

AHI EVRAN

*International Conference
on Scientific Research*

Kırşehir Ahi Evran University



*"Know how to forgive
when you are strong and superior
be gentle when you are angry and
be generous enough to give to others
even when you are in need"*

Ahi Evran

FULL TEXTS BOOK

VOLUME-2

EDITORS:

Prof. Dr. Ahmet KAZANKAYA/ Assist. Prof. Dr. Mevlude Alev ATES/Dr. Kahraman IPEKDAL

ISBN: 978-625-7464-55-0



**AHI EVRAN
INTERNATIONAL CONFERENCE ON
SCIENTIFIC RESEARCH**

November 30 - December 1-2, 2021
Kırsehir Ahi Evran University

**FULL TEXTS BOOK
VOLUME-2**

Editor:

Prof. Dr. Ahmet KAZANKAYA
Assist. Prof. Dr. Mevlude ALEV ATES
Dr. Kahraman IPEKDAL

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Issued: 15.12.2021

WWW.AHIEVRANCONFERENCE.ORG
ISBN: 978-625-7464-55-0

CONFERENCE ID

TITLE OF CONFERENCE

AHI EVRAN
International Conference on Scientific Research

DATE - PLACE

November 30 - December 1-2, 2021
Kırşehir Ahi Evran University

ORGANIZATION

Kırşehir Ahi Evran University
&
Institute of Economic Development and Social Researches



EDITED BY

Prof. Dr. Ahmet KAZANKAYA
Assist. Prof. Dr. Mevlude ALEV ATES
Dr. Kahraman IPEKDAL

COORDINATOR

Alina AMANZHLOVA

EVALUATION PROCESS

All applications have undergone a double-blind peer review process

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Turkey, Azerbaijan, India, Nigeria, Algeria, Pakistan, Morocco, South Africa, Ethiopia, Malaysia, Saudi Arabia, Iran, Iraq, Serbia, Bosnia & Herzegovina, Singapore, Bangladesh, China, France, Indonesia, North Macedonia, United Kingdom, Portugal, Palestine, Bulgaria, Lebanon, Hungary, Belgium, Russia, Oman, Brasil, Canada, Kosovo, USA, Romania, Vietnam, Ukraine, Northern Cyprus, Poland, Mèxico

TOTAL NUMBER OF PAPERS: 517
THE NUMBER OF PAPERS FROM TURKEY: 257
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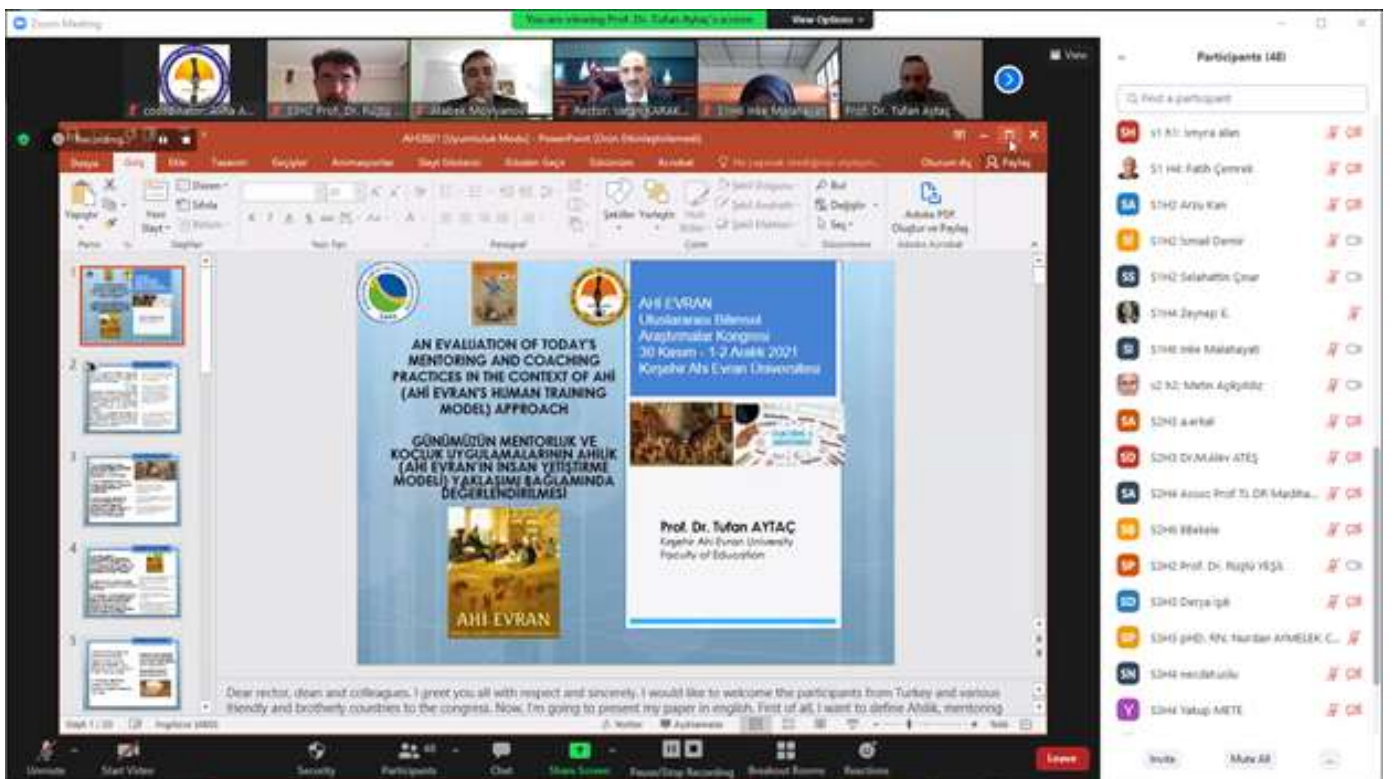
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PHOTO GALLERY







Вы просматриваете экран Session 2 / Май-3 Абдул-Калим...

Осталось: 05:59:58

"EXPERIENCE OF METACOGNITION, INTEGRITY, AND SELF-EFFICACY LEARNING AMONG VOCATIONAL POSTSECONDARY STUDENTS".

*AHI EVRAN International Conference on Scientific Research
30 November – 1-2 December 2021
Kirsehir Ahi Evran University.*

1 назначенный участник

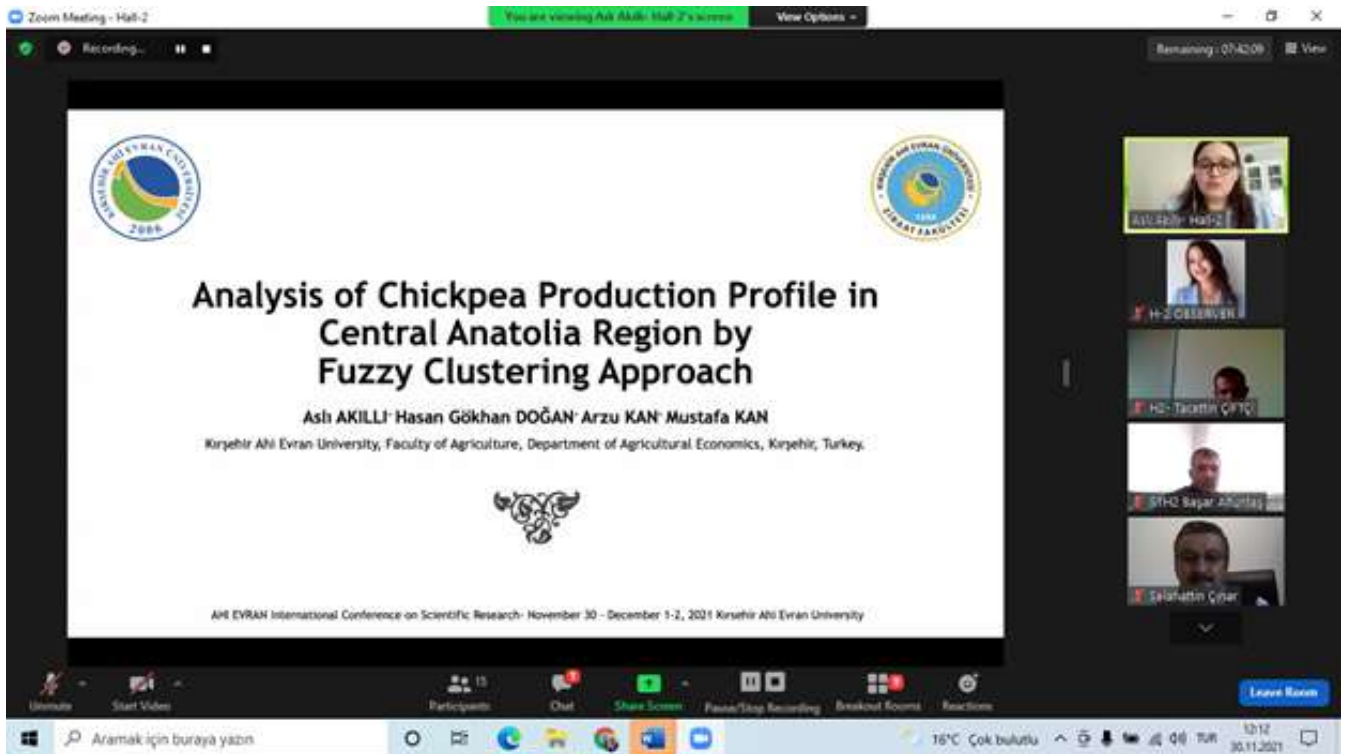
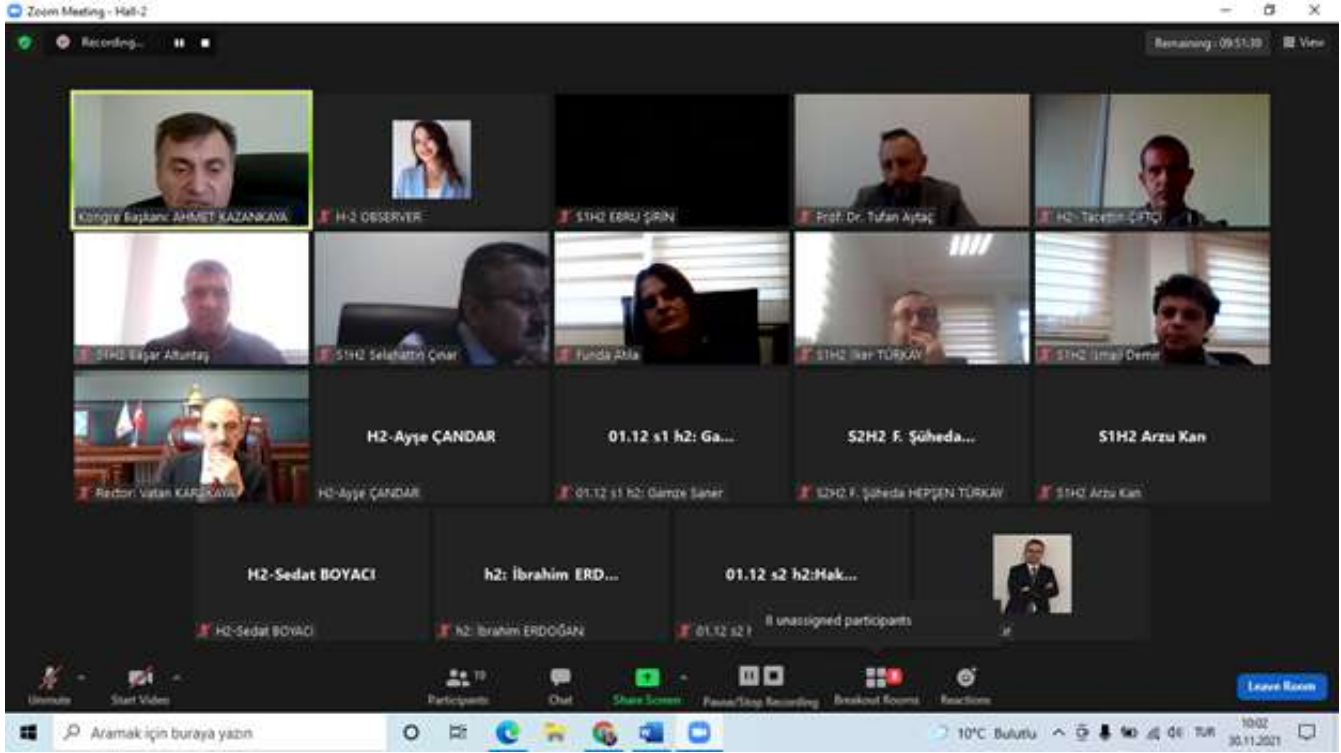
Включить звук Включить видео Участники 15 Чат Демонстрация экрана Пауза/остановить запись Реакции Дополнительно Выйти из зала

coordinator: Alina Amanzholova разговаривает...

Вид

Prof. Dr. Tufan Aytac	Kongre Başkanı: AHMET KAZAN...	S1H2 Ismail Demir	h4: Dr. Ali MUTI
S1H1 Nail DEMIRER	S3H2 Prof. Dr. Rüştü YEŞİL	S1H5 Inke Malahayati	CIO Assoc Prof Ts DR Madinah...
S1H3 Bögür Solmaz	S1H2 EBRU ŞİRİN	Kamazyna OBALONSKA	S1H4 Saadet TULUM
Hall-S: Ejri Mukarromah	Subash Jayasinghe	Atabek Movlyanov	H3- Fatih Seyis

Включить звук Включить видео Безопасность Участники 64 Чат 2 Демонстрация экрана Запись Реакции Дополнительно Выйти






H-6 Observer H-6 Observer neeraja.sasipri... C vasanthi H-6- Oshubel... Recording

INTRODUCTION

- A **roof garden** is any **garden** on the **roof** of a **building**.
- Besides the decorative benefit, roof plantings may provide food, temperature control, hydrological benefits.
- Also provides architectural enhancement, habitats or corridors for wildlife, recreational opportunities, and in large scale it may even have ecological benefits.



The screenshot shows a Zoom meeting interface. The main window displays a presentation slide with the following text:

AN EVRAN
International Conference in Scientific Research
November 30- December 1-2, 2021
Ezadir Adnan University

STUDY OF THE FREQUENCY OF COMPOSITE BEAMS WITH VARIABLE FIBER VOLUME

Prof. Dr. BERBAHAN NARZA SAGHO

Below the slide, it says "Cliquez pour ajouter des commentaires".

On the right side, there is a list of participants:

- H7 - Observer (Co-host, me)
- H8 - DR BERBAHAN N.Z. / H.S.
- H9 - Halil T. Vagner Sane
- DM - ELMAGUENI-Second 2nd
- HA - DR Anna Carat
- HQ - Halil S. Gurbaneli Yalçın
- DR - DR MB LAMINA BIKI

Below the list, there are video thumbnails for H-6 Observer, H-9 Observer, and DR MB LAMINA BIKI. At the bottom, it says "2 unassigned participants".

The screenshot shows a Zoom meeting interface. The main window displays a video feed of a woman wearing a grey hijab and a yellow top. The background shows a painting and a plant.

At the top, there are video thumbnails for H7 - Observer, DR MELZI NAIMA, and HALLT. Kratti Fouad. The name "Amni Yamina" is also visible.

Below the video feed, there is a toolbar with icons for Mute, Start Video, Participants, Chat, Share Screen, Pause/Stop Recording, Breakout Rooms, and Reactions. A "Leave Room" button is at the bottom right.

On the right side, there is a list of participants:

- H7 - Observer (Co-host, me)
- AN - Atafeh Najdi
- AY - Amni Yamina
- DM - DR MELZI NAIMA
- DS - Dr. Shafiq Mubarak
- H7 - Halil T. Vagner Aparecido de Mo...
- HK - HALLT. Kratti Fouad

At the bottom right, there is a "Mute All" button.

Zoom Meeting: Встреча по видеосвязи с группой ST / HALL-5, Мох... | Остаток: 09:46:20

Exponential stability of the solution

5. Exponential decay result-Proof

We differentiate (9), and recall (7) et (10), (11), (12), we obtain

$$\begin{aligned}
 \mathcal{L}'(t) \leq & -(N\beta - c) \int_0^1 v_x^2 dx - \left[\frac{c}{2}\right] \int_0^1 y_x^2 dx \\
 & - \left[\frac{c}{2}\right] \int_0^1 y^2 dx - \left[\frac{c}{2}\right] \int_0^1 v_x^2 dx - \left[\frac{N\beta}{2}\right] \int_0^1 v^2 dx \\
 & - (N\beta - c) \int_0^1 v_x^2 dx - \int_0^1 2b v_x y dx \\
 & - (N_1 \gamma) \int_0^1 \int_0^1 x y^2(x, t) dx dt \\
 & - (N_1 \gamma) - c \int_0^1 x^2(x, t) dx \\
 & - (N_1 \gamma - N_1 - c) \int_0^1 y^2 dx.
 \end{aligned} \tag{13}$$

Participants: ST / HALL-5, Mohamed HOJADNI; Obayida, Fatma; s3 h5: Noor Alam; s3 h5: Noor Alam; MS Moderator: Dalal mafar; MS: KARNATI VEERAREDDY; MS: Sheroz Kazam; bourshech zahra; Hayder Hashim; B.Yahyapour; Hali-5, iman Taha; B.Yahyapour

Zoom Meeting Controls: Включить звук, Выключить видео, Участники, Чат, Демонстрация экрана, Подключить камеру, Скрининг видео, Реакции, Выйти из зала

Zoom Meeting: Встреча по видеосвязи с группой ST / HALL-5, Мох... | Остаток: 09:28:19

Definition

The t-product \ast_t between two tensors $\mathcal{A} \in \mathbb{R}^{n_1 \times n_2 \times n_3}$ and $\mathcal{B} \in \mathbb{R}^{n_1 \times n_2 \times n_3}$ is a tensor given by:

$$\mathcal{C} = \mathcal{A} \ast_t \mathcal{B} = \text{fold}(\text{bcirc}(\mathcal{A}), \text{unfold}(\mathcal{B})), \tag{14}$$

of size $n_1 \times n_2 \times n_3$, where

$$\text{bcirc}(\mathcal{A}) = \begin{bmatrix} A^{(1)} & A^{(n)} & A^{(n-1)} & \dots & A^{(2)} \\ A^{(2)} & A^{(1)} & A^{(n)} & \dots & A^{(3)} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ A^{(n)} & A^{(n-1)} & \dots & A^{(2)} & A^{(1)} \end{bmatrix}, \quad \text{unfold}(\mathcal{B}) = \begin{bmatrix} B^{(1)} \\ B^{(2)} \\ \vdots \\ B^{(n)} \end{bmatrix}$$

and

$$\text{fold}(\text{unfold}(\mathcal{A})) = \mathcal{A}.$$

Participants: H-T, Arif Khan; KSAD Institute of Economic Development; H-T, Keyvan Asafpour Vakilian; H-T, Somayeh Khosravi; Mahresh Fata

Zoom Meeting Controls: Включить звук, Выключить видео, Участники, Чат, Демонстрация экрана, Подключить камеру, Скрининг видео, Реакции, Выйти из зала




Recording... You are viewing Zoom Meeting ID: 9111 11 1111 View Options... Remaining: 00:15:00

AHI EVSAN INTERNATIONAL CONFERENCE ON SCIENTIFIC RESEARCH

Teknolojik/Endüstriyel Dönüşümlerin Tarihsel Gelişim Süreci

Endüstri çağı "en çok değişen ve en çok değiştiren çağ" olarak adlandırılmaktadır.



The industrial age is called "the most changing and most changing age".

Hall-1, Observer

H1_Ayşe N. Yücel

H1_Observer

H1_Ahmet Y.

H1_Meltem S.

H1_Zafer Cankaya

H1-Deniz Çoş

H1-1 Merve Hatipoğlu

H1_11111111

H1 Doç. Dr. Yük...

H1_Deniz S.

Go to Settings to activate Windows

Leave Room

Unmute Start Video

Participants Chat Share Screen Pause/Stop Recording Breakout Rooms Reactions

Zoom Meeting - Hall 2

Recording... Remaining: 00:05:00

H2-EBRU ŞİRİN

H2-OBSERVER-JAN

H2-Tutku Arslan

H2 moderator Ahmet Şahin

H2Uzma Nedda

H2 Semih AÇIKBAŞ

Bidem SAĞLAM/ Kirazlı

H2-Semih AYKUT

H2-SELMA BOYACI

Samba Sarıer

ceylin saner

H2 - Adnan Doğan

h2: Prof. Dr. Meh...

Ertuğrul KUL

Hayrettin Çayro...

ceylin saner

H2-Prof. Dr. Mehmet SARİ

Ertuğrul KUL

Hayrettin Çayroğlu

H2_Koray KIRIKÇI

H2-Gülnaz ÖZ...

H2_Koray KIRIKÇI

H2-Gülnaz ÖZÖĞÜL

Unmute Start Video

Participants Chat Share Screen Pause/Stop Recording Breakout Rooms Reactions

Leave Room

Type here to search

6°C Cloudy 11:49 01/12/2021

Zoom Meeting - Hall-2

You are viewing Hall2 Moderator Mustafa KAN's screen

View Options

H2-OBSERVERJAN H2-F. TUHEDA H2-F. Housna Neddar Hall2 Moderator-Mustafa H2- Yigar ESTURU H2- Alm arDN

Recording

General: Beroz Sato - PowerPoint

Remaining: 09:53:55

File Home Insert Layout References Send Diagnostics Update Stage Help

Share Screen

Zoom Meeting

Doç. Dr. Mustafa KAN
Tarım Ekonomisi Bölümü
mustafa.kan@ahievran.edu.tr

Participants Chat Share Screen Pause/Stop Recording Breakout Rooms Reactions

Leave Room

Type here to search

5°C Cloudy 7:08 09/12/2021

Zoom Meeting - Hall-4

You are viewing Hall-4, Siddhant's screen

View Options

H4-OBSERVERJANI Hall-4, Siddhant Hall-4, Siddhant Hall-4, Siddhant Hall-4, Siddhant

The shared content is fit to your screen. To see the original size, click "Original size" in the menu.

Remaining: 09:53:19

AVAILABILITY OF EDIBLE MUSHROOMS IN AYODHYADHAM, INDIA

Dr. Siddhant
Former Assistant Professor,
Department of Botany,
Durgesh Nandan Degree

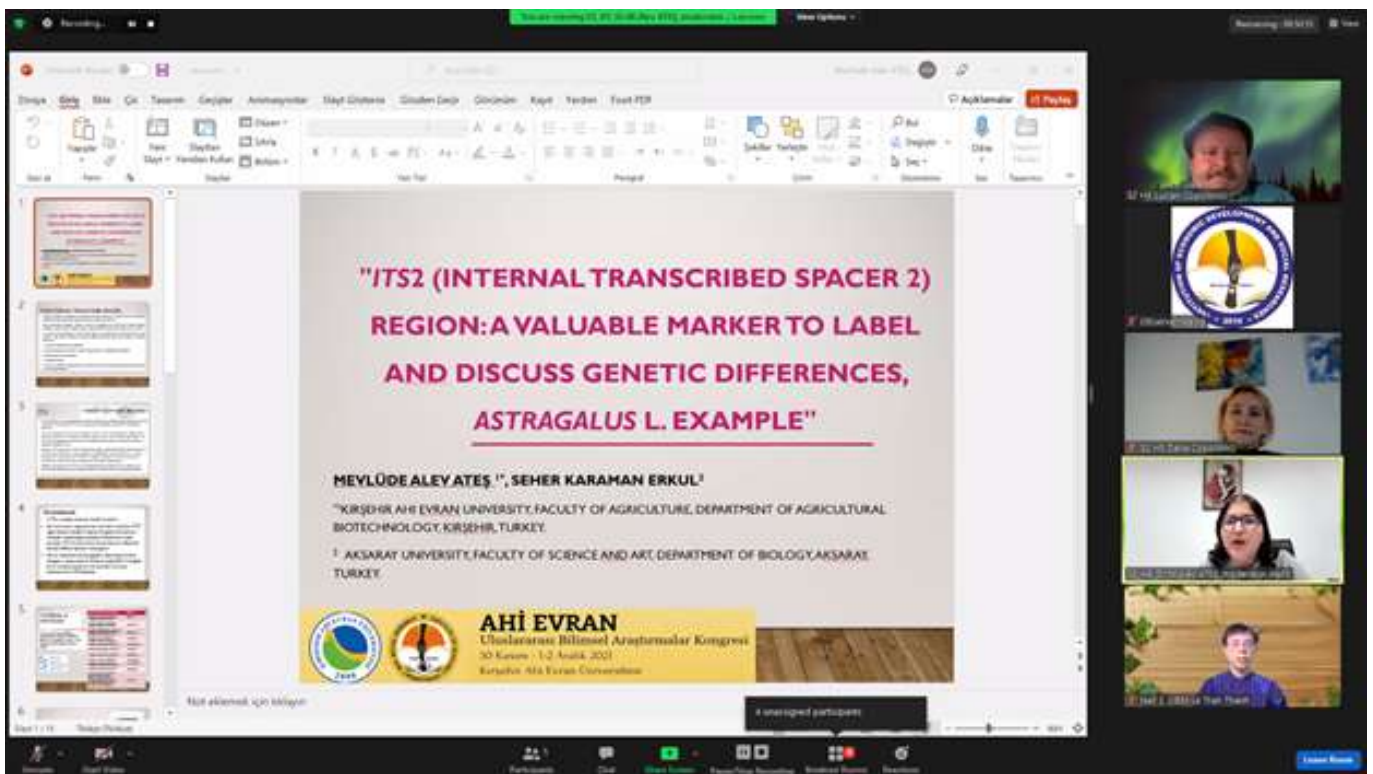
4 unassigned participants

Participants Chat Share Screen Record Breakout Rooms Reactions

Leave Room

Type here to search

5°C Mostly cloudy 7:08 09/12/2021



Zoom Meeting - Hall 1

Recording

Participants (17)

MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...

MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...
MS UMAR MUHAMMAD...

A NUMERICAL SOLUTION FOR A COMPETITIVE LOTKA-VOLTERRA SYSTEM WITH TWO DISCRETE DELAYS

ELONGOKEM, COMMUNIST CPT
DEPARTMENT OF MATHEMATICS, MOGLA SHIKH HOSSAIN UNIVERSITY
FELLEMINARY MATHEMATICS EDUCATION PROGRAM, MOGLA SHIKH HOSSAIN UNIVERSITY

Zoom Meeting - Hall 1

Zoom Meeting - Hall 1

Original Sound Off

Recording

Participants

Chat

Share Screen

Pause/Stop Recording

Breakout Rooms

Searches

Remaining: 09:25:21

h7 - Observer
h7 - Observer
h7 Felicia Di Doman...
h7 Galih Putri Milan Ne...
MODERATOR S2...
MODERATOR S2-NT...
h7 Ojuzhan Bayrak...
h7 Ojuzhan Bayrak

ISLAMIC SENIOR HIGH SCHOOL OF NURIL HUDA TARUB - TAWANGHARJO

DEVELOP CREATIVITY AND LEADERSHIP OF YOUNG PEOPLE FROM THE PANDEMIC

Dr. Ahmad Fauzi, M.S.I.
Mukhamad Luthfi Ali, M.Pd.
Galih Putri Milan Nasya

Zoom Meeting - Hall 1

Zoom Meeting - H6-7

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30 November -1-2023 / Kirsehir Ahi Evran University

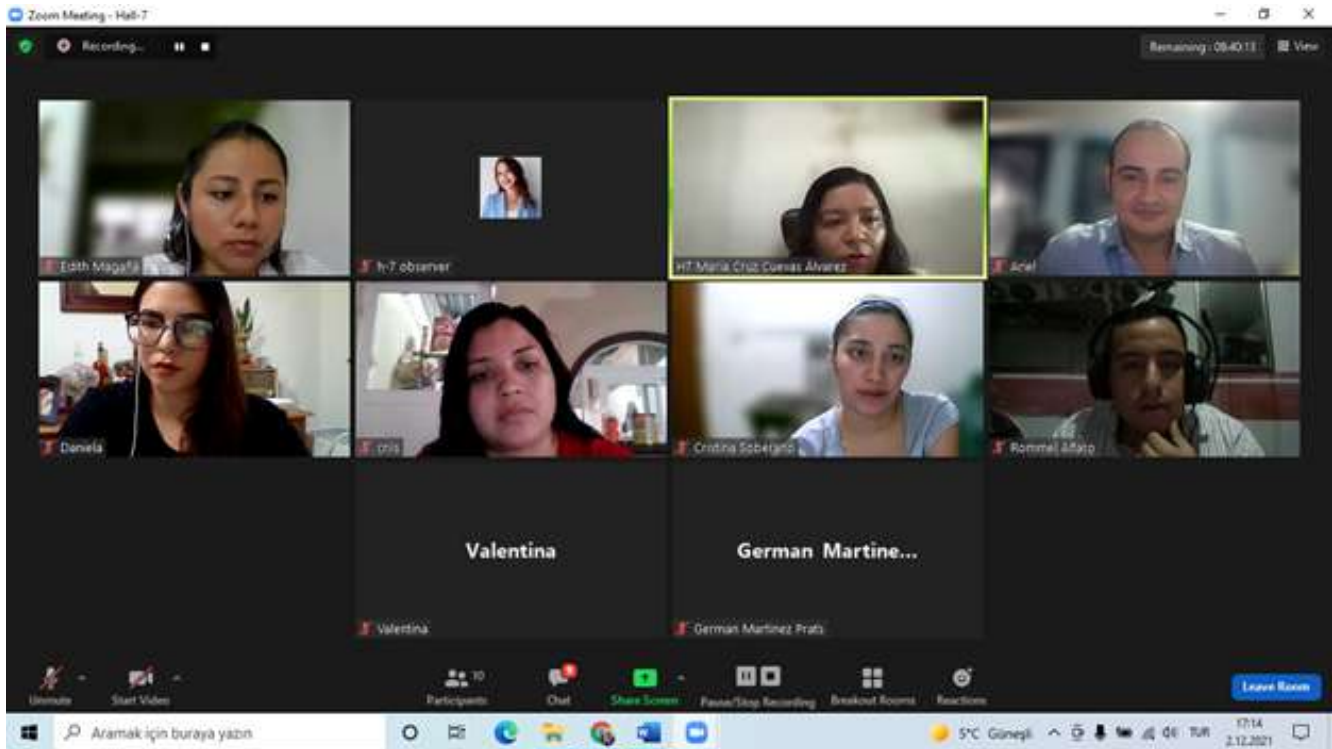
Sundrprasad, PhD
 Professor of Chemistry
JSS Commerce & Science (Autonomous)
 of University of Mysore
 (Institute with Potential of Excellence)
 Mysuru, India
 www.jsscacs.edu.in

HD: SUNDRPRASAD

Unmute, Start Video, Participants, Chat, Share Screen, Pause/Stop Recording, Breakout Rooms, Reactions, Leave Room

Find a participant

- H4 Observer (Co-Sect. H4)
- Dr. Oyediran Yeku Oyekan
- ICMC Moderator: Prof. Aderinola M...
- ENGR. ADEGBOLA
- Feyasi Rafat Bolani Hall 4
- H5 Berhanu
- H6 Atolagbe motu shola
- H6 Bebbjan
- Dr. Oyediran Yeku Oyekan
- ENGR. ADEGBOLA
- Feyasi Rafat Bolani Hall 4
- H5 Berhanu
- H6 Atolagbe mu...
- s2h6 Akhila
- H6 Bebbjan
- 2 unassigned participants



Zoom Meeting - Hall-7

You are viewing Cristina Substrac's screen

View Options

Recording...

Remaining: 09:27:57

Ventajas del comercio electrónico

- Image 1:** Social media icons (Google, YouTube, Facebook, Twitter, LinkedIn, RSS). Text: "Dar a conocer tu marca y tener mayor oportunidad de ventas." (Make your brand known and have a greater opportunity for sales.)
- Image 2:** A hand holding a smartphone with a shopping cart icon. Text: "Contar con un horario comercial las 24 horas del día, los 7 días de la semana sin limitaciones geográficas." (Have a commercial schedule 24 hours a day, 7 days a week without geographical limitations.)
- Image 3:** A person standing next to a large upward-pointing arrow. Text: "Personalizar la comunicación con tus clientes y diseñar estrategias de ventas específicas para atender sus necesidades." (Personalize communication with your customers and design specific sales strategies to meet their needs.)
- Image 4:** A woman sitting at a desk with a computer. Text: "Dar atención a diversos tipos de clientes al mismo tiempo." (Give attention to different types of customers at the same time.)
- Image 5:** A hand holding a smartphone with a payment icon. Text: "Ofrecer a tus clientes diferentes formas de pago." (Offer your customers different payment methods.)
- Image 6:** A colorful graphic with 'OFERTAS' (Offers) and percentages like '40%' and '10%'. Text: "Implementar diferentes estrategias de marketing orientadas al tipo de cliente a través de descuentos, cupones, promociones especiales." (Implement different marketing strategies oriented to the type of customer through discounts, coupons, special promotions.)

Zoom Meeting controls: Mute, Start Video, Participants, Chat, Share Screen, Pause/Stop Recording, Breakout Rooms, Reactions, Leave Room

Windows taskbar: Aramak için buraya yazın, 6°C Güneşli, 19:26 2.12.2021

Participants: Edith Magaña, h-Tobiasara, HT Maria Cruz Costa, Valentina, Cristina Substrac

Zoom Meeting - Hall-4

You are viewing Hall-4, Macy Spears's screen

View Options

Recording...

Remaining: 09:33:12

Acoustic Emission Testing

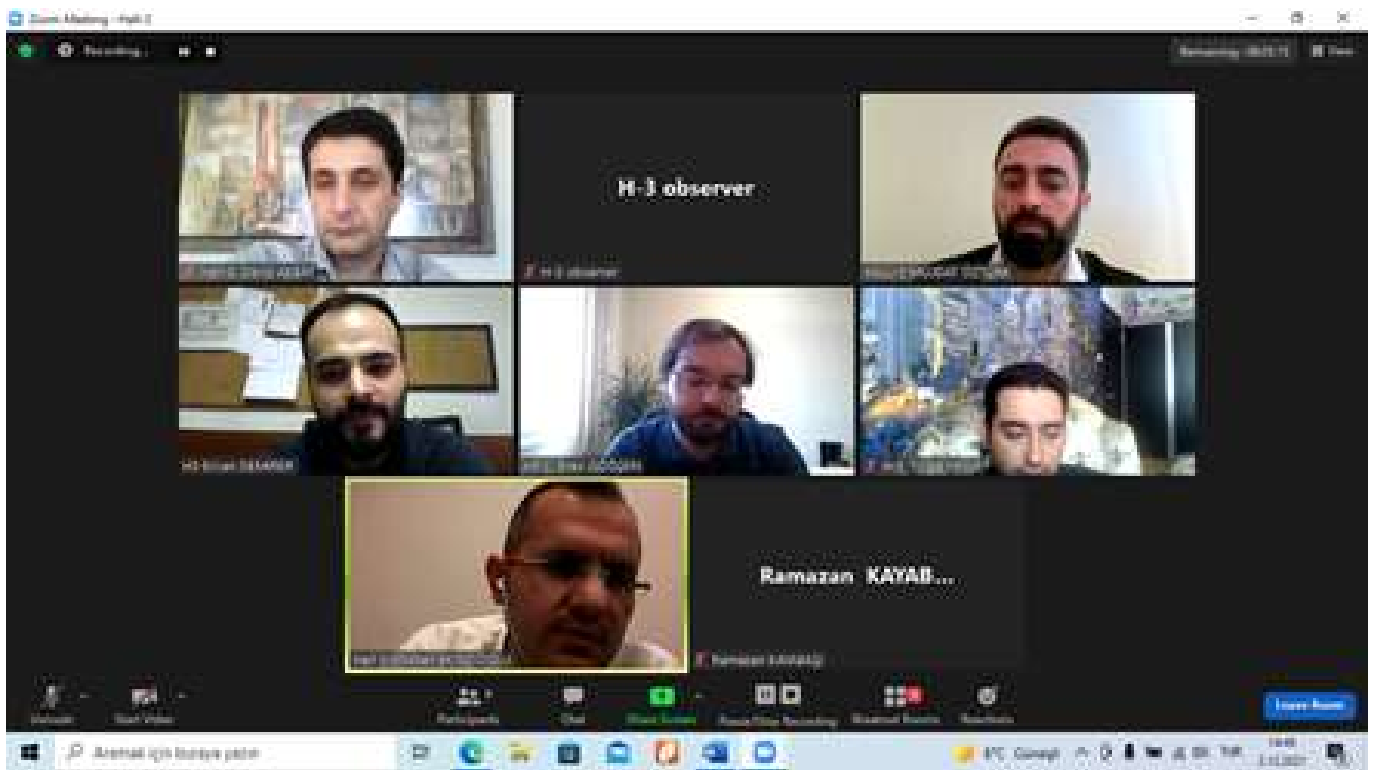
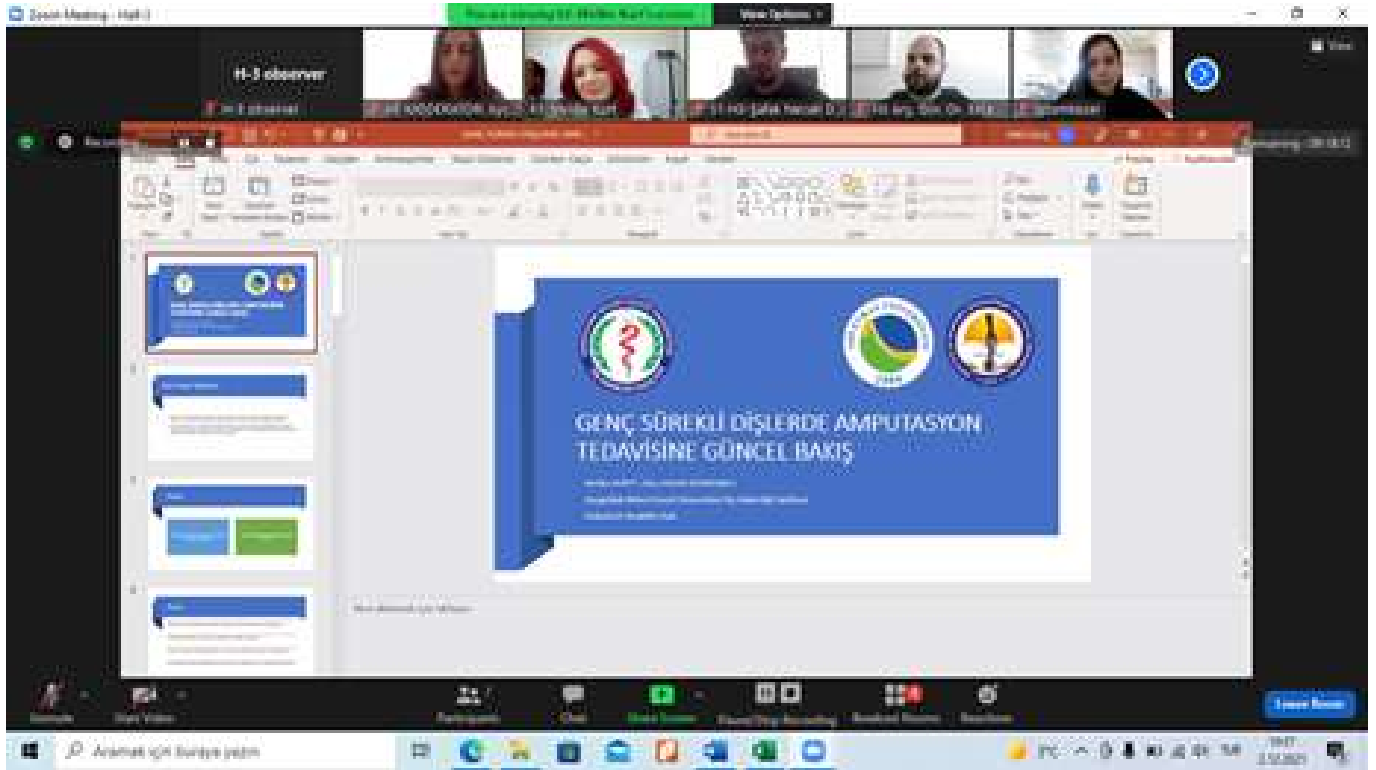
- ❖ Utilizes sensors to detect changes in the tested material, which is loaded past its elastic limit to produce acoustic emission
- ❖ Assesses material components under realistic environment to identify weaknesses (cracking, corrosion, and fiber breakages)
- ❖ Parameters obtained with processed signals
 - Amplitude
 - Total counts
 - Count rate
 - Number of events

Figure 1: Acoustic Emission Testing Principles

Zoom Meeting controls: Mute, Start Video, Participants, Chat, Share Screen, Pause/Stop Recording, Breakout Rooms, Reactions, Leave Room

Windows taskbar: 14°C Güneşli, 16:01 2.12.2021

Participants: Observer Aygul..., Hall-4, Macy Spears, Hall-4 moderator, Mohd..., Hall-4 Ehsanul Kabir, h4: Nadia TEBBAL



The image shows a Zoom meeting interface. The main window displays a presentation slide with a blue and white floral pattern. The slide text is as follows:

RESİM SANATINDA LİF, İPLİK VE KUMAŞ ETKİLERİNİN DOKUSAL AKTARIMI
TEXTURE TRANSFER OF FIBER, YARN AND FABRIC EFFECTS IN PAINTING
ÖĞR. GÖR. DR. GÜLSEN ŞEFİKA BERBER
MANİSA CELAL BAYAR ÜNİVERSİTESİ
SALİHLİ MESLEK YÜKSEKOKULU

Below the slide, it says "Not alınmak için tıklayın" and "Slayt 1 / 27".

On the right side, there is a vertical list of participants:

- H2- Muge TARHAN
- Observer Hall-2
- H2- Baran TARHAN Uyak U
- Marcello Teles H2
- H2- Yelma Mahmuti (H2)
- H2 moderator Deniz Kocak
- Gülşen Şefika Berber

The image shows a Zoom meeting interface. The main window displays a large video of a man with a grey beard and a maroon shirt, sitting in front of a bookshelf. The meeting title is "Konya (2025)".

On the right side, there is a vertical list of participants:

- Hall-1, Observer
- Hall-1, Observer
- H1- Hafsan Kuzunglu
- H1- Hakan İnanç
- H1, Dr. Mehmet İOÇ
- Hall-1 Bayram Özgür

At the bottom right, there is a watermark: "Activate Windows. Get Windows 10 in minutes. activate Windows."

Recording... Remaining: 28:54

2. CALCULATIONAL DETAILS

- All basis free total energy calculations were carried out using a pseudopotential plane wave (PP-PW) scheme within density functional theory (DFT) as implemented in the Quantum ESPRESSO package [4].
- The electronic exchange-correlation potential was calculated within the generalized gradient approximation (GGA) in the scheme of Perdew-Burke-Ernzerhof (PBE) [5].
- In all these total energy calculations, ultra-soft pseudopotential [6] was used to treat the potential seen by the valence electrons because of the machine and the basis-set choices.
- The wave functions were expanded in a plane-wave basis set with a kinetic energy cut-off of 50 Ry. The electronic charge density was evaluated up to the kinetic energy cut-off of 500 Ry.
- Milliwave-pair integrations were performed using 12-12-12 grids. Integrations up to the Fermi surface was performed using the smearing technique [7] with smearing parameter 0.02 Ry.

Hall-1, Observer

H1-Elina Naphtan Kivinen

H1-Albert MOCIA

H1-Daniel Oros

H1-Duygu OK

Hall-1 Mustafa...
H1-1 Mustafa Dukturan

H1-Halil Demirekale

H1-Emre VURAL

H1-Emre VURAL

Activate Windows
Go to Settings to activate Windows.

Recording... Remaining: 09:25

Introduction

- According to World Health Organization (WHO), Disease outbreaks is the number of cases of any disease that increases suddenly and in the most geographic location [1-2].
- Disease Outbreaks caused by infection, spread through person to person, animal to person, person to animal or any other medium[2]. Predicting disease outbreaks is a total issue as it is challenging to know when a disease becomes an outbreak.
- Detecting and Predicting disease outbreaks computationally for the disease such as Malaria[3-5], SARS [7], Cholera [8], Dengue [10], Avian Influenza [12] and many more have been studied over the past but lacks in timely detecting and predicting outbreaks.
- Besides Covid-19, the world is facing disease outbreaks in countries and regions such as Ebola virus in Democratic Republic of the Congo, Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia and United Arab Emirates and Zika Virus in India [3].
- This research work focuses on the latest data analysis and techniques that are currently used to detect and predict disease outbreaks.

Hall-1, Observer

H1-Muhammad Emre Erkin Karagül

H1-Gökay Şenol

H1-DAVRAM Abduhamidov

Session 3, Hall 1, Zahid Razi

Amel Vahidi

H1-Ömer Şeyhi Güler

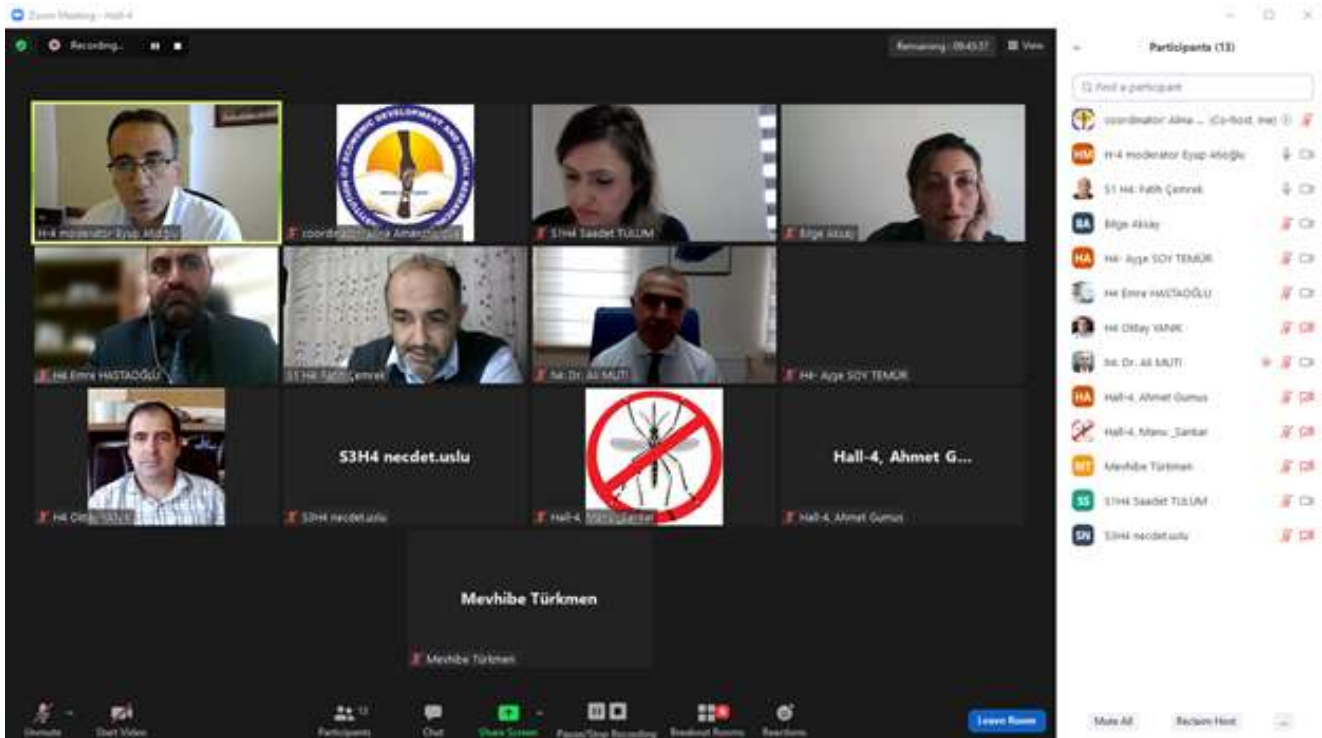
H1-Ömer Şeyhi Güler

imaculada vumi

Seydi Karlı

imaculada vumi

Activate Windows
Go to Settings to activate Windows.

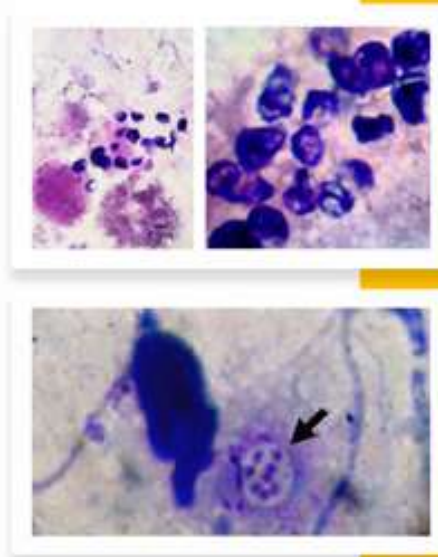


Zoom Meeting

Recording

P. jirovecii

- Since *P. jirovecii* cannot be cultured in respiratory system samples, staining methods, immunofluorescence techniques and PCR are used in the diagnosis of the agent.
- Among the staining methods, Gram-Weigert, Wright-Giemsa, Giemsa and the methenamine silver stain of Gomori is most used for diagnosis.



Participants (14)

Find a participant

- KSAD Institute of E... (Unhost met)
- Ali Muhammad KARAKAYLIK
- HA-Duygu Kaba
- HA-Fatma ERGUN
- HA-Rabia Şeker
- HA-Yakup ULDU
- Halil-i moderatör: Ahmet D...
- Halil-i. Kamal Al-AARIF
- Halil-i. Mulu Seher: DeFi Univer...
- İsmail
- Dr.H. Zekiye İrem Güneşel
- Seslen 3- Halil-i Dr. Ali Seydi AL...
- Seslen 1/Halil-i Jutha Benzer O...
- Dr.H. Zekiye İrem Güneşel

Mute All Reclaim Host

Recording

INTRODUCTION

Emotions play a **key role** in the success of a competition for the strong impact on human performance.

"An intense affective reaction with acute onset and short duration determined by an environmental stimulus, whose appearance causes a modification at somatic, vegetative and psychic levels."

Negative emotions are seen as antagonistic to concentration, particularly anxiety as it can negatively affect performance.

```

    graph TD
      Performance --- Cognitive_anxiety[Cognitive anxiety]
      Performance --- Somatic_anxiety[Somatic anxiety]
      Performance --- Self-confidence[Self-confidence]
  
```

Zoom Meeting

Participants

- Halil-i. Seray K...
- Halil-i. Seray K...

Zoom Meeting

Recording... Remaining: 06:25:25 View

Participants (11)

Find a participant

- h4-4 observer (Co-host, me)
- h4 Faruk KILIÇ
- H4 moderator: hatice aylin karahan...
- h4: Levent Urtekin
- h4-Ahmet İyğör
- H4-Çağrı KILINÇ
- H4-Fatih DEMIRKALE
- H4-4, Sinem BOZATLI
- H4-4, Manu Sankar, Delhi Univer...
- S1H4 Zeynep E. Közel
- S1-H4-Mukaddes Şevval Çetin

h4: Levent Urtekin

h4-Ahmet İyğör

Recording... Remaining: 06:20:21

Participants (12)

Find a participant

- observer h4-4 (Co-host, me)
- h4-Ahmet Hayrettin Tuncay
- h4-Deniz ÖZLER
- h4 Özge Kalk
- h4 Burak Pekroy
- h4 Leyla KILICILAR KILICI
- h4-4 Mustafa Kaya
- h4-Semir Önel
- h4- Genm gidişim ash nar Doğan
- h4 Zihanelizel
- h4-4 Özlem Deniz B. BÜYÜKÖZ
- h4-4, Manu Sankar, Delhi Univer...

ÇALIŞMANIN AMACI / THE AIM OF THE STUDY

Çalışmanın amacı Covid-19 pandemi döneminde tıbbi dokümantasyonun karar ve tedavi süreçlerine ne şekilde fayda sağladığını tespit edilmesidir.

The aim of the study is to determine how medical documentation benefit the decision and treatment processes during the Covid-19 pandemic period.

Zoom Meeting - Hall 4

You are viewing Miki Krstevska's screen

Recording...

Participants (12)

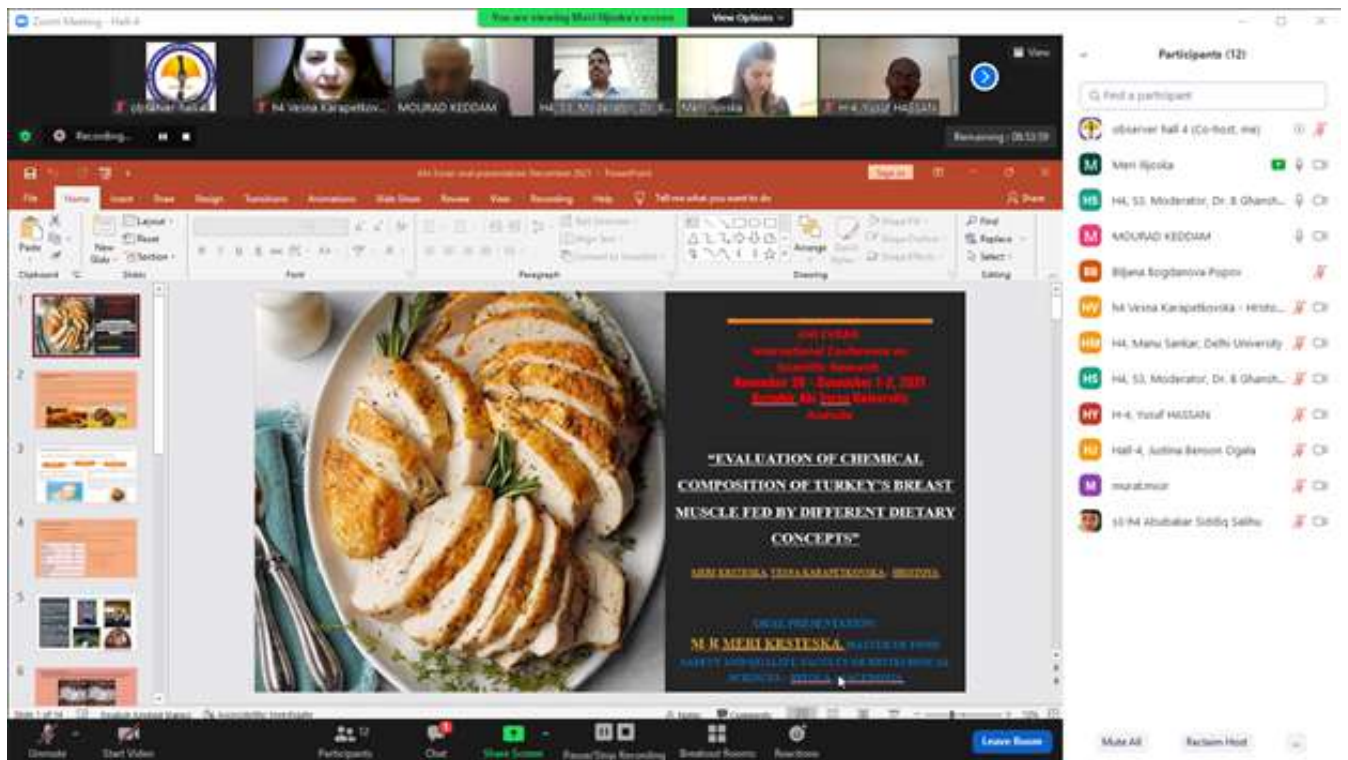
- observer hall 4 (Co-host, me)
- Miri Ripola
- H-4, SS, Moderator, Dr. B. Ghosh...
- MOURAD KEDDAM
- Biljana Bogdanova Popov
- Ni Verka Karapetrovska - Hrist...
- H-4, Manu Senkar, Delhi University
- H-4, SS, Moderator, Dr. B. Ghosh...
- H-4, Yusuf HASSANI
- Hall 4, Justice Benson Ogala
- muradmur
- Dr. M. Abubakar Siddiqy Salihu

6th IFCM International Conference on Scientific Research November 29 - December 1, 2023 Istanbul, Attila Turan University, Istanbul

"EVALUATION OF CHEMICAL COMPOSITION OF TURKEY'S BREAST MUSCLE FED BY DIFFERENT DIETARY CONCEPTS"

ABSTRACT BY DR. MARIJANA MURILJKOVIC

LOCAL PRESENTATION: **M. R. MIKI KRSTEVKA**



Zoom Meeting - Hall 5

You are viewing Tanay Ahmad Sadiq's screen

Recording...

Participants (8)

- IKSAD Institute of E... (Co-host, me)
- Hall 5, Farzan Ahmad SADD...
- Abubakar Siddiqy Salihu
- Comoderator, Hall 5, Iqbal Hameed...
- HALL 5 - Rodolfo
- Hall 5, Kapka Marcheva
- Hall 5, Same Azlan
- Moderator- Session 1 Hall 5...
- Tajana Dandov

Chemical reaction scheme showing the synthesis of a complex organic molecule.

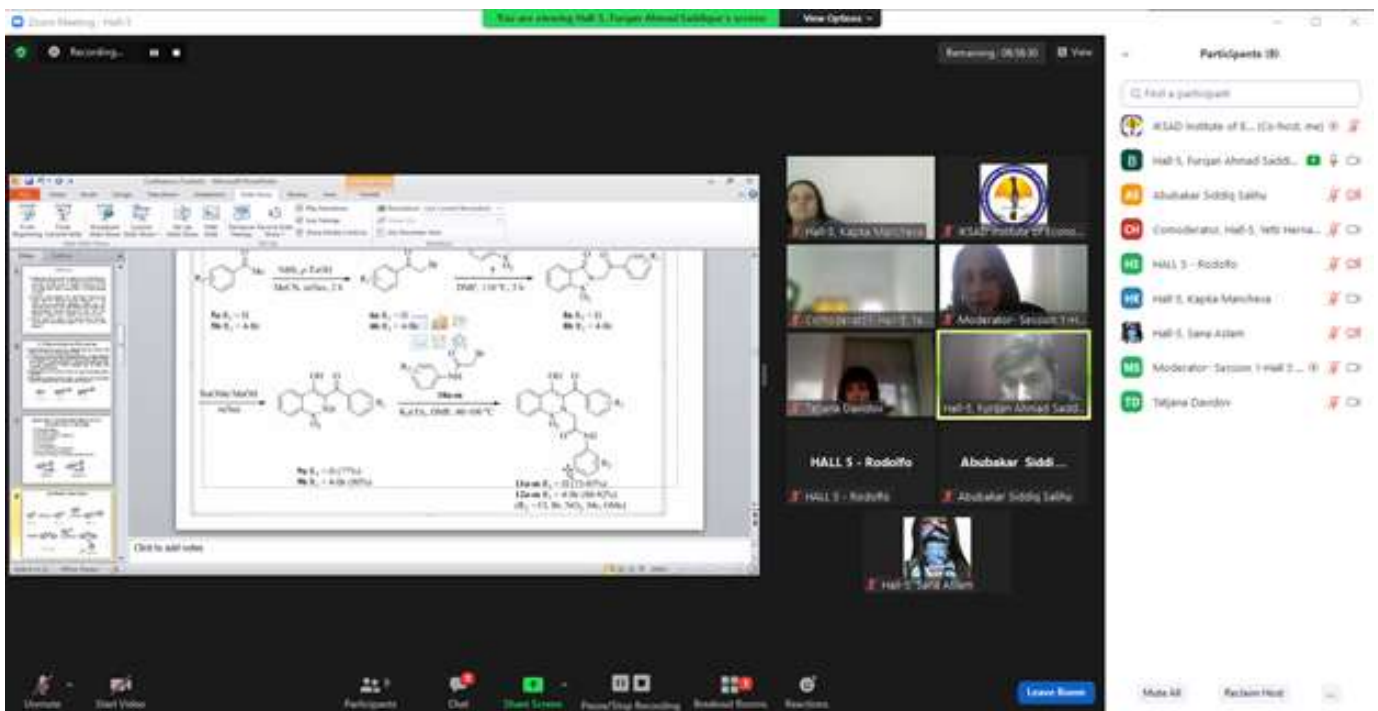
Reaction 1: C1=CC=C(C=C1)N(C)C + CC(=O)N → C1=CC=C(C=C1)N(C)C(=O)N (Yield: 73%)

Reaction 2: C1=CC=C(C=C1)N(C)C(=O)N + C1=CC=C(C=C1)N → C1=CC=C(C=C1)N(C)C(=O)N(C)C (Yield: 75%)

Reaction 3: C1=CC=C(C=C1)N(C)C(=O)N(C)C + C1=CC=C(C=C1)N → C1=CC=C(C=C1)N(C)C(=O)N(C)C(=O)N (Yield: 80%)

Reaction 4: C1=CC=C(C=C1)N(C)C(=O)N(C)C(=O)N + C1=CC=C(C=C1)N → C1=CC=C(C=C1)N(C)C(=O)N(C)C(=O)N(C)C (Yield: 80%)

Reaction 5: C1=CC=C(C=C1)N(C)C(=O)N(C)C(=O)N(C)C + C1=CC=C(C=C1)N → C1=CC=C(C=C1)N(C)C(=O)N(C)C(=O)N(C)C(=O)N (Yield: 80%)



Zoom Meeting Recording... Remaining: 05:04

LOCATION of the research:

EMU- faculty of pharmacy

NORTHERN CYPRUS

Participants (18)

Find a participant

- KSAD Institute of E... (Co-host, me)
- HS Seyid Arslan Housh... [Mute] [Close]
- Alexandra Vlasovici [Mute] [Close]
- K: Abubakar Siddiqy Saifu [Mute] [Close]
- HS Ogden Erik CAN [Mute] [Close]
- HS Huseyin Ozan Nenci [Mute] [Close]
- HS Salim Oguz Altun [Mute] [Close]
- HS Vildan Burcak Moderator [Mute] [Close]
- HS-5 Jerald Genral [Mute] [Close]
- HS-5 Diana Shepat [Mute] [Close]
- HS-5 Fergan Ahmad Saddique [Mute] [Close]
- HS-5 Igor Pucar [Mute] [Close]
- HS Ogden Erik CAN [Mute] [Close]
- Melya Tantha- HS 5 [Mute] [Close]
- HS-5 Nener Alan [Mute] [Close]
- HS-5 Ozana Spina [Mute] [Close]
- HS-5 Kisha Mervin Rasapin [Mute] [Close]

Mute All Reclaim Host

Zoom Meeting HS 5 You are viewing Vihai H. Jadhav's screen View Options... Remaining: 08:13:21

A schematic sketch of charging bore well and check dam

A schematic sketch of charging bore well and check dam

Participants (6)

- KSAD Institute of E... (Co-host, me)
- Vihai H. Jadhav [Mute] [Close]
- HS A U ARUN [Mute] [Close]
- HS zozozu thama [Mute] [Close]
- HS-5 Dang Hoang Xuan Hy [Mute] [Close]
- HS-5 Rafal Abdumajid [Mute] [Close]

Mute All Reclaim Host

Unmute Start Video Participants Chat Share Screen Pause/Stop Recording Breakout Rooms Reactions Leave Room



AHI EVRAN
International Conference on Scientific Research
30 November – 1-2 December, 2021
Kırşehir Ahi Evran University

CONFERENCE PROGRAM

Online (with Video Conference) Presentation



Meeting ID: 884 8432 4978
Passcode: 000777



AHI EVRAN International Conference on Scientific Research
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Meeting ID: 884 8432 4978

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- ✓ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
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- ✓ Her oturumdaki sunucular, sunum saatinden 15 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- ✓ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ✓ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

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- ✓ Katılım belgeleri kongre sonunda tarafınıza pdf olarak gönderilecektir
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Before you login to Zoom please indicate your name_surname and HALL number,
exp. Hall-1, Awais Khan



Meeting ID: **884 8432 4978**

Passcode: **000777**



-OPENING SPEECH-

30.11.2021

Ankara Local Time: 09:00 – 09:30

Prof. Dr. Ahmet KAZANKAYA

Kırşehir Ahi Evran University

Honorary Chairman

Prof. Dr. Vatan KARAKAYA

Kırşehir Ahi Evran University Rector

-PLENARY SPEECH-

30.11.2021

Ankara Local Time: 09:30 – 10:00

Prof. Dr. Rüştü YEŞİL
Mustafa ASLANDEREN

Sakarya University

“THE REVIEW OF THE APPLICATIONS OF RESPONSIBILITY EDUCATION IN AHI-ORDER”

Prof. Dr. Tufan AYTAÇ

Kırşehir Ahi Evran University

“AN EVALUATION OF TODAY'S MENTORING AND COACHING PRACTICES IN THE CONTEXT OF AHI (AHI EVRAN'S HUMAN TRAINING MODEL) APPROACH”



Session 1 / Hall-1

30.11.2021

Literature/ Moderator: Prof. Dr. Orhan Küçük

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
CULTURAL FOUNDATIONS OF THE FUNDAMENTAL PRINCIPLES OF AKHISM: A VIEW OF THE QUR'AN	Prof. Dr. Orhan Küçük	Sakarya Uygulamalı Bilimler Üniversitesi
REVIVING FOLKLORE LITERATURE THROUGH PUPPETRY, STORYTELLING AND POETRY DURING HOME-BASED LEARNING ACTIVITIES	Sydney Engelbert Ganggang	Keningau Vocational College, Keningau, Malaysia.
LEXICO-PRAGMATIC TRANSFER IN SELECTED NIGERIAN PLAYS: A SOCIOLINGUISTIC PERSPECTIVE	Dr. SALAMI Amadou	University of Abomey-Calavi (UAC), Benin
THE IMPORTANCE OF CULTURAL HERITAGE AWARENESS IN KIRŞEHİR, THE LAND OF AHI ORDER	Sinan Özcan	Kütahya Dumlupınar University
GENEROSITY IN HACI BEKTASH VELİ'S MAKALAT AND IN THE AHILIK ORGANIZATION	Assist. Prof. Dr. Sümeyra ALAN	Erzurum Technical University
THE ANALYSIS OF JOHN FOWLES' "THE ENIGMA" AS AN ANTI-DETECTIVE NOVEL	Niğmet ÇETİNER	Kastamonu University
AYOT AND BIG BROTHER IN THE CONTEXT OF POWER AND THE SUBJECT IN MICHEL FOUCAULT	Muhammed Nail DEMİRER	Kırşehir Ahi Evran University
ZAIN AL-DIN IBN AL-WARDİ'S "MAQAMAT" (D. 749 A.H.) IN AL-FATUWWA : AN ANALYTICAL STUDY	Prof. Dr. Mashour Habazi	Al- Kuds University, Kudüs - Filistin
	Prof. Dr. Seyfullah Korkmaz	Kırşehir Ahi Evran Üniversitesi
THE IDEALIZED LOVER IN A POEM BY MUHİBBİ	İbrahim Tahir KARAKAYALI	Kırşehir Ahi Evran Üniversitesi
ZAHİD KHALİLİN OBRAZES IN CHILDREN'S POEMS	Ayətəxan Ziyad (İsgəndərov)	Azərbaycan Dövlət Pedaqoji Universiteti. Elmi işçi

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Session 1 / Hall-2

30.11.2021

Agriculture/ Moderator: Assoc. Prof. Dr. Funda ATİLA

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
THE PAST, PRESENT AND FUTURE OF KIRŞEHİR REGIONAL AGRICULTURE	Ahmet KAZANKAYA	Kırşehir Ahi Evran University
	Funda ATİLA	Kırşehir Ahi Evran University
MYCOREMEDIATION POTENTIAL OF BASIDIOMYCETES MUSHROOMS	Funda ATİLA	Kırşehir Ahi Evran University
	Ahmet KAZANKAYA	Kırşehir Ahi Evran University
AN AHP DECISION MODEL FOR FACILITY LOCATION SELECTION OF CATTLE BREEDING ENTERPRISES: THE CASE OF KIRŞEHİR PROVINCE	Başar ALTUNTAŞ	Kırşehir Ahi Evran University
DEVELOPMENT OF AGRICULTURAL COOPERATIVES AND EVALUATION OF AGRICULTURAL COOPERATIVE POTENTIAL OF KIRŞEHİR PROVINCE WITH SWOT ANALYSIS	Başar ALTUNTAŞ	Kırşehir Ahi Evran University
DETERMINATION OF BIOFILM FORMING CAPACITIES OF SOME PLANT GROWTH PROMOTING BACTERIA	Tacettin ÇİFTÇİ	Kırşehir Ahi Evran University
	İbrahim ERDOĞAN	Kırşehir Ahi Evran University
COMPARISON OF GROWTH AND YIELD PARAMETERS OF DIFFERENT SUNFLOWER (HELİANTHUS ANNUUS L.) CULTIVARS IN DRY FARMING CONDITIONS	Assoc. Prof. Dr. İsmail DEMİR	Kırşehir Ahi Evran University
AN OVERVIEW OF THE METHODS AND TECHNOLOGIES USED TO OBTAIN EXTRACTS FROM MEDICINAL AND AROMATIC PLANTS	Dr. İlker TÜRKAY	Kırşehir Ahi Evran University
A RESEARCH ON THE VEGETATION STRUCTURE OF SOME RANGELAND IN KYRGYZSTAN CUY REGION	Selahattin Çınar	Kırşehir Ahi Evran University
EVALUATION OF RANGELAND IMPROVEMENT AND MANAGEMENT PROJECTS CARRIED OUT WITHIN THE SCOPE OF RANGELAND LAW IN TURKEY	Selahattin ÇINAR	Kırşehir Ahi Evran University
ANALYSIS OF CHICKPEA PRODUCTION PROFILE IN CENTRAL ANATOLIA REGION BY FUZZY CLUSTERING APPROACH	Aslı AKILLI	Kırşehir Ahi Evran University
	Hasan Gökhan DOĞAN	Kırşehir Ahi Evran University
	Arzu KAN	Kırşehir Ahi Evran University
	Mustafa KAN	Kırşehir Ahi Evran University
CHARACTERISTICS OF RISK GROUPS IN CHICKPEA PRODUCERS: CASE STUDY FOR CENTRAL ANATOLIA REGION	Hasan Gökhan DOĞAN	Kırşehir Ahi Evran University
	Aslı AKILLI	Kırşehir Ahi Evran University
	Arzu KAN	Kırşehir Ahi Evran University
	Mustafa KAN	Kırşehir Ahi Evran University

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Session 1 / Hall-3

30.11.2021

Microbiology, Nutrition/ Moderator: P.K.S.C.Jayasinghe & Emine Yurteri

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
DEVELOPMENT OF EDIBLE OIL QUALITY IN LEAFY CABBAGE	Emine Yurteri	Recep Tayyip Erdogan University
	Aysel Özcan	Recep Tayyip Erdogan University
	Fatih Seyis	Recep Tayyip Erdogan University
EFFECT OF ORGANIC FERTILIZERS ON TEA (<i>Camellia sinensis</i> L. Kuntze) YIELD	Emine Yurteri	Recep Tayyip Erdogan University
	Aysel Özcan	Recep Tayyip Erdogan University
	Fatih Seyis	Recep Tayyip Erdogan University
EFFECTS OF FLAXSEED, TURMERIC AND POPPY SEED ON SOME QUALITY CHARACTERISTICS OF CRACKERS	Büşra SOLMAZ	Karamanoğlu Mehmetbey University
	Hacer LEVENT	Karamanoğlu Mehmetbey University
EFFECTS OF BUCKWHEAT, QUINOA AND TRANSGLUTAMINASE ENZYME ON COUSCOUS QUALITY	Büşra SOLMAZ	Karamanoğlu Mehmetbey University
	Hacer LEVENT	Karamanoğlu Mehmetbey University
DEVELOPMENT OF MOBILE-BASED FOOD TRACING SYSTEM FOR SRI LANKA	P.K.S.C.Jayasinghe	Faculty of Technology, University of Ruhuna, Kamburupitiya, Sri Lanka
REVIEW ON FOOD WASTAGE IN SOCIETY	Amala.B	International School of Technology and Sciences for Womens, India
	Janaki.B	International School of Technology and Sciences for Womens, India
	Sowmya.P	International School of Technology and Sciences for Womens, India
	Lavanya.CH	International School of Technology and Sciences for Womens, India
	V Sravani	International School of Technology and Sciences for Womens, India
	K Ravi Kumar	International School of Technology and Sciences for Womens, India
DETERMINATION OF FATTY ACID CONTENT OF FISH OILS OBTAINED FROM FISHMEAL-OIL FACTORY OPERATING IN THE BLACK SEA REGION	Mustafa DURMUŞ	Çukurova University
SYNTHESIS METHODS OF THIAZOLIDIN-4-ONE DERIVATIVES	Sertan Aytaç	Kırşehir Ahi Evran University

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Session 1 / Hall-4

30.11.2021

Finance –Management/ Moderator: Dr. Eyup ATİOĞLU

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
THE ROLE OF THE FLAG CARRIER AIRLINE ON EXPORT: TODA-YAMAMOTO CAUSALITY ANALYSIS	Eyup ATİOĞLU	Cappadocia University
INVESTIGATION OF ACADEMIC'S ATTITUDES AND BEHAVIORS ABOUT THE RELIABILITY OF MOBILE AND INTERNET BANKING	Fatih Çemrek	Eskişehir Osmangazi University
COMPARISON OF FINANCIAL PERFORMANCES OF BIST COMMUNICATION ENTERPRISES WITH EDAS AND WASPAS METHOD ON THE BASIS OF CASH FLOW STATEMENT	Saadet TULUM	Kırklareli University
	Ayşe SOY TEMÜR	Düzce University
EXAMPLE OF SUSTAINABLE ENTREPRENEURSHIP: SOUTH ADANA WOMEN ENTREPRENEURS AGRICULTURAL DEVELOPMENT COOPERATIVE	Bilge AKSAY	Adana Alparslan Türkeş Bilim ve Teknoloji Fakültesi, İşletme Fakültesi, Yönetim Bilişim Sistemleri
	Hasan YILDIZHAN	Adana Alparslan Türkeş Bilim ve Teknoloji Fakültesi, Mühendislik Fakültesi, Enerji Sistemleri Mühendisliği
EVALUATION OF THE UNDERSTANDING OF FOLLOWERSHIP IN AKHISM WITHIN THE CONTEXT OF MODERN THEORIES	Oktay YANIK	Yüksek İhtisas University
IS TOXIC LEADERSHIP A HARMFUL LEADERSHIP STYLE?: A LITERATURE RESEARCH	Ph.D. Ahmet GÜMÜŞ	Ağrı İbrahim Çeçen University
RESEARCHING ONLINE FOOD ORDERS BY GEOGRAPHICAL REGIONS: THE YEMEKSEPETİ SAMPLE	Emre HASTAOĞLU	Sivas Cumhuriyet University
A STUDY ON REAL ESTATE VALUATION IN TURKEY THE IMPORTANCE OF REAL ESTATE APPRAISAL IN TURKEY	Ali MUTİ	Dr. Tapu ve Kadastro Genel Müdürlüğü, Yakutiye Tapu Müdürlüğü, Erzurum
THE RELATIONSHIP BETWEEN TECHNOLOGICAL INNOVATIONS AND GROWHT	Prof. Dr. Salih ÖZTÜRK	TNKÜ İktisat Bölümü
	Mustafa Latif EMEK	TNKÜ İktisat Anabilim Dalı
	Dilan GÜRÇEK	İKSAD
2008 GLOBAL FINANCIAL CRISIS, AND THE EFFECTS OF OBTAINING NECESSARY PRECAUTIONS TO TURKEY	Prof. Dr. Salih ÖZTÜRK	TNKÜ İktisat Bölümü
	Damla Souksu	TNKÜ İktisat Anabilim Dalı

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Session 1 / Hall-5

30.11.2021

Business/ Moderator: Dragan Đuranović & Slobodan Popović

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
THE DYNAMICS OF INTER-ORGANIZATIONAL COOPERATION IN ECONOMIC INTEREST GROUPINGS: THE CASE OF TARGANINE EIG IN MOROCCO	Affaghrou Wafa	Faculty of Economic and Social Sciences, Morocco
EXCEEDING THE TAX LIMIT: AN ASSESSMENT FROM THE PERSPECTIVE OF OVERLOAD PROBLEMS IN TAXATION	Ahmet ARSLAN	Gaziantep University
	Ayşe AYDIN	Gaziantep University
THE 3 MOST EFFECTIVE CARDS MAKE YOU STOP INSECURE: IMPROVE WORSHIP, INVEST & TAKE CARE OF YOUR HEALTH	Fitri Mukarromah	IAIN Pekalongan, Faculty of Islamic Economics and Business, Department of Islamic Economics
	Hendri Hermawan ADİNUGRAHA	IAIN Pekalongan, Faculty of Islamic Economics and Business, Department of Islamic Economics
ANALYSIS AND REPRESENTATION OF THE GLOBAL PERFORMANCE OF COOPERATIVES	Naoual Mamdouh	University Ibn Zohr, Faculty Of Economics, Legal And Social Sciences, Agadir, Morocco
	Said Ahrouch	University Ibn Zohr, Faculty Of Economics, Legal And Social Sciences, Agadir, Morocco
THE NEXUS BETWEEN ENTREPRENEURSHIP DEVELOPMENT AND SMES PERFORMANCE IN NIGERIA	Adesanya, Abel Olusegun.(PhD)	Lagos State Polytechnic, Ikorodu, Lagos. Nigeria
	Oginni Babalola Oluwayemi	Osun State University , Nigeria
THE IMPORTANCE OF COMPILING FINANCIAL STATEMENTS IN TRANSITION COUNTRIES SUCH AS THE REPUBLIC OF SERBIA	Dragan Đuranović	PIM University Banja Lulka, Bosnia and Herzegovina
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
BUSINESS DECISION-MAKING OF TOP MANAGEMENT IN TRANSITION COUNTRIES ON THE EXAMPLE OF THE REPUBLIC OF SERBIA	Dragan Đuranović	PIM University Banja Lulka, Bosnia and Herzegovina
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
MANAGEMENT DECISIONS OF TOP MANAGEMENT IN ENTERPRISES DEALING WITH FOOD DISTRIBUTION IN A PANDEMIC CONDITION LIKE KOVID	Dragan Đuranović	PIM University Banja Lulka, Bosnia and Herzegovina
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
BUSINESS AND INNOVATION: MUTUAL CONDITIONS	Mircea Udrescu	Artifex University from Bucharest, Bucharest, Romania
	Alina Gheorghe	Artifex University from Bucharest, Bucharest, Romania

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Session 1 / Hall-6

30.11.2021

Agriculture/ Moderator: Widya Pintaka Bayu Putra

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
REVIEW ON ROOF GARDENING	Neeraja Sri. D	International School of Technology and Science For Women, India
	Tulasi .E	International School of Technology and Science For Women, India
	Pujitha.G	International School of Technology and Science For Women, India
	Ujwala Jemisri.G	International School of Technology and Science For Women, India
	Sasi Priya. G	International School of Technology and Science For Women, India
REVIEW ON PADDY HARVESTER	Divya.S	International School of Technology and Science For Women, India
	NTVishalakshi.T	International School of Technology and Science For Women, India
	Shalini.T	International School of Technology and Science For Women, India
	Mounika.T	International School of Technology and Science For Women, India
	Kerenpaul.V	International School of Technology and Science For Women, India
	Pravallika.N	International School of Technology and Science For Women, India
FABRICATION OF AUTOMATED VEGETABLE CUTTING MACHINE	Pawani.P	International School of Technology and Science For Women, India
	Vidya Sri. P	International School of Technology and Science For Women, India
	Somaratnam.S	International School of Technology and Science For Women, India
	Sumalatha.P	International School of Technology and Science For Women, India
	Queenie.M	International School of Technology and Science For Women, India
FABRICATION OF SOLAR SEED DRYER	Vineetha.N	International School of Technology and Science For Women, India
	Hari Chandana.S	International School of Technology and Science For Women, India
	Charishma.P	International School of Technology and Science For Women, India



	Vandana.D	International School of Technology and Science For Women, India
	Ramu.P	International School of Technology and Science For Women, India
	Aruna.B	International School of Technology and Science For Women, India
	B.S.Lakshmi.A	International School of Technology and Science For Women, India
PRACTICE OF HYDROGEL TECHNIC IN AGRICULTURE	T. Vasanthi	International School of Technology and Science For Women, India
SIGNIFICANCE OF CAFETERIA FOOD LEFTOVER AS ALTERNATIVE CHEAP FEED RESOURCE IN POULTRY NUTRITION: A VIABLE STRATEGY TO REDUCE ITS POLLUTION IMPACT ON THE ENVIRONMENT	Oliyad Gelan	Agarfa Agricultural Technical and Vocational Educational Training College, Department of Animal Science, Bale-Robe, Ethiopia
	Aberra Melesse	Hawassa University, College of Agriculture, School of Animal and Range Sciences, Hawassa, Ethiopia
DISTRIBUTION AND ANTIBIOTICS SENSITIVITY PATTERN OF VIBRIO SPECIES FROM DOMESTIC WASTEWATERS	Olubukola Olusola-Makinde	Federal University of Technology Akure, School of Life Sciences, Department of Microbiology, Akure, Nigeria
DIVERSITY OF 16s-rRNA (mtDNA) SEQUENCE IN STRIPED TREE FROG (<i>Polypedates leucomystax</i>): A META-ANALYSIS STUDY	Widya Pintaka Bayu Putra	Research Center for Biotechnology, Research Organization of Life Science, National Research and Innovation Agency

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Session 1 / Hall-7

30.11.2021

Economics/Moderator: Dr.Shariq Mohammed & Assoc. Prof. Dr. Madihah Mohd Saudi

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
IMPACT OF PUBLIC DEBT ON ECONOMIC GROWTH OF LOW-INCOME STATES IN INDIA	Manoj Kumar Agarwal	Department of Economics, University of Lucknow, Lucknow, Uttar Pradesh, India
	Samia Ansari	Department of Economics, University of Lucknow, Lucknow, Uttar Pradesh, India
TARIFFS AND GROWTH PROSPECT IN AFRICAN COUNTRIES	Usman A. Usman	Department of Economics, Ibrahim Badamasi Babangida University Lapai
A STUDY OF ONLINE COURSES OF ACCOUNTING SUBJECTS DURING THE COVID PERIOD	Dr.Shariq Mohammed	Dhofar University, Assistant Professor, Department of Accounting, Salalah, Oman
	Dr.Nadia Sha	Dhofar University, Assistant Professor, Department of Finance and Economics, Salalah, Oman
ECONOMIC GROWTH FROM SELF-EMPLOYMENT IN RURAL AREAS	Prof. asoc. Dr. Jehona Shkodra	University of Prishtina “Hasan Prishtina”, Faculty of Agriculture and Veterinary, Department of Agro-economy, Kosovo
EVALUATION OF GEOTHERMAL RESOURCES IN KIRŞEHİR IN TERMS OF TOURISM	Çağatay KAYA	Kastamonu University
	Muharrem AVCI	Kastamonu University
	Gazi POLAT	Kırşehir Ahi Evran University
REGIONAL INEQUALITY IN INDONESIA, 2000-2017: Do FDI, Fiscal Decentralization, Monetary Policy, and Human Development Matter?	Kuncoro, Mudrajad	Faculty of Economics and Business, Gadjah Mada University, Yogyakarta, Indonesia
THE REALITY OF CHANGE MANAGEMENT AND ITS IMPACT ON THE PERFORMANCE OF WORKER'S IN THE MINISTRY OF LOCAL GOVERNMENTS IN BETHLEHEM	Israa Issa Ayyad	Al-Quds Open University, Applied Human Resources Management, Ramallah, Palestine
SEVEN PHASES OF FREEZING AND REOPENING, AND MECHANISMS OF PUBLIC AID TOWARDS THE AUDITORIUM CULTURE SECTOR DURING THE FIRST YEAR OF THE COVID-19 PANDEMIC IN THE REPUBLIC OF POLAND	Artur Bartoszewicz	Warsaw School of Economics, Poland
	Katarzyna Oblakowska	independent researcher, Warsaw, Poland

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Session 2 / Hall-1

30.11.2021

Education/ Moderator: Ebru Burcu ÇİMİLİ GÖK

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
THE DIFFICULTIES OF PRIMARY SCHOOL 4TH GRADE STUDENTS IN REPRESENTING FRACTIONS ON THE NUMBER LINE	Halil Önal	Burdur Mehmet Akif Ersoy University
TEACHERS' ATTITUDES TOWARDS THE INNOVATION CLIMATE IN THEIR SCHOOLS	Assist. Prof. Dr. Serdar ÖZÇETİN	Akdeniz University
	Ebru Burcu ÇİMİLİ GÖK	Öğretmen / Milli Eğitim Bakanlığı, Antalya, Türkiye
	Cemil Gökhan ÜNAL	Öğretmen / Milli Eğitim Bakanlığı, Antalya, Türkiye
THE LONELINESS OF SCHOOL ADMINISTRATORS: A PHENOMENOLOGICAL STUDY	Ebru Burcu ÇİMİLİ GÖK	Teacher, Phd. / Ministry of National Education, Antalya, Turkey
EXAMINATION AND EVALUATION OF 7TH GRADE STUDENTS' OPINIONS ON THE DIMENSION OF DIGITAL SECURITY, FROM THE SUB-DIMENSIONS OF THE DIGITAL CITIZENSHIP CONCEPT	Mustafa Sezer	Nevşehir Hacı Bektaş Veli University
	Assist. Prof. Dr. Recep Kürekli	Nevşehir Hacı Bektaş Veli University
INDIRECT VALUE TRANSFERS OF CULTURE AND HERITAGE LEARNING FIELD OUTCOMES IN SECONDARY SCHOOLS AT SOCIAL STUDIES CURRICULUM	Ömer TOKAT	Nevşehir Hacı Bektaş Veli University
	Recep KÜREKLİ	Nevşehir Hacı Bektaş Veli University
INVESTIGATION OF THE RELATIONSHIP BETWEEN ACADEMIC SELF-EFFICACY AND EMPATHIC TENDENCY OF UNIVERSITY STUDENTS	Ezgi AKINCI DEMİRBAŞ	Kırıkkale University
	Mehmet GÜNEY	Kırıkkale University
THE EFFECT OF DEVELOPED ACTIVITIES ON THE FIELD KNOWLEDGE OF PHYSICS TEACHERS ON PARTICLE PHYSICS	Seher PERVAN	Gazi University
	Pervin ÜNLÜ YAVAŞ	Gazi University
THE PROFILE RESEARCH OF UNIVERSITY CHILD'S STUDIES CENTERS IN TURKEY	Beyza TURAN	Kırşehir Ahi Evran University
	Gökçe DEMİR	Kırşehir Ahi Evran University
INVESTIGATION OF THE RELATIONSHIP BETWEEN COGNITIVE MATURITY AND THINKING SKILLS OF UNIVERSITY STUDENTS	Mehmet GÜNEY	Kırıkkale University
	Ezgi AKINCI DEMİRBAŞ	Kırıkkale University
OPINIONS OF TEACHER CANDIDATE ON THEIR AND THEIR INTERNSHIP PRACTICE TEACHERS' COMPETENCIES	Assist. Prof. Dr. Serdar ÖZÇETİN	Akdeniz University

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Session 2 / Hall-2

30.11.2021

Education/ Moderator: Prof. Elvan YALÇINKAYA & Assist. Prof. Dr. Tuğba KAFADAR

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
EXAMINING THE RELATIONSHIP BETWEEN SECONDARY SCHOOL STUDENTS' TURKISH ACADEMIC ACHIEVEMENT AND THE OTHER DISCIPLINES	Selvi DEMİR	Kilis 7 Aralık Universtiy
RESEARCH OF THE RELATIONSHIP BETWEEN SECONDARY SCHOOL 7TH GRADER'S PARENTS ANTICIPATIONS FROM MATHS EDUCATION AND STUDENTS MATH ANXIETY, MATHEMATICAL ATTITUDES, ACADEMIC RESILIENCE	Nezahat GÜLSER	Kırşehir Ahi Evran Universtiy
	Serdal BALTACI	Kırşehir Ahi Evran Universtiy
AKHISM (AHILIK) IN SOCIAL STUDIES AND HISTORY TEXTBOOKS	Prof. Elvan YALÇINKAYA	Erciyes University
	Assist. Prof. Dr. Tuğba KAFADAR	Erciyes University
STUDENTS ACHIEVEMENT IN SCIENCE AND MATHEMATICS AND THEIR CAREER PERSPECTIVES IN STEM FIELDS: HIGHER EDUCATION EXAM RESULTS FOR LAST TEN YEARS	Bilge KAYA	Kilis 7 Aralık University
	Metin AÇIKYILDIZ	Kilis 7 Aralık University
	Nihat ALTINÖZ	Kilis 7 Aralık University
KİMYANIN TƏDRİSİNDƏ İNTERAKTİV TƏLİM METODLARINDAN İSTİFADƏNİN ÜSTÜNLÜKLƏRİ	Arzu Paşayeva	Bakü State University
	Sevinc Hasanova	Bakü State University
IMPROVING OF THE USE OF MODERN TEACHING METHODS IN BIOLOGY LESSONS	Afag GASIMOVA	Ganja State University, Ganja/Azerbaijan
INVESTIGATION OF THE EFFECTIVENESS OF COURAGE-BASED VALUES EDUCATION PRACTICES FOR PRESCHOOL CHILDREN AGED 6 YEARS LIVING IN A SOCIOECONOMICALLY DISADVANTAGED REGION	Gökhan ŞENGÜN	Kırıkkale University
NEW DIGITAL TEACHING COMPETENCIES: OPINIONS OF PRE-SERVICE TEACHERS	Bilge Aslan Altan	Muğla Sıtkı Koçman University

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Session 2 / Hall-3

30.11.2021

Public Diplomacy/ Moderator: Assoc. Prof.Dr. Atila Erkal

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
FROM ERBAKAN AND ECEVIT TO KARAMOLLAOĞLU AND KILIÇDAROĞLU NATIONAL OUTLOOK AND CHP RELATIONSHIP	Özgür Bayraktar	Karamanoğlu Mehmetbey University
UNIVERSITY REFORM AND NATION BUILDING IN THE EARLY REPUBLICAN PERIOD	Özgür Bayraktar	Karamanoğlu Mehmetbey University
THE EXCLUSIVE ECONOMIC REGIONAL PROBLEM OF THE EASTERN MEDITERRANEAN AND TURKEY	Rahime Kayacan	Ahi Evran University
POLITICAL APPROACHES OF ERNESTO LACLAU AND CHANTAL MOUFFE: POST-MARXISM AND RADICAL DEMOCRACY	Ayman Kara	Kırıkkale University
MEDIATION IN ADMINISTRATIVE DISPUTES	Assoc. Prof.Dr. Atila Erkal	Sakarya University
A RESEARCH ON COMPULSORY CITIZENSHIP BEHAVIOR	Demet Çakıroğlu	Hacettepe University
OPENING PROCEDURE OF FULL JURISDICTIONS ARISING FROM ADMINISTRATIVE ACTIONS	Lect. İdris KAYDUL	Fatih Sultan Mehmet Vakıf University

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Session 2 / Hall-4

30.11.2021

Education/ Moderator: Dang Hoang Xuan Huy

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
CHALLENGES AND SOLUTIONS IN TEACHING LITERATURE TO PRE-SERVICE TEACHERS	Norhanim Abdul Samat	Universiti Teknologi Malaysia
	Ain Suraya Binti Harun	Universiti Teknologi Malaysia
ONLINE EDUCATION AND DIGITAL PLATFORMS IN PANDEMIC ROMANIA: FROM ENTERTAINMENT TOOLS TO LEARNING TOOLS	Georgiana Udrea	National University of Political Studies and Public Administration, Bucharest, Romania
	Gabriela Guiu	National University of Political Studies and Public Administration, Bucharest, Romania
EFFECTS OF VISUAL OCCLUSION TRAINING ON PERCEPTUAL-COGNITIVE SKILLS IN YOUNG FOOTBALL PLAYERS	Giovanni Esposito	University of Salerno, Salerno, Italy
CONGRUENCE OF THE UNIVERSITY BRAND AND THE BRAND OF THE UNIVERSITY TEACHER	Mikhailova Anna	Candidate of Economic Sciences, Head of the Department of Sociology and Personnel Management, North-Eastern Federal University, Yakutsk, Russia
FACING THE NEW NORM WITH SMART UNIVERSITY BLUEPRINT: A CASE STUDY	Assoc. Prof. Dr. Madihah Mohd Saudi	Universiti Sains Islam Malaysia (USIM)
EXAMINATION OF SECONDARY SCHOOL MATHEMATICS TEACHERS' PEDAGOGICAL CONTENT KNOWLEDGE ON THE SUBJECT OF EXPONENTIAL NUMBERS IN THE COMPONENT OF KNOWLEDGE OF TEACHING STRATEGIES	Eyüp BEZEYEN	Kırşehir Ahi Evran University
	Assist. Prof. Dr. Yasemin KIYMAZ	Kırşehir Ahi Evran University
EVALUATION OF KPSS TURKISH LANGUAGE AND LITERATURE TEACHER'S FIELD KNOWLEDGE QUESTIONS IN TERMS OF TURKISH LANGUAGE AND LITERATURE TEACHER'S UNDERGRADUATE PROGRAM AND SPECIAL FIELD COMPETENCIES	İsmail Erbek	Ali Gural High School, Kütahya, Turkey
	Ayşe Derya Eskimen	Kütahya Dumlupınar University

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Session 2 / Hall-5

30.11.2021

Education/ Moderator: Nadia Maftouni & Dang Hoang Xuan Huy

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
IMPACT OF CSR INITIATIVES AND DEMOGRAPHIC PROFILE OF THE BENEFICIARIES: A STUDY OF CSR INITIATIVES IN KORBA COALFIELDS OF CHHATTISGARH (INDIA)	Sukanta Chandra Swain	KIIT Deemed to be University, Bhubaneswar
	A S Babu	SECL, Korba
SOME STRATEGIES FOR UTILIZING SOCIAL MEDIA IN TEACHING & LEARNING ENGLISH FOR ACADEMIC PURPOSES IN NIGERIA	Joseph Onyema Ahaotu, PhD	University of Port Harcourt, Nigeria
	Nkechi FrancesAnn Asiegbu	University of Port Harcourt, Nigeria
THE DEGREE OF THE PRACTICE OF THE PRINCIPALS OF PUBLIC SCHOOLS IN JERUSALEM GOVERNORATE TO THE STANDERS OF PERSONAL QUALITY FROM THE PERSPECTIVE OF TEACHERS	Dr. Ibrahim Slaibi	Alquds university-educational collage-based educatinal department-alquds-palestine
THE AVAILABILITY OF LEADERSHIP SKILLS AMONG THE EDUCATIONAL SUPERVISORS IN HEBRON GOVERNMENT FROM THE POINT OF VIEW OF TEACHERS AND PRINCIPLES	Dr. Omer Slaibi	Alquds university-managment collage-alquds-palestine
PASSION OF A DISTANT FOOTBALL FAN: A QUALITATIVE ENQUIRY	Darrel TEO	Temasek Polytechnic, Business School, Singapore
EXPERIENCE OF METACOGNITION, INTEGRITY, AND SELF-EFFICACY LEARNING AMONG VOCATIONAL POST-SECONDARY STUDENTS	Abdul-Rahman Balogun Muhammed-Shittu	Khazar University, Baku, Azerbaijan
EXPLORING VIETNAMESE WOMEN RURAL MIGRANT' LIFE EXPERIENCE UNDER THE LENS OF GENDER	Ly Huynh	Can Tho University - College of Economics, Can Tho City - Vietnam
SUPPORTING ENTREPRENEURSHIP AND INNOVATION IN HIGHER EDUCATION INSTITUTIONS FROM THE REPUBLIC OF MOLDOVA	GARBUZ Veronica	Alecu Russo State University, Faculty of Real, Economic and Environmental Sciences, Department of Economic Sciences
	PETELCA Oleg	Alexandru Ioan Cuza University, Doctoral School of Economics and Business Administration, Iași România
	BEȘLIU Iurie	Alecu Russo State University, Faculty of Real, Economic and Environmental Sciences, Department of Economic Sciences
THE AVAILABILITY OF DIMENSIONS OF ADMINISTRATIVE EMPOWERMENT AMONG GOVERNMENT SCHOOL PRINCIPALS IN THE BETHLEHEM GOVERNORATE	Nariman Youssef	Educational College - Al-Quds University



AHI EVRAN International Conference on Scientific Research
30 November – 1-2 December 2021 / Kırşehir Ahi Evran University

CONFERENCE PROGRAM

PEDAGOGY VIS-À-VIS ARTWORKS

Nadia Maftouni

University of Tehran, Faculty of
Theology and Islamic Studies,
Department of Philosophy and Islamic
Kalam, Tehran, Iran

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Session 2 / Hall-6

30.11.2021

Engineering/ Moderator: Samir Zahaf & Dang Hoang Xuan Huy

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
STUDY OF THE FREQUENCY OF COMPOSITE BEAMS WITH VARIABLE FIBER VOLUME	BERRABAH HAMZA MADJID	Relizane University, Algeria
EFFECT OF PRE-DIFFUSER HEIGHT ON THE PERFORMANCE OF CENTRIFUGE PUMP	Aidin Salimi Sofla	University of Tabriz, East Azerbaijan, Iran
EFFECT OF MAGNETIC FIELD AND VIBRATION ON GROUNDWATER REMEDIATION USING STEAM INJECTION	A.A. Adegbola	Ladoke Akintola University of Technology, Ogbomosho, Oyo State.
	A.A. Dare	University of Ibadan, Ibadan.
CITY LIVABILITY AND ACTIVE TRANSPORTATION IN LAGOS METROPOLIS, NIGERIA	Ayobami Ademola AKANMU	Federal University of Technology, Akure, Nigeria
	Kolawole Taofeek GBADAMOSI	Federal University of Technology, Akure, Nigeria
	Felix Kayode OMOLE	Federal University of Technology, Akure, Nigeria
ON SOME PARTICULARITIES OF THE FLUID PROPERTIES ON THE WAVE AXISYMMETRIC WAVE DISPERSION IN THE HOLLOW CYLINDER WITH INHOMOGENEOUS INITIAL STRESSES CONTAINING THIS FLUID	Gurbanali J. VALIYEV	Baku State University, Department of Theoretical and Continuum Mechanics, Baku, Azerbaijan
NUMERICAL VALIDATION OF THE 3D MODEL OF THE L4-L5 LUMBAR SEGMENT FUNCTIONAL UNIT BY THE FINITE ELEMENT METHOD	Samir Zahaf	University of Djilali Bounaama-Khamis Meliana
	Amar Chemmami	National Polytechnic School of Oran - MA, BP 1523 ElMnaour, Oran, Algeria.
	Mouloud Dahmane	Faculty of Mechanical Engineering, USTO-MB, BP 1055 El Menaour, Oran 31000, Algeria
	Azzeddine Belaziz	University campus of châab ernessas, Constantine, 25017, Algeria.
THE DUCTILITY AND F AGILITY OF HDPE PIPES: EXPERIMENTAL STUDY	Azzeddine Belaziz	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Mohamed Bouamama	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Samir Zahaf	University of Djilali Bounaama-Khamis Meliana
EFFECT OF MACHINING PARAMETERS ON TOOL WEAR AND SURFACE ROUGHNESS IN DRY TURNING OF GRAY CAST IRON	Aissa Laouissi	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Imane Elmequenni	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Riad Brahami	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Abdelwahab Zerrouki	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Mohamed Mossaab BLAOUI	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Mourad Nouioua	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
A COMPUTATIONAL FRAMEWORK ON STRESS INTENSITY FACTOR IN FSW WELDING JOINT ZONES BASED ON XFEM METHOD	Imane Elmequenni	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Aissa Laouissi	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.



	Riad Brahami	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Mourad Nouioua	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.
	Mossaab blaoui	Mechanics Research Centre. Po, Box 73B, 25000 CONSTANTINE, ALGERIA.

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Session 2 / Hall-7

30.11.2021

Moderator: Yamina Ammi

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
COMPUTATIONAL TOOLS: MATHEMATICS' REPOSITORY IN THE ENGINEERING UNDERGRADUATE COURSES	Vagner Aparecido de Moura	São Paulo State's Virtual University (UNIVESP)
	Paulo Samir Silva Ferreira dos Santos	São Paulo State's Virtual University (UNIVESP)
	Cleber Costa Santana	São Paulo State's Virtual University (UNIVESP)
	Edson Cezário de Oliveira	São Paulo State's Virtual University (UNIVESP)
	Mateus Lima Bonfim	São Paulo State's Virtual University (UNIVESP)
LINEAR INTEGRATED CIRCUITS WITHIN THE FRAMEWORK OF THEORETICAL-PRACTICAL TRAINING DURING PANDEMIC OF COVID-19	Saeed Olyae	Shahid Rajae Teacher Training University (SRTTU), Iran
	Atefeh Najibi	Shahid Rajae Teacher Training University (SRTTU), Tehran, Iran
HUMAN ACTION RECOGNITION IN VIDEOS USING 3D CONVOLUTIONAL NEURAL NETWORKS AND OPTICAL FLOW MAPS	Abelmalek Khebli	Université de Boumerdès Algérie
	Hocine Meglouli	Université de Boumerdès Algérie
	Salah Aguib	Université de Boumerdès Algérie
	Wisse Dilmi	Université de Boumerdès Algérie
QSPR-NEURAL NETWORKS MODEL FOR THE PREDICTION OF THE REJECTION OF ANTI- INFLAMMATORY DRUGS BY MEMBRANES (poster)	Yamina Ammi	University of Médéa, 26000, Algeria
	Cherif Si-Moussa	University of Médéa, 26000, Algeria
	Hanini Salah	University of Médéa, 26000, Algeria
PREDICTION OF THE ORGANIC COMPOUNDS PASSAGE BY MEMBRANES USING NEURAL NETWORKS (poster)	Kratbi Fouad	University of Médéa, 26000, Algeria
	Yamina Ammi	University of Médéa, 26000, Algeria
	Hanini Salah	University of Médéa, 26000, Algeria
QSPR LINEAR MODEL FOR THE PREDICTION OF THE REJECTION OF ANTI-INFLAMMATORY DRUGS BY REVERSE OSMOSIS MEMBRANES (poster)	Yamina Ammi	University of Médéa, 26000, Algeria
	Cherif Si-Moussa	University of Médéa, 26000, Algeria
	Hanini Salah	University of Médéa, 26000, Algeria
NEURAL PREDICTION OF DIFFUSION COEFFICIENT FOR POLAR BINARY GAS	Naima Melzi	University of Médéa, 26000, Algeria
	Yamina ammi	University of Médéa, 26000, Algeria
	Salah Hanini	University of Médéa, 26000, Algeria
	Maamar Laidi	University of Médéa, 26000, Algeria

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Session 3 / Hall-1

30.11.2021

Health/ Moderator: Assist. Prof. Dr. Yasemin CEYHAN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
THE EFFICACY OF AEROBIC AND ANAEROBIC EXERCISE ON SARCOPENIA	Eda Ağaçcıoğlu	Lokman Hekim University
HEART RATE TURBULENCE AND HEART RATE VARIABILITY IN PATIENTS WITH FAMILY MEDITERRANEAN FEVER	Uzm. Dr. Nuran Günay	Health Sciences University
MASSIVE INTRACRANIAL HEMORRHAGE MIMICKING ST-ELEVATION MYOCARDIAL INFARCTION IN AN ELDERLY PATIENT	Çaşıt Olgun ÇELİK	Başkent University Konya, Turkey
AN EXAMINATION ON NURSES IN MENTAL HEALTH LITERACY	Asist. Prof. Dr. Hilal SEKİ ÖZ	Kırşehir Ahi Evran University
	Gamze ANNAK	Kırşehir Ahi Evran University
NURSE CARE FROM THE PERSPECTIVE OF THE CHILD AND FAMILY	Yasemin CEYHAN	Kırşehir Ahi Evran University
	Enes Saygın MERCİMEK	Kırşehir Ahi Evran University
CHILDHOOD OBESITY AND HEALTH PROBLEMS	Yasemin CEYHAN	Kırşehir Ahi Evran University
	Nagihan Merve SÖYLEMEZ	Kırşehir Ahi Evran University
HOW DID THE COVID-19 PANDEMIC AFFECT SOLID ORGAN TRANSPLANTATION ACTIVITIES?	Zeliha ÖZDEMİR KÖKEN	Hacettepe University
A PROMISING NEW APPROACH IN CANCER TREATMENT: PHOTODYNAMIC THERAPY	Nuriye Tuna Subaşı	Kırşehir Ahi Evran University
THE IMPORTANCE OF THE NURSING PROCESS IN DISEASES OF THE RESPIRATORY SYSTEM	Yasemin CEYHAN	Kırşehir Ahi Evran University
	Buse AYDIN	Kırşehir Ahi Evran University

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Session 3 / Hall-2

30.11.2021

Health/ Moderator: Ömer Alperen GÜRSES & Ferdi BAŞKURT

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
COMPARISON OF PHYSICAL FITNESS AND ATTENTION LEVELS OF ATHLETES AND SEDENTARY CHILDREN	Ece KUMLU	Kırşehir Ahi Evran University
	Mehmet CANLI	Kırşehir Ahi Evran University
	Mehmet Hanifi KAYA	Kırşehir Ahi Evran University
INVESTIGATION OF THE RELATIONSHIP BETWEEN MUSCULOSKELETAL SYSTEM PROBLEMS AND JOB PERFORMANCE IN FEMALE OFFICE WORKERS	Ömer Alperen GÜRSES	Kırşehir Ahi Evran University
	Ferdi BAŞKURT	Suleyman Demirel University
PREVELANCE OF APPLICATION OF CLEAN INTERMITTENT CATHETERIZATION OF PATIENTS WITH PARAPLEGIA IN PHYSICAL THERAPY SERVICE IN THE LAST 10 YEARS	Muteber Yağmuroğlu	Kırşehir Ahi Evran University
	Ayla Ünsal	Kırşehir Ahi Evran University
INVESTIGATION OF THE RELATIONSHIP BETWEEN SEVERITY OF SYMPTOMS, PAIN, QUALITY OF LIFE, AND PSYCHOLOGICAL STATUS IN PATIENTS WITH TEMPOROMANDIBULAR JOINT DISORDER	Nazım Tolgahan YILDIZ	Hacettepe University
	Hikmet KOCAMAN	Karamanoğlu Mehmetbey University
	Zafer ERDEN	Hacettepe University
HOW DOES OCCUPATIONAL THERAPY-BASED COGNITIVE REHABILITATION INTERVENTION AFFECT THE COGNITIVE SKILLS AND OCCUPATIONAL PERFORMANCE OF INDIVIDUALS WITH MULTIPLE SCLEROSIS?	Selen AYDÖNER	İstanbul Gelişim University
	Gonca BUMİN	Hacettepe University
RELATIONSHIPS BETWEEN SENSORY PROCESSING SKILLS AND OCCUPATIONAL PERFORMANCE OF PEOPLE WITH MULTIPLE SCLEROSIS	Selen AYDÖNER	İstanbul Gelişim University
	Gonca BUMİN	Hacettepe University
KINEMATIC EVALUATION OF THE RESULTS OF FEMORAL DEROTATION OSTEOTOMY APPLIED TO PATIENTS WITH CEREBRAL PALSY	Yücel BİLGİN	İstanbul University
	Mehmet EKİNCİ	İstanbul University
	Fuat BİLGİLİ	İstanbul University
	Ekin AKALN	İstanbul University
	Yener TEMELLİ	İstanbul University
INVESTIGATION OF MAGNESIUM OXIDE, ZINC OXIDE AND NİCEL OXIDE SYNTHESIS, CHARACTERIZATION AND POTENTIALS TO BE A CATALYST IN ADVANCED OXIDATION PROCESSES IN A DEEP EUTECTIC SOLVENTING MEDIUM	Selda Doğan Çalhan	Mersin University
PARKINSON AND ATRAUMATIC STERNUM FRACTURE: A CASE REPORT	Özlem ORHAN	MD. Harran University
	Funda CANSUN	MD. Sanliurfa Research and Training Hospital

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Session 3 / Hall-3

30.11.2021

Health/ Moderator: Assist. Prof. Dr. Arif KOL

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
NEWBORN HEARING SCREENINGS IN TURKEY	Berkant Oral	Yıldırım Beyazıt University
	Bushra Bilani	Yıldırım Beyazıt University
	Assist. Prof. Dr. Nimetcan Mehmet	Yıldırım Beyazıt University
	Assoc. Prof. Dr. Dilek Öztaş	Yıldırım Beyazıt University
MENOPAUSE AND RELATED CANCERS	Bushra Bilani	Yıldırım Beyazıt University
	Berkant Oral	Yıldırım Beyazıt University
	Assist. Prof. Dr. Nimetcan Mehmet	Yıldırım Beyazıt University
	Assoc. Prof. Dr. Dilek Öztaş	Yıldırım Beyazıt University
OPINIONS OF MOTHERS WORKING IN A HEALTH ORGANIZATION ON BREASTFEEDING RELATED TO PARTITION AND MILK LEFT	Ertuğrul DAĞLI	Ahi Evran University
	Ayla ÜNSAL	Ahi Evran University
THE EFFECT OF ANTICOAGULANT USE ON COMPLICATIONS IN PATIENTS PERFORMED TRANSRECTAL PROSTATE BIOPSY	Assist. Prof. Dr. Arif KOL	Aydın Adnan Menderes University
	Assoc. Prof. Dr. Erhan Ateş	Aydın Adnan Menderes University
POTENTIAL FETAL EFFECTS IN PRENATAL DRUG USE AND NURSING CARE	Emine ASLANDEREN	Kırşehir Ahi Evran University
	Nurdan AYMELEK ÇAKIL	Kırşehir Ahi Evran University
DETERMINATION OF ANXIETY LEVELS AND CAUSES OF ANXIETY OF PATIENTS WHO HAVE TO UNDERGO SURGERY DURING THE COVID-19 PANDEMIC PROCESS	Dr. Nurs. Kadriye ACAR	Izmir Katip Celebi University
	Prof. Dr. Kemal Erdinç KAMER	Health Sciences University
	Assoc. Prof. Dr. Gülay OYUR ÇELİK	Izmir Katip Celebi University
	Ress. Assist. Büşra DALFİDAN	Izmir Katip Celebi University
	Ress. Assist. Nagehan EVKAYA	Izmir Katip Celebi University
ARE LIFE SATISFACTION AND DEPRESSION LEVELS OF WORKING WOMEN AFFECTED DURING THE PANDEMIC?: A CROSS-SECTIONAL STUDY	Nurdan AYMELEK ÇAKIL	Kırşehir Ahi Evran University
	Erdem ÇAKIL	Kırşehir Ahi Evran University
EXAMINATION OF GRADUATE THESES ON NURSING EDUCATION IN TURKEY	Nazike Duruk	Osmangazi Üniversitesi, Hemşirelik Esasları Anabilim Dalı, Eskişehir
	Derya Işık	Eskişehir Şehir Hastanesi, Eskişehir
HISTOPATHOLOGICAL ANALYSIS OF GASTRIC BIOPSIES	Özlem Ceren Günizi	Alaaddin Keykubat University
HISTOPATHOLOGICAL ANALYSIS OF ADULT TONSILLECTOMY MATERIALS IN OUR CLINIC	Hüseyin Günizi	Alaaddin Keykubat University

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Session 3 / Hall-4

30.11.2021

Health/ Moderator: Assist. Prof. Dr. Mehmet DOĞAN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
INVESTIGATION OF <i>P. JIROVECI</i> FREQUENCY IN RESPIRATORY SYSTEM SAMPLES BY REAL-TIME PCR OF PATIENTS APPLYING TO EGE UNIVERSITY FACULTY OF MEDICINE MOLECULAR PARASITOLOGY LABORATORY IN 2009-2019	Muhammet Karakavuk	Ege University
	Hüseyin Can	Ege University
	Aysu Degirmenci Döşkaya	Ege University
	Adnan Yüksel Gürüz	Ege University
	Mert Döşkaya	Ege University
COMPARISON OF FUNCTIONAL WALKING, BALANCE AND FUNCTIONAL INDEPENDENCE IN CHILDREN WITH DIPLEGIC AND HEMIPLEGIC CEREBRAL PALSY	Kamal AL-AAYEDİ	Kırşehir Ahi Evran University
	Assist. Prof. Dr. Anıl ÖZÜDOĞRU	Kırşehir Ahi Evran University
MEDIATOR ROLE OF INNOVATION ON THE RELATIONSHIP BETWEEN COUNTRIES' SOCIAL PROGRESS LEVEL AND HAPPINESS	Zekiye İrem GÖZÜBOL	Bezmiâlem Vakıf University
	Ayşenur BAYSAL	Bezmiâlem Vakıf University
	Kerem TOKER	Bezmiâlem Vakıf University
CROWD ANALYSIS OF THE EMERGENCY SERVICE: EXAMPLE OF AKSARAY PROVINCE	Yakup Uslu	Aksaray University
VITAMIN D LEVELS IN MIGRAIN PATIENTS	Rabia Şeker	SBÜ Dr. Sami Ulus Kadın Doğum Çocuk Sağlığı ve Hastalıkları Eğitim ve Araştırma Hastanesi
EVALUATION OF UNIVERSITY STUDENTS' LEVEL OF KNOWLEDGE ABOUT COVID-19 AND THEIR ATTITUDES TO VACCINE	Ali Seydi ALPAY	Alanya Alaaddin Keykubat University
	Haluk ERDOĞAN	Alanya Alaaddin Keykubat University
ANTIOXIDANT CAPACITY OF RIBWORT PLANTAIN (<i>PLANTAGO LANCEOLATA</i> L.) COLLECTED FROM KIRŞEHİR REGION	Fatma ERGÜN	Kırşehir Ahi Evran University
COMORBIDITY OF ATTENTION DEFICIT AND HYPERACTIVITY DISORDER IN A PATIENT DIAGNOSED WITH DNA LIGASE IV SYNDROME	Duygu KABA	Başkent University, School of Medicine, Ankara Turkey
TURKEY'S SINGLE EMERGENCY CALL NUMBER, 112	Mehmet DOĞAN	Assist. Prof. Dr., University of Erciyes
WHY IS FIRST AID IMPORTANT?	Mehmet DOĞAN	Assist. Prof. Dr., University of Erciyes

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Session 3 / Hall-5

30.11.2021

Microbiology/ Moderator: Boban Stanković & Cristian Moisa

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
CONTRIBUTION TO THE KNOWLEDGE OF THE MYRMECOFAUNA (HYMENOPTERA: FORMICIDAE) OF POMORIE, BULGARIA	Boban Stanković	Department of Environmental Protection, City of Jagodina, Serbia
NEST SITE PREFERENCES OF RED-BACKED SHRIKE (LANIUS COLLURIO) IN VICINITY OF JAGODINA (SERBIA)	Boban Stanković	Department of Environmental Protection, City of Jagodina, Serbia
THE HERPETOFAUNA OF JAGODINA REGION (SERBIA)	Boban Stanković	Department of Environmental Protection, City of Jagodina, Serbia
THERMODYNAMIC PREDICTION OF PRECIPITATION CONDITIONS IN THE MIXTURE OF ANIONIC AND AMPHOTERIC SURFACTANTS	Igor Povar	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Oxana Spinu	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Petru Spataru	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Diana Shepel	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Boris Pintilie	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Alexandru Visnevschi	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
THERMODYNAMIC STUDY OF THE PRECIPITATION PROCESSES OF ANIONIC SURFACTANTS BY CALCIUM AND MAGNESIUM IONS	Igor Povar	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Oxana Spinu	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Petru Spataru	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Diana Shepel	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Boris Pintilie	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
	Alexandru Visnevschi	Institute of Chemistry, Department of Physicochemical Methods of Research and Analysis
COMPARATIVE STUDY OF OIL ADSORBENTS USING CORN CHAFF AND COCONUT FIBRE	Manase Auta	Federal University of Technology, Nigeria



OPTIMIZATION AND CHARACTERISATION OF BIOLUBRICANT FROM NEEM SEED OIL (<i>Azadirachta Indica</i>)	Isah Abubakar Garba	Federal University of Technology, Minna, Nigeria.
	Alhassan Mohammed	Federal University of Technology, Minna, Nigeria.
	Usman Baro Abdullahi	Federal University of Technology, Minna, Nigeria.
DISTILLED BIOMASS, A SUSTAINABLE RESOURCE FOR EXTRACTING BIOACTIVE COMPOUNDS FOR GREEN SYNTHESIS	Cristian Moisa	"Aurel Vlaicu" University, Romania.
	Andreea Lupitu	
	Lucian Copolovici	
	Dana Copolovici	
LITHOLOGY AND RESERVOIR PROPERTIES OF THE MAYKOPIAN ROCKS THE MIDDLE KURA BASIN OF AZERBAIJAN	Safarli Kamala Huseyn g.	SOCAR "Oil gas scientific research project" Institute

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Session 3 / Hall-6

30.11.2021

Health- Well Being/ Moderator: Elsa Vitale & Sara Aliberti

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
THE MODERATING ROLE OF GRATITUDE IN DETERMINING PSYCHOLOGICAL WELL-BEING THROUGH MARITAL SATISFACTION AMONG COUPLES IN KHYBER PAKHTUNKHWA	Dr. Saima Arzeen	University of Peshawar
	Dr. Naeema Arzeen	University of Peshawar
THE MINDFULNESS AND THE EMOTIONAL REGULATION SKILLS IN ITALIAN NURSES DURING THE COVID-19 PANDEMIC	Elsa Vitale	Department of Mental Health, Local Healthcare Company Bari, Italy
SOME PSYCHOLOGICAL FACTORS AS PREDICTOR OF STUDENTS' ATTITUDE TOWARDS MATHEMATICS IN TECHNICAL AND VOCATIONAL INSTITUTIONS IN IBADAN, OYO STATE, NIGERIA	Appah Ogechukwu Rose	Department of Basic Science and General Studies, Federal College of Forestry, Ibadan, Forestry Research Institute of Nigeria
	Tunde-Francis Abuekin Anne	Department of Basic Science and General Studies, Federal College of Forestry, Ibadan, Forestry Research Institute of Nigeria
GAMIFICATION AS A MEANS OF SOFT SKILLS DEVELOPMENT IN THE PROCESS OF EDUCATING HIGHER SCHOOL STUDENTS IN THE ONLINE MODE	Oksana Zhukova	V.N. Karazin Kharkiv National University, Faculty of Psychology, Department of Pedagogy, Kharkiv, Ukraine
RELATIONSHIP BETWEEN ANXIETY, DEMOGRAPHIC CHARACTERISTICS AND RANKING IN DANCESPORT	Sara Aliberti	University Of Salerno, Department Of Human, Philosophical And Education Sciences, Fisciano, Salerno, Italy
A MEDIATED MODERATION OF AFFECTIVE COMMITMENT AND PERSONALITY TEMPERAMENT WITHIN FRAMEWORK OF JD-R MODEL	Ume Laila	GIFT University, Gujranwala, Pakistan
	Dr. Rubina Hanif	National institute of psychology Quaid-e-Azam University Islamabad Pakistan
	Sana Rehman	University of Sargodha Gujranwala Campus, Gujranwala Pakaistan
DEVELOPMENT AND VALIDATION OF STABILITY-INDICATING HPLC METHOD FOR ESTIMATION OF DULOXETINE HCL IN BULK AND TABLETS: APPROACH TO PREDICT PHARMACOKINETIC, THERAPEUTIC AND TOXICOLOGICAL PROFILING OF ITS DEGRADATION PRODUCTS	Sandeep S. Sonawane	MET's Institute of Pharmacy, Bhujbal Knowledge City, Nashik, INDIA
	Santosh S. Chhajed	MET's Institute of Pharmacy, Bhujbal Knowledge City, Nashik, INDIA
	Sanjay J. Kshirsagar	MET's Institute of Pharmacy, Bhujbal Knowledge City, Nashik, INDIA
STUDY OF PHYSICAL, CHEMICAL AND PHARMACOTECHNOLOGICAL PROPERTIES OF CORN COLUMNS WITH STIGMAS FOR THE PURPOSE TO OBTAIN A DRY EXTRACT	Konovalenko I.	National University of Pharmacy, Kharkiv, Ukraine
	Kutsevol E.	National University of Pharmacy, Kharkiv, Ukraine
THE STATE OF UKRAINE'S READINESS FOR ESTABLISHMENT OBSERVATORIES FOR	Tatiana Bezverkhniuk	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine



SUSTAINABLE DEVELOPMENT OF RESORT DESTINATIONS	Khrystyna Koieva	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Alexander Plakida	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine

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Session 3 / Hall-7

30.11.2021

Engineering/ Moderator: V Thiyagarajan & Dr. Nazeer Ahmad Anjum

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
USER ASSISTED MULTIPLE SEGMENTATION OF COLOR IMAGES VIA ROBUST HYPOTHESIS TESTING	Hüseyin Afşer	Adana Alparslan Türkeş Science and Technology University
	Shahin Mammadov	Adana Alparslan Türkeş Science and Technology University
SENSORLESS CONTROL FOR MULTIPHASE INDUCTION MOTOR DRIVES BASED ON EXTENDED KALMAN FILTER OBSERVER	Hadji chaabane	Department of the Electrical Engineering, M'sila. Algeria.
A NEW CONTROL STRATEGY FOR HYBRID ENERGY STORAGE SYSTEMS IN STANDALONE MICROGRIDS	Hocine Guentri	GE Laboratory Saida University, Algeria
	Tayeb Allaoui	University of TIARET, Tiaret, Algeria
	Ahmed Allali	University of Sciences and Technology of Oran Med Boudiaf, Algeria
	Mouloud Denai	University of Hertfordshire, Hatfield, UK
FAULT TOLERANT CONTROL BASED ON SLIDING MODE CONTROLLER FOR DOUBLE FED INDUCTION GENERATOR	Oussama DJAIDJA	University Mohamed Boudiaf of M'Sila
	Hemza MEKKI	University Mohamed Boudiaf of M'Sila
	Samir ZEGHLACHE	University Mohamed Boudiaf of M'Sila
	Ali DJERIOUI	University Mohamed Boudiaf of M'Sila
ANALYSIS OF BUCKLING STABILITY BEHAVIOR OF ELCTRO-MAGNETORHEOLOGICAL ELASTOMER PLATE	Kobzili Lallia	Dynamic of Engines and Vibroacoustic Laboratory (LDMV), Algeria
	Aguib Salah	Dynamic of Engines and Vibroacoustic Laboratory (LDMV) , Algeria
	Khebli Abdemalek	University of Boumerdes 35000, Algeria
	Djedid Toufik	M.B. Boumerdes University, Boumerdes 35000, Algeria
PERFORMANCE ANALYSIS OF HIGH GAIN DC-DC CONVERTERS FOR SOLAR PHOTOVOLTAIC SYSTEMS	V Thiyagarajan	Department of Electrical and Electronics Engineering, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam, Chennai, Tamil Nadu, INDIA
INVESTIGATION OF STRESS CORROSION CRACKING IN TITANIUM ALLOY (Ti6Al4V) WITH AND WITHOUT CADMIUM COATING	Fawad Yousaf Malik	University of Engineering and Technology, Taxila, Pakistan
	Dr. Nazeer Ahmad Anjum	University of Engineering and Technology, Taxila, Pakistan
	Dr. Rubeena Kousar	University of Engineering and Technology, Taxila, Pakistan
	Ghulam Murtaza	University of Engineering and Technology, Taxila, Pakistan
	Shoaib Ahmed	University of Engineering and Technology, Taxila, Pakistan
SWOT ANALYSIS OF WASTEWATER-TO-HYDROGEN ENERGY TECHNOLOGIES	Elanur ADAR	Artvin Coruh University, Turkey
LaNdB6 ALLOY: RARE EARTH METAL HEXABORIDES	Cengiz Bozada	Gaziantep University
	Mikail Aslan	Gaziantep University

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Session 1 / Hall-1

01.12.2021

AKHI ORDERS/ Moderator: Prof. Dr. Bülent ARI

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
AHI-ORDER IN TURKISH SOCIETY AND TOLERANCE IN AHI-ORDER	Prof. Dr. Bülent ARI	HMKÜ
AHI MAHMUD VELI (KEÇECI BABA) ONE OF TOKAT'S SPIRITUAL LEADERS	Assoc. Prof. Dr. Hasan COŞKUN	Tokat Gaziosmanpaşa University
THE SHIELD OF CAPITALISM IN THE OTTOMAN CITIES: THE AHILIK MENTALITY AND THE GUILDS	Arzu YILMAZ ASLANTÜRK	Aksaray University
AHI EVRAN AND AHI-ORDER IN TEXTBOOKS AND TEACHING PROGRAMS	Assoc. Prof. Dr. Ahmet ÇOBAN	Dicle University
	Uzm. Orhan KORKMAZ	Dicle University
A RESEARCH ON POSTGRADUATE THESIS STUDIES IN THE FIELD OF AHI EVRAN AND AHI-ORDER	Assoc. Prof. Dr. Ahmet ÇOBAN	Dicle University
	Uzm. Orhan KORKMAZ	Dicle University
ON THE HERITAGE (LEGACY OF WISDOM) OF TURKISH CULTURE- THE AKHILIC UNION	Assoc. Prof. Dr. Vesile ŞEMŞEK	Ahi Evran University
A VIEW OF AKHISM THROUGH VOCATIONAL EDUCATION AND WORK ETHICS	Gizem ŞAHİN	İzmir Kavram Meslek Yüksekokulu, İnsan Kaynakları Yönetimi Programı

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Session 1 / Hall-2

01.12.2021

Botany- Environment/ Moderator: Prof. Dr. Ahmet KAZANKAYA

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
DETERMINATION OF POMOLOGICAL PROPERTIES OF NATURALLY GROWING ROSEHIP (Rosa Canina L.) FRUITS IN KIRŞEHİR REGION	Ebru ŞİRİN	Kırşehir Ahi Evran University
	Ahmet KAZANKAYA	Kırşehir Ahi Evran University
BLACK CHOKEBERRY (ARONIA MELANOCARPA L.) GROWING IN KIRŞEHİR	Selma BOYACI	Kırşehir Ahi Evran University
THE LIVESTOCK POTENTIAL OF KIRŞEHİR PROVINCE AND THE NEED FOR AHI EVRAN VELİ'S LEATHER CRAFT	Ahmet Şahin	Kırşehir Ahi Evran University
	Mehmet Sarı	Kırşehir Ahi Evran University
	Hayrettin Çayıroğlu	Kırşehir Ahi Evran University
	Hüseyin Çayan	Kırşehir Ahi Evran University
DETERMINATION OF PRIMING APPLICATION TIME WITH SILICON IN COMMON GRASSPEA (Lathyrus sativus L.)	Semih AÇIKBAŞ	Siirt University
	Mehmet Arif ÖZYAZICI	Siirt University
DETERMINATION OF ADAPTATION CAPABILITIES OF SOME STANDARD PEAR VARIETIES TO THE MUŞ REGION	Semih AYKUT	Yüzüncü Yıl University
	Adnan DOĞAN	Yüzüncü Yıl University
WILD GRAPE POTENTIAL IN HAKKARI REGION	Tuncer ARSLAN	Van Yüzüncü Yıl University
	Adnan DOĞAN	Van Yüzüncü Yıl University
WINE GRAPE PRODUCTION IN TURKEY, EVALUATION OF DEVELOPMENTS IN THE WINE SECTOR, AND FORECASTS	Gamze SANER	Ege University
	Duran GÜLER	Ege University
	Zekiye ŞENGÜL	Ege University
	Ceylin SANER	Ege University

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Session 1 / Hall-3

01.12.2021

Energy/ Moderator: Assoc. Prof. Dr. Ferdağ KAHRAMAN AKSOYAK

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
BASIN GEOMETRY FEATURES OF THE YESILDERE AND CAGLAYAN STREAM BASINS HAVING CAUSED FLOOD AND OVERFLOW IN FINDIKLI (RIZE)	Vedat AVCİ	Bingöl University
INVESTIGATION OF THE CAUSAL RELATIONSHIP BETWEEN CO2 EMISSIONS, ENERGY CONSUMPTION AND ECONOMIC GROWTH: THE EXAMPLE OF TURKEY	Fatih Çemrek	Eskişehir Osmangazi University
NUMERICAL INVESTIGATION OF FLOW PROPERTIES OF GENERATOR CABINETS	Barbaros MAZLUMCU	Marmara University
	Prof. Dr Mustafa Atmaca	Marmara University
ON GAUSS MAP OF TENSOR PRODUCT SURFACES VIA GENERALIZED BICOMPLEX NUMBERS	Ferdağ KAHRAMAN AKSOYAK	Kırşehir Ahi Evran University
SOLUTIONS OF LINEAR FREDHOLM INTEGRAL EQUATIONS WITH THE THREE-STEP ITERATION METHOD	Asst. Prof. Dr. Lale CONA	Gumushane University
	Kadir ŞENGÜL	Gumushane University
FIXED POINT APPROACH TO FRACTIONAL INTEGRO-DIFFERENTIAL EQUATION	Asst. Prof. Dr. Lale CONA	Gumushane University
	Esmahan BAL	Gumushane University

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Session 1 / Hall-4

01.12.2021

Engineering / Moderator: Asst. Prof. Hatice Aylin KARAHAN TOPRAKÇI

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
HYBRID NANOCOMPOSITES AND THEIR STRESS SENSING BEHAVIOUR	Asst. Prof. Hatice Aylin KARAHAN TOPRAKÇI	Yalova University
	Mukaddes Sevval CETİN	Yalova University
	Asst. Prof. Ozan TOPRAKÇI	Yalova University
FABRICATION OF NANOCOMPOSITES FROM SINGLE AND HYBRID FILLERS AND THEIR APPLICATION FOR DETERMINATION APPLIED FORCE	Mukaddes Sevval CETİN	Yalova University
	Asst. Prof. Ozan TOPRAKÇI	Yalova University
	Asst. Prof. Hatice Aylin KARAHAN TOPRAKÇI	Yalova University
DETERMINATION OF KINETICS OF DRYING OF MANDARIN (CITRUS RETICULATA) PEEL AND ENERGY ANALYSIS	Faruk KILIÇ	Gazi University
ON THE FORCED VIBRATION OF A HYDROELASTIC SYSTEM CONSISTING OF ORTHOTROPIC / PIEZOELECTRIC PLATE, INVISCID FLUID AND RIGID WALL	Zeynep EKİCİOĞLU KÜZECİ	Kırşehir Ahi Evran University
	Tarana V. HUSEYNOVA	Ganja State University
THEORETICAL INVESTIGATION OF HYDROGEN STORAGE AND PHYSICAL PROPERTIES OF Be(BH ₄) ₂ COMPOUND	Fatih DEMİRKALE	Kırşehir Ahi Evran University
	Osman ÖRNEK	Kırşehir Ahi Evran University
CONSTRUCTION OF BLOCKS USING MULTIPLE REFERENCE BLOCKS IN VIDEO CODING	Çağrı KILINÇ	Eskisehir Osmangazi University
	Erol SEKE	Eskisehir Osmangazi University
INVESTIGATION OF EROSION CORROSION OF DIFFERENT BIOMATERIALS BY FINITE ELEMENT ANALYSIS	Levent Urtekin	Kırşehir Ahi Evran University
	Deniz Ada	Kütahya Dumlupınar University
	Kadir Gök	İzmir Bakırçay University
MICROSTRUCTURE ANALYSIS AND CHARACTERIZATION OF AZ91 BIOMATERIALS PRODUCED BY DIE CASTING	Levent Urtekin	Kırşehir Ahi Evran University
	Kadir Gök	İzmir Bakırçay University
RAILWAY LINE CAPACITY CALCULATION USING UIC CODE 406: APPLICATION FOR MALATYANARLI LINE	Sinem BOZATLI	Yıldız Technical University
	İsmail ŞAHİN	Yıldız Technical University

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Session 1 / Hall-5

01.12.2021

Mathematics & Engineering/ Moderator: Prof. Dr. Dalal Adnan

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
EXPONENTIAL STABILITY FOR A DELAY POROUS THERMOELASTIC SYSTEM WITH SECOND SOUND	Mohamed HOUASNI	Université Djilali Bounaâma Khemis Miliana, Algérie
	Salah ZITOUNI	Department of Mathematics and Informatics, Souk Ahras Univ, P.O. Box 1553, Souk Ahras, 41000, Algeria
A NEW METHOD OF DYNAMICAL STABILITY IN FRACTIONAL SYSTEMS	Shiva Eshaghi	Shahrekord University, P.O.Box 115, Shahrekord, Iran
ADOMIAN DECOMPOSITION METHOD FOR SOLVING NONLINEAR ODES EQUATION USING MAPLE	Dalal Adnan Amer Maturi	King Abdulaziz University, Jeddah, Saudi Arabia
USING THE DISCRETE LOGARITHM PROBLEM TO IMPROVE THE SECURITY OF A PUBLIC KEY CRYPTOSYSTEM	Hayder Raheem Hashim	University of Kufa, Iraq
DERIVATIONS ON LIE AND JORDAN ON SEMIPRIME RINGS	TAHA I.	Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak
	MASRI R.	Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak
	TARMIZI R.	Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak
UNSTEADY FREE CONVECTION MOTION OF CASSON LIQUID PAST A SEMI-INFINITE VERTICAL POROUS PLATE ON NUMERICAL SOLUTION OF MHD, SORET, DUFOUR AND THERMAL RADIATION CONTRIBUTIONS	K. VEERA REDDY	Koneru Lakshmaiah Education Foundation, Vaddeswaram, India-522 502
	G.VENKATA RAMANA REDDY	Koneru Lakshmaiah Education Foundation, Vaddeswaram, India-522 502
FLOW OF MHD CASSON FLUID OVER A VERTICAL POROUS SURFACE IN THE PRESENCE OF CHEMICAL REACTION AND RADIATION EFFECTS	A.Sandhya	Department of Mathematics, VRSEC, Kanur, Vijayawada-520007
	G.Venkata Ramana Reddy	Department of Mathematics, KLEF, Vaddeswaram, AP-522502
	G.V.S.R.Deekshitulu	Department of Mathematics, JNTUK Kakinada, AP-533003
GENERAL AND OPTIMAL DECAY FOR A NONLINEAR VISCOELASTIC EQUATION	Tikialine Belgacem	University of El-Oued, P.O.Box789, El Oued39000.
	Tedjani Hadj Ammar	University of El-Oued, P.O.Box789, El Oued39000.
	Abdelkarim Kelleche	Université Djilali Bounaâma, Algeria.
TUNABLE THREE-DIMENSIONAL TERAJET CONTAINING DIRAC SEMIMETAL	Babak Yahyapour	Department of Condensed Mater Physics, Faculty of Physics, University of Tabriz, Tabriz, Iran
	Behrooz Rezaei	Department of Condensed Mater Physics, Faculty of Physics, University of Tabriz, Tabriz, Iran



PARAMETERIZED CONTROL OF NATURAL AND FORCED CONVECTION IN A THREE- DIMENSIONAL ENCLOSURE	Zakaria LAFDAILI	National School of Applied Sciences, University Ibn Zohr, Agadir, Morocco
	Mohamed El Hattab	National School of Applied Sciences, University Ibn Zohr, Agadir, Morocco
	Lahoucine Belarche	National School of Applied Sciences, University Ibn Zohr, Agadir, Morocco
	Sakina El-Hamdani	National School of Applied Sciences, University Ibn Zohr, Agadir, Morocco

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Session 1 / Hall-6

01.12.2021

Management/ Moderator: Ayşenur Erdil

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
OCCUPATIONAL HEALTH AND SAFETY APPLICATIONS, RISK ANALYSIS AND SOLUTION SUGGESTIONS IN METAL DOOR MANUFACTURING	Servet SOYGÜDER	Ankara Yıldırım Beyazıt University
	Çağla ŞAHİN	Ankara Yıldırım Beyazıt University
REPRODUCTIVE HEALTHCARE SERVICES AMONG COMMUNITY CLINICS IN RURAL BANGLADESH: SERVICES, SERVICE SATISFACTION AND SERVICE GAPS	Nargis Fatema	Institute of Social Welfare and Research, University of Dhaka, Dhaka-1205, Bangladesh
THE IMPACTS OF THE GREAT FINANCIAL CRISIS ON THE BANKING SECTOR OF A SMALL TRANSITION COUNTRY ON THE EXAMPLE OF BOSNIA AND HERZEGOVINA	Sonja Tomas-Miskin	School of Economics Banja Luka, Kralja Alfonsa XIII, Banja Luka 78000, Bosnia & Herzegovina
	Jelena Vitomir	Megatrend University in Belgrade. Maršala Tolbuhina 8, 11000 Beograd, Serbia
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
DEVELOPMENT OF SOFTWARE APPLICATIONS IN TRANSITION COUNTRIES AT THE REQUEST OF TOP MANAGEMENT OF LARGE COMPANIES	Ivan Arnautović	High School of Entrepreneurship, Majke Jevrosime 15, 11000 Beograd, Serbia
	Tatjana Davidov	Infostan Tehnologije d.o.o. Beograd, 1, Danijelova 33, 11010 Beograd, Serbia,
	Jelena Vitomir	Megatrend University in Belgrade, Serbia
	Sanda Nastić	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
THE IMPORTANCE OF CONNECTING THE WORK OF INTERNAL CONTROL AND INTERNAL AUDIT IN THE OPERATIONS OF ENTERPRISES IN TRANSITION COUNTRIES LIKE THE EXPERIENCES OF THE ECONOMY OF THE REPUBLIC OF SERBIA	Dragan Đuranović	PIM University, Bosnia and Herzegovina
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
IMPLEMENTATION OF INTERNAL AUDIT IN LARGE ENTERPRISES WITH INFORMATION SYSTEM IN ALL SECTORS	Dragan Đuranović	PIM University Banja Luka, Bosnia and Herzegovina
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia



SOFTWARE METHODOLOGIES IN THE DEVELOPMENT OF SOFTWARE SOLUTIONS	Ivan Arnautović	High School of Entrepreneurship, Majke Jevrosime 15, 11000 Beograd, Serbia
	Tatjana Davidov	Infostan Tehnologije d.o.o. Beograd, 1, Danijelova 33, 11010 Beograd, Serbia,
	Goran Vitomir	Nova Banka A.D. Banja Luka, Republika Srpska, Bosna i Hercegovina
	Sanda Nastić	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
	Slobodan Popović	Faculty of Economics and Industrial Management u Novom Sadu, Cvečarska 2, 21000 Novi Sad, Serbia
THE EFFECTS OF ERGONOMIC CONDITIONS IN THE WORK ENVIRONMENT ON WORK PERFORMANCE AND PRODUCTIVITY	Ayşenur Erdil	İstanbul Medeniyet University
A CRITICAL LOOK AT A SYSTEMIC PROBLEM IN ACHIEVEMENT OF QUALITY IN HIGHER EDUCATION: REAPPOINTMENT OBLIGATION IN EVERY ACADEMIC PROMOTION	Nalan Sabır Taştan	Ordu Üniversitesi Sosyal Bilimle MYO
	Kürşat Taştan	Ordu Üniversitesi Genel Sekreterlik

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Session 1 / Hall-7

01.12.2021

Microbiology/ Moderator: Amina Mumtaz

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
APPLICATION OF MAGNETIZED ORANGE PEELS FOR THE REMOVAL OF ORGANOCHLORINE PESTICIDES (CHLORPYRIFOS AND PENDIMETHALIN) FROM AQUEOUS RESOURCES	Bilal Ashraf	PCSIR, Lahore.Pakistan
	Shafaq Mubarak	PCSIR, Lahore.Pakistan
	Amina Asghar	PCSIR, Lahore.Pakistan
INFLUENCE OF pH ON ADSORPTION ONTO ZnO NANOPARTICLES SURFACE	Denis Melehov	Tomsk Polytechnic University
	Anna Godymchuk	Tomsk Polytechnic University
BIOLOGICAL EVALUATION OF SCHIFF BASE TRANSITION METAL COMPLEXES DERIVED FROM SULPHA DRUG	Amina Mumtaz	PCSIR Laboratories Complex, Ferozepur Road, Lahore-Pakistan
NOVEL PVC MEMBRANE POTENTIOMETRIC SENSOR FOR HIGHLY SELECTIVE DETERMINATION OF FEXOPHENADINE IN PHARMACEUTICALS AND SPIKED HUMAN URINE	N. Rajendraprasad	JSS College of Arts, Commerce and Science (A research Centre Recognized by University of Mysore), B N Road, Mysuru, Karnataka, India
	C. Siddaraju	JSS College of Arts, Commerce and Science (A research Centre Recognized by University of Mysore), B N Road, Mysuru, Karnataka, India
THE ANTIMICROBIAL ACTIVITY OF LEAF EXTRACTS FROM EUCALYPTUS	Muneer Kamel	Peoples' Friendship University of Russia, Moscow, Russia
POLYMERS-BASED LUMINOL: SYNTHESIS, CHARACTERIZATION AND APPLICATION	Hamad Atallah Aljayzani	Chemistry Department King Abdulaziz University - Jeddah - Saudi Arabia
QSPR-NEURAL NETWORKS MODEL FOR THE PREDICTION OF THE REJECTION OF ANTI-INFLAMMATORY DRUGS BY MEMBRANES	Yamina AMMI	University of Médéa, Medea, Algeria.
	Cherif Si-Moussa	University of Médéa, Algeria.
	Salah HANINI	University of Médéa, Algeria.
GROWTH KINETICS OF FEB AND FE2B LAYERS ON AIS 316 STEEL BY THE INTEGRAL METHOD	Zouzou chaima	Laboratoire de Technologie des Matériaux, Faculté de Génie Mécanique et Génie des Procédés
	Keddam mourad	Laboratoire de Technologie des Matériaux, Faculté de Génie Mécanique et Génie des Procédés
IS CATECHOL O-METHYLTRANSFERASE A MORPHEEIN PROTEIN?	Aminu Usman	Umaru Musa Yar'adua University, Katsina-Nigeria

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Session 2 / Hall-1

01.12.2021

AKHISM: Moderator: Assoc. Prof. Dr. Ertugrul Guresci

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
AN EVALUATION ON THE TRANSITION METHODS AND TECHNIQUES OF AHI ORDER FROM THEORY TO PRACTICE	Dr. Hatice Dülber	Ahi Evran University
SOCIAL COMPLEX OF AHI EVRAN AND VISITING CULTURE	Dr. Seyit GEZER	Kırşehir
AKHISM AND AHI EVRAN FROM SUSTAINABLE HUMAN RESOURCES MANAGEMENT PERSPECTIVE	Safa ACAR	Siirt University
THE PSYCHOSOCIAL MORAL FUNCTION OF FAITH ACCORDING TO AHI EVRAN	Dr. Osman Oral	Bozok University
EXAMINATION OF UNIVERSITY STUDENTS' OPINIONS ABOUT AHI EVRAN	Süleyman DOĞAN	Yıldız Teknik University
	Lütfullah ÇELİKTEN	İstanbul Ayvansaray University
AHHISM AND COOPERATIVE THOUGHT	Ertugrul Guresci	Kırşehir Ahi Evran University

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Session 2 / Hall-2

01.12.2021

Biology/ Moderator: Assoc. Prof. Dr. Mustafa KAN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
LOCAL DEVELOPMENT WITH LOCAL VALUES: CEMELE PEPPER (CEMELE BIBERI)	Assoc. Prof. Dr. Arzu KAN	Kırşehir Ahi Evran University
	Assoc. Prof. Dr. Mustafa KAN	Kırşehir Ahi Evran University
	Assist. Prof. Dr. Serdar GENÇ	Kırşehir Ahi Evran University
DETERMINATION OF THE EFFICIENCY OF DIFFERENT PGPR COMBINATIONS AT REDUCED FERTILIZER RATE IN PAZAR-20 TEA CLONE	Yaşar ERTÜRK	Kırşehir Ahi Evran University
	Ramazan ÇAKMAKÇI	Çanakkale 18 Mart University
FRUIT CHARACTERISTICS AND SEED YIELD OF IN NAKED SEED PUMPKIN (CUCURBITA PEPO VAR. STYRİCA) LINES	Alim AYDIN	Kırşehir Ahi Evran University
	Halit YETİŞİR	Erciyes University
	Hakan BAŞAK	Kırşehir Ahi Evran University
	Ayşe Nur ÇETİN	Kırşehir Ahi Evran University
DEVELOPMENT OF ETTRAPLOİD BOTTLE GOURD (LAGENARIA SICERARIA) GENOTYPE BY THE APPLICATION OF COLCHICINE	Alim AYDIN	Kırşehir Ahi Evran University
	Halit YETİŞİR	Erciyes University
	Ramazan GÜNGÖR	Kırşehir Ahi Evran University
	Metin TUNA	Tekirdağ Namık Kemal University
EFFECTS OF HOLDING TIME AND DIFFERENT IBA DOSES ON ROOTING OF LAVANDULA ANGUSTIFOLIA "SEVTOPOLIS" CUTTINGS	Bahadır ALTUN	Kırşehir Ahi Evran University
	Ramazan GÜNGÖR	Kırşehir Ahi Evran University
	Ayşe Nur ÇETİN	Kırşehir Ahi Evran University
	Ayşe BAŞPINAR	Kırşehir Ahi Evran University
	Zuhal ÖZKAN	Kırşehir Ahi Evran University
BIOLOGICAL FERTILIZERS AND THEIR IMPORTANCE IN SUSTAINABLE AGRICULTURE	Fevziye Şüheda Hepşen Türkay	Kırşehir Ahi Evran University
RESEARCH OF FACTORS AFFECTING AQUACULTURE DEVELOPMENT KHANH HOA PROVINCE, VIETNAM	Vo Hoan Hai Dang Hoang Xuan Huy	Department of Education and Training of Khanh Hoa province Faculty of Economics - Nha Trang University
AN ALTERNATIVE TO NON-BENEFICIAL FLYING INSECTS IN AGRICULTURE	Neddar Lahouaria Flazi Samır	Abdelhamid Ibn Badis University Mohamed Boudiaf University, Oran, Algeria

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Session 2 / Hall-3

01.12.2021

Biology/ Moderator: Assist. Prof. Dr. Mevlüde Alev ATEŞ

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
MAPPING OF NEWLY DEVELOPED GENOMIC SIMPLE SEQUENCE REPEAT MARKERS TO THE LENTIL (<i>Lens culinaris</i> Medik.) GENOME	Brian Wakımwayı Koboyı	Erciyes University
	Melike Bakır	Erciyes University
ITS2 (INTERNAL TRANSCRIBED SPACER 2) REGION: A VALUABLE MARKER TO LABEL AND DISCUSS GENETIC DIFFERENCES, ASTRAGALUS L. EXAMPLE	Assist. Prof. Dr. Mevlüde Alev ATEŞ	Kırşehir Ahi Evran University
	Seher KARAMAN ERKUL	Aksaray University
INVESTIGATION OF GENETIC DIVERGENCE IN LOCAL SUNFLOWER HYBRIDS AND INBRED LINES BY APPLYING MORPHOLOGICAL MARKERS	Uzma Ayaz	University of Poonch Rawalakot, Pakistan
THE VOLATILE ORGANIC COMPOUNDS EMISSION FROM PLANTS IN THE FUTURE CLIMATE	Lucian Copolovici	“Aurel Vlaicu” University, Arad, Romania
	Andreea Lupitu	“Aurel Vlaicu” University, Arad, Romania.
	Cristian Moisa	Aurel Vlaicu” University
	Virgiliu Ciutina	“Aurel Vlaicu” University, Arad, Romania
	Dana Copolovici	“Aurel Vlaicu” University, Arad, Romania
PLANT EXTRACTS AND THEIR BIOMOLECULES	Dana Maria Copolovici	“Aurel Vlaicu” University, Arad, Romania
	Andreea Lupitu	“Aurel Vlaicu” University, Arad, Romania
	Cristian Moisa	Aurel Vlaicu” University
	Lucian Copolovici	“Aurel Vlaicu” University
THE SITUATION AND SOLUTIONS FOR SUSTAINABLE POVERTY REDUCTION UNDER THE MULTIDIMENSIONAL APPROACH IN VIETNAMESE MEKONG DELTA RURAL AREA – A CASE STUDY IN A COMMUNE OF HAU GIANG PROVINCE	Le Tran Thanh Liem	Can Tho University, Vietnam
	Pham Van Trong Tinh	Can Tho University, Vietnam
	Nguyen Thi Bach Kim	Can Tho University, Vietnam
SYNTHESIS AND APPLICATIONS OF BIOCHAR-BASED CATALYSTS FOR EFFICIENT REMEDIATION OF EMERGING CONTAMINANTS	Solomon Abesa	Federal University of Agriculture Makurdi, Nigeria
	Aderemi Timothy Adeleye	Chinese Academy of Sciences (CAS), Dalian, China
	Omoniyi Ahmed Olalekan	Veritas University, Abuja, Nigeria
	Dr. Oludare O. Osiboye	Tai Solarin College of Education, Omu-Ijebu, Ogun State, Nigeria
	Dr. Babatope Oluseun Odusina	Tai Solarin University of Education, Ijagun, Ijebu Ode, Ogun State, Nigeria

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Session 2 / Hall-4

01.12.2021

Public Helath/ Moderator: Assist. Prof. Dr. Deniz GÜLER

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' E-HEALTH LITERACY LEVELS AND HEALTHY LIFESTYLE BEHAVIORS	Aysun KANDEMİR TÜRE	Kırıkkale University
	Ahmet KAR	Kırıkkale University
	Ali YILLMAZ	Kırıkkale University
	Mustafa KAYA	Kırıkkale University
THE SOCIAL VULNERABILITY AS A DEEPENING FACTOR OF COVID-19'S IMPACTS ON HEALTH	Gizem Deniz BÜYÜKSOY	Kırşehir Ahi Evran University
	Aslıhan ÇATIKER	Ordu University
	Kamuran ÖZDİL	Nevşehir Hacı Bektaş Veli University
THE IMPORTANCE OF MEDICAL DOCUMENTATION DURING THE PANDEMIC PERIOD	Ahmet Hayrettin TUNCAY	Süleyman Demirel University
CHILD ABUSE: CHILD ABUSE WITH EMOTIONAL ASPECTS	Leyla KUŞÇULAR KURU	Bandırma Onyedi Eylül University
	Zeynep ACA	Bandırma Onyedi Eylül University
CALCULATION OF FULL ENERGY PEAK EFFICIENCY OF CSI(TL) DETECTOR FOR POINT AND DISK GAMMA SOURCES BY FLUKA CODE	Zehra Nur KULUÖZTÜRK	Bitlis Eren University
A SOCIOLOGICAL STUDY ON THE PERCEPTIONS OF MASCULINITY OF MARRIED MEN AND MARRIED WOMEN	Samet ÜNLÜ	Sivas Cumhuriyet University
	Sevda MUTLU	Assoc. Prof. Dr., Sivas Cumhuriyet University
A SOCIOLOGICAL LOOK AT THE CAUSES OF CHILD BRIDE MARRIAGES: "THEY EVEN TAKEN MONEY FROM MY MOTHER FOR THE MILK I SUCK"	Ümmü Gülsüm Aslı Nur DOĞAN	Sivas Cumhuriyet University
	Sevda MUTLU	Assoc. Prof. Dr., Sivas Cumhuriyet University
DEVELOPMENT OF MEDICAL KNOWLEDGE IN A MEDIEVAL INSTITUTION	Sabri Burak PEKSOY	Kırıkkale University
EFFECT OF A COGNITIVE-BASED EMOTIONAL INTELLIGENCE PSYCHO-EDUCATIONAL PROGRAM ON SUBMISSIVE BEHAVIOR, SELF-ESTEEM, SOCIAL SKILLS AND SCHOOL ADJUSTMENT LEVELS OF MIDDLE SCHOOL STUDENTS	Özge KINIK	Söğütlü Primary School, Trabzon, Turkey
	Hatice ODACI	Karadeniz Technical University, Faculty of Literature, Psychology, Trabzon, Turkey.
CAN MEANING IN LIFE AND HOPE MAKE US PSYCHOLOGICALLY MORE FLEXIBLE? A RELATIONAL ANALYSIS	Deniz GÜLER	Anadolu Üniversitesi, Eğitim Fakültesi, Eğitim Bilimleri Bölümü, Rehberlik ve Psikolojik Danışmanlık ABD, Eskişehir TÜRKİYE

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Session 2 / Hall-5

01.12.2021

Agriculture/ Moderator: Assist. Prof. Dr. C.S.N.PRANAVI & Teodora Mihova

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
APPLICATION OF BIO-EXTRACT ON THE GOWTH AND YIELD OF TWO VARIETIES YARDLONG BEAN	Darwin H. Pangaribuan	University of Lampung, Indonesia
	Septi Nurul Aini	University of Lampung, Indonesia
	Anisa Ayuningtyas	University of Lampung, Indonesia
	Aisyah Dwi Raphita	University of Lampung, Indonesia
REVIEW ON IMPACT OF COVID 19 ON AGRICULTURE SECTOR AND FOOD SUPPLY CHAIN	Shainy Kodali	International School of Technology & Sciences for Women, India
DESIGN AND FABRICATION OF MULTIPURPOSE AGRICULTURE VEHICLE	K.Ravi Kumar	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	B.Sri Harshini	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Y.Dhana Lakshmi	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	M.Harshitha	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	K.Harsitha	ISTS Women's Engineering College, Andhra Pradesh, INDIA
EFFECTS OF DIETARY INCLUSION OF PROCESSED AND RAW SWEET LUPIN SEED (LUPINS ANGUSTIFOILUS) ON GROWTH AND CARCASS PERFORMANCES OF BROILER CHICKENS	Alem Dida	Selale University, Ethiopia
	Tegene Negesse	Hawassa University, Hawassa, Ethiopia
	Aberra Melesse	Hawassa University, Hawassa, Ethiopia
APPLICATION OF MULTIVARIATE ANALYSIS TO DIFFERENTIATE THE HARARGHE HIGHLAND GOAT POPULATIONS REARED IN THREE AGROECOLOGIES OF WEST HARARGHE ZONE, ETHIOPIA	Alefe Takele	Oda Bultum University, Ethiopia
	Aberra Melesse	Hawassa University, Hawassa, Ethiopia
	Mestawet Taye	Hawassa University, Hawassa, Ethiopia
IMPLEMENTATION OF AI (ARTIFICIAL INTELLIGENCE) IN DRIP IRRIGATION SYSTEM USING SOLAR ENERGY IN AGRICULTURE FIELDS	Raganjali K.S	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Lakshmi keerthi B	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Naga Jhansi M	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Jyothsna Priya G	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Gayatri Lakshmi D	ISTS Women's Engineering College, Andhra Pradesh, INDIA
	Vijaya Kumar CH	ISTS Women's Engineering College, Andhra Pradesh, INDIA
PERSPECTIVE GENOTYPES FROM CHAENOMELES SP. LINDL FOR FRUIT PRODUCTION	Teodora Mihova	Research Institute of Mountain Stockbreeding and Agriculture, Troyan, Bulgaria



DEVELOPMENT OF AUTOMATIC
AND SEMI-AUTOMATIC ONION
TRANSPLANTER

Gopalam Sharmila

ISTS Women's Engineering College,
Andhra Pradesh, INDIA

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Session 2 / Hall-6

01.12.2021

Agriculture/ Moderator: Chaudhary Muhammad Ayyub & Aberra Melesse

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
ROLE OF INSTRUCTIONAL MATERIALS IN AGRICULTURE EXTENSION SERVICES FOR THE RURAL WOMEN IN NIGERIA	Fasasi Rafiat Bolanle	Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
IMPACT OF AGRICULTURAL EXTENSION EDUCATION ON NIGERIANS FOOD SECURITY	Oyediran, Wasiu Oyeleke (Ph.D.)	Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
EFFECT OF BIO STIMULANTS ON THE GROWTH OF EGGPLANT (SOLANUM MELONGENA L.) GROWN UNDER NACL INDUCED SALINITY	Chaudhary Muhammad Ayyub	University of Agriculture, Pakistan
	Mazhar Abbas	University of Agriculture, Pakistan
	Muhammad Nouman Akram	University of Agriculture, Pakistan
	Mujahid Ali	Water Management Research Farm, Renala Khurd-56150, Okara, Pakistan
	Saqib Ayyub	University of Agriculture, Pakistan
REVIEW ON FARMING AGRICULTURE ROBOTS	M. Chandini	International School of Technology and Science For Women, India
	B. Sirisha	International School of Technology and Science For Women, India
	B. Mounika	International School of Technology and Science For Women, India
	B. Akhila	International School of Technology and Science For Women, India
	CH. Beula Rani	International School of Technology and Science For Women, India
	K. Ravi Kumar	International School of Technology and Science For Women, India
EFFECT OF FERTILIZER APPLICATION ON FUNAABOR 1 IN THE INLAND VALLEY DURING THE DRY SEASON	ATOLAGBE, MUTIU SHOLA	Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
REVIEW ON SOLAR WEEDER CUM SPRAYER	S. Beebjan	International School of Technology and Science For Women, India
	V.B.V. Ramani	International School of Technology and Science For Women, India
	K.S. Latha	International School of Technology and Science For Women, India
	M.G. Ratnam	International School of Technology and Science For Women, India
	N. Rajasri	International School of Technology and Science For Women, India
	P. Sirisha	International School of Technology and Science For Women, India
	K. Meriba	International School of Technology and Science For Women, India



FERTILITY, HATCHABILITY, AND GROWTH PERFORMANCE OF INDIGENOUS, SASSO AND INDIGENOUS*SASSO CROSS CHICKEN GENOTYPES IN SIDAMA REGION, ETHIOPIA	Berhanu Bekele	Hawassa University, Hawassa, Ethiopia
	Wondmeh Esatu	International Livestck Research Institute (ILRI), Addis Ababa, Ethiopia
	Tadelle Dessie	International Livestck Research Institute (ILRI), Addis Ababa, Ethiopia
	Aberra Melesse	Hawassa University, Ethiopia
CHARACTERIZATION OF INDIGENOUS CHICKENS REARED IN THREE AGRO-ECOLOGIES OF HADIYA ZONE OF ETHIOPIA BASED ON THEIR MORPHOMETRIC TRAITS USING A MULTIVARIATE ANALYSIS APPROACH	Berhanu Bekele	Hawassa University, Hawassa, Ethiopia
	Wondmeh Esatu	International Livestck Research Institute (ILRI), Addis Ababa, Ethiopia
	Tadelle Dessie	International Livestck Research Institute (ILRI), Addis Ababa, Ethiopia
	Aberra Melesse	Hawassa University, Hawassa, Ethiopia

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Session 2 / Hall-7

01.12.2021

ART & SPORTS / Moderator: Thi Thanh Ha DAO & Naghmeh Hachempour

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
A NEW THEORY FOR VISUALIZING MUSIC	Naghmeh Hachempour	Georgia Southern University, Statesboro, GA, United States
RECOMMENDATIONS FOR PHYSICAL ACTIVITY IN PERIODS OF SOCIAL DISTANCING DUE TO COVID-19 PANDEMIC	Thi Thanh Ha DAO	University of Danang, Vietnam
EXPLORING NATURAL ADVANTAGES TO DEVELOP SPORT TOURISM PRODUCTS IN QUANG BINH PROVINCE	Thi Thanh Ha DAO	University of Danang, Danang, Vietnam
CORRELATION BETWEEN PERCEIVED EFFORT AND INTERNAL TRAINING LOAD	Felice Di Domenico	University of Salerno, Salerno, Italy
DEVELOP CREATIVITY AND LEADERSHIP OF YOUNG PEOPLE FROM THE PANDEMIC	Dr. Ahmad Fauzi	MA Nuril Huda Jl. Madukoro No. 08 Tarub, Tawangharjo, Grobogan, Jawa Tengah, Indonesia.
	Mukhamad Luthfi Ali	MA Nuril Huda Jl. Madukoro No. 08 Tarub, Tawangharjo, Grobogan, Jawa Tengah, Indonesia.
	Galih Putri Milan Nesty	MA Nuril Huda Jl. Madukoro No. 08 Tarub, Tawangharjo, Grobogan, Jawa Tengah, Indonesia.
REPRESENTATIONS OF RICH-POOR UNIVERSITY STUDENTS IN TURKISH TV SERIES: THE EXAMPLE OF "SOL YANIM" TV SERIES	Oğuzhan Bayrak	Ordu University

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Session 3 / Hall-1

01.12.2021

Management/ Moderator: Assoc. Prof. Dr. Bahar SUVACI

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
ESTIMATING THE BETA COEFFICIENTS BY QUANTILE REGRESSION: A STUDY ON MSCI-ISLAMIC STOCK INDICES	Assoc. Prof. Dr. Mercan HATİPOĞLU	Çankırı Karatekin University
	Assoc. Prof. Dr. Taner SEKMEN	Eskişehir Osmangazi University
TRANSITIONING FROM BIG DATA TO SMALL DATA: MAKING SENSE OF CONSUMER BEHAVIOR	Derya ŞAHİN	İstanbul Aydın University
CAN THE EMERGENCE OF THE CORONA VIRUS OUTBREAK AS A HUMANITARIAN CRISIS STOP THE ABUSE IN HUMAN RESOURCES MANAGEMENT?	Hüseyin Çiçek	Burdur Mehmet Akif Ersoy University
	Zafer Çankaya	Burdur Mehmet Akif Ersoy University
A COMPARATIVE ANALYSIS OF EFFECTS OF FINANCAL RATIOS ON PROFITABILITY: AN EMPIRICAL ANALYSIS ON BIST LISTED FABRICATED METAL PRODUCTS MANUFACTURING FIRMS	Damla Özer	Ahi Evran University
	Assoc. Prof. Yüksel İltaş	Kırşehir Ahi Evran University
CORPORATE SOCIAL RESPONSIBILITY PRACTICES OF MUNICIPALITIES: GEMLIK MUNICIPALITY CASE	Çağlar KALKAN	Gemlik Municipality Bursa, Turkey
	Assoc. Prof. Dr. Ayla TOPUZ SAVAŞ	Anadolu University
DETERMINING THE RELATIONSHIP BETWEEN LEADERSHIP STYLES OF MANAGERS AND EMPLOYEES' JOB SATISFACTION	Assoc. Prof. Dr. Bahar SUVACI	Anadolu University
	Lütfi Emirsoyu	Anadolu University
FROM THE PLAK COMPANY TO THE MUSIC MARKET: A CASE STUDY IN THE CONTEXT OF BUSINESS HISTORY	Ayşe Nurefşan YÜKSEL	Ahi Evran University
THE EFFECTS OF TECHNOLOGICAL DEVELOPMENTS ON YOUTH UNEMPLOYMENT	Hilmi ETCİ	Muğla Sıtkı Koçman University
	Büşra HALİS ÖZTÜRK	Muğla Sıtkı Koçman University
DETERMINING THE IMPORTANCE LEVEL OF JOB SATISFACTION AND PERFORMANCE FACTORS	Prof. Dr. Orhan KÜÇÜK Ali BRIDAN Khelid BENSHINIA	Sakarya University of Applied Sciences Applied Sciences Faculty, Sakarya/TURKIYE Kastamonu University

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Session 3 / Hall-2

01.12.2021

Learning/ Moderator: Assist. Prof. Dr. Gizem Köşker

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
COMPARING VARIOUS TASK DESIGNS IN SPEAKING TESTS	Murat POLAT	Anadolu University
FULFILLMENT LEVELS OF THE EXPECTATIONS OF UNIVERSITY STUDENTS FROM THEIR FOREIGN STUDENT PEERS IN MULTICULTURAL EDUCATIONAL SETTINGS	Rüştü Yeşil	Sakarya University
FACE-TO-FACE EDUCATION AFTER DISTANCE EDUCATION DURING THE PANDEMIC PERIOD: TEACHER OPINIONS	Güler GÖÇEN KABARAN	Muğla Sıtkı Koçman University
IS BILINGUALISM AN ADVANTAGE IN EDUCATIONAL PROCESS?	Assist. Prof. Dr. Gizem Köşker	Anadolu University
EXAMINATION OF SECONDARY EDUCATION TEACHERS' VIEWS ON ORGANIZATIONAL SILENCE IN TERMS OF DIFFERENT VARIABLES	Gözde SEZEN-GÜLTEKİN	Sakarya University
	Gizem YAMAN	Sakarya University
INVESTIGATION OF PARENTS' VIEWS ON DISTANCE EDUCATION DURING THE PANDEMIC PERIOD	Sedat ALTINTAŞ	Muğla Sıtkı Koçman University
	Sabri SİDEKLİ	Muğla Sıtkı Koçman University
TRENDS IN TRANSITION TO INDEPENDENT LIVING AND CAREER DEVELOPMENT OF INDIVIDUALS WITH SPECIAL NEEDS	Caner KASAP	Karamanoğlu Mehmetbey University
THE EFFECTS OF ONLINE CONCEPT TEACHING MATERIAL INTEGRATED TEACHING METHODS ON MOTIVATION	Emre YILMAZ	Bursa Uludağ University
	Fikret KORUR	Burdur Mehmet Akif Ersoy University

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Session 3/ Hall-3

01.12.2021

Philosophy/ Moderator: Prof. Dr. Aslı YAZICI

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
NIETZSCHE'S IMAGE OF THE SUPERMAN AND THE IDEA OF MAN OF THE NOOSPHERE REALITY OF V. VERNADSKY	Prof. Dr. Oleksandr Pavlov	Odessa National Technological University, Odessa, Ukraine
NARRATIVE OF INDIGENOUS COMMUNITY IN CANADA	Ananda Majumdar	The University of Alberta
SCIENTIFIC TOPICS IN MODERN UNIVERSAL MASS MEDIA	Kosiuk Oksana	Associate Professor, Lesya Ukrainka Volyn National University
A CRITICAL LOOK AT THE CONCEPT OF "SUPERSTITION" IN TERMS OF THE PROBLEMATIC OF DEFINITION	Assist. Prof. Dr. Hasan PEKER	Adıyaman University
THOMAS AQUINAS' THEORY OF VIRTUE	Prof. Dr. Aslı YAZICI	Bartın University
HUME'S THEORY OF EMOTIONS	Prof. Dr. Aslı YAZICI	Bartın University
EDUCATION, TEACHING AND TEACHER IN THOMAS AQUINAS' REALIST PHILOSOPHY OF EDUCATION	Prof. Dr. Sedat YAZICI	Bartın University
	Prof. Dr. Aslı YAZICI	Bartın University
THE ETHICS OF AMBIGUITY AND CHARACTER TRAITS IN EXISTENTIAL MORAL PHILOSOPHY	Prof. Dr. Sedat YAZICI	Bartın University
	Prof. Dr. Aslı YAZICI	Bartın University
THE NEED TO RETHINK PHILOSOPHY AND ETHICS IN THE INFORMATION AGE	Dr.Nesibe Kantar	

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Session 3 / Hall-4

01.12.2021

Chemistry/ Moderator: Dr. Ghanshyam Barman

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
SYNTHESIS AND CHARACTERIZATION OF NOVEL POLYSTYRENE AND POLYTERTBUTYLACRYLATE MACROINITIATORS VIA ATOM TRANSFER RADICAL POLYMERIZATION	Murat Mısıır	Kırşehir Ahi Evran University, Kırşehir, Turkey
PCL-b-PLLA BLOCK COPOLYMER BEARING TRIFLUOROBENZYLOXY UNITS VIA RING-OPENING POLYMERIZATION: SYNTHESIS AND CHARACTERIZATION	Murat Mısıır	Kırşehir Ahi Evran University, Kırşehir, Turkey
PERVAPORATION: AN EFFICIENT SEPARATION PROCESS	Dr. Ghanshyam Barman	C G P I T, Uka Tarsadia University, Chemical Engineering, Bardoli, Gujarat, India
EFFECT OF THERMAL RADIATION AND CHEMICAL REACTION ON MHD FLOW OF BLOOD IN STRETCHING PERMEABLE VESSEL	Dr. Binyam Zigta	Wachemo University College of Natural and Computational Science, ETHIOPIA
EFFECT OF THERMAL RADIATION AND CHEMICAL REACTION ON MHD FLOW OF BLOOD IN STRETCHING PERMEABLE VESSEL	Dr. Binyam Zigta	Wachemo University College of Natural and Computational Science
BORIDING KINETICS OF AISI T1 STEEL BASED ON THE MEAN DIFFUSION COEFFICIENT METHOD	M. Keddam	Laboratoire de Technologie des Matériaux, Algeria
	Z. Nait Abdellah	Université Mouloud Mammeri, 15000 Tizi-Ouzou, Algeria
	B. Boumaali	Laboratoire de Technologie des Matériaux, Algeria
HONEYBEE PRODUCTS AS MONITORS FOR HEAVY METAL POLLUTION IN SELECTED AREAS IN R. N. MACEDONIA	Biljana Bogdanova Popov	University of Niš, Bulevar Višegradska 33, Niš, Serbia
	Vesna Karapetkovska - Hristova	University "St. Kliment Ohridski", North Macedonia
	Syed Khalid Mustafa	University of Tabuk, Kingdom of Saudi Arabia
	Daniel Ingo Hefft	University Centre Reaseheath, Reaseheath College, United Kingdom
EVALUATION OF CHEMICAL COMPOSITION OF TURKEY'S BREAST MUSCLE FED BY DIFFERENT DIETARY CONCEPTS	Meri Krsteska	University "St. Kliment Ohridski", North Macedonia
	Vesna Karapetkovska - Hristova	University "St. Kliment Ohridski", North Macedonia
ANTIBACTERIAL POTENTIAL OF BENZYL ALCOHOLS	Mamman Sulaiman	Umaru Musa Yar'adua University, , Nigeria
	Yusuf Hassan	Umaru Musa Yar'adua University, Nigeria
	Tugba Taskin-Tok	Gaziantep University, Turkey
	Xavier Siwe-Noundou	Rhodes University, South Africa



EXPLORATION OF ANTIFUNGAL POTENTIAL OF BENZYL ALCOHOL DERIVATIVES	Justina Benson Ogala	Umaru Musa Yar'adua University, Katsina, Nigeria
	Yusuf Hassan	Umaru Musa Yar'adua University, Faculty of Natural and Applied Sciences, Department of Chemistry, Katsina, Nigeria
	Murtala Isah Bindawa	Umaru Musa Yar'adua University, Katsina, Nigeria
	Abdullahi Samaila	Umaru Musa Yar'adua University, Nigeria
	Tugba Taskin-Tok	Gaziantep University, Gaziantep, Turkey

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Session 3 / Hall-5

01.12.2021

Science& Technology/ Moderator: Cristina Dias

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
ADAPTABILITY AND STABILITY ANALYSIS OF WHEAT GENOTYPES	Cristina Dias	New University of Lisbon, Portugal
	Carla Santos	New University of Lisbon, Portugal
“BERTRAND BOX” AND “MONTY HALL” PROBLEMS AS LECTURE TOOLS	Carla Santos	Polytechnic Institute of Beja, Portugal
	Cristina Dias	Polytechnic Institute of Portalegre, Portugal
ACCELERATED TENSORIAL DOUBLE PROXIMAL GRADIENT METHOD FOR TOTAL VARIATION REGULARIZATION TECHNIQUE	Benchettou oumama	ULCO/UCA, France/Morocco
	Bentbib Abdeslem Hafid	UCA Morocco
	Bouhamidi abderrahman	ULCO France
FIXED POINT THEOREMS IN RELATIONAL METRIC SPACES WITH AN APPLICATION TO BOUNDARY VALUE PROBLEM	Gopi Prasad	HNB Garhwal University, Srinagar Garhwal, India
A NEW ANT COLONY OPTIMIZATION FOR TRAVELING SALESMAN PROBLEM	Payam Basiri	Payame Noor University, Tehran, Iran
	Majid Yousefikhoshbakht	Bu-Ali Sina University, Hamedan, Iran
EXTENDED UNIFIED MITTAG-LEFFLER FUNCTION AND ITS PROPERTIES	Umar Muhammad Abubakar	Kano University of Science and Technology, Kano State, Nigeria
	Salim Rabi'u Kabara	Kano University of Science and Technology, Kano State, Nigeria
	AmeerAbdullahi Hassan	Kano University of Science and Technology, Wudil, Kano State, Nigeria
	Faisa Adam Idris	Sa'adatu Rimi College of Education, Kumbotso, Kano State, Nigeria
APPROXIMATION FOR MAX-PRODUCT OPERATORS VIA STATISTICAL CONVERGENCE WITH RESPECT TO POWER SERIES METHOD	Asiye Arif	Bilecik Şeyh Edebali University, Turkey
	Tuğba Yurdakadim	Bilecik Şeyh Edebali University, Turkey
A NUMERICAL SOLUTION FOR A COMPETITIVE LOTKA-VOLTERRA SYSTEM WITH TWO DISCRETE DELAYS	Elçin Gökmen	Muğla Sıtkı Koçman University
	Osman Raşit Işık	Muğla Sıtkı Koçman University
NECESSARY OPTIMALITY CONDITIONS FOR A BILEVEL MULTIOBJECTIVE PROGRAMMING PROBLEM VIA A PSI-REFORMULATION	Lafhim Lahoussine	Sidi Mohammed Ben Abdellah University
RECENT TECHNOLOGY IN SOLAR ABSORPTION COOLING SYSTEM: A REVIEW	Dr. Noor Alam	Nawab Shah Alam Khan College of Engineering and Technology
	Dr. Zahir Hasan	Nawab Shah Alam Khan College of Engineering and Technology

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Session 3 / Hall-6

01.12.2021

Biology/ Moderator: Assist. Prof. Dr. Samer Mudalal

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
AVAILABILITY OF EDIBLE MUSHROOMS IN AYODHYADHAM, INDIA	Siddhant	Durgesh Nandini Degree College, India
	Mahesh Kumar	Independent Researcher, Ayodhyadham
	Shalini Mishra	UG Student, SPSP PG College, Ayodhyadham, India
THE IMPACT OF COMMERCIAL DISTRIBUTION CHAIN CONDITIONS ON THE SHELF LIFE OF CHICKEN CARCASSES MARKETED IN PALESTINE	Samer Mudalal	An-Najah National, University, P.O. Box 7, Nablus, Palestine
	Ahmed Zaazaa	An-Najah National University, P.O. Box 7, Nablus, Palestine
PARASITE FAUNA OF FISH FROM RESERVOIR STREZHEVO (N. MACEDONIA)	Dijana Blazhekovicj - Dimovska	University "St. Kliment Ohridski", N. Macedonia
	Stojmir Stojanovski	Hidrobiological Institute, 6000 Ohrid, N. Macedonia
EXPLORING THE STRUCTURAL AND RHEOLOGICAL CHARACTERISTICS OF MAIZE BRAN CELL WALL	Muzzamal Hussain	Government College University, Faisalaabd, Pakistan.
	Farhan Saeed	Government College University, Faisalaabd, Pakistan.
	Muhammad Afzaal	Government College University, Faisalaabd, Pakistan.
GENETIC DIVERSITY FOR YIELD AND YIELD TRAITS OF BAMBARA GROUNDNUT (<i>Vigna subterranea</i> (L.) Verdc) UNDER TWO AGRO-ECOSYSTEMS	OLALEKAN O. J.	Forestry Research Institute of Nigeria
	ELUMALERO G. O.	Forestry Research Institute of Nigeria
	OGUNBELA A. A.	Forestry Research Institute of Nigeria
	APENAH M. O.	Forestry Research Institute of Nigeria
	AGBOOLA J. O.	Forestry Research Institute of Nigeria
	ONASANYA A. K.	Forestry Research Institute of Nigeria
	AJAYI O. K.	Forestry Research Institute of Nigeria
A REVIEW OF SOME EFFECTS OF AQUEOUS EXTRACT OF CYMBOPOGON CITRATUS LEAF ON STOMACH	OLALEKAN O. J.	Forestry Research Institute of Nigeria
	OLALEKAN O. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
	ADEBANJO F. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
	ADEBANJO M. T	Ogun State College of Health Technology, Ilese-Ijebu, Nigeria
	ELUMALERO G. O	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
	APENAH M. O	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
INVESTIGATING THE ROLE/IMPACT OF EARTHWORM IN SOIL CONDITIONING (VERMICASTING)	ADEBANJO M. T	Ogun State College of Health Technology, Ilese-Ijebu, Nigeria
	ADEBANJO F. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
	OLALEKAN O. J.	Forestry Research Institute of Nigeria
	OLALEKAN O. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria



EFFECTS OF PLANT EXTRACTS ON THE MANAGEMENT OF SEED-BORNE PATHOGENS OF COOTON (Gossypium spp)	ADEBANJO F. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
	ADEBANJO M. T	Ogun State College of Health Technology, Ilese-Ijebu, Nigeria
	OLALEKAN O. J.	Forestry Research Institute of Nigeria
	OLALEKAN O. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria
STUDY BY ASSAYING THE VARIATION OF THE CONTENT OF ASCORBIC ACID IN (ORANGE JUICE, LEMON JUICE, PARSLEY AND CELERY)	Affaf TABTI	University of Relizane Ahmed Zabana, Algeria
	Souhila Djalout	University of Relizane Ahmed Zabana, Algeria
	Khiera BOURAS	University of Relizane Ahmed Zabana , Algeria

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Session 3/ Hall-7

01.12.2021

Artificial Intelligence/ Moderator: Assoc. Prof. Dr. Yassine YAKHELEF

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
NEURAL NETWORK INTEGRATED WITH ACTIVE CONTOUR MODEL FOR SEGMENTATION OF MEDICAL IMAGES	Mehreen Fida	University of Engineering and Technology Peshawar, Peshawar, Pakistan
	Dr. Noor Badshah	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Asif Ahmad	Cecos University of IT and Emerging Sciences
	Dr. ABDUL HAFEEZ	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Arif Ulla	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Yalin Zheng	Department of Eye and Vision Science
DEEP LEARNING APPROACHE FOR SEGMENTATION OF MEDICAL IMAGES	Arif Ullah	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Dr. Noor Badshah	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Asif Ahmad	Cecos University of IT and Emerging Sciences
	Dr. Abdul Hafeez	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
	Mehreen Fida	University of Engineering and Technology Peshawar, Peshawar, Pakistan.
A SYSTEMATIC REVIEW ON DURABLE SECURITY SOLUTIONS FOR SECURITY-CRITICAL WEB-APPLICATIONS	Alka Agrawal	Department of Information Technology, Babasaheb Bhimrao Ambedkar University Lucknow, 226025, Uttar Pradesh, India
	Raees Ahmad Khan	Department of Information Technology, Babasaheb Bhimrao Ambedkar University Lucknow, 226025, Uttar Pradesh, India
	Md Tarique Jamal Ansari	Department of Information Technology, Babasaheb Bhimrao Ambedkar University Lucknow, 226025, Uttar Pradesh, India
TENSOR PRODUCTS WITH APPLICATION TO FACE RECOGNITION	Asmaa Khouia	University of Littoral Cote d'Opale-LMPA-France
COMPARISON STUDY OF MODULAR MULTILEVEL CONVERTER BASED SOLAR MICROGRID CONVERSION	Yassine YAKHELEF	Associate Professor at University of Boumerdes, Algeria
	Billel SMAANI	Assistant Professor at University of Boumerdes, Algeria



SYSTEM WHEN USING NEURAL NETWORK MPPT CONTROL	Fares NAFA	Assistant Professor at University of Bumerdes, Algeria
	Messaoud BOULOUH	Full Professor at University of Guelma, Algeria
	Ali BOUHEDDA	Assistant Professor at University of Bouira, Algeria
AN INTELLIGENT ENVIRONMENTAL BIOSENSOR BASED ON THE FUZZY INFERENCE SYSTEM	KEYVAN ASEFPOUR VAKILIAN	Gorgan University, Gorgan, Iran
A COMPARISON OF OPTIMIZATION METHODS IN IMAGE PROCESSING-BASED AGRICULTURAL YIELD ESTIMATION	KEYVAN ASEFPOUR VAKILIAN	Gorgan University, Gorgan, Iran

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Session 1 / Hall-1

02.12.2021

Religion & Ethics/ Moderator: Assist. Prof. Dr. Mehmet KOÇ

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
BASED on FATWAS and COURT DECISIONS TRUST (VEDIA) CONTRACT in OTTOMAN LAW	Assist. Prof. Dr. Mehmet KOÇ	Niğde Ömer Halisdemir University
THE OPINIONS OF THE STUDENTS OF THE FACULTY OF ISLAMIC SCIENCES ON THE RELIGIOUS MUSIC COURSE	Duygu TURAN	Tokat Gaziosmanpaşa University
INTUITION TO INSIGHT: Error, Doubt and Belief	Habibe Aldağ	Çukurova University, Adana, Turkey.
THE ROLE OF MOTHERS AND FATHERS IN THE FORMATION OF ETHICAL ATTITUDES OF CHILDREN IN PRIMARY SCHOOL PERIOD	Muhyettin ÖZEN	Van Yüzüncü Yıl University
THE EMOTION WALK: EXPLORING RELIGIOUS AND HISTORICAL SPACES THROUGH PSYCHOGEOGRAPHY	Aslıhan KUŞÇUOĞLU	Tokat Gaziosmanpaşa University
	Hüseyin MERTOL	Tokat Gaziosmanpaşa University
THE SCIENTIFIC PROGRESS IN RELIGIOUS EDUCATION: GRADUATE THESIS	Aslıhan KUŞÇUOĞLU	Tokat Gaziosmanpaşa University
ISLAM AND HUMAN RIGHTS IN THE CONTEXT OF SLAVERY	Hasan MAÇİN	Adıyaman University

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Session 1 / Hall-2

02.12.2021

Agriculture/ Moderator: Assoc. Prof. Dr. Serap KILIÇ ALTUN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
INTERACTION VARIANCES OF MOSQUITOES' GENERA	Dr. Olubunmi T. OLORUNPOMI	Nigeria Police Academy, Wudil Kano State, Nigeria
	Dr. Rabi S. DUWA	Nigeria Police Academy, Faculty of Science, Department of Biological Sciences, Nigeria Police Academy, Wudil, Kano, Nigeria
AGE AND GROWTH CHARACTERISTICS OF GREATER FORKBEARD (PHYCIS BLENNOIDES) CAUGHT FROM NORTHEASTERN MEDITERRANEAN	Hülya GİRĞİN	Dokuz Eylül University, Faculty of Veterinary, Department of Animal Science, Izmir, TURKEY
	Nuri BAŞUSTA	Fırat University, Faculty of Fisheries, Department of Fisheries Basic Sciences, Elazığ, TURKEY
EXPERIMENTAL AND STATISTICAL STUDY OF THE PHYSICAL, CHEMICAL, AND MECHANICAL CHARACTERISTICS OF THE NORMAL AND TORREFIED PELLETS OF THE USED HORSE BEDDING	Bahman Ghiasi Gholamreza Asadollahfardi Mohsen Asadi	UBC, Faculty of Science, Department of Chemical and Biological Engineering, Vancouver, Canada Kharazmi University, Tehran, Iran University of Saskatchewan, Canada
ANALYSIS OF SOME TRACE AND TOXIC ELEMENT CONCENTRATIONS OF SHEEP MILK BY USING AN INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETER	Assoc. Prof. Dr. Serap KILIÇ ALTUN	Harran University, Veterinary Faculty
	Assist. Prof. Dr. Nilgün PAKSOY	Harran University, Veterinary Faculty
DETERMINATION OF SOME TRACE ELEMENTS IN EWE MILK YOGURT ANALYZED BY ICP-OES	Assoc. Prof. Dr. Serap KILIÇ ALTUN	Harran University, Veterinary Faculty
SOME CHARACTERISTICS OF GOAT MEAT	Füsun Coşkun	Kırşehir Ahi Evran Üniversitesi, Ziraat Fakültesi, Zootekni Bölümü, Kırşehir , Türkiye
A RESEARCH ON THE RELATIONSHIP BETWEEN AGRICULTURAL INCOME AND TRACTORIZATION IN TURKEY AS OF 2020	Asst. Prof. Dr. Gülfinaz ÖZOĞUL	Yozgat Bozok University

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Session 1 / Hall-3

02.12.2021

Health/ Moderator: Aycan DAL DÖNERTAŞ

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
TREATMENT APPROACHES FOR DENTAL TRAUMA IN CHILDREN: CASE SERIES	Aycan DAL DÖNERTAŞ	Niğde Ömer Halisdemir University
FREE GINGIVAL GRAFT APPLICATIONS IN ATTACHED GINGIVAL INSUFFICIENCY: CASE SERIES	Şafak Necati DÖNERTAŞ	Niğde Ömer Halisdemir University
NORTH CAROLINA MACULAR DYSTROPHY:CASE REPORT	Ali ŞİMŞEK	Harran University
	Çağrı MUTAF	Harran University
	Eren HÜZMELİ	Harran University
	Ekrem Can ARABACI	Harran University
AN INCIDENTAL STRAATSMA SYNDROME DETECTED IN THE INVESTIGATION OF CATARACT ETIOLOGY	Ali ŞİMŞEK	Harran University
	Çağrı MUTAF	Harran University
	Eren HÜZMELİ	Harran University
	Ekrem Can ARABACI	Harran University
CURRENT EVALUATION OF PULPOTOMY TREATMENT IN YOUNG PERMANENT TEETH	Melike Kurt	Zonguldak Bulent Ecevit University
	Ebru Hazar Bodrumlu	Zonguldak Bulent Ecevit University
PHOTON INTERACTION PERFORMANCE OF DENTAL COMPOSITES	Mehmet Fatih TURHAN	Afyonkarahisar Health Sciences University
HYBRID METAHEURISTICS APPROACH FOR CLINICAL DATABASE WITH SPECIAL REFERENCE TO DIABETES	Gunasekar Thangarasu Kayalvizhi Subramanian	MAHSA University, Malaysia MAHSA University, Malaysia
HEALTH COMES FROM APITHERAPY	Gizem KEZER Özlem AYDIN	Kırşehir Ahi Evran University

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Session 1 / Hall-4

02.12.2021

Cultivation/ Moderator: Prof. Dr. Ahmet Kazankaya

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
A RESEARCH ON THE DETERMINATION OF THE AMPELOGRAPHIC CHARACTERISTICS OF GRAPE VARIETIES GROWN IN ŞEMDİNLİ (HAKKARI) REGION	Mustafa Aktaş	Ziraat Mühendisi, Tarım İl Müdürlüğü – Hakkari-TÜRKİYE
	Ahmet Kazankaya	Kırşehir Ahi Evran University
	Adnan Doğan	Kırşehir Ahi Evran University
DETERMINATION OF CHLOROPHYL AMOUNT, STOMA DENSITY AND NUTRITIONAL STATUS IN CHICKENS CULTIVATED IN ADILCEVAZ (BITLİS) REGION	Ebrar Tunalı	Ziraat Mühendisi, Tarım İl Müdürlüğü – Bitlis-TÜRKİYE
	Ahmet Kazankaya	Kırşehir Ahi Evran University
	Adnan Doğan	Kırşehir Ahi Evran University
EFFECTS ON HAY YIELD AND QUALITY OF DIFFERENT GRASSPEA (LATHYRUS SATIVUS L.) AND OAT (AVENA SATIVA L.) MIXTURES RATIO IN KIRŞEHİR CONDITIONS	Assist. Prof. Dr. Hakan KIR	Kırşehir Ahi Evran University
	Assoc. Prof. Dr. Tamer YAVUZ	Kırşehir Ahi Evran University
	Lect. Veysel GÜL	Kırşehir Ahi Evran University
EVALUATION OF THE EFFECT OF NATURAL VENTILATION AND EVAPORATIVE COOLING APPLICATIONS ON INDOOR VAPOR PRESSURE DEFICIT IN HIGH TUNNELS	Sedat BOYACI	Kırşehir Ahi Evran University
THE EFFECT OF INCREASING CONCENTRATIONS OF IRON ON IRON NUTRITIONAL PROPERTIES OF SOME SUNFLOWER LINES GROWN IN SAND CULTURE	Prof. Dr. Ahmet KORKMAZ	Ondokuz Mayıs University
	Güney AKINOĞLU	Ondokuz Mayıs University
	Elif Boz	General Directorate of Turkish Coal Enterprises, Ankara, TURKEY
	İlkay ÇOKA	Mersin University
DETERMINATION OF THE ENERGY POTENTIAL OF TOMATO AND PEPPER RESIDUES GROWN IN THE GREENHOUSE	Ayşe BAŞPINAR	Kırşehir Ahi Evran University
	Hakan BAŞAK	Kırşehir Ahi Evran University
	Ayşe Nur ÇETİN	Kırşehir Ahi Evran University
	Alim AYDIN	Kırşehir Ahi Evran University
EFFECT OF MYCORRHIZA INOCULATION ON DIFFERENT SUBSTRATES ON CUCUMBER (CUCUMIS SATIVUS L.) PLANT DEVELOPMENT, YIELD AND FRUIT QUALITY	Ayşe Nur ÇETİN	Kırşehir Ahi Evran University
	Hakan BAŞAK	Kırşehir Ahi Evran University
	Alim AYDIN	Kırşehir Ahi Evran University
	Ayşe BAŞPINAR	Kırşehir Ahi Evran University
DETERMINATION OF THE EFFICACY OF TAGETES PATULA L. (ASTERALES: ASTERACEAE) SILVER AND GOLD NANOPARTICLES WATER EXTRACT AGAINST SITOPHILUS GRANARIUS (L.) (COLEOPTERA: CURCULIONIDAE) IN LABORATORY CONDITIONS.	Hayriye Didem SAĞLAM ALTINKÖY	Kırşehir Ahi Evran University

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Session 1 / Hall-5

02.12.2021

Health/ Moderator: Assist. Prof. Dr. Nivine H. Abbas & Yetti Hernaningsih

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
UPPER AND LOWER BRANCHES OF CENTRAL RETINAL ARTERY	Tetiana Orlova	Kharkiv National Medical University, Kharkiv, Ukraine
METABOLIC SYNDROME IN PREGNANT WOMEN: THE ROLE OF BODY COMPOSITION	Alexander Plakida	Odessa National Medical University, Odessa, Ukraine
THE STATE OF UKRAINE'S READINESS FOR ESTABLISHMENT OBSERVATORIES FOR SUSTAINABLE DEVELOPMENT OF RESORT DESTINATIONS	Tatiana Bezverkhiuk	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Khrystyna Koieva	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Alexander Plakida	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
ISOLATION OF MESENCHYMAL STEM CELLS FROM HUMAN TESTICULAR TISSUE	Maryam Hassan Nasab	Islamic Azad University, Ashkezar, Yazd, Iran
	Rahim Ahmadi	Avicenna International College, Budapest, Hungary
AN UPDATE OF THE POSSIBLE APPLICATIONS OF MAGNETIC RESONANCE IMAGING (MRI) IN DENTISTRY: A LITERATURE REVIEW	Rodolfo Reda	Sapienza University of Rome, 00161 Rome, Italy
	Alessio Zanza	Sapienza University of Rome, 00161 Rome, Italy
	Alessandro Mazzoni	Sapienza University of Rome, 00161 Rome, Italy
	Andrea Cicconetti	Sapienza University of Rome, 00161 Rome, Italy
	Luca Testarelli	Sapienza University of Rome, 00161 Rome, Italy
	Dario Di Nardo	Sapienza University of Rome, 00161 Rome, Italy
KOI HERPESVIRUS AND PROBIOTICS APPLIED IN AQUACULTURE TO DECREASE DAMAGES CAUSED BY THE DISEASE	Kapka Mancheva	Bulgarian Academy of Sciences; Bulgaria
	Svetla Danova	Bulgarian Academy of Sciences; Bulgaria
	Neli Vilhelmova-Ilieva	Bulgarian Academy of Sciences; Bulgaria
	Lora Simeonova	Bulgarian Academy of Sciences; Bulgaria
	Lili Dobрева	Bulgarian Academy of Sciences; Bulgaria
	Georgi Atanasov	Bulgarian Academy of Sciences; Bulgaria



THE PROFILE OF CD4+, CD8+, AND CD4+/CD8+ T CELLS RATIO IN ADULT ACUTE LEUKEMIA	Yetti Hernaningsih	Universitas Airlangga, Indonesia
	Yulia Nadar Indrasari	Universitas Airlangga, Indonesia
	Ami Ashariati	Universitas Airlangga, Indonesia

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Session 1 / Hall-6

02.12.2021

Moderator: Assoc. Prof. Dr. Shikha Saxena & Assoc. Prof. Dr. Priyanka Singh

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 10:00 – 12:30

Title	Author(s)	Affiliation
KNOWLEDGE, FEAR, AND PREVENTIVE COVID-19 BEHAVIOR IN PREGNANT WOMEN IN INDONESIA	INKE MALAHAYATI	Medan Health Polytechnic of Ministry of Health, Department of Midwifery, Medan, Indonesia
	ZURAIDAH	Medan Health Polytechnic of Ministry of Health, Department of Midwifery, Medan, Indonesia
MORPHOGENESIS OF THE LYMPHOID TISSUE OF THE THYROID GLAND AT AN EARLY AGE UNDER CONDITIONS OF EXPERIMENTAL PRENATAL ANTIGENIC LOAD	Olha Fedosieieva	Zaporizhzhia State Medical University, Ukraine
«MORPHOFUNCTIONAL FEATURES OF OLFACTOR EPITHELIUM IN COVID-19 INFECTION»	Hanna Sakal	Kharkiv National Medical University
	Oleksandr Stepanenko	Kharkiv National Medical University
	Nataliia Maryenko	Kharkiv National Medical University
	Nadiia Nikandrova	Kharkiv National Medical University
IMPROVING THE DIGITAL LESSON IN MEDICAL SCHOOL	Kyuchukova Silviya	Trakia University, Bulgaria
INFLUENCE OF SOME MINERAL NATURAL WATERS OF THE BLACK SEA REGION OF UKRAINE ON THE EXPERIMENTAL GASTRIT	Sergey Gushcha	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Boris Nasibullin	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Michael Arabaji	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
	Alexander Plakida	State Institution "Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine", Odesa, Ukraine
RECENT DIAGNOSTIC AIDS IN ORAL CANCER DETECTION	Dr. Shikha Saxena	RUHS College of Dental Sciences, Jaipur, Rajasthan, India
	Dr. Priyanka Singh	King George's Medical University, Lucknow (UP), India
CLIMATIC FACTORS AND HOME ENVIRONMENT WITH DENGUE CASES IN THE SEASON ZONE IN FIVE CITIES/DISTRICTS IN EAST JAVA	Ririh Yudhastuti	Environmental Health Department, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
	Aldio Yudhatrisandy	Master Student of Environmental Health Department, Faculty of Public Health, Universitas Airlangga Surabaya Indonesia
	M.Azmi Maruf	Master Student of Environmental Health Department, Faculty of Public Health, Universitas Airlangga Surabaya Indonesia



	Hari Basuki N	Biostatistics and Demography Department, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
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Session 2 / Hall-1

02.12.2021

Moderator: Hafize Nagehan Köysüren

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
STUDY OF PHOTOCATALYTIC ACTIVITIES OF BORON DOPED SIC	Hafize Nagehan Köysüren	Kırşehir Ahi Evran University
ANTIDEPRESSANT DRUG FLUOXETINE-SELECTIVE POTENTIOMETRIC MICROSENSOR	Murat YOLCU	Giresun University
	Duygu OK	Giresun University
INVESTIGATIONS OF PHYSICAL PROPERTIES OF BINCA3 ANTIPEROVSKITE COMPOUND: FIRST PRINCIPLES METHOD	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
	Osman ÖRNEK	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
INVESTIGATIONS OF PHYSICAL PROPERTIES OF BiNca3 ANTIPEROVSKITE COMPOUND: FIRST PRINCIPLES METHOD	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
	Osman ÖRNEK	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
INSIGHT INTO STRUCTURAL, ELECTRONIC, THERMODYNAMIC, AND MECHANICAL PROPERTIES OF LI2MGBI HEUSLER ALLOYS	Osman ÖRNEK	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
AB-INITIO INVESTIGATION OF STRUCTURAL, MECHANICAL, ELECTRONIC, AND THERMODYNAMIC PROPERTIES OF HALF-HEUSLER ALLOY MgLiBi	Osman ÖRNEK	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
CRYSTAL STRUCTURE, MECHANICAL AND THERMODYNAMICALLY PROPERTIES OF Os2CuAl COMPOUND: A FIRST-PRINCIPLES INVESTIGATION	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Osman ÖRNEK	Kırşehir Ahi Evran University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
AB-INITIO CALCULATIONS OF ELASTIC CONSTANTS, ELECTRONIC, VIBRATIONAL, AND THERMODYNAMIC PROPERTIES OF VO2Ga HEUSLER COMPOUND	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Osman ÖRNEK	Kırşehir Ahi Evran University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Nihat ARIKAN	Osmaniye Korkut Ata University
PREPARATION AND CHARACTERIZATION GOLD-MAGNETIC NANOCOMPOSITE BY USAGE GREEN CHEMISTRY	Yeliz Akpınar	Kırşehir Ahi Evran University
	Eda Akın	Middle East Technical University

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Session 2 / Hall-2

02.12.2021

Art & Handcraft/ Moderator: Assist. Prof. Dr. Derya KONUK

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
CORAL UNIFESP: THE SCENIC CHOIR AS A FIELD FOR MUSIC-PEDAGOGICAL EXPERIENCES	Marcello Teles Vania Malagutti	Universidade Estadual de Maringá, Maringá, Paraná, Brasil
INVESTIGATION OF THE USE OF OLIGOCLEASE INSTEAD OF ALBITE IN WALL TILE ENGOBE FRITS	Müge TARHAN	Uşak University, Uşak, Türkiye
	Baran TARHAN	Uşak University, Uşak, Türkiye
THE EFFECT OF ALKALINE/EARTH-ALKALINE RATIO ON THE TECHNICAL PROPERTIES OF CERAMIC WALL TILE ENGOBES	Baran TARHAN	Uşak University, Uşak, Türkiye
	Müge TARHAN	Uşak University, Uşak, Türkiye
ACCESSORIES MADE OF KIRKITLI WEAVING IN MUT REGION	Derya KONUK	Karamanoğlu Mehmetbey University
AN EXAMPLE OF CARPET WEAVING CAMPUS LIVING ON THE SKIRT OF AKSARAY HASANDAĞI "AKÇAKENT TOWN"	Semra KILIÇ KARATAY	Aksaray University
TEXTURE TRANSFER OF FIBER, YARN AND FABRIC EFFECTS IN PAINTING	Lect. Dr. Gülşen Şefika BERBER	Manisa Celal Bayar Üniversitesi, Salihli Meslek Yüksekokulu
FORMATION OF SENIOR STUDENTS' VITAL SKILLS IN CREATIVE ORGANIZATION OF INTEGRATION OF FINE ARTS INTO MUSIC	Ayshah RASULOVA	Ganja State University, Ganja/Azerbaijan
LOOKING AT THE FILM OF THE SYNECDOCHE NEW YORK FROM JEAN BAUDRILLARD'S PERSPECTIVE OF SIMULATION	Gönül Cengiz	Gaziantep University

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Session 2 / Hall-3

02.12.2021

Moderator: Dr. Müjdat Öztürk

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
INVESTIGATION OF THE RELATIONSHIP BETWEEN L-TYPE AND N-TYPE SCHMIDT HAMMER HARDNESS VALUES OF ROCKS AND THE EFFECT OF SCHMIDT HAMMER TYPE ON THE PREDICTION OF UNIAXIAL COMPRESSIVE STRENGTH	Deniz AKBAY	Çanakkale Onsekiz Mart University, Çanakkale, Türkiye
	Gökhan EKİNCİOĞLU	Ahi Evran University, Kırşehir, Türkiye
TELEWORK'S POTENTIAL TO REDUCE ANKARA TRAFFIC LOAD	Tolga HORUZ	Gazi University, Turkey
	Ali İbrahim ATILGAN	Gazi University, Turkey
THE EFFECT OF THE HEIGHT SETTING OF THE CUTTING TOOL ON CUTTING FORCES IN TURNING OPERATIONS	Yunus KAYIR	Gazi University, Turkey
	Ercan DEMİRER	Gazi University, Turkey.
DIRECT USE OF DC ENERGY PRODUCED BY PHOTOVOLTAIC MODULE IN INDOOR LIGHTING AND ECONOMIC ANALYSIS OF THE SYSTEM	Müjdat Öztürk	Ahi Evran University, Kırşehir, Turkey
	Ramazan Kayabaşı	Kayseri University, Kayseri, Turkey
ESTIMATION OF ROOFTOP SOLAR ENERGY POTENTIAL WITH IMAGE SEGMENTATION USING SATELLITE IMAGES	L. Enes GÖĞSEN	Düzce University, Düzce, Türkiye
	Prof. Dr. Ali ÖZTURK	Düzce University, Düzce, Türkiye

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Session 2 / Hall-4

02.12.2021

Agriculture/ Moderator: Assoc. Prof. Dr. A.U.ARUN & Assist. Prof. D. Gayathri

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
A PRELIMINARY TOXICITY STUDY ON THE LARVICIDAL POTENTIAL OF SPECIFIC SHAMPOOS	Reemy Sara Mathai	Mar Thoma college for Women, Perumbavoor, Kerala, India
	Dr. A. U. Arun	St. Peter's Collge, Kolenchery, Kerala, India
RESPIRATORY STRESS OF UJALA DETERGENT ON OREOCHROMIS NILOTICUS	Mrs.SHALU SOMAN	Nirmala College, Muvattupuzha, Kerala, India.
	Dr.A.U.ARUN	St.Peter's College, Kolenchery, Kerala, India.
LARVICIDAL ACTIVITY OF CERTAIN HERBAL MOSQUITOREPELLENTS: AN APPRAISAL	Revathy R	Nirmala College, Kerala, India
	A. U. Arun	St. Peters College, Kolenchery, Kerala, India
SOIL-INHABITING INSECTS AND PRODUCTIVITY IN ALFALFA-COCKSFOOT MIXED CROPPING SYSTEMS	Ivelina Nikolova	Institute of Forage Crops – Pleven, Bulgaria
	Viliana Vasileva	Institute of Forage Crops – Pleven, Bulgaria
THE MOST COMMON DISEASES OF HONEYBEES IN THE BELGRADE AREA	Ivan Pavlovic	Scientific Veterinary Institute of Serbia
	Milan Stevanovic	Academy of Beekeeping and Apitherapy of Serbia
	Oliver Radanovic	Scientific Veterinary Institute of Serbia
NUTRITIVE VALUE OF TRASH FISHES OF ASHTAMUDI LAKE OVER DELICACIES	Assistant Professor Mrs. BLESSY V RAJAN	St Xavier's College, Vaikom, Kerala, India
	Associate Professor Dr. A.U.ARUN	St Xavier's College, Vaikom, Kerala, India
AN INSIGHT INTO EVOLUTION OF AUTISM SPECTRUM DISORDER ON A WORLD WIDE SCENARIO	D. Gayathri	National College, Trichy -01
GROWTH REGULATORY AND FITNESS COST STUDIES IN AEADES AEGYPTI ON EXPOSURE TO DIFLUBENZURON, AN INSECT GROWTH REGULATOR	Manu Sankar	Acharya Narendra Dev College, Department Of Zoology, University Of Delhi, New Delhi, India
	Sarita Kumar	Acharya Narendra Dev College, Department Of Zoology, University Of Delhi, New Delhi, India
ABOVEGROUND AND ROOT BIOMASS PARAMETERS AND RATIOS IN ALFALFA SOWN UNDER COVER OF SORGHUM SSP	Viliana Vasileva	Institute of Forage Crops – Pleven, Bulgaria
	Plamen Marinov-Serafimov	Institute of Forage Crops – Pleven, Bulgaria
	Irena Golubinova	Institute of Forage Crops – Pleven, Bulgaria
IMPLEMENTATION OF THE CONCEPT OF COGNITIVE APPRENTICESHIP TO THE POLICE TRAINING	Ruslan Valieiev	Dnipropetrovsk State University of Internal Affairs, Ukraine

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Session 2 / Hall-5

02.12.2021

Chemistry/ Moderator: Assist. Prof. Dr. E. Vildan BURGAZ

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
INVESTIGATION OF MICROSTRUCTURE AND BIODEGRADABLE PROPERTIES OF ZN-MG EUTECTIC ALLOY SOLIDIFIED UNDER STATIC ELECTRIC FIELDS APPLIED WITH DIFFERENT MAGNITUDES AND DIRECTIONS	Çiğdem Ece CAN	Yıldız Technical University, Istanbul, Turkey
	Salim Oğuz AKBULUT	Yıldız Technical University, Istanbul, Turkey
	Hüseyin Ozan YAVUZ	Yıldız Technical University, Istanbul, Turkey
	Assist. Prof. Sercan BASİT	Kırşehir Ahi Evran University, Kırşehir, Turkey
	Prof. Dr. Necmettin MARAŞLI	İstanbul Aydın University, İstanbul, Turkey
SYNTHESIS AND CHARACTERIZATION OF NOVEL 1,5-BIS(4-FLUOROPHENYL)PENTA-1,4-DIEN-3-ONE O-BENZOYL OXIME	Assist. Prof. Dr. E. Vildan BURGAZ	Eastern Mediterranean University, Famagusta, North Cyprus
	Seyed Armin Houshmand Kia	Eastern Mediterranean University, Famagusta, North Cyprus
	Mahya Tanha	Eastern Mediterranean University, Famagusta, North Cyprus
COMPARISON OF MICROWAVE ASSISTED AND CHEMICAL PRE-TREATMENTS AND ENZYMATIC HYDROLYSIS OF THREE AGRICULTURAL WASTES FOR BIOETHANOL PRODUCTION	Ahmed Salisu	Umaru Musa Yar'adua University Katsina, PMB 2218, Nigeria
	Aisha Mannir Rawayau	Umaru Musa Yar'adua University Katsina, PMB 2218, Nigeria
	Aminu Musa	Umaru Musa Yar'adua University Katsina, PMB 2218, Nigeria
	Abubakar Siddiq Salihu	Umaru Musa Yar'adua University Katsina, PMB 2218, Nigeria
EVALUATION OF LARVICIDAL AND CYTOTOXIC ACTIVITY OF EUPORBIA POISSONII EXTRACTS	Abubakar Siddiq Salihu	Umaru Musa Yar'adua University, Nigeria
	Omar Al-moubarak Adoum	Bayero University, Nigeria
THERMODYNAMIC MODEL FOR THE DETERMINATION OF THE AREAS OF PHASE STABILITY IN MIXTURES OF ANIONIC AND CATIONIC SURFACTANTS	Igor Povar	Institute of Chemistry
	Oxana Spinu	Institute of Chemistry
	Petru Spataru	Institute of Chemistry
	Diana Shepel	Institute of Chemistry
	Boris Pintilie	Institute of Chemistry
	Alexandru Visnevschi	Institute of Chemistry
LEACHING OF MUNICIPAL SOLID WASTE FROM THE MOSTAGANEM DISTRICT IN ALGERIA (poster)	Bourechech Zohra	University of Mostaganem. 27000 Mostaganem, Algeria
PRELIMINARY PHYTOCHEMICAL STUDY OF HELIOPSIS HELIANTHOIDES (L.) SWEET., CELOSIA PLUMOSA (VOSS) BURV. AND CELOSIA CRISTATA L.	Viktoriia Protska	National University of Pharmacy, Kharkiv, Ukraine
	Iryna Zhuravel	National University of Pharmacy, Kharkiv, Ukraine
1,2-BENZOTHAZINE DERIVATIVES: SYNTHESIS, MOLECULAR DOCKING AND α -GLUCOSIDASE INHIBITIONS	Furqan Ahmad Saddique	Government College University, Faisalabad, Pakistan.
	Sana Aslam	Government College Women University, Faisalabad, Pakistan.
	Matloob Ahmad	



		Government College University, Faisalabad, Pakistan.
	Usman Ali Ashfaq	Government College University, Faisalabad, Pakistan
ELECTRONIC, ELASTIC, THERMODYNAMIC PROPERTIES OF MG3ZN COMPOUND: INSIGHTS FROM DFT-BASED COMPUTER SIMULATION	Nihat ARIKAN	Osmaniye Korkut Ata University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Osman ÖRNEK	Kırşehir Ahi Evran University
AB INITIO CALCULATION OF MECHANICAL AND THERMODYNAMIC PROPERTIES OF NbOsSi COMPOUND IN C1b PHASE	Nihat ARIKAN	Osmaniye Korkut Ata University
	Ahmet İYİĞÖR	Kırşehir Ahi Evran University
	Mustafa ÖZDURAN	Kırşehir Ahi Evran University
	Osman ÖRNEK	Kırşehir Ahi Evran University

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Session 2 / Hall-6

02.12.2021

Law/ Moderator: Ph.D. Maja Vizjak

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 13:00 – 15:30

Title	Author(s)	Affiliation
LEGAL AND ECOLOGICAL SYSTEM OF THE REPUBLIC OF CROATIA	Ph.D. Maja Vizjak, M.Sc. Art	Faculty of Economics and Tourism Dr. Mijo Mirković
PROSTITUTION HANDLING STRATEGIES IN HIV/AIDS PREVENTION BASED ON LOCAL WISDOM: BANYUWANGI REGENT REGULATION NO. 45 YEAR 2015	Dr. (Chand). Hary Priyanto, S.T, M.Si Dr. Nana Noviana, S.ST, M.Kes	17 August 1945 University, Banyuwangi, East Java. Indonesia ID Scopus: 57220027441 Researcher at Regional Research and Development Agency, South Kalimantan Province, Indonesia
CLAIMING HISTORY: WOMEN'S MEMOIRS OF STRUGGLES AGAINST MARCOS MARTIAL LAW	Dirb Boy O. Sebrero	University of the Philippines Cebu
WOMEN'S ENTREPRENEURSHIP AND THE SOCIO-ECONOMIC DEVELOPMENT	Gordana Gasmi Mina Zirojevic	Institute od Comparative Law
PAKISTAN'S JUDICIAL INDEPENDENCE ORIGIN AND INVOLVEMENT IN NATION-BUILDING: A HISTORICAL PERSPECTIVE DETAILING JUDICIAL DILEMMAS	Rida Zulfiqar Dr. Attila Badó Antal Tamás Róbert	University of Szeged, Szeged, Hungary
EARTHQUAKES ECONOMIC COSTS THROUGH RANK-SIZE LAWS	Valerio Ficcadenti	London South Bank University, Business School, London, United Kingdom
	Roy Cerqueti	Sapienza University of Rome, Department of Social and Economic Sciences, Rome, Italy

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Session 3 / Hall-1

02.12.2021

Moderator: Evrim Ersin Kangal & Dr. Olubunmi T. OLORUNPOMI

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
FACE RECOGNITION BASED POLLING SYSTEM	Günay TEMÜR	Düzce University
	Nurgül KURT	Düzce University
COMPARISON OF BINARY LOGISTICS REGRESSION, KNN, CART AND NAIVE BAYES METHODS OF CLASSIFICATION METHODS	Bayram YAPICI	Gazi University, Ankara, TÜRKİYE
	Hülya OLMUŞ	Gazi University, Ankara, TÜRKİYE
EVALUATING THE RECENT COSMOLOGICAL DATA VIA DEEP LEARNING ANALYSIS	Evrin Ersin Kngal	Mersin University, Mersin, Turkey
DISEASE OUTBREAK PREDICTION: DATA SOURCES AND TECHNIQUES	Avneet Singh Gautam	Jawaharlal Nehru University, Delhi, India.
	Dr. Zahid Raza	Jawaharlal Nehru University, Delhi, India.
PREDICTION OF THE SIMPLE COMPRESSIVE STRENGTH OF LIME STABILIZED CLAYEY SOILS USING ARTIFICIAL NEURAL NETWORKS	KELLOUCHE Yasmina	Department of Earth Science and Univers, University Djilali Bounaama, 44225 Khemis-Miliana, Algeria
	Kanté Seydou	Department of Earth Science and Univers, University Djilali Bounaama, 44225 Khemis-Miliana, Algeria
	Vumi Quilulo Nunes Alvaro	Department of Earth Science and Univers, University Djilali Bounaama, 44225 Khemis-Miliana, Algeria
	Ahmed Bilal Sari	Geomaterials Laboratory, University Hassiba Benbouali, 02000 Chlef, Algeria
CYBER FORENSICS: RELEVANCE OF DIGITAL EVIDENCE IN INDIA	Sneha Dhillon	Asian Law College, Noida (Delhi NCR) India
THE OPTIMIZED ARTIFICIAL NEURAL NETWORK MODEL WITH LEVENBERG-MARQUARDT ALGORITHM FOR GLOBAL SOLAR RADIATION ESTIMATION IN OUARGLA CITY OF ALGERAI	Dahmani Abdennasser	University of Médéa, 26000, Algeria
	Ammi Yamina	University of Médéa, 26000, Algeria
	Hanini Salah	University of Médéa, 26000, Algeria
PREDICTION HOURLY SOLAR RADIATION USING ARTIFICIAL NEURAL NETWORK TECHNIQUE OF BENI SLIMANE, ALGERIA (poster)	Dahmani Abdennasser	University of Médéa, 26000, Algeria
	Ammi Yamina	University of Médéa, 26000, Algeria
	Hanini Salah	University of Médéa, 26000, Algeria

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Session 3 / Hall-2

02.12.2021

International Realties / Moderator: Assist. Prof. Dr. A.Kutalmış YALÇIN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
YUNUS EMRE INSTITUTE AS A CULTURAL DIPLOMACY INSTITUTION: ITS STRUCTURE, FUNCTIONING AND HISTORY	Assist. Prof. Dr. A.Kutalmış YALÇIN	Düzce University
ANALYSIS THE PROXY WAR OF THE COLD WAR IN THE MIDDLE EAST OF THE ISLAMIC REPUBLIC OF IRAN AGAINST THE UNITED STATES (A CASE STUDY OF THE AFGHANISTAN CRISIS)	Vorya Shabrandi	Guilan of University, Rasht, Iran
INTERNAL FUNDAMENTAL FACTORS LIMITING THE RISE OF IRANIN INTERNATIONAL POLITICAL ECONOMY	Vorya Shabrandi	Guilan of University, Rasht, Iran
LOOK AT THE FLOW OF SOCIAL AND ECONOMIC REFORMS IN CONTEMPORARY IRANIAN HISTORY	Vorya Shabrandi	Guilan of University, Rasht, Iran
AUTHORITY: A CONCEPT BETWEEN THE GUARANTEE OF ORDER AND STABILITY, AND THE ENMITY OF FREEDOM AND DEMOCRACY	Fatma ODABAŞI	Marmara University
TRUST AND ARMED CONFLICT IN SOLID WASTE MANAGEMENT: A CASE STUDY OF THE AL-FAYHAA UNION, LEBANON	Nivine H. Abbas	University of Balamand, Lebanon
	Manale N. Abou Dagher	American University of Beirut, Lebanon
	Manal R. Nader	University of Balamand, Lebanon.
	Jon C. Lovett	School of Geography, University of Leeds, UK
A. CHALMERS' INTERPRETATION OF RADICAL INSTRUMENTALISM OR PLURALISTIC REALISM FOR INTERNATIONAL RELATIONS	Fatma AKKAN GÜNGÖR	KTÜ-İİBF-Uluslararası İlişkiler-Trabzon, Türkiye

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Session 3 / Hall-3

02.12.2021

Engineering/ Moderator: Assoc. Prof. Dr. Çiğdem Belgin DİKMEN

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
INVESTIGATION OF MICROSTRUCTURAL AND MECHANICAL PROPERTIES FOR WELDED JOINTS OF PROTAC-500, PROTAC-600 AND MARS-300 ARMOR STEELS	Ali Batuhan VURAL	Gazi University, Faculty of Technology, Department of Manufacturing Engineering, Ankara, Turkey
	Prof.Dr.Mahmut İZCİLER	Gazi University, Faculty of Technology, Department of Manufacturing Engineering, Ankara, Turkey
THE EFFECT OF NATURAL STONE FROM TRADITIONAL BUILDING MATERIALS IN KAYSERİ TALAS ON HOUSING ARCHITECTURE IN TIME	Güler Çimen	Ahi Evran Üniversitesi
	Assist. Prof. Dr. Arzu Çağlar	Ahi Evran Üniversitesi
	Assist. Prof. Dr. Hakan Çağlar	Ahi Evran Üniversitesi
STRATEGIES FOR USE OF WOOD FROM TRADITIONAL BUILDING MATERIALS IN EXTERIOR (KAYSERİ / TALAS / TABLAKAYA, KICIKOY NEIGHBORHOODS SAMPLE)	Güler Çimen	Ahi Evran Üniversitesi
	Assist. Prof. Dr. Arzu Çağlar	Ahi Evran Üniversitesi
	Assist. Prof. Dr. Hakan Çağlar	Ahi Evran Üniversitesi
THE EVALUATION OF URBAN FITTING ELEMENTS WITHIN THE SCOPE OF USAGE: THE CASE OF KIRŞEHİR GÜZLER PARK	Assist. Prof. Dr. Olcay Türkan YURDUGÜZEL	Yozgat Bozok University
EVALUATION OF THE DESIGN OF URBAN FURNITURE USED IN URBAN OPEN AREAS: THE CASE OF KIRŞEHİR KENT PARK	Assoc. Prof. Dr. Çiğdem Belgin DİKMEN	Yozgat Bozok University
CONTACT PROBLEM OF A RIGID CYLINDRICAL INDENTER ON FUNCTIONALLY GRADED ISOTROPIC LAYER AND HOMOGENEOUS ORTHOTROPIC LAYER	Erdal ÖNER	Bayburt University

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Session 3 / Hall-4

02.12.2021

Material Engineering/ Moderator: Mohd Khairul Idlan Muhammad

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
CONSTRUCTION DELAY IMPACT ANALYSIS & DIGITALIZED PROJECT MONITORING	Rehan Khan	University of Mumbai, India
	Fauwaz Parkar	University of Mumbai, India
	Rajendra Magar	University of Mumbai, India
SUSTAINABLE SOIL STABILIZATION USING ECO-FRIENDLY BY-PRODUCTS: A STUDY FOR UTILIZATION OF WASTE MATERIALS	Esha Rehman	Pakistan Institute of Engineering & Technology, Pakistan
	Syyed Adnan Raheel Shah	Pakistan Institute of Engineering & Technology, Pakistan
	Muneeb Hassan	Pakistan Institute of Engineering & Technology, Pakistan
	Gulab Ali	Pakistan Institute of Engineering & Technology, Pakistan
	Ahsan Rehman Khan	Ghent University, Department of Civil Engineering, Belgium
A REVIEW OF NON-DESTRUCTIVE TESTING METHODS ON CONCRETE STRUCTURES	Macy Spears	Georgia Southern University, United States
	Dr. Saman Hedjazi	Georgia Southern University, United States
CHANGE IN SPATIAL EXTENTS OF HEATWAVES OVER TIME IN PENINSULAR MALAYSIA	Mohd Khairul Idlan Muhammad	Universiti Teknologi Malaysia (UTM)
	Sobri Harun	Universiti Teknologi Malaysia (UTM)
	Shamsuddin Shahid	Universiti Teknologi Malaysia (UTM)
	Tarmizi Ismail	Universiti Teknologi Malaysia (UTM)
COMBINED EFFECT OF BRICK AND CERAMIC WASTE ON THE BEHAVIOR OF THE MORTAR	Belouadah Messaouda	M'sila University, M'sila, Algeria
	Rahmouni Zine-El-Abidine	M'sila University, M'sila, Algeria
	tebbal nadia	M'sila University, M'sila (28000), Algeria
A SIMPLE APPROACH TO CORROSION IDENTIFICATION IN STEEL BRIDGES	Ehsanul Kabir	Georgia Southern University, Statesboro, GA, United States
	Dr. Saman Hedjazi	Georgia Southern University, Statesboro, GA, United States
A NEW SCHEME FOR ISOLATED BUILDINGS ACCORDING TO ALGERIAN EARTHQUAKE REGULATIONS AND THEIR COMPATIBILITY WITH SEVERAL INTERNATIONAL CODES	OUNIS HADJ MOHAMED	University Mostefa Ben Boulaid, Batna, Algeria
	ZAATAR NASSIMA	University Mostefa Ben Boulaid, Batna, Algeria
	OUNIS ABDELHAFID	University Mohamed Khider, Biskra, Algeria
SEDIMENTATION STABILITY OF DIFFERENTLY SHAPED AND SIZED NANOPARTICLES	Zhengchuan Zhao	Tomsk Polytechnic University
	Anna Godymchuk	Tomsk Polytechnic University
SYNTHESIS AND DESIGN OF VARIOUS PEROVSKITE CATALYSTS FOR LOW TEMPERATURE OXIDATION OF CARBON MONOXIDE	Subhashish Dey	Environmental Engineering Department, Rajiv Gandhi Proududyogiki Vishwavidyalaya, Bhopal, India

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Session 3 / Hall-5

02.12.2021

Environment/ Moderator: Vithal H. Jadhav & Olga Derendyaeva

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
UN INTERNATIONAL POLICY ON SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE	Olga Derendyaeva	All-Russian Research Institute for Civil Defense and Emergencies EMERCOM of Russia
THE NAME OF AN ANCIENT FORTRESS IN THE FOLK PERCEPTION. ENISALA OR HERACLEA?	Associate Prof. Maria Butucea	Technical University of Civil Engineering, Romania
	Vasile Moise	Vice-President, Cultural Association INISLA, Romania
LOCAL PERCEPTION OF CLIMATE CHANGE INDICATORS IN KURFI LOCAL GOVERNMENT AREA, KATSINA STATE, NIGERIA	Rufai Abdulmajid	Isa Kaita College of Education, Dutsin-Ma, Katsina State, Nigeria
MICRO LEVEL FLOOD CONTROL TECHNIQUES: A CASE STUDY ON BENNI HALLA (STREAM) IN NORTH KARNATAKA OF INDIA	Vithal H. Jadhav	Research Scholar, V.T.U. Belagavi, Karnatak State, India and Prof. School of Civil Engineering K.L.E. Technological University Hubballi India
EVALUATION OF ENVIRONMENTAL IMPACT ON THE CITY PROSPERITY INDEX – CASE STUDY IN DANANG CITY - VIETNAM	Tran Thi An	Thu Dau Mot University, Vietnam
	Truong Van Canh	The University of Danang, Vietnam
	Le Ngoc Hanh	The University of Danang, Vietnam
ROLE OF INDIAN JUDICIARY IN MITIGATION OF CLIMATE CHANGE: AN IDEALISTIC APPROACH	A. U. Arun	Cochin University of Science and Technology, INDIA
	Usha K.	Cochin University of Science and Technology, INDIA
	Aneesh V. Pillai	Cochin University of Science and Technology, INDIA
TOURISM IN INDIAN CONTEXT	C.S.N.PRANAVI	ISTS Women's Engineering College, Andhra Pradesh, INDIA
EVALUATION OF INPUT EFFICIENCY FOR FISHING VESSEL IN COASTAL AREAS OF VIETNAM	Nguyen Trong Luong	Nha Trang University – Vietnam
	Dang Hoang Xuan Huy	Nha Trang University – Vietnam

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Session 3 / Hall-6

02.12.2021

Moderator: Fadime Eroglu

Biology/ Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
INVESTIGATION OF THE EFFECTS OF COLD STRESS AND OBESITY ON ANGIOGENIC FACTORS IN RATS	Muhittin YÜREKLİ	İnönü University
	Meral DAĞ	İnönü University
	Filiz ÇOBAN	İnönü University
EFFECT OF HEAVY METALS ON PIGMENT PRODUCTION and ANTIOXIDANT SYSTEM in PSEUDOMONAS AERUGINOSA	Muhittin YÜREKLİ	İnönü University
	Duygu GÜÇLÜ	İnönü University
THE EFFECTS OF HERBAL ESSENTIAL OILS ON BLASTOCYSTOSIS	Fadime Eroglu	Aksaray University
CORRELATION OF NUTRIENT ELEMENTS WITH THE ANTIBACTERIAL ACTIVITY OF BLACK CABBAGE	Muazzez Gürkan Eser	Tekirdağ Namık Kemal University
	Sevinç Adiloğlu	Tekirdağ Namık Kemal University
MOLECULAR DETECTION OF PLASMID-MEDIATED QUINOLONE RESISTANCE GENES IN CLINICAL ESCHERICHIA COLI ISOLATES	Ahmed Mohsin Saleh AL-AZZAWI	Ahi Evran University
	Fatma Filiz ARI	Ahi Evran University
	Elif SEVİM	Ahi Evran University
	Fikriye MİLLETLİ-SEZGİN	Amasya University
REMOVAL OF CHEMICAL OXYGEN DEMAND FROM WHEY BY USING MAGNETIC NANOPARTICLE	Dr. Mustafa AKGÜN	Ardahan University
	Assoc. Prof. Dr. Rövşen GULİYEV	Ardahan University
	Dr. Ömer SADAK	Ardahan University
	Dr. Yusuf ESEN	Ardahan University
COMPARATIVE STUDY OF OIL ADSORBENTS USING CORN CHAFF AND COCONUT FIBRE	M. Auta	Federal University of Technology Minna, Niger State, Nigeria
	K.S. Obayomi	College of Engineering, Landmark University Omu-Aran Kwara State, Nigeria
	A.A. Faruq	Federal University of Technology Minna, Niger State, Nigeria

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Session 3 / Hall-7

02.12.2021

Moderator: German Martinez Prats & Maria Cruz Cuevas Alvarez

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
BARRERAS ARANCELARIAS Y BARRERAS NO ARENCELARIAS	Cristhell Guadalupe Tellaheche Gómez	Ujat, Dacea, Mèxico
	Dr. Miguel Àngel Vite Pèrez	Ujat, Dacea, Mèxico
	Dra. Fabiola de Jesùs Mapen Franco	Ujat, Dacea, Mèxico
HERRAMIENTAS ALTERNATIVAS PARA LA VALORACIÓN DE OPERACIONES ENTRE PARTES VINCULADAS	Ariel Arturo Arias Muñoz	Ujat, Dacea, Mèxico
	Jose María Nieto Contreras	Ujat, Dacea, Mèxico
	Atilano del Jesus Guerra Lizcano	Ujat, Dacea, Mèxico
E-COMMERCE EN MÉXICO, ANÁLISIS ACTUAL DESDE LA PERSPECTIVA DEL CONSUMIDOR	Rommel Shazam Alfaro Mantilla	Ujat, Dacea, Mèxico
	Dra. Aransazú Ávalos Díaz	Ujat, Dacea, Mèxico
	Dr. Germán Martínez Prats	Ujat, Dacea, Mèxico
LA AUDITORIA ADMINISTRATIVA, COMO HERRAMIENTA DE CONTROL INTERNO	Erika Marín Sánchez	Ujat, Dacea, Mèxico
	Dr. Germán Martínez Prats	Ujat, Dacea, Mèxico
	Francisca Silva Hernandez	Ujat, Dacea, Mèxico
COMERCIO ELECTRÓNICO	Lourdes Cristina Soberano Gutierrez	Ujat, Dacea, Mèxico
	Arturo Aguilar de la Cruz	Ujat, Dacea, Mèxico
	Carlos Mauricio Tosca Vidal	Ujat, Dacea, Mèxico
IMPACTO DEL COVID-19 AL COMERCIO EN MÉXICO	Edith Lorena Magaña Pérez	Ujat, Dacea, Mèxico
	Francisca Silva Hernandez	Ujat, Dacea, Mèxico
	Dr. Germán Martínez Prats	Ujat, Dacea, Mèxico
EL CONTROL INTERNO EN LA EFICIENCIA DEL PERSONAL DE UNA EMPRESA	Daniela Valencia Acosta	Ujat, Dacea, Mèxico
	Aída Beatriz Armenta Ramírez	Ujat, Dacea, Mèxico
	José Félix García Rodríguez	Ujat, Dacea, Mèxico

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Session 3 / Hall-8

02.12.2021

Moderator: Marcos Perez Mendoza & Francisca Silva Hernandez

Meeting ID: 884 8432 4978 / Passcode: 000777

Ankara Local Time: 16:00 – 18:30

Title	Author(s)	Affiliation
TRATADOS INTERNACIONALES COMERCIALES DE MEXICO	Abenamar Jimenez Martinez	Ujat, Dacea, Mèxico
	Tomas francisco Morales Cardenas	Ujat, Dacea, Mèxico
	Candelaria Guzman Fernandez	Ujat, Dacea, Mèxico
BARRERAS NO ARANCELARIAS: LAS RESTRICCIONES AL TRATADO DE LIBRE COMERCIO	Lcp. Edrei Del Carmen Izquierdo Alejandro	Ujat, Dacea, Mèxico
	Dra. Candelaria Guzman Fernandez	Ujat, Dacea, Mèxico
	Dr. Germán Martínez Prats	Ujat, Dacea, Mèxico
EL ACCESO A LA INFORMACIÓN COMO UN DERECHO HUMANO	Elia Méndez Díaz	Ujat, Dacea, Mèxico
	Dr. Gregorio Romero Tequextle	Ujat, Dacea, Mèxico
	Dr. Jesús Antonio Piña Gutiérrez	Ujat, Dacea, Mèxico
EL DERECHO A LA VIVIENDA Y LA CARENCIA DE SERVICIOS BÁSICOS	Mtro. Saúl Horacio Rodríguez de la Cerda	Ujat, Dacea, Mèxico
	Dra. Egla Cornelio Landero	Ujat, Dacea, Mèxico
	Dr. Armando Gutiérrez López	Ujat, Dacea, Mèxico
LA LENGUA COMO VEHÍCULO PARA UNA VIDA DIGNA	Mtra. Marilyn Sarai Avalos Huesca	Ujat, Dacea, Mèxico
	Dr. Alfredo Islas Colín	Ujat, Dacea, Mèxico
	Dr. Freddy Alberto Priego Álvarez	Ujat, Dacea, Mèxico
LA MEDIACIÓN EN LOS JUICIOS POR HERENCIA EN TABASCO	Mtra. Bertha Velázquez Jiménez	Ujat, Dacea, Mèxico
	Dra. Francisca Silva Hernández	Ujat, Dacea, Mèxico
	Dr. Jesús Antonio Piña Gutiérrez	Ujat, Dacea, Mèxico
NIÑOS MIGRANTES Y LAS GARANTÍAS MÍNIMAS DEL DERECHO AL DEBIDO PROCESO	Mtro. Oscar Eduardo Cornelio Landero	Ujat, Dacea, Mèxico
	Dra. Guadalupe Vautravers Tosca	Ujat, Dacea, Mèxico
	Dr. Jorge Luis Capdepoont Ballina	Ujat, Dacea, Mèxico

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STUDY OF PHOTOCATALYTIC ACTIVITIES OF BORON DOPED SiC

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ABSTRACT

In this study, boron doping was applied to SiC nanoparticles. Boron doped SiC nanoparticles were obtained by using the wet impregnation method. The photocatalytic activity of pure SiC boron doped SiC (B-SiC) was analyzed by monitoring the degradation of an organic dye (methylene blue) in aqueous solution exposed to UV light. The structure and morphology of SiC and B-SiC were characterized by FTIR, X-ray diffraction spectroscopy and field emission scanning electron microscopy (FESEM). The optical properties and band gap energy of the prepared samples were evaluated from UV-Vis absorption spectroscopy. Boron atoms substituted silicon atoms during the doping process, which results in a narrower band gap. Under UV light irradiation, B-SiC exhibited an enhanced photocatalytic activity compared to pure SiC nanoparticles.

Keywords: Silicon carbide, photocatalytic activity, boron doping, UV light.

1. INTRODUCTION

Silicon carbide (SiC), has varied industrial and scientific applications because of high hardness and strength properties.^[1,2] Varying forms of SiC such as nanotubes, nanofibers are used as a main component of catalytic systems, electrical devices and polymer composites.^[1,2] Particularly, one-dimensional nanoscale SiC has took attention as a component of electronic and optoelectronic devices due to its yellow and blue luminescence. Actually, SiC can be considered as a potential alternative to silicon in the electronic industry.^[3] Also, the potentials of the valence band and the conduction band are proper for the photolysis of organic materials. The utilization of UV light or sunlight for photocatalytic decomposition of organic compounds in wastewater can be seen as a green technique, protecting the environment.^[2]

With the increase of the dye processing industry, this kind of wastewater has become an huge environmental problem.^[4] Among diversity of treatment techniques, photocatalytic degradation by semiconductor photocatalysts can take out organic dye from the wastewater quickly. Nearly all organic molecules detrimental to the environment can be decomposed to harmless H₂O and CO₂ molecules with photocatalytic degradation technique.^[4] Generally, the photoinduced charge carriers are disposed to recombine before they spread to the photocatalyst surfaces.^[2] To compress the recombination of the photoinduced electron-hole pairs, metal or nonmetal doping was carried out on the semiconductor photocatalysts.^[2] Different metal atoms such as, Fe^[6], Ir^[5], Ag^[1] and Pd^[5] have been studied as dopant with SiC to advance the photocatalytic activity. In accordance with the literature, electron transfers were realized between the metal atoms and the SiC photocatalyst because of the Mott-Schottky effect.^[1,5,6] Otherwise, it was reported that the combination of nonmetal atoms played a supreme role in changing the electronic structure of SiC and evolved light absorption feature. On account of this, doping SiC with nonmetal atoms is one of the most main methods to advance the catalytic activity.^[7] In this status, SiC was doped with C atoms^[7], S atoms^[8] and B atoms^[9]. Yang et al.^[9] synthesized boron doped SiC nanowires. It was noticed that boron atoms were replaced by Si atoms during

the dopibg process, following in a more narrower band gap. Within the purpose of this study, the photocatalytic activity of B-SiC was examined and compared with undoped SiC by following the degradation of an organic dye in aqueous solution, subjected of to UV light irradiation.

2. EXPERIMENTAL

2.1. Doping of SiC

SiC nanofibers ($D < 2.5 \mu\text{m}$, $L/D \geq 20$, Sigma-Aldrich) were used in this study as semiconductor photocatalyst. Methylene blue (Sigma-Aldrich) was used as a model dye. Boric acid (H_3BO_3) was used as boron atom (B) source. Boron doped SiC (B-SiC) nanofibers were acquired though the liquid impregnation method.^[6,10] For this aim, a certain amount of boric acid and SiC nanofibers (4 g) were joined together in ethanol-distilled water mixture (100 ml) and then the solution was retain under stirring for 3 hours. The as-prepared slurry was separated from the solution. And then the slurry was dried at 100°C for 24 hours. After the drying process, the acquired product was calcined at 400°C for 3 hours. Eventually, boron doped SiC (B-SiC) nanofibers were acquired.^[6,10]

2.2. Methods of Characterization

B-SiC and SiC were exposed to FTIR spectroscopy to investigate the chemical structure of the as-prepared photocatalyst systems. The crystal structure of B-SiC and SiC were featured by XRD analysis. The morphology analyses was followed with a field emission scanning electron microscope. The optical absorption ability of the samples was surveyed by UV-Vis absorption spectroscopy making use of a Genesys 10S spectrophotometer in the wavelength set from 200 nm to 800 nm.

The photocatalytic performance of the samples was appreciated by following up the degradation of the model dye, methylene blue, in aqueous solution using a Genesys 10S UV-VIS spectrophotometer (Thermo Scientific). To assign the photocatalytic performance, photocatalyst samples were added into the methylene blue solution (10 mg/l). Prior to irradiation, the dye solution including the photocatalyst sample was took in the dark atmosphere for half an hour. The methylene blue solution was lighed up with UVA lamp for 300 minutes. A sample (~2 ml) from the methylene blue solution was taken and then divorced from the photocatalyst particles. The photocatalytic decomposition performance of the photocatalyst samples was analyzed by analyzing the density of the optical absorption peak of methylene blue at 663 nm.

3. RESULTS AND DISCUSSION

3.1. FTIR Analysis

FTIR spectrum of undoped SiC nanofibers is indicated in Figure 1a. The absorption bands are indicated at around 3448 cm^{-1} and 1630 cm^{-1} , which were based on the -OH stretching vibration^[11] The absorption peak between 1010 cm^{-1} and 670 cm^{-1} was bounded up with the vibration of the Si-C bond (Figure 1a).^[11] FTIR spectrum of B-SiC nanofibers also displays the weak absorption bands of the -OH vibration and the O-H distorted vibration (Figure 1b). Another peaks couldn't be seen in the FTIR spectrum of B-SiC nanofibers (Figure 1b).

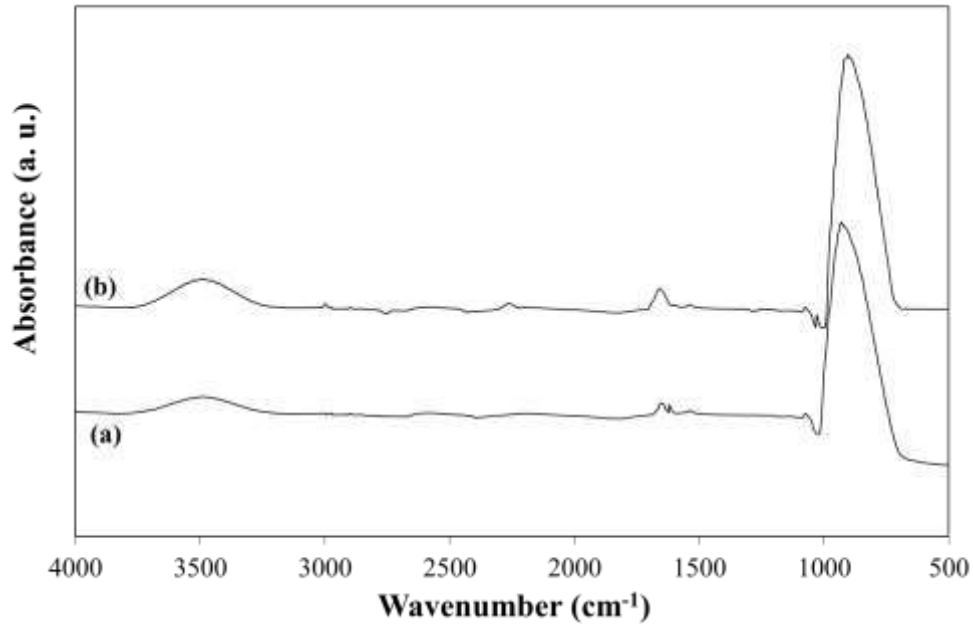


Figure 1. FTIR spectra of (a) SiC and (b) B-SiC

3.2. XRD Analysis

Undoped SiC nanofibers have diffraction peaks at the angles of 34.92°, 40.96°, 60.38°, 71.84° and 75.39° corresponding to (311), (220), (200), (111) and (222) peaks characteristic to the cubiform crystal of SiC (Figure 2a).^[12] Whole the XRD peaks correspond to the dissimilar aspects of β -SiC (JCPDS, No. 29-1129).^[13] The shift in the diffraction angle was bound up with the defect in the cubiform crystal structure owing to the shift of silicon atoms (0.134 nm) by boron atoms (0.095 nm) in SiC crystal lattice. The average size of crystalline both in undoped and doped SiC was checked out utilizing the Debye-Scherrer formula:

$$D = k\lambda/\beta\cos\Theta \quad (1)$$

where k is the dimensionless shape factor (0.9), λ is the X-ray wavelength; β is the full width at half the maximum density of the average diffraction peak and Θ is the Bragg angle.^[14] For B-SiC and SiC nanofibers, the average crystallite size was calculated as 21.8 nm and 20.9 nm, respectively. The average crystallite size of undoped SiC decreased slightly owing to the distortion impact of the boron doping.

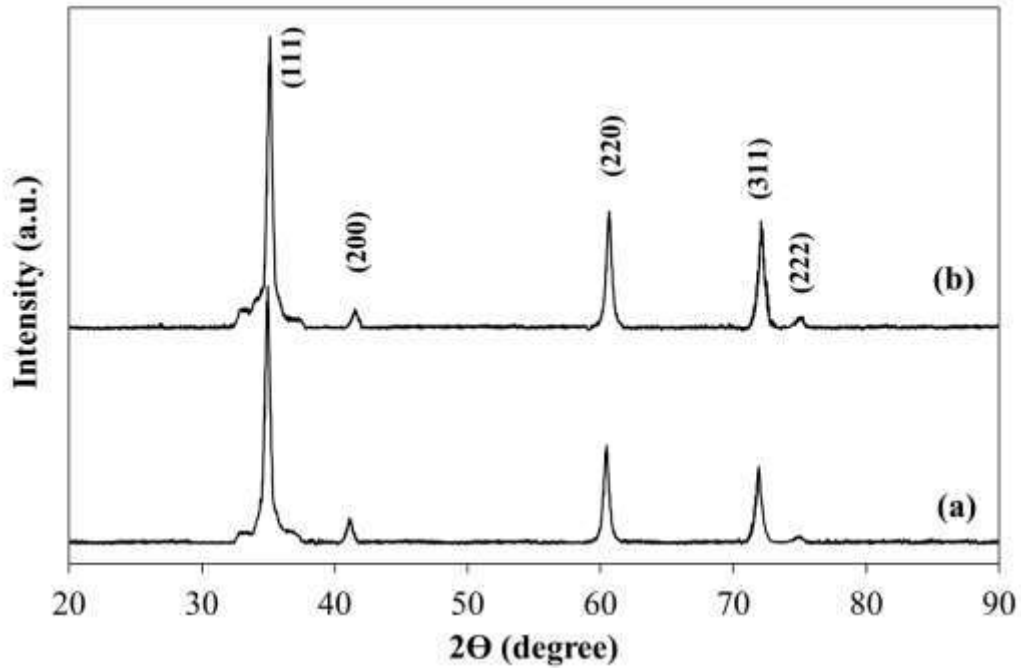


Figure 2. XRD spectra of (a) SiC and (b) B-SiC

3.3. Morphological Analyses

The SEM image displays that both B-SiC (Figure 3b) and SiC (Figure 3a) nanofibers have a almost cylindrical shape. It was certainly monitored that the entrance of boron atoms did not impress the morphology of SiC nanofibers.

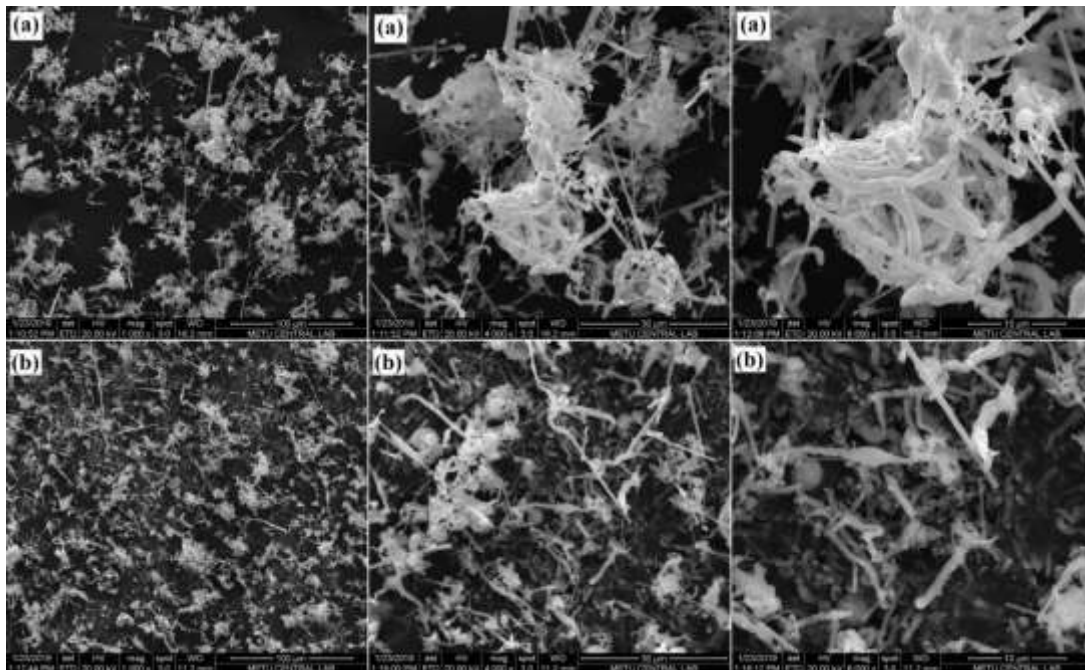


Figure 3. SEM images of (a) SiC and (b) B-SiC.

3.4. UV-Vis spectroscopy

Optical absorption attitude of SiC and B-SiC was worked by UV-Vis spectroscopy. The samples displayed vast absorption from UV light to visual light (Figure 4). Dissimilar from the UV-Vis spectrum of SiC, B-SiC had an absorption band at around 390 nm.^[12,13] Boron atoms could take the place of silicon atoms in the SiC crystal lattice.

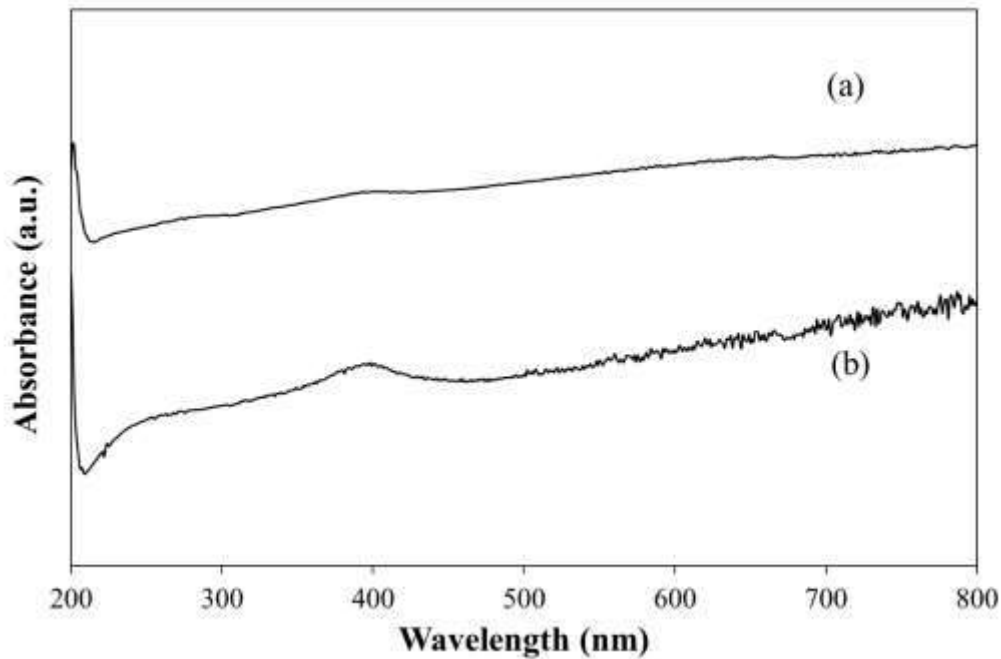


Figure 4. UV-Vis absorbance spectra of (a) SiC and (b) B-SiC

The band gap energy of the samples was calculated from the optical absorption data by utilizing the Tauc equation:^[13]

$$\alpha hv = A(hv - E_g)^{1/2} \quad (2)$$

where A , α , E_g and hv are a proportionality constant, the absorption coefficient, the band gap energy and the photon energy, respectively. The band gap value of SiC reduced from 2.2. eV to 2.0 eV by boron doping. Boron atoms could stimulate acceptor energy levels above the valance band edge of SiC^[13]

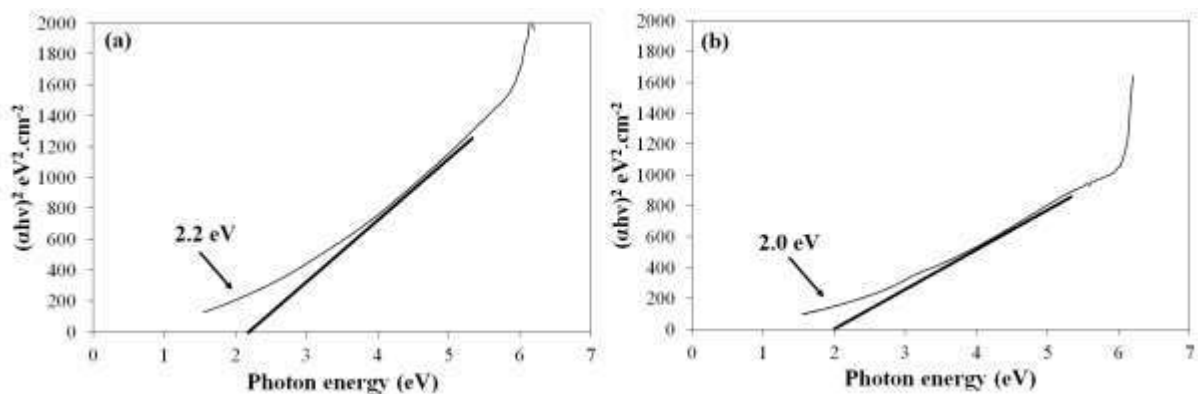


Figure 5. Tauc's plot for (a) SiC and (b) B-SiC

3.5. Photocatalytic activity

Photocatalytic activity of all samples was appraised by the degradation tests of the model dye (methylene blue). Figure 6 shows the absorbance of methylene blue in the existence of the photocatalyst samples. As irradiation time rised, the absorption density reduced for all samples. To ensure the photocatalytic performance of the samples more correctly, the curves of C_t/C_0 versus irradiation time were placed and indicated in Figure 7. Then checked against SiC, B-SiC indicated better photocatalytic activity. In accordance with the literature boron atoms could diffuse into the interstitial areas of SiC and/or substitute for Si atoms in the crystal lattice. The diffusion of boron atoms straight the interstitial sites of SiC could decrease the recombination rate of the photoexcited charge carriers by catching the photoinduced electrons on the conduction band of the photocatalyst nanofiber.^[15] Also more charge carriers might be produced under UV light irradiation within the boron doped photocatalyst and the photogenerated charge carriers might move within the photocatalyst with the minimum impedance and recombination rate.^[16]

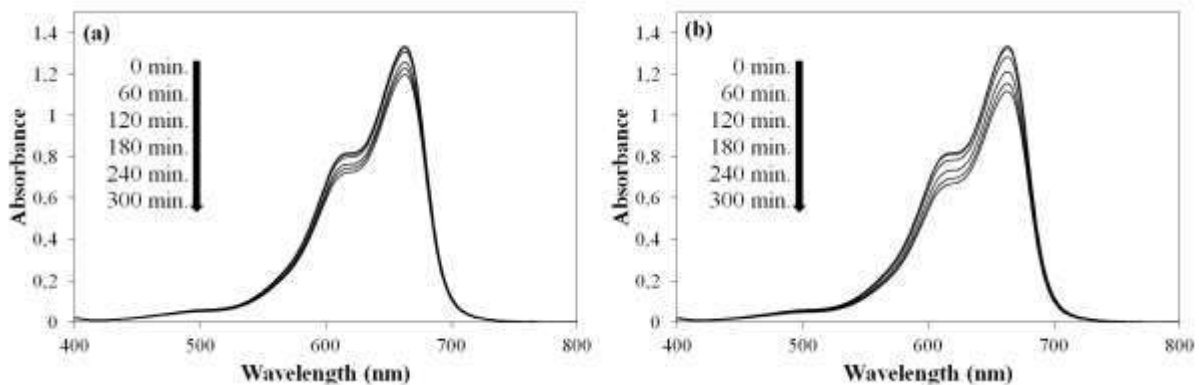


Figure 6. The variation in the UV–visible spectrum of the dye solution including (a) SiC and (b) B-SiC

Pseudo-first order kinetic model was utilized to investigate the dye degradation reaction:^[17]

$$\ln(C_0/C_t) = kt \tag{3}$$

where C_t and C_0 are the concentration of the model dye after and before UV light irradiation, k is the degradation rate constant and t is the time, which was defined from the incline of the plot of $\ln(C_0/C_t)$. The reaction rate constants are illustrated in Table 1. With respect to the degradation rate constants, the photocatalytic performance of SiC nanofibers was increased by 2 times by the boron atom contribution.

Table 1. The discoloration rate of methylene blue for SiC and B-SiC

Sample	k (min ⁻¹)	R ²
SiC	0.0003	0.9437
B-SiC	0.0006	0.9406

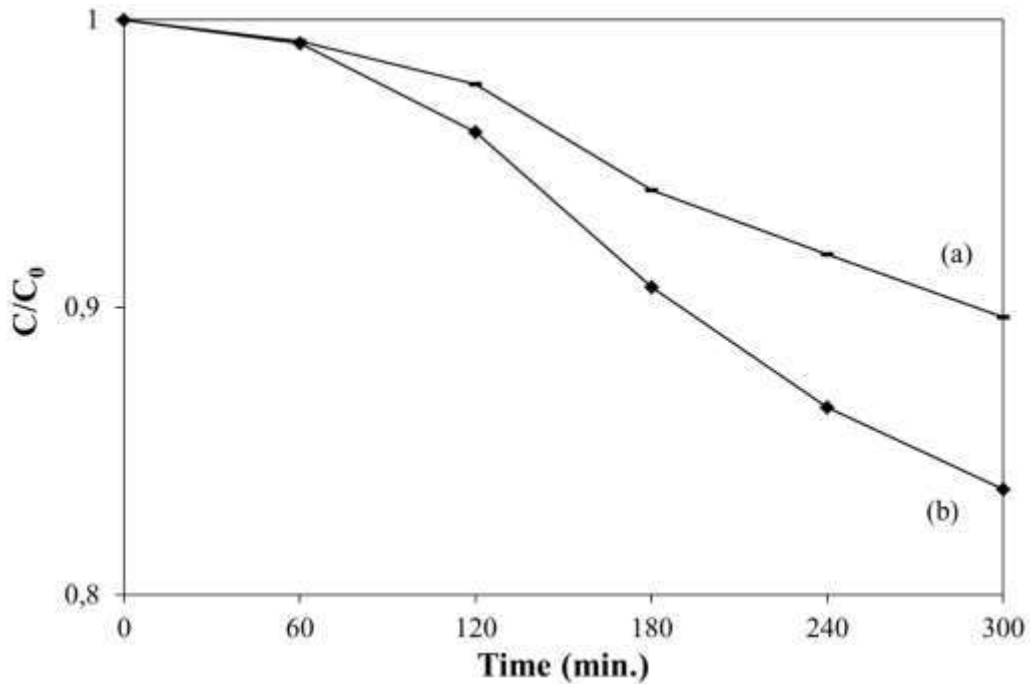


Figure 7. Degradation efficiency of the model dye, methylene blue, over (a) SiC and (b) B-SiC under UVA light irradiation

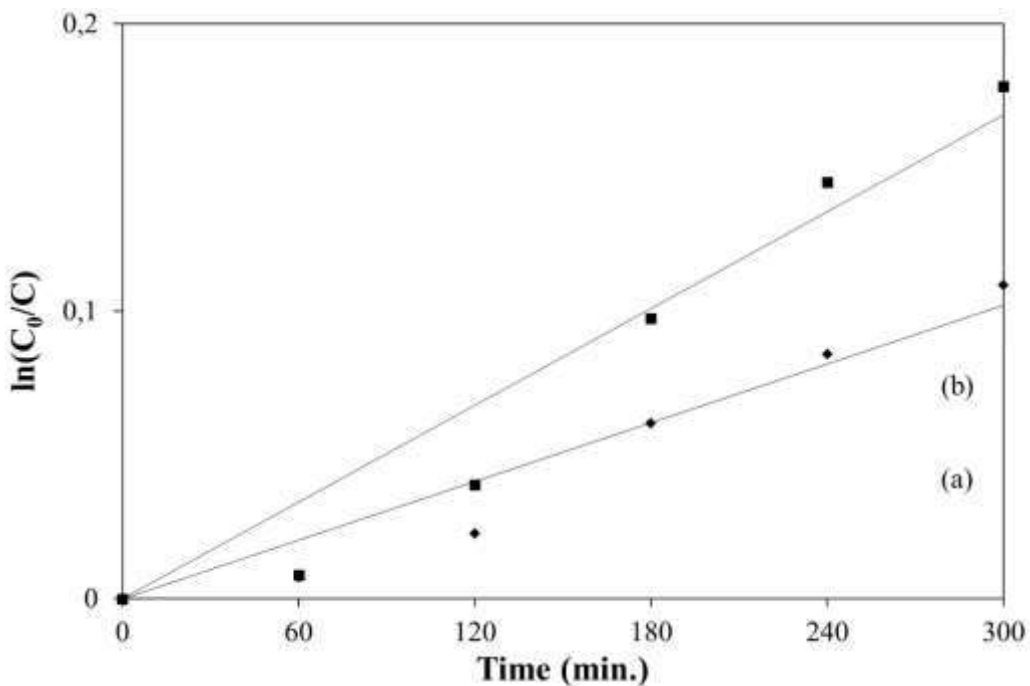


Figure 8. Kinetic plot of degradation reaction of the model dye, methylene blue, over (a) SiC and (b) B-SiC under UVA light irradiation

4. CONCLUSIONS

B doped SiC was doped by utilizing the wet impregnation technique. Boron atoms replaced silicon atoms during the doping processing. Under UVA light irradiation, B doped SiC displayed of an increased photocatalytic activity for the photocatalytic degradation of methylene blue. As a result, B doped SiC could be thought as a photocatalyst to degrade organic dyes within the wastewater.



REFERENCES

- [1] Nazarkovsky, M.; Alekseev, S.; Huczko, A.; Zaitsev, V.; Dupont, J.; Kai, J.; Xing, Y. T.; Scofield, A. L.; Chacon, G.; Carreira, R. S. Structural and photocatalytic properties of silicon carbide powder and nanowires modified by gold nanoparticles. *Res. Chem. Intermediat.* **2019**, *45*(8), 4081-4100. DOI: 10.1007/s11164-019-03892-3.
- [2] Zhang, Y. Y.; Zhang, Y.; Li, X.; Dai, J. H.; Song, F. J.; Cao, X. Q.; Lyu, X. J.; Crittenden, J. C. Enhanced Photocatalytic Activity of SiC-Based Ternary Graphene Materials: A DFT Study and the Photocatalytic Mechanism. *ACS Omega* **2019**, *4*(23), 20142-20151. DOI: 10.1021/acsomega.9b01832.
- [3] Chen, S. L.; Li, W. J.; Li, X. X.; Yang, W. Y. One-dimensional SiC nanostructures: Designed growth, properties, and applications. *Prog. Mater. Sci.* **2019**, *104*, 138-214. DOI: 10.1016/j.pmatsci.2019.04.004.
- [4] Yang, J. J.; Peng, Y.; Yang, B. Enhanced photocatalytic activity of SiC modified by BiVO₄ under visible light irradiation. *J. Dispersion Sci. Technol.* **2019**, *40*(3), 408-414. DOI: 10.1080/01932691.2018.1470533.
- [5] Li, P. H.; Wang, Y. Y.; Wang, Y. W.; Jin, G. Q.; Guo, X. Y.; Tong, X. L. Silicon Carbide Supported Palladium-Iridium Bimetallic Catalysts for Efficient Selective Hydrogenation of Cinnamaldehyde. *Chin. J. Chem.* **2020**, *38*(4), 367-371. DOI: 10.1002/cjoc.201900299.
- [6] Koysuren, O. Improving ultraviolet light photocatalytic activity of polyaniline/silicon carbide composites by Fe-doping. *J. Appl. Polym. Sci.* **2020**, *137*(14), 48524. DOI: 10.1002/app.48524.
- [7] Mishra, G.; Parida, K. M.; Singh, S. K. Facile Fabrication of S-TiO₂/beta-SiC Nanocomposite Photocatalyst for Hydrogen Evolution under Visible Light Irradiation. *ACS Sustain. Chem. Eng.* **2015**, *3*(2), 245-253. DOI: 10.1021/sc500570k.
- [8] Asadzadeh-Khaneghah, S.; Habibi-Yangjeh, A.; Asl, M. S.; Ahmadi, Z.; Ghosh, S. Synthesis of novel ternary g-C₃N₄/SiC/C-Dots photocatalysts and their visible-light-induced activities in removal of various contaminants. *J. Photochem. Photobiol. A-Chem.* **2020**, *392*, 112431. DOI: 10.1016/j.jphotochem.2020.112431.
- [9] Yang, T.; Chang, X.; Chen, J.; Chou, K.-C.; Hou, X. B-doped 3C-SiC nanowires with a finned microstructure for efficient visible light-driven photocatalytic hydrogen production. *Nanoscale* **2015**, *7*, 8955-8961. DOI: 10.1039/c5nr01742d.
- [10] Garg, A.; Singh, A.; Sangal, V. K.; Bajpai, P. K.; Garg, N. Synthesis, characterization and anticancer activities of metal ions Fe and Cu doped and co-doped TiO₂. *New J. Chem.* **2017**, *41*, 9931-9937. DOI: 10.1039/c7nj02098h.
- [11] Jiang, S. N.; Gao, S. B.; Liu, Y.; Cui, X. H.; Tin, X.; Wei, D. H.; Kong, M.; Xing, P. F. An efficient way of recycling silicon kerf waste for synthesis of high-quality SiC. *Int. J. Appl. Ceram. Technol.* **2020**, *17*(1), 130-137. DOI: 10.1111/ijac.13240.
- [12] Pawbake, A.; Mayabadi, A.; Waykar, R.; Kulkarni, R.; Jadhavar, A.; Waman, V.; Parmar, J.; Bhattacharyya, S.; Ma, Y. R.; Devan, R. S.; Pathan, H.; Jadhkar, S. Growth of boron doped hydrogenated nanocrystalline cubic silicon carbide (3C-SiC) films by Hot Wire-CVD. *Mater. Res. Bull.* **2016**, *76*, 205-215. DOI: 10.1016/j.materresbull.2015.12.012.
- [13] Dong, L. L.; Wang, Y. Y.; Tong, X. L.; Jin, G. Q.; Guo, X. Y. Synthesis and Characterization of Boron-Doped SiC for Visible Light Driven Hydrogen Production. *Acta Phys.-Chim. Sin.* **2014**, *30*(1), 135-140. DOI: 10.3866/pku.whxb201311052.



- [14] Kouidri, F. Z.; Berenguer, R.; Benyoucef, A.; Morallon, E. Tailoring the properties of polyanilines/SiC nanocomposites by engineering monomer and chain substituents. *J. Mol. Struct.* 2019, 1188, 121-128. DOI: 10.1016/j.molstruc.2019.03.100.
- [15] Neto, N. F. A.; Zanatta, P.; Nascimento, L. E.; Nascimento, R. M.; Bomio, M. R. D.; Motta, F. V. Characterization and Photoluminescent, Photocatalytic and Antimicrobial Properties of Boron-Doped TiO₂ Nanoparticles Obtained by Microwave-Assisted Solvothermic Method. *J. Electron. Mater.* 2019, 48, 3145-3156. DOI: 10.1007/s11664-019-07076-y.
- [16] Niu, P. P.; Wu, G. H.; Chen, P. H.; Zheng, H. T.; Cao, Q.; Jiang, H. L. Optimization of Boron Doped TiO₂ as an Efficient Visible Light-Driven Photocatalyst for Organic Dye Degradation With High Reusability. *Front. Chem.* **2020**, 8, 172. DOI: 10.3389/fchem.2020.00172.
- [17] Hasan, J.; Li, H.; Tian, G.; Qin, C. Fabrication of Cr₂S₃-GO-TiO₂ composite with high visible-light-driven photocatalytic activity on degradation of organic dyes, *Chem Phys.* **2020**, 539, 110950. DOI: 10.1016/j.chemphys.2020.110950.

A NEW METHOD OF DYNAMICAL STABILITY IN FRACTIONAL SYSTEMS

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ABSTRACT

In this article, by using the Lyapunov second method, we study the stability of nonlinear generalized fractional system. Then, in order to illustrate the effectiveness and availability of the our result, we provide an example. Further, by employing numerical simulation, we depict the numerical value of the example and show that the zero solution of the nonlinear fractional dynamical system converges to the origin or equilibrium point of the system when the time tends to infinity.

1. INTRODUCTION

Recently, the stability of nonlinear fractional systems has attracted a great attention, for example, [3,4,7,8]. However, stability analysis of nonlinear fractional systems is much more difficult and only a few are available with respect to the integer order systems. One of the available methods to study the stability of nonlinear fractional system is the Lyapunov direct method.

In the present paper by using the Lyapunov function, we intend to investigate the stability of the following nonlinear generalized fractional system with the regularized Prabhakar derivative

$${}^C D_{\rho, \mu, \omega, 0^+}^\gamma x(t) = Ax(t) + f(t, x(t)), \quad x(t_0) = x_0, \quad (1)$$

where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$, $x(t) \in \mathbb{P}^n$ is a state vector, $A \in \mathbb{P}^{n \times n}$ is a constant matrix and $f(t, x) \in \mathbb{P}^n$ with $f(t, 0) = 0$.

The paper is organized as follows. In Section 2, some definitions of generalized fractional calculus are given. In Section 3, we state some properties of the regularized Prabhakar fractional derivative. Asymptotic stability of nonlinear generalized fractional system by using the Lyapunov direct method is provided in Section 4. In order to illustrate the applications of our result, in Section 5, an example is provided and numerical value of this example is depicted. Section 6 concludes the paper.

Definition 2.1 Let $f \in L^1[0, b]$. The Prabhakar integral operator with the generalized Mittag-Leffler function in its kernel is defined as follows [5]

$$E_{\rho, \mu, \omega, 0^+}^\gamma f(x) = \int_0^x (x-u)^{\mu-1} E_{\rho, \mu}^\gamma(\omega(x-u)^\rho) f(u) du, \quad 0 < x < b \leq \infty, \quad (1)$$

where $\rho, \mu, \omega, \gamma \in \mathbb{X}$, $\Re(\rho), \Re(\mu) > 0$, and the generalized Mittag-Leffler function $E_{\rho, \mu}^\gamma(z)$ is

of the following form [9]

$$E_{\rho,\mu}^{\gamma}(z) = \sum_{k=0}^{\infty} \frac{\Gamma(\gamma+k)}{\Gamma(\gamma)\Gamma(\rho k + \mu)} \frac{z^k}{k!}, \quad \gamma, \rho, \mu \in \mathbb{X}, \Re(\rho) > 0,$$

Definition 2.2 For $f \in L^1[0, b]$, the Prabhakar derivative is defined by [5]

$$D_{\rho,\mu,\omega,0+}^{\gamma} f(x) = \frac{d^m}{dx^m} E_{\rho,m-\mu,\omega,0+}^{-\gamma} f(x), \quad 0 < x < b \leq \infty, \quad (2)$$

where $\rho, \mu, \omega, \gamma \in \mathbb{X}, \Re(\rho), \Re(\mu) > 0$.

Also, the regularized Prabhakar derivative for $f \in AC^m[0, b]$, is given by

$${}^c D_{\rho,\mu,\omega,0+}^{\gamma} f(x) = E_{\rho,m-\mu,\omega,0+}^{-\gamma} \frac{d^m}{dx^m} f(x) = D_{\rho,\mu,\omega,0+}^{\gamma} f(x) - \sum_{k=0}^{m-1} x^{k-\mu} E_{\rho,k-\mu+1}^{-\gamma} (\omega x^{\rho}) f^{(k)}(0+). \quad (3)$$

3. SAME PROPERTIES OF REGULARIZED PRABHAKAR DERIVATIVE

Lemma 3.1 Let ${}^c D_{\rho,\mu,\omega,0+}^{\gamma} x(t) \geq {}^c D_{\rho,\mu,\omega,0+}^{\gamma} y(t)$ and $x(0) = y(0)$, where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$. Then $x(t) \geq y(t)$ for $t > 0$.

Proof. It is a straightforward result from ${}^c D_{\rho,\mu,\omega,0+}^{\gamma} x(t) \geq {}^c D_{\rho,\mu,\omega,0+}^{\gamma} y(t)$ that there exists a nonnegative function $n(t)$ satisfying

$${}^c D_{\rho,\mu,\omega,0+}^{\gamma} x(t) = n(t) + {}^c D_{\rho,\mu,\omega,0+}^{\gamma} y(t). \quad (4)$$

Applying the Laplace transform on the both side of (4) and using the Laplace transform of regularized Prabhakar derivative [10], we obtain

$$\frac{s^{-\rho\gamma+\mu}}{(s^{\rho}-\omega)^{-\gamma}} X(s) - \frac{s^{-\rho\gamma+\mu-1}}{(s^{\rho}-\omega)^{-\gamma}} x(0) = N(s) + \frac{s^{-\rho\gamma+\mu}}{(s^{\rho}-\omega)^{-\gamma}} Y(s) - \frac{s^{-\rho\gamma+\mu-1}}{(s^{\rho}-\omega)^{-\gamma}} y(0),$$

By taking into account $x(0) = y(0)$ and using the inverse Laplace transform, we obtain

$$x(t) = E_{\rho,-\mu,\omega,0+}^{\gamma} n(t) + y(t).$$

Since $n(t) \geq 0$, $x(t) \geq y(t)$.

Lemma 3.2 Let $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$ and $x(t) \in P$ be a differentiable function. Then, for any time instant $t > t_0$, the following inequality holds

$$\frac{1}{2} {}^C D_{\rho, \mu, \omega, t_0^+}^\gamma x^2(t) \leq x(t) {}^C D_{\rho, \mu, \omega, t_0^+}^\gamma x(t).$$

Proof. According to the definition of regularized Prabhakar derivative, the above inequality is equivalent to

$$\int_{t_0}^t (t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho) [x(t) - x(u)] x'(u) du \geq 0. \quad (5)$$

Therefore, it is sufficient to show that the inequality (5) is true. By letting $z(u) = x(t) - x(u)$, the left hand side of (5) can be written as

$$\int_{t_0}^t (t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho) [x(t) - x(u)] x'(u) du = - \int_{t_0}^t (t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho) z(u) z'(u) du. \quad (6)$$

Integrating by parts of (6), and then using

$$\left(\frac{d}{dx}\right)^n [x^{\mu-1} E_{\rho, \mu}^\gamma(\omega x^\rho)] = x^{\mu-n-1} E_{\rho, \mu-n}^\gamma(\omega x^\rho), \quad n \in \mathbb{N},$$

we get

$$\begin{aligned} & \int_{t_0}^t (t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho) z(u) z'(u) du \\ &= -\frac{1}{2} [z^2(u)(t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \Big|_{u=t} + \frac{1}{2} [z_0^2(t-t_0)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-t_0)^\rho)] \\ &+ \frac{1}{2} \int_{t_0}^t z^2(u)(t-u)^{-\mu-1} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho) du. \end{aligned} \quad (7)$$

Now we take limit of the first term of the right hand side of (5), as

$$\begin{aligned} & \lim_{u \rightarrow t} \frac{1}{2} [z^2(u)(t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \\ &= \frac{1}{2} \lim_{u \rightarrow t} [(x(t)^2 - 2x(t)x(u) + x(u)^2)(t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho)]. \end{aligned}$$

By employing the L'Hopital rule, we conclude

$$\begin{aligned} & \frac{1}{2} \lim_{u \rightarrow t} [(x(t)^2 - 2x(t)x(u) + x(u)^2)(t-u)^{-\mu} E_{\rho, 1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \\ &= \lim_{u \rightarrow t} [(x(t)x'(u) - x(u)x'(u))(t-u)^{-\mu-1} E_{\rho, -\mu}^{-\gamma}(\omega(t-u)^\rho)] = 0. \end{aligned}$$

Hence,

$$\frac{1}{2} [z_0^2 (t-t_0)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-t_0)^\rho)] + \frac{1}{2} \int_{t_0}^t z^2(u) (t-u)^{-\mu-1} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho) du \geq 0,$$

and this confirms the inequality (3).

Remark 3.3 It is clear that if $x(t) \in P^n$ is a vector of differentiable functions, then for any time instant $t > t_0$

$$\frac{1}{2} {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma x^T(t)x(t) \leq x^T(t) {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma x(t). \quad (8)$$

This can be deduced by employing Lemma 3.2 and decomposing (8) into a sum of scalar products.

Theorem 3.4 [1]. Let $P \in P^{n \times n}$ be a real symmetric matrix. Then it may be transformed into a diagonal form by means of an orthogonal transformation, that is, there exists an orthogonal matrix $B \in P^{n \times n}$ and a diagonal matrix $\Lambda \in P^{n \times n}$ such that

$$P = B\Lambda B^T.$$

Lemma 3.5 Let $x(t) \in P^n$ be a vector of differentiable functions and $P \in P^{n \times n}$ be a constant, square, symmetric and positive definite matrix. Then, for any time instant $t \geq t_0$, the following relationship holds

$$\frac{1}{2} {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma (x^T(t)Px(t)) \leq x^T(t)P {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma x(t),$$

where $\gamma, \mu, \omega \in (0,1)$, $\rho \geq 1$.

Proof. The proof is straightforward, following the proof of Lemma 4 in [2], by using Theorem 3.4 and Remark 3.3.

4. LYAPUNOV DIRECT METHOD FOR STABILITY ANALYSIS OF GENERALIZED FRACTIONAL SYSTEM

Definition 4.1 x_0 is an equilibrium point of the system (1), if and only if $A(x_0) + f(t, x_0) = 0$

Definition 4.2 The nonlinear generalized fractional system (1) is stable if for any initial value x_0 and $t > 0$, there exists an $\varepsilon > 0$ such that $Px(t)P < \varepsilon$. The system (1) is asymptotically stable if it is stable and $\lim_{t \rightarrow \infty} \|x(t)\| = 0$.

Remark 4.3 Without loss of generality, we suppose the equilibrium point $x_0 = 0$. Otherwise an equilibrium point $\hat{x} \neq 0$ can be transformed to the origin by the change of variable $y = x - \hat{x}$. So, the regularized Prabhakar derivative of y is given by

$${}^c D_{\rho, \mu, \omega, 0+}^\gamma y = {}^c D_{\rho, \mu, \omega, 0+}^\gamma (x - \hat{x}) = Ax + f(t, x) = A(y + \hat{x}) + f(t, y + \hat{x}) = By + g(t, y),$$

where $B(0) + g(t, 0) = 0$ and in the new variable y , the system has equilibrium point at the origin.

Definition 4.4 [6] A continuous function $\alpha: [0, t) \rightarrow [0, \infty)$ belongs to class- K if it is strictly increasing and $\alpha(0) = 0$.

Theorem 4.5 Let $x = 0$ be an equilibrium point for the system (1). Suppose that there exists a Lyapunov function $V(t, x(t))$ and class- K functions $\alpha_i (i = 1, 2, 3)$ satisfying

$$\begin{aligned} \alpha_1(PxP) &\leq V(t, x(t)) \leq \alpha_2(PxP), \\ {}^c D_{\rho, \mu, \omega, 0+}^\gamma V(t, x(t)) &\leq -\alpha_3(PxP), \quad t \geq 0, x \in D, \end{aligned}$$

where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$. Then the system (1) is asymptotically stable.

Proof. The proof is similar to that of Theorem 6.2 in [7], by considering Definition 4.1, Lemma 3.1.

Now, by using the Lyapunov function, we consider asymptotic stability of system (1).

Theorem 4.6 Let f be Lipschitz continuous. If there exists a positive definite matrix P such that

$$A^T P + PA + (L^2 + PPP^2)I < 0,$$

where L is Lipschitz constant, the trivial solution of nonlinear generalized fractional system (1) is asymptotically stable.

Proof. We get $V(t) = x^T(t)Px(t)$ as a Lyapunov function candidate. Employing regularized Prabhakar fractional derivative operator ${}^c D_{\rho, \mu, \omega, 0+}^\gamma$ on the Lyapunov function $V(t) = x^T(t)Px(t)$ and using Lemma 3.5, we get

$$\begin{aligned} {}^c D_{\rho, \mu, \omega, 0+}^\gamma V(t) &\leq 2x^T(t)P {}^c D_{\rho, \mu, \omega, t_0+}^\gamma x(t) \\ &= [Ax(t) + f(t, x(t))]^T Px(t) + x^T(t)P[Ax(t) + f(t, x(t))] \end{aligned}$$

$$= x^T(t)(A^T P + PA)x(t) + 2x^T P f(t, x(t)).$$

Since f is Lipschitz continuous

$$\begin{aligned} {}^c D_{\rho, \mu, \omega, 0+}^\gamma V(t) &\leq x^T(t)(A^T P + PA)x(t) + 2x^T P f(t, x(t)) \\ &\leq x^T(t)(A^T P + PA)x(t) + x^T(t)P^2 x(t) + f^T(t, x(t))f(t, x(t)) \\ &\leq x^T(t)(A^T P + PA)x(t) + (L^2 + PPP^2)Px(t)P^2 \\ &\leq x^T(t)[A^T P + PA + (L^2 + PPP^2)I]x(t) < 0. \end{aligned}$$

Therefore, according to Theorem 4.5, the system (1) is asymptotically stable and the proof is completed.

5. EXAMPLE

We now present an example to consider asymptotic stability of generalized fractional system with the regularized Prabhakar derivative and depict numerical values of the system. In this example, we apply the numerical method in [3] to solve the systems and find numerical solution by using the well known fourth order Runge-Kutta method.

Example 5.1 Consider the following nonlinear fractional system

$$\begin{cases} {}^c D_{\rho, \mu, \omega, 0+}^\gamma x(t) = -5x - 10y + \log(\log(10 + x^2)), \\ {}^c D_{\rho, \mu, \omega, 0+}^\gamma y(t) = -10x - 5y + \log(\log(10 + y^2)), \end{cases} \quad (9)$$

with the initial conditions $x(t_0) = x_0, y(t_0) = y_0$ and $\gamma, \mu, \omega \in (0,1), \rho \geq 1$. We choose $P = I_2, V(t) = x^T(t)x(t)$ and $\zeta = 1$. The function f is clearly Lipschitz continuous with Lipschitz constant $L = \frac{1}{\sqrt{10}}$ and the conditions of Theorem 4.6 hold. Therefore the trivial solution of system (7) is asymptotically stable.

Numerical values of system (7) are presented in Figure 1. We fix the set parameters $\gamma = 0.6, \rho = 1, \mu = 0.8, \omega = 0.05, h = 0.01$. Figure 1 is presented for $(x_0, y_0) = (-0.01, 0.06)$.

6. CONCLUSION

In this paper, we have investigated the stability of nonlinear generalized fractional system by means of the Lyapunov direct method.

Then, to examine the analytical obtained result, we have presented an example of nonlinear generalized fractional system and have performed numerical simulation to reveal asymptotical stability behavior of the presented system. $x = 0$ is a equilibrium point of the system (7), Figure 1 converges to the equilibrium point $x = 0$, and shows the asymptotic stability behavior of system.

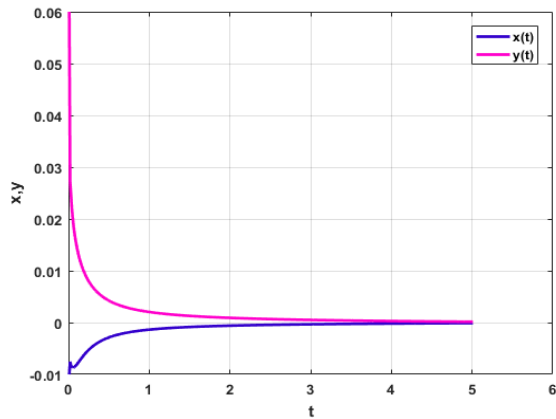


Fig. 1. Numerical value of $x(t), y(t)$ of system (7).

REFERENCES

- [1] Bellman, R. (1997). Introduction to matrix analysis, Society for Industrial and Applied Mathematics (SIAM).
- [2] Duarte-Mermoud, M.A., Aguila-Camacho, N., Gallegos, J.A., Castro-Linares, R. (2015). Using general quadratic Lyapunov functions to prove Lyapunov uniform stability for fractional order systems, *Commun Nonlinear Sci Numer Simulat*, vol. 22, p. 650-659.
- [3] Eshaghi, S., Khoshsiar Ghaziani, R., Ansari, A. (2019). Stability and chaos control of regularized Prabhakar fractional dynamical systems without and with delay, *Mathematical Methods in the Applied Sciences*, 42 (7) p. 2302-2323.
- [4] Eshaghi, S., Khoshsiar Ghaziani, R., Ansari, A. (2020). Hopf bifurcation, chaos control and synchronization of a chaotic fractional-order system with chaos entanglement function, *Mathematics and Computers in Simulation*, 172(C), 321-340.
- [5] Garra, R., Gorenflo, R., Polito, F., Tomovski, Z. (2014). Hilfer-Prabhakar derivatives and some applications, *Applied Mathematics and Computation*, vol. 242, p. 576-589.
- [6] Khalil, HK. (2002). Nonlinear Systems, third edition, Prentice Hall.
- [7] Li, Y., Chen, Y.Q., Podlubny, I. (2010). Stability of fractional-order nonlinear dynamic systems: Lyapunov direct method and generalized Mittag-Leffler stability, *Applied Mathematics and Computation*, vol. 59, p. 1810-1821.
- [8] Liu, S., Jiang, W., Li, X., Zhou, X-F. (2016). Lyapunov stability analysis of fractional nonlinear systems, *Applied Mathematics Letters*, vol. 51, p. 13-19.
- [9] Prabhakar, T. R., (1971). A singular integral equation with a generalized Mittag-Leffler function in the kernel, *Yokohama Journal of Mathematics*, vol. 19, p.7-15.
- [10] Eshaghi, S., Ansari, A., Khoshsiar Ghaziani, R., Ahmadi Darani, M. (2017). Fractional Black-Scholes model with regularized Prabhakar derivative, *Publications De L'institut Mathematique*, vol. 102, 121-132.

CALCULATION OF FULL ENERGY PEAK EFFICIENCY OF CsI(Tl) DETECTOR FOR POINT AND DISK GAMMA SOURCES BY FLUKA CODE

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ABSTRACT

Scintillation detectors are one of the detector types commonly used in detecting gamma radiation. These detectors are produced in different crystals and different geometries depending on the field to be used. It is important to calibrate these detectors in order to determine the detection accuracy before the measurement to be made, as it defines the performance of the detector. The detector's full energy peak efficiency is required for quantitative analysis. In this study, the full energy peak efficiency of the 3x3 inch CsI(Tl) detector, which is a scintillation detector and used as a gamma spectroscopy system, was calculated with the FLUKA code. FLUKA is a Monte Carlo-based code developed for calculations of particle transport and interaction with matter, and it has wide applications in high energy and particle physics, accelerator physics, and nuclear physics. It is frequently used in nuclear physics, especially in detector design, dosimetry, and radiation shielding studies. To simulate the full energy peak efficiency of the CsI(Tl) detector with the FLUKA code, a 7.62x7.62 cm cylindrical detector was modeled. Point and disk gamma sources with isotropic distribution as radiation sources in the code have been defined at energies of 50, 80, 100, 300, 600, 1000, 1300, and 1500 keV. Maximum radius of the disk source was determined based on the width of the CsI(Tl) detector surface and disk sources were selected with the radius of 1, 2, 3, and 3.81 cm. Gamma sources were positioned at distances of 1, 2, 5, and 10 cm from the detector. The full energy peak efficiency of the CsI(Tl) detector was calculated depending on the changing source energy and source radius by simulations results. In addition, the effect of the variation of the distance between the gamma source and the detector on the full energy peak efficiency of the CsI(Tl) detector was determined.

Keywords: FLUKA code, 3x3 inch CsI(Tl) detector, Full energy peak efficiency, Point and disk sources, Monte Carlo simulation.

ÖZET

Sintilasyon dedektörleri, gama radyasyonunun tespitinde yaygın olarak kullanılan dedektör tiplerinden biridir. Bu dedektörler kullanılacak alana göre farklı kristallerde ve farklı geometrilere üretilmektedir. Bu dedektörlerin kalibre edilmesi, dedektörün performansını tanımladığı için yapılacak ölçüm öncesinde algılama doğruluğunu belirlemek için önemlidir. Kantitatif analiz için dedektörün tam enerji tepe verimliliği gereklidir. Bu çalışmada, bir sintilasyon dedektörü olan ve gama spektroskopisi sistemi olarak kullanılan 3x3 inç CsI(Tl) dedektörünün tam enerji tepe verimi FLUKA kodu ile hesaplanmıştır. FLUKA, parçacık madde etkileşimini ve taşınımı hesaplama için geliştirilmiş Monte Carlo tabanlı bir koddur ve yüksek enerji ve parçacık fiziği, hızlandırıcı fiziği ve nükleer fizikte geniş uygulamalara sahiptir. Nükleer fizikte, özellikle dedektör tasarımı, dozimetri ve radyasyon kalkanı çalışmalarında sıklıkla kullanılmaktadır. FLUKA koduyla CsI(Tl) dedektörünün tam enerji tepe verimini simüle etmek için 7.62x7.62 cm silindirik bir dedektör modellenmiştir. Kodda radyasyon

kaynağı olarak izotropik dağılıma sahip nokta ve disk gama kaynakları 50, 80, 100, 300, 600, 1000, 1300 ve 1500 keV enerjilerde tanımlanmıştır. Disk kaynağının maksimum yarıçapı, CsI(Tl) dedektör yüzeyinin genişliğine göre belirlendi ve disk kaynakları 1, 2, 3 ve 3.81 cm yarıçaplı olarak seçildi. Gama kaynakları dedektörden 1, 2, 5 ve 10 cm mesafelere yerleştirildi. Simülasyon sonuçları ile değişen kaynak enerjisine ve kaynak yarıçapına bağlı olarak CsI(Tl) dedektörünün tam enerji tepe verimi hesaplanmıştır. Ayrıca gama kaynağı ile dedektör arasındaki mesafenin değişiminin CsI(Tl) dedektörünün tam enerji tepe verimliliği üzerindeki etkisi belirlenmiştir.

Anahtar Kelimeler: FLUKA kodu, 3x3 inç CsI(Tl) dedektörü, Tam enerji tepe verimliliği, Nokta ve disk kaynakları, Monte Carlo simülasyonu.

1. INTRODUCTION

Scintillation detectors, which are based on the principle that the gamma photon turns into a scintillation photon as a result of its interaction with the crystal, called the scintillator, have been used for many years in gamma ray spectroscopy and nuclear medicine. Scintillation detectors are generally advantageous detectors due to their high detection efficiency, ability to measure energy spectrum, and operation at room temperature. The thallium doped CsI(Tl) detector is a scintillation detector with high detection efficiency (Irfan and Prasad, 1970; Irfan and Prasad, 1973; Baccouche et al., 2012).

Detector efficiency of scintillation detectors such as NaI(Tl), LaBr₃(Ce), CsI(Tl) has been reported using Monte Carlo methods (Selim et al., 1998; Selim and Abbas, 2000; Yalcin et al., 2007; Yalcin et al., 2009; Kadhem and Mohammed, 2010; Baccouche et al., 2012; Mouhti et al., 2019; Tam et al., 2017; Kuluöztürk and Demir, 2019; Mitra, et al., 2019; Kuluöztürk and Demir, 2021). Any physical state can be flexibly reproduced and evaluated in detail with Monte Carlo methods. In this study, parameters such as gamma source energy, point and disk gamma sources, detector-source distance, which affect the full energy peak efficiency of the 3x3 inch CsI(Tl) detector with FLUKA Monte Carlo code, were investigated. The full energy peak efficiency of the CsI(Tl) detector was simulated for point and disk sources in the 50-1500 keV energy range and for detector source distances of 1, 2, 5 and 10 cm.

2. MATERIALS AND METHOD

The cards required to define a problem in the FLUKA code are defined in the input file (Ferrari et al., 2005; Böhlen et al, 2014; Vlachoudis, 2019). A photon with an isotropic distribution and varying radius of 0, 1, 2, 3, and 3.81 cm was chosen for the BEAM card. For the BEAMPOS card, the photon beam position is defined at the -1, -2, -5 and -10 cm points. Figure 1 shows the geometry of the 3x3 inch CsI(Tl) detector at the Flair interface. The CsI crystal has a density of 4.5 g/cm³ and a cylindrical geometry of 7.62 x 7.62 cm. The crystal is covered with 0.19 cm thick MgO and 0.05 cm thick Al as the outermost layer (Baccouche et al., 2012).

The full energy peak efficiency of the detector was calculated as the ratio of the count at the full energy peak corresponding to the measured energy and the number of photons emitted from the gamma source. DETECT card has been chosen as the score card in FLUKA. This card calculates the amount of energy accumulated per event in the detector crystal.

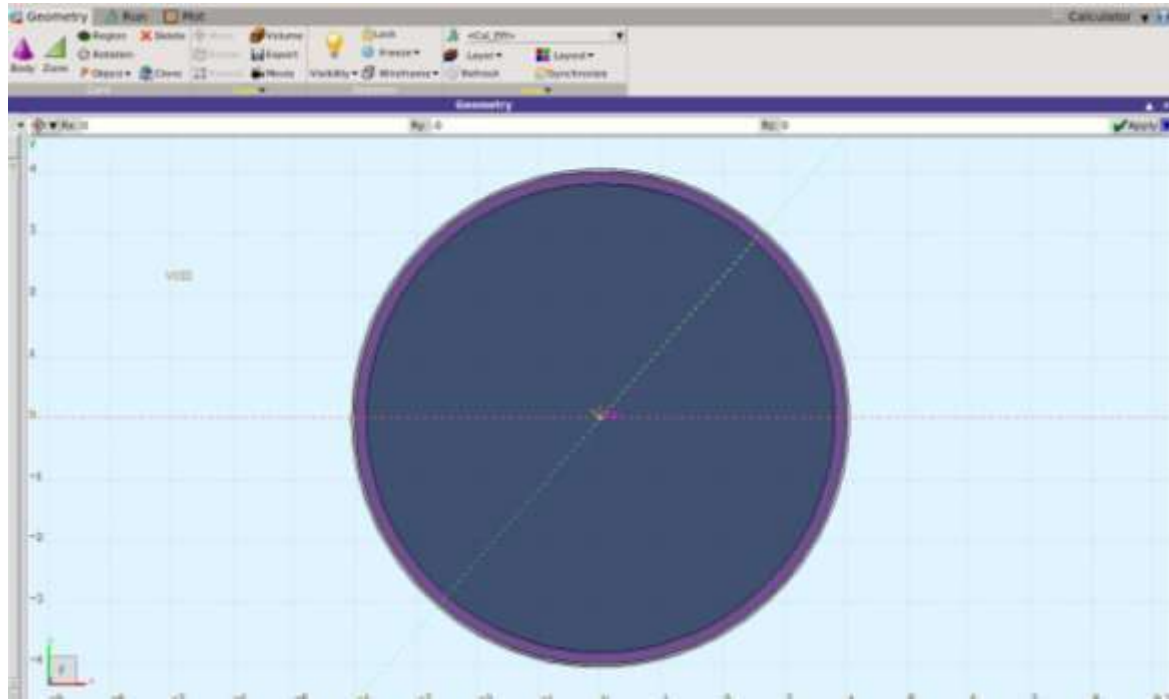


Figure 1. FLAIR view of the 3x3 inch CsI(Tl) detector geometry

3. RESULTS AND DISCUSSION

In this study, the full energy peak efficiency of 3x3 inch CsI(Tl) detectors for different energy photons was calculated using the FLUKA Monte-Carlo code for point and disk sources. FLUKA was used to carry out these calculations. Since the parameters in the input file can be controlled in Monte Carlo methods, it can be used for gamma sources of different sizes and energies, different detector types, and different detector-source distances. For the full energy peak efficiency calculation, the input files prepared in the FLUKA code were run 10 cycles for 10^5 particles.

In Figure 2, the full energy peak efficiency values of the 3x3 inch CsI crystal for different gamma energies have been compared with the previously reported study (Irfan and Prasad, 1973) for point sources. Percent relative difference ($RD(\%) = |A - B|/A \times 100$) values between FLUKA and the results of the study in the literature were calculated for the 10 cm detector-source distance. The minimum and maximum $RD(\%)$ values between the results are 6.54% and 12.46%, respectively.

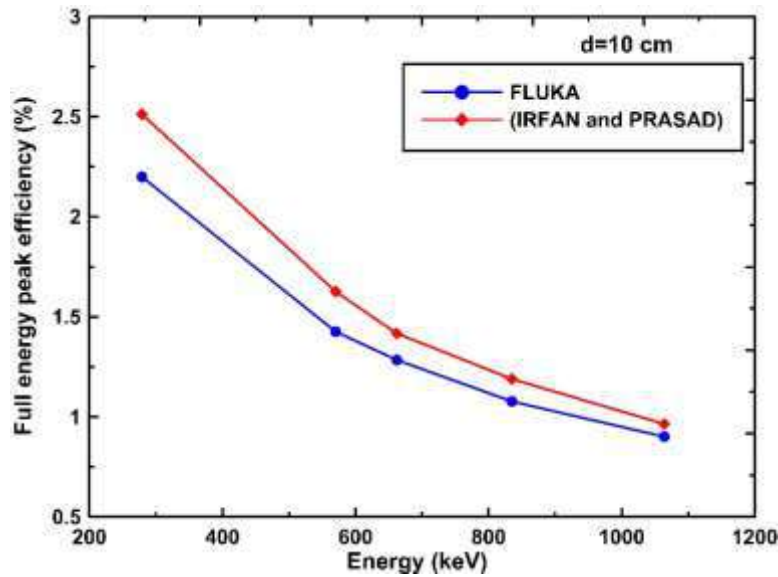


Figure 2. Comparison of the full energy peak efficiency of the 3x3 inch CsI crystal with the results of the reported study (Irfan and Prasad, 1973) and FLUKA simulation data

Figure 3 shows the variation of the full energy peak efficiency of the detector for point and disk gamma sources in the energy range of 50-1500 keV. There is a rapid increase in results up to about 150 keV due to the attenuation effect of the detector cup (Yalcin et al., 2007). As the gamma energy increases, the full energy peak efficiency of the detector decreases, since the probability of a photon being absorbed in the detector decreases. At the same time, the highest efficiency was calculated for point source, and the lowest efficiency was calculated for disk source with a radius of 3.81 cm. In other words, the efficiency decreased as the radius of the disk source increased.

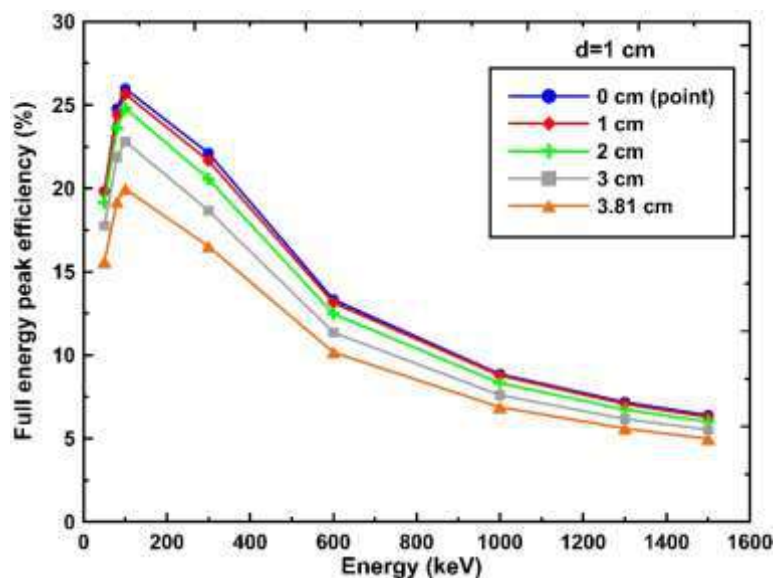


Figure 3. The calculated full energy peak efficiency of the 3x3 inch CsI(Tl) detector as a function of photon energy from 50 up to 1500 keV of 0 (point), 1, 2, 3 and 3.81 cm radius disk sources

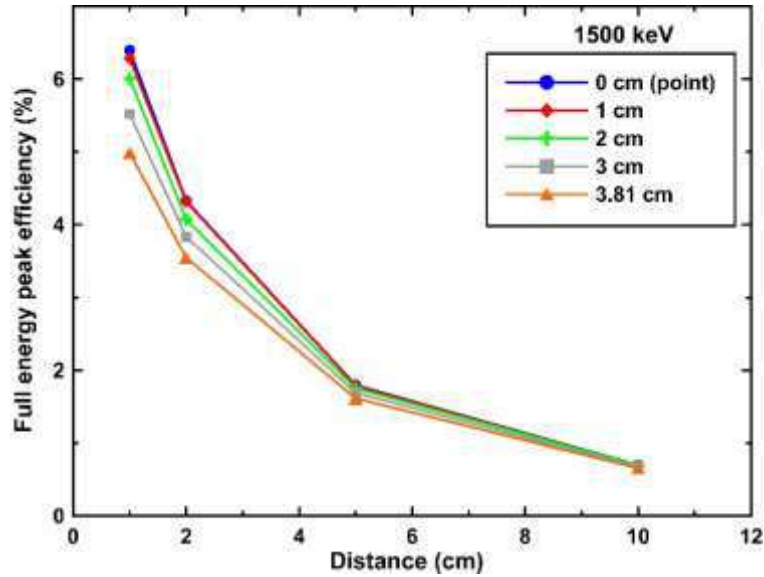


Figure 4. The calculated full energy peak efficiency of the 3x3 inch CsI(Tl) detector of disk sources of 0 (point), 1, 2, 3 and 3.81 cm radius with an energy of 1500 keV as a function of the detector-source distances from 1 up to 10 cm

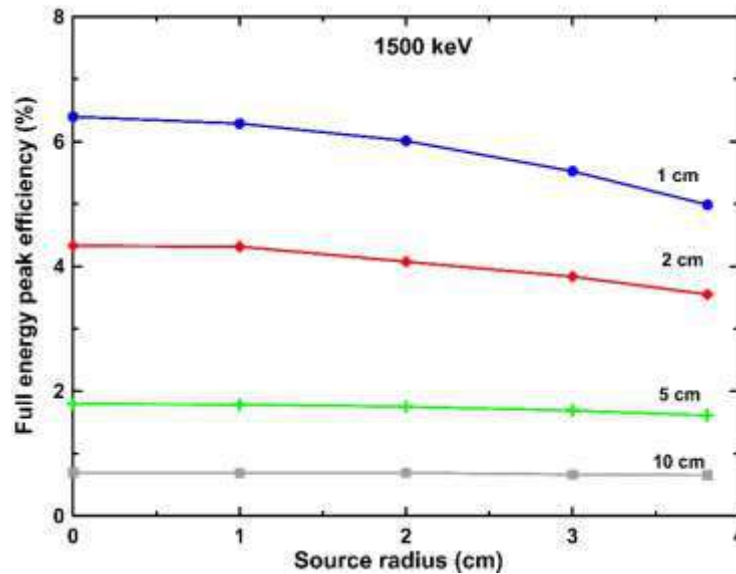


Figure 5. Calculated full energy peak efficiency of the 3x3 inch CsI(Tl) detector for 1500 keV as a function of disk sources with 0 (point), 1, 2, 3 and 3.81 cm radius

Another parameter that affects the full energy peak efficiency of the detector is the detector source distance. The variation of the full energy peak efficiency for four different source-detector distances, 1, 2, 5 and 10 cm, is presented in Figure 4. It is seen that the efficiency decreases with distance from the detector surface. Figure 5 clearly shows the change in full energy peak efficiency with increasing disk source radius. As the radius of the disk source increases, the full energy peak efficiency decreases. The most obvious change is seen at 1 cm where the detector source distance is the least.

4. CONCLUSIONS

In this study, the full energy peak efficiency of the 3x3 inch CsI(Tl) detector was calculated. Since Monte Carlo methods made it possible to expand the study, energy range of 50 - 1500 keV, point and disk sources with different radius and different source detector distances were defined as simulation parameters. The full energy peak efficiency curve of the 3x3 inch CsI(Tl) detector was obtained for point and disk source with isotropic distribution in the energy range of 50-1500keV. The effect of the change in the distance between the source and detector on the detector efficiency was determined. As a result of the simulations, it has been seen that the modeling of different types of scintillation detector systems and the parameters affecting the efficiency can be handled with the FLUKA code.

REFERENCES

- Baccouche, S., Al-Azmi, D., Karunakara, N., Trabelsi, A. (2012). Application of the Monte Carlo method for the efficiency calibration of CsI and NaI detectors for gamma-ray measurements from terrestrial samples. *Applied Radiation and Isotopes*, 70, 227–232.
- Böhlen, T.T., Cerutti, F., Chin, M.P.W., Fassò, A., Ferrari, A., Ortega, P.G., Mairani, A., Sala, P.R., Smirnov, G., Vlachoudis, V. (2014). The FLUKA Code: Developments and Challenges for High Energy and Medical Applications. *Nuclear Data Sheets*, 120, 211-214.
- Ferrari, A., Sala, P.R., Fassò, A., Ranft, J. (2005). FLUKA: a multi-particle transport code. CERN-2005-10, INFN/TC_05/11, SLAC-R-773.
- Irfan, M. and Prasad, R.D.G. (1970). Relative Photopeak Efficiencies and Photofractions of a 2"× 2" CsI(Tl) Crystal *Nuclear Instruments and Methods*, 88, I65-I76.
- Irfan, M. and Prasad, R.D.G. (1973). Photofractions from experimental relative photo-peak efficiencies of a 3"×3" CsI(Tl) crystal. *Nuclear Instruments and Methods*, 107, 585–588.
- Kadhem, A.B. and Mohammed A. N. (2010). The Treatment of Efficiency of NaI(Tl) Detector by Using Monte Carlo Simulation. *Eng. & Tech. Journal*, 28, No.5.
- Kuluöztürk, Z.N. and Demir, N. (2019). Investigation of the Collimator Effect on the 3"×3" NaI(Tl) Detector System by the FLUKA code. *BEU Journal of Science & (Special Issue)*, 30-36.
- Kuluöztürk, Z.N. and Demir, N. (2021). Simulation of Pulse Height Distribution and Full Energy Peak Efficiency of 2"×2" Scintillation Detectors. *European Journal of Science and Technology*, 21, 383-388.
- Mitra, P., Tyagi, M., Thomas, R.G. Vinod Kumar, A., Gadkari, S.C. (2019). Optimization of Parameters for a CsI(Tl) Scintillator Detector Using GEANT4-Based Monte Carlo Simulation Including Optical Photon Transport. *IEEE Transactions On Nuclear Science*, 66, No. 7.
- Mouhti, I., Elanique, A., Messous, M.Y., Benahmed, A., McFee, J.E., Elgoub, Y., Griffith, P. (2019). Characterization of CsI(Tl) and LYSO(Ce) scintillator detectors by measurements and Monte Carlo simulations. *Applied Radiation and Isotopes*, 154 108878.



- Selim, Y.S., Abbas, M.I. (2000). Analytical calculations of gamma scintillators efficiencies-II. Total efficiency for wide coaxial circular disk sources. *Radiat. Phys. Chem.* 58 (1), 15–19.
- Selim, Y.S., Abbas, M.I., Fawzy, M.A. (1998). Analytical calculation of the efficiencies of gamma scintillators. Part I: total efficiency for coaxial disk sources. *Radiat. Phys. Chem.* 53 (6), 589–592.
- Tam, H.D., Yen, N.T.H., Tran, L.B., Chuong, H.D., Thanh, T.T. (2017). Optimization of the Monte Carlo simulation model of NaI(Tl) detector by Geant4 code. *Applied Radiation and Isotopes*, 130, 75–79.
- Vlachoudis, V. (2009). FLAIR: A Powerful But User Friendly Graphical Interface for FLUKA. *Proc. Int. Conf. on Mathematics, Computational Methods & Reactor Physics (M&C 2009)*, Saratoga Springs, New York.
- Yalcin, S., Gurler, O., Kaynak, G., Gundogdu, O. (2007). Calculation of total counting efficiency of a NaI(Tl) detector by hybrid Monte-Carlo method for point and disk sources. *Appl. Radiat. Isot.*, 65, 1179–1186.
- Yalcin, S., Gurler, O. Gundogdu, O. Kaynak, G. (2009). Monte Carlo simulation of gamma-ray total counting efficiency for a Phoswich detector. *Radiation Measurements*, 44, 80–85.

‘BERTRAND BOX’ AND ‘MONTY HALL’ PROBLEMS AS LECTURE TOOLS

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ABSTRACT

It is widely described in the literature that the study of probability involves great difficulties for many students. Leading to these difficulties, two factors stand out: the fact that the traditional formal study of probabilities involves, almost exclusively, the simple application of algorithms, and the weak probabilistic intuition of the human being. Due to these factors, most students are not successful in solving non-routine problems, and they also do not have the opportunity to realize that certain probabilistic situations come into conflict with their intuition. Since misconceptions associated with probabilistic interpretation do not disappear with spontaneous cognitive development, it is essential that students are confronted with counterintuitive situations, otherwise the wrong intuitions remain unchanged. The integration of counter-intuitive problems in the teaching of Probability Theory, and the in-depth discussion and analysis of the resolution of these problems, is a constructivist pedagogical strategy that provides deep learning, leading students to reflect on their thought processes, at the same time, it allows to tackle situations with a high incidence of errors in a challenging and motivating way. Exploring the countless situations in which human beings' weak probabilistic intuition leads to misinterpretations and wrong answers, throughout the history of probability several counterintuitive problems have arisen, promoting the confrontation between the rules of the Theory of Probabilities and intuition. One of these problems, which leads us to ignore or misinterpret the information we have, and let our intuition prevail, is the well-known "Bertrand Box problem", which due to its challenging nature has triggered many variants, among which the most popular and discussed is the "Monty Hall" problem. Due to its appealing and challenging nature, the "Bertrand Box" problem (and its variants) has been for us an option to motivate students to reason about uncertainty, and challenge students' intuition by demanding their active personal involvement. In this work we present the "Bertrand Box" problem and the variant "Monty Hall" problem, as teaching and learning tools, identifying the probabilistic concepts involved in these problems and the solution strategies.

Keywords: Intuition, Probability, Uncertainty.

INTRODUCTION

Difficulties in the study of probability have been identified across all levels of education, occurring at an international level. The concern with these difficulties and their consequences, not only in the fragility of probabilistic literacy but also in the repercussions in other areas of knowledge, has triggered vast investigation into the factors that influence these difficulties.

Research has focused on different aspects related to learning difficulties and understanding of Probabilities, adopting different approaches. One of the research lines has focused on the

influence that teaching methods, adopted by teachers who teach Probability, have on students' success and on their difficulties and misconceptions.

Studies carried out by different authors, including Batanero, Green & Serrano (1998) have concluded that one of the preponderant factors for the difficulties and misconceptions presented by the students is the traditional formal study of probabilistic contents, that is, the adoption of strategies in which the exploration of probabilities problems focuses, almost exclusively, on the calculation. As highlighted by the researchers who conducted these studies, reducing the study of probability to its mathematical algorithm does not allow students to be unprepared to solve non-routine problems or to realize that the reasoning they are developing possibly conflicts with their intuition. It is crucial that students are confronted with counter-intuitive situations, otherwise the wrong intuitions remain unchanged. (Leviatan, 2002). It is also essential that the proposed tasks require the personal involvement of the student (Fischbein & Gazit, 1984).

In the study of probability, the use of counterintuitive problems is a constructivist pedagogical strategy that provides deep learning (Lesser, 1998), allows to approach situations with a high incidence of errors in a challenging and motivating way (Contreras, Batanero, Arteaga & Cañadas, 2011) and encourage students to reflect on their thought processes, through discussion and in-depth analysis of problem solving (Falk & Konold, 1992).

There are countless situations in which the weak probabilistic intuition of human beings leads to misinterpretations and wrong answers. Exploring these situations, there are several probability problems that defy intuition, confronting us with scenarios where our intuition leads us to ignore or misinterpret the information we have. One of the most famous counterintuitive problems involving probabilities is the "Bertrand Box" problem. Due to its appealing and challenging nature, we consider the "Bertrand Box" problem to be a good option to challenge students' intuition, and we use it frequently in classes where the study of Probability Theory is carried out. This "Bertrand Box" problem and other more complex variants, like the "Monty Hall" Problem, can be used as teaching and learning tools to help students to reason about uncertainty. Problems of the "Bertrand Box" type, are tasks that demand the active personal involvement of the student, which for Fischbein & Gazit, (1984) is essential for the counterintuitive challenges to produce the desired effect of reinforcement of the probabilistic intuition.

“BERTAND BOX” PROBLEM

The “Bertrand Box” problem was published by the French mathematician Joseph Bertrand (1822–1900) in his 1889 text *Calcul des Probabilités*.

The "Bertrand Box" problem is based on a scenario in which there are three boxes with different contents. One of the boxes contains two gold coins, another box contains two silver coins, and the remaining box contains one gold coin and one silver coin (figure 1).

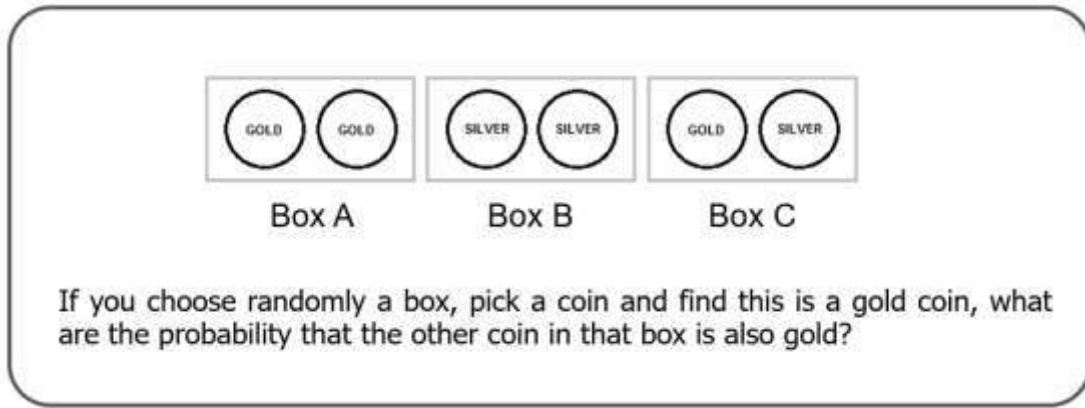


Figure 1: "Bertrand Box" problem

The situation described in the problem involves the (random) extraction of a coin from one of the boxes. Considering that the extracted coin is gold, the question that arises is to know what is the probability that the other coin that remained in the box is also gold?

The "Bertrand box" problem is a one-step decision problem involving counterintuitive conditional probabilities.

Wrong answer: the most common response (based on intuition) is that the probability that the other coin in that box is also gold is $1/2$. The mistake, as highlighted Bertrand himself, is to assume that the probability that the other coin is gold is equal to the probability that the other coin is silver.

Correct answer: To achieve a correct solution we must consider the possibility that, when choosing a box that has two gold coins, either of these two coins may have been extracted. In fact, compared to the box that has a coin each, a box that has two gold coins is twice as likely to have been chosen.

The requested probability is therefore $2/3$.

"MONTY HALL" PROBLEM

The "Monty Hall" problem arose from the TV game show "Let's Make a Deal", a very popular show on American television, between 1963 and 1986, whose host was Monty Hall (Rosenhouse, 2009). In this game, there are three doors. Behind one of these doors is a new car and behind the other two doors are goats (figure 2).

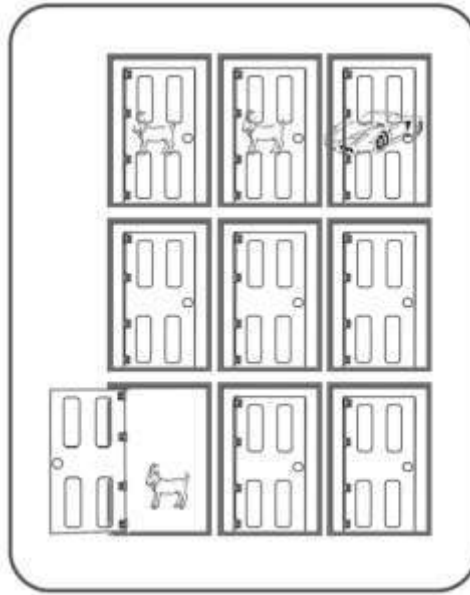


Figure 2: "Monty Hall" problem

Monty ask the contestant to choose one of three doors. The contestant chooses a door and Monty, knowing what is behind the doors, opens one of the other two doors, revealing a goat. Then, Monty asks the contestant if he wants to change his initial choice and switch to the other door.

The question is “should the contestant switch to the other door?”

The “Monty Hall” problem is a two-step decision problem involving counterintuitive conditional probabilities. The first choice is made among three equally probable options, whereas the second choice takes place after the elimination of one of the non-selected options which does not hide the car.

Wrong answer: Since there are only two doors in the final stage of the game and only one of them has the car behind it, the naïve and most common reasoning assumes that final probabilities are equal, leading to the wrong answer that it did not matter whether the contestant switches or not.

Correct answer: The contestant initially selects a door hiding a goat with probability $2/3$, so, since Monty always shows a door that does not contain the car, if the contestant switches, he will win the car with probability $2/3$.

“BERTAND BOX” AND “MONTY HALL” PROBLEMA IN CLASS

After the presentation of the problems, it is essential to leave some time for students reach a possible solution. Then, correct and wrong solutions must be discussed with the students, and the causes of errors must be explained.

Although there is some resistance from students in accepting the correct answer to the "Bertrand Box" problem, it is in the resolution of the "Monty Hall" problem that more discussion and disagreement are generated.

It is frequent, among the students, the fallacious argument that suggests that, when showing us a goat, Monty did not give us any new information, because from the start we knew that behind (at least) one of the doors that was not selected would be a goat. The teacher must explain that



this reasoning is wrong, being able to demonstrate it simply by listing all the possibilities found for the three doors. Analyzing this listing, it turns out that the trading strategy works best, being successful two out of three times.

The main Probability Theory concepts involved in the problems are:

- Random experiment
- Event
- Sample space
- Conditional probability
- Laplace probability
- Frequentist probability
- Kolmogorov's Axioms
- Probabilistic (in)dependence

Regarding the solving strategies used in the problems, these can involve:

- Bayes' Theorem
- Contingency table
- Tree diagram
- Simulation

FINAL REMARKS

"Bertrand Box" and "Monty Hall" problems leads us to ignore or misinterpret the information we have, and challenge our intuition. Due to their appealing and challenging nature, these problems have been for us an option to motivate students to reason about uncertainty, challenge students' intuition by demanding their active personal involvement, address the concepts of random experiment, event, sample space, conditional probability, Laplace probability, frequentist probability, Kolmogorov's Axioms, probabilistic (in)dependence, and highlight the different possibilities of probability problem solving strategies.

REFERENCES

- Batanero, C., Green, D. R., & Serrano, L. R. (1998). Randomness, its meanings and educational implications. *International Journal of Mathematical Education in Science and Technology*, 29(1), 113-23.
- Falk, R. & Konold, C. (1992). The psychology of learning probability. In F. Gordon and S. Gordon (Eds.) *Statistics for the Twenty-First Century*. MAA Notes 26. Washington, D.C.: Mathematics Association of America, 151-164.
- Fischbein, E. & Gazit, A. (1984) Does the teaching of probability improve probabilistic intuitions? *Educational Studies in Mathematics*, 15, 1-24.
- Konold, C. (1995). Issues in assessing conceptual understanding in probability and statistics. *J. Stat. Educ.*, 3 (1).
- Leviatán, T. (2002) On the use of paradoxes in the teaching of probability, in *Proceedings of the Sixth International Conference on Teaching Statistics (ICOTS 6)*, South Africa.



Lesser, L. (1998), Countering Indifference Using Counterintuitive Examples. *Teaching Statistics*, 20 (1), 10-12.

Rosenhouse, J. (2009) *The Monty Hall Problem: The remarkable story of Math's most contentious brainteaser*. Oxford University Press, USA.

DUVAR KAROSU ANGOB FİRİTİNDE ALBİT YERİNE OLİGOKLAS MİNERALİNİN KULLANIMININ ARAŞTIRILMASI

INVESTIGATION OF THE USE OF OLIGOCLASE MINERAL INSTEAD OF ALBITE IN WALL TILE ENGOBE FIRITS

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ÖZET

Angob, seramik karolarda sırlama öncesi bünye üzerine uygulanan, camlaşma özelliği göstermeyen veya az miktarda camlaşan, yüksek opaklık özelliği ile bünyenin rengini örten astar tabakasıdır. Angob kompozisyonlarında geçirimsizlik, opaklık ve sır ile bünye arasındaki ısıl genleşme uyumunun sağlanması için önemli oranlarda firit kullanılmaktadır. Bu çalışmada duvar karosu angob firit kompozisyonunda kullanılan albit (sodyum feldispat) yerine oligoklas kullanım olanakları araştırılmıştır. Bu kapsamda standart duvar karosu angob firit kompozisyonunda albit oranı kademeli olarak azaltılarak yerine oligoklas alkali kaynağı ilave edilmiş ve yeni firit reçeteleri geliştirilmiştir. Albite alternatif olarak kullanılan oligoklas alkali kaynağının firit ve duvar karosu engobunun teknik özellikleri üzerine olan etkileri incelenmiştir. Bu kapsamda öncelikle albit ve oligoklas hammaddelerinin kimyasal ve mineralojik analizleri ile tanımlamaları yapılmıştır. Hammaddelerin mineralojik analizi XRD cihazı ile belirlenmiştir. Oligoklas alkali kaynağının kullanımıyla geliştirilen firitlerin akma davranışı, renk değerleri ve yüzey özellikleri ile bu firitlerle geliştirilen angobların renk ve parlaklık değerleri ile geçirimsizlik özellikleri analiz edilmiştir. Firitlerin ısıl genleşme katsayısı değerleri dilatometre cihazı ile belirlenmiştir. Elde edilen sonuçlara göre, albit yerine kullanılan oligoklas alkali kaynağı firitin ergime davranışını kolaylaştırarak viskozitesini düşürmektedir. Oligoklas alkali kaynağı kullanımı ile birlikte firitin beyazlık (L) değerleri çok fazla değişmemesine rağmen bu firitlerle oluşturulan angobların L değerlerinin standart angoba göre düştüğü tespit edilmiştir. Ayrıca firit kompozisyonlarında oligoklas oranındaki artışla birlikte angobların parlaklık değerleri artarken geçirimsizlik özelliklerinin iyileştiği belirlenmiştir. Sonuç olarak duvar karosu angob kompozisyonlarında uygun kompozisyon tasarımının yapılmasıyla oligoklas türü alkali kaynağının kullanımının teknik özellikleri olumsuz yönde etkilemeden mümkün olabileceği tespit edilmiştir.

Anahtar Kelimeler: Albit, oligoklas, angob, firit

ABSTRACT

Engobe is a primer layer that is applied on the ceramic body before glazing, which does not Show any vitreous or slightly vitrified, and covers the color of the body with its high opacity feature. Frit is used in significant proportions to ensure the compatibility of impermeability, opacity, and thermal expansion between the glaze and the body. In this study, the possibilities of using oligoclase instead of albite (sodium feldspar) used in wall tile engobe frit composition were investigated. In this context, the albite ratio was gradually reduced in the standard wall

tile engobe frit composition, and an oligoclase alkali source was added instead, and new frit recipes were developed. The effects of oligoclase alkali source used as an alternative to albite on the technical properties of frit and wall tile engobe were investigated. First of all, albite and oligoclase raw materials were defined by chemical and mineralogical analysis. Mineralogical analysis of raw materials was determined by the XRD device. The melting behavior, color values, and surface properties of frits developed by the use of oligoclase alkaline source were analyzed. In addition, the color, glossiness, and permeability properties of the engobe developed with these frits were determined. The thermal expansion coefficient values of the frits were determined with a dilatometer device. According to the results obtained, the oligoclase alkali source used instead of albite decreases the viscosity of the frit by getting the melting behavior easier. Although the whiteness (L) values of the frit did not change much with the use of the oligoclase alkali source, it was determined that the L values of the engobes formed with these frits decreased compared to the standard engobe. In addition, it was determined that the glossiness values of engobes increased with the increase in the oligoclase ratio in frit compositions, while their impermeability properties improved. As a result, it has been determined that the use of oligoclase-type alkaline source in wall tile engobe compositions can be possible without adversely affecting the technical properties by making the appropriate composition design.

Keywords: Albite, oligoclase, engobe, frit

1. GİRİŞ

Seramik karo ürünleri yapı malzemelerinin en önemli bileşenlerinden biridir. 2007 yılından bu yana dünya pazarında düzenli olarak büyüyen seramik karo üretimleri 13,5 milyar m²'ye ulaşmıştır. Seramik karo ürünleri temel olarak duvar karoları, yer karoları ve porselen karolar olmak üzere üç ana gruba ayrılmaktadır. Seramik duvar karoları yüksek gözeneklilik ve yüksek su emmeye sahip (> %10), boyutsal olarak kararlılığı yüksek olan ve sahip olduğu teknik özellikler nedeniyle genellikle iç uygulamalar için tercih edilen seramik kaplama malzemeleridir[1-5].

Seramik karolarda angop, sahip olduğu opaklık özelliği ile bünyenin rengini örten, sırlama öncesi sır ile bünye arasına uygulanan bir çeşit astardır. Angop opaklığı temelde angop tabaka kalınlığı, katı fazın transparanlığı ve açık porların varlığı olmak üzere üç parametreye bağlıdır. Seramik angopların en önemli özelliklerinden birisi de alttaki bünyeye su geçirmezlik özelliğini kazandırmasıdır. Angobun bu iki özelliği yüksek su emmeye sahip duvar karolarının kullanımında oldukça öne çıkmaktadır. Angobun sıvı geçirimsizliği sahip olduğu porozitenin sonucudur. Angoptaki açık porozite, angobun ergiyebilirliği ile kontrol edilmektedir. Angopta ergiyebilirliği arttırmak için açık porları azaltacaktır. Angobun opaklığını ise angoptaki katı fazın opaklığı belirler. Angobun katı fazı genelde amorf ve kristalin fazlar içerir. Opaklık camı matris ve kristaller arası refraktif indis farkına bağlıdır. Refraktif indis farkı ne kadar yüksek olur ise malzemenin opaklığı o kadar yüksek olacaktır. Kristaller angop formülasyonuna ilave edilebilir veya pişirim esnasında geliştirilebilir [5-7].

Duvar karosu angop kompozisyonları uygun reolojik özellikler için kil ve kaolen gibi plastik hammaddelerin yanı sıra, feldspat, kuvars ve opaklık özelliğinden dolayı zirkon hammaddelerinden oluşmaktadır. Dolomit ve manyezit gibi hammaddeler ise nadiren kullanılmakla birlikte angoblarda deformasyon kontrolü ve opaklık için tercih edilebilmektedir. Bunların yanı sıra geçirimsizlik özelliği için %40 ile %80 arasında değişen oranlarda firit kullanılmaktadır. Firit, belirli bir tane boyutuna kadar öğütülen seramik hammaddelerinin uygun oranlarda tartılarak hazırlanması, 1450°C gibi yüksek sıcaklıklarda ergitilmesi ve hızlı bir şekilde soğutulmasıyla elde edilen camı yapıya ara üründür. Angop kompozisyonlarında

kullanılan firitin miktarı pişirim sıcaklığına bağlıdır. Kullanılan firitin cinsine göre farklı özelliklerde engoblar elde edilmektedir [8]. Nispeten ucuz ve alternatif bir opak kaplama bileşimi tasarlamak amacıyla, yüksek kırılma indeksi nedeniyle diyopsit firitleri kullanılabilir [9-11]. Aparisi ve ark. çalışmalarında beyazlık artışına neden olan diyopsit ($\text{CaMgSi}_2\text{O}_6$) kristalleri elde ederek zirkon içermeyen yer karosu sırları geliştirmiştir [10]. Ayrıca titanyum bileşiklerinin ve firitlerinin kullanımının, pişirim sırasında oluşan TiO_2 kristallerinin varlığından dolayı sırlara ve engoblara opaklaşma ve beyazlık sağladığını belirten çalışmalar da mevcuttur [12-14].

Çizelge 1. Plajioklasların oluşturduğu izomorf serisi.

		% Anortit
Albit	$\text{NaAlSi}_3\text{O}_8$	0-10
Oligoklas		10-30
Andezin		30-50
Labrador		50-70
Bitovnit		70-90
Anortit	$\text{CaAl}_2\text{Si}_2\text{O}_8$	90-100

Seramik endüstrisinde firit, angob, sır ve bünye kompozisyonlarında yoğun olarak kullanılan feldispatlar sahip oldukları Ca ve Na oranlarına göre izomorfik bir seri oluştururlar. Feldispatlar sahip oldukları alkali içerikler sayesinde pişirim sürecinde sıvı faz oluşumunu sağlayarak pişirim sıcaklığını düşürmek amacıyla kullanılırlar. Oligoklas, albit ve anortit ile "plajiyoklas" serisinden çok yaygın bir karışık kristaldir. Bu çalışmada standart duvar karosu angob firit kompozisyonunda albit yerine oligoklas alkali kaynağının kullanılabilirliği araştırılmıştır.

2. DENEYSEL ÇALIŞMALAR

Çalışmada öncelikle standart angobluk firit kompozisyonunda albit yerine oligoklas kullanılarak yeni firit reçeteleri geliştirilmiş ardından geliştirilen bu firitler ile duvar karosu angobları hazırlanmıştır. Firit reçete çalışmalarında soda, boraks, mermer, sodyum feldispat (albit), alümina, zirkon ve oligoklas hammaddeleri kullanılmıştır. Albit ve oligoklas hammaddelerine ait kimyasal analizler Çizelge 2’de, oligoklasın mineralojik analizi Çizelge 3’te verilmiştir.

Çizelge 2. Oligoklas ve sodyum feldispatın kimyasal analizleri (ağ. %)

Hammaddeler	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	Na_2O	K_2O	A.Z.
Oligoklas	76,25	14,5	0,12	0,18	3,68	0,12	4,77	0,15	0,24
Sodyum Feldispat	69,73	18,70	0,031	0,029	0,70	0,04	10,28	0,26	0,16

A.Z. Ateş Zayıatı

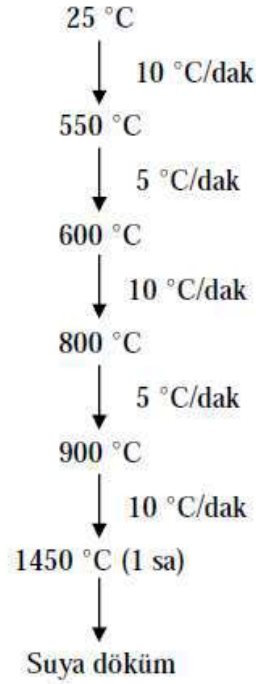
Çizelge 3. Oligoklasın mineralojik analizi (ağ. %)

	%
Albit	37,8
Anortit	16,6
Ortoklas	0,7
Kaolinit	0,2
Kuvars	44,7

Firit geliştirme çalışmalarında standart duvar karosu angob firit kompozisyonunda albit oranı kademeli olarak azaltılarak yerine oligoklas alkali kaynağı sırasıyla % 5, %10, %15 ve %20 oranlarında ilave edilmiştir (Çizelge 4). Geliştirilen firitlerin ergitme işlemi için firitlerin reçete yüzdelere göre hammaddeler 300 gr. lık tartılarak oluşturulan toz yığını homojen bir şekilde karıştırılmış ve alümina-silikat esaslı seramik krozelere yerleştirilmiştir. Ergitme işlemleri, Protherm marka elektrikli ergitme fırınında Şekil 1’de belirtilen rejime göre 1450 °C’de gerçekleştirilmiştir. Uygun sıcaklık ve sürede eriyik haline gelen malzeme fırından çıkarıldığı gibi ~20°C su içine atılarak şoklama işlemi gerçekleştirilmiştir.

Çizelge 4. Oligoklas alkali kaynağı ile oluşturulan duvar karosu angob firiti kompozisyonları (ağ. %)

Hammaddeler	Std	AO1	AO2	AO3	AO4
Soda	10	10	10	10	10
Boraks	12	12	12	12	12
Mermer	5	5	5	5	5
Sodyum Feldispat	52	47	42	37	32
Alümina	9	9	9	9	9
Zirkon	12	12	12	12	12
Oligoklas	-	5	10	15	20



Şekil 1. Laboratuvar ortamında camsı faz kompozisyonlarına uygulanan ergitme rejimi.

Firitlerin renk ve yüzey incelemeleri için elde edilen firitler % 10 kaolen ilavesi ile birlikte alümina bilyeli porselen sır değirmenlerine yüklenerek 50 dk. süre ile öğütülmüştür. Hazırlanan firitler pişmiş duvar karosu bünyesine ragle ile uygulanarak karo pişirimi için özel olarak üretilmiş Protherm marka hızlı pişim fırınında tepe sıcaklığı 1130°C olan 35 dk. çevrim süresinde pişirilmiştir.

Geliştirilen firitlerden angobların hazırlanması için hazırlanan firitler sırasıyla standart duvar karosu angop reçetesinde kullanılan firitte alternatif olarak kullanılmıştır. Bu şekilde geliştirilen her bir firit için bir angob reçetesi hazırlanmış olup, standart reçete ile birlikte toplam beş farklı angob hazırlanmıştır. Hazırlanan angop kompozisyonları %70 katı oranında, %0,3 CMC (karbosimetil selüloz) ve % 0,3 STPP (sodyum tripolifosfat) ilaveleri ile birlikte alümina bilyeli porselen değirmenlerde 25 dk. süre ile öğütülmüştür. Hazırlanan angoplar pişmiş duvar karosuna 0,4 mm ölçekli ragle ile uygulanmıştır. Hazırlanan angoplu karolar Protherm marka hızlı pişim fırınında endüstriyel duvar karosu rejiminde 1130°C sıcaklık ve 36 dk. sürede sinterlenmiştir.

Pişmiş firit ve angopların renk ölçümü (L^* , a^* , b^* renk değerleri) 3nh model renk ölçüm cihazı ile gerçekleştirilmiştir. Angobların su geçirmezlik testi şırınga yardımıyla her bölgeye eşit miktarda su koyularak ve kronometre ile emme süreleri hesaplanmıştır. Hazırlanan firitlerin ısıl genleşme katsayıları Netesh marka DIL 402 PC model dilatometre cihazı ile ölçülmüştür.

3. BULGULAR ve TARTIŞMA

Oligoklas alkali kaynağı ile geliştirilen firitlerin döküm işlemi sırasında (soğuk suda şoklama) firitlerin döküm sürelerine bağlı olarak akışkanlık özellikleri değerlendirilmiştir. Eşit miktarlarda hazırlanan firit harmanlarının ergime sonrası soğuk suya dökümleri sırasında, oluşan eriyiğin akışkanlığının albit yerine oligoklas ilavesi ile birlikte bir miktar arttığı tespit edilmiştir. Bu da firit kompozisyonlarında albit yerine oligoklas kullanımının firitin eriyik

viskozitesini düşürdüğünü göstermektedir. Alkali metal oksit-silika sistemlerinde CaO, MgO gibi toprak alkali oksidin alkali oksitle yer değiştirmesi durumunda çift değerlikli daha büyük alan kuvvetine sahip iyon oksijene komşu olan bağları kuvvetlendirir. Alan kuvvetinin değişiminden dolayı viskozitede az miktarda bir artış meydana gelir. Bundan dolayı toprak alkali oksit içeren silikat eriyiklerinin viskoziteleri alkali silikatlara göre daha yüksektir. [15-17] Ancak düşük sıcaklıklarda alkali oksit içeren sistemlere göre daha yüksek viskoziteye sahip olan toprak alkali oksit içeren sistemlerde artan sıcaklıkla birlikte viskozite çok daha hızlı bir şekilde düşmektedir[17].

Çizelge 5'te verilen firitlerin renk değerleri incelendiğinde firit kompozisyonlarında albit yerine oligoklas alkali kaynağı kullanımının renk değerlerini çok değiştirmedeği tespit edilmiştir. Firitlerin ısı genleşme katsayıları incelendiğinde firit kompozisyonuna albit yerine oligoklas ilavesinin artmasıyla birlikte firit ısı genleşme katsayısının kademeli olarak düştüğü belirlenmiştir. Albit ve oligoklas hammaddelerinin Çizelge 2'de verilen kimyasal analizlerine göre firit kompozisyonlarına albit yerine oligoklas ilave edilmesiyle kompozisyonda Na₂O oranı azalmakta, SiO₂ oranı artmaktadır. Cam kompozisyonlarında Na₂O ısı genleşme katsayısını yükseltirken, SiO₂ camın ısı genleşme katsayısını düşürmektedir[18]. Bu nedenle de firit kompozisyonlarında albit yerine oligoklas kullanımı ile firitin ısı genleşme katsayısı oligoklas oranına bağlı olarak düşmüştür.

Çizelge 5. Oligoklas alkali kaynağı ile oluşturulan firitlerin renk değerleri (ağ. %)

	Std.	AO1	AO2	AO3	AO4
L	93,65	93,63	93,77	93,69	93,46
a	-0,49	-0,57	-0,76	-0,71	-0,72
b	0,38	0,46	0,67	0,64	0,33

Çizelge 6. Oligoklas alkali kaynağı ile oluşturulan firitlerin ısı genleşme katsayısı değerleri

	α ($10^{-7} \text{ }^\circ\text{C}^{-1}$)
Std.	92,06
AO1	91,78
AO2	91,13
AO3	90,21
AO4	89,35

Geliştirilen firitler üzerinden hazırlanan angobların renk ve yüzey özellikleri incelendiğinde, oligoklas ilavesi ile birlikte angob beyazlık değerinin düştüğü tespit edilmiştir. Aynı zamanda oligoklas ilavesi ile geliştirilen angobların yüzeylerinde kademeli olarak parlamanın başladığı ve giderek artan parlaklık gözlenmiştir. Bu da firit kompozisyonlarında albit yerine oligoklas kullanımı ile ergime ve dolayısıyla camlaşmanın arttığını göstermektedir. Bunu destekleyici şekilde angobların geçirgenlik test sonuçlarına göre su emme süreleri değerlendirildiğinde (Çizelge 8) oligoklasın kullanıldığı firitlerle oluşturulan angoblarda su emme sürelerinin oligoklas oranındaki artışla birlikte belirgin şekilde arttığı, yani angobların geçirgenliklerinin azaldığı belirlenmiştir. Firit kompozisyonunda albit yerine oligoklasın kullanımı firitin ergime davranışını iyileştirerek dolayısı ile angobun sinterlenmesini artırmış ve porozitesini düşürmüştür.

Çizelge 7. Geliştirilen fritlerle hazırlanan angobların renk değerleri

	Std.	E1	E2	E3	E4
L	92,48	88,36	86,73	87,44	86,62
a	-0,39	0,41	1,08	0,89	1,18
b	3,08	1,33	1,07	0,91	1,03

Çizelge 8. Geliştirilen fritlerle hazırlanan angobların geçirgenlik süreleri

Reçete kodu	Su emme süresi (sn)
Std	25
E1	58
E2	46
E3	67
E4	70

4. GENEL SONUÇLAR

Bu çalışmada, oligoklas alkali kaynağının duvar karosu angob fritinde albit yerine kullanımının fritin ve angobun renk, yüzey ve ısıl özellikler üzerine olan etkileri incelenmiş, frit kompozisyonunda kullanılmakta olan standart albit yerine kullanım olanakları araştırılmıştır.

Elde edilen sonuçlara göre, albit yerine kullanılan oligoklas alkali kaynağı fritin ergime davranışını kolaylaştırarak viskozitesini düşürmektedir. Oligoklas alkali kaynağı kullanımı ile birlikte fritin beyazlık (L) değerleri çok fazla değişmemesine rağmen bu fritlerle oluşturulan angobların L değerlerinin standart angoba göre düştüğü tespit edilmiştir. Ayrıca frit kompozisyonlarında oligoklas oranındaki artışla birlikte angobların parlaklık değerleri artarken geçirimsizlik özelliklerinin iyileştiği belirlenmiştir. Sonuç olarak duvar karosu angob kompozisyonlarında uygun kompozisyon tasarımının yapılmasıyla oligoklas türü alkali kaynağının kullanımının teknik özellikleri olumsuz yönde etkilemeden mümkün olabileceği tespit edilmiştir.

KAYNAKLAR

- [1] Tarhan, M., Tarhan, B. Development of waterproof engobe layer for ceramic wall tiles. J Therm Anal Calorim 140, 555–565 (2020).
- [2] Tarhan M, Tarhan B, Aydın T. The effects of fine fire clay sanitaryware wastes on ceramic wall tiles. Ceram Int. 2016;42:17110.
- [3] Tarhan, B. Usage of fired wall tile wastes into fireclay sanitaryware products. J Aust Ceram Soc 55, 737–746 (2019).
- [4] Tarhan, M., Tarhan, B. Development of waterproof engobe layer for ceramic wall tiles. J Therm Anal Calorim 140, 555–565 (2020).
- [5] Gambuli P. World production and consumption of ceramic tile 6th edition. Acimac. 2018. http://www.mec-studies.com/filealbum/740_0.pdf. Accessed 18 Oct 2019.
- [6] Yıldız B, Kucuk A, Kara A. Effect of pore characteristics on engobe permeability for the water mark problem. Qualicer. 2014;Pos:1–4.



- [7] Yıldız B, Kucuk A, Kara A. Effect of pore characteristics on engobe permeability for the water mark problem. *Qualicer*. 2014;Pos:1–4.
- [8] Gajek M, Rapacz-Kmita A, Leśniak M, Stodolak-Zych E, Dudek M, Sitarz M. Influence of SrO content on microstructure and crystallization of glazes in the $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-CaO-MgO-K}_2\text{O}$ system. *J Therm Anal Calorim*. 2019. <https://doi.org/10.1007/s10973-019-08188-7>.
- [9] Hocaoglu E. Developing of the engobe glazes with diopside based crystallization. Master of science thesis, Anadolu University, Eskisehir, Turkey; 2004.
- [10] Aparisi J, Sanchez LF, Amoros JL, Escardino A, Orts MJ, Mestre S. Obtaining smooth, white floor tile glazes from zirconium-free frits. *Qualicer*. 1998;Pos:66–68.
- [11] Senanon W, Yongsiri P, Eitsayyeam S, Tunkasiri T, Pengpat K. Comparison between incorporation and conventional fabrication techniques of diopside-based glass-ceramics. *Mater Lett*. 2019. <https://doi.org/10.1016/j.matlet.2019.04.077>.
- [12] Bou E, Moreno A, Escardino A, Gozalbo A. Micro structural study of opaque glazes obtained from frits of the system: $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-B}_2\text{O}_3\text{-(P}_2\text{O}_5)\text{-CaO-K}_2\text{O-TiO}_2$. *J Eur Ceram Soc*. 2007;27:1791–6.
- [13] Teixeira S, Bernardin AM. Development of TiO_2 white glazes for ceramic tiles. *Dyes Pigm*. 2009;80:292–6.
- [14] Biffi G, Orтели G, Vincenzini P. Ceramic glazes opacified with CaTiSiO_5 . *Ceramurgia Int*. 1975;1:34–5.
- [15] Varshneya, A.K. (1994), *Fundamentals of inorganic glasses*, New York State College of Ceramics, Alfred University, Academic Pres, Inc., An Imprint of Elsevier, Alfred New York.
- [16] Shelby, J.E. (2005), *Introduction to Glass Science and Technology*, 2nd Edition, The Royal Society of Chemistry, Cambridge, UK.
- [17] Tarhan M., (2010), *The Relationship between composition-sintering behavior of porcelain stoneware tile*, Anadolu University Ph.D. thesis
- [18] Eppler, R. A. ve Eppler, D. R. (2000), *Glazes and glass coatings*, The American Ceramic Society, Westerville, Ohio.

SERAMİK DUVAR KAROSU ANGOBLARINDA ALKALİ-TOPRAK ALKALİ ORANLARININ ANGOB TEKNİK ÖZELLİKLERİ ÜZERİNE ETKİSİ

THE EFFECT OF ALKALINE/EARTH ALKALINE RATIO ON THE TECHNICAL PROPERTIES OF CERAMIC WALL TILE ENGOBES

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ÖZET

Seramik duvar karolarında angop, sahip olduğu opaklık özelliği ile bünyenin rengini örten, bünye ile sır arasında fiziksel ve kimyasal uyum sağlayarak deformasyonu kontrol eden, bünyeye geçirmezlik özelliği sağlayan ve yüzey hatalarını minimuma indiren, sırlama öncesi bünye yüzeyine uygulanan bir çeşit astardır. Duvar karosu angob kompozisyonları uygun reolojik özellikler için kil ve kaolen gibi plastik hammaddelerin yanı sıra, feldispat, kuvars ve opaklık özelliğinden dolayı zirkon hammaddelerinden oluşmaktadır. Bunların yanı sıra geçirimsizlik özelliği için %40 ile %80 arasında değişen oranlarda frit kullanılmaktadır. Angob kompozisyonlarında kullanılan fritin miktarı pişirim sıcaklığına bağlıdır. Dolomit ve manyezit gibi hammaddeler ise nadiren kullanılmakla birlikte angoblarda deformasyon kontrolü ve opaklık için tercih edilebilmektedir. Bu çalışmada duvar karosu angob kompozisyonlarında alkali-toprak alkali oranlarının angob teknik özellikleri üzerine olan etkileri incelenmiştir. Bu doğrultuda farklı Na₂O/MgO+CaO ve MgO/CaO oranlarında reçeteler geliştirilmiş ve teknik özellikleri standart angob özellikleri ile karşılaştırılmıştır. Bu kapsamda angobların akma davranışları, renk değerleri ve yüzey özellikleri ile geçirimsizlik özellikleri analiz edilmiştir. Angobların ısıl genleşme katsayısı değerleri dilatometre cihazı ile belirlenmiştir. Ayrıca pişirim sürecinde gelişen fazların analizi XRD cihazı ile gerçekleştirilmiştir. Kompozisyonlarda artan alkali oksit (Na₂O) oranıyla birlikte angob geçirgenliği azalırken, değişen MgO/CaO oranının geçirgenlik üzerinde belirgin bir etkisi olmamıştır. Standart angob kompozisyonunda diopsit, kuvars, anortit, ve titanit fazları tespit edilirken kompozisyonlarda azalan MgO oranı ile birlikte diopsit fazının belirgin şekilde azaldığı belirlenmiştir. Buna bağlı olarak da artan Na₂O oranı ve azalan MgO/CaO oranının angobların beyazlık değerini ve özellikle ısıl genleşme katsayısı değerini belirgin şekilde düşürdüğü tespit edilmiştir.

Anahtar Kelimeler: Angob, kompozisyon, alkali, toprak alkali

ABSTRACT

In ceramic wall tiles, engobe is a kind of primer applied to the body surface before glazing, which covers the color of the body with its opacity feature, controls deformation behavior by providing physical and chemical compatibility between the body and the glaze, provides impermeability to the body and minimizes surface defects. Wall tile engobe compositions consist of feldspar, quartz, zircon, and clay/kaolin raw materials. Zircon is used due to its opacity feature while clay and kaolin are used for suitable rheological properties. In addition to these, frits are used at between 40-80% for impermeability. The amount of frit used in engobe

compositions depends on the firing temperature. Raw materials such as az dolomite and magnesite are rarely used, but they can be preferred for deformation control and opacity in engobes. In this study, the effects of alkaline-earth alkaline oxide ratios on the technical properties of wall tile engobes were investigated. For this purpose, recipes with different $\text{Na}_2\text{O}/\text{MgO}+\text{CaO}$ and MgO/CaO ratios were developed and their technical properties were compared with standard engobe properties. In this context, rheological behavior, color values, surface properties, and permeability properties of engobes were analyzed. The thermal expansion coefficient values of the engobes were determined by the dilatometer device. In addition, the analysis of the phases developed in the firing process was carried out with the XRD device. Engobe permeability decreased with increasing alkali oxide (Na_2O) ratio in the compositions while changing MgO/CaO ratio did not have a significant effect on permeability. While diopside, quartz, anorthite, and titanite phases were detected in the standard engobe composition, it was determined that the diopside phase decreased significantly with the decreasing MgO ratio in the compositions. Accordingly, it was determined that increasing the Na_2O ratio and decreasing MgO/CaO ratio significantly decreased the whiteness value and especially the thermal expansion coefficient value of engobes.

Keywords: Engobe, composition, alkaline, earth alkaline

1. GİRİŞ

Seramik duvar karolarında angop, sahip olduğu opaklık özelliği ile bünyenin rengini örten, bünye ile sır arasında fiziksel ve kimyasal uyum sağlayarak deformasyonu kontrol eden, bünyeye geçirmezlik özelliği sağlayan ve yüzey hatalarını minimuma indiren, sırlama öncesi bünye yüzeyine uygulanan bir çeşit astardır. Angoblar tam bir camlaşma özelliği göstermez veya sadece bir miktar camlaşır. Çoğunlukla beyaz renktedir ve seramik karo ürünlerinin hepsinde kullanılmaktadır[1-5]. Angobun seramik karo üretiminde angoptan sonraki sır uygulamasında uygun bir etki sağlaması için yüksek opaklık ve beyazlık değerine sahip olması gerekmektedir[6]. Angop kompozisyonlarında istenilen beyazlığı sağlayan mikroyapılarındaki yüksek kırınım indisine sahip fazlardır.

Angoblar asli görevi olan seramik karo bünyesinin rengini örterek sır ve dekorlama gibi sonraki uygulama adımları için bir taban oluşturur. Bunun yanısıra tamamen ergimeyerek yapısında çok sayıda porozite bulunan angob üzerine uygulanan sır yüzeyinde hava kabarcıklarının ve delik hatasının oluşmasını önler. Angoblar ısıl genleşme katsayıları ile seramik karonun deformasyonunu kontrol altında tutar [5,7,8].

Günümüzde angopların kompozisyonları hakkında sırlara oranla daha fazla bilgiye ihtiyaç vardır. Angob kompozisyonları genellikle kil ve kaolen gibi plastik hammaddeler, kuvars, feldispatlar ve yüksek kırınım indisi ile örtücülük özelliğinden dolayı zirkonyumdan oluşmaktadır. Bu hammaddelere ek olarak %40-80 aralığında değişen oranlarda firit kullanılmaktadır. Angoblarda firitin kullanım amacı kısmi ergimeyi sağlayarak angobla bünyenin birbirine bağlanmasını sağlamak, opaklığa ve deformasyon kontrolüne yardımcı olmaktır[4,5,7,8]. Bu hammaddelerin dışında dolomit, manyezit ve kalsit gibi hammaddeler ise nadiren kullanılmakla birlikte angoblarda deformasyon kontrolü ve opaklık için tercih edilebilmektedir.

Bu çalışmada duvar karosu angob kompozisyonlarında farklı alkali ve toprak alkali oranlarının angob teknik özellikleri üzerine olan etkisi araştırılmıştır. Seramik duvar karosu angobunda değişen MgO/CaO oranı ile $\text{Na}_2\text{O}/\text{MgO}+\text{CaO}$ oranının angobun renk, yüzey, geçirgenlik, ısıl ve mikroyapı üzerine olan etkileri incelenmiştir.

2. DENEYSEL ÇALIŞMALAR

Angob reçete çalışmalarında sodyum feldispat, dolomit, Eskişehir kili, kuvars, kaolen ve firit hammaddeleri kullanılmıştır. Hammaddelere ait kimyasal analizler Çizelge 1’de verilmiştir.

Çizelge 1. Angob reçetelerinde kullanılan hammaddeler ve kimyasal analizleri (%ağ.)

	A.Z.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	MgO	Na ₂ O	K ₂ O	B ₂ O ₃	ZnO	ZrO ₂
Sodyum Feldispat	0,2	0	0	0,01	0	0,4	0,3	10,8	0,2	0	0	0
Eskişehir Kili	39,5	14,8	3,2	1,6	0,2	1,4	38,6	0,1	0,4	0	0	0
Dolomit	45,8	0	0	0,1	0	33,8	0	0	0,1	0	0	0
Kuvars	0,1	98,9	0	0	0	0	0	0,3	0	0	0	0
Kaolen	12,0	0	0	0	0,1	0	0,3	0,1	0,9	0	0	0
Firit 1	0	39,8	18,8	0	0	2,8	0,1	13,4	0	5,78	0	7,7
Firit 2	0	57,5	4,1	0	0	11,9	2,7	2,7	0	4,0	10,5	6,7

Çalışmada öncelikle standart duvar karosu angobunun Seger oranları çıkarılmış ve bu Seger oranları üzerinden farklı MgO/CaO ve Na₂O/MgO+CaO oranlarına sahip yeni angob reçeteleri geliştirilmiştir. Standart angob reçetesinin Seger değerleri Çizelge 2’de verilmiştir. Reçeteler oluşturulurken diğer oksit oranları sabit tutulmaya çalışılmıştır. Reçetelerde farklı MgO/CaO oranları hazırlanırken yüksek oranda MgO içeren Eskişehir kili yerine dolomit kullanırken, farklı Na₂O/MgO+CaO oranlarındaki angob reçeteleri için başlıca sodyum feldispat ile birlikte Eskişehir kili, dolomit hammadde oranları değiştirilmiştir. Standart angob reçetesi Std. Olarak belirtilirken farklı MgO/CaO oranında hazırlanan kompozisyonlar azalan oranda sırasıyla TA1, TA2 ve TA3 olarak kodlanmış ve Çizelge 3’te verilmiştir. Değişen Na₂O/MgO+CaO oranlarına sahip angob reçeteleri artan oranda sırasıyla TA4, TA5 ve TA6 olarak kodlanmış ve yine Çizelge 3’te verilmiştir.

Çizelge 2. Standart angob reçetesinin Seger değerleri

ZnO	0,142
CaO	0,322
MgO	0,429
K ₂ O	0,004
Na ₂ O	0,103
Al ₂ O ₃	0,082
Fe ₂ O ₃	0,004
B ₂ O ₃	0,074
SiO ₂	1,878
TiO ₂	0,001
ZrO ₂	0,069

Çizelge 3. Farklı alkali oranlarında geliştirilen angob reçeteleri

Reçete kodu	MgO/CaO	Reçete kodu	Na ₂ O/MgO+CaO
Std.	1,332	Std.	0,138
TA1	0,794	TA4	0,196
TA2	0,419	TA5	0,282
TA3	0,144	TA6	0,420

Standart duvar karosu angobu ile birlikte geliştirilen angob kompozisyonları %70 katı oranında, %0,3 CMC (karbosimetil selüloz) ve % 0.3 STPP (sodyum tripolifosfat) ilaveleri ile birlikte alümina bilyeli porselen değirmenlerde 25 dk. süre ile öğütülmüştür. Hazırlanan angoplar pişmiş duvar karosuna 0,4 mm ölçekli ragle ile uygulanmıştır. Hazırlanan angoplu karolar karo pişirimi için özel olarak dizayn edilmiş protherm marka hızlı pişirim fırınında duvar karosu rejiminde 1130°C sıcaklık ve 36 dk. sürede sinterlenmiştir.

Pişmiş firit ve angopların renk ölçümü (L*, a*, b* renk değerleri) 3nh model renk ölçüm cihazı ile gerçekleştirilmiştir. Angobların su geçirmezlik testi şırınga yardımıyla her bölgeye eşit miktarda su koyularak ve kronometre ile emme süreleri hesaplanmıştır. Standart angob ile birlikte angob reçetelerinden seçilen angobların faz analizleri X-ışınları kırınımı (XRD) yöntemi kullanılarak yapılmıştır. XRD ölçümleri X' Pert Pro MPD 30 mA, 40 kV 0,02 Step Size ile 5- 70° 2θ arası taranarak tespit edilmiştir. Angobların ısıl genleşme katsayıları Netcsh marka DIL 402 PC model dilatometre cihazı ile ölçülmüştür.

3. BULGULAR ve TARTIŞMA

Farklı alkali ve toprak alkali oranlarında geliştirilen angobların su geçirgenlik süreleri Çizelge 4'te verilmiştir. Angob kompozisyonlarında MgO/CaO oranındaki azalmanın angobun su emme süresi üzerinde belirgin bir etkisi olmamıştır. Standart angobun su emme süresi 26 sn. olarak belirlenirken standart angoba en uzak MgO/CaO oranına sahip TA3 kodlu angobun geçirgenlik süresi 30 sn. olarak belirlenmiştir. Bu iki geçirgenlik süresi birbirine çok yakın olup angob kompozisyonlarında MgO/CaO oranının angobun geçirgenliği üzerine çok büyük bir etkisi olmadığını göstermektedir. Angob reçetelerinde Na₂O/MgO+CaO oranındaki artış yani kompozisyonda Na₂O oranının artması ise angob su geçirgenliği üzerinde oldukça etkilidir. Kompozisyonlarda Na₂O/MgO+CaO oranındaki artış ile birlikte angobların geçirgenlikleri azalarak angob su emme süresi belirgin şekilde artmıştır. Seramik karo üretimlerinde sırlama öncesi uygulanan angopların en önemli özelliklerinden birisi seramik akro bünyesine su geçirmezlik özelliğini kazandırmasıdır[9]Angobun su geçirgenlik özelliği yapısında bulunan porozitenin bir sonucudur[10]. Angob kompozisyonlarında ergimeyi arttırmak su geçirgenliğinin sebebi olan açık poroziteyi azaltacaktır. Angob kompozisyonunda kullanılan ergiticiler angobun ergiyebilirliğini arttırarak geçirgenliğini azaltır. Feldispatlar, talk, alkali ve/veya toprak alkali elementler içeren hammaddeler bu grubun içerisinde yer alırlar. Artan Na₂O/MgO+CaO oranlarında geliştirilen angob reçetelerinde de alkali oksit oranındaki artış ergitici özelliği nedeni ile angob mikroyapısındaki poroziteyi azaltmış ve su emmeyi düşürmüştür.

Çizelge 4. Farklı alkali oranlarında geliştirilen angob reçetelerinin su geçirgenlik süreleri (sn.)

Reçete kodu	Su emme süresi (sn.)	Reçete kodu	Su emme süresi (sn.)
Std	26	Std	26
TA1	24	TA4	32
TA2	28	TA5	45
TA3	30	TA6	84

Angobların renk değerleri incelendiğinde kompozisyonlarda azalan MgO/CaO oranı ile birlikte angob beyazlık değerlerinin (L) çok değişmediği tespit edilmiştir. Ancak angob sarılık (b) ve kırmızılık (a) değerinde bir miktar artış tespit edilmiştir. MgO/CaO oranındaki azalma angob porozitesini ve dolayısıyla ergiyebilirliğini çok etkilememiştir. Ancak Şekil 1’de verilen angonların XRD analizi incelendiğinde değişen MgO/CaO oranının faz gelişimi üzerine etkisinin büyük olduğu görülmektedir. Angob mikroyapısında gelişen kristal fazlar sahip oldukları farklı kırınım indisleri nedeni ile angobun renk değeri üzerinde belirleyici etkiye sahiptir[8]. Bu nedenle değişen MgO/CaO oranlarında geliştirilen angoblardaki renk ton değişiminin bu gelişen fazların değişimi nedeni ile olduğu düşünülmektedir.

Çizelge 5. Değişen MgO/CaO oranlarında geliştirilen angobların renk değerleri

	Std.	TA1	TA2	TA3
L	93,22	93,31	93,01	92,98
a	-0,12	0,18	0,55	0,79
b	2,05	2,49	2,68	2,62

Angob kompozisyonlarda artan Na₂O/MgO+CaO oranındaki artış ile özellikle yüksek Na₂O oranında beyazlık değerlerinde belirgin bir azalma tespit edilmiştir. Angoblarda artan ergitici oranı mikroyapıdaki poroziteyi azaltmaktadır. Sinterlemenin artması ve mikroyapıdaki porozitede azalma angob beyazlık değerini azaltmıştır. Bunun yanısıra değişen alkali oranlarında angoblarda değişen faz gelişimi angobun benyazlık ve renk tonu üzerinde etkili olmuştur.

Çizelge 6. Değişen Na₂O/MgO+CaO oranlarında geliştirilen angobların renk değerleri

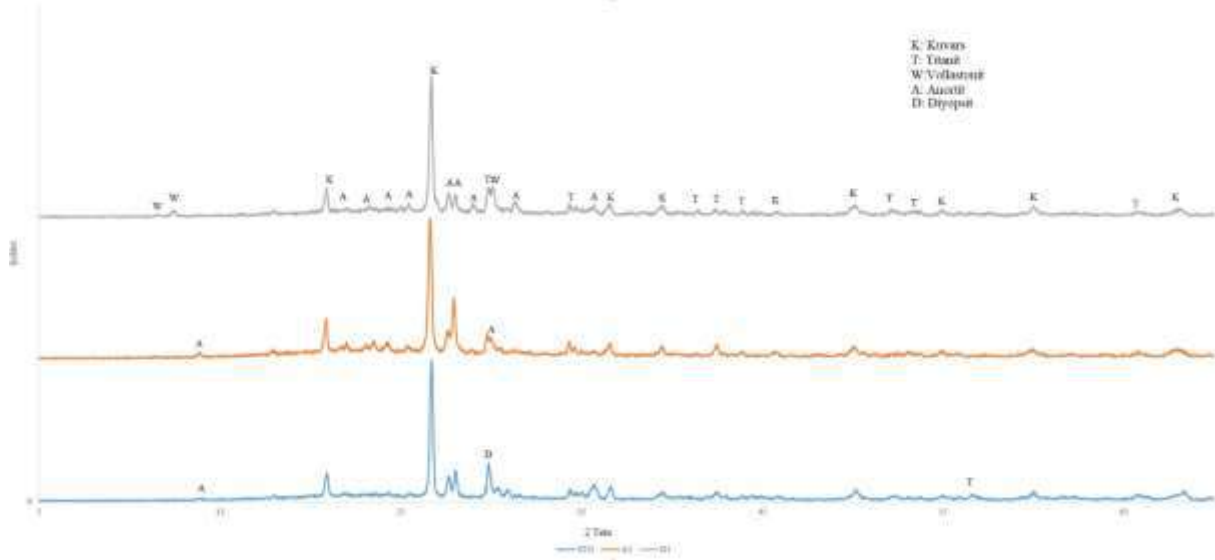
	Std.	TA4	TA5	TA6
L	93,22	93,29	93,11	91,90
a	-0,12	-0,08	0,16	0,07
b	2,05	2,20	1,92	1,02

Isıl genleşme analizlerine göre, farklı alkali oranlarında geliştirilen reçetelerin tümünde ısıl genleşme katsayılarının düştüğü tespit edilmiştir. Azalan MgO/CaO oranının ısıl genleşme katsayısını düşürme etkisi çok daha yüksektir. Angoblarda MgO/CaO oranının azalmasıyla faz gelişimi değişmiş, angob mikroyapısında diopsit fazı yerine vollastonit ve anoritit fazları oluşmuştur. Angob mikroyapısında yüksek ısıl genleşme katsayısına sahip diopsit fazı yerine düşük ısıl genleşme katsayısına sahip anoritit ve vollastonit fazlarının gelişimi azalan MgO/CaO oranlarında angob ısıl genleşme katsayısını düşürmüştür. Diopsit fazının ısıl genleşme katsayısı yüksek olup angobun ısıl genleşme katsayısını yükseltmektedir[4,8]. Angob kompozisyonunda artan Na₂O/MgO+CaO oranında yine ısıl genleşme katsayısı düşmüştür. Standart angoba göre diopsit fazının bu angobta gelişmemesinin yanı sıra artan kuvars faz miktarı ısıl genleşme katsayısındaki düşüşü sınırlamıştır.

Çizelge 7. Angobların ısıl genleşme katsayıları

	Std.	TA2	TA5
Isıl Genleşme Katsayısı ($10^{-7} \text{ }^{\circ}\text{C}^{-1}$) (20-400 $^{\circ}\text{C}$)	87,43	79,03	84,66

Standart angob ile TA2, TA5 angoblarının XRD paternleri Şekil 1’de verilmiştir. Bütün angoblarda ortak olarak anortit, kuvars, titanite fazları saptanırken, standart angobda diopsit fazı tespit edilen diğer fazdır. Azalan MgO/CaO oranında geliştirilen TA2 angobunda artan CaO etkisiyle farklı olarak vollastonit kristal fazı tespit edilmiştir. Standart angoba göre artan Na₂O/MgO+CaO oranında geliştirilen TA5 angobunda diopsit fazı gelişmezken farklı olarak daha fazla miktarda kuvars fazı bununla birlikte anortit ve vollastonite fazları belirlenmiştir.



Şekil 1. Standart, TA2 ve TA5 angoblarına ait XRD analizleri

4. GENEL SONUÇLAR

Bu çalışmada, seramik duvar karosu angob kompozisyonunda değişen alkali ve toprak alkali oranlarının (MgO/CaO, Na₂O/MgO+CaO) angobun fiziksel, optik ve mikroyapı özellikleri üzerine olan etkileri incelemiştir. Bu kapsamda angobların renk, yüzey, geçirgenlik, ısı genleşme katsayısı ve faz gelişimleri araştırılarak standart angob özellikleri ile karşılaştırılmıştır.

Angob kompozisyonlarında değişen MgO/CaO oranının geçirgenlik üzerinde belirgin bir etkisi olmazken, artan alkali oksit (Na₂O) oranıyla birlikte angob geçirgenliği alkali oksidin ergitici etkisi ile azalmıştır.

Angoblarda kompozisyona bağlı olarak değişen faz gelişimleri nedeni ile renk ve ısı genleşme katsayısı değerleri değişmiştir. Standart angob kompozisyonunda diopsit, kuvars, anortit, ve titanit fazları tespit edilirken kompozisyonlarda azalan MgO oranı ile birlikte diopsit fazı tespit edilememiştir. Buna ek olarak artan CaO oranı ile vollastonit fazının geliştiği, artan Na₂O oranı ile de kullanılan sodyum feldispat hammaddesi kaynaklı olarak yapıda kalan kuvars faz miktarının arttığı tespit edilmiştir. Bunlara bağlı olarak da artan Na₂O oranı ve azalan MgO/CaO oranının angobların ısı genleşme katsayısı değerini belirgin şekilde düşürdüğü gözlenmiştir. Angoblarda azalan MgO/CaO oranı angobun beyazlık değerini değiştirmeyip sarı ve kırmızılık değerlerini değiştirirken, artan Na₂O/MgO+CaO oranı ile birlikte ergiticilik etkisiyle angobların beyazlık değeri azalmıştır.



KAYNAKLAR

- [1] Tarhan, M., Tarhan, B. Development of waterproof engobe layer for ceramic wall tiles. *J Therm Anal Calorim* 140, 555–565 (2020).
- [2] Tarhan M, Tarhan B, Aydın T. The effects of fine fire clay sanitaryware wastes on ceramic wall tiles. *Ceram Int.* 2016;42:17110.
- [3] Tarhan, B. Usage of fired wall tile wastes into fireclay sanitaryware products. *J Aust Ceram Soc* 55, 737–746 (2019).
- [4] Tarhan, M., Tarhan, B. Development of waterproof engobe layer for ceramic wall tiles. *J Therm Anal Calorim* 140, 555–565 (2020).
- [5] Vari, A. (2000), Raw material preparation and forming of ceramic tiles, S.A.L.A., Modena, Italy.
- [6] Moreno, A.; Bou, E., Cabrera, M. J., Quereda, P. (1998); “Zirconium silicate opacification mechanism in ceramic engobes”; *Qualicer98*, Pos 29-31
- [7] Sacmi (2002), *Applied Ceramic Technology*, Italy
- [8] Yıldız B.,(2010), *Development of Diopside Based Wall Tile Glazes And Engobes*, Anadolu University Ph.D. thesis
- [9] Hocaoğlu, E. (2004), *Diopsit esaslı angop kompozisyonlarının geliştirilmesi*, Yüksek Lisans Tezi, Fen Bilimleri Enstitüsü, Eskisehir
- [10] Kara, F., Çavaç, M., Özdemir, H., Özkaplan, S. (2000), “Sıvı Geçirgenliği Düşük, Opaklığı Yüksek, Angop Kompozisyonlarının Gelistirilmesi”, TÜBİTAK Seramik Arastırma Merkezi, (SAM) Proje Son Raporu, P/2000-6



DISEASE OUTBREAK PREDICTION: DATA SOURCES AND TECHNIQUES

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ABSTRACT

Disease outbreak is an amount of illness cases in a normal expectancy that arises unexpectedly and in a relatively large geographic area. Disease outbreaks are generally instigated by an infection, spreading through person-to-person, animal-to-person or from any other medium. An adequate amount of pathogens, transmission mode and vulnerable people are some of the known factors for disease outbreak. In India, several outbreaks have been reported in the past such as Nipah, Zika, Chikungunya, Avian influenza, Japanese Encephalitis (JE), Meningococcal, Dengue fever, Severe Acute Respiratory Syndrome (SARS), Plague and Cholera from year 2000 to year 2018. Currently the world faces disease outbreaks such as the Ebola virus in the Democratic Republic of the Congo and Guinea, Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia and the United Arab Emirates (UAE), and the Covid-19 pandemic globally. Therefore, there is a need of a system that can predict disease outbreak using data from multiple sources such as news headlines data, social media trends data, search engine trends data. Data sources such as news headlines related to disease outbreak and social media trends and search engine trends are being used for predicting disease outbreaks frequently with various computational techniques such as Machine learning, Statistical techniques and some hybrid approaches. This work attempts to list and discuss latest research approaches being carried out for disease outbreak prediction aiming to summarize the trends in the domain.

Keywords: Disease outbreak, news headline, social media trends, search trends, machine learning.

1. INTRODUCTION

According to World Health Organization (WHO), Disease outbreak is the number of cases of any disease that increases suddenly and in the same geographic location [1-2]. Predicting disease outbreaks is a vital issue as it is challenging to know when a disease becomes an outbreak. Global disease outbreaks caused 43% loss of life [3]. Detecting and Predicting disease outbreak computationally for the disease such as malaria, a common disease in India [4], Malaysia transmitted through Anopheles mosquito bites [5], SARS [7], Cholera [9], Dengue [10], Avian Influenza [12] and many more have been studied over the past years but lacks in timely detecting and predicting outbreaks. Humankind has witnessed several outbreaks overtime and is currently struggling with the Covid-19 outbreak, categorized as a pandemic by WHO, allegedly started from Wuhan, China, and spread all over the world, causing a massive loss of life and enormous economic loss underlying the importance of disease detection to



prevent the loss of human life and economies [13]. Thus, various factors such as the number of daily cases of hand-foot-mouth disease [16] and dengue [18], simulated data [19], users search queries on search engines, social media posts related to outbreaks [23], and news headlines related to disease outbreaks [24, 26] have the potential to enable us to lookout for desired and sometimes hidden patterns in the available data that can be used to detect and predict disease outbreak. Internet's popularity and reach have unlocked numerous ways to use user-generated data to predict and detect disease outbreaks [26].

This research work focuses on the latest data sources and techniques that are currently used to detect and predict disease outbreaks. This section presents the introduction to the problem. A literature review is presented in section 2 while discussing the key features and limitations of the works. Section 3 describes the data sources used to predict disease outbreak. Section 4 summarizes the techniques used to predict disease outbreak, with section 5 presenting the discussion and conclusions drawn.

2. LITERATURE REVIEW

This section presents the literature review related to the domain of disease outbreak detection and prediction. Various approaches reported in the literature suggest, use of techniques ranging from form-based approaches, analysis of internet-based data to the use of Machine Learning (ML) and Deep Learning (DL) to detect and predict disease outbreaks.

Disease outbreaks such as dengue, diphtheria, yellow fever, influenza, cholera, and bird flu caused massive damage across the world in the past. Countries, e.g., Malaysia, have faced dengue, chikungunya, hepatitis and many more like disease outbreaks. In [3], the effectiveness of disease outbreak prediction has been determined using the backpropagation method with various factors such as disease identification and detection of disease outbreaks. Co-relation of health predictive analysis and epidemic disease dissemination factors also presented, including physical network data such as population and public gathering (hotspot), geographical data such as climate and geodemographic, clinical studies such as clinical case classification and vaccination tracking, and social media data such as geo-mapping. The work suggests that epidemic disease dissemination factors can be different according to various countries and should be considered in the context of geography. Research work presented in the Integrated Disease Surveillance Project (IDSP) of India reported which claims to recognize disease outbreaks but does not predict the outbreak [4]. To assess the temporal correlation between IDSP data for Chandigarh and Haryana states and Google Trends data to predict disease outbreak, all states data, sent to State Surveillance Unit (SSU) at all State/Union headquarters and finally sent to Central Surveillance Unit (CSU) in New Delhi. In IDSP data, three forms need to be submitted: 'S,' 'P,' and 'L.' In work, Google search trend data of 7 days were randomly collected and tagged with a topic after removing personal information. Google Correlate was used to find out the frequency of queries following a similar pattern. Various search terms such as dengue, chikungunya, malaria, and typhoid were obtained from Google Trends, and Google-Correlate was used. However, Keywords obtained from Google search trends data cannot be viewed as a factor for disease outbreak prediction. This is because any person, whether ill or not, can still search any topic or use related keywords on the Google search engine and thereby does not represent any direct relation between the trending topic and the disease outbreak. Furthermore, data collected from IDSP, which may contain any type of human disease data, doesn't provide surety of disease outbreak because diseases can be of various types for the same duration. In India, Malaria has been a major health issue. Prediction of malaria outbreaks is a key to control malaria, which can help policymakers, medical officers, and the health ministry. A total of 1680 samples of malaria were collected over a period of 3



years from the National Vector Borne Disease Control Program, Pune, and Meteorological data from Indian Meteorological Department, Pune used with Support Vector Machine (SVM) based model to predict Malaria 15-20 days in advance. However, this prediction level works only for health centers of Maharashtra state only for Malaria disease [5]. Ecological, social, financial and demographic, and population factors in India, a developing country, suffer extremely due to disease outbreaks and eradicated diseases like poliomyelitis. The work in [6] stresses on the need to utilize data from various sources such as climatic data, demographic data, hospital records, social media data and web search queries with the past data about the diseases to develop an efficient outbreak prediction system. Recent outbreaks such as H1N1, dengue, malaria shifted focus to disease outbreak prediction at an early stage. Facebook data such as medical brands, public walls and health-related public posts, Instagram media uploads, and blogs data open-sourced by [9] can be further used to study social media relevance in detecting and predicting the disease outbreak. A dengue outbreak prediction model used to predict the number of dengue cases within a terrestrial area has been proposed in [10]. Disease outbreak prediction systems that were or are still being used by various Government organizations across the world, such as the Program for Monitoring Emerging Diseases (ProMed) developed by the Government of Canada with the aid of WHO, GPHIN (The Global Public Health Intelligence Network), European Commission's Medical Information System (MedISys) and Pattern-based Understanding and Learning System (PULS) reported in [11]. Climate change affecting early detection and prediction of disease outbreaks assessed using Risk Modeling (RM) and Event-based surveillance (EBS) techniques using regression analysis and statistical inference. EBS system uses open-source data such as Media news articles related to medical issues, medical reports from health departments, news aggregators such as Google News, and social media such as Twitter to detect the possible emergence of disease outbreaks. Further, issues such as how climate change affects various factors responsible for disease outbreaks such as mobility of people, transport of pathogens, and refugees with transmission risk addressed in work. However, the work leaves room for establishing a direct or indirect link between climate change and disease outbreaks; this suggests that work can be carried out on various factors that cause the disease outbreak and affect climate change with respect to human living conditions [11]. Social Media such as the Twitter data analysis model monitors and keeps track of the avian influenza outbreaks in animals in real-time reported in [12]. World Organization for Animal Health, previously known as "Office International des Epizooties" (OIE), is an intergovernmental organization for Animal well-being. OIE data and Twitter data used to assess the potential for outbreak detection in animals. Tweets and geolocation data were obtained from Twitter API. Total 58 outbreaks were reported from 21 countries, and 18 outbreaks were detected earlier than the detected by OIE. However, social media data cannot be deemed reliable as not every ill person discusses their illness on social media, and also, those people who are not ill or fit could possibly be discussing illness or other diseases. Although this study was carried on animal data of various reports obtained from the OIE website, the same approach can be applied considering various human disease data with Twitter data. A soft computing approach using multiple Swarm Intelligence (SI) algorithms were reportedly used to predict dengue outbreak in the detection and prediction of dengue, but the work is restricted to only dengue outbreak [14]. According to the data obtained from National Vector Borne Disease Program, India, the highest number of dengue cases were reported in the year 2017 over the last ten years [15]. Mosquitos and sandflies bite spreads Vector-Borne diseases, which frequently spread in rural areas and can cause a large number of deaths. An expert system in which the user enters the disease symptoms, developed using Artificial Neural Network (ANN) with various optimizations techniques to predict the communicable disease outbreak, has been reported in [17]. The work depends on the manual input by the users and becomes a significant limitation. Assessment of 21 statistical algorithms for temporal outbreak detection performed

on a simulated dataset of weekly time series data has been presented, but this research work depends only on the data for five simulated outbreaks and the number of outbreak cases that can be predicted in the future [19]. Internet articles from MedISys that were related to infectious disease were used to determine if news data can be used to predict disease outbreaks and detect the pattern of disease outbreaks has been presented in [20]. However, the trained model shows the worst performance and can be improved with the use of future passenger air travel data. The invocation of emotions and sentiments related to Covid-19 related news studied using news headlines data, which uses Covid-19 news data but categorizes news only as positive or negative rather than predicting the disease outbreak [21]. A literature review presents an organized way to seek knowledge representation that can be used to infer encoding information about diseases outbreak [22]. The increasing growth of user-generated data connected to social Media provides knowledge about disease outbreaks that is being shared by the users over the internet and also shows patterns of symptoms-based disease outbreaks in real-time. But, the work did not clarify the problem of the inability to identify diseases based on symptoms and misses using “in-depth error analysis” [23]. A news-based Epidemic Disease Surveillance (News-EDS) developed to identify the English news-related diseases in Southeast Asia. News-EDS performs surveillance of 5 diseases such as Dengue, Malaria, Hepatitis, HIV/AIDS, and Influenza/Flu and another class as “unknown”. However, the model exhibits only 78% accuracy for the unknown disease class [24]. Travel data of the year 2018 generated from the International Air Transport Association (IATA) assessed to compute passenger volumes originating from the international airport in Wuhan, China, between January and March. IATA data consists of ~90% of passenger travel routes on flights, demonstrates that passenger's flight data later can be used to predict the international spread of disease outbreak through air travel [25]. The work in [26] suggests that online news headlines related to the Indonesian language contain lower noise compared to social media data which shows potential for public health surveillance in Indonesia. But, the work is region-specific to only Indonesia.

3. DATA SOURCES USED TO PREDICT DISEASE OUTBREAK

EBS and RM techniques use open data sources such as news media reports related to health issues, medical reports, Google News aggregator, and social media data [11]. Social media data such as tweets related to influenza posted on Twitter are classified into related to influenza or not [23]. MedISys provides real-time news articles and reports of infectious disease-related to 115 diseases, collected and was employed to predict disease outbreaks [20]. Covid-19 related news headlines operated by John Hopkins University (JHU) were used to detect the sentiments and emotions, published by Reuters, BBC, Yahoo News, South China Morning Post, National Post, Daily Mail UK, CNBC, CNN, and The Guardian [21]. Two datasets, InfectiousDiseaseNet (IDNet) and DiseaseNews (DNews), were developed to identify news related to diseases. News headlines related to disease of Dengue, Malaria, Hepatitis, HIV/AIDS, and Influenza/Flu were used to develop the dataset [24]. A dataset was created by querying news headlines on 'detik.com', a national online media, using a keyword search 'Demam berdarah', translated in English as dengue fever [26]. Research article abstracts of 188 articles published from 2008 to 2018 were used to identify the techniques used to predict disease outbreaks [22]. IDSP of India uses IDSP data and Google Trends data to assess temporal correlation [4]. The number of cases reported by the hospital and other health institutes such as OIE data which is the number of cases reported of avian influenza and twitter data with geolocation obtained from Twitter API, used to monitor and keep track of the avian influenza outbreaks in animals in real-time [12]. Physical network data such as public congregation, climate, and geodemographic data, clinical studies data, vaccination tracking and social media data was used to establish co-relation of health predictive analysis and epidemic disease

dissemination factors. Electronic Health Record (EHR) data can be used as various epidemic disease outbreak factors later which can be used as features (feature selection) for various machine learning algorithms [3]. Hybrid models and Data Mining techniques used only with disease data, but it can be applied for even climate data, geological data and social media data [5]. A local hospital patient disease symptoms dataset has been used to train the Neural Network [17]. Time series data used to predict dengue outbreaks such as the number of dengue cases, temperature, humidity, and rainfall value [14], and similarly, 42 parameters called scenarios, associated with frequency of counts, trend, seasonality and dispersion have been simulated. Five outbreaks (number of outbreaks cases) were simulated for every time series data out of which four outbreaks were for baseline weeks, and the fifth outbreak was generated in the recent weeks [19]. Infectious Disease Vulnerability Index (IDVI) scores of countries receiving significant number of travelers from Wuhan with travel data of the year 2018 collected from the IATA used to predict the international spread of the virus through air travel [25]. Various Natural Language Processing (NLP) techniques such as white space removal, lower case of all the textual data, tokenization, lemmatization, stop word removal and vectorization used in [21-24] [26].

4. TECHNIQUES USED TO PREDICT DISEASE OUTBREAK

Classification with backpropagation and clustering with various factors such as disease identification, detection of disease outbreak presented in [3]. Various types of Artificial Neural Networks (ANN) based techniques used to predict disease outbreaks such as Radial Basis Function Neural Network (RBFNN), Generalized regression neural network (GRNN), and Feed-Forward Back-Propagation Neural Network (FFBPNN) in [6]. Regression analysis and statistical inference used to detect disease outbreaks with Google News headlines and Twitter data in [11]. ANNs were used along with the Backpropagation and gradient descent optimization technique, and a comparison of 3 gradient optimizers discussed in [17]. Manual labeling of news headlines, preprocessing, feature extraction using Term Frequency-Inverse Document Frequency (TF-IDF), classification using six machine learning classifiers such as Multinomial Naive Bayes (MNB), Stochastic Gradient Descent (SGD), Multi-layer Perceptron (MLP), K-Nearest Neighbors (KNN), AdaBoost (AdB) and Random Forest (RF) were performed. Bidirectional Encoder Representations from Transformers (BERT) were used to generate embedding in [24]. Neural network-based techniques have been used to predict disease outbreaks such as Semi-Supervised Learning (SSL), SVM and Deep Neural Network (DNN) [20]. Logistic regression and several DL models such as MLP, CNN and Long Short-Term Memory (LSTM) were used, and for preprocessing, Tokenizer-API from Keras library were used for tokenization and vectorization in [26]. SVM-based model predicted Malaria 15 days in advance according to which provided valuable time and preparedness to the health authorities [5]. SVM-SMOTE (Synthetic Minority Oversampling TEchniques) and RNN were used to classify tweets related to influenza [23]. Implementation of Twenty-one statistical methods, including CDC algorithm, RKI algorithm, and Bayes algorithm reported in [19]. Four hybrid SI algorithms with Least Squares Support Vector Machines (LSSVM), namely Artificial Bee Colony, Grey Wolf Optimizer, Moth flame Optimization, and Firefly Algorithm used to predict dengue outbreak in [14]. Various knowledge representation techniques such as Fuzzy Rules, ANN, Semantic Networks, Bayesian Networks, Case-based Reasoning, Graph Techniques, Data-driven temporal model, Semantic-Web Rules (SWRL), Decision Tree presented in [22].

5. DISCUSSION AND CONCLUSION

Disease outbreak is a concern that the world is still facing. Preventive and early detection measures for the same are lacking in harnessing the available data from multiple sources such as Medical health data and EMR data. Early disease outbreak prediction, detection and prevention help in the form of life loss, medical emergency, economic loss, social disruption and can provide reliable ways to policymakers to prepare public health policies and the clinical staff to prepare early for the disease outbreak. Using past Disease Outbreak data, Medical Health Data, EMR, and public health surveillance systems with other data such as social media, climate, geolocation can produce a better disease outbreak prediction system. This research work aims to provide an insight into the various data sources and techniques that are being used to detect and predict disease outbreaks. As has been observed, emphases have increased from the traditional data sources to automated data sources such as generated data on a daily basis which includes news headlines, social media, blogs, and search engine trends data. Usage of AI techniques with big data and cloud computing has also increased the possibility to detect and predict disease outbreaks, especially when we have a large amount of daily user-generated data, which can be handled by the latest ML, DL, and SL techniques. However, early detection and prediction is still an opportunity for medical health professionals, policymakers, patients, and governments and the trends are still setting. The advent of the Internet of Things (IoT) promises to generate Big Data that can further help mankind to come up with proactive, efficient computational solutions to disease outbreak predictions.

6. REFERENCES

- [1]. World Health organization, https://www.who.int/Environmental_health_Emergencies_disease_outbreaks/en/.
- [2]. Raymond S. Greenberg, Stephen R. Daniels, W. Dana Flanders, John William Eely, John R. Boring III, *Medical Epidemiology*, 4th Edition.
- [3]. Ibrahim, N., Akhir, N. S. M., and Hassan, F. H., “Predictive analysis effectiveness in determining the epidemic disease infected area”, *International Conference on Applied Science and Technology*, 2017, doi:10.1063/1.5005397.
- [4]. Verma, M., Kishore, K., Kumar, M., Sondh, A. R., Aggarwal, G., & Kathirvel, S., “Google Search Trends Predicting Disease Outbreaks: An Analysis from India”, *Healthcare informatics research*, <https://doi.org/10.4258/hir>, 2018.
- [5]. Sharma, Vijeta, “Malaria Outbreak Prediction Model Using Machine Learning”, *International Journal of Advanced Research in Computer Engineering & Technology*, 2016.
- [6]. Bharambe, Asha & Kalbande, Dhananjay, “Techniques and Approaches for Disease Outbreak Prediction: A Survey”, 2016, <https://doi.org/10.1145/2909067.2909085>.
- [7]. H. Chen et al., "AI for Global Disease Surveillance," in *IEEE Intelligent Systems*, 2009, doi: 10.1109/MIS.2009.126
- [8]. D. B. Neill, “New Directions in Artificial Intelligence for Public Health Surveillance”, in *IEEE Intelligent Systems*, 2012, doi: 10.1109/MIS.2012.18.
- [9]. Xie, Yusheng & Chen, Zhengzhang & Cheng, Yu & Zhang, Kunpeng & Agrawal, Ankit & Liao, Wei-Keng & Choudhary, Alok, “Detecting and tracking disease outbreaks by mining social media data”, *International Joint Conference on Artificial Intelligence*, 2013.



- [10]. Jain, R., Sontisirikit, S., Iamsirithaworn, S., & Prendinger, H. (2019). Prediction of dengue outbreaks based on disease surveillance, meteorological and socio-economic data. *BMC Infectious Diseases*, 19(1). <https://doi.org/10.1186/s12879-019-3874-x>
- [11]. Rees EE, Ng V, Gachon P, Mawudeku A, McKenney D, Pedlar J, Yemshanov D, Parmely J, Knox J., “Risk assessment strategies for early detection and prediction of infectious disease outbreaks associated with climate change”, *Can Commun Dis Rep* 2019, <https://doi.org/10.14745/ccdr.v45i05a02>.
- [12]. Yousefinaghani, S., Dara, R., Poljak, Z., “The Assessment of Twitter’s Potential for Outbreak Detection: Avian Influenza Case Study”, *Springer Scientific Reports*, 2019, <https://doi.org/10.1038/s41598-019-54388-4>.
- [13]. WHO Coronavirus Disease (COVID-19) Dashboard, <https://covid19.who.int/>
- [14]. Z. Mustaffa, M. H. Sulaiman, M. F. M. Mohsin, Y. Yusof, F. Ernawan and K. A. M. Rosli, "An Application of Hybrid Swarm Intelligence Algorithms for Dengue Outbreak Prediction," 2019 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology, Jordan, 2019, doi: 10.1109/JEEIT.2019.8717436.
- [15]. M. Chovatiya, A. Dhameliya, J. Deokar, J. Gonsalves and A. Mathur, “Prediction of Dengue using Recurrent Neural Network”, 2019 3rd International Conference on Trends in Electronics and Informatics, India, 2019, doi: 10.1109/ICOEI.2019.8862581.
- [16]. W. Jia, X. Li, K. Tan and G. Xie, “Predicting the outbreak of the hand-foot-mouth diseases in China using recurrent neural network”, *IEEE International Conference on Healthcare Informatics*, China, 2019, doi: 10.1109/ICHI.2019.8904736.
- [17]. S. Karn, S. Sangole, A. Gawde and J. Joshi, “Prediction and Classification of Vector-Borne and Communicable Diseases through Artificial Neural Networks”, *International Conference on Intelligent Computing and Control Systems*, India, 2019, doi: 10.1109/ICCS45141.2019.9065500.
- [18]. A. Nakvisut and T. Phienthrakul, “Two-Step Prediction Technique for Dengue Outbreak in Thailand”, *International Electrical Engineering Congress*, Thailand, 2018, doi: 10.1109/IEECON.2018.8712258.
- [19]. Bédubourg G, Le Strat Y, “Evaluation and comparison of statistical methods for early temporal detection of outbreaks: A simulation-based study”, *PLOS ONE*, 2017, <https://doi.org/10.1371/journal.pone.0181227>.
- [20]. Kim, J., & Ahn, I. (2021). Infectious disease outbreak prediction using media articles with machine learning models. *Scientific Reports*, <https://doi.org/10.1038/s41598-021-83926-2>.
- [21]. Aslam, F., Awan, T. M., Syed, J. H., Kashif, A., & Parveen, M. (2020). Sentiments and emotions evoked by news headlines of coronavirus disease (COVID-19) outbreak. *Humanities and Social Sciences Communications*, 7(1). <https://doi.org/10.1057/s41599-020-0523-3>.
- [22]. Vinarti, R. A. (2019). Knowledge Representation for Infectious Disease Risk Prediction System: A Literature Review. *Procedia Computer Science*, 161, 821–825. <https://doi.org/10.1016/j.procs.2019.11.188>.
- [23]. Wang, C., Singh, O., Tang, Z., & Dai, H. (2017). Using a Recurrent Neural Network Model for Classification of Tweets Conveyed Influenza-related Information. *DDDSM@IJCNLP*.



- [24]. Azam, N., Tahir, B., & Mehmood, M. A. (2020). News-EDS: News based Epidemic Disease Surveillance using Machine Learning. 2020 14th International Conference on Open Source Systems and Technologies, <https://doi.org/10.1109/icosst51357.2020.9333083>.
- [25]. Bogoch, I. I., Watts, A., Thomas-Bachli, A., Huber, C., Kraemer, M. U. G., & Khan, K. (2020). Pneumonia of unknown aetiology in Wuhan, China: potential for international spread via commercial air travel. *Journal of Travel Medicine*, <https://doi.org/10.1093/jtm/taaa008>.
- [26]. Khotimah, P. H., Fachrur Rozie, A., Nugraheni, E., Arisal, A., Suwarningsih, W., & Purwarianti, A. (2020). Deep Learning for Dengue Fever Event Detection Using Online News. 2020 International Conference on Radar, Antenna, Microwave, Electronics, and Telecommunications (ICRAMET). <https://doi.org/10.1109/icramet51080.2020.9298630>.



PEDAGOGY VIS-À-VIS ARTWORKS

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ABSTRACT

In my courses, I have vastly used entertainment and art works like plays, feature films and documentaries for education in Covid 19 era. In this paper, I am presenting the philosophical foundation of my method. In many cases, I use art works like movies, plays, and documentaries which are formerly created. For instance, in the course sequence on Mysticism, I use a Persian play called *The Vagabond*, and for Philosophy of Economics, three episodes of *Commanding Heights* appear much more helpful than the best textbooks.

Philosophical bases for the method follow. Farabi believes in art as the best and sometimes the only way to teach the most complicated and abstract subjects including philosophy as well as religion. He places artists in the second position of Virtuous City as religion-conveyers after the prophetic rulers. The main job of artists is to teach religious and philosophical concepts and rules. The first head of Virtuous City is no one but the prophet, and his government is believed to be accompanied by the divine revelation and all his actions and views are based on heavenly inspiration. In the second place, there are religion-conveyers including orators, missionaries, poets, musicians, singers, writers and the like. The role of poets, singers, musicians, writers, and all artists in Virtuous City can be best accounted for in terms of the roles with which Farabi credits the imaginary faculties in both revelation and poetics.

Key words: Farabi, art, teaching, revelation, imagination, intelligible.

1. INTRODUCTION

Farabi entitles the society in which the public cooperate toward real happiness ‘al-Madīnah al-Fāḍilah’, which has been translated as Virtuous City¹ and Excellent City². Virtuous City includes five sections of which the highest position is dedicated to the first head and the sages, as well as the clear-sighted in important affairs.³ The first head of Virtuous City is no one but the prophet, and his government is believed to be accompanied by the divine revelation and all his actions and views are based on heavenly inspiration.⁴ In the second place, there are ‘religion-conveyers’ including orators, missionaries, poets, singers, writers and the like. The third class includes engineers, physicians, astronomers and the like; fourth rank belongs to the country's warriors and the guards and the like; and the fifth rank includes artisans, farmers and the like.⁵

The subject matter is that why on the one hand, Farabi puts poets immediately following the prophetic rule and on the other hand, next to the orators and religious missionaries. What is the relation between the Virtuous City poet and both groups that one of them is his superior

¹ M. Fakhry, *Al-Fārābī, Founder of Islamic Neoplatonism* (Oxford: Oneworld, 2002) 79.

² I. Alon, “Fārābī’s Funny Flora Al-nawābit as Opposition”, *Arabica* 37(1990): 56.

³ Fārābī, *Fuṣūl Muntaza’ah*, ed. H. Malikshāhī (Tehrān: Surūsh, 2003) 55.

⁴ Fārābī, *Al-Millah wa Nuṣūṣ Ukhrā*, ed. M. Mahdī (Beirut: Dār al-Mashriq, 1991), 44.

⁵ Fārābī, *Fuṣūl Muntaza’ah*, 55.

and the other is at the same position? What is the function of poetics in Virtuous City to achieve happiness?

The answer needs to know Farabi's theory of revelation and his theory of imagination, as well as components of poetics from his viewpoint. Because the element of imagination in Farabi's special conceptualization, both exists in the theory of revelation and the conceptualization of poetics. Therefore, it can be useful in analyzing the relation between religion and poetics in Farabi's Virtuous City.

2. FARABI'S THEORY OF REVELATION⁶

Farabi used Active Intellect in explaining his revelation and prophecy, and introduced it as the revelation angel or the Holy Spirit.⁷ He places Active Intellect in a position from which the intelligible, whether theoretical or practical, are imparted to the prophet's intellectual faculties and from there to his imagination.⁸ Aristotle, before him, had spoken about the concept of Active Intellect, of course without titling it as, and he regarded it as a factor for transforming potential knowledge into the actual knowledge, as light transforms potential colors into actually visible colors.⁹ Although Kindi¹⁰ had a brief essay about the intellect before Farabi, no attention was paid to subject of revelation in his essay.

There are two aspects in which imagination theory is used by Farabi to explain the revelation: receiving the revelation from Active Intellect and delivering it to the people.

2.1. Prophet and Active Intellect

Farabi regards the prophet as a human who has traversed the stages of perfection and has been linked to the revelation angel, and his intellectual faculties have been completed with perceiving all the intelligible. Furthermore, prophet's imaginary faculties have reached the highest possible extent. Whatever is granted to Active Intellect by God reaches the prophet's intellect; and it is being reincarnated in both theoretical and practical parts of intellectual faculties, from which it is imparted to his imagination.

The Prophet's imaginary faculties are considered to be in the utmost perfection and power.¹¹ This ability will cause that on one hand the sensations which enter in imagination don't become so dominant that all the space of mind would be taken, and on the other hand, imagination is not entirely used by the intellectual faculties. This means that, while involving in the intellectual faculties and the sensible, imagination still has a vast empty space and extra capacity in which its own actions can be performed. The state of mind of such a human when involving in the sensible and intellectual faculties at the time of being awake is like that of others when being asleep. When sleeping, the imaginary faculty has the most perfect capacity and neither the sensible nor the intelligible has any involvement in it. Therefore, while sleeping and being awake, imagination of the prophet receives both the particular details of the present and the future, and the intelligible and universal causes of beings. The particular details of the affairs are comprehended either in direct way or indirectly through their similar and analogous entities, while he receives the intelligible only through the similar and

⁶ For an extended explanation for prophecy see: M. Fakhry, 12-15.

⁷ Fārābī, *Al-Siyāsah al-Madanīyah*, ed., H. Malikshāhī (Tehrān: Surūsh, 1997), 27.

⁸ Fārābī, *Ārā' Ahl al-Madīnah al-Fāḍilah wa Muḍāddātihā*, 121.

⁹ Aristotle, *The Complete Works of Aristotle*, ed., J. Barnes (Princeton University Press: 1995) 430a 10-25.

¹⁰Y., Kindī, *Majmū'ah Rasā'il Phalsaphī Kindī*, trans., M. Y. Thānī, (Tehrān: Elmifarhangi, 2008) 177-180.

¹¹Fārābī, *Ārā' Ahl al-Madīnah al-Fāḍilah wa Muḍāddātihā*, 110-121.

illustrating entities. This level is considered as the most perfect extent to which imagination can reach, and as the most perfect stage which human can attain through the imaginary faculty. Prophecy comes about due to the intelligible having been conferred by Active Intellect to the imaginary faculty.¹²

2.2. Prophet and People

Now a question might arise: why does Farabi include the imagination in the explanation of revelation? This is not a question of reason, but a question of cause. When explaining the revelation, why Fārābī did not suffice to say that Active Intellect is granting prophet's passive intellect all theoretical and practical forms of the intelligible, in a way that his passive intellect knows all the intelligible? Considering the fact that according to him final happiness is to perceive the intelligible and to reach Active Intellect¹³. What is the necessity for entering the imaginary faculties to revelation process? Of course, one reason for focusing on the imagination is to explain the divine verses in details. These particular details cannot be rationally understood and are merely within an imaginary and sensory perception. There is another point for which Farabi involved the imaginary faculties to explain revelation.

According to Farabi, final happiness is the state in which a human being would be successful in perceiving the intelligible and in achieving the nearest status to Active Intellect.¹⁴ On the other hand, for him, as it will be further described, there is a familiarity with imagination among the public who cannot understand the rational.¹⁵ So the intelligible truths and happiness should be transferred somehow to the imagination of people, and they should be approached to the true happiness through their imaginary faculties. This should be undertaken firstly by the Prophet who himself has been linked to Active Intellect and received all the facts by the intelligible and imaginary forms.

According to Farabi, there are two ways to understand the affairs and things: perceiving the essence of one thing and imagining it in its existing form, or imagining the ideas and things similar to it.¹⁶ It is not possible to speak of or bring in action the particular details of non-sensible arenas, such as soul, ten heavenly intellects, the hyle, and all abstract beings unless they are formed in the imagination. But given that these affairs are not possible to be imagined through feeling them, another way should be chosen to help us imagining them and this way is nothing but analogy or parallelism or allegory.¹⁷

This is related to beings and affairs about which it is not basically possible to reason, concerning the other affairs about which the reasoning is possible, the majority of people has not reasoning power due to its nature or habit.¹⁸ In other words they are not used to reason and intelligible affairs. In most of them the soul is absorbed in imagination, imagination controls the self and physical forces prevent that the self with its essence and special perceptions, i.e. the rational, can be sole and independent; and there is confidence of the self in the sensible to some extent that it denies existence of the intelligible and considers them as

¹² Ibid,110-119.

¹³ Fārābī, *Al-Tanbīh 'alā Sabīl al-Sa'ādah wa al-Ta'liqāt wa Risālatān Phalsaphīyatān*, ed.,J. Āl Yāsīn (Tehrān: Hikmat, 1992) 109-112.

¹⁴ Fārābī, *Risālah fī al-Aql*, ed., M.Bouyges (Beirut: Imprimerie Catholique, 1984) 31.

¹⁵ Fārābī, *Al-Tanbīh 'alā Sabīl al-Sa'ādah wa al-Ta'liqāt wa Risālatān Phalsaphīyatān*, 129-130.

¹⁶ Fārābī, *Al-Siyāsah al-Madanīyah*, 225.

¹⁷ Fārābī, *Mūsīqī Kabīr*, 43.

¹⁸ Fārābī, *Al-Siyāsah al-Madanīyah*, 225.

baseless delusions.¹⁹ So the proper method for educating the affairs to public is transferring images and resemblances of the affairs to their mind and imagination.²⁰

Farabi elsewhere has also reiterated that the public are not to follow the intelligible, and human actions in many times, is subject to imagination, though this imagination may be in conflict to his knowledge or suspicion.²¹

Even in some cases, belief of people is contrary to what they think about, and are sure that the reality is different with what it has imagined. However, when imagining the frightening affair, people are being shocked; and there are also similar instances in other cases of the self.²² So, to make people happiness there is no way except that the prophets transfer facts and the rational and intelligible happiness, to public minds through ideas and analogy in the imagined and the embodied form.

3. FARABI'S THEORY OF IMAGINATION

Farabi conceptualizes the imagination through the three main activities of which the third activity creates the ability of imagination to illustrate and embody the intelligible: 1. Storing sensory forms after sensory disconnection; 2. Analyzing and synthesizing sensory forms. There are a variety of analyses and syntheses on which the mind desirably governs; sometimes they are concord with the sensible and sometimes they are not so.²³ For example, the main invents winged human through combining wing of the bird with the human body; 3. Embodiment or metaphor: among the forces of the soul, only the imaginary faculty is able to embody the sensible and even the intelligible. The imagination even can embody the intelligible, such as the Prime Cause and abstract beings of matter, which have attained perfection. Of course, embodying them is done by the highest and most perfect forms of the sensible, such as handsome and beautiful things. On the contrary, it does embody the imperfect intelligible by bad, ugly and imperfect forms of the sensible.²⁴

Thus, the imaginary faculty is a force that stores, analyzes, and synthesizes forms of the sensible and utilizes them to embody the sensible and intelligible affairs. For example, Iranian poet, Hāfiz²⁵ brought one the highest metaphor of the sensible to the intelligible. Human life is as a farm in which his actions grow as seeds and harvestman of the time looks for the crop with scythe. The moon, that is formed like a scythe in the sky in the first nights, reminds their actions and the results which will be finally harvested. Hāfiz has compared actions and their results to a beautiful landscape, based on intelligible law of the survival of action and result conservation. This very intelligible law has also been likened by another poet, Mowlavī to the mountain and the voice being repeated in it: this universe is regarded as the mountain, and our action is an echo. After being encountered with the Mountain, our voice returns toward us.²⁶

¹⁹ Fārābī, *Al-Tanbīh 'alā Sabīl al-Sa'ādah wa al-Ta'liqāt wa Risālatān Phalsaphiyātān*, 129 -130.

²⁰ Fārābī, *Al-Siyāsah al-Madaniyah*, 225.

²¹ Fārābī, *Al-Manṭiqiyāt*, (Vol. 1), ed., M. T. Dānishpajūh, (Qum: Maktaba al-Marashi, 1987) 502.

²² Fārābī, *Fuṣūl Muntaza'ah*, 52-53.

²³ Fārābī, *Ārā' Ahl al-Madīnah al-Fāḍilah wa Muḍāddatihā*, 84, 95.

²⁴ Ibid, 106-107.

²⁵S.M. Hfız, 1988. *Dīvān Hāfiz*. ed., H.E. Qumshe'ī (Tehrān: Surūsh, 1988) 437.

²⁶ J. M. Mowlavī, *Mathnavī Ma'navī*. ed., T. Subhānī (Tehrān: Rowzaneh, 2001) 13.

Although before Farabi, Aristotle had spoken about the nature of imagination in the discussions of the self, he had not considered the third feature.²⁷ Some researcher has mentioned this point.²⁸

4. TENETS OF POETICS

In Farabi's works, there are several sections in which he has spoken of poetics. Analyzing the speech shows the share of fancy imagination in essence and coordinates of the poetics.

He divided poetics to six types, three of which are considered as the desirable, and three other ones as undesirable. First type of poetics, which is regarded as the highest from Farabi's viewpoint, aims at reforming the faculty of reasoning, thoughts, and actions toward the happiness and the poetics which is concentrated on leading to think about divine actions, goodness, presenting real virtues as good and great.

The second type is the poetics trying to moderate radical qualities and attributes: these qualities of the self include feelings such as anger, egotism, domination, greed and the like, which its holders are intended to use them to get to goodness and wellness, instead of to create vices and obscenity.

Third type, as desirable poetics, wants to moderate dissipative qualities of the self and to turn inability and weakening of the self and desires, as well as to change lassitude, fear, grief and welfare, etc. in order to moderate the feelings. And it would firmly be used for acquiring goodness, instead of creating vices and obscenity.

Farabi does not describe more three wicked poetics, and points out that the three undesirable ones are just against the three sorts, wanting to corrupt thought and tending to sensual qualities and moods.²⁹ In short, when describing desirable poetics, Farabi focuses on setting to think of goodness, happiness and moderation of feelings, i.e., he emphasizes on two elements: imagination and emotions.

In another section, when expressing characteristics of the poem, he says:

Poetic speech is words through which a mood is excited in the audience, and indicates something above what exists or lower than the fact. These qualities are directed at beauty, ugliness, magnificence, contempt and the like. When listening poetic words, we are given so much imagination that it will be just like a state which we feel when looking, for example, at uncomfortable objects.³⁰

In this definition of poetry, Farabi also emphasizes on the two components: exciting sensual emotions and creating strong imagination.

On the whole when discussing essence and descriptions of poetics, Farabi focuses on the components of taste or the intelligible element, i.e., understanding of meanings, imagination, sensual passions and pleasure. Of course, it should be noted that, as mentioned above, in his view, people understand the intelligible and meanings through imagination. Furthermore, feelings and emotions of people often originate from the imagination and the imaginary forms.

²⁷ Aristotle, 427 a 18- 429 a 4, 432 a 9.

²⁸ Black, D. L. "Al- Fārābī", *History of Islamic Philosophy*, ed. S. H. Nasr and O. Leaman (London and New York: Routledge, 1996) 185.

²⁹ Fārābī, *Fuṣūl Muntaza'ah*, 53-54.

³⁰ Fārābī, *Ihṣā' al-Ulūm*, trans., H. Khadivjam (Tehrān: Elmifarhangi, 2002) 66-67.



5. RELATION BETWEEN ART AND REVELATION

Among the elements introduced by Farabi in discussion of the art, there are two elements, i.e., the imagination and the understanding of the intelligible, which are used to explain the relation between art and religion. As it was mentioned above, he believes that highest art is one in which the imaginary forms lead people to think about divine thoughts and actions. Furthermore, the desirable art, by creating a visionary state, tries to moderate extremity of emotion and feeling.

On the other hand, as it was expressed about Farabi's imagination theory, he believes that there is relation between imagination and intellectual faculty and that the imaginary faculties are able to embody meanings and intelligible affairs by the imaginary and sensual forms. The ultimate goal of the Virtuous City rulers also is to provide the public intelligible happiness. The prophet, through revelation, perceives all the affairs in a rational way and also in an imaginary form.

When trying to imagine them, he succeeds to perceive the essence of things and he, of course, knows ideas and comparisons of things. And by way of acknowledgement, he perceives all the truths through rational arguments of certainty. Happiness plays a pivotal role in Farabi's thought. However, as the public would not be able to perceive intellectually the real happiness, so to conceive the intelligible affairs, its ideas are thrown into the imaginary faculties of people, and the persuasive and oratorical methods (instead of arguments of certainty) are being used for acknowledging intelligible happiness and rational truth.

Artist of the Virtuous City engages in embodying intelligible happiness by sensible and imaginary forms. A religious orator or missionary tries to promote the intelligible with the satisfying and persuasive methods among people. So, both artist and preacher perform an activity similar to that of the prophet and for this reason, they are just next to him and in the second rank of Virtuous City, lower than the prophet.

6. CONCLUSION

The ultimate goal of Virtuous City is that the public achieve intelligible happiness. Because the public, based on their nature or habit, is not able to perceive true and intelligible happiness, so intelligible happiness should be transferred to his imagination. Angel of revelation sends whole truth and intelligible happiness to intellectual faculties of the prophet and also to his imaginary faculties. Although the prophet himself has perceived all the affairs at the intelligible level, but in order to lead people to prosperity, he transfers facts through allegory, comparison, image to the imaginary faculties of people, and what is proved for him by argument of certainty is distributed among people through the persuasive arguments. On the other hand, for Farabi, elements of imagination and speech are constructive components of art. Artist is able to embody intelligible happiness by sensory and imaginary forms and Virtuous City artist, like the prophet, makes intelligible happiness close to people's minds through sensible and imaginary forms. The artist is next to the religious orators because as duty of religious missionaries is to promote the intelligible through persuasive methods and oratorical ways, Virtuous City's artist is engaging in embodying and imagining intelligible truths as the best way and in some cases the only way to teach and educate people.



INTERACTION VARIANCES OF MOSQUITOES' GENERA

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ABSTRACT

This article considers the differences among all pairs of sample means divided by the estimated standard deviation of the sample means of adult mosquitoes in four selected sites in Nigeria police academy (Polac), Wudil, Kano, Nigeria in August, 2019 via a two-factor experiment and Tukey honestly significant difference (HSD) test. A total of one thousand and sixty (1534) mosquitoes comprising of 3 genera; Anopheles, Aedes and Culex were identified in the girls' hostel, girls' hostel staircase, quarter guard, and clinics. Anopheles mosquitoes was higher in terms of abundance with a total number of 905 samples, about 59.00% followed by Aedes mosquitoes with a total number of 343 samples, about 22.36% and Culex mosquitoes with a total number of 286 samples, about 18.64%. Also, 280 of the mosquitoes were males; about 18.25% and 1254 of the mosquitoes were females; about 81.75%. The population of mosquitoes in girls' hostel was 320, about 20.86%; the staircase of the girls' hostel is 702, about 45.76%; the quarter guard 473, about 30.83%; and the clinic is 39, about 2.54%; thus, abundance of mosquitoes is prevalent in the staircase of the girls' hostel followed by the quarter guard, the girls' hostel and the clinic. The design plot showed that the staircase of the girls' hostel and quarter guard have the highest mean of yields for mosquitoes, while the girls hostel's and the clinics' mean of yields fall below overall mean of the sample. The means interaction plot made known that the differences between levels of one factor for Aedes will depend on the level of the other factors of Anopheles and Culex mosquitoes. No significant difference between Culex and Aedes as well as Culex and Anopheles mosquitoes; but, significant differences transpired between sample means of Anopheles and Aedes. Also, significant differences between site surveyed sample means of quarter guard and clinic; and girls' hotel staircase and clinic were detected.

Effective control of mosquito populations by improving environmental sanitation, removing mosquito habitats, preventing mosquito exposure; and provide mosquito repellents to protect against mosquito-borne illnesses are necessary for prevention and control of these diseases.

Keywords: Environmental Sanitation, Mosquito-borne illnesses, Two-Factor Experiment, Tukey Honestly Significant Difference (HSD) test

INTRODUCTION

Mosquitoes are the most important vectors of public health due to their roles in the transmission of diseases such as Malaria, Lymphatic filariasis and others. Apart from their role in the transmission of diseases, the sound they make to announce their presence is also annoying. Different species of this insect have been identified as the vector transmitting these

diseases. The females of most species have piercing and sucking mouth parts for sucking blood. Malaria is a life-threatening disease caused and spread by *Plasmodium* parasite and female mosquito vectors, respectively with 92% of malaria cases and 93% of malaria deaths occurring in the African region (WHO, 2018). Corresponding to WHO, 2015; the transmission of diseases by mosquitoes is more intense in places where the mosquito life span is longer (so that the parasite has time to complete its development inside the mosquito) and where it prefers to bite humans rather than animals. Relating to WHO, 2019 World Malaria Report, Nigeria had the highest number of global malaria cases (25 % of global malaria cases) in 2018 and accounted for the highest number of deaths (24 % of global malaria deaths). The mature female anopheles mosquito needs a blood meal for its reproduction.

Two-way analysis of variance enables us to look at the individual and joint effects of two independent variables on one dependent variable; thus, it tells us about the main effect and the interaction effect. Regularly, ANOVA is used to test equality among several means by comparing variance among groups relative to variance within groups (random error). Moreover, the design affords natural replications that result from overlapped factors. Tests of main effects are tests of one factor averaged over levels of the other factors (Bland & Altman, 1996c; Fisher, 1925; Fujikoshi, 1993). Absence of interaction between two factors implies that the additive effect of one factor is identical across all levels of the other factor. In that situation, tests and interpretation of main factors are straightforward. If interactions exist, one must interpret main effects carefully, because relations among mean levels of one factor differ according to levels of the second factor (Fisher, 1925; Kleinbaum, et al., 1988; Winer et al., 1991; Fujikoshi, 1993; Bland & Altman, 1995c; Zar, 1999; Gelman, 2005; Sit, 2007; Kass, 2011).

MATERIALS AND METHODS

Study Area and Sites

Nigeria Police Academy, Wudil Kano, Nigeria lies on latitude 11°49'N and longitude 8°51' E and falls within the semi-arid Sudan savannah zone of West Africa about 840 kilometers from the edge of the Sahara Desert as shown in figure 1. Kano has a mean height of about 472.45m above sea level. The temperature of Kano usually ranges between a maximum of 33°C and a minimum of 15.8°C although sometimes during the harmattan, it falls down to as low as 10°C. Kano has two seasonal periods, which consist of four to five months of wet season and a long dry season lasting from October to May. The rainfall in this area ranges between 1016mm and 1524mm with a relative humidity between 60% and 80%. The guinea savannah is divided into two vegetation zone; the northern and southern guinea savannah. The temperature of this area is highly influenced by the Niger Benue trough where heat is trapped.



Figure 1: Map of Nigeria Police Academy Wudil Kano, Nigeria

Study Design

The study was carried out in four selected sites in some parts of the Nigeria Police Academy, Wudil Kano, Nigeria. These sites are Girls’ hostel, staircase, Quarter guard (a building used mainly for the detention of offenders in the Academy premises), and the clinic.

Sample Collection and Analysis

In the month of August, 2019 mosquitoes were collected indoors between 05:30pm and 06:00am using the pyrethrum-base aerosol spray (Raid). Mosquitoes were collected on white clothes spread on the floors of the four (4) selected sites: Girls hostel, staircase, quarter guard, and clinic. All knocked down mosquitoes were collected into sample bottles and taken to the laboratory for morphological identification as described by (Amusan, et al., 2007; Gillies & Coetzee, 1987).

Mosquitoes were picked with forceps, dropped on a clean slide and then observed under a light microscope with $\times 40$ objectives. Features such as size of antennae, color and size of the maxillary palps, length of proboscis, colour and shape of abdomen, colour and length of legs, colour of wings etc., were observed and compared. Individual mosquitoes were identified into species level, counted and recorded.

Data Analysis

The dataset comprises of three insects (mosquito); Anopheles, Culex, and Aedes being surveyed at different sites (Girls Hostel, Girl’s hostel staircase, Quarter Guard, and Clinic) of Nigeria Police Academy, Wudil, Kano State. The insects have male and female as interaction.

A two-way ANOVA test analyzes the effect of the independent variables on the expected outcome along with their relationship to the outcome itself (Yates, 1934; Kass, 2011). All these variables are varying independently and normally around a mean. Let Y_{ijk} denote the response random variable in k -th measure for treatment (i,j) ; $k = 1, \dots, n_{ij}$, $i = 1, \dots, I$ indexes the levels of the first factor, and $j = 1, \dots, J$ indexes the levels of the second factor, then:

$$Y_{ijk} = \mu_{ij} + \varepsilon_{ij} \tag{1}$$

Besides the variation explained by the factors, there remains some amount of unexplained variation ε_{ijk} , random error. The mean of the response variable is modeled as a linear combination of the explanatory variables (Gelman, 2005; Gelman and Hill, 2006):

$$\mu_{ij} = \mu + \alpha_i + \beta_j + v_{ij} \tag{2}$$

where μ is the population group means, α_i is the additive main effect of level i from the first factor (i -th row in the contingency table), β_j is the additive main effect of level j from the second factor (j -th column in the contingency table) and v_{ij} is the non-additive interaction effect of treatment (i,j) from both factors (cell at row i and column j in the contingency table) (Fujikoshi, 1993).

A two-way ANOVA partitions the total sum of squares into within sum of squares and between sum of squares. Carrying out hypothesis test on an appropriate test statistic requires the assumption of normality for the ANOVA model that is; $Y_{ijk} \sim N(\mu_{ij}, \sigma^2)$ (homoscedasticity) or equivalently $\varepsilon_{ijk} \sim N(0, \sigma^2)$ and the homogeneity of variance among groups being compared is expected to be similar across all groups. If one of these assumptions is not met, we might need to transform the data using a logarithmic or exponential

transformation to reduce the variability in the data, or you may be able to use a non-parametric alternative (Kleinbaum, et al., 1988; Sit, 2007).

The mean corresponds to mosquitoes (anopheles, culex, aedes) by gender groups (female, male) that are defined by the combination of the two independent variables surveyed at girls hostel, girls’ hostel staircase, quarter guard, and clinics has the following hypotheses adopted at 0.05 level of significance. The dataset was analyzed using R programming language.

Hypothesis (I): Main effect insects

H₀: insect group means are all equal versus

H_A: at least one insect group mean is different from the others

Hypothesis (II): Main effect of site surveyed

H₀: surveyed site group means are all equal versus

H_A: at least one surveyed site group mean is different from the others

RESULTS AND DISCUSSION

Descriptive statistics of table 1 revealed that, a total of one thousand and sixty (1534) mosquitoes comprising of 3 genera; Anopheles, Aedes and Culex were identified during the month of August, 2019 in the girls’ hostel, girls’ hostel staircase, quarter guard, and clinics. The population of mosquitoes in the girls’ hostel is 320, about 20.86%; the staircase of the girls’ hostel is 702, about 45.76%; the quarter guard 473, about 30.83%; and the clinic is 39, about 2.54%; thus, abundance of mosquitoes is prevalent in the staircase of the girls’ hostel followed by the girls’ hostel, quarter guard and the clinic. Also, Anopheles mosquitoes was higher in terms of abundance with a total number of 905 samples, about 59.00% followed by Aedes mosquitoes with a total number of 343 samples, about 22.36% and Culex mosquitoes with a total number of 286 samples, about 18.64%. More so, 280 of the mosquitoes were males, about 18.25% and 1254 of the mosquitoes were females, about 81.75% in Nigeria Police Academy.

Table 1: Descriptive Statistics

Sites surveyed	Anopheles		Culex		Aedes		Total(mean)
	Male	Female	Male	Female	Male	Female	
Girls’ hostel	17	246	7	42	2	6	320
Staircase	63	182	33	104	69	251	702
Quarter guard	64	300	19	75	2	13	473
Clinic	3	30	1	5	0	0	39
Total (mean)	147	758	60	226	73	270	1534

The F test on table 2 for the main effect of insect with p-value=0.129 indicates that the insects group means are all equal. Also, for the main effect of the sites surveyed with p-value=0.146 indicates that surveyed site group means are all equal.

Table 2: Analysis of Variance for the month of August (original data)

Response data	df	SS	MS	F-value	Pr(>F)
insect	2	29261	14630	2.298	0.129
Sites_surveyed	3	38694	12898	2.026	0.146
residuals	18	114605	6367		

To validate the inferences made for the ANOVA in table 2, we need to check for normality and homogeneity of variances assumptions of its residuals.

Normality Assumption of the Dataset

It can be seen in figures 2 below that the residuals of the original data are not distributed symmetrically around the centre of all scores.

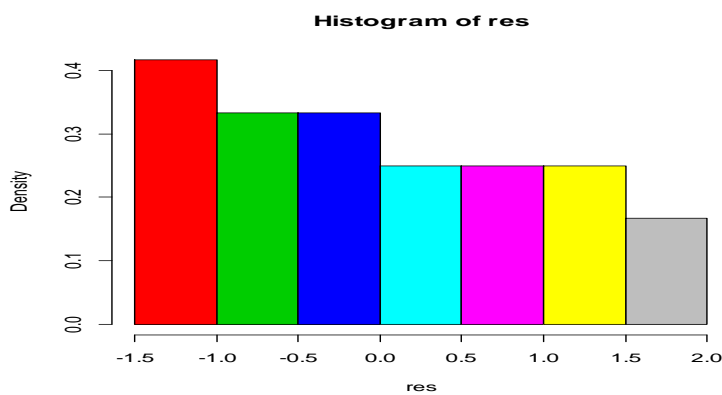


Figure 2: Histogram of the original data

It can be seen from the plot of sample quantiles in figure 3 that the datasets are not normally distributed since the points seem to deviate markedly away from the straight line with outliers' points at the ends of the line, distanced from the bulk of the observations.

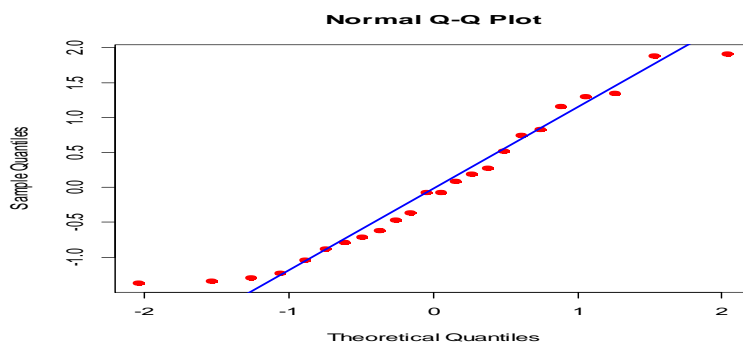


Figure 3: Quantile to quantile (Q-Q) plot

Shapiro-Wilk and Jarque-Bera tests in table 3 revealed that, the residuals of the model are not normally distributed with p-values of 0.003777 and 0.003708 less than significance level of 0.05

Table 3: Normality test for the month of August (original data)

Tests	Statistics	p-value
Shapiro-Wilk	0.8626	0.003777
Jarque-Bera	11.1946	0.003708

Homogeneity of Variances Assumption

The results of table 4 revealed that variances are not equal across groups or samples, since the p-value of 0.00195 is less than significance level, 0.05.

The residual of the original data did not satisfy the assumptions of normality and homogeneity of variance; so, the inferences made from table 2 are not valid. We have to transform the data using a logarithmic transformation.

Table 4: Homogeneity of Variances test for the month of August (original data)

K-squared	df	p-value
14.8009	3	0.001995

The F test in table 5 for the main effect of insect has p-value=0.007745 which indicates that, at least one insect group mean is different from the others. Also, the main effect of the sites surveyed has p-value=0.000485 indicates that, at least one surveyed site group mean is different from the others.

Table 5: Analysis of Variance for the month of August (transformed data)

Response data	df	SS	MS	F-value	Pr(>F)
insect	2	17.21	8.603	6.445	0.007745
Sites_surveyed	3	39.01	13.003	9.741	0.000485
residuals	18	24.03	1.335		

To validate the inferences made for the ANOVA in table 5, we check for normality and homogeneity of variances assumptions of its residuals as done previously.

The null-hypothesis that the population residuals are normally distributed in table 6 cannot be rejected for Shapiro-Wilk and Jarque-Bera tests with p-values of 0.557 and 0.458 greater than significance level, 0.05.

Table 6: Normality test for the month of August (transformed data)

Tests	Statistics	p-value
Shapiro-Wilk	0.9654	0.557
Jarque-Bera	1.5616	0.458

The results of table 7 revealed that variances are equal across groups or across samples, since the p-value of 0.3368 is greater than significance level of 0.05. Thus, after the transformation of the data the basic assumptions of ANOVA were satisfied. Hence, the inferences made about table 25 are valid and we conclude that at least one insect group means and one surveyed site group mean is different from the others.

Table 7: Homogeneity of Variances test for the month of August (transformed data)

K-squared	df	p-value
3.3792	3	0.3368

The design plot of figure 3 showed that *Aedes* mosquitoes' has a low mean of yields; *Culex* mosquitoes' mean of yields is slightly below the overall mean, while *Anopheles* mosquitoes' mean of yields is above the overall mean of the samples. Thus, *Anopheles* mosquito is more in Polac for the month of August. Furthermore, the staircase and quarter guard have the highest mean of yields for mosquitoes, while the girls hostel's and the clinics' mean of yields fall below overall mean of the sample. Thus, the staircase and quarter guard are breeding places for mosquitoes in Polac for the month of August.

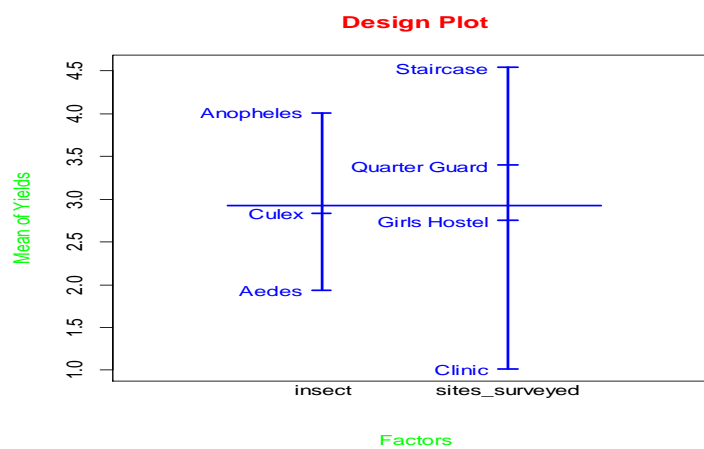


Figure 3: Design plot for mean of yields against the factors

The line that connects the means of data in figure 4 for *Culex* and *Anopheles* are quite parallel; thus, the interaction effects are very small compared to main effects or they are only apparent in a small number of treatments; so, they are probably unimportant. Also, the mean of data for *Aedes* crisscross the mean of data for *Anopheles* and *Culex*; thus, the differences between levels for one factor of *Aedes* will depend on the level of the other factors of *Anopheles* and *Culex* mosquitoes.

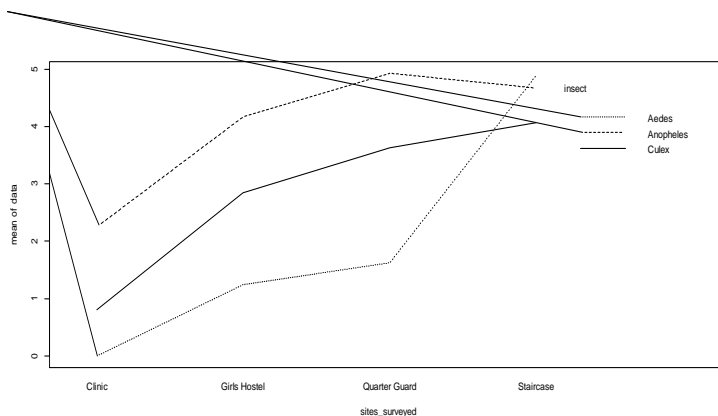


Figure 4: Interaction plot for mean of data against site surveyed

In figure 5 below, the interaction plots' line for staircase crisscross the plot of interaction line for quarter guard; thus, the differences between levels for one factor of the staircase will depend on the level of the other factors of the quarter guard. More so, the interaction plots' line for quarter guard, girls hostel and clinic are close to parallel; thus, the interaction effects will be very small compared to main effects or only apparent in a small number of treatments; so, they are probably unimportant.

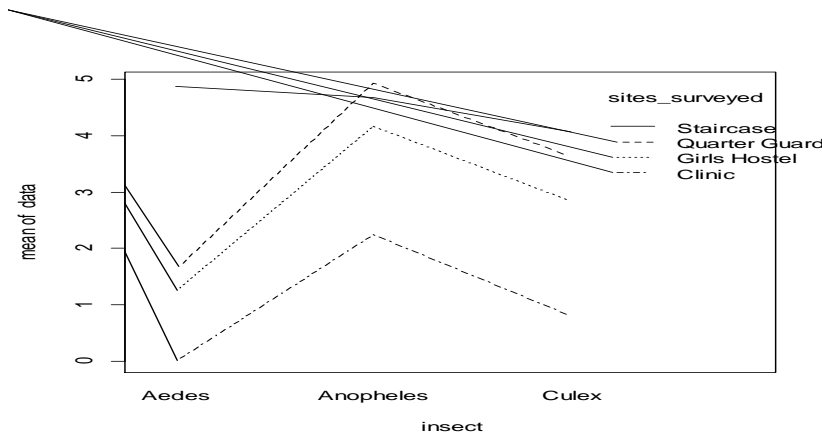


Figure 5: Interaction plot for mean of data against the insects

It can be seen from table 8 that, the mean of observation of the girls' hostel is significantly different from the mean of observation of the clinics. Also, the mean of observation of quarter guard is significantly different from the mean of observation of the clinic; but, not significantly different from the mean of the observation of the girls' hostel. More so, the mean of observation of the staircase is significantly different from the mean of observation of the clinics and girls' hostel; but, not significantly different from the means of the observation of the quarter guard.

Table 8: Fisher's Least Significant Different (LSD) Test

	Clinic	Girls Hostel	Quarter Guard
Girls Hostel	0.04956	-----	-----
Quarter Guard	0.00947	0.44499	-----
Staircase	0.00039	0.04315	0.18277

Tukey's honestly significant difference (HSD) test is used to test differences among sample means for significance. It tests all pairwise differences while controlling the probability of making one or more Type I errors; i.e., the probability of rejecting the null hypothesis (no significance difference) given that the null hypothesis is true. This post-hoc analysis will provide greater insight into the differences or similarities between specific groups.

The between groups of all insects sample means' plots for Culex and Aedes as well as Culex and Anopheles crossed the boundary line to the left; thus, no significant differences between groups of their sample means. But, significant differences transpired between sample means of Anopheles and Aedes.

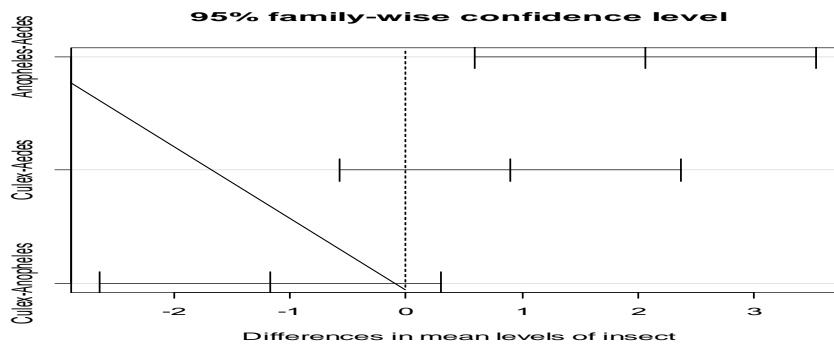


Figure 6: Tukey HSD confidence interval plot of insects

The 95% confidence interval for the differences in the sample means of site surveyed in figure 7 below showed that; the girls’ hostel and clinic, as well as the quarter guard and girls’ hostel; girls’ hostel staircase and girls’ hostel; girls’ hostel staircase and quarter guard crossed the boundary line to the left, while the remaining site surveyed did not cross the boundary line and remained at the right side. Thus, no significant differences between site surveyed sample means of girls’ hostel and clinic, as well as the quarter guard and girls’ hostel; girls’ hostel staircase and girls’ hostel; girls’ hostel staircase and quarter guard were observed. Succinctly, significant differences between site surveyed sample means of quarter guard and clinic; and girls’ hotel staircase and clinic were detected.



Figure 7: Tukey HSD confidence interval plot of sites surveyed

CONCLUSION

This article considers the differences among all pairs of sample means divided by the estimated standard deviation of the sample means of adult mosquitoes in four selected sites in Nigeria police academy (Polac), Wudil, Kano, Nigeria in August, 2019 via a two-factor experiment and Tukey honestly significant difference (HSD) test. A total of one thousand and sixty (1534) mosquitoes comprising of 3 genera; Anopheles, Aedes and Culex were identified in the girls’ hostel, girls’ hostel staircase, quarter guard, and clinics. Anopheles mosquitoes



was higher in terms of abundance with a total number of 905 samples, about 59.00% followed by *Aedes* mosquitoes with a total number of 343 samples, about 22.36% and *Culex* mosquitoes with a total number of 286 samples, about 18.64%. Also, 280 of the mosquitoes were males; about 18.25% and 1254 of the mosquitoes were females; about 81.75%. The population of mosquitoes in girls' hostel was 320, about 20.86%; the staircase of the girls' hostel is 702, about 45.76%; the quarter guard 473, about 30.83%; and the clinic is 39, about 2.54%; thus, abundance of mosquitoes is prevalent in the staircase of the girls' hostel followed by the quarter guard, the girls' hostel and the clinic. The design plot showed that the staircase of the girls' hostel and quarter guard have the highest mean of yields for mosquitoes, while the girls hostel's and the clinics' mean of yields fall below overall mean of the sample. The means interaction plot made known that the differences between levels of one factor for *Aedes* will depend on the level of the other factors of *Anopheles* and *Culex* mosquitoes. No significant difference between *Culex* and *Aedes* as well as *Culex* and *Anopheles* mosquitoes; but, significant differences transpired between sample means of *Anopheles* and *Aedes*. Also, significant differences between site surveyed sample means of quarter guard and clinic; and girls' hotel staircase and clinic were detected.

Effective control of mosquito populations by improving environmental sanitation, removing mosquito habitats, preventing mosquito exposure; and provide mosquito repellents to protect against mosquito-borne illnesses are necessary for prevention and control of these diseases.

REFERENCES

- Amusan, A.A.S., Mafiana, C.F. & Oke, O.A. (2007). A survey of adult mosquitoes in the hostels of the University of Agriculture, Abeokuta, Ogun State, Nigeria. *The Nigerian Journal of Parasitology*, 24:167-172.
- Altman, D. G. & Bland, J. M. (1996). Comparing several groups using analysis of variance. *British Medical Journal*, 312: 1472-1473.
- Bland, J. M. & Altman, D. G. (1995c). Multiple significance tests: the Bonferroni method. *British Medical Journal*, 310: 170.
- Bland, J. M. & Altman, D. G. (1996c). The use of transformation when comparing two means. *British Medical Journal*, 312: 1153.
- Fisher, R.A. (1925). *Statistical Methods for Research Workers*. Edinburgh, United Kingdom: Oliver & Boyd.
- Fujikoshi, Y. (1993). "Two-way ANOVA models with unbalanced data". *Discrete Mathematics*. 116 (1): 315–334. DOI:10.1016/0012-365X(93)90410-U.
- Gelman, A. (2005). "Analysis of variance? why it is more important than ever". *The Annals of Statistics*. 33 (1): 1–53. arXiv:math/0508526. doi:10.1214/009053604000001048.
- Gelman, A. and Hill, J. (2006). *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press. pp. 45–46. ISBN 978-0521867061.
- Gillies, M.T. & Coetzee, M. (1987). *A supplement of the African Anopheline Mosquitoes South of Sahara*. South African Institute for Medical Research, 55. DOI.org/10.1186/s12936-018-2189-5.
- Kass, R. E (2011). "Statistical inference: The big picture". *Statistical Science*. 26 (1): 1–9. arXiv:1106.2895. DOI:10.1214/10-sts337. PMC 3153074. PMID 21841892.



- Kleinbaum, D.G., Kupper, L.L. and Muller, K.E. (1988). *Applied Regression Analysis and Other Multivariable Methods*. 2nd ed. Boston, Mass: PWS-Kent Publishing.
- Sit, V. (2007). *Analyzing ANOVA Designs: Biometrics Information Handbook No. 5*. Province of British Columbia, Ministry of Forests Research Program. Working paper 07/1995. Available at: <http://www.for.gov.bc.ca/hfd/pubs/docs/Wp/Wp07.pdf>.
- Winer, B. J., Brown, D. R. & Michels, K. M. (1991). *Statistical Principles in Experimental Design*, McGraw-Hill, New York, NY.
- World Health Organization, WHO (2015). *World malaria report 2015*. World Health Organization. ISBN: 9789241565158.
- World Health Organization, WHO (2018). *World Malaria Report 2018*. World malaria report 2018. World Health Organization. ISBN: 9789241565653
- World Health Organization, WHO (2019). *World malaria report 2019*. World Health Organization. ISBN: 9789241565721.
- Yates, F. (1934). The analysis of multiple classifications with unequal numbers in the different classes. *Journal of the American Statistical Association*. 29 (185): 51–66. doi:10.1080/01621459.1934.10502686. JSTOR 2278459.
- Zar, J.H. (1999). *Biostatistical Analysis*. Upper Saddle River, NJ: Prentice Hall. 20.
- BLAND, J. M. & ALTMAN, D. G. (1996b). Transforming data. *British Medical Journal*, 312: 770.

MUT YÖRESİNDE KİRKİTLİ DOKUMADAN YAPILAN AKSESUARLAR ACCESSORIES MADE OF KIRKITLI WEAVING IN MUT REGION

Derya KONUK

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ÖZET

İlk insanlığın var olduğu günden bugünüme kadar çıplak olarak yaratılan vücutları kapatma duygusu ile dünyaya gelen insanoğlu, hep bir arayış içerisinde girmiştir. Bazen hayvan postlarından bazen ise sepet örücülüğünden esinlenerek günümüzdeki gelişen teknoloji ile artık hayal gücünü zorlar bir yere gelen dokuma sanatımız, kılık kıyafette ve onların tamamlayıcısı olmazsa olmaz aksesuarlarda da kullanılmaktadır. Dokuma iki iplik sisteminin birbiri ile kesişmesinden ya da birbirine bağlanmasından oluşturulan yüzeye verilen isimdir. Artık belirli bir doyuma ulaşan insanoğlu günümüzde geleneksel ürünlerimizi kullanarak moda kültürüne kazandırmak için gece gündüz çalışmaktadır. Mut yöresinde yaptığımız alan araştırması sırasında karşılaştığımız bu küçük atölyede çanta, kemer, bileklik, saç tokası, kolye gibi aksesuarlar tamamen kirkitli el dokuması ile dokunmuş olarak karşımıza çıkmaktadır. Bazı aksesuarlar tamamen dokumadan elde edilirken bazıları ise kumaşların üzerine ablike edilerek yapılmaktadırlar. Çok orijinal, organik ve kullanışlı olmalarına rağmen kendilerine yeterince pazar payı bulamayan bu ürünleri literatüre kazandırmak, diğer tasarımcı arkadaşlara örnek olmak ve gelecek nesillere aktarabilmek çalışmamızın amacını oluşturmaktadır. Yapılan alan araştırmasında 50 adet çanta 25 adet kemer, 1 adet saç tokası, 35 adet bileklik olarak dokunmuş ürüne rastlanılmıştır. Desen tekrarına düşmemek adına çalışmamıza dokuma 4 adet çanta, 3 adet kemer, 5 adet bileklik, 2 adet kolye ve 1 adet saç tokası dahil edilmiştir. Aksesuarlar atölyede fotoğraflandırılmış olup, dokuyuculara sorular yöneltilerek ürünler hakkında bilgiler toplanmıştır. Oluşturulan gözlem fişlerinde dokumaların desenleri ve dokuma yöntemleri hakkında bilgiler verilmiştir. Yöreyle ait dokumalar genellikle yün ve çin ipeği kullanılarak dokunmuştur. Dokuma tekniği düz kilim dokumadır. Ürünlerin dokunması esnasında germe tezgah kullanılmaktadır.

Anahtar Kelimeler: Dokuma, Tezgah, Kolye, Aksesuar, Çanta.

ABSTRACT

Since the first humanity existed, it always comes from being understood, from the human who came up with the animals that were created until today. Our weaving art, which is sometimes inspired by animal hides and sometimes basket knitting, is now used in costumes and indispensable accessories that complement them. Weaving is the name given to the surface formed by the intersection or connection of two yarn systems with each other. Human beings, who have reached a certain level of satisfaction, are working day and night to bring our traditional products to the fashion culture. Accessories such as bags, belts, bracelets, hairpins, necklaces are completely hand-woven in this small workshop, which we encountered during our field research in the Mut region. While some accessories are completely made from weaving, others are made by embroidering on fabrics. The aim of our study is to bring these

products to the literature, to set an example for other designer friends and to transfer them to future generations, although they are very original, organic and useful, but cannot find enough market share for themselves. In the field research, 50 bags, 25 belts, 1 hairpin, 35 bracelets were found. In order not to repeat the pattern, 4 woven bags, 3 belts, 5 bracelets, 2 necklaces and 1 hairpin were included in our work. Accessories were photographed in the workshop and information about the products was collected by asking questions to the weavers. Information about the patterns of weaving and weaving methods are given in the observation slips created. The weavings of the region are generally woven using wool and china silk. Weaving technique is plain rug weaving. During the weaving of the products, a stretching bench is used.

Key Words: Weaving, Stand, Necklace, Accessory, Bag.

1.GİRİŞ

İlk insanlığın var olduğu günden günümüze kadar çıplak olarak yaratılan vücutları kapatma duygusu ile dünyaya gelen insanoğlu, hep bir arayış içerisinde girmiştir. Bazen hayvan postlarından bazen ise sepet örücülüğünden esinlenerek günümüzdeki gelişen teknoloji ile artık hayal gücünü zorlar bir yere gelen dokuma sanatımız, kılık kıyafette ve onların tamamlayıcısı olmazsa olmaz aksesuarlarda da kullanılmaktadır.

Ortaya çıktıkları toplulukların sosyo kültürel özelliklerini, duygu ve düşüncelerini yansıtan, tarihi değeri olan belgeler arasında olan el sanatları içerisinde kirkitli dokumalar büyük bir önem taşımaktadırlar.

Ölmez ve Etikan (2008), el sanatlarını “belli bir geçmişi, orijini olan, kuşaktan kuşağa öğrenilerek günümüze gelen, günümüzde eğitimi verilen, görsel ve sanatsal değere sahip, el ile belli bir üretim tekniği kullanılarak ya da sermaye ve tesis gerektiren, ticari ya da bireysel amaçlı, turistik ve otantik, kullanım ve hatıra eşyası üretimine dayalı uğraşların ortak adıdır.” şeklinde tanımlamaktadır (Ölmez ve Etikan, 2008, s. 381).

İnsanoğlu ilk çağlarda hayvan postlarından esinlenerek çözümlerinin ucuna ağırlık olması amacıyla taş bağlayarak başladığı dokuma sanatını zamanla sarma ve germe tezgahlar üreterek ilerletmeye başlamıştır. El sanatları içerisinde önemli bir yere sahip olan ve tanıma göre sanatsal bir değere sahip, belli bir üretim tekniği kullanarak el ile üretilen kirkitli dokuma, geçmişten günümüze kadar asıl geleneğine bağlı kalarak gelebilmiştir. Dokumalar insanların giyinme, örtünme, ısınma gibi ihtiyaçlarından ortaya çıkmış olması bir yana zamanla üzerine yüklenen kültürel ve sanatsal ifadeyi de üzerinde taşımaktadır. Anadolu'nun hemen hemen her köşesinde dokuma sanatı uygulanmış olduğu için zengin bir kültüre sahiptir. Bazı yörelerdeki dokumalar özgün iken bazı yörelerde ise ortak özellikleri taşıdığı görülen dokuma kültürü birçok çeşitliliğe içerisinde barındırmaktadır (Güzel ve Kulaz, 2016, s. 1321).

Dokumacılık sanatının içerisinde ayrı bir yere sahip olan düz dokuma sanatı, yaygılar içerisinde önemli bir yere sahiptir. Kendine özgü dokuma teknikleri, desen özellikleri ve zengin kompozisyonları ile dikkatleri üzerine çeken düz dokumaların en karakteristik örnekleri de değerini koruyarak günümüze kadar gelmiştir. Fakat hassas bir yapıları olan düz dokumalar rutubet ve nemden çok çabuk etkilenecek çürüdükleri için çok fazla toprak altında ve terk edilmiş yerlerde kalamamaktalar. Bu sebeptendir ki düz dokumaların tarihini aydınlatacak parçalar çok azdır (Aytaç, 1989, s. 36).

Düğüm kullanılarak dokunan havlı dokumaların dışındaki tüm dokumalar düz dokumalardır. Düz dokumalar çözümler ve atkı kullanılarak iki iplik sistemi ile dokunabildiği gibi çözümler, atkı

ve desen ipliği kullanılarak üç iplik sistemi ile de dokunabilmektedir (Ölmez ve Etikan, 2013, s. 88).

Dokumalar kirkiteli ve kirkitsiz dokuma olarak ikiye ayrılmaktadır. Tülü, halı, kilim kirkiteli dokumalara girerken kumaş dokumalar ise kirkitsiz dokumalarda yer almaktadır. Kirkiteli düz dokuma yaygılar kendi aralarında teknik olarak, kilim, cicim, sili, sumak (verneh) gibi isimlendirilmektedir. Bu dokuma türlerinin kendilerine özgü türleri, dokuma teknikleri, süsleme özellikleri vardır. Kullanım yerleri bile birbirinden farklıdır (Deniz, 1998, s. 4). Bu çalışmada vereceğimiz örneklerin tümü kirkiteli düz dokumaları teşkil etmektedir.

Kilim: Önlü arkalı çift sıra halinde olan, çözü ipliklerinin arasından bir ön ve bir arkadan geçen, atkı ipliklerinden oluşan ve çözülerin atkılar tarafından tamamen kaplandığı bir dokuma türüdür (Acar, 1975, s. 19).

Cicim: Türkçe bir kelime olup, halk arasında cicim, cecim, cacım, çalma ve çelme gibi değişik adlarla ifade edilmektedir (Deniz, 1994, s. 69). Yüzü ve tersi birbirinden farklı olan bu dokumalar üç iplik sistemi ile dokunmaktadır. Yüzeyde motifler sonradan işlenmiş gibi kabarık olarak görünmektedir (Onuk ve Akpınarlı, 1988, s. 239-248).

Zili: Çözü çiftlerine uyulmayarak üç üstten bir alttan, motiflerin içi ve dışı değişik renklerle tamamen doldurulur. Her desen ipliği kendi desen alanında, enine boyu boyunca üç üstten bir alttan atlayarak geçerek dokunan düz dokumadır (Aytaç, 1982, s. 50).

Sumak: Çözü iplikleri üzerine farklı renklerde desen ipliklerinin çeşitli şekillerde sıralanması ile elde edilen bir yaygı türüdür. Motif oluşturan iplikler çözülere sarılarak motif oluşturulduğu için ve üzerine farklı bir renk tekrar geçirildiği için kat kat işlenmiş gibi görülmektedir (Acar, 1982, s. 69).

Artık belirli bir doyuma ulaşan insanoğlu günümüzde geleneksel ürünlerimizi kullanarak moda kültürüne kazandırmak için gece gündüz çalışmaktadır. Bizlerde Mut yöresinde yaptığımız alan araştırması sırasında karşılaştık bu küçük atölye ile. Mut, kuruluşu Roma dönemine rastlamakta olan çok eski tarihe sahip bir ilçedir. Mut ve çevresinin bir dönem Hitit egemenliğinde kaldığı da bilinmektedir (Köse ve Altay, 2005, s. 43). II.Beyazıt döneminde Mersin Osmanlı hakimiyetine girmiş Mut ve Mersin'in diğer kazaları Karaman iline bağlanmıştır.

2.YÖNTEM

Atölyede çanta, kemer, bileklik, saç tokası, kolye gibi aksesuarlar tamamen kirkiteli el dokuması ile dokunmuş olarak karşımıza çıkmaktadır. Bazı aksesuarlar tamamen dokumadan elde edilirken bazıları ise kumaşların üzerine ablike edilerek yapılmaktadırlar. Çok orijinal, organik ve kullanışlı olmalarına rağmen kendilerine yeterince pazar payı bulamayan bu ürünleri literatüre kazandırmak, diğer tasarımcı arkadaşlara örnek olmak ve gelecek nesillere aktarabilmek çalışmamızın amacını oluşturmaktadır. Yapılan alan araştırmasında 50 adet çanta 25 adet kemer, 1 adet saç tokası, 35 adet bileklik olarak dokunmuş ürüne rastlanılmıştır. Desen tekrarına düşmemek adına çalışmamıza dokuma 4 adet çanta, 3 adet kemer, 5 adet bileklik, 2 adet kolye ve 1 adet saç tokası dahil edilmiştir. Aksesuarlar atölyede fotoğraflandırılmış olup, dokuyuculara sorular yöneltilerek ürünler hakkında bilgiler toplanmıştır. Oluşturulan gözlem fişlerinde dokumaların desenleri ve dokuma yöntemleri hakkında bilgiler verilmiştir.

3. BULGULAR VE YORUM

Mut Yöresinde Bulunan Kirkitli Dokuma Aksesuarlar

Yöreyle ait dokumalar genellikle yün ve çin ipeği ile dokunmuştur. Dokuma tekniği kilim dokumadır. Bazı aksesuarlar tamamen dokumadan elde edilirken bazıları kumaş üzerine ablike edilerek kullanılmaktadır. Ürünlerin dokunma esnasında germe tezgah kullanılmaktadır (*Görsel-1*).

Görsel-1. Atölyede bulunan germe tezgah



Atölyede dokunan ürünler yeni başlayacak olan arkadaşlara da örnek teşkil etmesi amacıyla asma aparatında bu şekilde sergilenmektedir (*Görsel-2*).

Görsel-2. Atölyede üretilen dokuma aksesuarlar



Görsel-3. Atölyede kullanılan araç gereçler



Katalog No:1

Görsel-4. Koçboynuzu ve kurt ağızı motifli çantanın genel görünümü



Görsel-5. Koçboynuzu ve kurt ağızı motifli çantanın detay görünümü



Katalog No	: 1
Eserin Adı	: Koçboynuzu ve Kurtağızı motifli dokuma sırt çantası
Görsel No	: 4-5
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği/Kumaş
Teknik	: Sarma Konturlu kilim dokuma
Renkler	: Krem,yeşil, kırmızı
Kullanılan Motifler	: Kurtağızı, koçboynuzu
Tanım	: Yatay olarak başlanılan dokuma üçgen form verilerek bitirilmiştir. Dokumada sağ ve sol köşelere üst üste farklı renklerde 2 şer adet ve üçgen form kısmına 1 adet koçboynuzu motifi yerleştirilirken, orta zemine farklı renklerde 3 adet kurtağızı motifi üst üste sıralanmıştır. Desende tam raport tekniği uygulanmıştır. Sarma konturlu kilim tekniği ile dokunmuştur. Zemin ipliği yün iplik iken motif iplikleri Çin ipeğidir. Dokuma tezgahta dokunduktan sonra tezgahtan kesilerek kumaş üzerine ablike edilmiş olup sırt çantası formunda kullanılmaktadır.

Katalog No:2

Görsel-6 Sandık motifli dokuma omuz çantasının genel görünümü Görsel-7 Sandık motifli dokuma omuz çantasının detay görünümü



Katalog No	: 2
Eserin Adı	: Sandık motifli dokuma omuz çantası
Görsel No	: 6-7
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği
Teknik	: İlikli kilim dokuma
Renkler	: Krem rengi, yeşil, kırmızı
Kullanılan Motifler	: Sandık, kurtağzı

Tanım : Orta zemine içerisinde kurt ağzı motifi bulunan sandık motifleriyleleştirilen dokuma iki parça olarak dokunmuştur. Arka zemin modelsiz düz kilim dokumadan oluşmaktadır. Tezgahtan çıkarılan dokuma daha sonra sağ, sol ve alt kısımlarından dikilerek birleştirilmiştir. Çantanın ağız kısmına kurtçuk adı verilen tığ işi ile oluşturulan püsküller uçlarına boncuklar dizilerek sıralanmıştır. Sap kısmı da yine dokuma kullanılan ipliklerden elde örülerek oluşturulmuştur. Bu sap kısımları çantaya model vermek adına sağ ve sol alt köşelerden başlayarak çanta ile birleştirilmiştir. Ve uçlarına püsküller dikilmiştir.

Katalog No:3

Görsel-8. Yıldız motifli dokuma el çantası genel görünümü



Görsel-9. Yıldız motifli dokuma el çantası detay görünümü



Katalog No : 3

Eserin Adı : Yıldız motifli dokuma el çantası

Görsel No : 8-9

Bulunduğu Yer : Serpil Çolak/ Mut

İnceleme Tarihi : 28.05.2021

Malzemesi : Yün/ Çin ipeği/Kumaş

Teknik : Kilim dokuma

Renkler : Turuncu, yeşil, kahverengi, krem rengi.

Kullanılan Motifler : Yıldız, enine bant

Tanım : Dokumanın zemine ine ve kalın enine bantlarla birbirinden ayrılmıştır. İnce enine bantlar farklı renklerle birbirinden ayrılırken kalın enine bantlar üzerine farklı renklerde 3 er adet olmak üzere yıldız motifleri yerleştirilmiştir. Dokuma tezgahta tamamlandıktan sonra kesilerek kumaş üzerine çapraz şekilde yerleştirilerek ablike edilmiştir.

Katalog No:4

Görsel-10. Saçbağı motifli dokuma sırt çantasının genel görünümü *Görsel-11. Saçbağı motifli dokuma sırt çantasının detay görünümü*



Katalog No	: 4
Eserin Adı	: Saçbağı motifli dokuma sırt çantası
Görsel No	: 10-11
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği/Kumaş
Teknik	: Kilim dokuma
Renkler	: Krem,yeşil, kırmızı
Kullanılan Motifler	: Saçbağı, zikzak
Tanım	: Yatay olarak başlanılan dokuma üçgen form verilerek bitirilmiştir.

Dokumaya 5 adet farklı renklerde oluşturulan yatay zikzak motif üst üste sıralanarak başlanmıştır. Yukarıya doğru daralan zikzaklar içerisine sağ bağı iki farklı renkte saç bağı motifini ½ yarım raport şeklinde kaydırılarak yerleştirilmiştir. Dokuma düz kilim tekniği dokunmuştur. Zemin ipliği yün iplik iken motif iplikleri Çin ipeğidir. Dokuma tezgahta dokunduktan sonra tezgahtan kesilerek kumaş üzerine ablike edilmiş olup sırt çantası formunda kullanılmaktadır. Dokumanın saçak kısımları uzun bir şekilde bırakılmış olup daha sonra saç örgüsü şeklinde örülerek renkli iplikler ile bağlanmıştır.

Katalog No:5

Görsel-12. Göz motifli dokuma kemerin genel görünümü



Görsel-13. Göz motifli dokuma kemerin detay görünümü



Görsel-14. Göz motifli dokuma kemerin belde görünümü



Görsel-15. Göz motifli dokuma kemerin belde arkadan görünümü



Katalog No	: 5
Eserin Adı	: Göz motifli dokuma kemer
Görsel No	: 12-13-14-15
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği
Teknik	: İllikli kilim dokuma
Renkler	: Hardal sarısı, yeşil, kahverengi, krem rengi.
Kullanılan Motifler	: Göz

Tanım : Üçgen formda başlanan dikey olarak dokunan kemerde 2 farklı renkte göz motifi eşit aralıklarda üst üste sıralanmıştır. Dokuma tezgahtan kesildikten sonra kenarları trabzan adı verilen tığ işi ile tığlanmıştır. Alt ve üst kısımlarında uzun bırakılan çözümler elde bükülerek kemerin bağlama aparatı oluşturulmuştur. Kemerin alt kısmına gelecek yerlere eşit aralıklarla 6 adet tığ ile zeminde kullanılan ipliklerden renkli boncuklar takılarak püskül oluşturulmuştur.

Katalog No:6

Görsel-16. Yıldız motifli dokuma kemerin genel görünümü



Görsel-17 Yıldız motifli dokuma kemer detay görünüm



Katalog No	: 6
Eserin Adı	: Yıldız motifli dokuma kemer
GörselNo	: 16-17
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği
Teknik	: Sarma Konturlu kilim dokuma
Renkler	: Kahverengi, hardal sarısı, yeşil, krem rengi.
Kullanılan Motifler	: Yıldız

Tanım : Üçgen formda başlanan dikey olarak dokunan kemerde 2 farklı renkte yıldız motifi eşit aralıklarda 4 adet olarak üst üste sıralanmıştır. Dokuma tezgahtan kesildikten sonra kenarları trabzan adı verilen tığ işi ile tığlanmıştır. Alt ve üst kısımlarında uzun bırakılan çözümler farklı renk ilave edilip, elde büküm verilerek kemerin bağlama aparatı oluşturulmuştur. Kemerin alt kısmında tam orta kısmına gelecek şekilde 6 adet tığ ile zincir çekilerek zeminde kullanılan ipliklerden renkli boncuklar takılarak püskül oluşturulmuştur.

Katalog No:7

Görsel-18.Saç bağı motifli dokuma kemerin genel görünümü



Görsel-19. Saç bağı motifli dokuma kemerin detay görünümü



Katalog No	: 7
Eserin Adı	: Saç bağı motifli dokuma kemer
Görsel No	: 18-19
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği
Teknik	: Sarma Konturlu kilim dokuma
Renkler	: Krem rengi,yeşil, hardal sarısı, kahverengi.
Kullanılan Motifler	: Saçbağı

Tanım : Üçgen formda başlanan dikey olarak dokunan kemerde 3 farklı renkte saç bağı motifi eşit aralıklarda üst üste sıralanmıştır. Dokuma tezgahtan kesildikten sonra kenarları trabzan adı verilen tığ işi ile tığlanmıştır. Alt ve üst kısımlarında uzun bırakılan çözümler farklı bir renk eklenip, elde bükülerek kemerin bağlama aparatı oluşturulmuştur. Kemerin alt kısmına gelecek yerlere eşit aralıklarla 6 adet tığ ile zeminde kullanılan ipliklerden renkli boncuklar takılarak püskül oluşturulmuştur.

Katalog No:

Görsel-20. Bilekliklerin arka yüzü



Görsel-21. Bilekliklerin ön yüzü



Görsel-22. Bilekliklerin kolda görünümü



Görsel-23. Bilekliklerin detay görünümü



Katalog No	: 8
Eserin Adı	: Bileklik
Görsel No	: 20-21-22-23
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği/Kumaş
Teknik	: İlikli kilim dokuma
Renkler	: Krem rengi, yeşil, kahverengi, hardal sarısı.
Kullanılan Motifler	: Göz, saç bağı, zik zak

Tanım : Dikey olarak dokunan bilekliklerin her birinde ayrı ayrı olarak göz, saç bağı, zikzak motifleri farklı renklerde üst üste sıralanmaktadır. Başlangıç kısmına düğme bitiş kısmında ilik bırakılarak takılma aparatı sağlanmıştır. Bazı bilekliklerde ise tığ ile ilik kısmı örülmüştür. Dokuma bileklikler istenilen boyda dokunup, tezgahdan kesildikten sonra kenarları trabzan adı verilen tığ işi ile tığlanmıştır. Bileğe gelecek alt kısımlarına pazen kumaşlar dikilmiştir. Bazılarının kenar kısımlarına gelecek şekilde madeni süs objeleri dikilerek farklı bir hava oluşturulmaya çalışılmıştır.

Katalog No:9

Görsel-24. Saç bağı motifli dokuma saç bandının genel görünümü



Görsel-25 **Görsel-24.** Saç bağı motifli dokuma saç bandının detay



Katalog No	: 9
Eserin Adı	: Saç bağı motifli dokuma saç bandı
Görsel No	: 24-25
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği/kumaş
Teknik	: Kilim dokuma
Renkler	: Yeşil, kahverengi, hardal sarısı.
Kullanılan Motifler	: Saç bağı.

Tanım : Dikey olarak dokunan saç bandında saç bağı motifi farklı renklerde üst üste sıralanmaktadır. Dokuma saç bandı istenilen boyda dokunup, tezgahdan kesildikten sonra kenarları trabzan adı verilen tığ işi ile tığlanmıştır. Saçın arka kısmına gelecek bölümüne içerisine lastik geçirilen pazen kumaş dikilmiştir. Lastik geçirilmesinin sebebi kafaya saça takıldığı zaman belli bir elastikiyetin oluşturulması içindir. Alna gelecek kenar kısmına madeni süs objeleri dikilerek farklı bir hava oluşturulmaya çalışılmıştır.

Katalog No:10

Görsel-26. Saç bağı motifli dokuma kolyenin genel görünümü



Katalog No	: 10
Eserin Adı	: Saç bağı motifli dokuma kolye
Görsel No	: 26
Bulunduğu Yer	: Serpil Çolak/ Mut
İnceleme Tarihi	: 28.05.2021
Malzemesi	: Yün/ Çin ipeği
Teknik	: İlikli kilim dokuma
Renkler	: Turuncu, yeşil, kahverengi, hardal sarısı.
Kullanılan Motifler	: Saç bağı.

Tanım : 3 çift çözümlü teli ile başlanıp yarımşar cm dokunan dokumada, her yarım cm den sonra sağ ve sol kenarlardan 2 şer tel arttırılarak istenilen uzunlukta dokunduktan sonra boyun oyuntusu vermek için kesilmiş ve kesilen yerlere zincir çiti dokunmuştur. Sap kısımları da zincir çiti ile oluşturulmuştur. Dokuma kolyenin uç ve son kısımlarındaki saç bağı motifleri büyük, ortada bulunan 3 adet farklı renklerde yan yana olarak sıralanan saç bağı motifleri ise küçük ebatta yerleştirilmiştir. Kolyenin uç kısımları püskül ve metal objeler ile süslenmiştir.

Katalog No:11

Görsel-27 Saç bağı motifli dokuma kolyenin genel görünümü



- Katalog No** : 11
Eserin Adı : Saç bağı motifli dokuma kolye
Görsel No : 27
Bulunduğu Yer : Serpil Çolak/ Mut
İnceleme Tarihi : 28.05.2021
Malzemesi : Yün/ Çin ipeği
Teknik : İlikli kilim dokuma
Renkler : Yeşil, kahverengi, hardal sarısı, krem rengi.
Kullanılan Motifler : Saç bağı.

Tanım : Üçgen formada dokunmuş olan bu kolyede istenilen uzunluktan sonra belirli bir kısım düz dokunmuştur. Sap kısımları da boyun oyuntusu kesilerek verildikten sonra sağ ve sol kenarlardan 3 adet çift çözümlü teli düz bir şekilde dokunarak oluşturulmuştur. Uç kısımlarında ve sap kısımlarında uzun olarak bırakılan çözümlü iplikleri sap kısmında bağlama aparatı olarak kullanılmış uç kısmın da ise kolye ye farklı bir hava katmak için kullanılmıştır. Uç kısımlarındaki çözümlü iplikleri serbest bırakılırken sap kısımlarındaki çözümlü iplikleri saç örgüsü şeklinde örülmüştür.

4.SONUÇ

Atölyede çanta, kemer, bileklik, saç tokası, kolye gibi aksesuarlar tamamen kirkıtlı el dokuması ile dokunmuş olarak karşımıza çıkmaktadır. Bazı aksesuarlar tamamen dokumadan elde edilirken bazıları ise kumaşların üzerine ablike edilerek yapılmıştır. Çok orijinal, organik ve kullanışlı olmalarına rağmen kendilerine yeterince pazar payı bulamayan bu ürünleri literatüre kazandırmak, diğer tasarımcı arkadaşlara örnek olmak ve gelecek nesillere aktarabilmek çalışmamızın amacını oluşturmaktadır. Yapılan alan araştırmasında 50 adet çanta 25 adet kemer, 1 adet saç tokası, 35 adet bileklik olarak dokunmuş ürüne rastlanılmıştır. Desen tekrarına düşmemek adına çalışmamıza dokuma 4 adet çanta, 3 adet kemer, 5 adet bileklik, 2 adet kolye ve 1 adet saç tokası dahil edilmiştir. Aksesuarlar atölyede fotoğraflandırılmış olup, dokuyuculara sorular yöneltilerek ürünler hakkında bilgiler toplanmıştır. Oluşturulan gözlem fişlerinde dokumaların desenleri ve dokuma yöntemleri hakkında bilgiler verilmiştir. Yöreyle ait dokumalar genellikle yün ve çin ipeği ile dokunmuştur. Dokuma tekniği genel olarak kilim dokumadır. Sarma konturlu (katalog no: 1-6-7) ve ilikli kilim (katalog no: 2-5-8-10-11) teknikleri bazı dokumalara uygulanmıştır. Bazı aksesuarlar tamamen dokumadan elde edilirken (katalog no: 2-5-6-7-10-11) bazıları kumaş üzerine ablike (katalog no: 1-3-4-8-9) edilerek kullanılmaktadır. Ürünlerin dokunma esnasında germe tezgah (fotoğraf 1) kullanılmıştır. Bu tarz atölyelere Tarım Köy ve Kooperatifleri tarafından daha fazla ödenek ayrılmalı ve ev hanımlarına teşvik oluşturulmalıdır. Dokuma aksesuarlara yurt içinde ve yurt dışında pazar payları oluşturarak ülkemizin adını duyurma imkanı oluşturulmalıdır. Turistik merkezlere bu tarz dokumalar teşvik ve tanıtım amaçlı sergilenmek üzere gönderilmeli, tasarımcılar ve üreticiler bu yönden desteklenmelidir.

KAYNAKÇA

- Aytaç, Ç. (1982). *El Dokumacılığı*. İstanbul: Milli Eğitim Basımevi
- Aytaç, Ç. (1989). *El dokumacılığı*. Ankara: Milli Eğitim Bakanlığı.
- Acar, B. (1975). *Kilim ve Düz Dokuma Yayınları*. Ankara: Akbank Yayınları
- Deniz, B. (1994). Anadolu-Türk Dokuma Sanatında Cicim. *Sanat Tarihi Dergisi* , 7 (7) , 59-73. Retrieved from <https://dergipark.org.tr/tr/pub/std/issue/16510/172383>
- Etikan, S. ve Ölmez, F. (2013). *Muğla Yöresi Kirkıtlı Dokumalarının Sanatsal ve Bazı Teknolojik Özellikleri Üzerine Bir Belgelendirme ve Katalog Çalışması*. Muğla Sıtkı Koçman Üniversitesi Yayınları, Muğla.
- Güzel, E. & Kulaz, M. (2016). Tunceli-Çemişgezek- Doğan Köyü Halı Dokuma Örnekleri / Tunceli-Cemişgezek- Dogan Village Carpet Weaving Samples . Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi , 20 (4) , 1321-1335 . Retrieved from <https://dergipark.org.tr/tr/pub/ataunisobil/issue/26966/283400>
- Köse, Ensar ve Doğan, Altay (2005). *Mut Claudopolis*. Mersin: Mut Belediyesi Kültür Yayınları. 27-117.
- Onuk, T. , Akpınarlı, F. (1988). “*Güneydoğu Anadolu Karakeçili Türkmen Kilimleri*”. [Konferans sunumu] Türk Soylu Halkları Halı, Kilim ve Cicim Sanatı Uluslar arası Bilgi Şöleni Bildirileri, Ankara.
- Ölmez, F. & Etikan, S. (2013). Fethiye Alara Düz Dokumaları. *Art-e Sanat Dergisi*, 6 (11) , 75-99 . Retrieved from <https://dergipark.org.tr/tr/pub/sduarte/issue/20731/221548>

Kaynak kişi: Serpil Çolak

DİN EĞİTİMİ ALANINDAKİ BİLİMSEL BİRİKİM: LİSANSÜSTÜ TEZLER
THE SCIENTIFIC PROGRESS IN RELIGIOUS EDUCATION: GRADUATE THESIS

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ÖZET

Bu çalışmada Türkiye’de din eğitimi bilim dalında yapılmış olan lisansüstü tezler; tür, yazarın cinsiyeti, üniversite, konu ve yöntem gibi farklı açılardan analiz edilmiştir. Nitel araştırma yöntemlerinden doküman incelemesi tekniğinin benimsendiği bu çalışma ile hedeflenen gaye, din eğitimi bilim alanındaki lisansüstü bilimsel birikimi ortaya çıkarmak ve değerlendirmesini yapmaktır. Literatürde bulunan çalışmalarda ilgili alandaki tezlerin 1954-2019 yılları arası incelemesi yapıldığından ve 2021 yılı verileri de sürekli güncellendiğinden dolayı araştırmanın kapsamı 2020 yılındaki 42 teze sınırlandırılmıştır. Veriler, Yükseköğretim Kurulu Yayın ve Dokümantasyon Daire Başkanlığı Ulusal Tez Merkezi veri tabanından elde edilmiştir. Tümü erişime açık din eğitimi bilim dalına ait tezlerin 36’sı yüksek lisans, 6’sı doktora tezidir. Çalışmada ele alınan tezlerin 18’inin erkek 24’ünün kadın araştırmacılar tarafından yapıldığı görülmektedir. Üniversitelere göre dağılımlarına bakıldığında en çok Marmara Üniversitesi bünyesinde yapılmıştır. Buna göre Marmara Üniversitesi’nde 3 doktora 7 yüksek lisans tezi olmak üzere toplam 10 lisansüstü tez tamamlanmıştır. Bu üniversiteyi 6 yüksek lisans tezi ile Dicle Üniversitesi, 6 yüksek lisans tezi ile Bursa Üniversitesi, 2 doktora 3 yüksek lisans tezi ile Ankara Üniversitesi ve 5 yüksek lisans tezi ile Van Yüzüncü Yıl Üniversitesi takip etmektedir. En çok çalışılan konular arasında örgün din eğitimi, çeşitli filozof ve eğitimcilerin din eğitimine ilişkin görüşleri ve yüksek din öğretimi öne çıkmaktadır. Yöntem olarak ise en çok teorik/kuramsal çalışmaların tercih edildiği görülmektedir. Böylece bu çalışma, din eğitimi alanında yapılmış lisansüstü tezlerin niteliksel ve niceliksel olarak gelişim seyrinin bir çerçevede görülmesi ve bunun sonucunda oluşan din eğitimi alanı bilimsel birikiminin ortaya konması bakımından önemlidir.

Anahtar Kelimeler: Din Eğitimi Bilim Dalı, Lisansüstü Tezler, Bilimsel Birikim.

ABSTRACT

In this study, postgraduate theses made in the field of religious education in Turkey; analyzed from different perspectives such as genre, author's gender, university, subject and method. The aim of this study, in which the document analysis technique, which is one of the qualitative research methods, is adopted, is to reveal and evaluate the postgraduate scientific progress in the field of religious education. The scope of the research is limited to 42 theses in 2020, since the theses in the related field were examined between the years 1954-2019 and the data for the year 2021 were constantly updated in the studies in the literature. The data were obtained from the National Thesis Center database of the Higher Education Council Publication and Documentation Department. 36 of the theses belonging to the religious education discipline, all of which are open to access, are master's and 6 are doctoral theses. It is seen that 18 of the theses discussed in the study were made by male researchers and 24 by female researchers. Considering their distribution according to universities, they were mostly made within Marmara University. Accordingly, a total of 10 postgraduate theses, of which 3

doctorate and 7 master's theses, were completed at Marmara University. This university is followed by Dicle University with 6 master's theses, Bursa University with 6 master's theses, Ankara University with 2 doctorate and 3 master's theses, and Van Yüzüncü Yıl University with 5 master's theses. Among the most studied subjects, formal religious education, views of various philosophers and educators on religious education, and higher religious education come to the fore. As a method, it is seen that the most theoretical/theoretical studies are preferred. Thus, this study is important in terms of seeing the qualitative and quantitative development of postgraduate theses in the field of religious education in a framework and revealing the scientific progress of the field of religious education as a result.

Keywords: Science of Religious Education, Graduate Theses, Scientific Progress.

GİRİŞ

Bilimsel bilginin birikimli ilerlemesi görüşü 1960'larda ve 1970'lerde birçok bilim insanı tarafından etkin bir şekilde sorgulanmış ve genellikle “Bilim ne ölçüde ve hangi açılardan ilerlidir?”, “Bilimde ilerleme ile ne kastedilmektedir?” ve “Bilimdeki ilerlemeci gelişmeleri nasıl tanıyabiliriz?” sorularına cevap aranmıştır (Niiniluoto, 2002). Günümüzde ise bir bilimsel alandaki bilgi birikimini tanımanın ve takip etmenin ise pek çok yolu bulunmaktadır. Bunlardan birisi de lisansüstü tezleri incelemektir. Çünkü “Lisansüstü” kavramı sadece kronolojik olarak değil aynı zamanda öğrenmenin kalitesini de ifade etmektedir (Karaaslanoglu vd., 2019, s. 261). Zaten lisansüstü eğitimden (özellikle doktora çalışmalarında) beklenen de, ya ‘bilime yenilik getirme’ ya da ‘yeni bir bilimsel yöntem geliştirme’ ve yahut ‘bilinen bir yöntemi yeni bir alana uygulama’, niteliklerinden birini yerine getirmesidir (Acuner & Türkan, 2016, s. 1335). Dolayısıyla bu kavramın kullanıldığı lisansüstü tezler, aynı zamanda ele aldıkları konuları ve kaynakları ilmî metotlarla kapsamlı bir şekilde incelemeye çalışan akademik çalışmaların durumunu göstermektedir (Çanakçı, 2020, s. 279).

Her alanda olduğu gibi din eğitimi bilimi alanında da her geçen gün yeni çalışmaların yürütülmesi, alanyazındaki gelişimi gösteren makale, bildiri, tez ve kitap gibi pek çok bilimsel ürünün ortaya çıkmasına vesile olmaktadır (Türkan, 2015, s. 12). Ancak bu durum, alanın birikimine kolay ve hızlı ulaşabilmeyi amaçlayan din eğitimcilerinin bütüncül bir bakışa açısına sahip olabilmeyi zorlaştırabilmektedir. Bu noktada alandaki gerek künye bilgilerini içeren bibliyografya çalışmaları gerekse konuları içeren derleme çalışmaları önem arz etmektedir. Ayrıca bu türden çalışmalar sayesinde hem din eğitimi bilim alanının derinliği ve yaygınlığı gibi farklı konular hakkında bilgiler elde edilmekte hem de yeni ve özgün çalışmaların da önü açılmış olmaktadır.

İLGİLİ ÇALIŞMALAR

Din eğitimi bilimiyle ilgili yapılan lisansüstü tezleri inceleyen çalışmalara bakıldığında bunların ortak yönlerinin 1984 yılından itibaren alandaki mevcut çalışmaları derleme ve künye bilgileri oluşturma çabaları olduğu görülmektedir (Kayadibi vd., 2008; Öcal, 2008; Türkan, 2015; Usta, 1984). Son yıllardaki çalışmalar ise daha detaylandırılmıştır. Bilal Yorulmaz “Türkiye’de Yapılan Din Eğitimi Konulu Lisansüstü Çalışmalar Hakkında Genel Bir Değerlendirme” adlı çalışmasında, Türkiye’de din eğitimi alanında yapılan lisansüstü tezleri; tezin türü, tezin bitiş yılı, tezin yapıldığı üniversite, tezin konusu ve tezde kullanılan yöntem değişkenleri dikkate alınarak değerlendirmiş ve danışman-doktora öğrencisi ilişkisini gösteren bir “din eğitimcileri soy ağacı” hazırlamıştır (Yorulmaz, 2016). 1954-2015 yılları arasında din eğitimi alanında hazırlanan 1008 lisansüstü tezi konu ve yöntem açısından

inceleyen Yorulmaz, en fazla lisansüstü çalışmanın 219 yüksek lisans, 54 doktora çalışması ile Marmara Üniversitesi'nde yapıldığı ve yöntem olarak ise en çok literatür taraması ve nicel yönetime başvurulduğu sonucuna ulaşmıştır. Bir diğer çalışmada Çanakçı, 1986-2019 yılları arasında Türkiye'de yapılan ve başlığında “din eğitimi” ifadesi yer alan lisansüstü tezleri; tür, yıl, yazarın cinsiyeti, tezin dili, üniversite, yöntem, enstitü, anabilim dalı, bilim dalı, danışman sayısı gibi farklı değişkenler açısından incelemiş ve analiz etmiştir (Çanakçı, 2020). Araştırma sonuçlarına göre; lisansüstü çalışmalarda yazarın cinsiyeti değişkeni olarak “erkekler”, dil değişkeni olarak “Türkçe”, üniversite değişkeni olarak “Marmara Üniversitesi”, konu alanı değişkeni olarak “örgün din eğitimi”, yöntem olarak “literatür taraması”, enstitü değişkeni olarak “sosyal bilimleri enstitüsü”, anabilim dalı değişkeni olarak “felsefe ve din bilimleri”, bilim dalı değişkeni olarak “din eğitimi”, danışman sayısı değişkeni olarak ise “tek danışman” ın ön plana çıktığı görülmüştür. Her iki çalışmada da en fazla lisansüstü tezin Marmara Üniversitesi'nden çıkmış olması ve yöntem olarak da en çok literatür taraması yönteminin seçilmiş olması dikkat çekicidir. Görüldüğü üzere literatürdeki çalışmalar 1984-2019 yılları arasındaki çalışmaları kapsamaktadır. 2021 yılı da sürekli güncellendiğinden dolayı bu çalışma 2020 yılında yapılan din eğitimi alanındaki lisansüstü tezlerle sınırlandırılmıştır.

ARAŞTIRMANIN AMACI VE ÖNEMİ

Bu araştırmanın amacı Türkiye'de din eğitimi bilim dalında yapılmış olan lisansüstü tezleri; tür, yazarın cinsiyeti, üniversite, konu ve yöntem gibi farklı açılardan analiz ederek genel bir değerlendirme yapmaktır. Belirtilen hedef çerçevesinde çalışmada aşağıdaki sorulara yanıt aranmıştır:

- Din eğitimi alanında yapılmış lisansüstü tezlerin program türüne göre dağılımı nasıldır?
- Din eğitimi alanında yapılmış lisansüstü tezlerin yazarın cinsiyetine göre dağılımı nasıldır?
- Din eğitimi alanında yapılmış lisansüstü tezlerin üniversitelere göre dağılımı nasıldır?
- Din eğitimi alanında yapılmış lisansüstü tezlerde ele alınan konular nelerdir?
- Din eğitimi alanında yapılmış lisansüstü tezlerde hangi bilimsel araştırma yöntemleri tercih edilmiştir?

Böylelikle bu çalışma din eğitimi alanında yapılmış lisansüstü tezlerin incelenmesi ve mevcut durumun ortaya koyulması yoluyla niteliksel ve niceliksel olarak gelişim seyrinin bir çerçevede görülmesi ve bunun sonucunda oluşan din eğitimi alanı bilimsel birikiminin ortaya konması bakımından önemlidir.

YÖNTEM

Araştırmada veri toplama yöntemi olarak doküman incelemesi yöntemi kullanılmıştır. Doküman incelemesi araştırılması hedeflenen olgu ve olaylar hakkında bilgi içeren yazılı belge ve materyallerin analizini kapsamaktadır ve tek başına bir veri toplama yöntemi olabileceği gibi diğer veri toplama yöntemleri de birlikte kullanılabilir (Ali Yıldırım – Hasan Şimşek, 2013, s. 217). Veri toplama aracı ise Yükseköğretim Kurulu Yayın ve Dokümantasyon Daire Başkanlığı Ulusal Tez Merkezi veri tabanıdır. Veri tabanındaki arama neticesinde 2020 yılında din eğitimi bilim dalına ait 42 lisansüstü tez bulunmaktadır. Tümüne erişime açıktır.

Verilerin analizinde içerik analizi yöntemi kullanılmıştır. İçerik analizi; desen, tema, varsayım ve anlamlar çıkarma çabası içinde, belirli miktarda materyalin dikkatli, ayrıntılı, sistematik bir biçimde incelenmesi ve yorumlanmasıdır (Bruce L. Berg - Howard Lune, 2019, s. 344). Bu yöntem doğrultusunda tezlerin analizi için MAXQDA18 veri analiz programı kullanılmıştır. Program türü, yazar cinsiyeti ve üniversitelerine göre ayrılan tezlerde ele alınan konuların tematik dağılımı ve kullanılan bilimsel araştırma yöntemlerin kodlanması sonucu kategoriler oluşturulmuş, tablo ve şekiller halinde araştırmada sunulmuştur.

BULGULAR

Din eğitimi alanındaki lisansüstü tezlerin ait olduğu program türüne bakıldığında 36'sı yüksek lisans, 6'sı doktora tezi olmak üzere toplam 42 tez bulunduğu tespit edilmiştir. Bu tezleri oluşturan kısmın en fazla yüksek lisans tezi olması, yüksek lisans tez yazım sürecinin doktora tezlerinin çalışma ve yayınlanma süresine göre daha kısa olmasından kaynaklanıyor olabilir.

Çalışmada ele alınan tezleri hazırlayan araştırmacıların 18'inin erkek 24'ünün kadın araştırmacılar tarafından yapıldığı görülmektedir.

Tezlerin üniversitelere göre dağılımı ise Tablo 1.de gösterilmiştir.

Tablo 1. Tezlerin Üniversitelere ve Program Türüne Göre Dağılımı

Üniversite	Y.Lisans	Doktora
Ağrı İbrahim Çeçen Üniversitesi	1	-
Amasya Üniversitesi	1	-
Ankara Üniversitesi	3	2
Atatürk Üniversitesi	1	-
Bolu Abant İzzet Baysal Üniversitesi	1	-
Bursa Uludağ Üniversitesi	6	-
Çukurova Üniversitesi	1	-
Dicle Üniversitesi	6	-
Eskişehir Anadolu Üniversitesi	1	-
Erciyes Üniversitesi	1	-
Fırat Üniversitesi	1	-
İnönü Üniversitesi	1	-
Marmara Üniversitesi	7	3
Necmettin Erbakan Üniversitesi	-	1
Van Yüzüncü Yıl Üniversitesi	5	-
Toplam	36	6

Tablo 1'in verilerine göre 2020 yılında tamamlanan din eğitimi bilim dalına ait lisansüstü tezler en çok Marmara Üniversitesi'nde yapılmıştır. Buna göre Marmara Üniversitesi'nde 7 yüksek lisans, 3 doktora tezi olmak üzere toplam 10 lisansüstü tez tamamlanmıştır. Bu üniversiteyi 6 yüksek lisans tezi ile Dicle Üniversitesi, 6 yüksek lisans tezi ile Bursa Üniversitesi, 2 doktora 3 yüksek lisans tezi ile Ankara Üniversitesi ve 5 yüksek lisans tezi ile Van Yüzüncü Yıl Üniversitesi takip etmektedir. En az lisansüstü çalışma ise 1 teze Ağrı İbrahim Çeçen Üniversitesi, Amasya Üniversitesi, Atatürk Üniversitesi, Bolu Abant İzzet Baysal Üniversitesi, Çukurova Üniversitesi, Eskişehir Anadolu Üniversitesi, Erciyes Üniversitesi, Fırat Üniversitesi, İnönü Üniversitesi ve Necmettin Erbakan Üniversitesi'nde gerçekleştirilmiştir. Ulaşılan bu verilerden din eğitimi bilim dalına ait lisansüstü tezlerin tarihi

geçmişe, akademik birikim ve deneyime sahip büyük üniversitelerde daha fazla yapılmış olduğu anlaşılmaktadır. Bunun yanında öğrenci ve akademisyen sayısının fazlalığı da yapılan lisansüstü tezlerin nicelik olarak artış göstermesinde etkili olan sebepler arasında sayılabilmektedir.

Din eğitimi bilim dalında yapılmış lisansüstü tezlerin konularına göre dağılımına bakıldığında doktora program türündeki tezler; din eğitimi epistemolojisi, din eğitimi tarihi ve yüksek din öğretimi şeklindeki başlıklar halinde sınıflandırılabilir. Din eğitimi epistemolojisi ile ilgili çalışmalar incelendiğinde bunlardan ilki din eğitiminde bilgi problemini, kelam, İslam felsefesi ve tasavvuf gibi ilimlerde üretilen bilgi yaklaşımlarının disiplin nazarıyla nasıl yorumlanabileceği ve bu yorumlamalardan ortaya çıkan düşüncelerin günümüz için nasıl bir din eğitimi tasvir ettiği gibi çerçevelerde ele alınmıştır. Diğeri, insanın diğer varlıklarla olan ilişkiselliği boyutu olan yetkinlik kavramı çerçevesinde din eğitiminin muhatabı olarak insanın kendisini anlamlandırmaya çalışırkenki arayışını konu edinmektedir. Bu noktada çalışmada din eğitiminin pratik alanına da bir perspektif sunacak olan insanın yetkinlik arayışı, geleneğin önemli düşünürlerinden Sadreddin-i Konevî'nin düşüncelerinden hareketle yeniden yorumlanmaya ve din eğitiminin felsefi arka planı için düşünsel bir zemin oluşturmaya çalışılmıştır. Din eğitimi tarihi ile ilgili çalışmalar, Cumhuriyet dönemi din eğitimi tartışmaları, yine bu dönemde Kur'an kurslarındaki programların değişiminin incelenmesi, 2002 sonrası örgün din öğretimindeki tartışmalar ve Osmanlı dönemi Enderun eğitimi şeklinde gerçekleşmiştir. Bir diğer doktora tezinde yüksek din öğrenimi öğrencilerinin öğrenme iklimi ve akademik özyeterlik algılarını tespit etmek; öğrenme iklimi, akademik özyeterlik algıları ve akademik başarı arasındaki ilişkiyi incelemek amaçlanmıştır. Bu bağlamda çalışmada öğrenme iklimi ve akademik özyeterliliğin, tarihi, boyutları, türleri, ölçekleri ve ikilinin akademik başarıyla ilişkileri ele alınmıştır. Yüksek lisans program türündeki tezler ise çeşitli filozof ve düşünürlerin görüşlerinden hareketle din eğitimine olan katkıları, farklı boyutlarıyla örgün din eğitimi, Kur'an-ı Kerim'de din eğitimi, yaygın din öğretimi, Din eğitimi programlarında bazı kavramların ele alınması, dünyada din eğitimi, Hz. Peygamber dönemi ve din eğitimi, sosyal yaşamda din eğitimi, din öğretiminde teknoloji ve materyal kullanımı ve kültürlerarası din eğitimi şeklinde başlıklar halinde incelenebilir. Bu tezler arasında en çok çeşitli düşünürün din eğitimine dair görüşleri ve katkıları çalışılmıştır. Bu bağlamda hazırlanan tezlerde İhvan-ı Safa, Reşid Rıza, İbrahim Arvas, Peyami Safa, Seyyid Ahmet Arvasi, Mehmet Akif Ersoy, Yazıcıoğlu Mehmed, John M.Hull'ın din eğitimi ile ilgili görüşleri ve din eğitimine katkıları çalışılmıştır. Kur'an-ı Kerim minvalinde çalışılan tezlerde Meryem suresinin din eğitimi açısından incelenmesi, Kur'an'da mesleki ahlak eğitimi ve nüzul sırasına göre ilk beş surede şahsiyet eğitimi konuları yer almaktadır. Dünyada din eğitimi başlığı altında ise Somali'de din eğitimi ele alınmıştır. Örgün din eğitimi içerisinde ise DKAB dersi örneği lise öğrencilerinde inanç gelişimi, DKAB öğretmenlerinin kavram ve kavram öğretimine ilişkin görüşleri ve öğretmenlerin aldıkları din eğitiminin duygusal zeka düzeyleri ile mesleki öz-yeterliliklerine etkisi, Uluslararası Anadolu İmam Liselerinde eğitim, Suriyeli ortaokul öğrencilerinin din eğitimi, velilere göre imam hatip liselerindeki din eğitimi ve İmam Hatip liseleri meslek dersleri öğretmenlerinin mesleğe adanmışlık ve mesleki tükenmişlik düzeylerinin incelenmesi gibi konular ele alınmıştır.

Araştırmaya dahil edilen 42 tezin yönteme göre dağılımına bakıldığında 26 tezin teorik/kuramsal türde çalışmalar yapıldığı dikkat çekmektedir. Geri kalan 16 tezin ise 10'u nicel, 5'i nitel ve 1'i de karma yönteme sahip çalışmalar olduğu görülmüştür. Teorik/kuramsal çalışmalarda literatür taraması ve doküman analizi teknikleri kullanılmıştır. Nicel yöntemin seçildiği araştırmalarda veri toplama tekniği anket, nitel yöntemin seçildiği araştırmalarda görüşme tekniği ve karma yöntemin seçildiği araştırmada ise hem anket hem mülakat tekniği birlikte kullanılmıştır. Görüldüğü üzere Tezlerde kullanılan yöntemlerle ilgili bulgular

değerlendirildiğinde, lisansüstü çalışmalarda daha çok literatür taraması yönteminin kullanıldığı, bunu nitel ve nicel araştırma yöntemlerinin takip ettiği, en az kullanılanın ise karma araştırma yöntemi olduğu anlaşılmaktadır.

SONUÇ

Din eğitimi bilim dalı, çok uzun bir geçmişe sahip olmamasına rağmen dinin öğrenildiği ve öğretildiği her alanda çok geniş bir kapsama sahiptir. Gerek tarihi gerek günümüzdeki eğitim sistemindeki yeri gerekse geleceğe yönelik verdiği önerilerle güncel tüm boyutlarda kendi araştırma alanını oluşturmuştur. Bu kadar geniş alana sahip olduğu düşünüldüğünde din eğitimcilerinin bu bilgi birikimini en iyi göstereceği saha ise lisansüstü tezler olmaktadır.

Türkiye’de yapılan din eğitimi başlıklı lisansüstü çalışmaların incelendiği bu çalışmada, 36’sı yüksek lisans, 6’sı ise doktora olmak üzere toplam 42 lisansüstü tez tespit edilmiştir. Yükseköğretim Kurulu Yayın ve Dokümantasyon Daire Başkanlığı Ulusal Tez Merkezi veri tabanından elde edilen açık erişimli olan tezlerin 18’inin erkek 24’ünün kadın araştırmacılar tarafından yapıldığı görülmektedir. Bu noktada kadın araştırmacıların çoğunluğu oluşturduğu göze çarpmaktadır.

Üniversitelere göre dağılımlarına bakıldığında en çok Marmara Üniversitesi bünyesinde yapılmıştır. Buna göre Marmara Üniversitesi’nde 3 doktora 7 yüksek lisans tezi olmak üzere toplam 10 lisansüstü tez tamamlanmıştır. Bu üniversiteyi 6 yüksek lisans tezi ile Dicle Üniversitesi, 6 yüksek lisans tezi ile Bursa Üniversitesi, 2 doktora 3 yüksek lisans tezi ile Ankara Üniversitesi ve 5 yüksek lisans tezi ile Van Yüzüncü Yıl Üniversitesi takip etmektedir.

Lisansüstü tezler konu tasnifi açısından incelendiğinde çalışılan konuların geniş bir yelpazede ele alındığı rahatlıkla söylenebilir. En çok çalışılan konular arasında örgün din eğitimi, çeşitli filozof ve eğitimcilerin din eğitime ilişkin görüşleri ve yüksek din eğitimi öne çıkmaktadır. Bunlar da kendi içerisinde alt konulara ayrılmaktadır. Literatürdeki diğer ilgili çalışmalar da arka plana alındığında pek çok alt başlığa ve zengin içeriğe sahip örgün din eğitiminin yine en fazla tercih edilen konu alanı olması şaşırtıcı bir sonuç değildir. Türkiye’de din eğitimi alanının hızlı gelişim ve dönüşümü ile farklı yeni problem alanlarının tez çalışmalarında yer almasına yansıtıldığı rahatlıkla söylenebilir.

Tezlerde kullanılan yöntemlerle ilgili bulgular değerlendirildiğinde, lisansüstü çalışmalarda daha çok literatür taraması yönteminin kullanıldığı, bunu nitel ve nicel araştırma yöntemlerinin takip ettiği, en az kullanılanın ise karma araştırma yöntemi olduğu anlaşılmaktadır. Nitel yöntemi; görüşme/mülakat ve doküman incelemesi, nicel yöntemi; anket, karma yöntemi ise nitel destekli nicel ve nicel destekli nitel araştırmaların oluşturduğu görülmektedir. Önceki yıllardaki çalışmaların sonuçlarına bakıldığında da yine teorik çalışmaların en çok tercih edilmesi yolundan vazgeçilmediği anlaşılmaktadır.

Literatürdeki çalışmaların izin verdiği ölçüde 2020 yılıyla kapsanan ve sınırlandırılan bu çalışma, din eğitimi bilim dalındaki yüksek lisans ve doktora tezlerinden tespit edilenlerin isim ve konularından hareketle yapılan belirlemelerin, kullanılan yöntemin seçiminde ve uygulanmasındaki başarı açılarından ayrıca değerlendirmeye ihtiyaç duyduğu açıktır. Bu sebeple bu çalışmada sadece din eğitimcilerinin alanları ile ilgili metodolojiye sahip oldukları ve bu metodolojiyi kullanarak geliştirdikleri ve bilgi ürettikleri söylenebilir. Elbette ki din eğitimi alanında yapılmış lisansüstü tezlerin niteliksel ve niceliksel olarak gelişim seyrinin bir çerçevede görülmesi ve bunun sonucunda oluşan din eğitimi alanı bilimsel birikiminin ortaya konması bakımından önemlidir. Günümüzde disiplinlerarası bir niteliğe sahip olan din eğitimi

alanının diğer bilim dalları ile işbirliği içerisinde yapılacak lisansüstü tezlerle yeni yaklaşımlar ve paradigmlar üretmesi bir ihtiyaç olarak karşımıza çıkmaktadır.

KAYNAKÇA

- Acuner, H. Y., & Türkan, M. (2016). Türkiye’de Din Eğitimi Alanı’nda Yapılan Lisansüstü Çalışmaların Konu Yönelimleri. *Journal of International Social Research*, 9(43), 1334-1334. <https://doi.org/10.17719/jisr.20164317704>
- Ali Yıldırım – Hasan Şimşek. (2013). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri* (9.). Seçkin Yayıncılık.
- Bruce L. Berg - Howard Lune. (2019). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri* (Asım Arı, Ed.). Eğitim Yayınevi.
- Çanakçı, A. A. (2020). Türkiye’de Yapılan Din Eğitimi Başlıklı Yüksek Lisans ve Doktora Tezleri Üzerine Bir Analiz (1986-2019). *The Journal of Academic Social Science Studies*, 13(79), 277-306.
- Karaaslanoğlu, F., Akinet, M., & Şahin, E. T. (2019). Türkiye’de Pazarlama Alanında Yapılan Lisansüstü Tezlerin Analitik İncelemesi (2013-2018). *Finans Ekonomi ve Sosyal Araştırmalar Dergisi*, 4(3), 260-269. <https://doi.org/10.29106/fesa.581915>
- Kayadibi, F., Başkurt, İ., & Furat, A. Z. (2008). *Cumhuriyet Dönemi Din Eğitimi Literatürü*. İstanbul Üniversitesi Rektörlüğü Yayınları. <https://cdn.istanbul.edu.tr/statics/ilahiyat.istanbul.edu.tr/wp-content/uploads/2012/02/cddeliteraturu.pdf>
- Niiniluoto, I. (2002). *Scientific Progress*. <https://plato.stanford.edu/entries/scientific-progress/#SciPro>
- Öcal, M. (2008). Türkiye’de Din Eğitimi Tarihi Literatürü. *Türkiye Araştırmaları Literatür Dergisi*, 6(12), 399-430.
- Türkan, M. (2015). *Türkiye’de Din Eğitimi Alanı’nda Yapılan Lisansüstü Çalışmaların İçerik ve Yöntem Açısından İncelenmesi* [Yüksek Lisans Tezi]. Recep Tayyip Erdoğan Üniversitesi Sosyal Bilimler Enstitüsü.
- Usta, M. (1984). *Cumhuriyet Döneminde Türkiye Üniversitelerinde Din Eğitimi ve İlahiyat Sahasında Yapılan Lisans Üstü Tezler ve Bunların Eğitim Açısından Değerlendirilmesi* [Yayımlanmamış Yüksek Lisans Tezi]. Marmara Üniversitesi SBE.
- Yorulmaz, B. (2016). Türkiye’de Din Eğitimi Alanında Yapılan Lisansüstü Çalışmalar Hakkında Genel Bir Değerlendirme. *Öneri Dergisi*, 12(46), 41-62. <https://doi.org/10.14783/od.v12i46.1000010003>
- YÖK. (2021). Ulusal Tez Merkezi. 02 Kasım 2021 tarihinde <https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp> sitesinden erişilmiştir.

FETVALAR VE MAHKEME KARARLARINDAN HAREKETLE OSMANLI HUKUKUNDA VEDİA (EMANET) AKDİ

BASED on FATWAS and COURT DECISION TRUST (VEDİA) CONTRACT in
OTTOMAN LAW

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ÖZET

Bu çalışmada, öncelikle İslam hukukundaki vedîa akdi, mezheplerin farklı görüşleri de dikkate alınarak ele alınacaktır. Daha sonra vedîa akdi ile alakalı Osmanlı dönemi fetva mecmuaları ve mahkeme kararlarından hareketle Osmanlı hukukundaki vedîa akid örnekleri sunulacaktır. Çalışmanın sonucunda vedîa akidlerinde Osmanlı hukukunda hangi mezhebin görüşlerine uygun hükümler verildiğini tesbit etmek mümkün olacaktır.

Sözlükte “bırakmak, terketmek” manasındaki vd‘a kökünden türeyen vedîa fıkhıta bir kişiye koruması için bir malın bırakılmasını ve bu şekilde bırakılan malı ifade eder. Vedîa, fikhın muâmelât bölümünde güvene dayalı olarak oluşan emanet akidleri içinde ayrı bir akid türü olarak yer almaktadır. Bir malın başkasına emanet edilmesi işlemine îda‘, akde konu olan şeye vedîa, akdin taraflarından vedîayı verene mûdî‘, malı kabul edene mûda‘ denir. Vedîa, akid yapma ehliyetine sahip (akıl-baliğ) tarafların birbirine uygun karşılıklı irade beyanı ile kurulur. Vedîa konusu malın belirli, dinen mübah ve teslim edilebilir bir özellik taşıması gerekir. Vedîa iki taraf için de bağlayıcı olmayan (gayri lâzım) akidlerdendir, dolayısıyla mûdî‘ malı dilediği zaman geri isteyebilir, mûda‘ da geri vermekle yükümlüdür.

Vedîa akdinin başlıca hukukî sonucu (hükmü) vedîanın mûdâın elinde emanet oluşu, mûdâın bu malı koruma ve istendiğinde iade etme sorumluluğudur. Mûdâın temel görevi olan vedîayı koruma yükümlülüğü malı teslim almasıyla başlar. Vedîanın korunmasında örf ve teamül en belirleyici unsur kabul edilmiş ve mûdâın vedîayı kendi malı gibi koruması esası getirilmiştir. Vedîayı elinde bulunduran kimsenin mal sahibinden izin almadan vedîada satış, kiralama, ödünç ve rehin verme gibi bir tasarruf hakkı yoktur, bu hususta İslam hukukçuları aynı görüştedir. Eğer akid sırasında veya sonrasında mûdî‘ vedîayı satma, kiralama, ödünç verme, bağışlama gibi konularda mûdaa yetki vermişse akdin vedîa niteliği kalkar, işlem vekâlet akdine dönüşür ve vekâlet hükümleri uygulanır.

Vedîa mûdâın elinde emanet hükmündedir. Bunun için de mûdâın teaddî veya kusuru dışında telef ve zayi olması halinde tazmini gerekmez. Vedîanın mûdâın teaddî yahut kusuru sonucunda telef olması veya zarar görmesi halinde tazmininin gerektiği konusunda fukaha ittifak etmektedir. Vedîada sahibinin rıza göstermeyeceği bir eylemde bulunulması teaddî sayılmıştır.

Vedîa akdi karşılıklı rıza ile veya tek taraflı fesihle sona erer. Ayrıca taraflardan birinin ölümü veya akid ehliyetini kaybetmesi, vedîanın mülkiyetinin başkasına intikali gibi sebepler de vedîa akdini sonlandırır. Şâfiî ve Hanbelî hukukçuları mûdâın tazmini gerektiren kusurlu davranışı ile vedîa akdini bozacağını söylerken Hanefî ve Mâlikî hukukçuları bu durumda akdin sona ermeyeceği, sadece mûdâın bu davranışıyla tazminle yükümlü tutulacağı görüşündedir. Bütün İslam hukukçularına göre mûdâın istemesi halinde vedîanın iade edilmesi zorunludur. Çünkü mûdâın malını talep etmesiyle akid bozulmuş ve malını geri alma hakkı doğmuştur. Mûda‘ meşru bir mazereti yokken iadede gecikirse tazminle yükümlü tutulur. Vedîa kural olarak

mûdın kendisine iade edilmelidir. Mûdın vefatı halinde vedîa varislerine iade edilir. Bunun yanı sıra mûdı temsil yetkisi bulunanlara yapılan iade de geçerlidir.

Osmanlı dönemi fetva mecmualarında ve mahkeme kayıtlarında, vedîanın muhafazası, tasarrufu, zarar görmesi ve çalınması gibi durumlarda tazmin edilmesi, mûdaa emanet bırakılan malların mûdîa ve mûdın hukuki temsilcisine geri teslimi, vedîanın hayvan olduğunda ona harcanan nafakanın hesaplanarak mûdiden istenmesi, hayvanı emanet bırakanın teslim almaması durumunda hayvanın satılması ve vedîanın teslim yeriyle alakalı çeşitli örnekler bulunmaktadır.

Sonuç olarak Osmanlı hukukundaki vedîa akidlerinde Hanefî mezhebinin görüşlerine uygun mahkeme kararlarının alındığını söylemek mümkündür.

Anahtar Kelimeler: Osmanlı, Vedîa, Akid, Mahkeme.

ABSTRACT

In this study, first of all, the vedia contract in Islamic law will be discussed by taking into account the different views of the sects. Then, based on the Ottoman period fatwa journals and court decisions related to the vedia contract, the examples of the vedia contract in the Ottoman law will be presented. As a result of the study, it will be possible to determine which sect's opinions were given in Ottoman law in vedia contracts.

Derived from the root vd'a, which means "to leave, to abandon" in the dictionary, in fiqh, vedia refers to leaving a property to a person for protection and the property left in this way. Vedia is included as a separate type of contract among the trust-based contracts in the transactions section of the fiqh. The process of entrusting a property to someone else is called îdâ, the thing that is the subject of the contract is called vedia, the person who gives the gift from the parties of the contract is called mudi, and the person who accepts the property is called muda.

Vedia is established by the mutual declaration of will of the parties who have the capacity to make contract (intellect-young). The subject matter of the vedia must have a specific, religiously permissible and deliverable feature. Vedia is one of the non-binding (non-necessary) contracts for both parties, so the depositor may request the property back whenever he wishes, and the muda is obliged to give it back.

The main legal result (judgment) of the vedia contract is that the vedia is entrusted to the muda, and the muda is responsible for protecting this property and returning it when requested. The obligation to protect the vedia, which is the main duty of the muda, begins with the receipt of the goods. Customs and practices have been accepted as the most determining factor in the protection of the vedia the principle the vedia as his own property has been introduced.

The person holding the vedia does not have the right to sell, rent, lend or pledge on the vedia without the permission of the owner, and Islamic jurists are of the same opinion on this issue. If, during or after the contract, the depositor has authorized the muda in matters such as selling, renting, lending and donating, the quality of the contract is removed, the transaction becomes a proxy contract and the provisions of the attorney are applied.

Vedia is like a trust in the hands of the muda. For this reason, compensation is not required in case of loss or damage other than the muda's taaddi or fault. It is agreed with the fughâ that if the vedia is destroyed or damaged as a result of the muda's obedience or fault, compensation is required. It is considered taaddi to take an action that owner of the vedia would not consent to.

Vedia contract ends with mutual consent or unilateral termination. In addition, reasons such as the death of one of the parties or the loss of contractual capacity, the transfer of the ownership

of the trust to someone else, also terminates the agreement of the trustee. While Shafii and Hanbali jurists say that muda's faulty behavior that requires compensation, he will break the contract of vedia, Hanafi and Maliki jurists are of the opinion that in this case, the contract will not be terminated, and only the muda's will be held liable for compensation with this behavior.

According to all Islamic jurists, it is obligatory to return the vedia if the depositor requests it. Because when the depositor demanded his property, the contract was broken and he had the right to take his property back. If muda is delayed in returning without a legitimate excuse he is held liable for compensation. As a rule, the vedia should be returned to the depositor himself. In case of death of the depositor, it is returned to his heirs. In addition, the refund made to those who have the authority to represent the depositor is also valid.

In the fatwa journals and court records of the Ottoman period, various kinds of problems such as returning the goods entrusted to the mudi to the legal representative of the mudi, compensation for the damage and theft of the trust, demanding the alimony from the depositor by calculating the alimony spent on him when the vedia is an animal, and selling the animal if the person who entrusted the animal does not receive it examples are available.

As a result, it is possible to say that court decisions were taken in accordance with the views of the Hanafi sect in vedia contracts in Ottoman law.

Keywords: Ottoman, Vedia, Contracting, Court.

GİRİŞ

Bu çalışmada İslam hukukunda emanet akidleri arasında yer alan vedîa akdi, Osmanlı fetva mecmuaları ve mahkeme kararlarından hareketle ele alınacaktır. Öncelikle klasik İslam hukukundaki vedîa akdi mezheplerin farklı görüşleri de dikkate alınarak kısaca incelenecektir. Daha sonra Osmanlı fetva mecmualarına ve mahkeme kararlarına yansıyan vedîa akidleri ile alakalı örnekler sunulacaktır. Bu çalışmada vedîa akidleri ile alakalı hükümlerin, Osmanlı topraklarındaki mahkemelerde yürürlüğe konan ve resmi mezhep¹ olarak kabul edilen Hanefî görüşlerine uygun olup olmadığı tespit edilmeye çalışılacaktır. Teori (fetvalar) ile pratiği (mahkeme kararları) vedîa akdi özelinde beraberce ele alan bu çalışmanın İslam hukuk tarihine küçük bir katkı sunması ümit edilmektedir.

1. İSLAM HUKUKUNDA VEDÎA AKDİ

Sözlükte bırakmak, terk etmek, emanet vermek anlamına gelen vd'a kökünden² türeyen "vedîa" kelimesi, İslam borçlar hukukunda, bir kimseye koruması için bir malın emanet edilmesi sözleşmesini (akid) ve bu şekilde emanet edilen malı ifade eden bir terimdir.³

¹ "Osmanlı yöneticileri tarafından ülkede hukuk birliğini temin için 16. Asrın ortalarından itibaren mahkemelere gönderilen kadı beratlarına "...eimme-i Hanefiyye'den muhtelefun fihâ olan mesâili kemâ yenbeği tettebbu' edip esahh-i akvâli bulup anınla amel eyleye" şeklindeki ifadeler eklenmiştir. 1805 yılından itibaren ise Anadolu ve Rumeli'de mahkemelere diğer mezheplerden kadı ve nâib tayini terkedilmiş ve sadece Hanefî mezhebi uygulamasına izin verilmiştir." Geniş bilgi için bk. Aydın, M. Akif, *Osmanlı Hukuku Devlet-i Aliyye'nin Temeli*, Ankara: Türkiye Diyanet Vakfı, 2020, s. 251-256.

² Muhammed b. Mükerrrem İbn Manzûr, *Lisânü'l-'Arab*, nşr. Abdullah Ali el-Kebîr, "vd'a", Kahire: Dâru'l-Maârif, ts, 6: 4796.

³ Ebû Muhammed Bedreddin Mahmud b. Ahmed b. Musa el-Aynî, *el-Binâye fî şerhi'l-Hidâye*, Beyrut: Dâru'l-Fikr, 1990, 9: 131; İbrahim b. Muhammed b. İbrahim el-Halebî, *Mülteka'l-Ebhur*, thk. Vehbî Süleyman el-Ulbânî, byy: yy, 1986, 2: 143; "Vedîa", *el-Mevsuatu'l-fikhiyye*, Kuveyt: Vizâretü'l-Evkaf ve's-Şuûni'l-

Vedâ sözleşmesi, malda tasarrufta bulunmadan sadece onu korumaya yönelik olduğu için emanet bırakmanın özel bir şekli kabul edilir.⁴ Vedâ, güvene dayalı olarak oluşan emanet akidleri⁵ içinde ayrı bir akid türü olarak yer almaktadır. Bir malın başkasına emanet edilmesi işlemine “îda”, emanet bırakan kişiye “mûdı”, emanet bırakılan kişiye “mûda” veya “müstevda” denilir.⁶

Vedâ akdi diğer akidlerde olduğu gibi akid yapma ehliyetine (eda ehliyeti) sahip (akıl-baliğ) tarafların birbirine uygun (icab-kabul) karşılıklı irade beyanı ile kurulur. Emaneti bırakanın, -bunu size emanet bıraktım- demesine “icab”; kendisine emanet bırakılan kişinin –emanet almayı kabul ettim- demesine “kabul” denilir.⁷ Vedâ sözleşmesinde icab ve kabul, bölgenin örf ve âdetine göre tarafların söz veya fiilleri ile meydana gelir. Örneğin: Bir kimse malını bir şahsa hitaben; -Emanet eyledim- deyip o şahıs da -kabul ettim- dese aralarında sarahaten icab ve kabul ile îda akdi geçerli olur. Aynı şekilde bir kimse bir malını bir esnafın dükkanına girip; -Bu sana vedâdır- diyerek, bırakıp gitse, dükkan sahibi de bunu görüp sükut eylese emanet bırakanın sözü sarahaten icab, dükkan sahibinin sükut etmesi delâleten kabul anlamına geldiği için yapılan îda geçerlidir. Fakat dükkan sahibi -kabul etmem- diyerek red etse îda geçerli olmaz.⁸

Vedâ konusu mal belirli, dinen meyte (leş) ve kan gibi haram olmayan mübah bir mal olmalıdır. Ayrıca malın teslim edilebilir özellikte olması gerekir. Havadaki kuş, denize düşen mal emanet olarak bırakılamaz.⁹

Vedâ iki taraf için de bağlayıcı olmayan (gayri lâzım) akidlerdendir, dolayısıyla mûdı malı istediği zaman geri alabilir, mûda da malı geri vermekle sorumludur.¹⁰ Ayrıca emanet bırakan sözleşme yaptığı halde malını mûdaya teslim etmeme hakkına, emanet bırakılan kişi de dilediği zaman sözleşmeyi fesh (akdin sonlandırılması) ve emanet aldığı malı mûdiye iade hakkına sahiptir; çünkü vedâ mûda açısından bir teberru¹¹ akdi niteliğindedir ve mûda akdi sürdürmeye

İslâmiyye, 2005, 43: 5; Bardakoğlu, Ali, *İslam'da İnanç İbadet ve Günlük Yaşayış Ansiklopedisi*, İstanbul: Marmara Üniversitesi İlahiyat Fakültesi Vakfı Yayınları, 2006, 4: 2131.

⁴ “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 5.

⁵ “Emanet akidlerinde karşılıklar arası denge bulunmayıp teberru ve yardım amacı veya güven esası hâkimdir. Vedâ, şirket, vekâlet, vesâyet, hibe ve tartışmalı olmakla birlikte âriyet akidleri böyledir.” Bk. Aktan, Hamza, “Emanet”, *DİA*, İstanbul: TDV Yayınları, 1995, 11: 84; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 12.

⁶ *Mecelle*, md: 764.

⁷ Molla Hüsrev, *Dürerü'l-hükkâm fî şerhi Ğureri'l-ahkâm*, İstanbul: Mir Muhammed Kütüphanesi, 1890, 2: 244; Halebî, *Mülteka'l-Ebhur*, 2: 143; Muhammed Emin b. Ömer b. Abdilaziz el-Hüseynî ed-Dımaşkî İbn Âbidîn, *Reddü'l-muhtâr ale'd-Dürri'l-muhtâr*, Riyad: Dâru Âlemi'l-Kütüb, 2003, 7: 454; Ebû İshak Cemalüddin İbrahim b. Ali b. Yusuf Şirâzî, *el-Mühezzeb fî fikhi'l-imam eş-Şafîi*, Beyrut: Dâru'l-Kütübü'l-İlmiyye, 1995, 3: 181; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 13.

⁸ Fahrüddin Osman b. Ali b. Mihcen Zeyle'î, *Tebyînü'l-hakâik şerhu Kenzi'd-dekâik*, Bulak: Matbaatü'l-Kübrâ el-Emîriyye, 1896, 5: 76; Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 244; Halebî, *Mülteka'l-Ebhur*, 2: 143; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 455; Bilmen, Ömer Nasûhî, *Hukuk-ı İslâmiyye ve Istılâhâtı Fikhiyye Kâmusu*, İstanbul: Bilmen Yayınları, 1976, 4: 151. “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 9.

⁹ Aynî, *el-Binâye*, 9: 131; Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 244; Halebî, *Mülteka'l-Ebhur*, 2: 143; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 455; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 15.

¹⁰ Şemsü'l-Eimme Ebû Sehl Ebû Bekir Muhammed b. Ahmed es-Serahsî, *el-Mebsût*, Beyrut: Dâru'l-Marife, ts, 11: 117; Muhammed b. Ahmed el-Hatîb Şirbinî, *Muğni'l-Muhtâc ilâ ma'rifeti meânî elfâzi'l-Minhâc*, Beyrut: Dâru'l-Marife, 1997, 3: 113; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 35.

¹¹ “Teberru: Kişinin yükümlü olmadığı bir şeyi karşılıksız vermesini-yapmasını ifade eder.” Bk. Aybakan, Bilal, “Teberru”, *DİA*, İstanbul: TDV Yayınları, 2011, 40: 215.

zorlanamaz.¹² Vedîa sözleşmesinin hukuki sonucu, vedîanın mûdâın yanında emanet olması, mûdâın bu malı koruma ve istendiğinde geri verme sorumluluğudur.¹³

Vedîa teberru niteliğinde olduğu için emanet bırakılan kişinin bu sözleşmede herhangi bir ücret istemesi sözleşmenin tabii unsurları arasında yer almaz. Ancak sözleşme esnasında ücret alma şartı koşulmuşsa veya bu konuda bir örf varsa malı emanet alan kimseye ücret isteme hakkı tanınır.¹⁴

Vedîanın korunma yükümlülüğü mûdâın malı teslim almasıyla başlar. Vedîanın korunmasında örf ve teamül en belirleyici unsur kabul edilmiş ve mûdâın vedîayı kendi malı gibi koruması esası getirilmiştir.¹⁵

Vedîa olan mal hayvan ise hayvanın yavrusu, sütü, yünü gibi malın bizzat kendisinden kaynaklanan artma ve gelirler asıl mal sahibine aittir ve bunların da emaneten vedîanın aslı gibi korunması gerekir.¹⁶

Mûdı tarafından vedîanın korunacağı yer hususunda özel bir şart ileri sürülmemişse mûda kendi malını örfte nasıl saklıyorsa emanet malı da o şekilde saklamakla sorumludur. “Hırz-ı misl” denilen bu muhafaza yeri, şahsın kendi malını koymakla zayı etmiş olmayacağı veya malların genelde saklandığı yerdir. Bu yerin emsaline uygunluğu konusundaki ölçü yine örf ve teamüldür.¹⁷

Vedîayı koruma konusunda mûdâın bir diğer sorumluluğu ise vedîanın ekonomik değerinin düşmemesine yönelik tedbirler almasıdır. Bu tedbirler vedîanın cinsine ve niteliğine göre çeşitlilik gösterir. Örnek olarak hayvanın sulanıp yemlenmesi, yünün güve için ilaçlanması gibi tedbirler alınabilir. Şâfiî, Mâlikî ve Hanbelîlere göre, bu konuda mûdâın ayrıca bir talepte bulunması şart değildir; çünkü vedîa olarak bırakılan malın cinsi ve çeşidine göre ne tür bir koruma işleminin yapılması hususu yine örf tarafından belirlenmiştir.¹⁸ Hanefîlere göre ise vedîa konusu malın bakım sorumluluğu sözleşme ile meydana gelmez ve emanet bırakan bu konuda ayrıca talepte bulunmalıdır.¹⁹

Vedîanın bakımı için yapılan bütün masraflar mûdı tarafından karşılanır. Bu konuda mezhepler arasında ittifak vardır.²⁰ Hanefîlere göre emanet bırakılan hayvanın sahibi gaib olmuş ise

¹² Serahsî, *el-Mebsût*, 11: 117; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 5; Yıldırım, Mustafa “Vedîa”, *DİA*, İstanbul: TDV Yayınları, 2012, 42: 597.

¹³ Serahsî, *el-Mebsût*, 11: 110; Aynî, *el-Binâye*, 9: 145; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 456; Şîrâzî, *el-Mühezzeb*, 3: 181; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 23.

¹⁴ Ebu Bekir el-Haddâd, *el-Cevheretü'n-Neyyira*, s. 605, www.al-mostafa.com; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 12.

¹⁵ Zeyla'î, *Tebyînü'l-hakâik*, 5: 78; *Mecelle*, md. 780: “Müstevda’, vedîayı kendi malı gibi hıfz eder, yahut emîni olan kimseye hıfz ettirir.”

¹⁶ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 248; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 27; *Mecelle*, md. 798: “Vedîanın menâfi’i, sahibinindir.”; Yıldırım, “Vedîa”, *DİA*, 42: 597.

¹⁷ Ebü'l-Hasan Burhânüddîn Ali b.Ebî Bekr b. Abdilcelil Merğînânî, *el-Hidâye şerhu Bidâyeti'l-mübtedî*, thk. Muhammed Adnan Derviş, Beyrut: Dâru'l-Erkâm, ty, 2: 211; İbn Rüşd, Ebü'l-Velîd Muhammed b. Ahmed b. Muhammed, *Bidâyetü'l-müctehid ve nihâyetü'l-muktesid*, Beyrut: Darü'l-Kütübü'l-İlmiyye, 2007, s. 695; Zeyla'î, *Tebyînü'l-hakâik*, 5: 76; Şîrbînî, *Muğni'l-Muhtâc*, 3: 106; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 3; *Mecelle*, md. 781: “Müstevda’, kendi malını nerede hıfz eder ise, vedîayı dahi orada hıfz edebilir.”; *Mecelle*, md. 782: “Vedîanın emsâli vechile muhafazası lâzımdır. Binaenaleyh, nukûd ve mücevherât misüllü emvâli, ahur ve samanlık gibi yerlerde tutmak, hıfzda taksîr olmakla, bu halde telef ya zâyî’ olsa zamân lâzım gelir.”

¹⁸ Muhammed b. İdris eş-Şâfiî, *el-Ümm*, thk. Rifat Fevzi Abdulmuttalib, byy.: Darü'l-Vefâ, 2001, 5: 295; Şîrâzî, *el-Mühezzeb*, 3: 181; Şîrbînî, *Muğni'l-Muhtâc* 3: 107; Sahnûn b. Abdisselâm b. Said et-Tenûhî, *el-Müdevvenetü'l-kübrâ*, Beyrut: Darü'l-Kütübü'l-İlmiyye, 1994, 4: 435.

¹⁹ Serahsî, *el-Mebsût*, 11: 123; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 460; Yıldırım, “Vedîa”, *DİA*, 42: 597.

²⁰ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 245; Şîrbînî, *Muğni'l-Muhtâc*, 3: 108; Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 443; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 462; “Vedîa”, *el-Mevsuatu'l-fikhiyye*, 43: 11.

hayvanın nafakası üç gün boyunca mûda tarafından karşılanır. Üç günden sonra hakim izniyle hayvan satılır.²¹

Kendisine vedîa olarak bırakılan malda, mûda emanet bırakanın izni olmadan satış, kiralama, ödünç ve rehin verme gibi bir tasarrufta bulunamaz. Bu hususta mezhepler ittifak etmiştir.²²

Vedîa konusu mal, emanet bırakılan kişinin elinde emanet hükümlerine tabidir. Bunun için de mûdan yetki sınırını aşır haksız tasarrufta bulunması (teaddî) veya kusurlu olması dışında malın telef veya zarara uğraması tazmin gerektirmez.²³ Vedîanın mûdan teaddî veya kusuru sonucunda telef olması veya zarar görmesi halinde ise tazmini gerekir. Bu konuda mezhepler ittifak etmiştir.²⁴

Vedîada sahibinin rıza göstermeyeceği bir tasarrufta bulunulması teaddî sayılır.²⁵ Örneğin mûdan elbisenin giyilmesi, atına binilmesi²⁶, malının başka bir malla karıştırılması, başkasına verilmesi, yolculuğa giderken birlikte götürülmesi, başkasına emanet bırakılması,²⁷ mûdan vedîayı inkarı, vedîayı korumada ihmal gösterilmesi, vedîanın sahibine iade edilmemesi²⁸ gibi durumlar vedîanın tazminini gerektiren başlıca sebeplerdir.²⁹ Hanefî ve Mâlikîlere göre vedîada teaddî veya kusur olarak değerlendirilebilecek bir davranışta bulunan mûdan, mala zarar gelmeden önce bu teaddî ve kusurlu hareketleri sonlandırırsa tazmin sorumluluğu yoktur.³⁰

Tazmin konusunda, zayi edilen malın taşıdığı özelliğe göre piyasada aynısının bulunması (misli) veya piyasada benzeri olmayan (kıyemî) mallar olması açısından farklı görüşler bulunmaktadır. Telef olan mal kıyemî ise kıymeti ile misli mal ise misli ile tazmin edilir.³¹ Tazmini gereken vedîa kıyemî mal ise Hanefiler tazmin sebebinin vuku bulduğu vakitteki değerinin ödenmesi gerektiği görüşündedir. Telef olan malın emsali piyasada artık satılmaz hale gelmişse misli mal kıymeti üzerinden tazmin edilir. Ebû Hanîfe, bu durumdaki bir mala kıymet takdiri hususunda mahkemenin tazmine hükmettiği tarihin esas alınması gerektiği görüşündedir. Çünkü malın kıymetini ödeme yükümlülüğü mûdan zimmetine ancak mahkeme kararıyla geçer. İmam Muhammed'e göre zayi olan malın piyasadaki zamanki

²¹ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 246; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 462; "Vedîa", *el-Mevsuatu'l-fikhiyye*, 43: 28; Yıldırım, "Vedîa", *DİA*, 42: 597.

²² Haddâd, *el-Cevheretü'n-Neyyira*, s. 605; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 463; Şîrâzî, *el-Mühezzeb*, 3: 184; Şîrbînî, *Muğni'l-Muhtâc*, 3: 108; Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 443; "Vedîa", *el-Mevsuatu'l-fikhiyye*, 43: 59.

²³ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 245; Şîrbînî, *Muğni'l-Muhtâc*, 3: 108; "Vedîa", *el-Mevsuatu'l-fikhiyye*, 43: 69; *Mecelle*, md. 777: "Vedîa, yed-i müstevda'da emanettir. Binaenaleyh, müstevda'nın sun' ve taaddîsi ve hıfzda taksiri olmaksızın, telef ya zâyi' olsa zamân lâzım gelmez. Meselâ, bir kimsenin yedinden kazârâ vedîa olan saat düşüp de kırılrsa, zamân lâzım gelmez. Amma saati çığnese yahut elinden bir şey düşüp de saat kırılrsa, zamân lâzım gelir."

²⁴ Şâfî, *el-Ümm*, 5: 694; İbn Rüşd, *Bidâyetü'l-müctehid*, s. 695; Şîrbînî, *Muğni'l-Muhtâc*, 3: 107; Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 435; "Vedîa", *el-Mevsuatu'l-fikhiyye*, 43: 11; *Mecelle*, md. 787: "Müstevda'nın, taaddî veya taksiri halinde, vedîa telef veyahut kıymetine noksan târî olsa, zamân lâzım gelir. Meselâ, müstevda' kendisinde vedîa olan nukûdu, umûruna sarf ile istihlâk etse, zâmin olur. Ve kezâ müstevda', yedinde vedîa olan hayvana bilâ-izn binip de giderken, gerek fevkalâde sürmekle ve gerek diğer sebeple ve gerek bilâ sebebe telef olsa, veyahut esnâ-yı râhda sirkat olsa, müstevda' ol hayvanı zâmin olur."

²⁵ *Mecelle*, md. 779: "Vedîa hakkında, sahibinin râzı olmadığı şeyi yapmak teaddîdir."

²⁶ Halebî, *Mülteka'l-Ebhur*, 2: 144;

²⁷ Merğînânî, *el-Hidâye*, 2: 208.

²⁸ Haddâd, *el-Cevheretü'n-Neyyira*, s. 607.

²⁹ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 246; Şîrbînî, *Muğni'l-Muhtâc*, 3: 107; Yıldırım, "Vedîa", *DİA*, 42: 598.

³⁰ Merğînânî, *el-Hidâye*, 2: 209; İbn Rüşd, *Bidâyetü'l-müctehid*, s. 695; Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 247; Haddâd, *el-Cevheretü'n-Neyyira*, s. 608; Aynî, *el-Binâye*, 9: 143; İbn Âbidîn, *Reddü'l-muhtâr*, 7: 464; Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 435; "Vedîa", *el-Mevsuatu'l-fikhiyye*, 43: 58.

³¹ Serahsî, *el-Mebsût*, 11: 131 Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 435; Yıldırım, "Vedîa", *DİA*, 42: 598.

kıymetine göre tazmin edilir. Ebû Yûsuf ise mûdamın malı telef ettiği zamanı esas almaktadır. Hanefî mezhebinde Ebû Yusuf'un görüşü tercih edilmiştir.³²

Vedâ sözleşmesi tarafların karşılıklı rızası ile veya tek taraflı fesihle biter.³³ Ayrıca akdi yapan taraflardan birinin delirmesi, sürekli baygınlık geçirmesi, sefihlik gibi gerekçelerden dolayı eda ehliyetini kaybetmesi, mal sahibinin mülkünü satması, hibe etmesi veya benzeri bir muamele yapmasıyla da vedâanın mülkiyetinin başkasına intikali gibi sebepler de vedâ akdini sonlandırır.³⁴

Şâfiî ve Hanbelîler mûdamın tazmini gerektiren kusurlu davranışı ile vedâ akdinin bozulacağı görüşündedirler.³⁵ Hanefî ve Mâlikîler ise kusurlu davranışın akdi sona erdirmeyeceğini, mûdamın bu kusurlu hareketiyle sadece tazminle sorumlu olacağı görüşündedirler.³⁶

Vedâ akdinin sonlanmasıyla mûdamın yanındaki vedâ, akidsiz meydana gelen emanet vasfı kazanmış olur ve sahibine veya vârislerine iade edilmesi gerekir. Mûda iade etmezse vedâyaya gelecek zararı tazmin etmesi gerekir. Mûdamın istemesi halinde mûdamın vedâyayı mûdiye iade etmesi zorunludur. Çünkü mûdamın malını geri istemesiyle vedâ sözleşmesi bozularak mûdamın malını geri alma hakkı meydana gelmiştir. Mûda geçerli bir mazereti yokken malı iade etmede gecikirse tazminle sorumlu olur.³⁷

Vedâ mûdamın bizzat kendisine iade edilmelidir. Mûdamın ölümü halinde mal vârislerine iade edilir. Mal mûdamın kanuni temsilcisine de iade edilebilir.³⁸ Mûda vefat ederse vedâ mûdamın vârislerinin elinde emanet hükmündedir. Vedâ mûdiye iade edilir.³⁹ Vedâanın iade edileceği yer sözleşmenin yapıldığı ve malın teslim alındığı yer olmalıdır.⁴⁰

2. OSMANLI HUKUKUNDA VEDÂ AKDİ

Bu bölümde vedâanın muhafaza, bakım masrafları, tasarrufu, tazmini, teslim yeri ve kime teslim edilmesi meseleleriyle alakalı fetvalar ve ilgili meselelerin mahkeme karar örnekleri sunulacaktır.

2.1. Fetvalar ve Mahkeme Kararlarında Vedâanın Muhafaza Yeri

İslam hukukunda vedâanın muhafaza yeriyle alakalı “Hırz-ı misl” terimi Osmanlı dönemi fetvalarına ve mahkeme kararlarına yön vermektedir.

Örnek fetvada, mûdamın kendi malını korumadığı evde mûdamın malını muhafaza ederken malın çalınması durumunda mûda hırz-ı misl şartını yerine getirmediği için tazminle sorumlu tutulmaktadır: “Zeyd Amr’a şu kadar akçesini îda’ ve teslim ettikde meblağ-ı mezburu fûlan dârında (ev) hıfz eyle ahar darda hıfz eyleme deyü nehy etmişken Amr meblağ-ı mezburu ol darda hıfz etmeyüp Zeyd’in izninsiz min gayri zaruretini ol dardan hırzda dîn (düşük) olan ahar

³² Ebû'l-Hüseyn Ahmed b. Muhammed b. Ahmed b. Cafer el-Kudûrî, *el-Muhtasar*, thk. Kamil Muhammed Uveyda, Beyrut: Dâru'l-Kütübü'l-İlmiyye, 1997, s. 91; Aynî, *el-Binâye*, 7: 527; Yıldırım, “Vedâ”, *DİA*, 42: 598.

³³ Molla Hüsrev, *Dürerü'l-hükkâm*, 2: 247. “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 78; Yıldırım, “Vedâ”, *DİA*, 42: 598.

³⁴ Şîrâzî, *el-Mühezzeb*, 3: 181; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 10.

³⁵ Şâfiî, *el-Ümm*, 5: 693; Şîrbînî, *Muğni'l-Muhtâc*, 3: 108.

³⁶ Haddâd, *el-Cevheretü'n-Neyyira*, s. 608; Sahnûn, *el-Müdevvenetü'l-kübrâ*, 4: 438; Yıldırım, “Vedâ”, *DİA*, 42: 598.

³⁷ Haddâd, *el-Cevheretü'n-Neyyira*, s. 608; Yıldırım, “Vedâ”, *DİA*, 42: 598.

³⁸ Serahsî, *el-Mebsût*, 11: 130; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 11.

³⁹ “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 72.

⁴⁰ *Mecelle*, md. 797: “Vedâyı teslimde, mekân-ı îdâ' muteberdir.”; “Vedâ”, *el-Mevsuatu'l-fikhiyye*, 43: 39.

dara vaz (koymak) ettikde meblağ-ı mezbur sirka (çalınma) olunup zayi olsa Amr'a daman (tazmin) lazım olur mu? el-Cevab: Olur."⁴¹

Diğer bir fetva örneğinde ise vedîa hırsız tarafından çalındığı halde mûda hırz-ı misl şartını yerine getirdiği için tazminle sorumlu tutulmamaktadır: "*Hind bir bileziğini Amr'a îda' ve teslim ettikten sonra "Ol bileziği kesende hıfz eyle" deyip Amr dahi kesesinde hıfz eylemeyi kendi eşyasını hıfzettiği çuval içine koyup hıfz üzere iken Amr'ın teaddî ve taksîrinsiz bilezik çuval ile serika olunup zayi olsa Zeyd "Kavlime muhalefet etmiş olmakla teaddî etmiş olursun" deyu bileziği Amr'a tazmine kadir olur mu? el-Cevab: Olmaz.*"⁴²

Fetvalarda olduğu gibi mahkemede görülen davalarda da malın muhafaza yerinin hırz-ı misl olup olmaması verilen kararları belirlemektedir. Örneğin 1699 tarihli Konya mahkeme defterinde böyle bir hüküm bulunmaktadır. Davacı Fatma hatun komşusuna sandık içinde verdiği eşyalarının evde korunur halde iken gece vakti duvardan atlayan Mustafa isimli hırsız tarafından eşyalarının çalındığını ve hırsızın malları kendisine iade etmesi için mahkemede dava açmaktadır. Mahkeme, emanet mallar hırz-ı mislde korunduğu için ev sahibini tazminle sorumlu tutmamaktadır.⁴³

2.2. Fetvalar ve Mahkeme Kararlarında Vedîanın Bakım Masrafları

Mezhepler arasında, vedîanın bakımı için yapılan masrafların emanet veren tarafından karşılanacağı konusunda yukarıda zikri geçtiği üzere ittifak vardır. Fetvalar ve mahkeme kararlarında vedîaya yapılacak masraflarla alakalı örnekler bulunmaktadır.

Fetvalarda mûdan emanet aldığı vedîaya hakim kararı olmaksızın kendi malından yaptığı masrafları mûdiden tazmin edemeyeceği beyan edilmektedir: "*Zeyd kulu Amr'ı Bekir'e îda' ve teslim ettikten sonra Zeyd âhar diyara gidip gaib oldukda Bekir hakim izninsiz Amr'ı kendi malından bir müddet infak eylese Zeyd geldikde Bekir nafaka baha namına Zeyd'den nesne almağa kadir olur mu? el-Cevab: Olmaz.*"⁴⁴

⁴¹ Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, İstanbul: TBMM Kütüphanesi Eser No: 1927/841, 1894, 2: 99.

⁴² Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetâvâ*, haz. Kaya, Süleyman-vd., İstanbul: Klasik Yayınları, 2011, s. 511.

⁴³ "(...) Konya'da el-Hac Eymîr Mahallesi sakinelerinden bâisetü'l-kitab Fatıma bt. Ahmed nam hatun meclis-i şer'-i şerîf vâcibü't-teşrîfe mahmiye-i mezbure kazasına tabi Karaarslan nam karye sükkanından Mustafa b. el-Hac Mehmed nam kimesneyi ihzâr ve mahzarında üzerine dava ve takrîr-i kelim idüp tarih-i kitabdan tahminen beş ay mukaddem bağa çıktığımda yedimde mülküm olan eşyamdan bir kırmızı Şam alacası ve bazen al kutni ve bazen al boğası yeşil düğmeli bir zıbun ve bir beyaz Mısır peştemali (...)bir beyaz kelle puşimi bir sanduk içine koyup kilidleyüp konşum Osman Çelebi'nin menziline hıfz için îda' ve teslim eylediğimden sonra menzil-i mezburda mahfuza iken gece ile menzili merkumun duvarından aşılıp içeriye girülüp sanduğun kilidi açılıp içinden eşya-i mezburem sirka olunmuşidi hala eşya-i mezbureden işbu muayene olunan bazen al kutni ve bazen al boğası yeşil düğmeli bir zıbun ile bir beyaz Mısır peştemalimi merkum **Mustafa bey'a arz iderken yedinde buldum sual olunup eşya-i mezkurem alıverilmek matlubumdur deyüp zıbun ve peştemali ibraz eyledikde gibbe's-sual ve akîbe'l-inkar ve bade'l-istişhâd udül-i müsliminden mahalle-i mezburede sakinin Bekir b. Nebi Dede ve Marziye bt. Ahmed ve Fati bt. Mehmed nam kimesneler li-ecli'ş-şehâde meclis-i şer'a hazırun olup eserü'l-istişhâd fi'l-vâki işbu muayene olunan bazen al kutni ve bazen al boğası yeşil düğmeli bir zıbun ve bir beyaz Mısır peştemal müddeî merkume Fatıma hatunun mülküdür biz bu hususa şahidleriz şehâdet dahi ideriz deyu eda-i şehâdet-i şer'iyye eylediklerinde bade't-tadîl ve 't-tezkiye şehâdetleri makbule oldukdan sonra ve sair eşya-i mezkure dahi taleb olundukda mezbur Mustafa (...) bir zıbun ile bir peştemali bey'a arz eylediğimden mezbure ahz eyledi deyu bi't-tav' ikrar ve itiraf itmeğin mâriü'z-zikr zıbun ile peştemali aynı ile ve nâ mevcud olan sair eşya-i mezkurenin bade's-sübut kıymet-i misillerini müddeî merkumeye red ve teslime mezkur Mustafa'ya tenbîh.1699" Taşın, Mustafa Fırathan, 651 Numaralı Konya Şer'iyye Sicili (1096-1110/1685-1699) Değerlendirme ve Transkripsiyon, Konya: Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2019, s. 219.**

⁴⁴ Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetâvâ*, s. 514.

Ancak emanet malın masrafından onu satarak kurtulmak için de hakimden izin alınması gerekmektedir: “Zeyd bir re’s bargirini (beygir) hancı olan Amr’a îda’ ve teslim ettikten sonra birkaç gün mürurunda Zeyd gaib olup mekanı malum olmasa Amr bargiri emr-i hakimle misliyle bey’ edip semeni Zeyd için hıfza kadir olur mu? el-Cevab: Olur.”⁴⁵

1521 tarihli Üsküdar mahkemesindeki bir kayıтта, emanet olarak bırakılan keçi ve koyunun masraflarının karşılanması için izin alınmakta ve hayvanların nafakası için harcanacak miktar belirlenmektedir.⁴⁶

1649 tarihli Rumeli mahkemesindeki bir kayıтта ise emanet bırakılan iki katırın sahibi ortadan kaybolduğu ve nerede olduğu bilinmediği için kırk günlük bekleme süresince hayvanların masrafları için sahibinden alınmak üzere nafaka tayin edilmektedir. Kırk gün dolduktan sonra mahkeme, hayvanların hayvan pazarında açık artırma ile satılmasına ve paranın sahibi ortaya çıktığında ona iade edilmesine karar vermektedir.⁴⁷

2.3. Fetvalar ve Mahkeme Kararlarında Vedîanın Tasarrufu ve Tazmini

Vedîada sahibinin rıza göstermeyeceği bir tasarrufta bulunulması teaddî olarak kabul edilmektedir. Vedîanın mûdân teaddî veya kusuru sonucunda telef olması veya zarar görmesi halinde ise tazminin gerekeceği noktasında mezhepler ittifak etmiştir.

Fetvalarda, vedîanın sahibinden izinsiz bir şekilde tasarruf edilmesi ve sonucunda vedîanın telef olması halinde mûdân tazminle sorumlu olacağı beyan edilmektedir.

Fetvalarda, mûdân kendisine emanet bırakılan vedîayı mûdân kullanması,⁴⁸ mûdân zaruret olmaksızın başka bir kimseye emanet verdiği vedîanın zayi olması,⁴⁹ ödünç verdiği vedîanın

⁴⁵ Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetâvâ*, s. 514.

⁴⁶ “Karye-i Nerdübanlı’da Ahmed b. Abdullah’da bir dişi keçi ve bir koca katır emanet konulup sahibi gelmeyip koyan kimesnenin şeklini soran mezbur Hamza bilmediği sebebden ve hem üç aydan ziyade olduğu sebebden tayin ettiği vakt geçdiği sebebden yavacı olan Çavuş kânûn-ı pâdişâhî üzere taleb edicek âdemisi İskender’den emanet konuldu nafakası ve hıfzı için bir akçe tayin edip takdir olundu.1521” Üsküdar Mahkemesi 2 Numaralı Sicil (H. 924-927 / M. 1518-1521), haz. Günalan, Rifat-ı vd., İstanbul: İSAM Yayınları, 2010, s. 375.

⁴⁷ “Mahmiye-i İstanbul’da hala Süleymaniye Dârü’s-şifâsı’nda reis-i etibbâ olan Atazâde Ahmed Efendi tarafından bey’-i âti’l-beyana vekil olup vekaleti bi mâ hüve nehcü’s-sübût şer’an sabite olan Tabîb-i Sâlis es-Seyyid İbrahim Çelebi b. Meclis-i şer’de takrir-i kelam edip el-Hac Mehmed nam mükârî iki re’s katırını bin elli dokuz Saferi evâsıtında zikr olunan Süleymaniye Tabhanesi ahûrunda koyup kendi gaybet-i munkatî’a ile gaybet etmekle, zikr olunan tabhânenin mâl-ı meşkûd beytûlmâlî dârü’s-şifâsına mahsul kayd olmakla, müvekkilim mezbur Ahmed Efendi dahi ber-müceb-i kayd-ı meşrûh mâl-ı meşkûd beytûlmâl emini olması hasebiyle zikr olunan katırları kırk günden mütevaciz ve sahibine rücû’ şartıyla yevmî onar akçe nafaka nakd-i mefrûza ile infâk eylemiştir. Hala müddet-i örfiyyeleri tamam olmakla, sıyâneten li mâli’l-mâlik zikr olunan katırların bey’ olunmasına kibel-i şer’den izin taleb ederim dedikten sonra zikr olunan iki re’s katır gâib-i mezburun olduğu müddet-i örfiyyeleri dahi münkaziye olduğu hâkim-i muvakkî-i kitab huzurunda şer’an sabit olduktan sonra bey’a izin verip, zikr olunan katırlar sük-ı sultânîde bey’ men’ yezîd olunup rağabât-ı nas bi’l-küllîye munkatî’a olduktan sonra iki bin üç yüz akçe işbu hazır bi’l-meclis Musa Efendi b. İlyas’ın üzerinde karar edip ziyâde ile tâlib-i âhar olmadığı mütehakkık olduktan sonra hâkim-i muvakkî-i kitabdan bey’a emr-i şer’î sudûrundan sonra mezbur es-Seyyid İbrahim Çelebi zikr olunan katırları mezbur Musa Efendi’ye iki bin üç yüz râyic fi’l-vakt akçeye tarafeynden icâb ve kabulü hâvî bey’-i kat’î ile bey’ edip beytûlmâl emîni yedinden bi’t-tamam ahz u kabz ve tesellüm etmeğin, mâ vaka’a bi’t-taleb ketb olundu.1649”Rumeli Sadâreti Mahkemesi 80 Numaralı Sicil (H. 1057-1059/ M. 1647-1649), haz. Recep, Fuat-ı vd., İstanbul: İSAM Yayınları, 2011, s. 107.

⁴⁸ “Zeyd bargirini Amr’a îda’ ve teslim ettikten sonra Amr Zeyd’in izinsiz bargirini bir müddet isti’mal etmekle bargir zebun olup kıymetine noksan terettüb eylese Zeyd bargirin noksan kıymetini Amr’a tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Fezzullah Efendi, *Fetâvâ-yı Feyziye*, haz. Kaya, Süleyman, İstanbul: Klasik Yayınları, 2009, s. 342.

⁴⁹ “Zeyd Amr’ın kendüye îda’ ettiği şu kadar akçeyi Amr’ın izinsiz Bekir’i ecnebiyeye min gayri zaruretin îda’ ve teslim ettikten sonra meblağ-ı mezbur Bekir’in yedinde zayi olsa Zeyd’e daman lazım olur mu? el-Cevab: Olur.” Şeyhülislam Minkârizâde Yahya Efendi, *Fetâvâ-yı Yahya Efendi*, Londra: British Museum, No. 135, s. 238a.

zayı olması,⁵⁰ vedîayı birine karz (borç verme) etmesi,⁵¹ vedîayı mûdının alacaklısına vermesi,⁵² hakimden izin almaksızın vedîayı mûdının eşinin⁵³ veya anne-babasının⁵⁴ nafakasına vermesi, vedîayı mûdından başkasına teslim etmesi⁵⁵ ve mûdının vedîayı mûdiye teslimi mümkün iken teslim etmemesi⁵⁶ gibi durumlarda mûdının mûdiye karşı tazminle sorumlu olacağı beyan edilmektedir.

Fetvalarda, ayrıca mûdının, teaddî ve kusuru sonucunda vedîanın telef olması durumunda tazminle sorumlu olacağı; mûdının teaddî ve kusuru olmaksızın vedîanın telef olması durumunda tazminle sorumlu olmayacağı ifade edilmektedir: “Zeyd Amr’a emanet vaz ettiği eşyasını Amr’ın harik (ateş) ğâlîbi vukuunda menzili bağteten (aniden) muharrek oldukda eşyayı çıkaramayıp muharrek olsa Amr’a daman lazım olur mu? el-Cevab: Olmaz.”⁵⁷

Mahkeme kayıtlarında da aynı şekilde mûdının teaddîsi veya kusuru sonucu zayı olan vedîanın mûda tarafından tazmin edilmesine dair hükümler bulunmaktadır. 1670 tarihli Konya mahkemesinde böyle bir hüküm bulunmaktadır. Hakim kendisine emanet bırakılan kazanı teaddî yaparak telef eden Mustafa isimli şahsı vedîayı tazminle yükümlü tutmaktadır.⁵⁸

Telef olan malın tazmini, mal mislî ise misli ile; kıyemî ise kıymeti ile olur. Bu kuralın yürürlüğü mahkeme kararlarında da görülür. 1713 tarihli Antep mahkeme defterindeki bir kayıta bu ifadeler görülmektedir. Mahkemede kendisine emanet bırakılan mal ve nakid para

⁵⁰ “Zeyd Amr’ın kendide vedîa olan atını Amr’ın izninsiz binmek için Bekir’e iâre (ödünç verme) edüp Bekir dahi ata binip bir mahalle giderken at düşüp helak olsa Amr atını Zeyd’e tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, 2: 98.

⁵¹ “Zeyd şu kadar akçesini Amr’a îda’ ve teslim ettikten sonra Amr meblağ-ı mezburun bir miktarını fuzûlen ahara ikrâz ve teslim eylese Zeyd müciz (onay vermek) olmayıp ol miktarı Amr’a tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Fezzullah Efendi, *Fetavâ-yı Feyziye*, s. 341.

⁵² “Zeyd Amr’ın kendide vedîa olan şu kadar akçesini Amr’ın izninsiz Amr’ın dâini (alacaklı) Bekir’e deyni (borç) için def’ ve teslim ile istihlak eylese Amr müciz (onay vermek) olmayıp meblağ-ı mezburu Zeyd’e tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, 2: 98.

⁵³ “Zeyd Amr’dan vedîa aldığı şu kadar akçeyi Amr’ın izninsiz emr-i kadı yokken Amr’ın zevcesi Hind’in nafakasına sarf eylese Amr razı olmayıp meblağ-ı mezburu Zeyd’dan tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü’l-Fetâvâ*, s. 512.

⁵⁴ “Zeyd şu kadar akçesini Amr’a îda’ ve teslim ettikten sonra Zeyd ahar diyara gittikde Amr meblağ-ı merkumu Zeyd’in izninsiz emr-i kadı yokken Zeyd’in ebeveyninin nafakasına sarf eylese Zeyd geldikde meblağ-ı merkumu Amr’a tazmine kadir olur mu? el-Cevab: Olur.” Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, 2: 98.

⁵⁵ “Zeyd bargirini Amr ve Bekir’e îda’ ve teslim ettikten sonra Amr ve Bekir Zeyd’in izninsiz ol bargiri Zeyd’in menzinde zevcesi Hind’e def’u teslim edip ba’dehu Zeyd gelip bargiri kabzetmeden bargir helak oldukda hakim damanla hükmeylese hükmü nâfiz olur mu? el-Cevab: Olur.” Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü’l-Fetâvâ*, s. 511.

⁵⁶ “Zeyd devesini Amr’a îda’ ve teslim ettikten sonra deveyi Amr’dan talep ettikde Amr teslim mümkün iken teslim etmeyip teğallüben alıkoyup teslim etmeyip sonra deveyi kurt helak eylese Amr’a daman lazım olur mu? el-Cevab: Olur.” Şeyhülislam Minkârîzâde Yahya Efendi, *Fetavâ-yı Yahya Efendi*, s. 235a.

⁵⁷ Şeyhülislam Minkârîzâde Yahya Efendi, *Fetavâ-yı Yahya Efendi*, s. 238a; Diğer örnekler için bk. “Zeyd Amr’a îda’ ve teslim ettiği akçesinin bir miktarı Amr’ın teaddî ve taksirinsiz zayı olsa Amr’a daman lazım olur mu? el-Cevab: Olmaz.” a.e., s. 238a; “Zeyd bir bargirini Amr’a îda’ ettikde Amr zayı olursa daman olayım deyüp bade bargir Amr’ın teaddî ve taksirinsiz zayı olsa daman lazım olur mu? el-Cevab: Olmaz.” a.e., s. 235a.

⁵⁸ “Mahmiye-i Konya sakinlerinden Mehmed Beşe b. Mehmed meclis-i şer’-i hatîr-ı lâzîmü’t-tevkîrde râfi’ü’l-kitab Muslî Çelebi b. Hacı Esi mahzarında dava ve takrîr-i kelâm idüp **mukeddemâ mezbur Mustafa’ya dokuz vukıyye bir leğen ve bir kazgan emanet vaz eylemişdim hâlâ taleb iderim sual olunsun didikde gibbe’s-sual mezbur Mustafa cevabında bir leğen ve bir kazgan bana emanet vaz’ eyledi lakin zikr olunan leğen sakin olduğum evim içinde zayı oldu deyicek bi’t-taleb sâlifü’z-zikr leğen evi içinde zayı olduğuna ve âhara hibe ve bey’ eylemediğine ve bir vechle **teaddî eylediğine** mezbur Mustafa’ya yemin teklîf olundukda ol dahi alâ vefki’l-mesûl yemin-i billahi’l-azîm imteğîn **mârî’z-zikr kazganı mezbur Mehmed Beşe’ye teslim mezbur Mustafa’ya tenbih** bir le mâ-vaka’a bi’t-taleb ketb olundu 1670.” Küçük, Fatih, *14 Numaralı Konya Şer’iyye Sicili (1080-1081/1669-1670) (Değerlendirme ve Transkripsiyon)*, Konya: Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2013. s. 255.**

olmadığını söyleyen müdaya, iddianın doğruluğu şahitlerin şهادetiyle kesinleşince, eşyalar duruyorsa onların teslimi durmuyorsa kıymetlerinin tazmin edilmesi hükmü verilmektedir.⁵⁹

Telef olan malın emsali piyasada artık satılmaz hale gelmişse misli mal kıymeti üzerinden tazmin edilir. Osmanlı dönemi fetva mecmualarında konuyla alakalı fetvalar Ebu Yusuf'un görüşüne göre verilmektedir: “*Semeni (tedavüldeki para) cedit raic iken Zeyd Amr'a şu kadar semeni cedit îda ' ve teslim edüp badehu Amr semenleri masarîfina sarfla istihlak ettikten sonra semeni cedit kâsid olsa Zeyd yevm-i istihlak altun ya gümüşden kıymetini Amr'a tazmin etmek istedikde Amr vermeyip semeni cedit al demeye kadir olur mu? el-Cevab: Olmaz.*”⁶⁰ “*Semeni cedit raic iken Zeyd Amr'a şu kadar semeni cedit îda ' ve teslim edüp badehu Amr semenleri masarîfina sarfla istihlak ettikten sonra semeni cedit kâsid (geçersiz) olsa Zeyd yevm-i istihlak altun ya gümüşden olan kıymetlerini Amr'dan talep ettikde Amr vermeyip ol kadar semeni al demeye kadir olur mu? el-Cevab: Olmaz.*”⁶¹

Mecelle'nin 803. maddesi de Ebû Yusuf'un görüşüne göre düzenlenmiştir: “Vedîanın tazmini lâzım geldikde, misliyyâtan ise mislini, kıyemiyâtan ise, zamânı mucîb olan şeyin yevm-i vukûundaki kıymetini vermek lâzım gelir.”

Mûdan teaddîsi olmadan vedîanın telef olması durumunda müda tazminle sorumlu değildir. Böyle bir hüküm 1670 tarihli Konya mahkemesinde görülmektedir. Müdaya emanet bırakılan atın ölüm gerekçesi bilirkişi tarafından tespit edilmektedir. Müdan bu ölüm olayında herhangi bir teaddîsinin olmadığı kanaatine varılmaktadır. Hakim bilirkişinin görüşüne binaen müdaya tazmin kararı vermemektedir.⁶²

2.4. Fetvalar ve Mahkeme Kararlarında Vedîanın Teslim Yeri

Vedîanın iade edileceği yer sözleşmenin yapıldığı ve malın teslim alındığı yer olmalıdır. İslam hukukundaki bu görüş hem fetvalara⁶³ yansımış hem de mahkeme kararlarında görülmektedir.

⁵⁹ “*Fi'l-asl medîne-i Ayntabda Şehreküstü mahallesi sükkânından olub mahmiye-i İstanbulda mütemekkin Mehmed Hanîfi Ağa b. el-Hac Mehmed mahfil kazada Ali Kaya Beşe b. Hasan nam racil mahzarında üzerine davae takrîr-i kelâm edüb bundan akdem İstanbul'da mezbur Ali Kaya Beşeye alâ tarîki'l-emanet iki buçuk gurus kıymetli bir entari iki gurus ve üç gurus kıymetli bir çuka şalvar cem'an yüz gurus kıymetli eşya ve elli iki nakd gurus vermişdim hâlâ talep etdiğimde edâdan imtina eder sual olunub alıverilmek matlubumdur dedikde gibbe's-sual ve akibü'l-inkâr muma-ileyh Mehmed Hanîfi Ağadan müddeâsını mebniye beyyine talep olundukda udûl-i müsliminden es-Seyyid Abdullah Çelebi b. Mustafa ve es-Seyyid Ebubekir Çelebi b. Ahmed nam kimesneler li-ecli's-şehâde meclis-i şer'a hazîrân olub eserü'l-istihâd fi'l-vaki bundan akdem Mahmiye-i İstanbulda mumailiyh Mehmed Hanîfi Ağa bizim huzûrumuzda alâ tarîki'l-emâne iki buçuk gurus kıymetli bir alaca entari ve elli iki nakd gurus (...) ceman yüz gurus kıymetli eşya ve elli iki nakd gurus teslim eyledi biz bu hususa bu vech üzere şâhidleriz şehâdet dahi ederiz deyu herbiri edâ-i şehâdet-i şer'iyeye eylediklerinde bade riayeti şerâti'l-kabul şehâdetleri makbûle olmağın zikr olunan elli iki nakd gurus ile eşya-i mezkurenin aynı mevcud ise aynı aynı müstehleke ise eşya kıymeti olan yüz gurusu mumailiyh Mehmed Hanîfi Ağaya edâ ve teslime merkur Ali Kaya Beşe'ye tenbîh 1713.” Narinç, Ökkeş, 64 Numaralı Gaziantep Şer'iyeye Sicili'nin Transkripsiyonu ve Değerlendirilmesi, Kilis: Kilis 7 Aralık Üniversitesi Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2010, s. 126.*

⁶⁰ Şeyhülislam Minkârîzâde Yahya Efendi, *Fetâvâ-yı Yahya Efendi*, s. 236b.

⁶¹ Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, 2: 98.

⁶² “(...) Ahmed Ağa hacc-ı şerîfden gelirken mahmiye-i Konya'ya nüzûl buyurduklarında bir re's kır atını at depüp kır ayağı sakat olmağla bana emanet koyup gitmişidi bugün üçüncü gündür sâlifü'z-zikr kır at bi-emrillahi teâlâ helak oldu cânib-i şer'den üzerine varılıp keşf ve tahrîr olunması matlubumdur didikde savb-ı şer'den Mevlânâ Hızır Efendi tayin olunup ol dahi zeyl-i kitabda isimleri mestûr olan müslimîn ile zikr olunan kır ayağı sakat kır atın üzerine varılıp nazar eylediklerinde bi-emrillahi teâlâ helak olduğu takrîr olmağın mahallinde keşf ve tahrîr idüp badehu meclis-i şer'a gelüp haber virmeğın mâ-vaka'a bi't-taleb ketb olundu 1670.” Küçük, 14 Numaralı Konya Şer'iyeye Sicili (1080-1081/1669-1670) (Değerlendirme ve Transkripsiyon), s. 247.

⁶³ “Zeyd şu kadar eşyasını İstanbul'da Amr'ın dükkanında vedîaten vaz edip badehu ikisi dahi Edirne'ye gittiklerinde Zeyd Amr'a “Eşyamı Edirne'ye getir anda teslim eyle” deyu cebre kadir olur mu? el-Cevab:

“1861 tarihli sak mecmuasındaki bir kayıтта, Sivas’ta mûdaya verdiği vedîayı İstanbul’da teslim almak isteyen mûdın talebi, gayri meşru olduğu için davası mahkeme tarafından red edilmektedir.⁶⁴

2.5. Fetvalar ve Mahkeme Kararlarında Vedîanın İade Edileceği Kişiler

Vedîa mûdın bizzat kendisine iade edilmesi, mûdın ölümü halinde ise mûdın vârislerine veya kanuni temsilcisine iade edilmesi gerekir.

Fetvalarda mûdın vedîayı mûdıye teslim etmemesi halinde tazminle sorumlu olacağı ifade edilmektedir: “Zeyd bargirini Amr ve Bekir’e îda’ ve teslim ettikten sonra Amr ve Bekir Zeyd’in izninsiz ol bargiri Zeyd’in menziline zevcesi Hind’e def’u teslim edip ba’dehu Zeyd gelip bargiri kabzetmeden bargir helak oldukda hakim damanla hükmeylese hükmü nâfız olur mu? el-Cevab: Olur.”⁶⁵

Vedîanın mûdın bizzat kendisine iade edilmesi, ölümü halinde ise mûdın vârislerine veya kanuni temsilcisine iade edilmesi örnekleri mahkeme kayıtlarında da bulunmaktadır.

1638 tarihli Kayseri mahkemesindeki bir kayıтта, vedîanın mûdıye iade edilme (teslim) örneği bulunmaktadır.⁶⁶ 1715 tarihli Antep mahkemesindeki bir kayıтта ise, vedîanın mûdın kanuni temsilcisine (vasî-i muhtar) iade edilme örneği bulunmaktadır. Vasî-i muhtar, mûdın ölmeden

Olmaz.” Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetâvâ*, s. 509; “Zeyd bargirini Amr’a îda’ edüp kendi ahar diyara gittikten sonra Amr bargiri menziline bırakıp ol diyara varsa Zeyd Amr’a bargirimi bu diyara getir bana burda teslim eyle deyü cebre kadir olur mu? el-Cevab: Olmaz.” Şeyhülislam Minkârizâde Yahya Efendi, *Fetâvâ-yı Yahya Efendi*, s. 239b.

⁶⁴ “(...) fi'l-asl vilayeti Anadolu Sivas kazası ahalisinden olup el-yevm Âsîtâne-i âlide Sarı Nasuh mahallesinde Titab hamamında (...)kâhdâr olan Muhammed Ağa b. Abdullah nam kimesne mahfil-i şer'iyede kaza-i mezkur ahalisinden olup bu defa der-Aliyye'ye gelmiş olan bâsü'l-ılam Veliyyüddin b. Ahmed nam kimesne müvâcehesinde ben bin ikiyüz filan senesi recebi'l-garra evasıtında kaza-i mezkurda malımdan mezbur Veliyyüddin'e üç vukiyye bir nuhas (bakır)kazgan ve iki vukiyye üç aded tencere maa kapağı îda' ve teslim ve kaza-i mezkurda vakı menziline hıfz etmek üzere emreylediğimde ol dahi yedimden ber vech-i meşruh isti'da' ve tesellüm ve kabz ve badehu bana red ve teslim etmeyüp halen kaza-i mezkurede menziline mahfuz ise de evânî-i (kap-kacak) nuhâsiye-i muharrare-i (yazılı) mezkureyi kaza-i mezkurdan Âsîtâne-i aliyyeye götürüp aynen bana red ve teslim etmek üzere mezbur Veliyyüddin'e kibel-i şer'den cebr ve tenbîh olunmak muradımdır deyü dava ettikte ol dahi cevabında müddei mezbur Muhammed Ağa malı olan evânî-i nuhâsiye-i muharrare-i mezkureyi kaza-i merkurda vakı menziline hıfz etmek üzere bana teslim edüp binaen aleyh menzil-i mezkurede mevcut ve mahfuzdur yine kaza-i mezkurede kendüye aynen ve tamamen red ve teslim ederim dedikte bu surette müdeî-i mezbur Muhammed Ağa'nın evânî-i nuhâsiye-i muharrare-i mezkureyi mahalli tesliminden gayri mahalde talebi gayr-i meşru idiği müddei mezbur Muhammed Ağa'ya tefhim ve mucebince mârû'z-zıkr cebr davasıyla mezbur Veliyyüddin'e bi vech-i şer'î muârazadan bade'l-men' evânî-i nuhâsiye-i muharrare-i mezkureyi kaza-i merkurda müddei mezbur Muhammed Ağa'ya aynen ve tamamen red ve teslimi şer'an iktiza eylediği dahi mezbur Veliyyüddin'e tefhim olunduğu bi'l-iltimas huzuru âlilerine ilam olundu el-emru li men lehü'l-emr.” Mehmet Aziz Çavuşzâde, *Dürrü's-Sukûk* İstanbul: yy, 1861, 2: 174.

⁶⁵ Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetâvâ*, s. 511.

⁶⁶ “Mahmiye-i Kayseriyye mahallâtından Kebe İlyas Mahallesi sakinelerinden Şihzade bt. Himmet nam hatun kendi tarafından asalaten ve li-ebeveyn kız karındaşı Fatıma nam sağireye canib-i şer'den vasî nasb olunduğu cihetden vesayeten meclis-i şer'de el-Hac Yusuf b. Balı nam kimesne mahzarında üzerine takrîr-i dava idüp li-ebeveyn er karındaşım Mustafa asker ile çıkub âhar-ı diyara gidüp lakin babamızın muhallelâfâtından bana ve sağire-i mezbureye ve merkur Mustafa'ya intikal iden yedi aded kilim ve iki çuval ve bir çul ve bir köhne kilim ve iki (...) ve bir tencere ve bir küçük sehen ve on beş gurus mezbur Yusuf'a emanet vaz' olunmuşdu el-hâlet-û hâzihî bu cümleden benim hissemi asaleten ve sağire-i mezburenin hissesini vesayeten mezbur Mustafa'nın hissesini emaneten bana teslim olunmak taleb iderim dedikte gibbe's-sual mezbur el-Hac Yusuf eşya-i mezbure ve meblağ-ı merkume vech-i meşruh üzere kendüye emanet vaz' olunduğun tav'an ikrâr idüp ikrâr-ı mucebiyle eşya-i mezbureyi mesfure Şihzade'ye teslimi tenbîh olunduktan sonra mezbur el-Hac Yusuf meblağ-ı mezburu vesair eşya-i merkumeyi meclis-i şer'de müddeî-i mesfureye teslim idüp ol-dahi asaleten ve vesayeten ve emaneten ahz ve kabz itmeğin mâ hüve'l-vaki gibbe't-taleb ketb olundu 1638.” Üstün, Bayram, 41/2 Numaralı Kayseri Şer'iyeye Sicili (H.1048/M.1638-1639)Transkripsiyon ve Değerlendirme, Kayseri: Erciyes Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2009. s. 318.

önce kendisi adına tasarrufta bulunma yetkisi verdiği kişidir. Yetkilendiren kişi (mûdî) öldükten sonra vasî-i muhtar onun adına mûdada bulunan vedîayı teslim almaktadır.⁶⁷

Mûdan yanında bulunan vedîa vefat etmesi halinde vârislerine intikal eder ve bu mallar vârislerin elinde emanet hükümlerine tabidir. Vârisler vedîayı mûdiye iade ederler. 1861 tarihli sak mecmuasında vârise geçen vedîanın mûdiye iade edilme örneği bulunmaktadır.⁶⁸

SONUÇ

Bu çalışmada, İslam hukukunda emanet akidleri arasında yer alan vedîa akdi, fıkıh mezheplerinin farklı görüşleri dikkate alınarak ve Osmanlı dönemi fetva mecmuaları ile mahkeme kararları üzerinden incelenmiştir.

Mezhepler arasında ihtilafli olan akdin kuruluşu, vedîanın ekonomik değerinin düşmemesine yönelik tedbirler ve vedîanın tazminini gerektiren kusurlu davranışla akdin bozulup bozulmaması meseleleri dışındaki vedîa akdi konularında mezhepler aynı görüşü paylaşmaktadırlar.

Osmanlı yönetimi ülkede (mahkemelerde) hukuk birliğini sağlamak üzere 16. yüzyılın ortalarından itibaren Hanefî mezhebini resmi mezhep olarak kabul etmiş ve 1805 yılına kadar

⁶⁷ “Medine-i Ayntab’da Akyol mahallesi sükkânından iken **bundan akdem fevt olan Mehmed** ibni Çerkes Mehmedin vasî-i muhtarı olduğunu iddia iden işbu râfiu’l-kitab es-Seyyid Dede Bekir Ağa b. eş-Şeyh Mehmed meclis-i şer-i hatîr-ı lâzîmu’t-tevkîrde el-Hac Mehmed b. el-Hac Mehmed nam kimesne **mahzarında bi’l-vesaye üzerine dava ve takrîr-i kelâm idub müteveffâ-yı mezbur Mehmed’in merkur el-Hac Mehmed’de beş aded cellah tarağı emanet olmağla vesayetim hasebiyle taleb iderim sual olunub edâya tenbîh olumak matlubumdur** didikde gibbe’s-sual merkur el-Hac Mehmed cevabında müteveffâ-yı mezbur Mehmed’in kendide beş aded cellah tarağı emanet olduğunu ikrar ve lakin mûmâ-ileyh es-Seyyid Dede Bekir Ağayı vasî-i muhtâr itdiğini inkar itmeğin mezbur Seyyid Dede Bekir Ağadan müddeâsını mübeyyin beyyine taleb olundukda udûl-i müsliminden Mehmed b. Hamîs ve Ebubekir b. Abdulkadir nam kimesneler li-ecli’ş-şehâde meclis-i şer’â hâzîrân olub eserü’l-istişhâd fi’l-vâki müteveffâ-yı merkur **Mehmed fevtinden yedi gün mukaddem mezbur es-Seyyid Dede Bekir Ağayı bizim huzurumuzda vasî-i muhtar nasb ve tayin itdi biz bu hususa bu vech üzere şâhidleriz şehâdet dahi ideriz deyu her biri edâ-yı şehâdet-i şer’iyye eylediklerinde bade riâyet-i şerâti’l-kabul şehâdetleri makbule olmağın zikr olunan beş tarağı vasî-i mezbur Dede Bekir Ağaya edâ ve teslime tenbîh birle mâ-vakaa bi’t-taleb ketb olundu 1715.” Karaçağlayan, Naime Yüksel, 1714-1715 Tarihleri Arasında Gaziantep’te Sosyal, Siyasi ve İktisadi Yapı (65 Numaralı Gaziantep Şer’iyye Sicili Metin Transkripsiyonu ve Değerlendirilmesi), Kilis: Kilis 7 Aralık Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2011, s. 479.**

⁶⁸ “(...) **sahibe-i arzuhâl muarrefetü’z-zât Şerife Emine hanım bt. Talha kismet-i askeriyeye mahkemesinde meclis-i şer’i münirde mahrûse-i Galata’ya muzafe kasaba-i Beşiktaş’ta yeni mahallede sakin iken bundan akdem fevt olan devlet-i aliyye tebaasının rum milletinden Çukacı Anton veled-i Dimitri sulbi kebir oğlu ve hasran varisi olunup tereke-i vâfiyesinde müstagillen bi’l-verase vâzu’l-yed olan teba-i merkurmeden derun-ı arzuhâlde ismi mastur Yorgi muvacehesinde müteveffâ-yı merkur Anton yedine sağlığında bin iki yüz otuz beş senesi cumadi’l-uhurasının on birinci günü mahalle-i mezburede vaki menziline malından li-ecli’l-hfz mecmûu zir mahbûb altın olarak üç bin guruş ida’ ve teslim eylediğimde ol dahi ber vech-i muharrer isti’da’ ve tesellüm ve kabz ettikten sonra meblağ-ı merkur üç bin guruşu bana red ve teslim etmeyüp bi-gayri hakkın kendi umuruna sarfla istihlâk edüp hatta müteveffâ-i merkur Anton veled-i Dimitri sağlığında meblağ-ı merkur üç bin guruşu zimmetinde bi-tarîki’d-daman bana deyni olduğunu mahzar-ı şuhudda ikrar ve itiraf dahi etmişken kable’t-tazmin fevt olmakla meblağ-ı merkur üç bin guruşu merkur Yorgi’nin bi’l-verase vâzî’l-yed olduğu babası ve murisi müteveffâ-i merkurun tereke-i vâfiyesinden olarak halen ve damanen bana edâ ve teslime merkur Yorgi’ye tenbîh olunmak muradımdır deyü dava ettikde ol dahi cevabında babası ve murisi ve müteveffâ-i merkurun tereke-i vâfiyesine bi’l-verase vaz-ı yedini ikrar mâ adâ müdde-i mezburenin ber vech-i muharrer müddeâsını inkar etmekle müdde-i mezbure Şerife Emine hanım ber minvâl-i muharrer müddeâsını lede’t-tezkîye udulleri zâhire fûlan b. fûlan b. fûlan nam kimesneler şehadetleriyle bi’l-muvâcehe ber nehc-i şer’i bade’l-isbat ve’l-hulf muccebince meblağ-ı merkur üç bin guruşu müteveffâ-i merkurun tereke-i vâfiyesinden olmak üzere müdde-i mezbure Şerife Emine hanıma halen ve teslime merkur Yorgi’ye tenbîh olunduğu huzur-u âlilerine ilam olundu. el-emru li men lehü’l-emr.” Çavuşzâde, Dürri’s-Sukûk, 2: 175.**

bazı bölgelerdeki mahkemelere Hanefî kadının yanında Şâfiî nâib ataması da yapmaya devam etmiştir. 1805 yılından itibaren ise Hanefî kadıların yanına diğer mezheplerden nâib atamasını durdurmuştur. Aynı şekilde yerleşim yerlerine atanan müftülere de Hanefî mezhebinin sahih görüşlerine göre fetva vermeleri emredilmiştir.

Osmanlı fetva mecmualarında vedâ akdinin temel maddeleriyle alakalı birçok fetva örneği bulunmaktadır. Bu çalışmada, mahkeme kayıtlarına yansıyan vedianın muhafazası, bakım masrafları, tasarrufu, tazmini, teslim yeri ve vedianın iadesi (geri teslim) ile alakalı davalar yer almaktadır. Çalışmada vedâ akdiyle alakalı bütün fetva örnekleri burada zikredilmedi. Sadece mahkemelere yansıyan davalarla alakalı fetva örnekleri alındı. Böylece zikri geçen meselelerle ilgili mahkeme kararlarının fetvalara uygun olup olmadığı görmek mümkün hale geldi.

Sonuç olarak Osmanlı mahkemelerinde vedâ akdiyle alakalı alınan kararların, Hanefî mezhebi görüşlerini yansıtan fetva mecmualarındaki fetvalara mutabık olduğunu söylemek mümkündür.

KAYNAKÇA

- Aktan, Hamza, “Emanet”, *DİA*, İstanbul: TDV Yayınları, 1995, 11: (83-84).
- Aybakan, Bilal, “Teberru”, *DİA*, İstanbul: TDV Yayınları, 2011, 40: (215-216).
- Aydın, Mehmet Akif, *Osmanlı Hukuku Devlet-i Aliyye'nin Temeli*, Ankara: Türkiye Diyanet Vakfı, 2020.
- Aynî, Ebû Muhammed Bedreddin Mahmud b. Ahmed b. Musa, *el-Binâye fî şerhi'l-Hidâye*, Beyrut: Dâru'l-Fikr, 1990.
- Bardakoğlu, Ali, *İslam'da İnanç İbadet ve Günlük Yaşayış Ansiklopedisi*, İstanbul: Marmara Üniversitesi İlahiyat Fakültesi Vakfı Yayınları, 2006.
- Bilmen, Ömer Nasûhî, *Hukuk-ı İslâmiyye ve Istılâhâtı Fikhiyye Kâmusu*, İstanbul: Bilmen Yayınları, 1976.
- Çavuşzâde, Mehmet Aziz, *Dürrü's-Sukûk*, İstanbul: yy, 1861.
- Halebî, İbrahim b. Muhammed b. İbrahim, *Mülteka'l-Ebhur*, thk. Vehbî Süleyman el-Ulbânî byy.: yy, 1986.
- Haddâd, Ebu Bekir, *el-Cevheretü'n-Neyyira*, www.al-mostafa.com
- İbn Âbidîn, Muhammed Emîn b. Ömer b. Abdilazîz el-Hüseynî ed-Dımaşkî, *Reddü'l-muhtâr ale'd-Dürri'l-muhtâr*, Riyad: Dâru Âlemi'l-Kütüb, 2003.
- İbn Manzûr, Muhammed b. Mükerrrem *Lisânü'l-'Arab*, nşr. Abdullah Ali el-Kebîr, “vd'a”, Kahire: Dâru'l-Maârif, ts.
- İbn Rüşd, Ebü'l-Velîd Muhammed b. Ahmed b. Muhammed, *Bidâyetü'l-müctehid ve nihâyetü'l-muktesid*, Beyrut: Daru'l-Kütübü'l-İlmiyye, 2007.
- Karaçaglayan, Naime Yüksel, *1714-1715 Tarihleri Arasında Gaziantep'te Sosyal, Siyasi ve İktisadi Yapı (65 Numaralı Gaziantep Şer'iyye Sicili Metin Transkripsiyonu ve Değerlendirilmesi)*, Kilis: Kilis 7 Aralık Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2011.
- Kudûrî, Ebû'l-Hüseyn Ahmed b. Muhammed b. Ahmed b. Cafer, *el-Muhtasar*, thk. Kamil Muhammed Uveyda, Beyrut: Dâru'l-Kütübü'l-İlmiyye, 1997.



- Küçük, Fatih, *14 Numaralı Konya Şer'iyeye Sicili (1080-1081/1669-1670) (Değerlendirme ve Transkripsiyon)*, Konya: Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2013.
- Mergînânî, Ebû'l-Hasan Burhânüddîn Ali b. Ebî Bekr b. Abdilcelil, *el-Hidâye şerhu Bidâyeti'l-mübtedî*, thk. Muhammed Adnan Derviş, Beyrut: Dâru'l-Erkâm, ty.
- Molla Hüsrev, *Dürerü'l-hükkâm fi şerhi Ğureri'l-ahkâm*, İstanbul: Mir Muhammed Kütüphanesi, 1890.
- Narinç, Ökkeş. *64 Numaralı Gaziantep Şer'iyeye Sicili'nin Transkripsiyonu ve Değerlendirilmesi*, Kilis: Kilis 7 Aralık Üniversitesi Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2010.
- Rumeli Sadâreti Mahkemesi 80 Numaralı Sicil (H. 1057-1059/M. 1647-1649)*, haz. Fuat Recep-Rasim Erol, İstanbul: İSAM Yayınları, 2011.
- Sahnûn, b. Abdisselâm b. Said et-Tenûhî, *el-Müdevvenetü'l-kübrâ*, Beyrut: Darü'l-Kütübü'l-İlmiyye, 1994.
- Serahsî, Şemsü'l-Eimme Ebû Sehl Ebû Bekir Muhammed b. Ahmed, *el-Mebsût*, Beyrut: Dâru'l-Marife, ts.
- Şafîî, Muhammed b. İdris, *el-Ümm*, thk. Rıfat Fevzi Abdulmuttalib, byy.: Darü'l-Vefâ, 2001.
- Şeyhülislam Çatalcalı Ali Efendi, *Fetavâ-yı Ali Efendi*, İstanbul, TBMM Kütüphanesi Eser No: 1927/841, 1894.
- Şeyhülislam Feyzullah Efendi, *Fetavâ-yı Feyziye*, haz. Süleyman Kaya, İstanbul: Klasik Yayınları, 2009.
- Şeyhülislam Minkârizâde Yahya Efendi, *Fetavâ-yı Yahya Efendi*, Londra: British Museum, No. 135.
- Şeyhülislam Yenişehirli Abdullah Efendi, *Behcetü'l-Fetavâ*, haz. Süleyman Kaya-Betül Angın-Zeynep Trabzonlu-Asuman Erkan, İstanbul: Klasik Yayınları, 2011.
- Şîrâzî, Ebû İshak Cemalüddîn İbrahim b. Ali b. Yusuf, *el-Mühezzeb fi fikhî'l-imam eş-Şafîî*, Beyrut: Dâru'l-Kütübü'l-İlmiyye, 1995.
- Şîrbînî, Muhammed b. Ahmed el-Hatîb, *Muğni'l-Muhtâc ilâ ma'rifeti meânî elfâzi'l-Minhâc*, Beyrut: Dâru'l-Marife, 1997.
- Taşın, Mustafa Fırathan, *651 Numaralı Konya Şer'iyeye Sicili (1096-1110/1685-1699) Değerlendirme ve Transkripsiyon*, Konya: Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2019.
- Üsküdar Mahkemesi 2 Numaralı Sicil (H. 924-927/M. 1518-1521)*, haz. Rıfat Günalan-Vildan Kemal-Özlem Altıntop-Hatice Ayyıldız Bahadır, İstanbul: İSAM Yayınları, 2010.
- Üstün, Bayram, *41/2 Numaralı Kayseri Şer'iyeye Sicili (H. 1048/M.1638-1639)Transkripsiyon ve Değerlendirme*, Kayseri: Erciyes Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, 2009.
- “Vedâ”, *el-Mevsuatu'l-fikhiyye*, Kuveyt: Vizâretü'l-Evkaf ve'ş-Şuûni'l-İslâmiyye, 2005, 43: (5-88).
- Yıldırım, Mustafa, “vedâ”, *DİA*, İstanbul: TDV Yayınları, 2012, 42: (596-598).
- Zeyla'î, Fahrüddin Osman b. Ali b. Mihcen, *Tebyînü'l-hakâik şerhu Kenzi'd-dekâik*, Bulak: Matbaatü'l-Kübrâ el-Emîriyye, 1896.



LOOK AT THE FLOW OF SOCIAL AND ECONOMIC REFORMS IN CONTEMPORARY IRANIAN HISTORY

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ABSTRACT

The flow of social and economic reforms from the Qajar period was started by Amir Kabir, leading to the desired result. In Iran, after the revolution, the reform flow with Sayed Mohammad Khatami began to work, in fact, it can be said that this stream was developed. Political foot in a path that was not news of economic development. The dialogue of civilizations was given by Sayed Mohammad Khatami Sayed Reform He stayed in oil, or in another language, the economy of the nightmare of the Iranian economy continued to take place. The party was considered a manifest of a manifest of the purpose and strategy of the party's thinking strategy, but in general was not published in society that different classes of society in the field of social and economic movements of the party, which themselves as the weakness is in this way. After passing through the presidency of Ahmadinejad and on the emergence of the Governor's government, the flow of reforms to realize this was entered into negotiations with the United States so that he might be able to break forty-year sanctions of the Islamic Revolution. Born was born with birth of new blood in the veins of reform. But with the arrival of Republicans in the United States and the withdrawal of Tramp from the present and the new sanctions of the Iranian economy in its darkest time. The path was open for the continued revolutionary slogans, but their realization was not clear. Even some of the reformists today seek to capture a new manifesto that can lead to new and salvation by new work, they can be said that the goals of this manifesto are issues that all the country toward today's civilization. Political or economically approaching the peaks of success, but what is noteworthy is the wrong policies of the country or their incorrect implementation, either false or semi-dimensioned. Turned into a bright flow. For certain reasons, it has more political approach and political discourse, in order to make an economic discourse that is certain if political and economic development will not be done with each other, and our evidence of the failure of the reform process in contemporary Iran.

Keywords: Iran, social-cultural and economic reforms, political parties, development and growth, reform process, contemporary Iranian history, political discourse.

INTRODUCTION

The reform of political developments is based on the process of peaceful and peaceful changes in society in order to achieve balance and resolve the illustrations, correct the errors and stop social abuse, prevent political crisis, and movements. Ahead in social engineering. The reforms are from political transformation. In this regard, the political transformation has been made in many definitions. For example, it has been shown that the reform is referred to as calm, peaceful, and gradual changes in society. Or that reforms are improved, the system is part of the situation in a moderate and gradual way in political, social and social life. In other definitions, this after the political transformation has been said that reforms mean the creation of beneficial changes in evolutionary manner and illness that aims to achieve balance and resolve the illustrations, correcting the errors and stop social abuse and prevent social crises. Political is implemented. Some definitions on the reform of social dimensions of this aspect of political transformation. In this regard, reforms are considered to be better and better structured



and planned to be planned to society. Such conditions are possible on the definition of reform by critique of the situation and finding the methods of leaving bottlenecks. In this regard, in another definition, it has been said that reforms are nothing but rationalization of the natural environment that is adopted in its process of problematic mechanisms and progressive movements in social engineering.

Reformation in Iran has a different concept with a general concept of reformism. Reformation in Iran is closely linked to the conservative branch, and if we want to compare the Iranian concept framework with its historical concept, we should read it as new conservatism. Iranian reformation is often gradual in situations, but its difference with the concept of reformation that the Social Democrats initially founded the basis that Iranian reformism is not fundamentally involved in fundamental changes and prioritized cultural changes to gradual economic and political changes. . Proving this claim is a record that presents the history of reform in Iran. Reforming is not a political party; An intellectual flow that begins after the Iranian and Russian wars and the failure of Iran and continues until today.

HISTORY OF REFORMIST STREAMS IN CONTEMPORARY IRAN

The efforts made since Shah Abbas 1 (1629-1589) and reformed by him was a follow-up change that stabilized the status quo, and this was the first conservative demand. These gradual changes, although they had a growth and development aspect, but were not fundamental. Other examples of other reformals in Iran, such as Abbas Mirza and Mirza Taghi Khan Amir Kabir, can not be nothing but non-cultural and cultural reforms, and gradually. At the time of Fathi Shah under the environmental and defeat of Iran in wars with Russia, the necessity of fundamental changes in the The defense organization felt and the new way of defense based on the teachings and western equipment gradually questioned the dominant system of arms and the country based on ethnic and tribal neuroticism and the traditional hierarchy. Fath Ali Shah has also made attempts to remove the distance between the government and the scholars, such as building mosques and new religious places to take advantage of the scholars as the legitimacy of its government. The reforms during this period, albeit on the government, but did not even review the same Qajar preliminary bureaucracy. Even if Reza Shaham called Iran's largest reformist, he eventually displays different reforms with Bernstein's view. It seems that this reform is rooted in the eastern central culture. In the book of political development barriers in Iran, according to Hussein Bashiriya, is discussed in detail in the defeat of reformalism. These cultural roots are a new concept structure for reform in Iran. In Iran, perhaps the only one who was familiar with the ideas of genuine reform, and its efforts were largely in line with gradual and fundamental changes, Mohammad Mossadegh. Of course, many Mossadegh analysts consider conservative, however, in lieu The transformation of the Constitutional Revolution has grown and was aware of the consequences of such revolutionism to the Social Democrats. Many times were spoken in the disadvantages of revolution and breaking down structures, and perhaps Mossadegh was the first to establish the concept of reform in Iran in modern form and its Bernstein. In the Fatemi memoir book, it was quoted at the time of Mossadegh, my mind. But, however, his tendency toward social-democratic ideas, as well as the Cold War between the two poles of the ideology, has led to reformation with the involvement of Western governments and also the provocations of the Soviet Union, and in the coup of August 28, 1332, this tendency is generally removed by conservatives. After that again, the concept of reformist in the 40s of the 40s was raised by Mohammad Reza Pahlavi. He also failed to make a major change in Iranian political and social structures, like his father. Cultural and economic changes were not so much that its fundamental structures were changed; Therefore, the Shah, which has failed reform, decides to



take these structures with a program called the White Revolution or the Revolution of the Shah and the people. (Rezakhli, 2007: p. 46).

Reforming streams in Iran are contemplated by 5 historical periods:

1- First course: Safavids: Shah Abbas

The efforts made since Shah Abbas 1 (1629-1589) and reformed by him was a follow-up change that stabilized the status quo, and this was the first conservative demand. These gradual changes, although they had a growth and development aspect, but were not fundamental. Other examples of other reforms in Iran, such as Abbas Mirza and Mirza Taghi Khan Amir Kabir, can not find anything other than non-fundamental and cultural and gradual reforms.

2- Secondary period: The Qajar period of Patrimonialism: (Representative of Farahani and Mirzatqi Khan Amirkabir)

As it was said, the first period of reforms against Qajar Patrimonialism and specifically emerged in the constitutional movement. Of course, the reform flow was able to emerge in Iran, but considerably before the constitutional movement in Iran's political and social environment. Therefore, it can be said that the first wave of reform began initially from the era of Abbas Mirza, when its syndrome revealed during the Iranian wars. Mirza was the fourth son of Fati Ali Shah, who was the prince with suffering and brave who was able to make possible rasters. Show considerably in the wars of Iran and Russia. Mirza's wars during the first war of Iran and Russia showed that nomadic forces are not working against mobile artillery, hence their contemporary reformist in the Ottoman Empire, Soltan Salim III Walked the New Ottoman system in Azerbaijan in Azerbaijan Made While printing many books, he built a doctrine for military and engineering guide books in Tabriz, and required them to know about scientific courses and learn the mapping and learning foreign languages. He deployed brokers to Russia to new professions Learn. With the possession of Cardan and Fighting, Mohammad Khan Amir System, Mirza Taghi Khan Farahani (Amir Kabir), Mirza Great Farahani and his son, Qa'im, Mirza Sadegh, and Mirza Sadeghi, did not move action. Also, the rights of court stop stopped pensions and wolf, and to prevent the religious resurrection that Soltan Salim was abandoned, he won the clergy's fatwa in agreement with the new system. (Rezakli, 2007: p. 56).

The second wave of Qajar reform during the kingdom of Mohammed Shah and in the minister's actions with his adequacy of depths. The deputy is the leading approach and attitude of reform and a kind of governance in Iran in Iran. The manner that later continued by people like Amir Kabir and Mossadegh. (Rezakli, 2007: p. 46).

The third wave of Qajar reform was followed by Naser al-Din Shah, known as Mirza Taghi Khan Farahani, known as Amir Kabir. Amir Kabir's reforms began slightly after his arrival, and until the end of his honest honesty continued. In fact, Amir Kabir's actions, the basis of a major part of the civil and administrative reform after his era. (Admine, 1354: 56) Amir With an emphasis on the necessity of the authority of the central government on the monarchy axis and the transformation of power structure in the service of social security and public prosperity, the Great found the form of a new form of monarchy, some of their historians called Menor's tyranny. (Subject to 96) In such a political system, people become a nation with certain social and political rights (Rezagli, 2007) in such a political system. He pointed to his action in the establishment of a Dar al-Fonong school, the publication of the newspaper of the events, addressing the financial situation, social reform, the authority of the army, the reform of foreign policy, religious reforms and religious reforms, and security. Amir Kabir even intended to change in the political system and waiting for the opportunity to deploy the convenient, but they do not give up. The continued reforms of Amir Kabir have followed some other qualifications such as Mirza Hossein Khan Sepahtal, Mirza Ali Khan Amin al-Dawlah and Mirza Ali Khan

Amin al-Sultan. (Rezaghi, 2007: p. 34). The wave of the reform of the Qajar time reform after the Mozaffar al-Din Shah, and during the constitutional revolution, the period of this period of Iranian political history, which led to the constitutional revolution, the fields of, structural, political had wake up and wake up. The most important component in the structural areas of this era's reforms, in the way of the monarchy of Nasser-al-Din Shah, the existence of despotism and the people of the people of Nasser-al-Din Shah's rule of the political and social reforms of this era, both to the plan of political thoughts, and the value of values, such as: equals, Freedom, lawpiracy and humanism returned from the political elite and the patrol, such as Amir Kabir and Mirza Hossein Khan Qazvini followed. The intellectual field of reforms. Jamal al-Din Assad Abadi, the speeches of Seyed Jamal Baez, Malek al-Malcolm, newspapers, faces, faculty, wisdom and Mullah Nasruddin. These works have thought to be significantly influential on the reform of these days. However, these areas led to the constitutional revolution to take reforms of the Qajar era. (Zarin Kub, 1375: 184), in this way, the real wave of reform in the Qajar era was constituted in the revolution. Therefore, this should be acknowledged that the constitutional movement of political politicalism was the entry of modern thoughts to Iran, which are based on liberalism, democracy, democracy, The rationality, law, separation of power, constitution, secularism and policy-making religion and religious institutions. (Zarin Kub, 1375: 186).

The verdict of Farahani and Mirazatqi Khan Amir Kabir were aware and lack of ethnic nervous, who tried to refine the social political system of Iran, relying on the developments in the contemporary world, and showed its action in the cultural and intellectual arena. Terry from the concept of modernity. The effort of Vafa Amir Kabir spent strong government development, a government that restores order throughout the country, providing social and economic reform. Political reform, reconstruction and renewal of the Army, sending a group of specialist workers to Europe to learn new weapons production technology. Reinforcement of the Davani Organization, replacing the number of rulers, preventing illegal taxes, reform the payment system, restrict the power of the scholars in the judiciary and ... economic reform, the establishment of national industries, the establishment of factories, the construction of the tax system, making new ways, and consequently. Faster communication between markets, foreign tax tax position to support domestic production growth. Social reforms, the establishment of the first science school called Darilson who provided European-style education, limiting the sources of scholars influence among people, such as teasing and set up the first Iranian journal called the events. The political reform of Amir Kabir noticed the rationalization of the fatherless bureaucracy and reducing the role of the Shah in political issues. In addressing the issue of renovation of Iran, Amir Kabir is referred to as the most important period in the process of modernization of Iran and consolidate government power. Amir Kabir reform was a reform of high and elitism, and so by stripping Amir Kabir vessels, the reform process was interrupted.

3- Third Course: First Pahlavi Reforms Against Patimial Pahlavi Pahlavi: (Reza Shah Pahlavi)

A: Reforms in the period of Reza Shah

Reza Shah, along with major changes in administrative, military and economic systems, changed the country's culture based on Western models. Establishing and expanding elemental, secondary and excellent schools and forced primary education, student deployment, men and women's clothing, the fight against clergy and the scoped areas and the struggle with many traditional beliefs and beliefs, including the fundamental changes in the country. To run. With the actions of Reza Shah tradition and modernism, Western and Iranian values were faced, and this controversy and the challenge in the form of a crisis have so far continued. Reforms in the time of Reza Khan, especially in social, administrative and economic areas, managed to strongly scatter the community and the Qajar era in a coherent coherent nation, which is more

coherent in the louble of cultural symbols such as flags, languages, line and cultural and nationalism It was objective and prosecuted. Properties of Renovation of the First Pahlavi (Reza Khan) .(Katouzian, 1994: p. 41).

- 1) Convert an Elly structure to the modern structure
- 2) The anti-intellectuals with religious forces in defense of political sovereignty
- 3) The presence of organized foreign countries in Iran
- 4) the presence of less clerical
- 5) The political rule of modernization

B: Mossadegh's regulation reform

The National Government of Mohammad Mossadegh was also in line with the public opinion of the community and independent of foreign powers and necessarily adheres to the implementation of democracy based on constitutional. Mossadegh considered the highest freedom pest on authoritarian authorities, which were the most important factor in deterrent to democracy. Mossadegh was considered the following principles for blowing the spirit of independence, freedom and democracy in the country. The negative balance and nationalization of the oil industry in contrast to positive balance, based on which it was thought that, as the southern oil of Britain, the North oil should also reach the Soviet Union. (Katouzian, 1371: p. 46).

- 1) Limit the power of the king or the precise monitoring of it
- 2) Reforming the Election Law.

In the economy sector, Mohammad Mossadegh was the implementation of an oil-free economy program, in spite of the Soviet Union and the United States, through the moderation of foreign trade and expanding domestic production. Mohammad Mossadegh never compromised the interests of Iran and the materials of oppressed masses with their aliens and mercenaries. The great tragedy of Mossadegh was that the massive energy of people did not control their constructive programs and did not guide the acceptable channels. (Katouzian, 1997: p. 46).

4- Fourth Course of Amendments in Pahlavi II: Mohammad Rezaz Shah

The goal of Mohammad Reza Pahlavi from economic, social and cultural reforms was in fact the creation of a society based on the Western capitalist system. Different institutions, especially education, group media and government bureaucracy in the fields of family, religion and economy, were all used in the direction of cultural secularization, which in the long run, accelerated to eliminate indigenous culture and promoting the surface aspects of Western culture, led to frustration and outbreath among the community. . The outcome of this reform was from the top that facilitated the process of forming the proletariat class without awareness and bourgeois class. The ultimate order of reform from above was the provision of political needs of the Shah's modern dictatorship, and also provides the necessary conditions for the expansion of bureaucracy to the parts of the country and strengthen the power of military forces.

5- Fifth period: post-revolution 1979: The third period of reform versus the ideological traditionalism after the Islamic Revolution: in the form of the second Movement of Khordad:

Islamist reform in Iran after the 1979 Islamic Revolution found another concept. In the first state of the revolution and then the Mahdi Bazargan government in the Free Election Abolhassan Bani Sadr received the presidency. He read the economy in France, claiming fundamental reforms, such as regaining power centers, from gradual removal of the Revolutionary Guards, the Revolutionary Courts and committees and their integration in other

government agencies, reduced the influence of clerics as well as the creation of a plan for the country's economic development and development. . Many believed that Bani Sadr was tendenced by Social Democrats through studying in France. After the overthrow of Bani Sadr, the conservatives and Iranian technocrats took the government. In this period, the rule was divided into two parts. Conservative group and other reformist group. The leftists were those who were close to groups such as the Islamic Revolution, as the MKO or the Organization of the People's People's Organization, and after the revolution were branched due to internal differences, and found new organizations, for example, the MKO of the Islamic Revolution with obvious socialist thoughts in the economy and due to their emphasis. The Islamic state was separated from the MKO. Meanwhile, among the clergy, the new ideas of reformation, although it became less fellows from other famous groups left. The militant clerics assembly was an example of these groups that the leftist supporters were considered among clerics (Fighting Clerical Assembly). . The political and social system of Iran in the 1370s showed some of the transitional syndrome to democracy. The students of the political sociology of this syndrome reminds the beginning of Iran's reforms in the contemporary and recent times. These reforms in the formation of structural fields, Economic, political, social, intellectual, and some waves of globalization. However, these areas, along with the neglect of fundamentalist discourse towards cultural and political issues, lead to the formation and emergence of reform flow And the reformist in Iran during the years 1384-1376, but in 1997, or 1998, in the presidential election, Seyyed Mohammad Khatami, with the official slogan of political reform, came up with a decisive majority. The reform government seeks to form civil society in Iran and dominate political participation in Iran. Freedom of the press, the modification of postgraduate studies, the formation of civil institutions, such as Islamic councils, was more favorable for gradual change. Protest of students in 2000 and the occurrence of murder organized by pressure groups, including the same crises. But the peak of government power reform was to obtain most of the seats of the House of Representatives during the sixth election of the Islamic Consultative Assembly. Meanwhile, one of the largest parties after the revolution was established, the Islamic Iranian Participation Front, the Front of Partnership was one of the most central leverage of Iranian civil society in the sovereignty of the state of reform, which led the largest partisan fraction with reformist approach in the sixth parliament. There is no significant changes in government changes due to the influence of tradition and conservatism in a major part of the state of reform and the majority of Iranian people, as well as the withdrawal of radical reformists from the circle of reforming and revolutionary radical approaches, and reforms failed to make structural changes in government and merely non-structural changes. Formed in the field of civil society and community. With the coming of the eleventh government, headed by Hassan Rouhani, which was supported by reformists, Iran's reformist movement entered a new stage of political life, and a large number of reformists returned to the state and political arena of the country. (Bahrami Moghaddam, 1398: p. 46).

A. Political Performance of Reform in post-revolution 1979:

The collection of fields and factors that were said to form the formation of reformation discourse. This discourse was an inevitable result of the Islamic Revolution, which opened the country's political space. At this stage of the life of the Islamic Revolution, the necessity of cultural, political, political and social development, the creation of political and social reforms, the creation of political and social openness, the process of aggregation of people's demands in new forms and sustainability, such as civil society, parties, tolerance, freedom Expression, freedom of post-expression, pluralism, legislation, quantitative and qualitative growth of press, press freedom and publications, holding political communities in colleges and level of the country, the plan of political discussions in the media, political participation, political development. Therefore, with the formation of discourse, natural reform seemed to be able to

pay their activities in the political life. For reform discourse, we can take a variety of activities. In such a way, this discourse was able to engage in intellectual, political, economic, cultural and diplomacy spectra. (Basiriyeh, 2009: p. 46).

B. ideological performance of reformists in post-revolution 1979:

Incidentally, some of the teachings in reformism were the impact of accepting Dr. Soroush and Dr. Benar. These two linears in the process of intellectual life were drawn to the bill and the expansion of the Shari'a and continued with political development. Some other teachings related to reformist flow, related to the research of the Board Strategic Research Center. In the scientific circle of Strategic Research Center, Saeed Hajjarian and Mohammad Reza Tajik and Khosrow Tehrani. Mohammad Khatami, President of the Republic of Reforms, chose Hajjarian as his security advisor. Mohammad Reza Tajik was influenced by the postmodern and thoughts of Michel Foucault. (Seyfzadeh, 2009: p. 46) The views of retardation and intellectuals in this discourse expressed the following statements: 1) Democratic relations and people are a whole human product and should not necessarily be enclosed within the framework of the semantic system and use, 2) The role of religion in the collapse of such relationships was a moral, normative, and justification role, explanation, interpretation and constraints, 3) the government is a customary matter, not a holy and religious rule, meaning that religion does not mean all arenas and sentences, 4) Many crises and turbulences in today's society are rooted in the head of the pyramid, 5) The religious system is based in the real arena and social action, as well as the Todiger of the home and politics of civil, lame., 6) The sovereignty has a dual character. It is always incompatible between democratic selective institutions and thorotic appointing institutions.

Another part of the intellectual and. The reformist discourse was focused on filling the gaps in the community. The gaps of the community were as follows:

1) The gap between tradition and modernism, 2) the gap between the clergy, 3) the gap between the sovereignty and the gap between religion and the public sepehr, 5) the gap between the subcultures and dominant cultures, 6) the gap between the masses and civil society, 7) The gap between revolutionary discourse and reform discourse, 8) the gap between the left-led led, 9) the gap between the social system and the political system. (Seifzadeh, 1368: p. 34)

It has been said that these gaps have led to an emphasis in the strategic research center on the thesis of revolution in the revolution. The remarkable point in the reformist discourse was that this discourse was utilizing mechanisms to strengthen their intellectual doctrines. The mechanisms available to strengthen intellectual doctrines were articulated in the form of the following strategies:

1) Strategy to build or construct dominant discourse, 2) Inhibition of floating slabs related to fluent discourse and their own implications against it, 3) the benefit of micro-physics of power and micro-ploky demands, 4) create homogeneous chains From Mutual Identities, 5) Intervention of Kinetic and Organizational Characteristics of Society, 6) Intervention of Oral Works, 7) Interest of Multilateral Determination Logic, 8) Organizing the Karnavalim Movement, 9) Radical Democracy Plan , 10) The creation of the association and holding political meetings and metrics, 11) acts of hegemony through civil society, 12) emphasizing the confiscation of discourse and personality, 13) the pregnant people of certain intellectuals, 14) acute protest characteristics. (Seifzadeh, 2009: p. 46)

C-The performance of two distinct political reformists in post-revolution 1979 :

The political performance of reformists can be evaluated in two separate periods. The first period of the reform began from the interval of 1376 until 1380 continued. The course resulted in the creation of a political outdoor. In this period, legislation was emphasized on law

enforcement, attempts to civil society, pluralism, tolerance, and strengthening legal participation institutions. (Akhavan Kazemi, 2004: 7) The remarkable point of reform in this period was that this period of life reform was Politically, the course was challenging and challenging. (Khatami, 2005: p. 46) It has been said that the flow of reforms in this period every 9 days has witnessed a crisis. Chain killings, university coy events, Hajjarian assassination, trial Gholam Hossein Karbaschi, Berlin Conference on the strike of teachers and the parliament of the syndrome of the chain crisis in this reform period. (Khatami, 1379: p. 46) We began the second round of 1380, and ended with the work of the government of Mahmoud Ahmadinejad in 2005. In the second round of reform, political performance was more rationalized and emphasized moderation and logicalism in behaviors. In this period, the moderate middle classes and all reformist layers are all-sided efforts through legal participation institutions for Made political and social decisions. But the professional and illegal interference of the tribes in the process of civilian institutions to undermine civil society stepped and all aspirations of the participation of the second election of June. In general, this part of the reform discourse, which was observed for freedom, in particular civil and political rights, did not occur. (sraeey Al-Qalam, 1380: p. 10)

D. The economic performance of reformists in post-revolution 1979:

From the positive points of the Khatami government during the two periods of reform, the uniformity of the exchange rate, the formation of currency storage, the reform of the tax system, the implementation of the foreign investment law, the creation of private banks and insurance, the development of provincial stocks, the establishment of the network Acceleration, and continue the economic adjustment policies of the state before. But the economic circulation of government during reforms, such as previous governments, was based on the rents and based on the pattern of drainism. This means that during the eight years of the presidency of Mohammad Khatami and the sovereign of reform discourse, in spite of the increase in government income from tax and export revenues, the main source of government was made from God's resources. In the meantime, one third of the oil income was invested in the oil industry. (Khatami Abrahamian, 1379: p. 66). The Khatami government has been told \$ 30 billion \$ 255 million, \$ 30 billion and \$ 302 million. Gross domestic product has reached 397 trillion and 304 billion rials since 76 to 83 trillion and 769 billion trillion and 304 billion rials. In general, the Khatami government's economic team failed to increase the power of people and the economic power of the community in spite of its promises, despite its promises, the power of people and the economic power of the community. Part of the failure of the economic plan was due to unpredictable management that the government suffered into mistakes. (Khatami Abrahamian, 1379: p. 56)

E- The cultural function of reformists in post-revolution 1979:

During the cultural activity of our reform discourse, we saw the publishing of books, press activity, freedom of expression. It has been that the press in the second period of reforms lost its impact and social values failed to manage properly, maybe that These values faced major challenges in society. In this discourse, cultural strategies had their own place. For example, in this discourse on peaceful, and low-cost methods, the formation of non-violence front, respect for the dignity of humans, the negation of any doubt, the negation of cultural invasion, negation of torture, assassination, intimidation, intervention in the private domain, legal observance Citizenship was emphasized by defending the main revolutionary and Islamic values, such as independence, freedom, equality and reluctance, and formation between religious rule and government religion. (Bashiri, 2004: p. 10)



CONCLUSION

The conceptuality and conceptuality of reforms, considering the assumptions for this flow, was said that reforms are nothing but the rationalization of the natural environment of the natural environment, which in its process of problematic mechanisms and forward movements in social engineering, It is adopted. On the background of reform in Iranian political history, Iran was said to be in five periods of Iran's history, against the Qajar Patrimonialism, and in the form of a constitutional movement, in front of Patimomial Pahlavi in the form of a national movement and against the assembly of the ideological traditionalism. From the Islamic Revolution in 1997, and in the form of the second Movement of June, the most reform syndrome against Qajar Patrimonialism in Abbas Mirza's correctional measures, Qaem Mirza, Amir Kabir and his constitutional constitution. In the same vein, the second round of reforms against Patimonialism and profile was found in the form of national movements and specifically in Mossadegh's actions. Subsequently, it was said that the third round of reforms in Iran was formed in the form of the second Movement of June and against the suspension of the ideological traditionalism after the revolution in 1997, in which the emergence of this round of reform, in fact, due to the lack of attention of the discourse of the principles There was a cultural, social and political development subjects. On the formation of reforms during the years 1376 to 1384, the fields such as structural, economic, social, political, intellectual, and the process of globalization were considered. According to the barriers to the Iranian political system in transition to democracy, in the theoretical form, it should be acknowledged that political reform is one of the tools for transition to democracy in Iran. The most important feature of reforms in Iran should be considered in its inadequacy. Manifestations in its reform in many periods of Iran's history, causes the institutional weakness of democratic procedures and reforms in the political system of this country and challenge the transition process to democracy. Has been seriously faced. On the other hand, it should be noted that in accepting the reforms of this far away from political history, the system of the Islamic Republic has been faced with several dense crises, although some of these crises were evident, especially since 1368. Some of these crises are the result of the pressure of the democratization process from within, which has been left over and more within the political system, and against some of the other crises or some of their funds, as a result of the pressure of the globalization process, The political system became clear. In general, democratization pressure from the inside and the globalization of globalization from the outside, which are associated with each other, have handed over and faced the Iranian political system with its own characteristics. These features should be summarized in the main features of the ideological government, the main characteristics of the reform movement and anti-reformist features of the rival discourse. However, given the existing crises and challenges, the most important strategies of the political system What is in transition to reform? It seems that the Iranian political system must require itself to accept the softness and components of transition to reform, which should be used in systems that have experienced the transition process. In this regard, the most important components of transitions are: the removal of the crisis of legitimacy or the crisis of ideology, the removal of the crisis of efficiency or efficiency, the elimination of the crisis of solidarity in the political elite or the ruling class, the removal of the crisis of domination of Vasila, and the elimination of the political participation crisis. It is natural that the political system will end up with the institutional dilemma of reform in their political system by eliminating the crises before the political system.

PERSIAN REFERENCES

- Abrahamian, Ervand, (1390), History of Modern Iran, translated by Mohammad Fattahizadeh, Tehran issued straw.



- Abrahamian, Ervand, (1390), Iran between two revolutions, Translation A. Rose, Mohammad Ibrahim Fattahizadeh Vlylayy, Tehran issued straw.
- Admieyt, Fereydoon. (1356). The notion of progress and the rule of law, not Tehran: Khwarizmi.
- Admieyt, Fereydoon. (1362). Amir Tehran, Iran: Khwarizmi
- Al-Ahmad, Jalale., (1357), serve and treason of the intellectuals, Khwarizmi publications.
- Al-Ahmad, Jalale, (1356), West rust, porch Publications, Second Edition.
- Al-Ahmad, Jalale, (1356), a three-year career, publishing porch, Third Edition.
- Bahrami Moghadam, Sajad., (1398), coalitions of political economy, foreign policy continuity and change Drparadaym Islamic Republic of Iran, the Islamic world Political Research Quarterly, Vol. IX, Number Three, Fall 1398, pp. 176-157.
- Bashiriyeh, Hossin. (1380), political sociology, Tehran: Ney Publications
- Bashiriyeh Hossin., (1382), obstacles to political development in Iran. The Tehran: Gam.
- Khatami, Mohammad, (1379), chosen words of the President's political development, economic development and security. Tehran: New Deal.
- Khatami, Mohammad, (1384), report of eight years of Khatami government's economic performance, the Iran newspaper (30)
- Rezagholi, Ali, (1398), the sociology of authoritarianism: a sociological analysis of Zahhak, Tehran: Reed Publishing, 1367.
- Rezagholi, Ali, (1398), sociology Nkhbhkshy vice president, Technology, Mossadegh: a sociological analysis of some of the historical roots of tyranny and backwardness
Rezagholi, Ali, (1398), in Iran, Tehran: Reed Publishing, 1377 (May 1398 published 44 was reached)
- sariohlgilm, Mahmoud (1380). Rationality and future development of Iran, Tehran: Center for Scientific Research and Middle East Strategic Studies.
- Seyfzadeh. Hossain (1388), modernization, development and political transformation, Tehran: Ghomes.
- Seyfzadeh. Hossein (1368), modernization and political change in Tehran: Publication Ambassador.
- Katouzian, Humayun (1371) certified and power struggle in Iran, translated by Ahmad religiosity, Tehran: Institute of Cultural Services expressive.
- Katouzian, Humayun (1372) certified and struggle for power, translation Farzaneh Taheri, Tehran: Publishing Center.
- Katouzian, Humayun (1373). Constitutional Political Economy of the end of the Pahlavi dynasty of Iran, Mohammad Reza Nafisi translation and K. Azizi, Tehran: Cente.
- Zarrinkoub, Abdul Hossain, (1338), two centuries of silence. Publisher immortal
- Zarrinkoub, Abdul Hossain, (1386), post-Islamic history of Iran. Publisher Amir Kbyr.chap XI



**RESOLUTION THE PROXY WAR OF THE COLD WAR IN THE MIDDLE EAST
OF THE ISLAMIC REPUBLIC OF IRAN AGAINST THE UNITED STATE
A CASE STUDY OF THE AFGHANISTAN CRISIS**

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ABSTRACT

After September 11, the Middle East, and especially Afghanistan, was at the center of the attention of the international community and especially the United States. The end of the Cold War and the collapse of the bipolar system did not mean to create regional peace. The main reason is the direct and indirect intervention of the United States, one of the areas in the center of these interventions is the Middle East and the crisis of Afghanistan. The US military attack on Afghanistan (2001) and the fall of the Taliban has led to a change in power balance in the region and increasing tensions in the relations between the Islamic Republic of Iran against the United States. The competition of the two countries to gain regional superiority, although they did not enter direct military conflict, have exploited the title of the opposite political ideology in the region as a tool for pursuing their own interests and regional allies. The two countries in the framework of a series of Naughty wars to spread sectarianism in poor countries in the region. The United States and Iran have long been engaged in regional influence in Iraq in Iraq. Which is more due to religious, geographic, historical and security differences and geopolitical competitions. This research was pursuing a descriptive-analytical method following the answer to the question of whether the Native War of the Cold War of the Middle East of the Islamic Republic of Iran against the United States in the form of nightstands in Afghanistan its influence on the security of the Middle East and hewable What is the explanation? The research hypothesis is that the Native War of the Cold War in the Middle East of the Islamic Republic of Iran against the United States was involved in a inebriation war, and through which they are increasing their influence and reducing rival influence. The findings of the research indicate that the government of the Islamic Republic of Iran (*sponsor*) has tried to increase the support of the Taliban (*follower*) and its influence in Afghanistan, in front of the United States, during the twenty-year wars with the destruction of the Taliban To reduce Iran's influence in this region, change the balance of power in their favor. But with the withdrawal of US troops and its allies, this balance has changed in favor of Iran, led to an increase in Iran's influence in this region and Afghanistan, and change the balance of power in their favor.

Key words: America, Iran, proxy Wars, the Afghan crisis, power balance, regional security, Fatemon's Lashkar.

SAYING THE QUESTION:

The US military invasion of the United States to Afghanistan (2001) and the balance of power in the region has led to tensions in the relations between Iran and Saudi Arabia. The competition of the two countries to gain regional superiority, although they have not entered into a direct military engagement cycle, but as a representative of opposite political ideology in the region, as a tool for pursue their own interests and regional allies. Have been exploited. Two countries in the framework of a series of Proxy Wars to spread sectarianism in weak countries in the region. Meanwhile, one of the issues that leads to tension in relations between the two countries.



The question of the Afghan civil war is. Whether the competition between Iran and the United States and Saudi Arabia in the crisis of Afghanistan can be explained in the form of conflict wars? The research hypothesis is that the two Iranian and Saudi governments in the United States were involved in the crisis in Afghanistan, and they are seeking to increase their influence and reduce rival penetration.

The Middle East(West Asia)as one of the strategic areas, due to geopolitical position, has energy reserves and economic benefits and civilization and ideological areas of the interaction between the interests and conflicts between global and regional powers, and each of the stakeholder actors and Impact attempts to manage the environment and rules in such a way that maximizing its interest in the region. Over the past four decades, one of the determinant and important parameters in the Middle East policy has been the relations between Iran and Saudi Arabia. Iran And Saudi Arabia has been a competitive relationship since the victory of the Islamic Revolution in Iran. With US military invasion of Afghanistan in 2001 years and the overthrow of the Taliban and the power of Hamid Karzai in Afghanistan's political structure and US policies The United States has led to a change in power balance between the two countries of Iran and the United States (Saudi Arabia) in the Middle East region and has provided the basis for increasing tension in relations between the two countries. Iran and Saudi competition in order to obtain regional superiority, although they have not entered the direct military conflict cycle, two countries represent two opposite political ideologies in the region, which used as a tool for pursuing the interests of regional allies and increase their influence and strength.

They conducted a set of honest wars to spread sectarianism in weak countries in the region. The competition of these two countries has become more complicated by increasing religious-ideological conflicts and structural tensions due to the claim of leadership of the Islamic world, which has overlapped geopolitical competition between the two countries. Shiite-Sunni opposite identity on foreign policy and relations between the two countries has the effect of the past, and the strategic outlook of the Middle East region has been drawn. Many experts and specialists in the field of Middle Eastern studies are called the competition between the two countries "the new Cold War of the Middle East." The best framework for understanding and understanding the policies of the Middle East is the Cold War between regional actors (government-non-governmental) that Iran and the United States of Saudi Arabia play prominent and important role. These two actors are not only involved in confrontation and military confrontation, the United States seeks to influence the internal structure of weak governments in the region. Instead of spending military competition, they are more likely to focus on domestic policies in the Middle East. The Cold War between the United States and Iran is one of the dimensions of the Cold War. (*Arnold Gause & Wiener, 2014*).

Afghanistan is one of its most important circles in terms of presence in the strategic environment of Iran. Afghanistan's strategic importance for Iran is very important. It can be said that after the 8-year-old Iraq war against Iran, one of the larger security problems in Iran by Afghanistan was formed during the Taliban rule. The presence of *NATO* and especially the United States in the eastern borders of Iran has raised the sensitivity of the borders of Iran and Afghanistan. The presence of US military in Afghanistan has followed the opportunities and threats for Iran's security, which the present article seeks to answer, a long-lasting year that the country of friend and neighboring Afghanistan, the pregnancy of different developments and engaging in conflict and Multiple conflicts. Perhaps in a preliminary look, it seems that the crisis of Afghanistan is merely domestic. But the impact of its effects on different layers of regional and the attention of the United Nations and large governments to this important country has turned the eastern neighbor of Iran into a strategic center at the regional surfaces and the scene of the international system. In this regard, this research tries to examine the competition



between Iran and Saudi Arabia in the Afghan crisis, according to the theory of the Proxy war. This research, using the theory of descriptive-analytical warriors, seeks to answer the question of whether the competition between Iran and America and its allies of Saudi Arabia in the crisis of Afghanistan can be explained and reviewed? The hypothesis of the research is that the two Iranian and Saudi governments in the Afghan crisis were involved in a non-war war, and through which they are increasing their influence and decreased rival penetration. The findings of the research indicate that the government of the Islamic Republic of Iran (supporters) has tried to support the government in the past government of *Hamid Karzai* and now the *Taliban* government (Follower). He preserves the help of the Taliban and its position and influence in the region Afghanistan increases against Saudi Arabia, with the fall of the Central Government of Ashraf Ghani and the help of Iran to the Taliban by supporting the opposition groups of the regime (according to the Iranian influence on the region, and change the balance of power in their favor.

LITERATURE AND RESEARCH

In the case of the proxy Wars of the Cold War, the Middle East, many books and articles have been written in Persian and English. We did not take place in the crisis of Afghanistan and the Nmental War of Iran and the United States and its allies, but in the case of case studied articles near research and among The works published in Persian can be addressed to the article by Dr. Mazarzadeh, Hamirra, Razavi, Hossein, (1397), transforming in unobtrusive wars during the cold postgrad period and its leaders for the field of international relations. The main argument of this article is that their own This war and the changes in this phenomenon in the post-cold era have made the ground for the emergence of conceptual and theoretical changes in the field of relations. The two courses show that the new Nucleaval war challenges many of the basic currents of international relations, including the effects of engagement caused by the conflict in the war, reducing the boundary between the inside and outside, and The levels of tolerant analysis noted that the diversity of approaches in the explanation of the proxy Wars shows how this phenomenon for the main theories of international relations, at least new in this pyramid, has provided a potential role for more richness. In another article by Ahmad Johnsiz, Saeed Paimohammad, as US Security Policy in Regional Crisis Management (1991-2015) and providing media approaches, the findings of the research indicate that the pattern of crisis management in dealing with regional developments and scanning Can be a function of the overall crisis management process in US foreign policy and security. United States to strengthen the hegemonic domination on regional security environments. In this connection, it can be used to leverage, a pre-attack warfare, coalition with NATO and regional actors and balance. In order to control Iran's activism and limit its policy area in West Asia, the United States will also use its own chaos strategy, such as allies of the region. Saudi Arabia uses. In another article by Alireza Alipour, the title of Iran and Saudi Arabia in the western region of Asia: A case study of the Syrian crisis, Ph.D. student of international relations, Tehran University of Tehran, says US military invasion of Iraq in Iraq (2003) and balance change Power in the region has led to stress in the relations between Iran and Saudi Arabia. The competition of two countries to gain regional superiority, although they have not entered the direct military conflict cycle, have exploited as an opposite political ideology representative in the region as a tool for pursuing its own interests and regional allies. Two countries in the framework of a series of Nababi wars to spread sectarianism in weak countries in the region. Meanwhile, one of the issues leading to tension in relations between the two countries has been the Syrian civil war. The author was looking to answer the question of whether the competition between Iran and Saudi Arabia in the Syrian crisis can be explained in the form of conflict wars? The hypothesis of the research is that the two Iranian and Saudi governments in the Syrian

crisis were involved in a disadvantage of a war, and through which they are increasing their influence and decreasing rival penetration. The findings of the research indicate that the government of the Islamic Republic of Iran (Hami) has tried to protect the Syrian government (Naib) of the help of helping party of Lebanon and increase its position and influence in the Shamat area vs. Saudi Arabia It seeks to reduce Iran's influence in this region with the collapse of Assad's regime and the breakdown of the ways of the help of Iran to the Hezbollah by supporting the opposition groups of the regime (according to Iran).

THEORETICAL FRAMEWORK: THE MODEL OF DANARES, HUGHES AND MAMFORD

Geopolitics is continuously in the stage of evolution and evolution, and the powers have a growth cycle, puberty and decline, and the change and transformation of governments along with war. The history of the state - the nation has always been violent and war. Governments have used war tools to secure political governance, legitimacy, interests and national goals. The war in its most general kind, although it has multiple definitions, but has a single and common concept. The war in the definite meaning of Webster's dictionary is defined as an announcement and the onset of armed conflict between governments or nations, but in the Dictionary of Oxford, it expands the definition of war, and every enemy and the activist of the living creatures and the struggle between the forces or the Including conflicting principles involving it, but in the meaning of the terms of Kalaseytes, one of the most prominent theorists of modern warfare; The war is a violent act that aims to enter the opponent to implement our demands, the war continues politics with another tool that not only has a military, US and Iran characteristics of diplomatic, psychology and economic characteristics.

In this research, the Cold War is considered to be the fourth dimension of the types of wars (internal-metric-ultra-state). This term was used by **Bernard Barov**, US financial and politician in 1947, and then repeatedly used by the famous American journalist Walter Lipman to refer to the international complexity and the deterioration of the relationship between the West and the former Soviet Union. In general, the Nanovation of Iran and America and its allies in Saudi Arabia in the East Asia region: A case study of the cold crisis is a state of seizure and hostility between countries or competing blocks, which, along with each side of policies to strengthen their strength and weaken the other side. It takes. Without a real or warm war. In recent years, many experts in the Middle East issues considered the competition between the two Iranian governments - the United States and its allies in Saudi Arabia as part of a major war in the Middle East region, both of which plays a significant role in exacerbating tensions and attitude of Shiite identity. They play and play the two countries of religious conflicts, but the main cause of stress in relations between the two countries is their competition for the superiority of the Middle East region. In this regard, specialists in Middle East issues have raised this competition in the form of "*Cold War*." The best framework for understanding and understanding the Middle East region's policies is the Cold War between regional (*state-non-governmental*), which Iran and the United States and its allies of Saudi Arabia play prominent and important. These two actors are not only involved in confrontation and military confrontation, the United States seeks to influence the internal structure of weak and weak state governments.

Instead of military competition, they are more likely to focus on domestic policies in the Middle East countries. Daniel Server considers this security puzzle in the Middle East as a Cold War. Arnold and Winner, with the investigation of US competition and the Soviet Union during the Cold War, believe that the Cold War has seven dimensions. The first dimension of the Cold War is ideology. America-



The Soviet disagrees had ideological differences, and the United States sought to create a free international system based on the values of democracy and free trade, and the Soviet Union was looking for a revolutionary ideology to create an utopia of communist, and this ideological difference was dominant on the stress relations between the two countries. The second dimension, which is the main core of the cold war, is diplomacy. With the end of the Second World War, the competition of the two countries in political, social and economic domains increased and the tension and hostility of the relations between the two countries. Except for a short-term stressful period, due to the increasing view between the two countries, any negotiation and agreement were virtually impossible. The third dimension is the role of alliances. Alliances played a major role during the Cold War in the competition between the two countries. Western alliances were formed against the eastern alliances, and the Western alliances represented democratic systems based on the multi-system system, a supporter of individual freedom and private property, and the eastern alliances represented focused and support systems of collective and participatory ownership.

The fourth dimension is the Cold War of Economics. During the Cold War, defense budgets increase the two countries, and they cost more in military, technology and weapons, and had less attention to welfare, education and health programs. Economic inflation and record were a serious consequence of the Cold War. In general, two superpowers were their economic costs in order to support ideology and issuing ideology to other countries, which seeks to fill the vacuum from the *Second World War*. The fifth dimension of the Cold War is the weapons race. During the Cold War, two superpowers were involved in competition for the best armed forces, a larger army and military technology, and in particular, two countries were involved in nuclear competition with each other. The sixth dimension of the Cold War is Proxy Wars. Safety wars are a method for competing powers to maintain or expand the region's control. During the Cold War of America and the Soviet Union with Supporting their supporters involved in the conflict. These conflict wars continuously changed the balance of power between two superpowers. Affectional wars are dangerous, because they tend to exacerbate conflicts for a long period of time, which causes instability of the logic and increases mutual panic, the seventh dimension of the Cold War to the American and Soviet interval Related "regional wars." While the conflict wars, the superpowers had the ability to achieve their goals indirectly, there are some direct military intervention that one of the superpowers or both of them intervened with their resources in these wars. (Arnold & Wiener, 2012: P367).

Therefore, according to Arnold and Winer's view, one of the dimensions of the Cold War is a fighter war. In this regard, this research seeks to explain the competition between the two countries of Iran and the United States and its allies in the Saudi region of Saudi Arabia. In the theoretical explanation of the NAB war, this kind of war is the conflict between the two countries that

None of them perform directly. In this war, opposition powers use a third-party government or non-governmental actors and mercenary soldiers as puppets. In the year 1964, **Karl Douich**, the conflict of two foreign power in third-party land on its domestic issues and the use of human resources, resources and land of the country, are instrumental to achieve foreign goals. Historically, **Bertiluners** in the Book of Military Intervention in the Internal Wars and **Patrick Raniz** in the Book of Civil War and Foreign Powers: Foreign intervention in the domestic wars defined the development of military intervention in the domestic conflicts of other countries. In recent years, there has been widespread research on unable wars. Safety war is as a missing ring in contemporary and security war studies. **Andrea Mumfard** raised the phrase about the conflict: at all times and places are exposed to analysis. (Mumford, 2013: p 1). Raised:

1- Apply asymmetric power is a central concept of war; That is, a patient should be under pressure to intervene and play alternatively. For example, if there are three A_B_C governments, and if the parties of the conflict and conflict of the B-C government if the government loses its military force and its territorial integrity in this conflict, then the government decided to reach the financial assistance and arms of the government. We conclude that the government is indirectly entered into conflict through the B state. The words of the Follower mean that the B government has entered the conflict and conflict, but if at the level of government power B is equal to A, the B state does not need to support material A, as a result of the asymmetric relationship as an essential criterion for the formation of a non-existence war. does not have.

2. He considers the other criterion for the conflict of interest. For example, the B-C government is in the war with each other, and the B government is more interested in government A policies than the state of C. Therefore, the government supports the state B, while their interests are different from each other. The interests of the government B are related to the state C and the interests of the state A related to the B government. But their interests are definitely consistent and consistent and can cooperate with each other about 30 years later, **Professor Grint of Hughes** in the enemy's enemy book of my enemy: Intelligence War in the International Policy (2014) attempts to define the concept of the conflict in his book. He conducted a non-governmental militant group who received direct help from a foreign power.

Hughes has raised three criteria for the formation of a new bread war:

- 1) Direct help including financial, educational, weapons, equipment, use of land support as a shelter, sending formal military forces to strengthen the publisher's forces (between Volt Hami.
- 2) The existence of a common enemy for supporters-Naib.
- 3) The existence of a sustainable relationship between the sponsor government - the non-cooperation of non-cooperation.

But after **Grint of Hughes - Mottfard** in the Proxy War Book (2013) conflict with the enemy through the third party that demands its strategic results. Definition (Mumford, 2013: P 11).. That has four compounds:

1. A government uses another government.
2. A non-government actor uses the government.
3. A non-government actor uses non-governmental actor.
4. A government uses non-government actor.

Mufard emphasized two features:

1. Conflict and conflicts should be shaped before external intervention.
2. Foreign intervention should be indirect.

All these definitions and the criteria of the Proxy war are faced with deficiencies from the viewpoint of **Daners, Hughes and Mu**. In this regard, this research uses the combination of these theories as theoretical framework. The combined model of the conflict is asymmetric relationship between support, which has direct dependence by helping the benefits of conflicts.

In addition to these criteria and indicators in the Proxy war, including:

1. Direct help.

- 2- Includes financial, educational, weapons, equipment, use of land supported as a shelter, sending official military forces to strengthen the Naib's forces (between Hami - Follower)
3. Connectivity of interest.
4. The benefits can be distinct and consistent, but should be compatible.
5. Sustainable relationships.
6. Asymmetric power.

Figure 1: A combined conceptual model of proxy wars¹

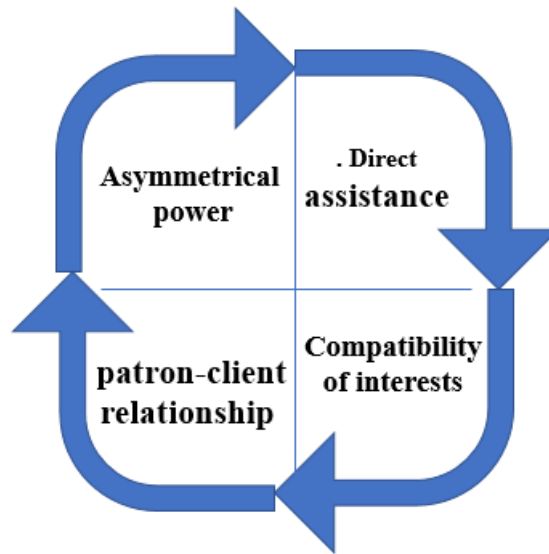


Figure 1: A combined conceptual model of proxy wars

HISTORY OF IRANIAN RELATIONS AND PROXY GROUPS:

The strategic requirements of the "Afghanistan" position have always been an important element in the decision-making of regional and transnational actors in the Middle East. Therefore, it can be said that the current "major strategic" game in Afghanistan will accelerate the Middle East and Strategic Future Equations and even areas around Iran.

Geography of the power and influence of actors and the multilateralism of the Afghan crisis creates us with this important, which should scenes the crisis of Afghanistan, the scene of the various policies and considerations of different governments and other beneficial currents, and in particular the two rival countries, the Islamic Republic of Iran, And the United States and the unified region of Saudi Arabia.

The Soviet Union attacked Afghanistan to turn Saudi Arabia to the most important financial and economic source of parties and Sunni groups, this process continued due to the Soviet

1. patron-client relationship ¹
 2. Direct assistance
 3. Compatibility of interests
 4. Asymmetrical power



departure in 1997 and the continuation of the Mujahedin battle with the Najibullah government. He reached the point where the war was grown and expanded among the jihadist parties, which should be considered as the reasons for the formation of the Taliban in 1994, which Saudi Arabia was the first state to recognize this group along with the Emirates and Pakistan. And guiding that payment. Inside the foreign policy of Saudi Arabia, the hidden combination of religious center of religion in the realm of the Islamic world is tied to the Sunni world and Islamic caliphate, which has been influenced by other Islamic groups and countries as well as regional relations. The recent events of Afghanistan and the dominates of the *Taliban group* on most districts and some provinces (about 220 cities and several provinces) indicate that the sensitivity and conditions of this eastern neighbor and this regional country are aggravated. The severity of the crisis in Afghanistan, the fall of the Central Government of Ashraf Ghani and the Taliban rule can be very critical to Iran, and for Saudi Arabia, as the first country that recognizes the Taliban and with its diverse layers, can The association is a special concept that its central point is a comparison, comparing the faces of the Houthis and Ansarullah in Yemen with Saudi Arabia and the conception of the confrontation between Taliban in Afghanistan. What is happening in the Afghan action scene reflects the bitter reality that if Iranian ruling staff with intelligence, rationality and adopting necessary and rapid measures to manage and control the crisis should be understood its dangerous consequences for the region and boundaries The east of its country, with regard to Saudi Arabia's influence in Afghanistan and the background of its relationship with the Taliban, can also be considered.

The ideas of Islamic dogmatism and fundamentalism should be considered the focal point in the dominant and dominant link between currents governing such as the Taliban and *Wahhabi* groups in Saudi Arabia, accepting different perspectives at different stages of Salafi, including Salafi, Salafi, belief, and also Operations also forms the continuity of this connection, which is a heterogeneous combination of thoughts of *Ahmad bin Hanbal*, *Ibn Timiyyah* and *Mohammad bin Abdulwhab*, whose action is practical in practice and deciding these currents based on apparent and sensualism. While these thoughts are the continuation of Saudi and Taliban currents.

Several field experiences have shown that trust in the Taliban will have a great error and complications and irreparable consequences, in spite of the familiarity and use of media tools such as laptops and smartphones, and even learn diplomatic customs over the last years, one It is one of the most extreme and violent groups that the possibility of acting in any action in the scene justifies and justifies it. The trend of violence and dangerous in three periods of this group (Mullah Mohammad Omar, Mullah Ehsanullah and the current command by the *Awakatullah Akhundzadeh*) also does not show the smallest positive change that the events of these Afghan days are indicative of it .

Saudi Arabia, in addition to having traditional influence on the Taliban, is also close to Pakistan as the father of this group of this group, but a question that is raised is why Saudi Arabia did not want to take effective steps in the Afghan peace path? The above question is that every response to our mind will notice the fact that in the event of continuity of long conflicts between Tehran and Riyadh in different regions, Saudi Arabia will be inclined to the instability and chaos in Afghanistan. And the territorial integrity of Iran exploits in the east of the country, and of course, there will be enough motivation, will and facilities.

With the work of the Taliban in Afghanistan, Iran's foreign policy entered a new stage. At a cross section, from the Afghan crisis, although Iran played an active role. But against the role of Pakistan was not working. The crisis of Afghanistan seeks for Soviet collapse and

Pakistan's decisive support from the Taliban entered a new stage. Pakistan was worried that Iran and Turkey develop their own business relations with Central Asia, and in the future, Iran

will turn into an important path to Central Asian trade to the Indian Ocean through Bandar Abbas, and in this way, the Karachi port of Pakistan. Another issue is Pakistan's need for central Asia and its transit gas in the country. Pakistan should dominate Afghanistan for its intended goals, because "country is part of the transit route. In this way, Pakistan took support for the Taliban, and eventually, with its financial and military support, the *Taliban* dominated all Afghanistan. At this point, Iran is the main supporter of the opposition for the Taliban and the coalition. Finally, the "Taliban collapse" created new opportunities for Iran in Afghanistan and removed from more important Iranian security threats in its neighborhood. After the fall of the Taliban, Iran continued to play an active role in the United Nations meeting, Louis Jirga continued. Iran, by encouraging Afghan groups to cooperate with another and cooperation with the United Nations and the Special Representative of the Secretary-General, as well as encouraging local commanders to play a role at the national level and strengthen their relationships for the central government, support Afghanistan's developments.

WILL AFGHANISTAN BECOME REGIONAL WARFARE SCENE?

Afghanistan has high-level borders and smuggling weapons in this country. Primary resources in this country are easy, but dramatic progress in providing weapons of the national resistance front or providing resources of a large attack requires targeted foreign support. Tajikistan is one of the possible ways that seems to have Russian support. Iran is also one of the possible resources of support. Tehran, due to concern over the influence of the Taliban control over Pakistani border and potential influence on the Taliban, may take advantage of the National Resistance Front and other paramilitary groups as forces to maintain their own interests and confront Islamabad. Undoubtedly, the Taliban is not the Iranian game, and if it is dominated by Afghanistan, it will be dangerous for Iran's national interests. *Taliban*, and, consequently, Turkey. A Taliban ideology, with the Salafi view of the political power that shows itself in the basic Islamic intellectual concept, instead of the concept of itself, will certainly be troublesome for Iran, and threatening national interests. Iran is, so the creation or support of a balanced force in Afghanistan is a political necessity! Iran should take place in Afghanistan, a principled and positive position in accordance with national interests and threats. If the policy of Steeli, it will definitely cost. From the time, the Afghan Square has provided an opportunity for Iran to maneuver the cultural element of Iran, and especially with Tajikistan. The reaction of internal public opinion of Iran and Persian speakers of Afghanistan and Tajik people to the adventure of Panjshir an appropriate occurrence and admitted to adoption on the boundaries of Iranian cultural, historic, provided that it should not be easily passed through the opportunity. And the element of Iranian culture, history of the region O we have been neglected for many years, when it is investing as a large capacity

CONCERNS FROM RUSSIA AND IRAN'S NEW WAR IN AFGHANISTAN

With the claim of Russian and Iranian relations with the Taliban, there is concern about the newest war in Afghanistan. By doing so, US troops may be affected in Afghanistan and Afghanistan will face a deep crisis. Moscow and Tehran emphasize that with the Taliban to secure security in the contact area, but to local and American officials who have already been tired of the two policies of Pakistan in Afghanistan, doubtful is. Iran is accused of being secretly with the Taliban. The government of Afghanistan and US forces have expressed concern. General John Nickel Son, from the general commanders of US forces in Afghanistan in recently, said Russia thinks that the Taliban are those who fight ISIS.



Nickel Son added, this obvious legitimacy to the Taliban who is given by Russia is not based on facts and somehow affects the efforts of the Afghan government and NATO. Nickel Son has said that about Iran is the same situation, between Iranians and the Taliban has been linked.

Mohammad Hanif Atarm Moscow and Tehran use relations with the Taliban for peace, not war

Mohammad Hanif, Atarm, Afghan National Security Advisor to launch a new Tehran and Moscow relations with the Taliban

"If the war is against ISIL or anti-Taliban war or war against other groups, it must be cooperating with the Afghan government in this war. Second, any kind of connection with the Taliban or other groups that are not for peace. In our opinion is nodes and friendship are not seen in it. "

Russia has formally provided Afghan military helicopters and equipped the Taliban simultaneously. A senior security official told the news agency to discover and record a large number of Russian weapons in front of Tajikistan and expressed concern over. A Taliban commander told Franspers that Russia's support helped them capture the city of Kunduz twice a year. The Taliban representatives have met several times with Russian officials in Tajikistan and Russia in recent months. Afghanistan's domestic minister spokesman Sediq Sadiqi said that no country should be contacted with malicious groups that Afghanistan's enemies are in contact.

BALANCE OF IRAN'S ACTIONS AND TRICKS IN AFGHANISTAN

By ending the involvement of the Shiite militias of Afghanistan and Pakistan in Syria against the ISIL group, their power and narratives that Iran planned by them for their mobilization will continue in South Asia and the Middle East in the coming years. This is especially true in Afghanistan and Mossadegh; Where the protective and strategic strategy of Iran and the years of calm to influence the Taliban and along with the Taliban in the military advances in insurgents have played a significant role in the past several years. **Ismail Qa'nini**, one of the senior military commanders in Iran, has traveled to Border Syria in late June to collect and judge a group of warriors. Usually, these types of trips and visits are not unusual, not and will not be. **Mr. Qa'nini**, commander of the Quds Corps, is the branch of the Islamic Revolutionary Guard Corps, which is the problem of external strategy and operations of these forces. Therefore, it is expected that he has been thought to travel to Syria for the coordination and efforts of Iran to preserve the regime. What was remarkable by **General Queeni's** trip was that he visited the **Fatemon Lashkar**. The **Fatemon's** division, the forces of Iran's support and blows, are soldiers and their infantry forces from Afghanistan and are mainly from the Shiite Hazaras in Afghanistan.

While **Fatemon's** military warriors are active in Syria, so far, they have been marginalized in Afghanistan and have not taken any actions in Afghanistan; But this process can also be changed. The **Fatemon's** division is a small but very powerful force with long-standing relations with Iran and the world and can be useful for Iranian and Iranian authorities; Because they always plan the policy of Afghanistan, especially if the Taliban continue to advantage its military advantage in Afghanistan. Iranian political leaders hosted Taliban talks and representatives of the Afghan government in Tehran. While Iran's foreign minister **Javad Zarif** used Afghanistan to celebrate the US withdrawal from Afghanistan, congratulated the US departure politicians and the world. He also warned that the continued wars and conflicts between Taliban fighters and the Afghan government will be costly. With the end of US military withdrawal from Afghanistan on August 31, Iranian politicians and politicians about the

approach and strategy of Afghanistan in Afghanistan are struggling with Afghanistan and the Afghan government. But they are faced with a tough set of decisions and decisions in Afghanistan, including how strong relations between their country with the Millennium Minority and the Hazara people in Afghanistan will balance Iran's diplomatic dance and diplomats with the Taliban and the Afghan government. However, the Fatemon's division is less and less likely in terms of number and capacity than the Taliban; But they can leverage influence for Iran. If the Taliban and the Afghan government eventually do not achieve a political agreement and responsibility, or if the massive and bloody civil wars occur in Afghanistan, the Taliban will continue to target the community and the people of Shiite millennium. If Afghan conflicts with the Hazara Shiites, who are mainly against the Taliban of Pashtun, have the role of sectarianism, in this regard, there will be significant hazards for Iran. If the history of wars and conflicts in Afghanistan, guiding and guidance, such scenarios can attract their attention to Iranian regional rivals, such as the United Arab Emirates and Saudi Arabia, which probably supported the Taliban in the past. In addition, the United States has previously shown that the United States is ready to use any means and facilities to examine threats against the interests of the United States in the region with recent revenge and retaliation attacks against Iran's support forces in Syria and Iraq. Slow down. In the following, the Iranian authorities will probably feel that they should step selves and prudent with the *Fatimon Lashkar* and the Taliban fighters.

THE EMERGENCE OF THE FATEMON LASHKAR

The links and communication of the Iranian Revolutionary Guard Corps with the Millennium of Afghanistan and Pakistan are rooted in the Iran-Iraq war. After the Iraqi attack by Saddam Hussein to Iran in September 1980, the revolutionary government of Iran considered this war for Shiites to prove and prove their faith. Many of the Shiites in Afghanistan responded positively by going to Iran, and they were under the education of the Islamic Revolutionary Guards of Iran. During the 1980s, Iran's efforts to deploy Afghan militias in several stages, renamed and reorganized reorganization. The Islamic Revolutionary Guard Corps, in addition to the training of Shiite warriors in Iran, deployed several officers as cultural and military advisers in Afghanistan; Where they had a warm and fat presence in the resistance movement and cells that were struggling with the occupation of the country by the Soviet Union.

After the withdrawal of the Soviet Union from Afghanistan, Afghan conflicts continued while different factions fought for and gain power. During the 1990s, Iran supported the Shiite groups of Sadat and the Northern Alliance in the fight against the Taliban. At that time, *General Qasem Soleimani* was one of the cadres of the Islamic Revolutionary Guard Corps, which participated in this struggle and struggles. Gen. Soleimani was commander of the Qur'an Corps in 1998, and until its killing in the US strike, the commander of the Quds Corps. Through these deep and long-standing links with the Shiite community of the Millennium and Sadat Afghanistan, Iran created the *Fatimon Lashkar* in 2012 as part of its widespread efforts to support the regime, the Syrian President, in combating armed insurgent forces. Under the supervision and command of *General Qasem Soleimani*, the Revolutionary Guards, foreign warriors of the Millennium and Sadat Afghanistan sent today for such purpose and goals to Syria. Also, called the sister slab, founded the Pakistani *Fatemon Lashkin, Lava Zinbyoun*. Thousands of foreign militants in Afghanistan, such as Sadat, *Sads and Pakistani Hazaras*, fought and died in these units and criminals to save the regime. In addition to their impact on the battlefields against ISIL terrorist group, the Fattom has been an important promotional asset for the Islamic Revolutionary Guard Corps, which to convince its voters and clients in the Shiite Sadat and Millennium in support of the Iranian government and policies It attempts. The announcement of courage, daring,



raster's and successes of Afghanistan's foreign warriors and the *Fatimon Lashkar* in Syria has played a key role in this campaign. The *Fatimon Lashkar* Promotion, with Iran's financial support, uses strategic narratives related to disputes in the conflicts and Sunni and Shiite interpretations of Islamic law and fair governance, causing concern among the Hazaras on the power of the Taliban and the forces of the Islamic State - ISIL-mainly Sunnis in Afghanistan And Syria. *General Qassem Soleimani*, the architect and the main star of Iran's promotional strategy. He was accustomed to register the front line with the Fatimon Lashkar and tell their heroes to the world and the world. Fatemon warriors and troops on YouTube and Twitter followed a significant number of social media; As long as both operating systems removed their media accounts. However, Fatemon is still active in other social media as a result of investing in Iran. However, they have thousands of followers in encrypted social networks such as telegram and Soroush under the control of the Iranian government, which they use to display their exploitation in the battlefields in Syria against the ISIL terrorist group. The warriors shared videos from the bloody war against ISIL in social media, which proved, this process is an effective tool for recruitment. Among those who joined this goal, a significant number of former soldiers were educated by American teachers in the Afghan National Army and Elite forces of Afghanistan's special operations.

Advertising of the Revolutionary Guards about the *Fatemon Lashkar* can have long implications. The Revolutionary Guards pushed sectarian narratives that may be hard and difficult in controlling their control, especially in relation to Afghanistan. In strengthening and supporting the soldiers and warriors of the *Fatemon*, the Revolutionary Guards has given the power to the network; While this network is strongly diagnosed and owed to Iran, but not completely under control of Iran. For the Iranian government, crisis management in Afghanistan is not so difficult, where the *Fatemon Lashkar* is an important and powerful political force. If the Taliban continues its attacks and aggressive and bloodshed operations for the purpose and targeting of the millennial communities, these attacks and operations will face dental and dangerous answers, which will no longer be compensable. In this case, Iranian authorities may be tempted to support the Fatimon warriors to help Iran to maintain their influence on the Hazara community and fight against the Taliban.

FUTURE OF FATEMON LASHKAR, STRATEGIES AND APPROACHES IN AFGHANISTAN

By ending the involvement of Shiite militias in Afghanistan and Pakistan in Syria against the ISIL group, their power and narratives that Iran planned through them for their mobilization will continue in South Asia and the Middle East to their organization and diplomacy. This is especially true in Afghanistan and Mossadegh; Where the protective and strategic strategy of Iran and the years of calm to influence the *Taliban* and along with the Taliban in the military advances in insurgents have played a significant role in the past several years. It should be seen and waited, whether the Iranian authorities can maintain their relationship with the *Fatimon Lashkar* warriors and Taliban fighters after the withdrawal of their joint enemy, the United States of America, from Afghanistan. There are many questions about whether *Ibrahim Risi*, the new president of Iran, can respond when Iran's influence on tens of thousands of Afghanistan in Afghanistan and across South Asia, who requested Tehran to join the Syrian war against ISIL near a decade ago Have given, to use; *Ibrahim Risi*, Iran's elected president, who promised to put Iran's economic revival, its main focus. Guidance and strategy of political results in Afghanistan, one of the largest Iranian business partners, and therefore this is an important and decisive part of the political calculations of Mr. Ibrahim Risi. There are increasing concerns that the victories and progress of the Taliban in the country in these days



can turn the rejuvenation of violent and bloody targeting on the Shiite Hazaras in Afghanistan. Also, it can follow the unwanted regional instability. However, there are obvious effects on Iranian sick economy. Recently, the authorities and officials of Iran and the media near the Islamic Revolutionary Guards Corps have argued and expressed that the Taliban has already changed. Therefore, false and the reality of these remarks should be passed if the Taliban have changed or not! But the Iranian approach to dealing with the Taliban and mainly the Taliban of Pashtun and Pashtounism will probably continue in the near future under the supervision of the President of the President. The game on all three parties from the main factions - Pro and supporters of the Taliban, Shiites of the Millennium and Elite, affiliated with the Kabul government, are likely to be strictly remarkable in Afghanistan; But it does not matter what Washington will take in the future. Different signals from Tehran come out about participation in Afghanistan, which can also be a sign of Iran's pragmatism and can also reflect the deeper gap between the principles with the great leader and critics of Iranian reformists of Ali Khamenei regime. The differences between devices, camps and covenations about Iran's participation and entertainment in Afghanistan have openly eroded in the Iranian press. For example, former Iranian diplomat *Seyyed Ali Khorramis* criticized the interactions of Ali Khamenei with the Taliban, saying that this would only encourage the Taliban to continue their aggressive and dominant attacks against Shiite Hazaras in Afghanistan. *Mr. Khorram* repeated other forms of Iranian reformists and reminded readers that the Taliban attacks on Iranian diplomats in the 1990s in Mazar-e Sharif, two countries in Afghanistan and Iran to the lips of the war between the two countries.

Considering that Iran has long introduced itself as the hero and supporter of the Shiite Hazaras in Afghanistan, the internal differences from the Taliban breeding by Iran show that Tehran's diplomatic inconsistencies with this group may be after The end of the withdrawal of the United States in this summer only leads to the legitimate marriage for the facility, which is easily comfortable. At the moment, how to play Iranian officials in Afghanistan, the game that should be waited and saw its results.

Mrs. Kennedy Rundo manages a television program called the future line in New Yes. He is also the master of the center of the consequences of war at Arizona State University. *Ms. Kendis* is 13 years old that covers Afghan war issues and works in the Washington Newspaper, the International Crisis Group and in the Cigar's Department or US Special Inspectorate in Afghanistan Reconstruction. *Amir Tomaj*, a non-US colleague in New York and the founder of a network called "Monitor Axis". Mystic Ammar, an independent researcher based in Washington, is essentially from Kabul of Afghanistan. He provides analyzes in the international crisis and the data base of armed conflict data on the controversy of Afghanistan.

PROXY WAR; TALIBAN AND FATIMON FIGHT AGAINST IRAN?

In Afghanistan, immediately after the death of *Qasim Soleimani*, the commander of the Qods Force of the Iranian Revolutionary Guard Corps in Iraq and the succession of *Ismail Qa'nini*, the commandment of the Quds Corps, has been raised whether the fire burned in Baghdad will take Kabul's skirt? Now the most important question is how does Iran respond to US attack? So far, the officials of the Islamic Republic have emphasized two points; One is "the response of military action is a military action" and "hard revenge is waiting for the United States." Political and security experts predict different cases that Iran will react to the United States based on them; Including the use of militant groups in a neibration war in the region. It is here that the concern of the government and the people of Afghanistan are drawn to the US and Iran's tension field.

However, many are worried that tensions between Iran and America are smoke in Afghanistan. The response of the Afghan government officials was in such a way as well as Normal. President **Mohammad Ashrahgini** told Iran that "Afghanistan will not be used against any country". Accept this speech Mr. Rich and its implementation is not easy. The United States has repeatedly what he asked. On the same day, killing Qassim Soleimani, the Central Command of the American-Central Forces in Twitter, "Flight and refueling the US Air Force Airlines in eastern Afghanistan, supports coalition and stability of the region covered by Central Command (Center). The field Covered by Centromo is more than the Middle East, indicating that US forces do not actually pay attention to the principle of declaration of the Afghan government.

WHY CAN IRAN AND TURKEY BE FORCED TO CONFRONT EACH OTHER?

In policy circles, it is often talked about the need to get the region from Iran. But the question is who leads this effort, because Iran and its representatives will not be separated from the Arab world without the involvement of an external force. Certainly, the United States does not want to commit another military campaign, especially in the Middle East. In these conditions, Turkey is the only power to deal with Iran. It may not happen sometime, but it is ultimately inevitable. On February 16, Turkish President Recep Tayyip Erdogan announced that his country will expand its border operations against these Kurdish militants in Iraq after killing 13 Turkish citizens by **PKK**. Erdogan said in a conversation with the supporters of the ruling party of the Justice and Development Party (AKP), "We will remain until we know in areas where we are essential for our security to prevent similar attacks in the future.

After the threat of Iraqi militants supported by Iran to attack the Turkish army in northern Iraq. Al-Naba's movement, a powerful Shiite militant group, also in Iraqi government security agencies, warned: "If the government continues silence, the Iraqi people and resistance will confront the occupiers and adopt a decisive position to repel them." The conflict of Turkey and Iran in northern Iraq will increase the cold war between the two countries in the region. Although Turkey and Iran seem to cooperate with each other, they are also inevitable, but the conflict between them is also inevitable, especially since Tehran has won the 40-year-old conflict with Saudi Arabia. While since 1979, Iran was in the development of its influence in the region, Saudi failed to carry out a lot of resistance. Now, although the Iranians see Turkey's way to the Arab world, the struggle of the two countries will affect the region for a long time, especially because the interests of the United States and Turkey overlap overlapping Iran's influence in the region.

Most observers continue to consider the main regional conflict in the Middle East in the Native War between Saudi Arabia and Iran, two countries known as Sunni and Shiite camps. Few people understood that the conflict ended about 5 years ago when the Iranian Syrian forces were supported by Aleppo from the rebels. Tehran, with victory in Syria, disappointed Saudis for the fall of Assad's government to undermine Iran's position. Shortly thereafter, Saudi Arabia and the United Arab Emirates failed to defeat the opposition forces supported by Tehran and under the guidance of the Houthis in Yemen. Ultimately, there is no surprise to say that the conflict of Saudi Arabia and Iran ended in favor of the Iranian side. For a long time, Arab countries suffer from an inherent and chronic weakness. Arab Spring rise in 2011 has created strategic vacuums in the region. Iran, who previously benefited from the US invasion of Iraq in 2003, was able to upgrade its regional position using the collapse process. Nevertheless, events have occurred long before the weakening of Arab tyranny countries, which ended in Iran. The first occurrence of a famous jihad phenomenon that has attracted a lot of attention since the September 11 attacks. The second and more important discussion is what I call it geology. This

Sunni and Shiite conflict is geopolitical in which these two sects behave as transnational identity camps. It is surprising that geographical sectarianism has been much less interested in spite of a long history. The background of this competition returns to the tenth century, when the central authority of the Sunnis, who has left most Muslim areas until then, was abandoned. The decline of the *Abbasian* caliphate resulted in the first wave of the Shiite geopolitical emergence. Several different Shiite governments, including the Fatimon Caliphate in North Africa, which expanded until dinner and the coastal region of the Hejaz in the Red Sea. The Government on the east coast of the Arabian and Zidid Peninsula in Yemen was also among other Shiite governments.

In the late eleventh century to the early thirteenth century, the Sunnis regained its position with the advent of the Seljuk Empire, the Aybian and Mamani Dynasty in Egypt and reduced Shiite power. This alteration of the balance of power between sectors, with the strategic weakening of the Sunni region, provided the ground for filling the vacuum. The fluctuation was between the age and the Shiite power and almost 500 years old. About five centuries, after that, the second wave of Shiite rehabilitation occurred with the advent of the Safavid Empire in 1501. The Safavids created an important challenge for both the great power of Sunnis of that time, the Ottomans in the Middle East and the Mongols in South Asia. About the late twentieth century, we once again witnessed Shiite revival with the emergence of the Islamic Republic. This is the last manifestation of geographic sectarianism because of intense competition within Sunnis. Iranians understand the unique moment in which they are well understood and do not intend to lose this historical opportunity. This aggressive behavior of Tehran, despite international sanctions that affected people's economy and well-being, has been an attempt to change the security structure of the region. Hence, Tehran's attempt to exploit three main occurrences of the region, the geographical sectarianism, jihadism and the collapse of the teens. These are not three scattered or independent issues. They interfere together and affect each other. The result of this triangular complex process has been that Iran's net strategic position in the region has been much better than Saudi Arabia.

The Houthi Movement has taken the sect of Saudi Arabia, what the representatives of Tehran in Bahrain, Iraq and Syria did not do. In fact, when the Arab Spring began, Iran had a good position to benefit from the cavity of the traditional powers of the region. Chaos then allowed Iran to expand their geopolitical footprint from the land of Al-Mesistani dinner to the Arabian Peninsula. This Yemen is a clear example. In spite of all these achievements, Iran faces limitations that limits the extent of its regional influence. What matters here is that there is no confrontation force in the Arab world that can outline Tehran from areas dominated by now. Iran, in the first place, has been able to make such a deep influence that there was nothing to prevent its actions. The rebellion in Syria was a major threat to Iranian strategic plans. Assad's overthrow was to create an important cavity in the area of continuous influence of Iran, which extends from the west of Zagros mountains to the Eastern Mediterranean. With the collapse of Assad Bridge, Iran's communication bridge was cut off to his main representative in the region, the Lebanese Hezbollah.

Therefore, Iranians made a lot of investment in their efforts to preserve the rule of Assad. Given that their intelligence and military abilities were very superior to Saudi Arabia, and the Syrian army was much more effective than insurgents, the Islamic Republic of Iran could overcome the immediate threat of rival factions. The main factor that was in the interest of Iran was that the Sunni regulations faced an internal difference more than before. The Saudis never had the monopoly of influence in the Arab world, and the resurrection in Syria led to the emergence of ISIL, a challenge that was much larger than al-Qaeda for the Saudis.



ISIS was able to exploit the divine conflict between Saudi Arabia and Iran. The Saudis supported the anti-Assad insurgency in Syria, in fact, it would be more in favor of ISIL. In contrast to its Iranian rivals, the Saudis had poor performance. Saudi Arabia alone could not manage this issue and always needed the UAE. Most importantly, Saudi Arabia also opposed Qatar. Riyadh has long been dissatisfied with the close relationships of Doha with Islamists such as Muslim Brotherhood and other very radical elements than this country. The Qatari itself does not have much challenge for the Saudis. Turkey saw the Arab Spring an opportunity to strengthen its position in the battle. For this purpose, Turkey is trying to use the Sunni Arab leadership crisis. The struggles within the Sunnis have changed sectarian developments. The conflict of Iran and Saudi Arabia has given the war between Iran and Turkey two historical rivals in the region. While Qatar is the only Arab ally of the two countries, the main tool of Ankara has always been the Muslim Brotherhood movement.

In the early years after the uprising of the Arab Spring, Turkey hoped that the Muslim Brotherhood emerged as the main option for Arab regimes. It was encouraging to reach the power of Tunisia and Egypt for Ankara. However, when the 2013 coup in Egypt overthrew the Brotherhood government within one year since its inception, this short-term optimism became Jasmine. Saudis and the Emirates, since they were unable to succeed in Iran in Syria, went to Turkey's efforts to expand his influence through the Brotherhood. In many ways, Turkey was not ready to take advantage of the Arab Spring on a regional scale, because it was close to a century that had left the political games of the Middle East. Since the collapse of the Ottoman Empire and until the emergence of the Erdogan regime, Turkey focused on becoming a Western power. When the Justice and Development Party of Erdogan came to power with the Islamist root, Turkey changed its foreign policy toward the Middle East. This change was as geopolitics as much as ideologically. Turkey realized that membership of the European Union who were looking for decades without success. In addition, membership in the European Union was no longer attractive to Ankara. Turkey was trying to introduce himself again as a regional power. Ankara has increasingly gone to unilateral foreign policy, and the region that can follow this agenda is the Middle East.

Although Turkey is the largest political, military and economic power in the Middle East, it faces many obstacles on the path to geopolitical recovery. Perhaps the most important on the domestic front, where the ruling justice and development party continues to face several challenges. Turkey's tendency toward autocracy has undermined the Justice and Development Party. In the last election of municipalities, the ruling party lost the control of the municipalities of the three main urban centers. In addition, after years of economic growth under the rule of the Justice and Development Party, the Turkish economy is declining. Meanwhile, the long-term separatist problem of Turkey is pushed in terms of domestic politics and foreign policy. Turkey's policies in Syria are in conflict with the United States and Russia. Even if these internal factors restrict Turkey's desire to have a large position, this country cannot prevent conflicts on its southern margin. At present, the country has been around 3 million refugees in Syria. There is concern that the ever-increasing influence of the Syrian Kurds can forgive the domestic Kurdish movement, especially after the ethnic minority group played the main role in destroying the ISIL caliphate.

In addition, ISIL has weakened, but generally did not destroy, and Salafi-jihadi groups are still dominating regional province. It is now necessary; Turkey will increase its military footprint in Syria. Of course, the first goal involves restricting the autonomy of Syrian Kurds. Ankara is currently supporting various insurgent factions to turn them into a coherent force. Finally, it should not be forgotten that Turkey will want to change the nature of the Syrian government. Although Iran saved Assad from the rebels, Syria is a decomposition. President Bashar al-Assad seems to be the leader of the largest coalition of militants than the leader of the PHC. This status



is not stable and Iranians lack the alternative option. Meanwhile, Turkey is determined to fill the growing vacuum of their southern borders. The last time Iran and Turkey were involved in geopolitical competition, they control the Turks of Iraq and Syria. The current situation is an unprecedented return. Therefore, Iranians are looking for their more consolidation because this opportunity may not be redeemed for centuries.

Recently, Erdogan's remarks about Azeri areas of Iran have raised many controversies. Obviously, Tehran is in danger in this regard, why the 2020 Nagorno war created conditions that can create separatist desires. In response to these statements, Iran summoned the Turkish ambassador to the State Department to say, the era of land claims and expansionist empires have ended. Iran does not allow anyone to interfere in its territorial integrity. Although the people of these areas are the majority of Shiites, the secular character of Azerbaijan has separated it from Iran's efforts to expand its influence. The imagination of Iran for a long time was comfortable from the fact that their unites, Armenia, in the Karabakh war, and the Russians manage the situation. However, now that Ankara and the unified Baku have found the upper hand, Iranians should be worried about the Turks not only in the west, but in its north. What is interesting in all of these is that none of the parties are looking for conflict with the other side, but their respective goals that are formed by a common geographic environment actually leads them to more conflict. South Caucasus will remain as a secondary scene for Iran and Turkey because the countries of this region are still powerful. In contrast, Iraq and Syria are collapsed countries that represent non-governmental and non-governmental actors from the main forces, war forces that will be the main bead of Turkish and Iranian battles in the coming years. The concept of Turkey and Iran is often strengthened by frequent diplomatic measures, bilateral agreements and support for some of the allies against seemingly common enemies. In policy-making circles, it is often about the need to get the region from Iran. But the question is who leads this effort, because Iran and its representatives will not be separated from the Arab world without the involvement of an external force. Certainly, the United States does not want to commit another military campaign, especially in the Middle East. In these conditions, Turkey is the only power to deal with Iran. It may not happen sometime, but it is ultimately inevitable.

HOW CAN A COSTLY WARFARE IN AFGHANISTAN BE PREVENTED?

Certainly, the withdrawal of American forces from Afghanistan will have a great influence on the geopolitical region. The emergence of a full-fledged civil war can bring Pakistan, India, Russia and Iran to support various factions. Without a sustainable agreement between the areas of the region that ensures the security and neutrality of Afghanistan, the country may cost a residential war. Such an agreement is very important in preventing Afghanistan's transformation into the policemen of global terrorism. The re-revitalization of the Taliban with Washington's strategic calculations could be decided to reinstate the former Afghan warlords and led to the revival of ethnic and tribal tensions. One of the biggest mistakes in the United States was that the West became one of the parties involved in the Afghan Civil War. In spite of the deployment of tens of thousands of soldiers, the United States could not destroy the insurgents once forever.

1. The February 2020 Agreement in Different ways revived the memory of the humiliation of the US military in Vietnam. It was a shame for Washington for Washington for Washington.
2. US officials negotiated with the same insurgent leaders who called a terrorist once. In fact, several members of the Taliban negotiating team were former Guantanamo prisoners.
3. The humor of history is that a superpower is left out of the country in thirty-second anniversary of Soviet withdrawal.



- 4- How many Taliban negotiators in Doha fought against the United States against the Soviet Union, and by Washington as a jihadist with the United States, the Soviet Union was out of Afghanistan and later, many of the same weapons to Took his former supporters.
5. American forces in October 2001 attacked Afghanistan with a small understanding of the land that the cemetery of the empire. This war was inconclusive from the very beginning.
- 6- General *Douglas Lut* said in 2015 about the lack of American readiness, "We did not have a fundamental understanding of Afghanistan and did not know what. With this speech, it may not be surprising that the Afghan war has become the longest American war.
- 7- The re-revitalization of the Taliban with Washington's strategic calculations could decide to reinstate Afghanistan's warlords and cause the alive of ethnic and tribal tensions. One of the biggest mistakes in the United States was that the West became one of the parties involved in the Afghan Civil War. In spite of the deployment of tens of thousands of soldiers, the United States could not destroy the insurgents once forever.
8. Also, there was a difference in basic views within successive governments on American goals in Afghanistan. Some officials believed that they are creating a sample democracy, and others considered their role in reforming Afghanistan, including on women's rights.
9. The efforts of the United States to prevent corruption, the creation of deserved army and police and the destruction of the booming of opium in Afghanistan.
10. The withdrawal of US troops as much as their arrival, and has created a great tenderness of power. The Taliban has used peace agreement with the United States and has increased its international validity.
11. The current leadership of the Taliban has given it to recognize women's rights and do not oppose their education, but this promise has prevented many people concerned about the possible measures of the Taliban after the withdrawal of foreign forces.
12. Certainly, the withdrawal of American forces from Afghanistan will have a great influence on the geopolitics of the region. The strategic geography of this country is historically vulnerable to the involvement of foreign forces and neibration wars.
13. The emergence of a full-fledged civil war can bring Pakistan, India, Russia and Iran to support various factions.
14. Without a sustainable agreement between the powers of the region that guarantees the security and neutrality of Afghanistan, the country may cost a reserved war.
15. Such an agreement is also very important to prevent re-turning Afghanistan into global terrorism poles. Political resolution with a regional approach will only be the perfect end for this crisis.

SOLUTIONS OPPORTUNITIES AND THREATS

This is an inevitable and immediate necessity for the two major countries of Iran and Saudi Arabia, which will lead their important priority in the current situation to pursue and realize the second round of peace talks, and in order to resolve a century hostility and efforts for bilateral and regional cooperation. You try. The Islamic Republic of Iran and Saudi Arabia are on the verge of important replica developments in domestic, regional and international arenas, and both countries have changed the conditions and look of Washington to the Middle East developments and determine the new world priorities (Russia and China) this power. Global is aware. Therefore, dialogue and negotiation are an important and undeniable fact to solve the



problems and conflicts of the two sides. Iran has been in the beginning of a process and a serious change, and the synergy of the thirteenth century to the head of the "Ibrahim Risi" can bring these changes to the maintenance and development of national interests, international exchanges and the withdrawal of the country from regional deadlock. It speeds up the resolution of international controversy, including the Common Action Plan (Buhazam), the creation of understanding with the Atomic Energy Agency and resolving disputes with neighboring countries will be able to track the second round of talks between Iran and Saudi Arabia and the confidence building between the two countries. On the way to achieving common goals and cooperation and resolving disagreements in a general look, it can be said that political, social, economic and cultural developments in Afghanistan, under any circumstances that are formed, have a direct and indirect impact on Iran's national security. Will take place. Which Afghanistan has Iran in the cultural and civilization of Iran and two countries have long boundaries. Threads that are difficult to protect their geographic characteristics and with very heavy costs and Will not complete the depth. Peace and stability in Afghanistan and the tensions of the overwhelming government can lead to stabilization of security in Iran.

Iran has faced rough problems in its eastern borders over the past few decades, and the instability and interior of Afghanistan in Afghanistan has been the main causes of these problems. The new state-building process in Afghanistan has pointed out different challenges in the eastern borders of Iran and has had many threats and opportunities for Iran. The first and most important opportunity is due to the new state of state-building in Afghanistan for Iran, eliminating the threat of the Taliban or at least its severe weakening. Dry and eastern ideology Extreme Taliban and presenting his anti-Shiite tendencies, and any threats in terms of its national security agenda, hence the investigation of the Taliban government directly eliminates the threatening factors of national security in Iran. In the state-building process, the efforts of the new government have been weakened and eradicated the Taliban. But signs of the Taliban in Afghanistan are still observed in Afghanistan, the effective and overwhelming power of the Taliban is not in line with the national security of Iran, and Iran should consider the necessary measures and policies in this regard. The latter has the opportunity of modern state in Afghanistan for Iran, "Increasing the security of eastern Iran as one of the most insecure borders in Iran over the past few decades Is. The production and product of drugs are the main cause of this insecurity, and the struggle against alignment and drug production is one of the issues and common interests of the Iranian government and the Kabul government; Because drugs from Taliban financial support and insecure Iran's borders are considered. The bilateral cooperation between the Iranian and Afghan government in this area leads to an increase in the security of the borders of Iran, and this is considered as a positive consequence of modern state-building in Afghanistan. The third chance of state-building in Afghanistan for Iran is the relative increase in political stability in Afghanistan, as a result of the formation of central mentality and reduced irregularities and chaos in the country. Stability in Afghanistan will have a positive and direct impact on security and stability in Iran and leads to instability for the loss and security of the region. The opportunities and threats of the nation-building process in Afghanistan for Iran's central authority in Afghanistan facilitate the relationship, strengthen cooperation, and forms of common disagreements and issues, and this in the long run is a more important step to institutionalize relations and Bilateral interactions and development are considered regional levels. Other positive consequences can be considered as the inclusive participation of all Afghan ethnic and religious groups in the national government, which reduces the negative relationships between the groups and is in the political and economic development of Afghanistan. Iran has called for the participation of all Afghan groups in the structure of the state, which considers it a factor in further stability of Afghanistan. On the other hand, Iran's cooperation with the Afghan government in this case means the development of interactions



with all Afghan groups, and in the long run, will strengthen the position of Iran in Afghanistan. Other opportunities for Afghanistan's reconstruction for Iran and Iran's economic participation and Afghanistan's economic development. Iran, due to advantages such as geographical proximity, cultural relations and economic and dietetic potentials It has favorable areas for contributing to Afghanistan and has taken steps in this regard. The expansion of interactions and economic cooperation between the two countries on the one hand will have economic benefits, and on the other hand, it increases cooperation in other areas, especially the security domains. Despite the positive opportunities and consequences of the new state of state-building in Afghanistan for Iran, there is also a process of origin and threats for Iran. The first is more threatening in this regard, "America's military presence and its allies in the borders of Iran." If the relationship between the non-Iranian militant and American militant in the future, the forecast of continuous prediction, the latter of threats can be considered as a waistline of the role of Iran at the level of the proprietary politics and the continuation of its role at the level of entity policy.. Some believe that the future of Afghanistan's developments in the path, which is likely to convert Iran from a focal and central actor to a semi-peripheral or marginal actor. Hence, the Iranian decision-making machine should pay attention to this process, and to prevent the variables involved and manipulate these variables. In addition to the above, developments in recent months in Afghanistan, especially in the southern regions, are as a third of the Taliban forces are in an increasing state of their positions that have faced the central government with serious challenges and, of course, Among the overlapping and interactions of finding "Pakistan" is a significant issue; Hence, the threat of another "Mehr", which in the current situation should be considered in policymakers and decision makers of foreign policy and national security, is that increasing the activities and the Taliban are again in order to threaten the national security and interests of Iran. he does. In terms of how and why challenges, threats and opportunities that are high in a general consideration can be said that there are two optimistic and pessimistic views in the future of Afghanistan. A group of pessimistic eyes believe that the withdrawal of the US, Global and NATO army from Afghanistan, other Lebanese and staying in Afghanistan, Israel will form another Palestinian, and the United States will not be able to organize the current Afghanistan. If Afghanistan succeeds in reintegrating the relationship between numerous ethnic and religious groups, which should be based on coexistence and equality, and does not effectively deal with current violence and centrifugal forces, existing tensions continue to be a permanent problem Will remain in the political life of Afghanistan and the region ..., And the other group, which from the perspective of optimism, believes that the United States has gradually transmit Rart to Afghans, especially in the security areas in line with its rational strategy, with critique and tactical changes. He will use the United Nations, NATO, and other global capacities in Afghanistan in order to reduce its costs and will remain in Afghanistan for many years, and to worry about, where in the field of possible complicated conditions after the withdrawal of NATO forces And America, according to the ethnic and religious evidence of Afghanistan, should continue the nation-building process for the participation of meta-regional actors, to ensure that stability and security deployment. Accordingly, in line with the two above-mentioned propositions, it seems that policymakers and decision makers in Afghanistan should also put two possible probable scenarios on the future developments in Afghanistan. The first scenario, while insisting security and accelerating security in the reconstruction process, provides the focus of more converging political forces for Iran in power structure and continue this process, and the other way is due to that probability Due to the deep evidence of ethnic and religious evidence in Afghanistan and the ups and landings of the center of the center, internal conflicts will lead to a gradual decomposition of Afghanistan, in which case Iran should support the political and logistics support of the group. Convergent with Iran provides substrates to institutionalize convergent forces with our country, especially in the western regions of Afghanistan. In this case, it would be that while using opportunities to a description that passes

can reduce the threats to the level of Mosh and the potential of Iran, especially with regard to cultural, historical and religious solidarity that can be with Afghanistan. Based on a unifying strategy, to emphasize the necessity of coherence and "further coordination with our domestic broker in Afghanistan," using all the elegance of the art of diplomatic activities desirable to further compatibility with the two requirements of the Muslim world and on the other The benefits of our country hope for the future over the past.

CONCLUSION

This research seeks that based on a combined model of *Daners, Hayl and Mu'mard* theories, it creates a theoretical framework for the two countries of Iran and the United States and its allies in Saudi Arabia based on the criteria of the notion of this theoretical framework To give. The criteria of the Negational War of the Combined Model include direct help, the coordination of interest, stability and asymmetric relationships. The government of Iran and the United States and its alliance in Saudi Arabia in the West of Asia in general in Afghanistan are particularly involved in a disadvantage that aims to increase its influence and reduce rival penetration. In this regard, this research was based on a combined model of the theories of *Denes, Hughes and Mumford* on the Proxy Wars that the competition and intervention of the two countries of Iran and Saudi Arabia in the crisis of Afghanistan can be explained by a disadvantage. The combined model of the conflict wars through direct help criteria) in the form of financial, educational, weapons and equipment (the coordination of interests, the sustainability of relations and asymmetric relations of relations between Iran and Saudi Arabia in the form of a conflict in Afghanistan. In the direct assistance model, two governments in Hami were subjected to financial, weapons and educational services that the Iranian government (from the Afghan government) of the Follower (and the Saudi government) supporters (opposed groups of financial support and weapons and training. Second, the coordination of the benefits is, although the two conservation countries can have different benefits, but in confrontation with a common enemy, they have the benefits of coordinating. For example, the Iranian government) supporters (and the Afghan government) of the Follower (with different interests that the Iranian government has to Following the maintenance of the flow and the route of weapons to the Fatemon army was to increase its influence and place in the region, but in this regard, two countries have different interests, but both against an enemy of the opposition's customers against the government of Ashraf Ghani seek to maintain the survival of the government. Themselves and recapture the landed lands

Is. (With each other, they have the benefits of coherence; and in front of Saudi Arabia), supporters (and opposite groups) in the civil war of Afghanistan have different interests. The Saudi government seeks to reduce Iran's influence in the region and opposition groups in particular the National Council of Afghanistan. The overthrow of the Afghan government and achieving power, but the two countries have the benefits of coherent benefits. Iran) Hami (and Afghanistan) Follower (and the Saudi government) supporters (and opposite groups). (At the beginning of the developments in the form of unity, but with the intensification of the crisis, the importance of the National Granite National Government for the Iranian government was lower and increased against the dependence of the Afghan government to Iran, as a result of an asymmetric relationship, and in the opposition between Saudi Arabia (and groups). Disagree). They had asymmetric relationships from the beginning. The final findings of this research It is based on the four criteria of the combination of the compilation of the competition between the two countries of Iran and Saudi Arabia in the crisis of Afghanistan in the form of conflict wars that the Iranian government is to maintain the flow and supply path to the Fatemon Lash to



increase its position and position in the region. And against the purpose of Saudi Arabia, seeks to reduce Iran's influence in this region.

REFERENCES:

PERSIAN REFERENCES

- Bahram, MR, (1389), developments in Afghanistan after September 11 and its impact on Iran.
- desire, Framrrz, (1393), America's foreign policy in Afghanistan, Tehran: Institute for Strategic Studies.
- desire, F., (1393). Afghanistan's foreign policy in the sphere of regional cooperation, Tehran: Center for Strategic Studies of the Ministry of Foreign Affairs.
- desire, F., (1393). America's foreign policy in Afghanistan, Tehran: Institute for Strategic Studies
- beg, M., (1393), United States of America and Afghanistan strategy review, Tehran, Institute for Strategic Studies.
- grateful, MJ, Joseph, Civil (1393), opportunities and threats for Iran's nation-building process in Afghanistan. Journal of Political Science and International Relations Alml.shfat 95-124.
- Jansyz, Ahmed; Bahrami, S., praised, A., (1393), a confrontation between Iran and Saudi Arabia in the Syrian crisis ", Journal of Policy Studies of the Islamic world, (12) 3; 0.92 to 6
- Jansyz, Ahmed; Bahrami, S., (1390), regional rivalry between Iran and Saudi Arabia in the Middle East ("(2013-2011Fslnamh Middle East Studies, (2) 20; ..
- Jansyz, Ahmed; When, M., (1394), the influence of Islamic fundamentalism in Central Asia after the withdrawal of international forces to the Afghan National Security Journal of world politics, Faculty of Law and Political Science, Volume 45, Number 4, Winter 1396, pages of 894- 877.
- spirit alive, J. (1384). Pass on the history of political relations between Iran and Afghanistan, Tehran: morn.
- Roman, F, Kazemi, E., (1399), standing proxy in the foreign policy of the Islamic Republic of Iran World Policy Journal, ninth period, the first issue, Spring 1400 162 consecutive 35 pages S131-
- Simbar, Reza Bahrami Moghadam, S. (1393), risks to growth in international politics, global politics, the third time, the first issue, the spring 93.
- Simbar, and Azita Reza Maleki (1398), foreign policy imperatives of governance and images Islamic Republic of Iran in the International Journal of Global policy, period, eighth, fourth issue, Winter, 1398 straight 30 pages: 267-3
- Simbar, Reza Esmaeili, A., (1392), causes the development and maintenance of -Svryh Union, World Policy Journal, Volume II, Number 2, Office of Gilan University Press, 1392. Pages 7-28.
- Alipoor, A., (1397), a proxy war between Iran and Saudi Arabia in West Asia: A Case Study Syrian crisis in scholarly studies of the political world Issue 2 consecutive 26 Summer 1397 Page 171-14.



- Jahromy Ghanbari, M., (1399), Journal of Philosophy of proxy wars in the modern age of twenty nine, no. 111, Winter 1399
- velar Hey, Pir Mohammad, (1383), stability in Afghanistan and its role on security, Iran, Asia Book 3, especially post-Taliban Afghanistan, Editor Ibrahim Khosroshahi Khatami, Tehran: Institute of Contemporary Abrar.
- Mollazahi, Pir Mohammad, (1383), opportunities and threats facing the Islamic Republic of Iran's attitude to Afghanistan "in international security (3), Tehran: Tehran Contemporary Abrar.
- Moshirzadeh, H, Razavi, H., (1397), changes in proxy wars in the post-Cold War international relations and models for two "study of political theory in autumn and winter, number twenty-four. Pages of 247-223.
- Nyakvyy, Syed Amir Bahrami Moghadam, S., (1391). India-Iran relations and the opportunities and limitations, Journal - external relations, in the sixth year, the first number, 139.
- Nyakvyy, Seyed Amir, BEHMANESH, H. (1391). Actors in conflict in Syria: Vmvaz goals ", Journal of Foreign Relations, (4) 4; .
- Nyakvyy, Seyed Amir praised, A., (1391). Nature of the strategy against the Islamic Republic of Iran, Saudi Arabia, Syria and Iraq to the conflict ", Journal of the Islamic revolution) (17.;

ENGLISH REFERENCES

- Dunér, Bertil (1985). Military intervention in civil wars, Alders hot: Gower
- Hughes, Geraint (2014), M y Enemy's Enemy: Proxy Warfare in International Politics, Brighton/Portland OR: Sussex Academic Press
- Mumford, Andrew (2013) Proxy Warfare. Polity Press. Ramazani, R.K (1986), 'Revolutionary Iran: Challenge and Response in The Middl East', John Hopkins University Press.
- Sajad Bahrami Moghadam, Niloufar Baghernia, (2020), The Political Economy of Gold in Geo Economic Evolving Conditions Geopolitics Quarterly, Volume: 16, No 4, Winter 2021, PP 209-233.



**THE SITUATION AND SOLUTIONS FOR SUSTAINABLE POVERTY REDUCTION
UNDER THE MULTIDIMENSIONAL APPROACH IN VIETNAMESE MEKONG
DELTA RURAL AREA – A CASE STUDY IN A COMMUNE OF HAU GIANG
PROVINCE**

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ABSTRACT

Poverty assessment through multidimensional poverty approach shows that households in Hoa An commune are poor in income and shortage basic social needs such as education, health care, housing, living conditions, and access to information. In the research area, low-income causes were severe or shortage of production means (residential land, production land), low education level, high dependency ratio, and without a job. The primary employment or, if any, focuses on farming with a precarious income. Households' shortage all essential social criteria for the five basic social needs, including education, health care, housing, clean water/sanitation, and access to information. Among them, shortages in health, housing, and education are most common. In general, most households are a real shortage of income criteria and basic social needs. However, the criteria of health and housing are the two criteria that need the most attention because of their highest proportion. In terms of health, households need to be appropriately aware of the importance of health insurance to protect their family members and must voluntarily participate in purchasing health insurance. Households need to raise awareness, invest, care about repairing the houses which deteriorated signs. Boost production to increase income and improve living conditions. The local government must promulgate policies to improve working skills, enhance providing vocational training for the rural labor force. Besides that, the solutions of public health care and education effectiveness increasing are essential in the long-term. The government has to support households with a small financial to establish a clean water supply connection and a hygienic toilet. Finally, encourage households to improve their capacity for information accessibility.

Keywords: Hau Giang province, the multidimensional approach of poverty assessment, poverty situation, sustainability of poverty reduction, Vietnamese Mekong delta.

1. INTRODUCTION

The Vietnamese Mekong Delta (MD) has the highest proportion of people vulnerable to any other region in Vietnam (Miller, 2014). The delta is subsiding due to a combination of natural and human-induced causes (Minderhoud et al., 2018). Although the provinces in MD have mobilized resources to improve social security for rural households, they have not overcome all existing limitations (Tran et al., 2019). Through programs, projects, and supporting policies, people's lives in rural and remote areas become more stable (Nguyen & Nguyen, 2020). "Nông thôn mới" (NTM) is a national target program and is one of the keys and cross-cutting programs on "tam nông" - agriculture, farmers and rural areas deployed in rural areas nationwide in

association with hunger eradication and poor reduction. The NTM program, the construction of the new rural area, is a solution proposed to improve the living standards of rural people and make a positive contribution to the eradication of poverty (Do & Park, 2018; Son, 2015). Hau Giang (HG) is a province in MD that comes up from poverty but always working in reducing/moving towards eradicating the poor households and step by step revive the economy. HG province has 80% of the agricultural area and is remote and terrain (Loc et al., 2020). Over the past five years, HG province has constantly strived to change and thoroughly grasp the policies and guidelines to achieve the goal of poverty eradication.

As a result, HG province has reduced the poverty rate significantly. However, facing adverse fluctuations such as disease, crop failure, reduced demand for services, reduced income due to price fluctuations of essential agricultural products, unstable working positions, and natural disasters, the households have faced many difficulties. On the other hand, HG province is one of the key provinces of the region in terms of implementing the NTM program. In order to achieve the success of the program, the province has issued and implemented a plan to build new rural areas, with the goal that by the end of 2020, more than 50% of communes will meet the new rural standards, and no communes will meet less than ten criteria (Hau Giang People Committee, 2016). Up to now, the province has recognized four more communes meeting the standards of rural areas, exceeding the target set by one commune, bringing the total number of communes meeting the provincial standards to 17 communes. The rate of poor households decreased from 14.91 to 12.55% in 2016.

Although the poverty rate has decreased rapidly, the monitoring, evaluation, and implementation of policies, projects, or poverty reduction solutions in many localities have not been timely and have not fully reflected the situation of poor households. Due to their high achievement, some localities have brought many households out of poverty while still facing many difficulties. If the government did not have the solutions for sustainable poverty reduction, there would be a high rate and potential danger of falling back into poverty, and new poor households would arise, especially in remote and remote communes. The worldwide review confirmed the evidence of this lesson (Few & Tran, 2010; Ravallion & van de Walle, 2008). Hunger eradication and poverty alleviation is fundamental factor to ensure social justice and sustainable economic growth. Therefore, the study of poverty is critical. Research on poverty will form a system of scientific arguments as the basis for making effective policies in poverty reduction. Hoa An (HA) commune, Phung Hiep (PH) district, HG province is one of the localities gradually striving to achieve new rural standards between 2016 and 2020. Although there are still many basic livings needs shortages, HA commune is also trying to develop and eradicate poverty. However, some poor households still depend on government support. According to the old poverty guidance approach, the single-dimensional methodology will not fully assess the shortfalls of the poor, so governments at all levels do not provide maximum support for people to reduce poverty. The study was carried out from the above issues to assess the current situation and causes according to a multidimensional approach to poverty and propose sustainable solutions to reduce the rural study area.

2. METHODOLOGY

2.1 Methodology approach

The research uses several documents related to poverty situation documentary (reports, scientific articles) in/of HA commune, PH district, HG province, and relative documents with the criteria of poverty assessment standards according to the current multidimensional approach. In the second step, the study collects data from households to analyze the situation of poverty by a multidimensional approach. In the third step, we determine the causes of

household poverty in HA commune with two levels of poor and near-poor households. Finally, the research will propose recommendation solutions to sustainable poverty reduction for policymakers and government.

2.2 Methodology to select the research area and the sample size

Selection of research area: HA commune with three hamlets of Xeo Tram, Bau Mon, and Bay hamlet in PH district was selected because HA is one of the particular zone III communes – a promote and special difficult commune of the nation (Prime Minister of the Socialist Republic of Vietnam, 2021).

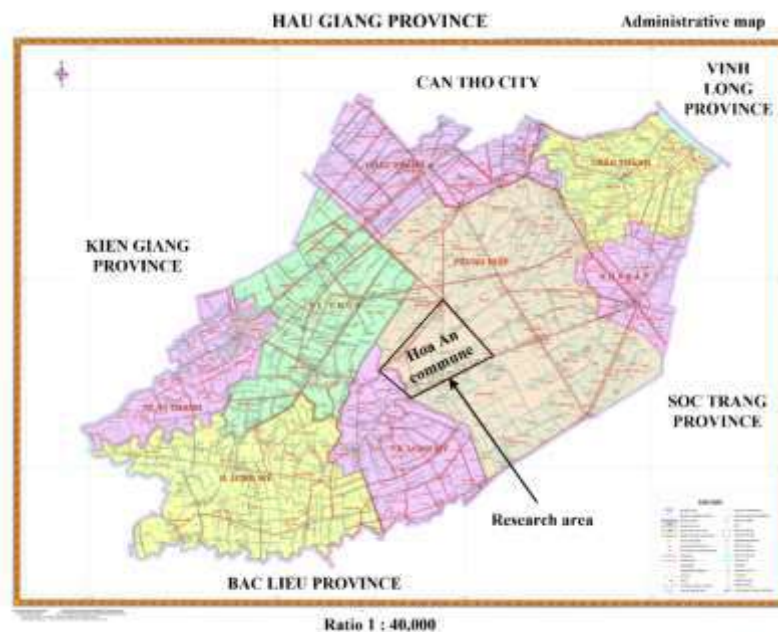


Fig. 1. Research area

Selection of researched households: 31 households (including 15, ten, and six households in Xeo Tram, Bau Mon hamlet, and Bay hamlet, respectively) were randomly selected according to the households list which HA Commune People’s Committee provided.

2.3 Methodology for data collection

Secondary data: Secondary data in the study are collected from many available sources, including government/agencies reports and statistical yearbooks.

Primary data: Primary data of the study were collected by directly interviewing 31 households by a questionnaire.

2.4 Methodology for data processing and analyzing

After conducting interviews and collecting data of households in the study area, the data was synthesized, coded, and entered the computer via Excel software. Statistical data of households in the study area are processed from SPSS software.

The research uses descriptive statistics with frequency, and percentage (%) values for data on per capita income, adult education level, school children, access to health services, health insurance, house quality, housing area per capita, domestic water sources, hygienic latrines, telecommunications usage, assets for accessing information to describe the multidimensional poverty situation.

In addition, the research applies both criteria: income and the shortage of access to five social services, including health, education, house, clean water/sanitation, and information (Prime Minister of the Socialist Republic of Vietnam, 2015). Ten indicators are measuring the shortage of access to services, including: (1) Education level; (2) Number of school children; (3) Access to health services; (4) Health insurance; (5) House quality; (6) Housing area per capita; (7) Domestic water source; (8) Type of latrine; (9) Telecommunications usage; (10) Access to the information. According to (Ministry of Labor - Invalids and Social Affairs of Vietnam, 2016), scoring and classifying poor and near-poor households' classification was used. The methodology to calculate the basic income and social needs criteria is as follows: (1) Income criteria (*criteria B1*): Score each criterion according to the available scale and calculate the total score for each household. (2) Criteria on basic social needs (*criteria B2*): Give 10 points/indicator and calculate the total score for each household.

After having the total score of B1 and B2, classify the poor and near-poor households with a multidimensional approach according to the following criteria: (1) *Poor households* (rural areas): households with a total B1 score of 120 points or less or households with a total B1 score of 120 to 150 points and a total B2 score of 30 or more. (2) *near-poor households* (rural areas): households with a total score of B1 over 120 points to 150 points and a total score of B2 below 30 points.

3. RESULTS AND DISCUSSION

3.1 Means of production of the household

The means of production of households include land, machinery, theater for production. These means of production, if available, will help people develop their economy (Boyd & Banzhaf, 2007; Mandelker et al., 2016; Reynolds et al., 2010; Sturm, 2004). Besides that, production also plays an essential role in reducing household poverty (Osabohien et al., 2019; Sharaunga & Mudhara, 2021; Van den Broeck & Maertens, 2017).

Table 1 shows that the average residential land area of the household is about 41.5 m². The smallest area is 11 m², and the largest is 120 m². The group's average residential land area per capita from 5 to 8 m² accounted for 29%. In comparison, the group from 8 to under 20 m² accounted for 51.5%. The house with a 40 m² or more built area was the lowest proportion, accounting for only 3.2% (Table 1). Most of the households built makeshift houses worth less than 10 million VND.

The number of households with productive land accounted for a low proportion (about 6.4%, equivalent to 2/31 households). These households have production land of 5,000 m² and 15,000 m², respectively. All the remaining households (accounting for 93.5%) are without productive land, nor other properties such as factories, farms, workshops, and shops. Factory accounted for only 3.2% of one household. Without productive land and means for production is a significant disadvantage. They often must work as hired laborers. Although households with farming land and means for production have an advantage, the application of science and technology is still limited and ineffective.

Table 1. Means of production of the household

Criteria	Frequency	%	Mean	Min	Max	Std.
Residential land area (m ²)			41.48	11	120	26.52
Area of residential land per capita (m ² /person)			2.06	1	5	1.03
<i>Group of residential land</i>						
5≤ and <8 m ²	9	29				
8≤ and <20 m ²	16	51.5				
20≤ and <30 m ²	2	6.5				
30≤ and <40 m ²	3	9.7				
≤ 40 m ²	1	3.2				
Area of production land (m ²)			0.65	0	1.5	0.28
<i>Group of production land</i>						
0 m ²	29	93.5				
5.000 m ²	1	3.2				
15.000 m ²	1	3.2				
Others:						
Factory	1	3.2				

3.2 The reality of poverty in a multidimensional approach

3.2.1 Estimated household income

Through the survey and scoring of the income criteria of households, the results are shown in Table 2. Indicators below 120 points accounted for the highest rate of 51.6%, followed by 120 to 150 points targets, accounting for 31.3%. The lowest is the target of over 150 points, accounting for 16.1%. According to (Ministry of Labor - Invalids and Social Affairs of Vietnam, 2016), households with a total income-based indicator score of fewer than 120 points are poor. As a result, there are precisely 16 poor households.

However, based on income criteria, only could not divide the households into poor, near-poor, or non-poor groups. The study analyzes five criteria belonging to social need access capacity, including education, medical, house, clean water/sanitation, and access to information.

Table 2. Target score according to household income criteria

The score of income criteria	Frequency	%
Below 120 points (<i>poor household</i>)	16	51.6
Over 120 to 150 points (<i>maybe poor or near-poor household</i>)	10	31.3
Over 150 points (<i>maybe non-poor household</i>)	5	16.1
Total	31	100.0

3.2.2 The shortage of indicators on basic social needs of households

The shortage of education dimension

Education is one of the essential means of action to limit poverty in all its forms and all places (Bray et al., 2020; Nikolopoulou et al., 2010). The results show that the household with “at

least one member from 15 to under 30 years old do not graduate from lower secondary school and are not currently attending school”, or “at least one member from 5 to 15 years old is currently not attending school” accounted for a high rate of 41.9%. This result shows that the government must improve the education support system to achieve poverty reduction.

The shortage of medical dimension

Health is one of the essential factors to ensure human health and fitness. A person with a healthy body will have the conditions to acquire and develop knowledge to contribute to building and improving the quality of life (Tracy & McDonald, 2015). The results showed that “households with sick people but did not seek medical care in the past 12 months” and “households with at least one six-year-old or older member who did not have health insurance” accounted for 100% of the total. The rural households must focus on and improve their health care activities. Poor health inevitably leads to reduced labor power and reduced labor productivity (Leonce, 2020). In general, the government must develop their social security concentrating on medical and public health care systems.

Shortage of housing dimension

Food and accommodation are the minimum essential conditions for poverty assessment for each household (Ulman & Ćwiek, 2020). Housing is one of the poverty assessments multidimensions. Households with low income always have housing problems such as makeshift, temporary, or even without a house. The results of “households living in makeshift or unstable houses” and “the average housing area is less than 8 m²/person” accounted for 93.5%. Thus, almost all local rural households (29/31 households) have a shortage of housing.



Fig. 2. The house of poor and near-poor households

The shortage of clean water and sanitation

Clean water and sanitation help improve the quality of life of rural residents (Arcipowski et al., 2017). The measure of clean water and sanitation is expressed at the threshold of deprivation inaccessible to a hygienic water source. There is the same trend of households without access to hygienic water with the number of clean water deprivation households.



Fig. 3. Surface water resource in the research area

The shortage of access to information

Access to information is vital (Laeq Khan et al., 2020). By accessing information, people can improve new knowledge, get new ideas, change their lifestyles, and get better in their production (Garetti & Taisch, 2012). All households regularly update the information of weather, working affairs, inputs/outputs/products price from local television and radio stations. A high proportion of 51.6% of households could not access the internet, multimedia communications because of without devices such as smartphones, computers, and television.

Table 3. The shortage of indicators on basic social needs of households

The shortage of education dimension	Frequency	%
Yes	13	41.9
No	18	58.1
<i>The shortage of medical dimension</i>	<i>Frequency</i>	<i>%</i>
Yes	31	100.0
No	0	0
<i>The shortage of housing dimension</i>	<i>Frequency</i>	<i>%</i>
Yes	29	93.5
No	2	6.5
<i>The shortage of clean water and sanitation</i>	<i>Frequency</i>	<i>%</i>
Yes	19	61.3
No	12	38.7
<i>The shortage of access to information</i>	<i>Frequency</i>	<i>%</i>
Yes	16	51.6
No	15	48.4

3.3 The reality of poverty in a multidimensional approach

Applying the multidimensional approach, we have the final assessment results in Table 4. In general, in 31 surveyed households, there are 26 poor households, five non-poor households, and no near-poor households. The poverty rate in each hamlet is Xeo Tram hamlet, respectively, with 14 households accounting for the highest rate of 93.33%, followed by Bau Mon hamlet with eight households accounted for 80%, and Bay hamlet with four households accounted for 66.67% - lowest percentage.

According to Table 2, when assessing poverty through income criteria, we can only accurately assess 16 poor households (under 120 points), while the remaining 25 households cannot accurately assess poor, near-poor, or non-poor households. After applying the multidimensional poverty assessment, the results of poor households increased to 26 households, non-poor households were five, and there were no near-poor households. Therefore, it will be difficult and ineffective to assess the situation of poverty based on income criteria only. The

multidimensional approach should be used to evaluate the poverty status of the household. Based on the assessment results, the government can provide sustainable poverty reduction programs and prevent the backing to poor/near-poor situation of the improved household.

Table 4. The reality of poverty in a multidimensional approach

Hamlet	Poor		Near-poor		Non-poor		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Xeo Tram	14	93.33	0	0	1	6.67	15	100.0
Bau Mon	8	80	0	0	2	20	10	100.0
Bay	4	66.67	0	0	2	33.33	6	100.0
Total		26				5	31	100.0

3.4 Causes of multidimensional poverty

3.4.1 Causes of multidimensional poverty

Number of people and number of dependents

The number of members in the family plays a vital role in creating and increasing the family’s income (Hamilton, 2009). However, the number of dependents is one of the factors that are detrimental to the household economy. A higher dependency ratio means more followers but less labor. In cases, income from labor does not cover the payment. Therefore, the dependency ratio in a household is often proportional to the ability and poverty level of the household itself.

In the case of excluding “*children under 15 years old, people over 60 years old, and people with disabilities/severe illnesses unable to work*”, the population of rural surveyed households ranged from one person to seven people (Table 5). Households with less than two people accounted for 9.7%, from 2 to 4 people accounted for the highest rate, 71%, and over five people accounted for 19.3% (Table 5). Thus, most households benefit labor force for household economic development (the number of people from 2 or more accounted for over 90%).

However, only one household has no dependents, 12 households with one dependent, and 18 households with 02 dependents, totaling 97.8% (Table 5). This dependent population will be one factor that is detrimental to household economic development, increasing the expenditure burden and reducing the household’s ability to accumulate.

Education level

Education level has a close relationship with workers’ income and raises the total income (Breton, 2013), so the rural labor force needs to enhance their education level. Most of the surveyed households have low income, and difficult to cover all living expenses so that the parents cannot afford to send their children to school. There is the fact that many parents just let their children to school for reading and write learning. They did not want or could not pay for their children’s high education learning. This is the main reason for the high dropout rate and low education and qualifications in rural areas. Specifically, “*the highest degree achieved by a household member is a high school diploma*” accounted for 12.9% and 87.1% without a degree. Thus, it can be affirmed that one of the causes of poverty in terms of income criteria in the study area is the lack of degrees and educational attainment.



Fig. 4. An extra-curricular activity for primary students in the research area

Employment status and pension

Due to the nature and diversity of occupations, agricultural work is a primary source of income for the rural family besides non but relative to agricultural support service. Most of the interviewed households only work with low-income, high-risk jobs leading to economic instability. There are 20 households with members working in agriculture, accounting for 64.5%. Non-agricultural jobs accounted for 35.5% (Table 5). Non-agricultural households only focus on jobs such as hired labor, cleaning, housekeeping. Households choose non-agricultural work because the family lacks productive land and low education level, high years old, and poor health.

On the other hand, farming households face many difficulties due to unbalanced input and output prices. With affected of natural disasters and crop failure due to the attack of disease, farmers' income decreased. Because of working in the agricultural and part-time employment, without members in the rural household will receive the pension.

Housing, productive land, and means of production

At present, some households are still living in temporary or damaged houses. The houses were built long ago, but the owners have not had money to repair them. The research also found that a household's income is not enough for living expenses, medical expenses, and loss in production, so that they must pledge and sell their land, their production means (cow, buffalo, chicken, duck), and their asset. Up to 29% of households have a per capita area of only "5 to less than 8 m²". The highest rate is 51.5% of households with a per capita area from "8 to less than 20 m²". The average household area per capita "over 40 m²" accounted for the lowest rate, only 3.2% (Table 5).

Basic living needs

In the research area, households often use water from rivers, ponds, and lakes for their daily activities. On the other hand, there is a high rate of households directly discharging their toilet wastewater to the surface water resources. Households using unsanitary latrines accounted for 61.3%. Households using unsafe water sources account for 48.4% (Table 5). Eating, drinking, using water, or improperly disposing of waste causes dangerous pathogens (Daud et al., 2017; Pal et al., 2018).

Table 5. Rural researched households' characteristics

No.	Household characteristics	Frequency	%
1	<i>The number of people in the household; No points are calculated for households that only include children under 15 years old, people over 60 years old, people with disabilities/severe illnesses unable to work.</i>		
	One person	3	9.7
	Two people	6	19.4
	Three people	8	25.8
	Four people	8	25.8
	Five people	1	3.2
	Six people	2	6.5
	Seven people	3	9.7
2	<i>Number of children under 15 years old, people over 60 years old, disabled/severely ill people unable to work</i>		
	No one	1	3.2
	Only one person	12	38.7
	More than two people	18	58.1
3	<i>The highest degree of a household member</i>		
	Having a high school diploma	4	12.9
	No degree	27	87.1
4	<i>Household with at least one person working in non-agriculture (working for three months or more in the last 12 months)</i>		
	Another non-farm employment	11	35.5
	Other jobs include farming	20	64.5
5	<i>Pension</i>		
	No one	31	100.0
6	<i>House</i>		
	The primary material of the house wall is concrete; stone; cement; solid wood	29	93.5
	The primary material of the house columns is reinforced concrete; stone; strong iron/steel/wood	2	6.5
7	<i>Residential area per capita</i>		
	≥5 and <8 m ²	9	29
	≥8 and <20 m ²	16	51.5
	≥20 and <30 m ²	2	6.5
	≥30 and <40 m ²	3	9.7
	≥ 40 m ²	1	3.2
8	<i>Average electricity consumption per month for the whole household</i>		
	25-49 KW	11	35.5
	50-99 KW	20	64.5
9	<i>Water supply</i>		
	Tap water purchased water	16	51.6
	Other water sources (river, lake, and other)	15	48.4
10	<i>Toilet</i>		
	Septic or semi-septic latrines	12	38.7
	Other types of toilets	19	61.3
11	<i>Main assets</i>		
	Color television	17	54.8
	Motorcycles, motor vehicles	3	9.7
	No assets	11	35.5
12	<i>Land</i>		
	Households managing/using an annual planting area of 5000 m ² or more	2	6.4
	No productive land	29	93.6
13	<i>Breed</i>		
	Households with aquaculture	1	3.2
	Households without livestock	30	96.8

3.4.2 Causes of shortage in basic social needs

Shortage of educational criteria

The parent's education level and their economic capacity will affect their children's education level. Some households think that their children need to know how to read-and-write and do not need higher education. It is a misconception that leads to the consequence that about 35.5% of "people have not graduated from lower secondary school and currently not attending school" and up to 48.4% of "households have children of school age (from 5 to under 15 years old) who are not currently attending school" (Table 6).

Shortage of medical criteria

There are 100% of "households did not seek medical care in the past 12 months", and 100% of "households did not have enough money to buy health insurance for children age of six and older" (Table 6). The result showed that people do not concern about taking care of and protecting their health, or they do not have the financial capacity to buy health insurance. Although that, many people think that buying medical insurance is unnecessary because when having sick, they often buy medicine buy their own at the local drug store.

Shortage of housing criteria

The makeshift and unstable houses accounted for 93.5%, while the narrow houses (under 8 m²) accounted for 29% (Table 6). In commonly, people do not have money to build or repair a permanent house. Instead, they want to save money for building a permanent house for another purpose.

Shortage of criteria for clean water and sanitation

Almost of households could not pay the fee for tap water supply setting and hygienic latrines establishment. The households that do not have clean water accounted for 48.4%. Instead, they use other water sources such as rainwater and surface water from canals near their house. Virtually current toilets are unhygienic due to long time living habits and the high fee of building a new hygienic toilet. The number of households that have not used hygienic latrines was 19/31, accounting for 61.3% (Table 6).

Shortage of criteria for accessing information

At present, 45.2% of households have had at least one smartphone and internet use. Households mainly use their smartphone for communicating, reading news, and advertising. Besides that, 35.5% of households do not have televisions, computers, radios and cannot receive the sound from the commune's loudspeaker system. Thus, the information accessibility of households was still limited and needed to be improved.

Table 6. Indicators of basic social needs of the household

Criteria	Frequency	%
<i>Education</i>		
Household with at least one member age between 15 and under 30 years old who has not graduated from secondary school and is currently not attending school	11	35.5
Household with at least one member age from 5 to under 15 who is not currently attending school	15	48.4
<i>Medical</i>		
Households with at least one member age of six or older who do not have health insurance	31	100.0
<i>House</i>		
Households with an unstable or makeshift house	29	93.5

The average housing area is less than 8 m ² /person	9	29.0
<i>Clean water and sanitation</i>		
Households do not have access to hygienic water sources	15	48.4
Households do not use hygienic latrines	19	61.3
<i>Access to information</i>		
Households with no members using phone and internet access	17	54.8
Households do not have televisions, radios, computers; and cannot receive the sound from the loudspeaker system of the local radio station	11	35.5

3.5 Synthetic assessment of causes of poverty in a multidimensional approach

By analyzing the situation and causes of poverty, most households are poor in terms of income and five basic social needs. For the income poverty dimension, the causes of poverty often focus on several factors: shortage/severe shortage of production means (residential land, production land), low education level, high rate of dependents, without a job, or unstable working with a fluctuation income. Households were shortage all five essential social criteria needs, including education, health care, housing, clean water and sanitation, and access to information. Among them, shortages in health, housing, and education are most common.

3.6 Proposing sustainable poverty reduction solutions

3.6.1 Advantage

Households in the researched area have several advantages in poverty reduction, including the age of the household head is in the working-age group (from 26-59 years old, accounted for 67.7%) and has extensive experience in family livelihood management. The labor force of households with from 2 to 4 members accounted for 71% who will improve income and develop the household economy. The number of children, pre-labor force, currently accounted for a high proportion.



Fig. 5. A training course class for rural labor on solar energy establishment in the research area

3.6.2 Disadvantage

Together with advantages, households in the rural area must face several difficulties in poverty reduction, including low education level, a high proportion of dependents under 15 years old, people over 60 years old, and disabled/severely ill people unable to work. Many people do not have stable jobs or even could not find a job. There are many households without production means (residential land, production land, farms, shops). People still live in an unstable/temporary house and cannot use hygienic latrines. People do not have family planning and health protection. They also shortage access to information such as multimedia communication, the internet, and social networks.

3.6.3 Solutions and recommendation

Group of solutions to reduce income poverty

Stable dependents rate: Households need to be aware of the importance and properly implement family planning to reduce the proportion of dependents, contributing to reducing the expenditure burden and increasing the household's savings capacity; Households need to take advantage of available human resources to increase their income in off-farm activities.

Employment status: Participate in short or medium-term vocational training courses for workers and encourage family members and neighbors to join; People help each other change awareness, boldly do business, and support each other in production.

Production land and means of production: Households need to focus on wage labor and protect their health to avoid hindering income generation. From there, people can accumulate to buy land and buy means of production.

Group of solutions to reduce poverty for basic social needs

Education: Encourage and motivate their children to study well and attend school fully to avoid dropping out of school. Create all the best and favorable conditions for children to develop their learning intelligence.

Health: It is necessary to be appropriately aware of the importance of health insurance to improve health care activities. Voluntarily participate in the purchase of health insurance. Attend regular health check-ups.

Living conditions: Raise awareness in the protection and use of clean water as well as hygienic latrines. Invest in repairing and building new water wells, hygienic latrines to ensure the quality of health. Attend training courses on capital use and farming techniques to use the capital for proper purposes.

Access to information: People need to buy/use telecommunications services (smartphone and internet service) and assets to access information such as televisions, computers, radios. The government help enhance the household's awareness of the importance of information accessibility.

Housing: Raise awareness on investing and repairing the house with deteriorated signs. It is boosting production to increase income and improve living conditions.

4. CONCLUSION

Poverty assessment through the dimensional poverty approach shows that households in the rural commune are disadvantaged in income and five sections of basic social needs, including education, health care, housing, living conditions, and access to information.

Causes of household's low income were shortage/serious shortage production means (residential land, production land), low education level, high dependency ratio, and without/unstable working job. Among five shortages of basic social needs, shortage of health care, housing, and education are most common.

The local government must promulgate policies to improve working skills, enhance providing vocational training for the rural labor force. Besides that, the solutions of public health care and education effectiveness increasing are essential in the long-term. The government has to support a household with a small financial to establish clean water supply connections and hygienic toilets. Finally, encourage households to improve their capacity for information accessibility.



REFERENCES

- Arcipowski, E., Schwartz, J., Davenport, L., Hayes, M., & Nolan, T. (2017). Clean Water, Clean Life: Promoting Healthier, Accessible Water in Rural Appalachia. *Journal of Contemporary Water Research & Education*, 161(1), 1–18. <https://doi.org/10.1111/j.1936-704x.2017.3248.x>
- Boyd, J., & Banzhaf, S. (2007). What are ecosystem services? The need for standardized environmental accounting units. *Ecological Economics*, 63(2–3), 616–626. <https://doi.org/10.1016/j.ecolecon.2007.01.002>
- Bray, R., de Laat, M., Godinot, X., Ugarteg, A., & Walker, R. (2020). Realising poverty in all its dimensions: A six-country participatory study. *World Development*, 134, 105025. <https://doi.org/10.1016/j.worlddev.2020.105025>
- Breton, T. R. (2013). The role of education in economic growth: Theory, history and current returns. *Educational Research*, 55(2), 121–138. <https://doi.org/10.1080/00131881.2013.801241>
- Daud, M. K., Nafees, M., Ali, S., Rizwan, M., Bajwa, R. A., Shakoor, M. B., Arshad, M. U., Chatha, S. A. S., Deeba, F., Murad, W., Malook, I., & Zhu, S. J. (2017). Drinking Water Quality Status and Contamination in Pakistan. *BioMed Research International*, 2017. <https://doi.org/10.1155/2017/7908183>
- Do, M. H., & Park, S. C. (2018). New Rural Development and hierarchical governance in Vietnam: Impacts of government support on rural households' income using a hierarchical linear modelling. *Agris On-Line Papers in Economics and Informatics*, 10(4), 3–15. <https://doi.org/10.7160/aol.2018.100401>
- Few, R., & Tran, P. G. (2010). Climatic hazards, health risk and response in Vietnam: Case studies on social dimensions of vulnerability. *Global Environmental Change*, 20(3), 529–538. <https://doi.org/10.1016/j.gloenvcha.2010.02.004>
- Garetti, M., & Taisch, M. (2012). Sustainable manufacturing : trends and research challenges. *Production Planning & Control: The Management of Operations*, 23(2–3), 83–104.
- Hamilton, K. (2009). Consumer decision making in low-income families: The case of conflict avoidance. *Journal of Consumer Behaviour*, 8, 252–267. <https://doi.org/10.1002/cb>
- Hau Giang People Committee. (2016). *The implementation of the national target program on building new rural areas for the period 2016-2020 of Hau Giang province* (No. 04/KH-UBND dated on 18/01/2016-In Vietnamese).
- Laeq Khan, M., Welser, H. T., Cisneros, C., Manatong, G., & Idris, I. K. (2020). Digital inequality in the Appalachian Ohio: Understanding how demographics, internet access, and skills can shape vital information use (VIU). *Telematics and Informatics*, 50(February), 101380. <https://doi.org/10.1016/j.tele.2020.101380>
- Leonce, T. E. (2020). The Inevitable Rise in Dual-Income Households and the Intertemporal Effects on Labor Markets. *Compensation & Benefits Review*, 52(2), 64–76. <https://doi.org/10.1177/0886368719900032>
- Loc, H. T. M., Trinh, B. Van, & Nghi, N. Q. (2020). *Agricultural Commodity Development: A Case Study Of Farming Households In Chau Thanh A District, Hau Giang Province*. 68–74. <https://doi.org/10.9790/1813-0710046874>
- Mandelker, D. R., Stamper, H. A., Brown, C. N., Meck, S., Merriam, D. H., Salsich, P. W., Stroud, N. E., & Tappendorf, J. A. (2016). *Planning and control of land development:*



- Cases and materials*. Carolina Academic Press.
- Miller, F. (2014). Constructing Risk: multi-scale change, livelihoods and vulnerability in the Mekong Delta, Vietnam. *Australian Geographer*, 45(3), 309–324. <https://doi.org/10.1080/00049182.2014.930000>
- Minderhoud, P. S. J., Coumou, L., Erban, L. E., Middelkoop, H., Stouthamer, E., & Addink, E. A. (2018). The relation between land use and subsidence in the Vietnamese Mekong delta. *Science of the Total Environment*, 634, 715–726. <https://doi.org/10.1016/j.scitotenv.2018.03.372>
- Ministry of Labor - Invalids and Social Affairs of Vietnam. (2016). *Circulars on The process guideline for investigating annual poverty and near- poverty household by multidimensional poverty approach for 2016-2020* (No. 17/2016/TT-BLDTBXH dated on 28/6/2016-In Vietnamese).
- Nguyen, T. B. N., & Nguyen, P. Q. (2020). The new rural area program in Vietnam from the sense of place theory perspective: Case Of Quang Nam Province. *International Journal of Conservation Science*, 11(2), 601–614.
- Nikolopoulou, A., Abraham, T., & Mirbagheri, F. (2010). *Education for Sustainable Development - Challenges, Strategies, and Practices in a Globalizing World*. SAGE Publications India.
- Osabohien, R., Matthew, O., Gershon, O., Ogunbiyi, T., & Nwosu, E. (2019). Agriculture Development, Employment Generation and Poverty Reduction in West Africa. *The Open Agriculture Journal*, 13(1), 82–89. <https://doi.org/10.2174/1874331501913010082>
- Pal, M., Ayele, Y., Hadush, A., Panigrahi, S., & Jadhav, V. J. (2018). Public Health Hazards Due to Unsafe Drinking Water. *Air & Water Borne Diseases*, 7(June), 1–6. <https://doi.org/10.4172/2167-7719.1000138>
- Prime Minister of the Socialist Republic of Vietnam. (2015). *Decision on Promulgating Multidimensional Poverty Levels Applicable During 2016-2020* (No. 59/2015/QD-TTg dated on 19/11/2015-In Vietnamese).
- Prime Minister of the Socialist Republic of Vietnam. (2021). *Decision on approving the list of communes in Region III, Region II, and Region I belonging to ethnic minorities and mountainous areas for the period 2021-2025* (No. 881/QD-TTg dated on 04/6/2021-In Vietnamese).
- Ravallion, M., & van de Walle, D. (2008). Does rising landlessness signal success or failure for Vietnam's agrarian transition? *Journal of Development Economics*, 87(2), 191–209. <https://doi.org/10.1016/j.jdeveco.2007.03.003>
- Reynolds, T. W., Farley, J., & Huber, C. (2010). Investing in human and natural capital: An alternative paradigm for sustainable development in Awassa, Ethiopia. *Ecological Economics*, 69(11), 2140–2150. <https://doi.org/10.1016/j.ecolecon.2009.03.007>
- Sharaunga, S., & Mudhara, M. (2021). Analysis of Livelihood Strategies for Reducing Poverty Among Rural Women's Households: A Case Study of KwaZulu-Natal, South Africa. *Journal of International Development*, 33(1), 127–150. <https://doi.org/10.1002/jid.3516>
- Son, N. D. (2015). Some Economic Issues in New Rural Development in Vietnam at Present. *Vietnam Social Sciences*, 6(170), 11–20.
- Sturm, R. (2004). The economics of physical activity: Societal trends and rationales for



- interventions. *American Journal of Preventive Medicine*, 27(3 SUPPL.), 126–135. <https://doi.org/10.1016/j.amepre.2004.06.013>
- Tracy, J., & McDonald, R. (2015). Health and Disability: Partnerships in Health care. *Journal of Applied Research in Intellectual Disabilities*, 28(1), 22–32. <https://doi.org/10.1111/jar.12135>
- Tran, T. A., Pittock, J., & Tuan, L. A. (2019). Adaptive co-management in the Vietnamese Mekong Delta: examining the interface between flood management and adaptation. *International Journal of Water Resources Development*, 35(2), 326–342. <https://doi.org/10.1080/07900627.2018.1437713>
- Ulman, P., & Ćwiek, M. (2020). Housing Poverty in Polish Households and its Diversity. *Folia Oeconomica Stetinensia*, 20(1), 437–455. <https://doi.org/10.2478/fofi-2020-0026>
- Van den Broeck, G., & Maertens, M. (2017). Moving Up or Moving Out? Insights into Rural Development and Poverty Reduction in Senegal. *World Development*, 99, 95–109. <https://doi.org/10.1016/j.worlddev.2017.07.009>

SOFTWARE METHODOLOGIES IN THE DEVELOPMENT OF SOFTWARE SOLUTIONS

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ABSTRACT

Methods, models, and tools for software development are changing and advancing in line with the development of software methodologies and information technologies. Classical traditional methodologies are used as stable reliable development technologies, which in modern development models are supplemented by new technical and technological requirements and standards. The classical methodology, component-based software development (CBSD), during the last century, and even today, occupies a primary role in the software development industry. The quality of the developed software solution also depends on the chosen methodology for software development. New modern methodological trends are represented by flexible agile methodologies. With this paper we want to point out the directions of development of software methodologies, the possibility of their mutual combination and their role in achieving a certain level of quality in the development of software systems for the needs of small and medium enterprises.

Keywords: Component based software development, agile development, Object-oriented programming, software quality, iterative development, software solution generator, small and medium enterprises.

1. INTRODUCTION

Historically, the research of software engineering is focused on the field of programming languages, software methodologies, patterns, tools, and methods in the development of software solutions. According to the manner and procedures of problem solving, programming languages

are classified into procedural and object-oriented (OO). Procedural languages solve a program task with program code, in a program loop, which is still an unsurpassed way of creating software solutions. Known procedural programming languages that have been used to date, Fortran, Cobol, Basic, Pascal, C. By improving the mentioned programming languages, new modern programming languages have been developed, which have modern methods and procedures that meet high standards of design and programming techniques. Today, programming languages are more perfect and are built into frameworks that provide significant support for the development and upgrading of software solutions. Software solutions are thus developed on different platforms, in various environments, modern multifunctional programming languages, as well as from ready-made solutions in the form of software components. With the development of software from ready-made components, software products gain a new dimension, both in terms of development and the possibility of their maintenance. The framework is a library of visual components, built into a well-designed, flexible development solution, with a rich content of components and tools, which provides conditions for comfortable and productive work of programmers. The framework is a library of visual components, built into a well-designed, flexible development solution, with a rich content of components and tools, which provides conditions for comfortable and productive work of programmers. The result of this development research is a set of methodologies built into the Software Solution Development Framework, which incorporates technologies for modern software development, Internet applications (e.g., Microsoft .Net Framework, Visual Studio work environment). .Net Framework is support for standard programming languages, as well as newer predefined and modern programming procedural languages such as Java, C #, Python, PHP, C ++, Visual Basic, etc. The framework also includes support for working with the database as well as support for manipulating data in the database using a script declarative language such as SQL, or procedural Transact SQL.

The development of programming languages also develops methodological frameworks, work areas, tools, and models for the development of software solutions. Over the past four decades, Nabil and Munassar have highlighted the importance of five leading models in software development:

- Waterfall model,
- Iteration model,
- V-shaped model,
- Spiral model,
- Extreme model [1]

Following the example of traditional models, newer modern models have been developed, which are being upgraded in the range of agile methodologies, such as:

- Scrum and Extreme Programming, as leading models of Agile software development, which is basically a conceptual framework for software engineering, and promotes development iteration throughout the project life cycle [2].

2. METHODS AND MODELS OF SOFTWARE SOLUTIONS DEVELOPMENT

2.1. Waterfall Model

The traditional software development model is promoted as the so-called waterfall model. W.W. Royce (1970) [3] was the first who describe a waterfall model. He argued that a rigid phased software development system could evolve into a flexible iterative process. This model

supports six phases that develop over the software life cycle and continuously follow one another, without skipping or shortening phase tasks. The six basic phases include: requirements analysis, design, implementation, testing, integration and maintenance. The Waterfall model has remained in use for many years, and is still used today due to its advantages, which are not negligible:

- the time and effort invested in the earlier stages can lead to cost-effective economic development in the later stages,
- emphasizes the documentation and source code of the software product,
- progresses linearly through easily understandable defined phases, which implies simplicity,
- checkpoints are easily visible during the development process.

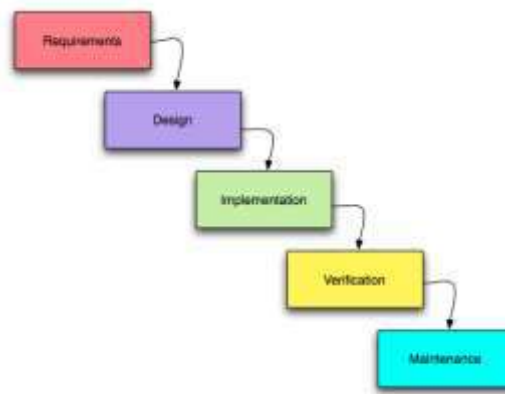


Figure 1: Practical implementation of the waterfall model ¹ [4] (based on Royce’s waterfall model, 1970.)

2.2. Iterative Model

The Waterfall model has significant advantages, but software development cannot be viewed as a uniform model. The experience of software teams and software solution designers proves that software development projects must be flexible to change, given that clients are prone to constant changes the information requirements. Thus, the problems generated by the waterfall model required an urgent solution. Software system development methods should provide faster results, eliminate the importance and amount of initial information, and offer greater flexibility [1]. Projects should be divided into small partial parts of the system, which are solved faster and have clearer requirements. Such wholes are called iterations. The development team has enough timely, input information and feedback from system users. One iteration is a mini-Waterfall process of one phase, which provides meaningful information and the result of the current state of the system, as well as input parameters for the design of the next phase. The result of one iteration is a new incremental release. The iterative development of the system is shown in the following figure:

¹ <http://www.umsl.edu/~hugheyd/is6840/waterfall.html>, retrieved, November, 2021.

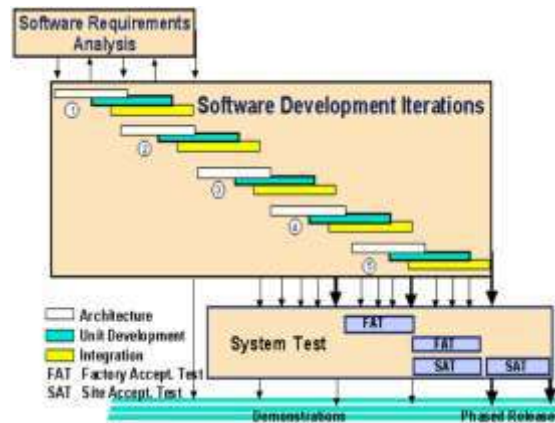


Figure 2: Iterative approach to development of software solutions [1].

2.3. Object-Oriented Programming (OOP)

The iterative development technique corresponds to the paradigm of software development methodology: Object-Oriented Programming. This programming technique offers partial units, which can be used to build a software solution according to the current requirements of programmers and users. According to the definition of OOP, an object is a complex whole, ie an entity, which contains data and methods that are executed on that data. The facility is easily adaptable to permanent changes of already specified information requirements. This software development model supports system analysis by levels, which contributes to:

- formal and logical design of the working framework of the future system,
- gradual elaboration of work tasks by facilities, and in accordance with project decisions,
- prototyping of a new system,
- evaluation of project decisions including economical choice and
- documenting all steps and iterations of system implementation.

The OO approach is building through an iterative software development lifecycle. Each iteration is an independent software unit and is implemented according to standard stages of development: analysis, design, programming, and testing. Each iteration is developed from start to finish, with comprehensive control of the achieved functionality. The result of the iteration can be embedded in a large number of software projects in which such functionality is required.

2.4. Rational Unified Process (RUP)

Different software systems design approaches promoted by leading experts Jacobson, Booch and Rumbaugh are integrated into the Unified Process (UP). The sponsor of the development of this methodology was the company Rational (a well-known software company that deals with the development of CASE tools). Thus, this process was named Rational Unified Process and belongs to the category of a new methodological approach to software development, which are popularly called "lightweight agile processes". Through joint research and practical experience and cooperation between the three authors, in 1997 a Unified Modeling Language (UML) was formed to support the RUP. UML is a standard recognized by the Object Management Group - OMG and is a standard language for the specification, design, visualization, construction, construction, and documentation of software system projects developed by OO technology [5].

The era of automation and high demands of the software industry sets strategic tasks, and thus raises the level of value of software products in many companies. The industry is constantly

looking for new techniques to automate software production and improve the reliability and quality of software products and software artifacts. Raising the quality of software implies reducing costs and shortening the time to market of software. Companies are forced to deal with solving problems: physical distribution of software solutions, competitiveness of software products on the market, data replication, security, load balancing of business system and software system, tolerance to software errors. In efforts to increase competencies in their own market, companies are constantly looking for technical progress in their own development opportunities. The UML model is designed to respond to these requirements and is used globally in processes: from visualization of a software solution project, to coding of program code. Such projects contain a detailed graphical description of the system, which greatly facilitates, speeds up and specifies communication between developers and end users.

4. NEW METHODOLOGIES CREATE REUSABLE (R) VALUES

The success rate of software development projects depending on the methodology used and whether it is adequate for the specific characteristics of those projects [6]. The methodology of software development is a complex set of operations necessary to provide benefits during development:

- consistent approach reduces the risk of errors,
- preparation of complete documentation for the current software project, as well as for future projects,
- raises the level of software quality, which is agile and flexibly adaptable to changes,
- changes of project teams, selected on the basis of experience and knowledge, are also adaptive,
- visual modeling (for example UML model) is easier to understand the system, and thus the adaptation of the system, instead of analyzing the software product through the search of program code.

Modern OO languages and purposeful work environments offer methodological and technical possibilities, as well as tools for creating software applications of different levels of complexity. A tool based on the OO programming language paradigm "Application Prototype Generator" can to ability to generate software system source code. The program code generator contains a set of generators for very different purposes in the process of project generation and implementation of the database schema. Following the example of application prototype generators, analysis of software requirements, methodological capabilities, tools, and technologies, we concluded that it is useful to create a generative software solution, which would be a tool for stable and reliable development of software projects for small and medium enterprises, whose are information requirements of a uniform nature. Companies have a high level of responsibility in the circumstances of very difficult and unpredictable market competition. It is necessary to ensure participation in one's own market, prestige among competitors, reliable business progress, a reliable source of information about one's own business as well as about the business and threats of competitors. For the company to participate in the competition, in such a fierce competitive ring, it must have a reliable and high-quality software solution that monitors the business and provides reliable reports on business results. Companies are in an unenviable situation, and it is quite certain and necessary to apply them to new and modern software solutions in companies that are developing in transition economies [7].

Ready-made software units offer reliable multi-tested software solutions. The integration of such reliable solutions into the new software system raises the level of innovation and modernization of procedures and tools with which software is developed. Companies often have uniform requirements because their software system usually monitors their financial and commodity operations. Therefore, reliable software blocks (reuse components) quickly and easily participate in the construction of software systems with uniform characteristics.

4.1. Architecture of component software development in the modern software industry

Software is a non-depreciable commodity. Once developed, without major oscillations, on a quality hardware platform, it can last a long time, unless it becomes obsolete². Elements that refer to the concept of software obsolescence include new operating system, new, more perfect, and comfortable software development and maintenance platforms, more rational access to the database, more modern interface and reporting system intended for end users, etc. The development of reliable software is taking precedence in the industry of the 21st century and is reflected in the combination of all previous software development methodologies with the new agile one. Component development, as the primacy of software systems development, are built on a three-layer architecture. The user interface is separated from the business logic, ie from the level of communication with the data, which creates the conditions for the functionalities of the parts of the software system to be developed independently and to be reused repeatedly. Independent functional units of three-layer development architecture are built of:

1. User interface layer - presentation layer graphical user interface - GUI,
2. Business layer - business logic layer - BLL,
 - Process components - local business functionality
 - Business domain components - business process functionality,
 - Business infrastructure components - functionality of business domains.
3. Technical infrastructure layer - technical service to business components - (data access layer - DAL), their physical storage on the disk of the database server.

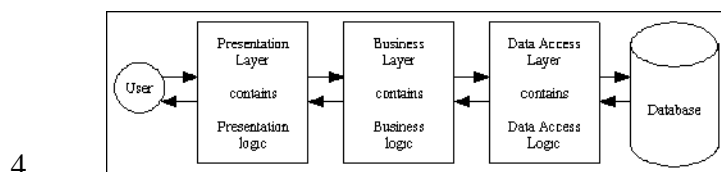


Figure 3: Slojevi komponentne arhitekture [8]

4.2. The role of agile methodologies in software project development

In modern software applications, agile software development methodologies are widely represented. Initially agile development originated in 2001 in Utah, USA. The most important methods that manage agile development are Scrum, XP, Open UP, Crystal, Lean, DSDM, Agile MSF. This development process is more adaptive, and the collaboration of staff involved in software solution development is far more efficient. Basically, all agile methods are based on 4 common principles:

- working staff involved in software development and their relationship is very important,
- software functioning is more important than multiple software documentation,

² It is very relative and biased to assess what it means that the software system is perpetual, and not obsolete, or that it is currently obsolete

- cooperation with customers is more important than direct contracting which specifies business tasks,
- response to new information requirements and changes that are reflected during further development of the system, is more important than pre-rigidly planned activities.

5. CONCLUSION

Software methodologies and software development processes significantly affect the quality of the software solution. Quality is equally important from the point of view of immediate users, as well as from the point of view of software developers. The software industry of the 21st century requires, above all, that software quality factors be satisfied. Software development methodology has a significant impact and role on the selection and control of the achieved level of software quality. Large and stable software systems that are developed by traditional or component methodologies, constantly need to be upgraded and changed. Traditional development requires the flexibility of development software tools and methods, in the form of agile development. Upgrading the traditional phases of the software development life cycle would mean the possibility of applying agile methods, when solving partial software tasks within large component-based development project phases or processes. Quality means the methodology, results, development process and tools with which development software activities and tasks are solved. "Quality factors are grouped according to performance, design, or adaptation concerns. These are the general categories that inherently characterize the nature of a software project's quality" [9]. The quality achieved in the development phases of the software project affects the functional quality which achieves a purposeful software system in accordance with user requirements. Raising the level of quality also raises the level of productivity, and the price of the software project becomes acceptable for the end user. A more productive project requires less human and time resources. A timely software solution is also a parameter of software project success. Quality during the development, implementation and maintenance of the finished software system implies, ultimately, the profitability of the software project and the companies that use the software system.

Modern software solutions create conditions for adaptive software development for all companies that are in a constant struggle for survival, especially in conditions where the state is in transition. The instability and insufficient strength of the state system cannot guarantee reliable measures to support insufficiently strong and financially weak companies. Therefore, it is necessary for such companies to provide reliance on their own capabilities, to rely on their own internal stable parameters. One of the most important parameters in the fight for survival on the market is doing business in the prism of modern technologies, the Internet and a modern information system that can meet the requirements of modern design and technical requirements. A reliable software solution is one of the most important tools that small and insufficiently strong companies must have at their disposal, in the conditions of unstable transitional movements of society.

REFERENCES

- [1] A. M. Nabil and A. Dr Govardhan, "A Comparison Between Five Models Of Software Engineering," vol. 7, no. 5, pp. 94-101, 2010.
- [2] V. Polishwala and D. A. k. Shastri, "Comparative Analysis of Various Software Development Approaches," in *Emerging Trends in Information Technology*, 2021.



- [3] V. W. Rovce, "Managing the development of large software systems," 1970.
- [4] V. Sauter, "The Traditional Waterfall Approach," 2009. [Online]. Available: <http://www.umsl.edu/~hugheyd/is6840/waterfall.html>.
- [5] Predrag, *Metodološko radni okvir za realizaciju softverskih projekata male i srednje veličine*, Subotica: University of Novi Sad, 2011, pp. 1-241.
- [6] Ț. Cristina, I. Jianu, J. Ionel and A. Gavrilă, "Influence factors for the choice of a software development methodology," *Accounting and Management Information Systems*, vol. 10, no. 4, p. 479–494, 2011.
- [7] Tatjana, V. Ivanka, G. Źeljko and P. Slobodan, "Application of new and modern software solutions in companies that are considered developmental in transition economies with reference to the application of internal audit," 2021.
- [8] Jelina Njeguš, *Projektovanje informacionih sistema Information Systems Design*, Beograd: Univerzitet Singidunum, 2009.
- [9] *Energy Software Quality Handbook*, "Renesas Synergy™ Platform, Synergy Software, Software Quality Assurance, 2017.

AN INCIDENTAL STRAATSMA SYNDROME DETECTED IN THE INVESTIGATION OF CATARACT ETIOLOGY

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ABSTRACT

Myelinated retinal nerve fibers are rare congenital anomalies that appear in the retina as gray-white opaque lesions with hairy edges that hide retinal details. Coexistence of myelinated retinal nerve fibers, amblyopia, axial myopia and strabismus has been defined as Straatsma Syndrome. In this case, we wanted to present our case, which was diagnosed as Straatsma Syndrome during the investigation of the etiology of our patient who had mature cataract at a very young age.

INTRODUCTION

Myelinated retinal nerve fibers (MRNF) are rare congenital anomalies that appear in the retina as gray-white opaque lesions with hairy edges that hide retinal details . They may be located in the optic disc or elsewhere in the retina. [1]

MRNF is found in approximately 1% of patients and was first described by the German pathologist Virchow . [2,3] Approximately 7% of the affected patients have bilateral involvement. MRNF is typically present at birth and the detected lesions are usually not progressive. It has rarely been reported to be an acquired or progressive syndrome. [3,4]

The pathogenesis of MRNF has not been totally elucidated. Oligodendrocytes are one of the main glial cells in the central nervous system and are responsible for the myelination of neurons in the central nervous system . This in turn isolates and speeds up the transmission of signals along axons. In the prenatal period, these cells actively proliferate and produce myelin under the influence of neurohormonal signals . [5] Normal myelination of optic nerve axons occurs through migration of oligodendrocyte progenitors along long axons . These progenitors then produce oligodendrocytes that produce myelin for axons . In humans, myelination along the optic nerve terminates in the lamina cribrosa , presumably due to dense astrocytes aggregation that can act as a barrier to prevent the migration of oligodendrocytes to the retina . [6] Histological studies from samples with MRNF mainly show areas of

myelination of nerve fibers surrounding cells that are morphologically very similar to oligodendrocytes . However, MRNF is separate from and not directly connected to the myelinated fibers in the optic nerve. [3] MRNF lesions in human samples show oligodendrocyte- like cells and surrounding myelination with significant patches of abnormal axonal and myelin sheath degeneration . [7]

Straatsma Syndrome is a syndrome in which ipsilateral myopia , strabismus , amblyopia and persistent myelinated nerve fibers in the retina coexist. [3]

CASE REPORT

A 23-year-old female patient was admitted to our clinic with the complaint of decreased vision in her right eye. From the anamnesis of the patient, it was learned that his right eye had a very poor vision. She was followed up with amblyopia in her childhood. She had no history of drug use and trauma. She was not exposed to any toxic agent and did not have a metabolic disease.

Direct and indirect light reflex was positive in both eyes.

Visual acuity was at the level of light sensation in the right eye and complete in the left eye.

In the slit-lamp examination, there was a mature cataract in the right eye and the fundus was not illuminated while the anterior segment and fundus were normal in the left eye .

Intraocular pressures were 16 mmHg in the right eye and 18 mmHg in the left eye . Eye movements were free in all directions. Our patient had 20 prism diopter exotropia in the right eye due to amblyopia. Orbital USG was normal in both eyes.

While refractive measurement could not be detected in the right eye with autorefractometer, it was measured as -0.25, -0.50x175 degrees in the left eye.

We decided to perform cataract surgery to improve the patients lowered visual acuity.

In the measurement taken with ultrasonic biometry repeated twice, the axial lengths were 27.56 mm in the right eye and 23.17 mm in the left eye. The phacoemulsification and intraocular lens implantation procedure was performed without any complications and the patient was called for follow-up on the 1st postoperative day for further examination.

Fundus examination performed under dilatation on postoperative first day revealed leukocoria and diffuse myelinated retinal nerve fibers including the optic nerve head and both temporal arcuates in the right eye. The left eye's fundus examination was normal.

Corrected visual acuity was counting fingers at 1 meter in the right eye and inefficient visual improvement was related to amblyopia.

The determination of axial myopia , strabismus , amblyopia and myelinated retinal nerve fiber led us to diagnosis of Straatsma Syndrome.

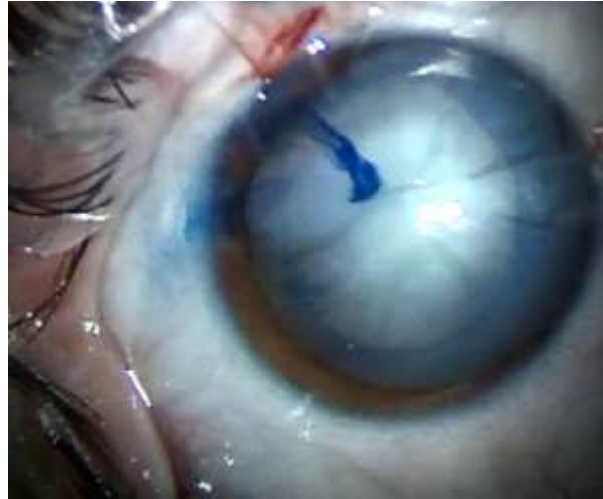


Figure 1: Intraoperative presentation of mature cataract



Figure 2: OD demonstrating myelinated retinal nerve fibers through optic disc and vascular structures

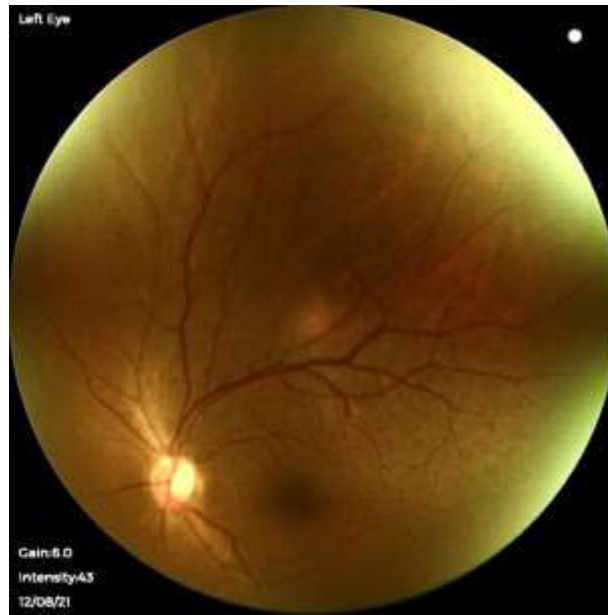


Figure 3: OS normal fundus view

DISCUSSION

Detection of MRNFs is usually based on incidental fundus examination. Because most of these patients are asymptomatic. They are rarely bilateral and rarely regress [8]

Myelinations around macula are thought to be a major cause of visual impairment. It has been stated that the excession of myelinated fibers in glial cells ignores the light and the transmission of retinal nerve impulses to reach lateral geniculate core and also causes axial elongation of the globe and myopia development. In axial myopia it takes longer the cribriform layer to develop and myelination may continue towards the optic nerve and retina. The formation of aberrant retinal fibers is thought to result from a failure to inhibit the passage of oligodendrocyte precursors responsible for myelination of axons in the optic nerve, cribriform layer, or optic nerve head . [8,9,10,11]

MRNFs are considered as an important differential diagnosis of leukocoria with retinoblastoma . [12] In our case leukocoria persisted after a successful cataract surgery postoperatively.

The absence of Straatasma Syndrome in association with mature cataracts in the literature distinguishes our case from other cases. The inefficient improvement of visual acuity in the right eye due to amblyopia supported our diagnosis. Therefore, a detailed anamnesis should be taken from patients presenting with cataract at a young age and further examination should be performed.

REFERENCES

1. Prakalapakorn SG, Buckley EG. Acquired bilateral myelinated retinal nerve fibers after unilateral optic nerve sheath fenestration in a child with idiopathic intracranial hypertension. JAAPOS. 2012 Dec;16(6):534-8. doi: 10.1016/j.jaapos.2012.08.006



2. Virchow VR. Zur pathologischen anatomic der netzaut und des scherven. Virchow's Arc Pathol Anat. 1856;10:170e193
3. Straatsma BR, Foos BY, Heckenlively JR et al. Myelinated retinal nerve fibers. Am J Ophthalmol. 1981 Jan;91(1):25-38. doi: 10.1016/0002-9394(81)90345-7
4. Shelton JB, Digre KB, Gilman J et al. Characteristics of myelinated retinal nerve fiber layer in ophthalmic imaging: findings on autofluorescence, fluorescein angiographic, infrared, optical coherence tomographic and red-free images. JAMA Ophthalmol. 2013 Jan;131(1):107-9. doi: 10.1001/jamaophthalmol.2013.560
5. Coman I, Barbin G, Charles P et al. Axonal signals in central nervous system myelination, demyelination and remyelination. J Neurol Sci. 2005 Jun 15;233(1-2):67-71. doi: 10.1016/j.jns.2005.03.029
6. Hunter SF, Leavitt JA, Rodriguez M. Direct observation of myelination in vivo in the mature human central nervous system. Brain. 1997 Nov;120 (Pt 11):2071-82. doi: 10.1093/brain/120.11.2071
7. Fitzgibbon T, Nestorovski Z. Morphological consequences of myelination in the human retina. Exp Eye Res. 1997 Dec;65(6):809-19. doi: 10.1006/exer.1997.0388
8. Campos F, Jiménez et al. Síndrome de straastma. Caso familiar de mielinización de fibras nerviosas. Rev Mexic Oftalmol. 2014;88(1):57-60
9. Osaguona VB, Uhumwangho OM. Myelinated retinal nerve fibers , myopia, amblyopia and strabismus. Niger Med J. 2014;55(6):517-8. doi: 10.4103/0300-1652.144714
10. Jalil N. Triad of myelinated retinal nerve fibers, axial myopia and amblyopia. J Ophtalmic Vis Res. 2010; 5(4):284-5
11. Shenoy R, Bialasiewicz AA, Al Barwani B. Bilateral hypermetropia, myelinated retinal nerve fibres and amblyopia. Middle East Afr J Ophthalmol. 2011;18(1):65-6. doi:10.4103/0974-9233.75891
12. Daniel LF, Teresita JM. Síndrome de mielinización de fibras nerviosas retinales, miopía y ambliopía. Rev Cubana Oftalmol. 2013;26 (2):668-78

TELE ÇALIŞMANIN ANKARA TRAFİK YÜKÜNÜ AZALTMA POTANSİYELİ TELEWORK'S POTENTIAL TO REDUCE ANKARA TRAFFIC LOAD

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ÖZET

Trafiğe eklenen araç sayısındaki artış özellikle iş gidiş ve dönüş saatlerinde yoğunluğa sebep olarak ciddi trafik yükü oluşturmaktadır. Yollardaki yoğunluk işe gidip gelme sürelerini uzatmakta, daha fazla yakıt harcanmasına sebep olmakta, strese ve hava kirliliğine yol açmaktadır. Bu sorunları çözmek için yolculukların daha verimli türlere yönlendirilmesi, ulaşım türlerinin kendi içinde verimliliğinin artırılabilmesi gayesiyle yolculuk talep yönetimi geliştirilmiştir. Tele çalışma yolculuk talep yönetimi stratejilerinden olup, çalışanların ev dahil her zaman ve her yerde çalışabilmesine imkan sağlayarak, trafiğin yoğun olduğu saatlerde ev-iş arasındaki özel otomobille yapılan yolculukların sayısını azaltma potansiyeline sahiptir. Bu çalışmada, tele çalışmanın Ankara trafik yükünü azaltma potansiyeli araştırılmıştır. Yapılan hesaplamalar sonucunda ev-iş arasındaki otomobil yolculuk sayısında tele çalışma gün sayısı 1 gün olması halinde %20 azalmaya, 2 gün olması halinde %40 azalmaya, 3 gün olması halinde %60 azalmaya, 4 gün olması gün olması halinde ise %80 azalmaya sebep olma potansiyeline sahip olabileceği belirlenmiştir. Sonuç olarak tele çalışma Ankara ilinde uygulanırsa ev-iş arası yolculuk yapan otomobil sayısını ciddi oranda düşürerek trafik yükünde yüksek oranda rahatlama sağlayabilme potansiyeli olduğu tespit edilmiştir. Böylelikle hem ulaşım süreleri kısılacak hem de hava kirliliğinde azalmalar olabilecektir.

Anahtar Kelimeler: Trafik, Trafik yükü, Yolculuk talep yönetimi, Tele çalışma, Ulaşım süresi.

ABSTRACT

The increase in the number of vehicles added to the traffic creates a serious traffic load, especially during the business hours of departure and return. Density on the roads prolongs commuting times, causes more fuel consumption, causes stress and air pollution. In order to solve these problems, travel demand management has been developed in order to direct the journeys to more efficient types and to increase the efficiency of the transportation modes. Teleworking is one of the journey demand management strategies, and it has the potential to reduce the number of private car trips between home and work during rush hour by enabling employees to work anytime and anywhere, including home. In this study, the potential of teleworking to reduce Ankara traffic load was investigated. As a result of the calculations, it has the potential to cause a 20% decrease in the number of teleworking days between home and work if it is 1 day, 40% decrease if it is 2 days, 60% decrease if it is 3 days, and 80% decrease if it is 4 days. As a result, it has been determined that if teleworking is applied in the province

of Ankara, it has the potential to provide a high level of relief in the traffic load by significantly reducing the number of cars traveling between home and work. Thus, both transportation times will be shortened and air pollution will be reduced.

Keywords: Traffic, Traffic load, Travel demand management, Teleworking, Travel time.

GİRİŞ

Türkiye İstatistik Kurumu (TÜİK) verilerine göre trafiğe her gün çok sayıda araç kayıt olmaktadır. Bu durum araç sahipliğinde ve trafikteki araç sayısında artışa yol açmaktadır. Elbetteki trafikteki araç sayısındaki artış bir çok sorun doğurmaktadır. Bu sorunların bazıları; trafikteki yoğunluk, ulaşma süresindeki artış, kaza olasılığı, gürültü, park etme ve park yeri eksikliği problemi, fazla enerji ve yakıt tüketimi, küresel ısınmaya katkı ve stress. Bu sorunlara çözüm getirmek amacıyla Yolculuk Talep Yönetimi (YTY) ortaya çıkmıştır. Bahsi geçen sorunların ortaya çıkardığı problemleri azaltmak amacıyla YTY bünyesinde çeşitli alt stratejiler kullanılmıştır. Tele çalışma bu alt stratejilerden birisidir.

Büyük şirketler, halihazırda en azından bazı iş grupları için hafta içi 08:00-17:00 arasındaki klasik işyerine gelmek ve gitmek yerine çalışanların işyerinin fiziki sınırlarından bağımsız bir şekilde istediği yerden, hatta evinden, işini yapma fikrini kabul etmiş durumdadırlar. Genel mantık, yapılması gereken görevin tamamlanmasıdır. Bu amaçla mutlaka işyerine gelmesine, orada bir yer işgal edilmesine, bunun için gerekli kira, elektrik-su-ısıtma giderlerine bütçe ayrılmasına gerek olmadığı gerçeği kavrandı. Bu durumun çalışan açısından da bir çok avantaj içerdiği gerçeği ortaya çıktı. Örneğin sabah-akşam trafik yoğunluğuna katlanmaması, işini evinde rahat bir ortamda istediği zaman diliminde gerçekleştirmesi, kendine ve ailesine zaman ayırması ve belki de işini erken bitirip boş zaman kazanarak bazı sosyal aktivitelere katılması vb. YTY açısından da bu çalışanların ev-iş arasındaki özel araçlarıyla yapacakları yolculukları gerçekleştirmemelerinden dolayı trafikte rahatlatma ve bu sebeple ulaşım sürelerinin kısalması gibi sonuçları doğurabileceği sonucuna varıldı. Elbette, unutulmamalıdır ki, bu tür uzaktan çalışmaya yani kısaca tele çalışmaya teknolojideki gelişmeler sebep olmuştur. Bu avantajların ve sonuçların farkına varan hem işyerleri, hem de trafik yoğunluğunu azaltma potansiyelini dikkate alan yerel ve ulusal yönetimler tele çalışmanın yaygınlaşması açısından teşvikler çıkarmaya başlamışlardır. Bu yüzden tele çalışma Avrupa ve Amerika gibi ülkeler de yaygın kullanım alanı bulmuş, önceleri düşük seviyede olan tele çalışma ve bu amaçla verilen teşvikler, gün geçtikçe artmaktadır [1-3]. Ancak, ülkemizde yeni ve çok düşük oranda olan tele çalışma, Covid-19'un pandemiye dönüşmesiyle hem Türkiye'de hem de dünyada pandemi şartlarının gereği bir mecburiyet olarak ortaya çıkmış ve tele çalışmanın avantajları görülmüştür. Öyleki, bazı işyerleri en azından uygun olan bazı çalışanlar için bu durumun kalıcı olabileceği konusunu düşünmeye ve uygulamaya başlamışlardır. Tele çalışma uygulamaları, hem çalışanların güvenliğini ve sağlığını koruyup işyerinin üretim sürekliliğini bozmamakta, hem de Covid-19 virüsünün kalabalık bir gruba yayılmasına engel teşkil ederek hükümetlerin resmi önlemlerine destek sağlamaktadır. Diğer bir deyişle, tele çalışma, hem hükümetlerin başlattığı maske ve sosyal mesafe kuralı ile hastalık riskini aza indirmenin en etkili yollarından olurken, hem de işyerlerinin üretim ve faaliyetlerinin devamını sağlayabilmektedir. Böylece teknolojinin desteğiyle Covid-19 pandemisine karşı tele çalışma uygulamalarının bir çözüm olabileceğini kavrayan şirketler he geçen gün artmaktadır. Mesela Facebook şirketinin CEO'su Mark Zuckerberg, 2020 yılı Temmuz ayında yeni tele çalışmayla işe başlayacak pozisyonların açılacağını ve önümüzdeki 5-10 yıl içinde Facebook çalışanların yarısını tele çalışma ve/veya farklı uzaktan çalıştırmayı amaçladıklarını bildirmiştir. Bir başka örnek olan Microsoft, Japonya'da bir uygulama başlatarak haftada 5 gün yerine 4 gün olan çalışma başlatmış ve Covid-19 sonrası işyerleri normal düzenine girdiğinde ise "hibrid" çalışma organizasyonuna

geçileceğini ve böylece, isteyen personelin 2020 yılı Ekim ayına kadar seçim yaparak evden çalışmayı seçebileceği konusunda serbest bırakmıştır. Amazon, Google, Twitter şirketleri de, Microsoft gibi, personellerine evden çalışabilme seçeneği sunmaktadırlar. Covid-19 pandemisi esnasında Barclays Bankası 80 bin personelinin yaklaşık 70 binini test için evden çalıştırmıştır. Mastercard ise, personelinin çoğunun kendi belirleyecekleri bir zamana kadar isterlerse uzaktan çalışabileceği seçeneğini sunmuştur. Facebook ve Google'dan sonra Fujitsu firması da pandeminin yeni normalini örnek göstererek, Japonya'daki ofis sayılarını yarıya düşüreceğini ve “iş hayatının değişim programı” ile 80.000 personeline sürekli bir esneklik sağlayabileceğini duyurmuştur. Bu değişim çerçevesinde Fujitsu firmasının çalışanlarının iş saatleri esnek olabilecek ve evden çalışmanın mümkün olabileceği her yerde bu program standart bir hale gelecektir [4].

Tele çalışma kavramı, Avrupa ve Amerika ülkelerine kıyasla ülkemiz için yeni bir kavramdır. Ancak Covid-19 ve beraberinde getirdiği pandemi koşulları tele çalışmanın dünyada ve ülkemizde yaygın kullanım alanı bulmasına sebep olmuştur. Hatta bazı şirketler bu sayede tele çalışmanın kendilerine ve çalışanlarına getirdiği avantajları kavradıklarından dolayı bazı şirketlerde kalıcı olabileceği görüşü hakim olmaya başlamıştır. Bu çalışmada, çeşitli ülkelerde birçok başarılı örnekleri bulunan yolculuk talep yönetimi alt stratejisi olan tele çalışmanın yardımıyla Ankara trafik yükünün muhtemel azaltma etkileri detaylı olarak araştırılmıştır.

1. TELE ÇALIŞMA

Uluslararası Çalışma Örgütü tele çalışmayı “işyeri merkezinden uzak bir mekânda, işyerindeki işçilerden ayrı yapılan ve yeni teknolojilerin bu ayrılmayı iletişim olanakları sağlayarak temin ettiği bir çalışma şekli” olarak açıklamıştır. İrlanda'nın tele çalışma konusundaki Milli Danışma Konseyi ise tele çalışmayı, “işin fiziki mekândan bağımsız olarak bilgi işlem teknolojileri kullanılarak yapıldığı bir çalışma biçimi” şeklinde belirtmektedir. Tele çalışma, çalışan kişilerin kendi evlerinden veya uydu ofislerde çalışmalarını sağlayarak, ev-iş arası yolculuklarını azaltmayı hedefler. Stratejiyi uygulamak için gerekenler; organizasyon, mekân ve teknolojidir [3]. Tele çalışma üzerinde çalışmaların doğuşu 1970'li yıllarda Nilles tarafından ortaya atılmıştır. Nilles petrol krizi ile beraber enerji tüketimini, iş yerine yapılan ulaşımın yerini sanal iletişimin yer almasını isteyerek hem ulaşım talebini hem de özel araç kullanımını azaltmayı hedeflemiştir.

Bilgi ve iletişim teknolojilerinin başardığı en önemli değişikliklerden biri, çalışanların her zaman ve her yerde çalışabilmesidir. Ev dahil her yerde çalışabilirler. Bu uygulamaya “tele çalışma” denir. Tele çalışma, işyerine ve işyerinden günlük gezilerin kısmen veya tamamen yerine bilgi teknolojisinin kullanılmasını ifade eder. Tele çalışma farklı tanımlamaları yapılsa da, aslında birbirinden çok farklı olmayan çok fazla terimin kullanılmasına yol açmıştır; “telecommuting”, “evden çalışma”, “e-çalışma”, “sanal çalışma”, “uzaktan çalışma”, “mesafeli çalışma”, “dağıtılmış çalışma”, “workshifting” veya “esnek çalışma” gibi bütün terimler aslında tele çalışmayı ifade etmektedir [4]. Ancak bu kavramlar, birbiriyle uyumlu, ancak kısmi olarak eş anlamlı olan farklı çalışma uygulamalarını tanımlamaktadır. Örneğin “tele-çalışma” çalışma haftasının en az bir gününü çalışanın işyerlerinden uzakta olarak düzenli bir şekilde yürütülen çalışma biçimidir.

1973 yılında, eski bir roket bilimcisi olan Jack Nilles, çalışmalarında yoğun nüfuslu bölgelerde trafik sıkışıklığı ve kirlilik için bir çözüm olarak hem “araç paylaşma” hem de “tele çalışma” terimlerini kullanmıştır. Nilles, tele çalışmanın gereksiz yere günlük işe gidip gelmeye çözüm olabileceğini savunmasına rağmen, şirketler yalnızca tele çalışma olasılığını 1970'lerin ortasındaki petrol krizi sırasında düşünmeye başladılar ve tele çalışmanın onlara krizi aşmakta yarar sağlayacaklarına inandılar. Bilgisayar ve yazılım alanlarındaki gelişmelerle birlikte, tele

çalışmaya ilgi artmaya başladı, bu nedenle ulaşım ve teknoloji arasındaki ilişkilerle ilk tele çalışma araştırmaları başladı [5].

Texas Ulaştırma Enstitüsü tarafından yapılan bir çalışma, Amerikalıların trafikte her zamankinden daha fazla zaman harcadıklarını tespit etmiştir. Amerika'nın en büyük şehirlerinde trafikte işe gidip gelme nedeniyle kaybedilen zamanın yılın iki çalışma haftası kadar süreyi kapsadığını ortaya koymuştur. Kaybedilen zamanı geri kazanmanın bir yolu olarak tele çalışma önerilmiş ve üretkenliğin artırılması, trafik sıkışıklığının azaltılması ve hava kirliliğindeki azaltılması için bir alternatif olarak sunulmuştur [6, 7].

Tele çalışmanın seyahat davranışı üzerindeki etkileri, büyük ölçüde Choo, Mokhtarian ve Salomon [8] nin çabalarıyla kapsamlı bir şekilde belgelenmiştir. Bu çalışmalara ilişkin değerlendirmeler Mokhtarian ve Varma [9], Mokhtarian ve arkadaşları [10] ve Choo ve arkadaşları [8] tarafından listelenmiştir. Yapılan bir dizi çalışma tele çalışanların yolculuk sayılarını ve kat edilen mesafeyi azalttığını, tele çalışma günleri boyunca tele çalışma olmayan günlere göre trafik üzerindeki etkilerini ve hava kalitesini araştırmıştır. Shafizadeh ve arkadaşları [11] 1998 yılında makro ölçeğe odaklanan araştırmalar yapmış ve tele çalışan başına ortalama tasarrufun yılda 1500 ve 3500 mil arasında değiştiğini bulmuştur. Bamister ve Marshall [12], 2000, tele çalışanların Hollanda'da tele çalışma günlerinde toplam sefer sayısını yüzde 50 azalttığını ve kat edilen mesafe başına 10 sent daha ucuz ulaşım sağlandığını bulmuştur. Aynı zamanda tele çalışma nedeniyle toplam seyahatlerde yüzde 17 ve en yoğun saat trafikte yüzde 26 azalma hesaplamışlardır.

Mokhtarian ve Varma [9] Kaliforniya'da uygulanan başka bir tele çalışma programı verilerini incelemiş ve uzaktan çalışma günlerinde tele çalışma olmayan günlere göre araç başına seyahat mesafesinin 53 mil daha düşük olduğunu bulmuşlardır.

Birleşik Krallık'ta, British Telecom (BT) çalışanları için bir tele çalışma programı uygulamış ve 2012 ve 2015 yılları arasında evde çalışmanın etkisiyle yıllık net olarak 6980 ton CO₂ emisyonunu azaltmayı başarmıştır. Elbette bu durum trafikte rahatlatma olarak da kendini göstermiştir.

Perez ve arkadaşları [13], tele çalışmanın etkisini İspanya'nın kuzeydoğusunda bulunan Zaragoza şehrinde araştırmışlardır. Sonuç olarak; yüzde 2.5 ile 15 arasında değişen tele çalışma ile trafikte yıllık 5.232,60 ve 31.395,90 bin euro tasarruf edilebileceği tahmin edilmiştir.

Sato, 2019 [14] bilgi iletişim teknolojisindeki gelişmelerin sağladığı dağınık bir işe gidip gelme tarzı olan evden çalışma, Japon beyaz yakalı çalışanlar arasında giderek daha popüler hale geldiğini belirtmiştir. 2010'a kadar 9-14 milyon çalışan evden çalışacak ve bu da Japonya'nın başkenti Tokyo'daki tıkanıklıkta %6,9-10,9'luk bir azalmaya neden olacağı tahmin edilmiştir. İlişkili maliyet tasarrufu, toplu taşımaya yapılan yıllık harcamaların % 7,9-26,4'üne eşdeğerdir. Bu olumlu dış etkilerin önemli boyutu nedeniyle, evden çalışma yoluyla sosyal olarak en uygun penetrasyon seviyesine ulaşmak için bir dereceye kadar politika desteği gerektiği belirtilmiştir.

Hatipoğlu [15], yaptığı çalışmada, kent ulaşım sektöründe, klasik, ciddi yatırımlar gerektiren ve geri dönüşümü uzun süren veya olmayan ulaşım politikaları yerine, az yatırım gerektiren ve mevcut kaynakların daha mantıklı ve verimli bir şekilde kullanılmasıyla kendini gösteren ulaşım politikaları benimsendiğini belirtmiştir. Artan ulaşım arz yaratmak yerine bunu yönetecek şekilde geliştirilmiş politikalar “yolculuk talep yönetimi stratejileri” olarak adlandırılmakta olduğunu vurgulamıştır. Çalışmada, 2 ayrı kuruluştaki, gerçekleştirilen iş yolculukları dikkate alınarak trafik yükünün azaltılması gayesiyle YTY stratejilerinden “araç paylaşma”, “toplulaşım iyileştirilmesi” ve “tele çalışma” uygulanmıştır.

Hatipoğlu ve Öztürk [16], son zamanlarda kent içi ulaşımı için hem sanayileşmiş hem de gelişmekte olan ülkelerdeki, uzmanlar ve yöneticiler, enerji tasarrufu ve çevre sorunlarını azaltmaya yönelik yeni ve güncel politikalar oluşturmaya gayret ettiklerini vurgulamışlardır. Bu amaçla çalışmalarında Türkiye için yeni ve organize uygulaması olmayan tele çalışma ve araç paylaşımı stratejilerinin kendi özel araçlarıyla ev-iş arası yolculuk yapanlar üzerine etkileri araştırılmıştır.

2. TELE ÇALIŞMANIN KENTSEL TRAFİK YÜKÜNE ETKİSİ

YTY’de hedef, ekonomik ve çevresel çıkarları göz önüne alarak ulaşımın amaçlarını ve stratejilerini yürütmek ve organize etmektir. Diğer bir deyişle, ulaşımın mevcut altyapısından maksimum kapasiteyle, en ekonomik ve çevreci bir şekilde yararlanmaktır. Bunu gerçekleştirmek için, yolculuklar daha verimli ve çevreci türlere yönlendirilmeli ve ulaşım seçeneklerinin kendi içinde verimliliklerinin artırılması gerekmektedir. Bunun için YTY çok dinamik, esnek ve geliştirilmeye açık olmalıdır. Bu çalışmada YTY stratejisi olarak tele çalışma seçilmiştir. Birçok ülkede YTY yaklaşımları yasalarla ve ulusal politikalarla uygulamaya konulmuş ve “yolculuk azaltma yöntemleri” kapsamında araştırmalar yapılmış, maddi destekler ve çeşitli engelleyici uygulamalarla özel araç kullanımını azaltmak ve/veya kaldırmak için çeşitli yollar denenmiştir ve denenmeye devam edilmektedir. Bu çalışmada YTY stratejilerinden tele çalışmanın, Ankara trafik yükünü azaltma potansiyeli detaylı olarak incelenmiştir.

Son yıllarda, YTY’nin önemi giderek daha da artmıştır. Yoğun trafik sıkışıklığını ve hava kirliliğini azaltmak ve ulaşım ile ilgili sorunları çözmek için YTY üzerinde detaylı çalışmalar yapılmıştır. Bu amaçla hergün artan sayıda şehir, belde ve işletmeler YTY programlarını benimsiyor. Ayrıca, hükümetler ve birçok eyalet ve yerel bölge YTY için teşvik veriyor veya işverenlerin YTY programlarını işyerlerinde uygulamalarını zorunlu kılacak yaptırımlar getirmeye çalışıyor. Buna en güzel yol gösterici örnek Amerikanın Federal Karayolu İdaresi’ne bir rehber olması için hazırlanmış COMSIS şirketince kestirimci bilgisayar yazılım modeli desteğiyle şekillendirilen, analitik ve ampirik kaynakları bütünleştirerek geliştirilen klavuzdur. Bu klavuz [17], YTY geliştirme ve uygulaması için süreçleri öneriyor ve teklifler sunuyor. Etkili YTY stratejilerinin seçimi konusunda rehberlik ederek, daha fazla strateji geliştirmeye yardımcı oluyor. Daha kısa sürede ve daha az hayal kırıklığı ile etkili bir YTY programı seçmeniz için yol gösteriyor. Bir genel bakış ile YTY planlamasının "büyük resminin", ardından hangi stratejilerin belirlenmesinde rehberlik ediyor. İstenen veya gerekli bir yolculuk azaltma elde etmek için mantıklı olan stratejilerin ne kadarına ihtiyaç olduğunu belirlemenize yardımcı oluyor. Bu sayede minimum zaman ve para harcanarak sadece doğru çaba seviyesini seçerek - ne çok az ne de çok fazla olmayan- başarılı bir YTY programının faydalarından yararlanmanız açısından yol gösteriyor.

YTY tek bir eylem değil, bir dizi eylemdir ve amacı yolcuların, özellikle günün en sıkışık saatlerinde, araba kullanmanın alternatiflerini kullanmaya teşvik etmek için stratejiler üretmektir. YTY terimi, hem tek başına araç sürüşüne alternatif yöntemler hem de bu yöntemlerin kullanımını teşvik eden teknikler veya stratejiler bütünüdür. YTY alternatifleri aşağıdakiler gibi herkesin bildiği seyahat seçeneklerini içerir: tele çalışma, araç paylaşımı (carpooling), toplu ve özel toplu taşıma (otobüs ve servisler dahil), bisiklet, yürüyüş ve diğer motorsuz seyahatler. YTY alternatifleri aynı zamanda “alternatif çalışma saatleri” program seçeneklerini de içerir; Taşıtların iş yerine gitmesi gereken gün sayısını veya vardiyayı azaltarak çalışanları günün yoğun olmayan zamanlarında seyahat etmeye yöneltmek. Alternatif çalışma saatleri üretmek: çalışanların tam 40 saat çalıştığı sıkıştırılmış çalışma haftaları yerine tipik 5 günden daha kısa sürede çalışma; çalışanların iş başlangıçlarını değiştirmelerine olanak tanıyan

esnek çalışma programları ve günün daha az sıkışık zamanlarına bitiş saatleri (dolayısıyla seyahat süreleri); ve çalışanların bir veya daha fazla gün evde veya evlerine daha yakın bir “uydu çalışma merkezinde” çalışmalarının sağlanması.

Bu çalışmanın ana konusu tele çalışma olduğundan YTY stratejilerinden tele çalışmanın kentsel trafik yüküne etkisine odaklanacaktır. Tele çalışma, ulaşımdaki talebi azaltmaya yardımcı olabilecek potansiyel bir tekniktir. Tele çalışma, aşağıdakilere izin veren çeşitli standart dışı istihdam düzenlemelerini içerir: yoğun saatlerde çalışanların evde veya başka yerlerde çalışmasını sağlayarak karayolundaki yolculukları kaldırarak, trafik tıkanıklık seviyelerinin azaltılmasına, hava kalitesinin iyileştirilmesine ve enerji tüketiminin azaltılmasına katkıda bulunmak. Telekomünikasyon programları işverenlere de fayda sağlayabilir ve ofis alanı ihtiyaçlarını azaltarak, üretkenliği artırarak ve daha fazlasına izin vererek çalışanların bireysel çalışmaları için esneklik kazandırabilir. Yukarıda belirtildiği gibi trafik sıkışıklığı ve hava kalitesi çoğu kentte en önemli problemler arasındadır. Kentlerdeki trafik yükünün azaltılmasında tele çalışma etkili olabilir.

Bu çalışma sadece tele çalışma stratejisinin uygulanmasını içerdiğinden, tele çalışmanın etkisini tespit etmek adına çalışanların çalışma programlarına göre çalışma haftasının belirlenen günlerinde tele çalışma ile evden çalışabilecek olanlar belirlenirse ilgili tablolara göre [17];

Yolculuk Azalması yüzdesi (VTR1), aşağıda belirtildiği gibi hesaplanabilir;

$$VTR1 = \text{Tele çalışan yüzdesi} \times TCK \quad (1)$$

burada TCK, tele çalışma katsayısı olup Tablo 1’de verilmiştir.

Tablo 1. Tele çalışma katsayısı (TCK) [17].

Tele çalışma gün sayısı	Tele çalışma katsayısı (TCK)
1	0,2
2	0,4
3	0,6
4	0,8
5	1

Başlangıç ortalama araç kullanımı (AVR0), yolculuk yapan kişilerin toplam sayısının, bu yolculukları gerçekleştirmek için trafiğe çıkacak araç sayısına oranı olarak tarif edilmektedir;

$$AVR0 = \frac{\text{toplam yolculuk yapan kişi sayısı}}{\text{bu yolculuklar için trafiğe çıkan araç sayısı}} = \frac{YS}{VT0} \quad (2)$$

Asıl amacımız yolculuklar için trafiğe çıkan araç sayısını azaltmak olduğuna göre hedef ortalama araç kullanma seviyesi (AVRH) ise, AVR0 değerinden daha büyük olarak belirlenmeli ve seçilen YTY stratejisi ile bu hedef sağlanmaya çalışılmalıdır.

Bu durumda tele çalışma stratejisi sonrası gerçekleşecek ortalama araç kullanımı, AVR1, Denklem 3 yardımıyla hesaplanır. Sonra, strateji sonrası yolculuk için trafiğe çıkan araç sayısı, VT1 ise Denklem 4 yardımıyla tespit edilir.

Strateji sonrası değerler aşağıdaki denklemler yardımıyla hesaplanır;

Strateji sonrası ortalama araç kullanımı (AVR1),

$$AVR1 = \frac{AVR0}{(1-VTR1)} \quad (3)$$

ve strateji sonrası yolculuk için trafiğe çıkan araç sayısı

$$VT1 = VT0x(1 - VTR1) \quad (4)$$

burada VTO, pik saatteki araç yolculuğunu gösterir.

Tele çalışmanın kentsel trafik yüküne etkisini incelemek için parametreler sırasıyla;

1. Tele çalışan yüzdesi
2. Tele çalışma gün sayısı
3. Başlangıçtaki yoğun saatteki trafiğe çıkan araç sayısı, VTO
4. Başlangıç ortalama araç kullanımı, AVR0

Bu parametrelerin incelenmesi sonucu tele çalışma sonrası hesaplanacak veriler ise;

1. Gerçekleşecek yolculuk azalması yüzdesi, VTR1
2. Gerçekleşecek ortalama araç kullanımı, AVR1
3. Gerçekleşecek yoğun saatteki trafiğe çıkan araç sayısı, VT1
4. Gerçekleşecek trafikteki azalan otomobil sayısı

Bu çalışmanın konusu olan tele çalışmanın Ankara trafik yükünü azaltma potansiyelini tespit etmek adına yukarıda belirtilen hesap yöntemi Ankara'ya uygulanacak ve tele çalışmanın uygulanmasıyla Ankara trafiğinden yoğun saatlerde muhtemel uzaklaştırılabilecek araç sayıları tespit edilmeye çalışılacaktır.

3. TELE ÇALIŞMANIN ANKARA TRAFİK YÜKÜNÜ AZALTMA POTANSİYELİ

Türkiye İstatistik Kurumu (TÜİK)'in 2021 kayıtlarına göre sadece Eylül ayındaki trafiğe kayıt edilen taşıtların %47,8'lik kısmını otomobil, %29'luk oranını motosiklet, %12,3 oranını kamyonet, %7,2'lik kısmını traktör, %2,3'ü kamyon, %0,9'u minibüs, %0,4'lük oranını otobüs ve %0,1'ini de özel amaçlı taşıtlar oluşturmaktadır. Trafiğe kayıt yapılan taşıt sayısı ise bir önceki ay olan Ağustos ayına göre %3 azalmıştır. Sadece 2021 Eylül ayında trafiğe kayıt yapılan 92.996 adet taşıtın 30.526 adeti İstanbul'a ve 7.235 adeti ise Ankara'a kayıt olmuştur ve 2021 Eylül ayı itibariyle (Tablo 2) [18] Ankara'da 1.647.864 adeti otomobil olmak üzere toplam 2.249.260 adet motorlu kara taşıtı mevcuttur. Ankara'a bir yılda trafiğe çıkan araç sayısı Türkiye'deki en az 20 ilin nüfusunun toplamından fazlasına eşittir.

Ankara, başkent olması dolayısıyla, sosyal ve ekonomik olarak büyüklüğünün yanında nüfusu, toplam araç sayısı ve ulaşım istatistikleri dikkate alındığında ülkemizin İstanbul'dan sonra ikinci büyük kentidir. Bu sebeple özellikle yoğun saatlerde ciddi trafik sıkışıklıkları yaşanmaktadır.

Her ne kadar İstanbul'a nazaran daha az otomobil bulursa da kişi başına düşen otomobil sayısı bakımından Ankara ülkemizde ilk sırada yer almaktadır. Kentte ulaşım planlamasının esasını oluşturması beklenen Ulaşım Ana Planı 2015 hedef yılıyla 1994'te hazırlanmıştır. Mevcut plan güncelliğini yitirdiğinden dolayı hedef yılı 2038 olan yeni planın hazırlanmasına ilişkin çalışmalara devam edilmektedir ve çalışmanın yürütüldüğü bu dönem itibariyle halen tamamlanmadığı tespit edilmiştir.

Tablo 3 ve Tablo 4’te farklı yıllar için Ankara’da günlük yolculukların dağılımı verilmiştir. Tablo 4’te yer alan Elektrik Gaz Otobüs Genel Müdürlüğü (EGO) verilerine göre Ankara’da günlük yolculukların yaklaşık yüzde 61’i toplu taşıma sistemleriyle, yüzde 39’u ise bireysel ulaşım sistemleriyle (yüzde 33 otomobil, yüzde 6 taksi) yapılmaktadır. Öte yandan toplu taşıma sistemleri kendi arasında değerlendirildiğinde minibüs ve dolmuşların yüzde 37’lik bir oranla ilk sırada geldiği, bunları yüzde 23 ile belediye otobüslerinin, yüzde 20 ile servis araçlarının, yüzde 10 ile halk otobüsü ve özel toplu taşıma araçlarının, yüzde 9 ile de metro ve hafif raylı sistemlerin takip ettiği görülmektedir. Tablo 5’te günlük ve yıllık yolculuk verileri sunulmuştur.

Tablo 2. TÜİK 2021 Eylül verileriyle il bazında motorlu kara taşıtları sayısı [18].

İllere göre motorlu kara taşıtları sayısı, 2021									
The number of road motor vehicles by province, 2021									
İl	Toplam	Otomobil	Minibüs	Otobüs	Kamyonet	Kamyon ⁽¹⁾	Motosiklet	Özel amaçlı	Traktör
Provinces	Total	Car	Minibus	Bus	Small truck	Truck ⁽¹⁾	Motorcycle	Special purpose	Tractor
Toplam-Total	25 022 960	13 591 103	487 395	209 898	4 073 560	880 043	3 698 361	76 609	2 005 991
Adana	706 779	360 745	11 200	4 577	108 773	20 519	143 997	1 557	55 411
Adıyaman	114 120	53 237	4 334	388	16 442	3 540	16 436	354	19 389
Afyonkarahisar	236 534	93 397	4 953	1 550	37 693	9 988	43 012	729	45 212
Ağrı	30 868	8 806	2 128	300	6 794	2 007	1 535	468	8 830
Amasya	125 628	63 334	2 856	631	18 263	3 659	14 311	335	22 239
Ankara	2 249 260	1 647 864	26 368	18 322	336 812	85 738	64 056	8 848	61 252
Antalya	1 202 543	573 533	16 550	11 137	203 176	25 724	315 194	3 240	53 989
Artvin	41 922	17 415	2 036	320	14 651	3 791	1 878	266	1 565
Aydın	492 886	194 860	10 488	2 820	75 093	9 359	147 663	912	51 691
Balıkesir	516 479	224 781	6 397	3 071	72 352	13 100	129 327	1 244	66 207
Bilecik	72 658	35 098	1 087	889	12 447	3 191	8 266	311	11 369
Bingöl	18 002	8 592	1 167	240	4 587	1 139	766	329	1 182
Bitlis	22 783	8 079	1 522	160	5 988	1 774	682	337	4 241
Bolu	120 784	58 940	1 503	922	17 445	6 172	12 486	542	22 774
Burdur	141 322	56 863	1 354	819	16 443	5 832	36 136	406	23 469
Bursa	989 878	559 556	15 657	7 929	184 164	29 729	120 827	2 675	69 341
Çanakkale	246 559	98 088	2 688	1 742	35 505	6 168	66 354	704	35 310
Çankırı	55 448	22 465	684	513	8 515	1 957	6 000	266	15 048
Çorum	180 214	85 010	2 607	1 031	23 169	5 787	19 110	387	43 113
Denizli	441 143	213 453	7 288	3 919	69 825	12 483	76 888	1 096	56 191
Diyarbakır	128 223	54 614	5 791	1 391	22 031	6 551	11 609	1 283	24 953
Edirne	168 443	72 716	1 986	1 776	22 937	4 578	31 234	372	32 844
Elazığ	136 931	78 660	3 757	792	27 299	5 712	8 080	522	12 109
Erzincan	63 018	30 174	1 551	474	11 894	2 022	9 100	380	7 423
Erzurum	123 425	61 762	2 597	1 181	27 281	5 879	3 313	716	20 696
Eskişehir	306 944	179 116	4 023	2 704	48 662	10 886	35 486	800	25 267
Gaziantep	563 377	252 724	13 434	4 700	99 544	20 668	130 803	1 292	40 212
Giresun	98 389	45 670	7 371	407	31 637	4 704	4 629	516	3 455
Gümüşhane	26 073	11 384	1 028	203	6 249	1 518	1 605	215	3 871
Hakkari	9 034	2 244	1 186	70	2 120	1 270	469	571	1 104
Hatay	525 008	231 979	10 162	3 906	66 847	20 968	165 853	989	24 304
Isparta	188 902	86 518	2 404	1 385	26 211	4 701	43 429	510	23 744
Mersin	669 384	305 123	9 294	5 482	115 263	35 481	159 744	1 558	37 439
İstanbul	4 604 028	3 146 946	95 888	37 847	730 972	137 894	417 037	10 440	27 004
İzmir	1 557 685	855 713	17 361	15 024	256 119	44 475	293 181	4 507	71 305
Kars	45 937	12 228	1 578	361	7 772	1 832	1 857	245	20 064
Kastamonu	137 845	64 640	2 581	957	19 194	5 470	11 809	519	32 675
Kayseri	405 731	253 796	6 656	5 227	69 404	17 420	20 458	1 057	31 713
Kırklareli	139 989	63 816	2 352	1 702	17 282	4 390	28 921	342	21 184
Kırşehir	71 604	40 219	1 097	486	9 156	2 468	5 155	201	12 822
Kocaeli	439 622	261 834	9 485	7 007	80 241	24 198	36 638	1 448	18 771
Konya	767 777	373 728	11 727	5 685	131 961	39 051	109 737	2 478	93 410
Kütahya	220 114	109 843	3 645	1 798	28 129	7 357	33 665	610	35 067
Malatya	192 135	103 734	4 454	1 768	37 416	5 613	11 697	557	26 896
Manisa	628 195	228 899	7 380	7 057	76 523	16 052	194 668	1 227	96 389

Kahramanmaraş	255 934	145 769	6 915	1 999	46 127	7 925	22 410	785	24 004
Mardin	78 925	24 468	4 081	680	18 301	10 129	8 701	630	11 935
Muğla	549 826	225 142	9 483	4 331	80 403	10 417	182 356	1 582	36 112
Muş	34 257	9 240	1 412	209	7 340	1 745	1 009	314	12 988
Nevşehir	129 477	56 876	3 655	747	21 181	7 022	16 413	306	23 277
Niğde	113 418	50 237	2 035	941	19 557	5 910	15 746	387	18 605
Ordu	149 802	81 664	10 863	1 111	38 499	6 355	8 064	513	2 733
Rize	85 843	37 120	3 296	580	35 053	5 920	3 406	312	156
Sakarya	309 347	158 500	5 818	3 130	51 036	11 113	36 301	971	42 478
Samsun	393 594	194 827	13 193	1 532	74 773	10 807	41 722	752	55 988
Siirt	20 898	7 036	1 495	120	5 143	969	2 179	349	3 607

Tablo 2. TÜİK 2021 Eylül verileriyle il bazında motorlu kara taşıtları sayısı [18] (devamı).

İllere göre motorlu kara taşıtları sayısı, 2021									
The number of road motor vehicles by province, 2021									
								Özel amaçlı	
İl	Toplam	Otomobil	Minibüs	Otobüs	Kamyonet	Kamyon ⁽¹⁾	Motosiklet	Special purpose	Traktör
Provinces	Total	Car	Minibus	Bus	Small truck	Truck ⁽¹⁾	Motorcycle		Tractor
Toplam-Total	25 022 960	13 591 103	487 395	209 898	4 073 560	880 043	3 698 361	76 609	2 005 991
Sinop	62 836	32 690	1 879	300	9 344	2 109	6 966	249	9 299
Sivas	169 457	88 823	3 094	1 260	27 323	6 280	8 184	565	33 928
Tekirdağ	286 851	152 368	5 452	5 489	47 022	11 148	33 095	840	31 437
Tokat	191 343	88 362	4 019	1 136	28 059	4 749	20 705	505	43 808
Trabzon	216 605	120 580	9 861	1 468	63 283	11 699	8 433	783	498
Antalya	1 196 909	570 943	16 561	11 167	202 504	25 643	313 128	3 194	53 769
Tunceli	10 028	3 943	558	113	1 904	452	609	489	1 960
Şanlıurfa	260 535	93 926	8 653	1 509	28 779	14 461	72 033	990	40 184
Uşak	144 710	70 006	2 323	1 357	20 198	4 258	26 005	390	20 173
Van	77 009	27 732	6 982	691	22 022	5 834	3 580	830	9 338
Yozgat	110 526	49 993	2 283	563	13 434	5 294	4 026	375	34 558
Zonguldak	162 237	98 976	4 298	1 766	26 322	6 336	13 983	518	10 038
Aksaray	134 270	69 434	1 471	1 361	19 095	6 747	14 371	523	21 268
Bayburt	16 148	6 927	564	111	3 020	690	1 303	93	3 440
Karaman	95 088	38 175	1 719	569	12 834	2 609	26 343	291	12 548
Kırıkkale	69 795	41 652	1 676	552	8 473	2 622	4 431	269	10 120
Batman	47 615	16 212	2 618	287	11 748	2 615	7 446	357	6 332
Şırnak	29 583	5 468	1 391	157	5 144	10 436	2 839	1 070	3 078
Bartın	54 005	30 529	1 484	514	7 947	1 654	5 654	205	6 018
Ardahan	19 069	3 846	698	51	2 813	483	534	158	10 486
İğdır	28 673	6 518	1 290	265	5 493	3 267	6 828	194	4 818
Yalova	70 740	38 240	2 202	979	13 785	2 103	9 911	277	3 243
Karabük	68 255	41 878	1 663	565	9 809	3 104	4 914	266	6 056
Kilis	49 649	11 348	907	149	3 972	1 069	25 068	228	6 908
Osmaniye	176 537	87 430	3 793	1 075	25 032	3 964	36 696	446	18 101
Düzce	119 061	59 718	2 619	1 524	18 340	4 790	18 898	390	12 782

Tablo 3. Ankara’da Günlük Yolculukların Dağılımı (2000) [19]

Araç Türü	Yolcu Sayısı	Yolcu Payı %
Otobüs	1 315 000	27,93
Minibüs	990 000	22,76
Servis Araçları	685 000	15,75
Banliyö Treni	100 000	02,30
Ankara Metrosu	175 000	04,02
Ankaray	175 000	04,02
Toplu Taşıma	3 340 000	76,78
Özel Oto	750 000	17,24
Taksi	260 000	05,98

Bireysel Ulaşım	1 010 000	23,22
Genel Toplam	4 350 000	100,00

Tablo 4. Ankara’da Günlük Yolculukların Dağılımı (2013) [19]

Ulaşım Türü	Yolcu Sayısı	Genel (%)	Toplu Taşıma (%)
EGO Otobüsleri	710.400	13,9	22,7
ANKARAY	105.450	2,1	3,4
Metro	170.940	3,3	5,5
Banliyö Treni	65.000	1,3	2,1
Minibüs-Dolmuş	1.152.900	22,5	36,8
Servis Araçları	610.000	11,9	19,5
Özel Halk Otobüsü	190.000	3,7	6,1
Özel Toplu Taşıma Aracı	88.800	1,7	2,8
İlçe Özel Toplu Taşıma Aracı	40.320	0,8	1,3
Toplu Taşıma Toplamı	3.133.810	61,2	100
Taksi	290.000	5,7	
Otomobil	1.700.000	33,2	
Özel Ulaşım Toplamı	1.990.000	38,8	
GENEL TOPLAM	5.123.810	100	

Tablo 4 ve Tablo 5’te yer alan günlük ve yıllık yolculuk verileri birlikte değerlendirildiğinde, yaklaşık bir hesapla, 2012 yılında otomobiller ile 605 milyon, minibüs ve dolmuşlarla 410 milyon, belediyeye ve şahıslara ait otobüslerle 367 milyon, raylı sistemler ile 95 milyon yolcu taşındığı söylenebilir. Yaklaşık 5 milyonluk bir nüfusa sahip olan Ankara’da ulaşımın çoğunlukla otomobil, minibüs ve dolmuşlar ile yapılması kentin trafik yükünü ortaya koymaktadır [19].

Tablo 5. Ankara’da Günlük ve Yıllık Yolculukların Dağılımı (2014) [19]

Durum	Raylı Sistemler	Başlama-Bitiş	Uzunluk (km)	İstasyon	Yolcu/Gün	Yolcu/Yıl (2012)
Mevcut	ANKARAY HRS	1992-1996	8,5	11	105.000	37.862.000
	Ankara Metro	1993-1997	14,6	12	170.000	56.631.000
	Kızılay-Çayyolu Metro	2011-2014	18,0	11	-	-
	Batıkent-Sincan Metro	2011-2014	15,6	11	-	-
	Toplam		56,7	45	275.000	94.493.000
İnşaatı Süren	Tandoğan-Keçiören Metro	2011-2014	10,2	10		
	Toplam		10,2	10		
	Genel Toplam		66,9	55		

Ankara’da günlük toplu taşıma yolcu sayıları 2020 ve 2021 verileri Tablo 6 ve Tablo 7’de verilmiştir. Tablo 6 incelendiğinde Covid-19 pandemisi başlamadan önceki 2020 Mart ayındaki

günlük toplu taşıma yolcu sayısı 1.701.177 iken pandemi başladıktan sonra ciddi bir düşüş göstermiştir. Ancak 2021 yılı sonu verileri neredeyse tekrar aynı sayılara ulaşıldığını göstermektedir. Toplu taşıma yolcu sayısının artmasıyla paralel olarak özel otomobil yolculuk sayısı da ciddi olarak artmış olsa gerekki yine sabah ve akşam saatlerinde ciddi trafik yoğunluğu başlamıştır. Hatta pandemiden dolayı insanların toplu taşımayı kullanmak yerine özel otomobillerini tercih ettikleri tespit edilmiş olduğundan dolayı pandemi öncesinden daha fazla trafik yoğunluğu göze çarpmaktadır.

Tablo 6. Ankara’da Günlük Toplu Taşıma Yolcu Sayıları (2020-2021) [20]

	2020									
	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Toplu Taşıma Türü	9	6	4	1	6	3	7	7	2	7
EGO	795922	115097	154006	240788	343417	4485	326843	362342	398288	264590
ANKARAY	123765	7675	10266	27673	41073	1	38744	39585	45195	29713
METRO	363151	42524	52015	105390	148316	155	139736	150150	161938	113438
TCDD TAŞIMACILIK	49897	7130	8944	17793	25718	17	23780	24997	27201	20405
OTOPARK										
LALAHAN										
ÖTA ŞEHİRİÇİ	124506	16756	19778	42997	55058	18408	51068	35974	58344	40176
ÖHA ŞEHİRİÇİ	243936	34100	35687	82312	119001	35606	117232	125870	135630	95650
AKYURT										3.546
ÇUBUK										4.628
OYACA										
AYAŞ										
ELMADAĞ										
KAZAN										
HASANOĞLAN										
SİRKELİ										
TELEFERİK	7308	0	0	0	0	0	0	0	0	0
TOPLAM	1.701.177	223.282	280.696	516.953	732.583	58.672	697.403	738.918	826.596	572.146

Tablo 6. Ankara’da Günlük Toplu Taşıma Yolcu Sayıları (2020-2021) [20] (devamı)

	2021											
	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
Toplu Taşıma Türü	1	1	1	1	3	1	1	1	1	1	1	3
EGO	52281	322448	355381	413423	149544	358.297	442.787	227.218	452.284	600.260	632.693	629.900
ANKARAY	1	40016	43861	47809	9234	45945	63.176	38.543	63.207	101.197	110.783	107.136
METRO	3	140703	156944	176923	47434	165199	217.886	112.058	224.909	300.884	300.259	306.694
TCDD TAŞIMACILIK	1583	25414	27477	30185	8880	29.253	37.401	20.525	37.064	46.653	50.826	50.858
OTOPARK			0	16	0	9	10	8	24	34	10	35
LALAHAN								191	279	425	506	458
ÖTA ŞEHİRİÇİ	0	50257	56797	64450	0	55715	64.664	37.638	64.262	78.886	82.750	82.083
ÖHA ŞEHİRİÇİ	0	111757	125009	135967	17580	124.354	148.717	78.751	158.171	184.631	189.707	193.958
AKYURT	0	4185	4509	5179	565	4776	5.045	3.474	6.308	7.140	7.451	7.358
ÇUBUK	0	5608	6162	6836	1129	6.469	7.913	4.849	7.673	9.131	11.336	10.894
OYACA							176	139	126	200	196	194
AYAŞ							0	15	64	0	0	0
ELMADAĞ	0	2235	3701	3705		3928	4.780	1.157	3.978	5.178	1.673	1.903
KAZAN	0	2371	3159	3151	295	3378	3.460	1.593	3.113	3.828	3.932	4.063
HASANOĞLAN							930	706	1.062	1.075	1.151	1.066
SİRKELİ							299	55	210	281	450	534
TELEFERİK	0	0	0	0	0	0	0	0	0	0	0	0
TOPLAM	53.868	704.994	783.000	887.644	234.661	797.323	997.244	526.920	1.022.734	1.339.803	1.393.723	1.397.134



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TABLO 7. ANKARA DA 2021 AYLIK/ORTALAMA TOPLU İSTATİSTİKLERİ [20]

	ANKARAY					ANKARA METROSU 1					ANKARA METROSU 2					ANKARA METROSU 3					ANKARA METROSU 4					ANKARA RAYLI SİSTEM				
	TAM	ÖĞREN	MANYET	SERBE	TOPLA	TAM	ÖĞREN	MANYET	SERBE	TOPLA	TAM	ÖĞREN	MANYET	SERBE	TOPLA	TAM	ÖĞREN	MANYET	SERBE	TOPLA	TAM	ÖĞREN	MANYET	SERBE	TOPLA	TAM	ÖĞREN	MANYET	SERBE	TOPLA
OCAK	465,235	124,781	23,328	30,697	644,041	888,080	176,632	19,833	110,565	1,195,110	487,258	113,804	6,714	34,393	642,169	369,046	66,586	7,682	28,418	471,732	174,813	30,164	2,259	18,591	225,827	2,384,432	511,967	59,816	222,664	3,178,879
ŞUBAT																														
MART																														
NİSAN																														
MAYIS																														
HAZİRAN																														
TEMMUZ																														
AĞUSTOS																														
EYLÜL																														
EKİM																														
KASIM																														
ARALIK																														
TOPLAM	465,235	124,781	23,328	30,697	644,041	888,080	176,632	19,833	110,565	1,195,110	487,258	113,804	6,714	34,393	642,169	369,046	66,586	7,682	28,418	471,732	174,813	30,164	2,259	18,591	225,827	2,384,432	511,967	59,816	222,664	3,178,879
AYLIK ORTALAMA	465,235	124,781	23,328	30,697	644,041	888,080	176,632	19,833	110,565	1,195,110	487,258	113,804	6,714	34,393	642,169	369,046	66,586	7,682	28,418	471,732	174,813	30,164	2,259	18,591	225,827	2,384,432	511,967	59,816	222,664	3,178,879
GÜNLÜK ORTALAMA	15,008	4,025	753	990	20,776	28,648	5,698	640	3,567	38,552	15,718	3,671	217	1,109	20,715	11,905	2,148	248	917	15,217	5,639	973	73	600	7,285	76,917	16,515	1,930	7,183	102,544
SAATLİK ORTALAMA	834	224	42	55	1,154	1,592	317	36	198	2,142	873	204	12	62	1,151	661	119	14	51	845	313	54	4	33	405	4,273	918	107	399	5,697

Şehirdeki trafiğin an itibariyle ne kadar yoğun olduğunu gösteren Yandex trafik sıklığı endeksi, Ankaralılar'ın da hizmetine sunulmuştur. Trafik sıklığını geliştirilen puan cetveline göre takip etmek isteyen kullanıcılar, hem Yandex'in ana sayfasında, hem Yandex.Haritalar'da, hem de Yandex.Navigasyon'da ilgili endeksi görebiliyor. Yeni bilgiler ve detaylı analizler kapsamında her 4 dakikada bir güncellenen trafik verileri ile Ankaralılar trafik durumunu, 0 puan "yollar serbest" ve 10 puan "trafik ilerlemiyor" şeklinde 0-10 arasında derecelendirilmiş olarak öğrenebiliyorlar. Yandex.Trafik servisinin verilerine göre Ankaralılar 24 saat içinde yaklaşık 20 yıllık bir süreyi trafikte geçiriyor. Özellikle hafta içi sabah 07:30'da başlayan trafik yoğunluğu saat 10:00'a kadar 4 puan civarına yükselerek en yoğun zamanı oluşturuyor. Öğlen saatlerinde azalan trafik akşam 17:00 itibariyle tekrar artarak 19:00'a kadar yoğunluğunu koruyor. Ankaralılar genellikle hafta içi akşam trafiğinde vakit kaybederken, en çok zaman kaybını da Cuma akşamları yaşıyorlar. Hafta sonu ise Yandex sıklık endeksi ters bir grafik izliyor. Cumartesi günü gündüz saatlerinde en yüksek değerlere ulaşan trafik sıklığı endeksi, Pazar günleri en düşük oranları gösteriyor. Yağış alan günlerde ise bütün şehirlerde olduğu gibi Ankara'da da trafik en yoğun zamanlarını yaşıyor.

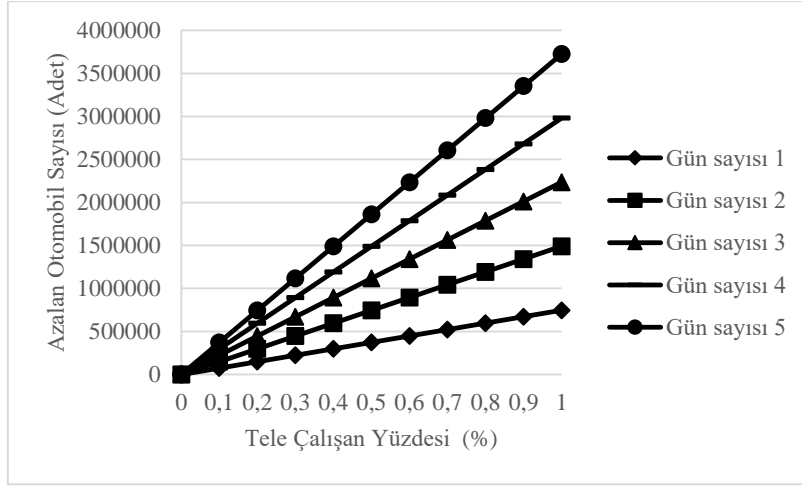
Hesaplamalar sonucunda tele çalışmanın Ankara trafik yüküne iyi yönde olabilecek etkilerinin detaylı incelenmesi için Tablo 8 oluşturulmuştur. Bu kapsamda örnek olması açısından Tablo 4 verileri dikkate alınmıştır. Ancak Tablo 6 ve Tablo 7 aslında toplu taşıma kullanımının azaldığını ve dolayısıyla trafiğe çıkan otomobil sayısının ciddi oranda arttığını göstermektedir. Tablo 8 tele çalışan yüzdesi ve tele çalışma gün sayısının muhtemel gerçekleşebilecek yolculuk azalması yüzdesine, gerçekleşebilecek yoğun saatteki trafiğe çıkan araç sayısına ve gerçekleşebilecek trafikteki azalan otomobil sayısına etkilerini göstermektedir. Tahmin edileceği üzere, tele çalışma gün sayısı ve tele çalışanların sayıları arttıkça yoğun saatlerde trafiğe çıkan araç sayısında ciddi oranda azalma sağlayarak trafik yükünde rahatlatma sağlayabilecektir. Yoğun saatlerde trafiğe çıkan araç sayısındaki bu azalma, tele çalışma gün sayısı 1 gün olması halinde bile evden-ışe giden otomobil sayısında Ankara için %20'lik bir değerle 300.000 otomobil sayısına denk gelmektedir. Bu sayı tele çalışma gün sayısı 2 gün olması halinde %40 azalma ile 600.000 otomobile, 3 gün olması halinde %60 azalma ile 900.000 otomobile, 4 gün olması halinde %80 azalma ile 1.200.000 otomobile karşılık gelmektedir. Yoğun saatlerde trafiğe çıkan araç sayısındaki bu azalma, Amerika Federal Karayolu İdaresi için hazırlanan klavuzun [17] ekindeki tablolarda araç paylaşımı, toplu taşıma program desteğinin farklı seviyelerinde bile bu oranlarda yüksek azalmalarla karşılaştırıldığında oldukça yüksek kalmaktadır ve daha etkili sonuçlar doğuracağı kesindir. Yoğun saatlerde trafiğe çıkan araç sayısındaki bu azalma Ankara trafik yükünün hafiflemesinde çok etkili olabilecektir. Yukarıda anlatılan verileri desteklemek adına Şekil 1'de Ankara için tele çalışan yüzdesinin ve gün sayısının trafikte azaltabileceği otomobil sayısı, Şekil 2 ve Şekil 3'te ise Ankara için tele çalışma gün sayısı sırasıyla 2 ve 3 için trafikteki araç sayısının tele çalışan yüzdesine göre değişimi ve Şekil 4'te ise Ankara için tele çalışan yüzdesinin ve gün sayısının yolculuk azalması yüzdesine etkisi grafiksel olarak sunulmuştur. Yapılan hesaplamalar literatürde yayınlanan çalışmalarla [15, 16] karşılaştırılmış ve çok güzel bir uyum içerisinde olduğu sonucuna varılmıştır.

Tablo 8. Ankara için tele çalışan yüzdesinin ve gün sayısının trafik yüküne etkisi.

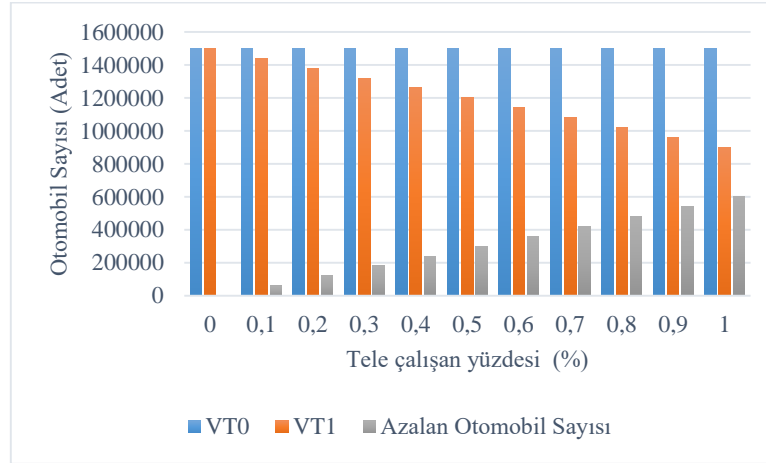
Tele çalışan yüzdesi	Tele çalışma gün sayısı	TCK	VTR1	AVR0	AVR1	VTO	VT1	Azalan otomobil sayısı
0	1	0,2	0	3,25	3,25	1500000	1500000	0
0,1	1	0,2	0,02	3,25	3,32	1500000	1470000	30000
0,2	1	0,2	0,04	3,25	3,39	1500000	1440000	60000
0,3	1	0,2	0,06	3,25	3,46	1500000	1410000	90000
0,4	1	0,2	0,08	3,25	3,53	1500000	1380000	120000



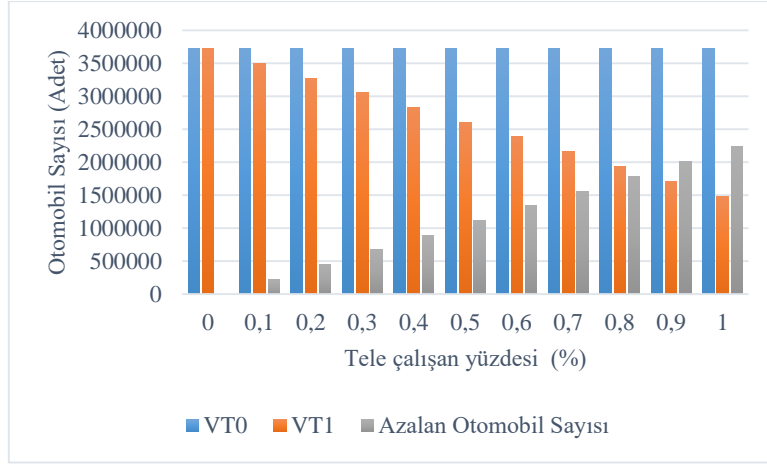
0,5	1	0,2	0,1	3,25	3,61	1500000	1350000	150000
0,6	1	0,2	0,12	3,25	3,69	1500000	1320000	180000
0,7	1	0,2	0,14	3,25	3,78	1500000	1290000	210000
0,8	1	0,2	0,16	3,25	3,87	1500000	1260000	240000
0,9	1	0,2	0,18	3,25	3,96	1500000	1230000	270000
1	1	0,2	0,2	3,25	4,06	1500000	1200000	300000
0	2	0,4	0	3,25	3,25	1500000	1500000	0
0,1	2	0,4	0,04	3,25	3,39	1500000	1440000	60000
0,2	2	0,4	0,08	3,25	3,53	1500000	1380000	120000
0,3	2	0,4	0,12	3,25	3,69	1500000	1320000	180000
0,4	2	0,4	0,16	3,25	3,87	1500000	1260000	240000
0,5	2	0,4	0,2	3,25	4,06	1500000	1200000	300000
0,6	2	0,4	0,24	3,25	4,28	1500000	1140000	360000
0,7	2	0,4	0,28	3,25	4,51	1500000	1080000	420000
0,8	2	0,4	0,32	3,25	4,78	1500000	1020000	480000
0,9	2	0,4	0,36	3,25	5,08	1500000	960000	540000
1	2	0,4	0,4	3,25	5,42	1500000	900000	600000
0	3	0,6	0	3,25	3,25	1500000	1500000	0
0,1	3	0,6	0,06	3,25	3,46	1500000	1410000	90000
0,2	3	0,6	0,12	3,25	3,69	1500000	1320000	180000
0,3	3	0,6	0,18	3,25	3,96	1500000	1230000	270000
0,4	3	0,6	0,24	3,25	4,28	1500000	1140000	360000
0,5	3	0,6	0,3	3,25	4,64	1500000	1050000	450000
0,6	3	0,6	0,36	3,25	5,08	1500000	960000	540000
0,7	3	0,6	0,42	3,25	5,60	1500000	870000	630000
0,8	3	0,6	0,48	3,25	6,25	1500000	780000	720000
0,9	3	0,6	0,54	3,25	7,07	1500000	690000	810000
1	3	0,6	0,6	3,25	8,13	1500000	600000	900000
0	4	0,8	0	3,25	3,25	1500000	1500000	0
0,1	4	0,8	0,08	3,25	3,53	1500000	1380000	120000
0,2	4	0,8	0,16	3,25	3,87	1500000	1260000	240000
0,3	4	0,8	0,24	3,25	4,28	1500000	1140000	360000
0,4	4	0,8	0,32	3,25	4,78	1500000	1020000	480000
0,5	4	0,8	0,4	3,25	5,42	1500000	900000	600000
0,6	4	0,8	0,48	3,25	6,25	1500000	780000	720000
0,7	4	0,8	0,56	3,25	7,39	1500000	660000	840000
0,8	4	0,8	0,64	3,25	9,03	1500000	540000	960000
0,9	4	0,8	0,72	3,25	11,61	1500000	420000	1080000
1	4	0,8	0,8	3,25	16,25	1500000	300000	1200000
0	5	1	0	3,25	3,25	1500000	1500000	0
0,1	5	1	0,1	3,25	3,61	1500000	1350000	150000
0,2	5	1	0,2	3,25	4,06	1500000	1200000	300000
0,3	5	1	0,3	3,25	4,64	1500000	1050000	450000
0,4	5	1	0,4	3,25	5,42	1500000	900000	600000
0,5	5	1	0,5	3,25	6,50	1500000	750000	750000
0,6	5	1	0,6	3,25	8,13	1500000	600000	900000
0,7	5	1	0,7	3,25	10,83	1500000	450000	1050000



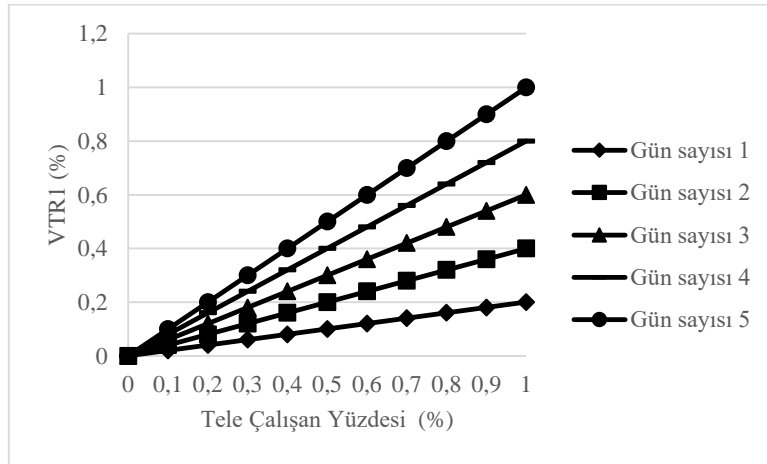
Şekil 1. Ankara için tele çalışan yüzdesinin ve gün sayısının trafikte azaltabileceği otomobil sayısı



Şekil 2. Ankara için tele çalışma gün sayısı 2 için trafikteki araç sayısının tele çalışan yüzdesine göre değişimi



Şekil 3. Ankara için tele çalışma gün sayısı 3 için trafikteki araç sayısının tele çalışan yüzdesine göre değişimi



Şekil 4. Ankara için tele çalışan yüzdesinin ve gün sayısının yolculuk azalması yüzdesine etkisi

Tablo 4 baz alındığında 2013 verilerine göre otomobil ve taksi ile yapılan günlük yolculuk sayısı yaklaşık 2 milyon değerini bulmaktadır. 2021 verileri bu yolculuk sayısı değerlerinin çok daha fazlası olduğunu göstermektedir. Her ne kadar bu hesaplamalarda Tablo 4 baz alınarak otomobil ve taksi ile yapılan günlük yolculuk sayısı 1.500.000 adet alınmışsa da burada vurgulanmak istenen ve bu çalışmanın özellikle belirtmek istediği husus Şekil 4'te gösterildiği üzere ev-iş arasındaki toplam otomobil sayısındaki yolculuk azalması yüzdesidir. Sonuç itibarıyla 3 günlük tele çalışma ile ev-iş arası yolculuk sayısında %60 azalma sağlanabilir. Bu durum yolculukları gerçekleştirecek otomobil sayısında %60 azalma anlamına gelerek trafik yükündeki rahatlama sonucunu doğurabilme potansiyelini göstermektedir.

SONUÇLAR

Bu çalışmada artan trafik yüküne çözüm bulma yöntemlerinden Yolculuk Talep Yönetimi stratejilerinden tele çalışma incelenmiştir. Tele çalışmanın Ankara trafik yükünü azaltma potansiyeli incelenmiştir. Araştırmalar sonucunda ev-iş arasındaki otomobil yolculuk sayısında tele çalışma gün sayısı 2 gün olması halinde %40 azalmaya, 3 gün olması halinde %60 azalmaya, 4 gün olması halinde ise %80 azalmaya sebep olma potansiyeline sahip olabileceği belirlenmiştir. Bu sonuç Ankara gibi ev-iş arasında yolculuk yapan otomobil sayısının yüksek olduğu illerde ciddi oranda azalmalara yol açma potansiyelini göstermektedir. Sonuç olarak tele çalışma Ankara ilinde uygulanırsa yoğun saatlerde trafiğe çıkan araç sayısındaki bu azalma, tele çalışma gün sayısı 1 gün olması halinde bile evden-işe giden otomobil sayısında Ankara için %20'lik bir değerle 300.000 otomobil sayısına denk gelmektedir. Bu sayı tele çalışma gün sayısı 2 gün olması halinde %40 azalma ile 600.000 otomobile, 3 gün olması halinde %60 azalma ile 900.000 otomobile, 4 gün olması halinde %80 azalma ile 1.200.000 otomobile karşılık gelmektedir. Sonuç olarak tele çalışma Ankara ilinde uygulanırsa ev-iş yolculuk yapan otomobil sayısını ciddi oranda düşürerek trafik yükünde yüksek oranda rahatlama sağlayabilme potansiyeli olduğu tespit edilmiştir. Böylelikle hem ulaşım süreleri kısılacak hem de hava kirliliğinde azalmalar olabilecektir.

KAYNAKLAR

- [1] Garlin T, Travel Demand Management Targeting Reduced Private Car Use: Effectiveness, Public Acceptability and Political Feasibility, *Journal of Social Issues* 2007;63(1): 139–153.
- [2] Çelik F, Geçmişte Ülkemizde Uygulanan Yolculuk Talep Yönetimi Yaklaşımları ve Bu yaklaşımların Kalıcılığına İlişkin Alınması Gereken Önlemler, 2. Ulaşım ve Trafik Kongresi, Ankara. 1999.
- [3] Martino V.D, Wirth, L., Telework: A New Way of Working and Living, *International Labour Review* 1990;129(5):529-540.
- [4] Görmüş A, Kovid-19 pandemisi döneminde sosyal mesafeli çalışma biçimi: Tele-çalışma. *Turkish Studies* 2020;15(4):481–496.
<https://dx.doi.org/10.7827/TurkishStudies.44261>
- [5] Nilles Jack M, Carlson F. Ray Jr., Gray, Paul and Hanneman, Gerhard J, *The Telecommunications-Transportation Tradeoff: Options for Tomorrow*, New York, NY: Wiley and Sons 1976.
- [6] Schrank D, Lomax T, 2005 Urban Mobility Report. May: 1-28. Texas Transportation Institute, Texas A&M University 2005.
http://tti.tamu.edu/documents/mobility_report_2005.pdf.
- [7] Bentley TA., Teo, STT, McLeod L, Tan F, Bosua R, Gloet M, The role of organizational support in teleworker wellbeing: a socio-technical systems approach. *Appl. Ergon* 2016; 52: 207–215.
- [8] Choo S, Mokhtarian P, Salomon I, 2005 Does telecommuting reduce vehicle-miles traveled? an aggregate time series analysis for the US Transportation 2005; 32: 37–64.
- [9] Mokhtarian P, Varma K, The trade-off between trips and distance traveled in analyzing the emissions impacts of center-based telecommuting. *Transp. Res.* 1998; 3(6): 419–428.



- [10] Mokhtarian P, Collantes, GO, Gertz, C, Telecommuting, residential location, and commute-distance traveled: evidence from State of California employees, *Environ. Plann.* 2004; 36:1877–1898.
- [11] Shafizadeh KR, Niemeier DA, Mokhtarian PL, Salomon I, The Costs and Benefits of Telecommuting: an Evaluation of the Macro-scale Literature, *Partners for Advanced Transit and Highways (PATH) Working Paper* 1998.
- [12] Bamister D, Marshall S, Encouraging Transport Alternatives: Good Practice in Reducing Travel. The Stationery Office, London 2000.
- [13] Perez MP, Sanchez AM, de Luis Carnicer MP, Jimenez, MSV, 2004. The environmental impacts of teleworking: a model of urban analysis and a case study. *Manag. Environ. Qual. Int. J.* 2004;15(6): 656–671.
- [14] Sato A, Telework and its effects in Japan, *The ILO Future of Work series* 2019. <https://doi.org/10.4337/9781789903751>
- [15] Hatipoğlu S, İki farklı kurumda uygulanan yolculuk talep yönetimi stratejilerinin karşılaştırılması, *Adıyaman Üniversitesi, Mühendislik Bilimleri Dergisi* 2016;5:60–70.
- [16] Hatipoğlu S, ve Öztürk, EA, Yolculuk Talep Yönetimi Stratejilerinin Kentsel Trafik Yüküne Etkisi Üzerine Bir Uygulama, *SAÜ. Fen Bilimleri Dergisi* 2012;16(2): 62–68.
- [17] Overview of Travel Demand Management Measures
https://rosap.ntl.bts.gov/view/dot/553/dot_553_DS1.pdf?
https://rosap.ntl.bts.gov/view/dot/2641/dot_2641_DS1.pdf
- [18] Türkiye İstatistik Kurumu (TÜİK) web sayfası
<https://data.tuik.gov.tr/Bulten/Index?p=Motorlu-Kara-Tasitlari-Eylul-2021-37431>
- [19] Cirit F, Sürdürülebilir Kentiçi Ulaşım Politikaları ve Toplu Taşıma Sistemlerinin Karşılaştırılması, *İktisadi Sektörler ve Koordinasyon Genel Müdürlüğü, Uzmanlık Tezi* 2014.
- [20] EGO web sayfası, <https://ego.gov.tr/tr/sayfa/61/istatistikler>



THE NAME OF AN ANCIENT FORTRESS IN THE FOLK PERCEPTION.

ENISALA OR HERACLEA?

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ABSTRACT

There is a fortress in Dobruja, Romania called Enisala. The original builder is unknown and many scholars emphasize some hypotheses. The official hypothesis is that it was built by Genovese in XIII centuries, and the name should be Enisala because Turkish arrivals of XIV centuries give this name to this fortress as new fortress. Till nowadays local people disagree. They still call it Heraclea and make so many confusions among academics, who reject it as just folk perception with no scientific proofs. We try in this short approach to determine why folk perception could be sustainable in some way even there are no evidence. The dominant form of current academic science is based on ideas and concepts about science and research, but we wonder if paying attention to some facts might lead in a new direction. It is even more amazing when we realize that all hypotheses are untenable. The core of truth could be embodied in cultural myths, language, toponym and some could change the status of scientific knowledge in history and archeology and can develop our ideas about 'truth' and the relation to reality. So, let see why simple people are so determined to call this fortress Heraclea even the village is named Enisala and what can reveal the myth of Zmeu, the mythological figure who is living in this fortress. We claim that if we can figure out cultural perspective using popular oral perception might be a new step for future researches.

Key words: culture, perception, myth, scientific truth

1.INTRODUCTION

This fortress seems to be a mystery for archeologists and historian. There is no doubt that the name was first time written in documents in XIV centuries as New Fortress - Enisala given by Ottomans and accepted by Russian chronicles¹, but there is any claim that this castle/fortress have been built by Ottoman Empire². They just rename something preexistent.³

Modern researchers show up three hypotheses which didn't accomplish total consensus. Meanwhile in folklore there are words and some legends about this edifice very different from official point of view. We had study carefully them in contemporary oral sayings and

¹ Iosipescu 2009, cite Alexandru Andronic, Orașe moldovenești în secolul al XIV-lea în lumina celor mai vechi izvoare rusești, în „Romanoslavica”, 11, 1965, p. 208.

² Celybi E in Calatori straini in Tarile Romane, vol. VI, p. 391. Academia de stiinte sociale si politice RSR si Institutul Nicolae Iorga”, Editura stiintifica si Enciclopedica, Bucuresti. 1976. <http://centrulslavici.uvvg.ro>

³ ANCA, POPESCU, DOBROGEA ÎN EPOCA OTOMANĂ: KAZAUA HÂRȘOVA (SEC. XVI) in „Studii si Materiale de Istorie Medie”, vol. XXXIII, 2015, pp. 85-112, Academia Romana, Institutul Nicolae Iorga. <https://www.cceol.com/search/article-detail?id=305420>

corroborated with academic scientific papers regarding discoveries and make some presumptions regarding the role of folk perception in preservation of ancestral meaning and knowledge.

2. THREE UNTENABLE HYPOTHESES

This fortress bear in different papers or navigation maps⁴ different names: Ieraclea, Heraclia, Heracleea, Enişla, Yeni-Sala, Ieni-Kaleh, Enisala. There are many academical papers that rewrite history. Any times researchers came along and reopen the site, locals become confused when they learn again and again a new given-name of fortress or about new interpretation.⁵

It seems very obvious for specialist and any citizen visiting this place to ask: Who has built this fortress? The guide will provide the official version, but always is saying that it is not for sure. And also, the guide or custode can add three hypotheses with different degree of certainty.

1. Genovese hypothesis. They said that because of navigation reason in this areas Genovese merchants should have settled this edifice. This is the official point of view written in textbooks and widely accepted. These arguments are based on similarity of procedures of construction. There are no evidences, any document in order to sustain these arguments. However, the stuff of construction, rocks extracted nearby are not very well polished and uncut and this could be a counterargument comparing with medieval Genovese construction of castles and fortress around Europe. So, it is just a possibility, but not a certitude. The name is Heracleea and sometimes is Enisala as in navigation maps.

2. Baraschi hypothesis. It has been called after the name a famous Romanian historian who claim that it must be built by the Romanian voivode (king) Mircea cel Bătrân (The Old) after regain Dobruja from Ottoman Empire (1394). This point of view, apparently is ideological contaminated, because it was proposed by communist historiography. The question is if the Romanian king had enough time for such project in that short time, until 1418, when he lost gain Dobruja.

3. The last one is Iosipescu Hypothesis. It is little bit strange because he claims that was build or reconsolidate by a Tartar Prince Demeter who was very meteoric figure in historical time. The proof is based on one coin and the interpretation of two letters D (delta gr.) and M on the ceramic vase. But we think it could be lesser that we need to accept. Even in his articles he tries to demonstrate and sustain strongly these arguments, later he accepts that the prince Demeter must found that location and use this fortress strategically.

However, all three proposals could not convince anybody.

Any researcher isn't determined to pay attention to folklore and culture anthropology. Scientifically story tales and legend seem to be weak comparing with archeological evidence, inscription, documents, maps and so on. Collective memory, imagology is nowadays more

⁴ Eskenasy, V. Izvoare cartografice medievale despre teritoriul românesc. Observații pe marginea unei lucrări recente, în RdI, 33, 4(1980), p. 762-763.

⁵ Ionescu-Dobrogianu, M. Dobrogea în pragul veacului al XXlea, București, 1904, p. 140; Iosipescu, & Iosipescu CETATEA IENISALA CONTRIBUȚII ARHEOLOGICE ȘI ISTORICE LA PROIECTUL DE DE RESTAURARE, 2009. http://www.revistamonumenteloristorice.ro/fisiere/RMI_2009_1-2_006.pdf; C. Barbulescu - Monografia Babadag, 1991/in nota 1, pag. 137: Barnea si Dragomir. Săpăturii de la Enisala. Raport 1963 - inedit
Silvia Baraschi, Gh. Cantacuzino, Cercetările arheologice din Cetatea de la Enisala (1976), Peuce, VIII, 1980, p. 456-472.

and more accepted in science body as open path if not as true in scientific sense. (Freud, Jung, Eliade). We had observed that simple people are very attached to their stories and are sometimes amused by the fact that any time when was started a new archeological works, a new label and banner which indicate the road to fortress or in tourist guide, the name of fortress was changed. (During 1970-1980 the fortress was Heraclea, after 1985-1995 was called Enisala, again Heraclea and today is again Enisala!!) Is the scientific truth in history so subjective? Local people said always the name of the village is Enisala and the name of fortress is Heraclea. Such conservative attitude must have a reason. There is a struggle to preserve the ancestral name, even they cannot explain or they are not sons and daughters of ancestors who knew the real name.

3. ARCULEA AND POWERFUL ZMEU LIVING IN THE CAVE FORTRESS

In Enisala village people are recalling the ancestral times when people were archer and use arrows to fight or hunt animals. So, to say something about the physical force or about the power of a man, they use the word as nick name *Arculea* (in Romanian, somebody who use the arch, is archer). Sometimes they said: “I am not *Arculea*, I cannot rise this stone! I am not enough strong to do this”. *Arculea* could be a Romanian form of Heracles/Hercules/Herculea/*Arculea*. It is well known that Greek hero was a great archer, too. Another word which can characterize a person who become furious instantly is “arcos”. De ce esti asa de arcos? (Romanian) Why are you so furious?

Might be that during history Heracles have had a significance in the people’s mind before and after romanization, before and after Christianity. Historians had revealed that sometime Heracles replace by syncretism the Thracian Rider like Saint George in Orthodox Christianity.

So, who was that Archer in the mythological times? It is obvious Hercules/ Heracles, the Greek hero. Inhabitants of Enisala village are people who know a little about Greek hero, may be nothing. In 20 centuries and before they use to be shepherd and not very educated people. (E. Celebi) The collective memory must preserve from long, long ago something about Heracles.

The hypothesis that fortress could be built by Heracles, the Byzantine emperor (VI centuries A.C.) was rejected by historians. Nevertheless, there are other castles located in different places with the same name (Heraclea Pontica and Heraclea Sintica). Iosipescu claims that is just a storytelling which was circulated in Middle Age as Alexandria book. Heracles emperor never construct here a fortress and the name must be a fantasy about heroic times. This idea could be correct, but again, mind can preserve the archetypal ideas and symbol of strongness which can be implemented in local areas.

The legend is much more interesting. They said that in cave on the hills, where is located fortress is still living a mythological figure, *Zmeu* (in Romanian). That fantastic entity has human face, but lion (or serpent) body. He was very strong and scary people. He used to enslave one day a girl that he liked and bring her in the cave. But the girl can escape and he remain alone and very sad. There are some stone near the walls where is sculpted by his back, because he was looking for girl to come back long, long time after. Sometime in the middle of the night he is still sitting over there. The small cave is visited by locals and many tourists. There is also a prevention. You must wear a scarf, a red scarf to avoid the encounter with the beast.

Who was originally that powerful creature? Why was so deeply engraved in mental the ideas of powerfulness? And way? No one knows. Local myths and language enclosed hidden signs. Collative imagology can preserve in any forms more or less closed to reality from far

distance in the past. Any fantasy starts always somehow from acknowledgeable fact. If during history this is corrupted, it is very possible. We must discern the false from true or persist in making research. Nowadays is accepted all form of knowledge that can help and direct research (see Schliemann discovery of Troy). The soft-ware of mind is very flexible and rooted in cultural background. It is not necessary to insist in that topic that can be developed in new possible approach.

4. SOME CORROBORATION WITH SCIENTIFIC EVIDENCES

There is possible connection with scientific discovery? Have been Greek here? Sure. Is well known about Greek colonization, about cities at Black See and the cities they settled. Also is known about Organum as the Greek and early Byzantine establishment (III. B.C -7 A.C) which is near Enisala Village and Fortress (16 km). How long could survive a mythology, a hero in storytelling? Longer that we can imagine, maybe millennia. If there are not internet, Tv, radio, even books, they must listen oral stories, and the mind must be affected with ideals, exemplarities, heroes and fantastic imaginary entities. Even the real facts are dressed in imaginary cloths.

The second connection could be established not only with local storytelling or brought by the migrants, but as well with artefacts like small statue and funeral votives, images, before Christian era. The following image is a little statue representing Hercules discovered at Telița-Amza (approx. 20 km), probably worshiped by rural local people.



(Hercules statue discovered at Telița–Amza, Baumann, 2013)

In VI centuries A.C., Byzantine Emperor Heracles wasn't interested in this place, but comparing the story from Heraclea Pontica⁶ with the story collected Enisala we can find some similarities. The story of the end of mythologic figure (Zmeu) living in in the underground cave at Enisala/Heracleea Fortress is similar with the story in Heraclea Pontica, where Heracles (Greek hero) after a long life, just disappear in the hill Archerusian. (Karadeniz Ereğli, Provincia Zonguldak, Turcia). The story and the place are the same. Maybe travelers made same confusion when they recorded again and again the storytelling. The Romanian fantastic entity, Zmeu became Heracles or Heracles became that Zmeu? However, there are some heroes that enclosed the symbol of power. In literature is used the expression "herculean walls" when they refer to a castle.

Conclusion

Certainly, folk perception has some raison to preserve the myth of hero Heracles. Actually, during history people has no interest to explain who built the edifice, they tend much more to

⁶ Heraclea Pontica Megara în cca. 560-558 B.C.



express the power. Less the person and much more the significance of the building for community. Might be local people was the builder for useful purpose, to save themselves, to protect against intruders. (The edifice is different from European edifices, even Romanian city of middle age). After a while the local governance disappeared or migrated. But the symbol of his struggle remains and the followers just call him Heracles, known as the powerful man. For them, any local leader should be like.

The question is how could be restored the scientific truth collected from legend, language and storytelling. We think is not possible to be recorded anything if it is not started from a real fact or event. We cannot claim that edifice was built by local or foreign people, but the symbol could be embraced by any community or leader. So, we can agree that this fortress is build by the symbolic leader transcending centuries and the name must be Heraclea, not Enisala (new village) which is a common name for any place, but not for special one.

REFERENCES

- Andronic, Al. (1965) Orașe moldovenești în secolul al XIVlea în lumina celor mai vechi izvoare rusești, în *Romanoslavica*”, 11, p. 208.
- Baraschi, S. Cantacuzino, Gh. (1976) Cercetările arheologice din Cetatea de la Enisala, in Peuce, VIII, 1980, p. 456-472.
- Barnea & Dragomir. (1963) Săpăturile de la Enisala. Raport, inedit/unpublished.
- Baumann, V. Retievd from: <https://revistapeuce.icemtl.ro/wp-content/uploads/Arhiva-Peuce-Serie-noua/10-Peuce-SN-XI-2013/04-Baumann-Peuce-11-2013.pdf>
- Bărbuleanu C. (1991) Monografia Babadag, /in nota 1, pag. 137.
- Celebi E. (1976) *Călători străini în Țările Române*, vol. VI, p. 391. Academia de științe sociale și politice RSR și Institutul Nicolae Iorga, Editura stiintifica si Enciclopedica, Bucuresti.
- Retrieved from <http://centrulslavici.uvvg.ro>
- Eskenasy, V. (1980) Izvoare cartografice medievale despre teritoriul românesc. Observații pe marginea unei lucrări recente, în *RdI*, 33, 4p. 762-763.
- Ionescu-Dobrogianu, M. (1904) Dobrogea în pragul veacului al XX-lea, București, p. 140.
- Iosipescu, & Iosipescu (2009) CETATEA IENISALA CONTRIBUȚII ARHEOLOGICE ȘI ISTORICE LA PROIECTUL DE DE RESTAURARE,
- Retrieved from: http://www.revistamonumenteloristorice.ro/fisiere/RMI_2009_1-2_006.pdf:
- POPESCU, A. DOBROGEA ÎN EPOCA OTOMANĂ: KAZAUA HÂRȘOVA (SEC. XVI) în „*Studii si Materiale de Istorie Medie*”, vol. XXXIII, 2015, pp. 85-112, Academia Română, Institutul Nicolae Iorga.
- Retrieved from: <https://www.ceeol.com/search/article-detail?id=305420>

DÜZEN VE İSTİKRARIN GARANTÖRLÜĞÜ İLE ÖZGÜRLÜK VE DEMOKRASİNİN DÜŞMANLIĞI ARASINDA BİR KAVRAM: OTORİTE¹

AUTHORITY: A CONCEPT BETWEEN THE GUARANTEE OF ORDER AND STABILITY, AND THE ENMITY OF FREEDOM AND DEMOCRACY

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ÖZET

Bildiri, otorite ve dini otorite kavramlarının sosyolojik analizi ve gençlerin bu kavramlarla ilgili algıları üzerine kurulmuştur.

Otorite, insan hayatının tüm aşamalarında, aile, eğitim, ekonomi, siyaset ve din gibi kurumlar içinde, birbirine benzeyen işlevlere sahip önemli ve tartışmalı bir olgudur. Bildiri, iki ana bölümden oluşmaktadır. Birinci başlıkta, kavramsal, tarihi ve kuramsal açılardan otorite kavramı üzerinde durulacaktır. Tarihi arka planda, otoritenin geleneksel ve modern toplumlardaki değişimi ve bu değişimin dayanaklarına değinilecektir. Kavramın kuramsal yönünde, uyuşmacı ve çatışmacı yaklaşımda otoritenin nasıl ele alındığı hakkında bilgi verilecektir. Otorite konusunda öne çıkan Kojeve, S.Milgram, J. B. Bocheński ve Max Weber gibi isimler üzerinde durulacak ve otorite çeşitlerine değinilecektir. Otoritenin yakından ilişkili olduğu alanlardan biri de dindir. Dini otorite kavramının ne anlama geldiği, İslam dininin otoriteye bakışı, bireysel ve kurumsal anlamda kimleri/neleri otorite kabul ettiğine dair hususlar ele alınacaktır.

İkinci bölümde ise, uygulamalı araştırma bulguları sunulacaktır. Örneklem İstanbul'daki devlet ve vakıf üniversitelerinin farklı fakültelerinde bölümlerinde öğrenim gören yirmi kişidir. Gençlerin otorite algılarını ortaya koymak için, kavramı nasıl tanımladıkları, hayatlarının değişik alanlarındaki otorite figürlerini, kavramdan ne anladıkları, otorite-güç ilişkisini ve dini hayatlarındaki otoritelerin neler olduğu soruları sorulmuştur. Birinci bölümde, dökümantasyon /belge tarama tekniği; ikinci bölümde ise görüşme/mülakat tekniği kullanılmıştır.

Anahtar Kelimeler: Din sosyolojisi, otorite, dini otorite, gençlik.

ABSTRACT

This paper is based on the sociological analysis of the concepts of authority and religious authority and young people's perceptions about these concepts.

Authority is an important and controversial phenomenon with similar functions in all stages of human life, within institutions such as family, education, economy, politics and religion. This paper consists of two main parts. In the first chapter, the concept of authority will be emphasized in terms of its conceptual, historical, and theoretical aspects. The historical background will emphasize the change of authority in traditional and modern societies and the basis of this change. Information will be given about the theoretical aspect of the concept and how authority is handled in the congruent and confrontational approach. Names such as Kojeve, S.Milgram, J. B. Bocheński, and Max Weber, who are prominent in the subject of authority, will be emphasized and types of authority will be mentioned. One of the institutions in which authority is closely related is religion. The meaning of the concept of religious authority, the view of the

¹ Bu bildiri, araştırmacının şu makalesinden üretilmiştir: Fatma Odabaşı, "Üniversite Gençliğinin Otorite Algısı ve Din", *İlahiyat Akademi*, 12 (Aralık 2020): 183-216.

religion of Islam on authority, the individual and institutional aspects of who / what they accept as the authority will be discussed.

In the second chapter, the findings of the applied research will be presented. The sample is twenty people studying at different faculties of state and foundation universities in Istanbul. In order to reveal their perceptions of authority, questions were asked about how the young people define the concept, the authority figures in different areas of their lives, what they understand from the concept, the authority-power relationship and what the authorities in their religious life are. In the first part of this paper, the documentation technique was used, and in the second part, the interview technique was used.

Key Words: Sociology of religion, authority, religious authority, youth.

1. OTORİTE: KAVRAM, TARİH VE TEORİ

Otorite, psikoloji, sosyoloji, eğitim, hukuk, siyaset, felsefe ve din gibi farklı disiplinlerin inceleme alanına giren çok boyutlu bir kavramdır. Bu sebeple de herkesçe kabul edilen net bir tanımını yapmak oldukça zordur. Bununla birlikte, sözlüklerde, güç, emir ve yetki ile ilişkilendirilerek “*yaptırma, yasaklama, itaat ettirme hakkı veya gücü, yetke, sulta velayet; idari, siyasî güç ve çalışmalarıyla kendini kabul ettirmiş başarılı kimse*”² şeklinde tanımlanmıştır. Kavramın en çok kullanıldığı alan olan siyaset teorisinde ise “*birileri için bağlayıcı kararlar alma, kişileri bu kararlara uymaya ikna etme veya zorlama gücü*” gibi hususların ön plana çıktığı görülür.³

Tanımlardan hareketle, inançla ilgili esasların, öğretilerin, fikirlerin ve kutsal kabul edilen tekstlerin ve fikirlerin belirli nispette otorite taşıdığı söylenebilir. Bunların yanında, anayasa gibi kanuni düzenlemelerin, yasaların, yönetmeliklerin ve çeşitli konulardaki hükümlerin de bağlayıcılık dereceleri değişen bir otoriteye sahip oldukları görülür. Bu bakımdan otorite, insan hayatının değişik alanlarında yer alan, anne-baba, öğretmenler, patronlar/yöneticiler, uzmanlar, yargıçlar, yasa yapıcılar ve din adamları gibi oldukça farklı kesimleri kuşatan bir anlam zenginliğine sahiptir.⁴

Otorite, eyleme muhatap olanla, onu gerçekleştiren arasındaki münasebete dayanması sebebiyle sosyolojik bir olgudur. Otorite, hareket, değişim ve eylem barındırır. Muhatap olanın karşıtlık göstermeden bazen ikna olarak bazen de mecburen kabul edip uyduğu; etkin, değiştirene ait ve bilinçli bir fiildir. Şu örnek kavramı açıklayabilmek için oldukça çarpıcıdır: Bir kişiyi ittiğim için candan düşerse, bu olayda benim otoritem söz konusu değildir. Ancak kişi, ben ona emrettiğim için candan atlayıp düşerse, işte bu durumda otoritemden söz edebiliriz.⁵

Geleneksel ve modern toplum tiplerinde, otoritenin geçerliliğinin dayanakları farklı farklıdır. Otorite, geleneksel toplumlarda, nizamın kendisiyle sağlandığı ana unsurlardan biridir ve kaynağı ya dindir ya da uzun zamandan beri tekrar edilegelmesine bağlı olarak geleneksel kabullerdir. Tanrısal veya kutsal otorite diye adlandırabileceğimiz bu otorite, tepkiyi ve kişisel bir değerlendirmeyi barındırması muhtemel olmadığından, mutlak bir şekilde itaati gerektirir. Orta Çağ Avrupa’sındaki, kilisenin ve din adamlarının/ruhban sınıfın otoritesini, Tanrısallık karşısında bireysel bir karşı koymanın mümkün olmadığı bu otoriteye örnek verebiliriz.

²Bk. TDK, “Otorite” ; Websters, “Authority”.

³ Hüseyin Bal, “Siyaset Teorisinde Otorite Kavramı”, *Turkish Studies International Periodical For the Languages, Literature and History of Turkish or Turkic*, 9/2 (2014), 247.

⁴ Bal, “Siyaset Teorisinde Otorite Kavramı”, 249.

⁵ Alexandre Kojève, *Otorite Kavramı*, çev. Murat Erşen, (İstanbul: Bağlam Yayınları, 2007), 13-14.

Aydınlanma düşüncesiyle beraber birey, kademeli bir şekilde etkili hale gelmiş ve kutsal otoritenin yerini, rasyonel-uzlaşmacı otorite almaya başlamıştır. Bir anlamda gelenek yıkılmaya başlamış, bireysel değerlendirmelerin ve aklın devreye girdiği bir otorite tanımı ortaya çıkmıştır. Kapsamı ve anlamı değişen bu yeni otorite algısı, liberalizm düşüncesinde de yer alan, özgürlük, düzen ve ilerleme gibi düşüncelerle de uygunluk arz etmiştir. Geleneksel toplumun yok olmuş bireyi büyültülmüş ancak bu defa da modern kapitalist düzenin, kendi meşruiyetini biçimlendirmek ve sağlamlaştırmak için oluşturduğu yeni değerler alanının tahakkümüne girmiştir. Başka bir deyişe, modern toplumda meşruiyetini akıldan alan otorite, bireyi ön plana çıkarmakla birlikte, kapitalist hegemonyayla sarmalanmasına ve Weber'in çarpıcı benzetmesiyle “demir kafese girmesine” yol açmıştır. Bugünkü toplumlarda, otoritenin meşruiyetini sağladığı araçlar, bireyin zihnine egemen olacak şekilde devamlı bir surette yenilenmektedir. Birey de bu egemenliği kendi menfaatleri doğrultusunda farklı şekillerde meşrulaştırarak adeta bir “gönüllü razı oluş” tavrı sergilemektedirler. Bu gönüllü rıza gösterişin meşruiyet kaynakları da çeşitlenmiş ve bugün otorite, ya iktidar, hakim tabakalar, medya veya cemaatler ya da inançlarımız, menfaatlerimiz, gelenek-göreneklerimiz, utançlarımız ve instagram/twitter/facebook kültürümüzün/bağımlılıklarımızın geçerli kabul ettiği her şey olmuştur.⁶

Sosyal teoride, otorite genellikle iktidarla ilgili tartışmalarla birlikte ele alınmış ve “ uyuşmacı ve çatışmacı” şeklinde iki farklı yaklaşımla sunulmuştur. Uyuşmacı teoride, sosyo-kültürel yapısıyla toplumun denge ve istikrarla işleyen bütüncül bir yapı olduğundan hareket edilmiş, otorite de bu sistemin düzen, devam ve fonksiyonel bütünleşmesi için vazgeçilmez bir unsur olarak kabul edilmiştir. Toplumun devamlı surette bir uyuşmazlık içinde gören çatışmacı teoride ise, düzen ve teşkilatlanmanın ancak ve ancak yönetenlerin diğerlerine uyguladığı güç ve baskıyla sağlanabileceği öngörülmüş ve otorite de bu baskının aracı olarak değerlendirilmiştir.⁷

Otoriteyle ilgili en kapsamlı teorik çalışmayı A. Kojève yapmıştır. Otoritenin birbirine irca edilemeyecek arı/basit dört halini inceleyen Kojève, bunlardan birincisine “*Babanın otoritesi*” adını vermiş ve bu otoritenin dayanağını, kişinin varlığını borçlu olduğu şeye duyduğu itaat olarak açıklamıştır. İkinci tip, asil olanın asil olmayan, askerinin sivil olan ve erkeğin kadın üzerinde olan otoritesiyle örneklendiği, “*Efendinin köle üzerindeki otoritesi*”dir. Burada dayanak, efendisini reddettikten sonra neyle karşılaşacağı riskini göze alamamaktır. Üçüncü başlıkta, olacakları öncesinde bilme/tasarlama gücünden beslenen “*Reisin otoritesi*”nden bahseder. Son olarak zikrettiği ilksel tip, “*Yargıcın otoritesi*”dir. Kojève bunu, hakemin otoritesi, denetçinin otoritesi ve adaletli/dürüst olanın otoritesi örnekleriyle sunar. Bu tip otorite meşruiyetini, insanların saygıyla karşıladığı, adaletli ve hakkaniyetli olmak düsturlarından alır.⁸ Kojève, bu dört arı biçimin, din ve siyaset gibi alanlarda ve saf halde değil de birleşmiş şekilde bulunduğunu vurgular.⁹

Otorite teorisinden bahsederken üzerinde durulması gereken isimlerden biri de Stanley Milgram'dır. Milgram, durumsal uyma davranışını ölçmek amacıyla sosyal psikoloji temelli bazı deneyler yapmıştır. Metodik açıdan tartışılrsa da Milgram bu deneyler sonucunda, otoritenin tanımına ve kimlerin otorite olduğuna dair önemli kuramsal bilgiler sunmuştur.¹⁰

⁶Ali Esgin, “Otoritenin Sosyolojisi: Otoriteye İtaatin Ya da Otorite Bağımlılığının Sosyolojik Anlamları”, *Sosyologca*, 5, (2013), 107-111.

⁷Esat Çam, *Siyaset Bilimine Giriş*, (İstanbul: İstanbul Üniversitesi Yayınları, 1984), 86-87; Salih Arslan, “Yönetim Sürecinde Otorite Kullanımı ve Ortaya Çıkan Sorunların Değerlendirilmesi: Eleştirel Bir Yaklaşım”, *Optimum Ekonomi ve Yönetim Bilimleri Dergisi*, 5/1(2018), 3-4.

⁸Kojève, *Otorite Kavramı*, 21-35; Arslan, “Yönetim Sürecinde Otorite Kullanımı”, 4.

⁹Kojève, *Otorite Kavramı*, 57.

¹⁰bk. Ülker Yükselbaba, “Milgram Deneyi: Otorite Ve İtaate Dair”, *İÜHMC*, 75/1, (2017), 227-270; Bal, “Siyaset Teorisinde Otorite Kavramı”, 253.

Otoritenin daha kolay anlaşılmasına yardımcı olacak bazı tasniflerden bahsetmek faydalı olacaktır. Bunlardan biri Chan'ın, "teorik ve pratik otorite" ayrımıdır. Teorik otorite, düşünce ve kanaatleri sebebiyle değer verilen ve belli konulardaki uzmanlıkları dolayısıyla saygı ve güven duyulan "yetke" anlamına gelen otoritedir. Pratik otorite ise, teorik otoriteden daha geniş bir kullanım alanına sahiptir ve meşguliyetleri ve toplumsal konum/statüleri nedeniyle diğer insanların karar alma vetirelerine tesir eden hatta onlar adına bağlayıcı kararlar alabilen ve onların davranışları üzerinde etkili olan kimselerin otoritesini ifade eder.¹¹

Friedman da bir otorite (an authority) ile otoritede (in authority) şeklinde Chan'ın ayrımını çağrıştıran bir ayırmadan bahseder. Chan, statü ve konumu aracılığıyla, başkalarının eylemlerini belirleme yetkisine sahip olmaya, "otoritede" ismini verirken; birinin düşüncelerinin ve söylediklerinin diğerleri tarafından saygı gösterilmeye değer bulunmasını ise "bir otorite" olarak adlandırır. "Otoritede", bilgiyle "bir otorite" ise, yetkiyle alakalıdır.¹²

"De jure otorite ve de facto otorite" literatürde adı geçen diğer bir ikilidir. De jure otorite, bazı resmi mukaveleleri, kurallar bütünü ve kimlerin, nasıl yetki gücüne sahip olacağını belirleyen "hukuki otorite" diye de adlandırılan bir türdür. De facto otorite ise, şahsi özellikleri ve bazı uzmanlıkları sebebiyle kabul edilen otoritedir ve "fiili otorite" olarak da isimlendirilir.¹³

Otorite konusunda en meşhur tipolojik ayrımı yapan Weber, geleneksel, karizmatik ve yasal olmak üzere otoritenin üç arı şekli bulunduğu düşüncesindedir. Geleneksel otorite, dünden bugüne tekrarlanarak devam eden kutsallaştırılmış geçmişin otoritesidir. Buna itaat, resmen değil de geleneksel kabullerle belirlenmiştir. Karizmatik otorite, olağan üstü ve tanrı vergisi kabiliyetleri ve kahramanlıkları sebebiyle bir kişiye gösterilen hürmet, bağlılık, saygı ve itaattir. Yasal otorite, kanunların geçerli olduğuna ve rasyonel kaidelere bağlı fonksiyonel yetkiye inanmaya dayalı otoritedir. Bu otoritede itaat edilmesi gereken, kanunlarla tespit edilen ve bireylerle ilişkili olmayan bir düzendir.¹⁴

Otoritenin kaynaklarıyla ilgili benzeri bir ayrımı Leslie Lipson yapmıştır: Tanrının otoritesi, gücün otoritesi, ata soyunun otoritesi. Lipson'un ayrımındaki ata soyunun otoritesi Weber'deki geleneksel otoriteyi çağrıştıır. Tanrı'nın otoritesi, Kojave'ni bahsettiği "babanın otoritesi"ne tekabül eder. Gücün otoritesi ise azınlık olan elit kesimin, çoğunluk üzerindeki tahakkümü manasındadır. Karşılığı, Weber'deki rasyonel-yasal otorite olabilir. Zira, yasa yapmak ve kaideler koymak seçkin kesimi güçlü hale getirir.¹⁵

Meseleyi, felsefî/mantıkî açıdan ele alan J. B. Bocheński, konunun sosyolojik veçhesine de dikkat çekerek otoriteyi, "otoriteye sahip olan, otoriteye muhatap olan ve otoritenin alanı" şeklinde üç unsurun bir arada olduğu sosyal bir münasebet olarak ele almıştır.¹⁶ Bocheński, "bilgi otoritesi/epistemik otorite" ve "emreden otoritesi/deontik otorite" olmak üzere ikili bir ayrım yapmıştır. Bocheński, "bir kimse, başka insanlar için her alanda otorite olamaz" görüşündedir. Her alana yayılan otoriteye "*mutlak otorite*" adını veren Bocheński, koşulsuz itaati gerektiren bu otoriteye sadece Tanrı sahip olabilir görüşünü savunmuş ve mutlak otoritenin bir kişi veya gruba atfedilmesinin

¹¹ Joseph Chan, "Authority", Encyclopedia of Democratic Thought, ed. Paul Barry Clarke and Joe Foweraker (London: Routledge, 2001), akt. Bal, "Siyaset Teorisinde Otorite Kavramı", 249.

¹² Richard B. Friedman, "On The Concept of Authority In Political Philosophy", Political Concepts and Political Theories (USA: Wesview Press, 2000), akt. Bal, "Siyaset Teorisinde Otorite Kavramı", 249-250.

¹³ Andrew Heywood, Key Concepts on Politics (Newyork: Palgrave Mcmillian, 2000), 15-16.

¹⁴ Max Weber, Sosyoloji Yazıları, çev. Taha Parla (İstanbul: Hürriyet Vakfı Yayınları, 1986), 81; Richard Sennett, Otorite, çev. Kamil Durand (İstanbul: Ayrıntı Yayınları, 1992), 28; Egin, "Otoritenin Sosyolojisi", 96.

¹⁵ Leslie Lipson, Siyasetin Temel Sorunları, çev. Fügen Yavuz (İstanbul: Türkiye İş Bankası Yayınları, 2005), 200-206.

¹⁶ J.M. Bocheński, *Otorite Nedir? Otorite Mantığına Giriş*, çev. Hilal Görgün, (İstanbul: Küre Yayınları, 2015), 25-30.

onların tanrılaştırılması anlamına geldiğini ilave etmiştir.¹⁷ Buradan “dini otorite” kavramına geçmek gerekir konuyu İslam Dini bağlamında ele aldığımızı belirtelim.

2. DİNİ OTORİTE

Din, otoriteyle irtibatlı olan kurumların başında gelmektedir. Dinî otorite, “*Dinin temel unsurlarının tanımlanmasında ve anlaşılmasında mutlak bir itaatle karşılanan, kavramsal, kişisel ve kurumsal güç ve yetkililik*” anlamına gelir ve dinin tarifinde vazgeçilmez ve dogma olarak kabul edilen, inanç, ibadet ve ahlâki unsurları kapsar.¹⁸

Özellikle tek tanrı inancına bağlı dinlerde otorite, daima tanrı ile ilişkili olarak kabul edilmekte ve tanrı, otorite hiyerarşisinin en üst basamağında yer almaktadır. Meseleye İslam özelinde baktığımızda, kayıtsız şartsız otorite sahibi olanın sadece Allah olduğunu ve dünyaya yönelik sistem ve iktidarların meşruiyetinin, mutlak otoritenin/Allah’ın belirlediği sınırlara uygunluğu çerçevesinde ele alındığını görürüz. Başka bir deyişle, İslami bakışta toplumsal veya siyasal bir sistem, Allah’ın belirlediği kaidelere uyuyorsa geçerli, uymuyorsa çizgiyi aşma ve yetkiyi ele geçirme olarak addedilir.¹⁹

İdeolojilerin tamamı, fikirler ve siyasi sistemler, var olabilmek için bazı otoritelere gereksinim duyarlar. İslam tarihi incelendiğinde, bir takım karakterlerin de otorite figürü olduğu dikkat çektiği fark edilir. Müslüman toplumlar için, üzerinde tartışma olmadan kabul edilen (Allah’tan sonra) tek otorite, Hz. Peygamber’dir. Sonrasında, aralarında dört halifenin de bulunduğu sahabenin önemli bir yeri olduğu; onları takiben özellikle mezheplerin ortaya çıkışıyla birlikte, bazı karakterlerin de Müslümanlar nazarında, imam-lider olarak özellikli bir yere sahip olduğu görülür.²⁰

Teorik planda, Kur’an ve Sünnet’in bireysel ve kurumsal manada benimsediği dini otorite sadece Hz. Peygamberinkidir. Bu şu anlama gelir: İslam toplumunda hiçbir kişi, grup ya da kurumun naslarla doğrulanacak bir otorite iddiası olamaz. Sosyal hayatın akışı içerisinde tâbi olunması gereken birey ya da kurumlar olabilir. Ancak bunların otoritesi ne dinidir ne de masum ve yanılmazdır.²¹

3. GENÇLERİN OTORİTE VE DİNİ OTORİTE HAKKINDAKİ GÖRÜŞLERİ

Burada bulgularını sunacağımız araştırma Ocak-Nisan 2020’de, İstanbul’un değişik devlet veya vakıf üniversitelerinde öğrenim gören yirmi gençle yapılan mülakatlara dayanmaktadır. Görüşmeler yüz yüze planlanmış ancak pandemi sebebiyle bazıları çevirim içi platformlarda yapılmış, bazıları ise mailleşme yoluyla yazılı olarak alınmıştır.

¹⁷ Bocheński, *Otorite Nedir*, 37-38.

¹⁸ Galip Türcan, “İslam’da Dinî Otorite”, *Süleyman Demirel Üniversitesi İlahiyat Fakültesi Dergisi*, 1/14, (2005), 98.

¹⁹ Şinasi Gündüz, “Otoritenin Teolojik Meşruiyeti: Kutsal Bir Fenomen Olarak Otorite”, *Milel ve Nihal*, 14/1, (2017), 13.

²⁰ Ahmet Aydın, “Dört Mezhep İmamının Otoritesini Tesis Eden Temel Unsurlar -Güven-Otorite İlişkinine Dair Analiz-“, *Türkiye Din Eğitimi Araştırmaları Dergisi*, 4 (2017), 78.

²¹ Gürcan, “İslam’da Dinî Otorite”, 111.

Gençlerin otorite algılarını anlamak için kendilerine, “otoriteden ne anladıkları, otorite ve güç ilişkisi hakkındaki fikirleri, sosyal hayatlarında neleri otorite kabul ettikleri ve dini otorite konusunda ne düşündükleri sorulmuştur.²²

Gençlerin otoriteyi daha çok, siyasi teoride benimsenen şekliyle algıladıkları ve iktidar, güç, hiyerarşi ve meşruiyet gibi kavramlarla beraber tanımladıkları görülmüştür. Otoriteyle güç arasında zorunlu bir ilişki bulunduğu dikkat çeken gençler, güç ve baskının hukuki sınırlarına dikkat edilmediği takdirde, yönetimi diktatörlüğe kadar götürebileceğine vurgu yapmışlardır.

Otoritenin sosyal hayatın farklı kurumlarına yayılmış çok boyutlu bir olgu olduğunu kabul eden katılımcılar ailede, anne babayı; iş hayatında patronu ve siyasi alanda da devleti önemli otorite unsurları olarak gördüklerini belirtmişlerdir. Devlet otoritesini, baskı, güç ve yaptırım kullanması sebebiyle zorunlu itaat gerektiren bir alan olarak görürken, aile ve iş hayatındaki otorite figürleri sevgi, saygı ve güvene dayalı itaat alanı olarak zikretmişlerdir. Otoriteyle ilgili literatürde yer verilen ayrımlara gençler tarafından da dikkat çekilmiş ve ihtisas, bilgi ve tecrübeye dayanan otorite kabul görürken, sahip olunan konum ve statü sebebiyle dayatan ve buyuran otoriteye uzak durdukları, eleştirdikleri ve tepkili oldukları anlaşılmıştır.

Dini inanç, ibadet ve davranışlarına yön verici olarak Kur'an ve Sünneti öncelikledikleri; bunların dışındakilerin otoritesini ise bu iki kaynağa uygunlukları açısından ele aldıkları görülmüştür. Sonuç

Otorite, insan yaşamını, doğduğu günden öldüğü ana kadar, anne-baba otoritesinden başlayıp Tanrı otoritesine kadar uzanan bir çizgide ve farklı şekillerde etkileyen bir olgudur. Çok boyutlu ve interdisipliner bir kavram olması sebebiyle hem karmaşık hem de tartışmalıdır.

Otorite, bireylere tanınan hak ve özgürlük alanının genişlediği ve hoşgörü esasına dayalı bir sosyal ahlak anlayışının benimsendiği modern toplumlarda, bazı kesimlerce modası geçmiş hatta lüzumsuz kabul edilirken diğer bazılarınca da sosyal hayatın değişik alanlarında otoritenin -tabiri caizse- erozyona uğraması, düzensizliğe, istikrarsızlığa ve sosyal çözülmeye davetiye çıkarmak anlamına gelmektedir. Yani otorite, kimilerince düzen ve istikrarın garantörü olarak görülürken kabul edilirken kimilerince de özgürlük ve demokrasinin düşmanı olarak kabul edilmektedir.

KAYNAKÇA

- Andrew Heywood, Key Concepts on Politics (Newyork: Palgrave Mcmillian, 2000), 15-16.
- Arslan, Salih. “Yönetim Sürecinde Otorite Kullanımı ve Ortaya Çıkan Sorunların Değerlendirilmesi: Eleştirel Bir Yaklaşım”. *Optimum Ekonomi ve Yönetim Bilimleri Dergisi* 5/1(2018), 1-18.
- Aydın, Ahmet. “Dört Mezhep İmamının Otoritesini Tesis Eden Temel Unsurlar -Güven-Otorite İlişisine Dair Analiz-”, *Türkiye Din Eğitimi Araştırmaları Dergisi* 4 (2017), 77-88.
- Bal, Hüseyin. “Siyaset Teorisinde Otorite Kavramı”. *Turkish Studies International Periodical Forthe Languages, Literature and History of Turkish or Turkic* 9/2 (2014), 247-255.
- Bocheński, J.M. Otorite Nedir? Otorite Mantığına Giriş. çev. Hilal Görgün. İstanbul: Küre Yayınları, 2015.

²² Görüşme türü olarak “dikkatlice yazılmış ve belirli bir sıraya konmuş bir dizi sorudan oluşan ve her görüşülen bireye bu soruların aynı tarz ve sırada sorulduğu” standartlaştırılmış açık uçlu görüşme, tercih edilmiştir. Veriler betimsel analize tabi tutulmuştur. Soru formu ve orijinal katılımcı ifadeleri için ilgili makaleye müracaat edilebilir: Fatma Odabaşı, “Üniversite Gençliğinin Otorite Algısı ve Din”, *İlahiyat Akademi*, 12 (Aralık 2020): 195-216.



- Çam, Esat. Siyaset Bilimine Giriş. İstanbul: İstanbul Üniversitesi Yayınları, 1984.
- Esgin, Ali. “Otoritenin Sosyolojisi: Otoriteye İtaatin Ya da Otorite Bağımlılığının Sosyolojik Anlamları”. *Sosyologca* 5 (2013), 91-112.
- Gündüz, Şinasi. “Otoritenin Teolojik Meşruiyeti: Kutsal Bir Fenomen Olarak Otorite”, *Milel ve Nihal* 14/1 (2017), 8-23.
- Heywood, Andrew. *Key Concepts on Politics*. Newyork: Palgrave Mcmillian, 2000.
- Kojéve, Alexandre. *Otorite Kavramı*. çev. Murat Erşen. İstanbul: Bağlam Yayınları, 2007.
- Lipson, Leslie. *Siyasetin Temel Sorunları*. çev. Fügen Yavuz. İstanbul: Türkiye İş Bankası Yayınları, 2005.
- Odabaşı, Fatma. “Üniversite Gençliğinin Otorite Algısı ve Din”, *İlahiyat Akademi*, 12 (Aralık 2020): 183-216.
- Sennett, Richard. *Otorite*. çev. Kamil Durand. İstanbul: Ayrıntı Yayınları, 1992.
- TDK, “Otorite”, (erişim 21.06.2020).
- Türcan, Galip. “İslam’da Dinî Otorite”. *Süleyman Demirel Üniversitesi İlahiyat Fakültesi Dergisi* 1/14 (2005), 95-123.
- Weber, Max. *Sosyoloji Yazıları*. çev. Taha Parla. İstanbul: Hürriyet Vakfı Yayınları, 1986.
- Websters, “Authority”, (erişim 21.06.2020).
- Yükselbaba, Ülker. “Milgram Deneyi: Otorite Ve İtaate Dair”. *İÜHMC* 75/1(2017), 227-270.



CONTRIBUTION TO THE KNOWLEDGE OF THE MYRMECOFAUNA (HYMENOPTERA: FORMICIDAE) OF POMORIE, BULGARIA

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ABSTRACT

In July 2021, the myrmecofauna of Pomorie City (Bulgaria) was studied. From the Formicidae family 15 species were recorded: *Cardiocondyla bulgarica*, *C. elegans*, *Crematogaster schmidtii*, *Formica cunicularia*, *F. sanguinea*, *Lasius niger*, *Messor barbarus*, *M. capitatus*, *M. structor*, *Plagiolepis pygmaea*, *Tapinoma erraticum*, *Temnothorax sp.*, *Tetramorium caespitum*, *T. chefketi* and *T. ferox*.

Keywords: Pomorie, Black Sea, Formicidae, *Messor capitatus*.

INTRODUCTION

Bulgarian myrmecofauna is well studied and with 163 species is one of the richest fauna of southern Europe (Lapeva-Gjonova et al. 2010). However, not all parts of Bulgaria have been explored equally. The study of the ant fauna of Pomorie is connected to the beginnings of the research of the ant fauna of Bulgaria by the Swiss myrmecologist Auguste Forel. Forel (1892) recorded 10 species of ants for Pomorie. Then, Atanassov & Dlusskij (1992) confirm the findings for three species (*Temnothorax recedens*, *Cardiocondila bulgarica* and *C. stambuloffii*). Scifert (2003) from the museum material of the Forel's research, confirms the species *Cardiocondila bulgarica* and *C. stambuloffii*. The territory of the Black Sea coast region is the smallest among all natural regions of Bulgaria and it is sufficiently studied: 75 ant species from ca. 27 localities are recorded (Lapeva-Gjonova et al. 2010). Therefore requires additional research.

This paper aims to contribute to a better knowledge of ants of Pomorie and the southern parts of the Bulgarian Black Sea coast.

STUDY AREA

Pomorie (42°34'6" N, 27°37'0" E) is a town in southeastern Bulgaria, located on a narrow rocky peninsula in Burgas Bay on the southern Bulgarian Black Sea coast (Fig. 1). The climate is temperate continental with increased influence of the Black Sea. Winters are mild. The temperature averages 13,7 ° C. With an average of 24,3 ° C, August is the warmest month. Pomorie has a significant amount of rainfall during the year with averages 637 mm. The driest month is August (31 mm). With an average of 65 mm, the most precipitation falls in December. The lowest value for the relative humidity is measured in August (68 %). The relative humidity is highest in January (78 %). On average, the fewest rainy days are measured in August (5,2 rainy days). The month with the rainiest days is December (9,6 rainy days). Around 2956 hours of sunshine are counted in Pomorie throughout the year (<https://no.climate-data.org/>).



Fig. 1. Bulgaria, showing the geographical location of Pomorie (black square). Fig. 2. Collection locations in Pomorie (red circles).

MATERIAL AND METHODS

Ants were collected at the locations "Stari grad", "Centar" and the coastal belt of Pomorie, in the period from July 16 to 26, 2021 (Fig. 2). The primary goal of this study was to record as many species as possible. Therefore, the active sampling method (direct sampling) was used. Many species inhabiting an area can be recorded in a relatively short time by direct sampling (Romero & Jaffe, 1989). Direct or hand sampling is particularly useful for a short-term faunal inventory and involves the collecting of ants in various microhabitats within the study area (Lattke, 2000). The search was performed on bare ground, in the litter, on twigs, under and on bushes and trees, at the base and at the root of grass clumps, under stones, on the bark of trees, on walls and sidewalks. I also used the method of Hölldobler & Wilson (1990). Small plots are cleared of fallen leaves and twigs, to reveal bare soil. Then, the plots were observed for a few minutes to find small and hidden specimens of ants. The ants were collected at different times of the day, which aimed to collect different species of ants. Material was preserved in 70% ethyl alcohol (Collingwood & Prince, 1998) and kept in the author's collection.

Determinations were made using stereomicroscope (BTC STM-1 x20). The identification of the species was based on currently available keys: Wilson (1955), Collingwood (1979), Agosti & Collingwood (1987), Collingwood & Prince (1998), Seifert (2003), Seifert & Schultz (2009). Also, the on-line key (<https://www.antweb.org>).

RESULTS AND DISCUSSION

In this study, 15 species from three subfamily were registered (Table 1). From the subfamily Myrmicinae, 10 species (*Messor barbarus*, *M. capitatus*, *M. structor*, *Crematogaster schmidtii*, *Temnothorax sp.*, *Cardiocondyla bulgarica*, *C. elegans*, *Tetramorium caespitum*, *T. chefketi*, *T. ferox*), subfamily Formicinae, four species (*Plagiolepis pygmaea*, *Lasius niger*, *Formica cunicularia*, *F. sanguinea*), and from subfamily Dolichoderinae, one species (*Tapinoma erraticum*).

Table 1. List of Pomorie ant fauna.

Species	References	This study
Myrmicinae		
<i>Messor barbarus</i> Linnaeus, 1767	Forel, 1892	+
<i>M. capitatus</i> Latreille, 1798	-	+
<i>M. structor</i> Latreille, 1798	-	+
<i>Crematogaster schmidtii</i> Mayr, 1853	-	+
<i>Temnothorax recedens</i> Nylander, 1856	Forel, 1892; Atanassov & Dlusskij, 1992	
<i>Temnothorax sp.</i>	-	+
<i>Cardiocondyla bulgarica</i> Forel, 1892	Forel, 1892; Atanassov & Dlusskij, 1992; Scifert, 2003	+
<i>C. elegans</i> Emery, 1869	-	+
<i>C. stambuloffii</i> Forel, 1892	Forel, 1892; Atanassov & Dlusskij, 1992; Scifert, 2003	
<i>Tetramorium caespitum</i> Linnaeus, 1758	Forel, 1892	+
<i>T. chefketi</i> Forel, 1911	-	+
<i>T. ferox</i> Ruzsky, 1903	-	+
Dolichoderinae		
<i>Tapinoma erraticum</i> Latreille, 1798	Forel, 1892	+
Formicinae		
<i>Plagiolepis pygmaea</i> Latreille, 1798	-	+
<i>Lasius niger</i> Linnaeus, 1758	-	+
<i>Camponotus piceus</i> Leach, 1825	Forel, 1892	
<i>Formica cunicularia</i> Latreille, 1798	-	+
<i>F. gagates</i> Latreille, 1798	Forel, 1892	
<i>F. rufibarbis</i> Fabricius, 1793	Forel, 1892	
<i>F. sanguinea</i> Latreille, 1798	-	+
<i>Cataglyphis aenescens</i> Nylander, 1849	Forel, 1892	

New species for Pomorie are: seven species from the subfamily Myrmicinae (*M. capitatus*, *M. structor*, *C. schmidtii*, *Temnothorax sp.*, *C. elegans*, *T. chefketi*, *T. ferox*) and four species from the subfamily Formicinae (*P. pygmaea*, *L. niger*, *F. cunicularia*, *F. sanguinea*). For four species known from previous research (Forel, 1892; Atanassov & Dlusskij, 1992; Scifert, 2003), the findings were confirmed. These are: *M. barbarus*, *C. bulgarica*, *T. caespitum* and *T. erraticum*. Most new species are expected. A similar fauna of ants has been registered in the surrounding towns. Of the 23 species registered in Burgas (Lapeva-Gjonova et al. 2010), 13 species are the same as in Pomorie. From this research, new species common to the ant fauna of Burgas are: *M. structor*, *C. schmidtii*, *T. chefketi*, *T. ferox*, *P. pygmaea*, *L. niger* and *F. cunicularia* (Table 2). Of the 16 species registered for Sozopol (Lapeva-Gjonova et al. 2010), half are the same as in Pomorie. Common species with ant fauna of Nessebar are *M. structor*, *C. elegans* and previously *T. caespitum* (Barrett, 1970).

Table 2. New species for Pomorie, previously registered in places on the southern Bulgarian Black Sea coast.

Species	Places and References
<i>M. structor</i>	Nesebar (Barrett, 1970), Burgas (Atanassov & Vassileva, 1976)
<i>C. schmidtii</i>	Burgas (Forel, 1895), Rezovo (Atanassov, 1934)
<i>C. elegans</i>	Nesebar, Primorsko (Atanassov & Dlusskij, 1992)
<i>T. chejketi</i>	Primorsko (Atanassov & Vassileva, 1976; Hubenov et al. 1998), Maslen Nos (Atanassov & Vassileva, 1976), Burgas (Csösz et al. 2007)
<i>T. ferox</i>	Burgas (Csösz & Schulz, 2010)
<i>P. pygmaea</i>	Burgas (Forel, 1892)
<i>L. niger</i>	Burgas, Sozopol (Forel, 1892)
<i>F. cunicularia</i>	Burgas (Forel, 1892)

The record of *M. capitatus* from Pomorie is only the second record for Bulgaria. The previous record was from the northern coast: Kavarna, Kaliakra (Marko & Csosz, 2002). Nests of *M. capitatus* were found on the shores of the Black Sea and nearby Lake Pomorie, on the sandy soil with dry sparse vegetation. Determination of the species *M. capitatus* (Fig. 3-4) was performed according to Collingwood & Prince (1998) and on-line key (<https://www.antweb.org>).

Only one worker from the genus *Temnothorax* was found (different from *T. recedens*), which was not sufficient to determine the species (Fig. 5). This specimen had characteristics very similar to the species *Temnothorax flavicornis*: yellow body, head significantly longer than width, long propodeal spines, deviating from the longitudinal axis of the mesosome more than 25°.

According to IUCN Red List of Threatened Species, one species *Temnothorax recedens* is cited in the category Lower Risk/least concern: “Taxa which do not qualify for Conservation Dependent or Near Threatened”.



Fig. 3-4. *M. capitatus* - dorsal, lateral and head view.



Fig. 5. *Temnothorax* sp.

CONCLUSION

The current list of the myrmecofauna of Pomorie has been compiled on the basis of personal research from July 2021 and available publications on Bulgarian ants. As a result, the list contains 21 species of ants, belonging to 11 genera of 3 subfamilies:

Subfamily Myrmicinae – 5 genera, 12 species;

Genera: *Messor* (3 sp.), *Crematogaster* (1 sp.), *Temnothorax* (2 sp.), *Cardiocondyla* (3 sp.), *Tetramorium* (3 sp.).



Subfamily Dolichoderinae – 1 genera, 1 species;

Genera: *Tapinoma* (1 sp.).

Subfamily Formicinae – 5 genera, 8 species;

Genera: *Plagiolepis* (1 sp.), *Lasius* (1 sp.), *Camponotus* (1 sp.), *Formica* (4 sp.), *Cataglyphis* (1 sp.).

REFERENCES

- Agosti, D., & Collingwood, C., A. (1987). A provisional list of the Balkan ants (Hym. Formicidae) and a key to the worker caste. I. Synonymic list. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 60: 51-62.
- AntWeb. Version 8.66. California Academy of Science, online at <https://www.antweb.org>. [Accessed 18 November 2021].
- Atanassov, N., & Dlusskij, G. (1992). [Fauna Bulgarica. 22. Hymenoptera, Formicidae]. Bulgarian Academy of Sciences, Sofia, 310 pp. [in Bulgarian].
- Barrett, K., E., J. (1970). Ants from Hungary and Bulgaria. *The Entomologist*, 130: 139-140.
- Collingwood, C., A. (1979). The Formicidae (Hymenoptera) of Fennoscandia and Denmark. *Fauna Entomol. Scand.* 8: 1-174.
- Collingwood, C., A., & Prince, A. (1998). A guide to ants of Continental Portugal (Hymenoptera: Formicidae). *Boletim da Sociedade Portuguesa de Entomologia. Supl. n°5*, pp 49.
- Forel, A. (1892). Die Ameisenfauna Bulgariens. (Nebst biologischen Beobachtungen.) *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien*, 42: 305-318.
- Hölldobler, B., & Wilson, E. O. (1990). *The ants*. Cambridge, Massachusetts, Harvard University Press, xii + 732 pp.
- Lapeva-Gjonova, A., Antonova, V., Radchenko, A., G., & Atanasova, M. (2010). Catalogue of the ants (Hymenoptera, Formicidae) of Bulgaria. *ZooKeys* 62: 1–124.
- Lattke, J., E. (2000). *Specimen Processing: Building and Curating an Ant Collection*. In Agosti, D., Majer, J., Alonso, E. & Schultz, T.R. (Eds.). *Ants: Standard Methods for Measuring and Monitoring Biodiversity*, pp. 155-171. Biological Diversity Handbook Series. Smithsonian Institution Press. Washington D.C.
- Markó, B., & Csősz, S. (2002). Die europäischen Ameisenarten (Hymenoptera: Formicidae) des Hermannstädter (Sibiu, Rumänien) Naturkundemuseums I.: Unterfamilien Ponerinae, Myrmicinae und Dolichoderinae. *Annales Historico-Naturales Musei Nationalis Hungarici*, 94: 109-121.
- Romero, H., & Jaffe, K. (1989). A comparison of methods for sampling ants (Hymenoptera: Formicidae) in savannas. *Biotropica* 21: 348-352.
- Seifert, B. (2003). The ant genus *Cardiocondyla* (Insecta: Hymenoptera: Formicidae) - a taxonomic revision of the *C. elegans*, *C. bulgarica*, *C. batesii*, *C. nuda*, *C. shuckardi*, *C. stambuloffii*, *C. wroughtonii*, *C. emeryi*, and *C. minutior* species groups. *Annalen des Naturhistorischen Museums in Wien*, 104 (B): 203-338.
- Seifert, B., & Schultz, R. (2009). A taxonomic revision of the *Formica rufibarbis* Fabricius, 1793 group (Hymenoptera: Formicidae). *Myrmecologische Nachrichten*, 12: 255-272.



Wilson, E. O. (1955). A monographic revision of the ant genus *Lasius*. Bulletin of the Museum of Comparative Zoology, 113: 1-201.

<https://en.climate-data.org/europe/bulgaria/pomorie/pomorie-28171/>

THE HERPETOFAUNA OF JAGODINA REGION (SERBIA)

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ABSTRACT

This paper presents mostly unpublished faunistic data on amphibians and reptiles in the region of Jagodina (Serbia). The main research was conducted in the period 2013-2015. 13 species of amphibians and 11 species of reptiles were registered. Zoogeographic analysis showed that herpetofauna of the studied area consists of nine chorotypes, with the Southern-European and Turano-European as the most dominant ones.

Keywords: Amphibians, Reptiles, Jagodina, Serbia.

INTRODUCTION

Populations as well as entire species of amphibians and reptiles are in decline or extinction in many regions and habitats around the world, primarily due to habitat loss, degradation and fragmentation (Dodd et al. 2012). Data about the distribution of species is basic for use in future research in the areas of ecology, systematics, biogeography and conservation biology. Their rapid worldwide declines have reinforced a need for more precise data about their distribution at the regional and national levels, especially in countries with poor distributional data (e.g. Margules et al. 2002)

Herpetofauna of vicinity of Jagodina not been studied, until now. In the recent literature, only occasional records were known from the Middle Pomoravlje and SE Šumadija (Džukić et al. 2008; Ljubisavljević et al. 2015).

STUDY AREA

Jagodina is located in the central part of Serbia (Fig. 1). The researched area includes parts of Middle Pomoravlje and SE Šumadija: the middle Velika Morava valley, parts of Mt. Juhor, Mt. Crni Vrh and the Levač valley. It belongs to the Peripannonic region of Serbia. The greatest altitudes are at Mt. Juhor (773 m) and Mt. Crni Vrh (707 m), while the lowest altitude point is in the Velika Morava valley (106 m). The most prominent hydrographical objects are the mid flow of Velika Morava and its lesser tributaries, Lugomir and Belica. Along the Velika Morava River, there are many ponds overgrown with emerged vegetation and the marshes that are periodically flooded by Velika Morava and its tributaries. The most important are: Rit, Brzansko moravište, Predorske bare and Laništanska bara (Nova bara). At Dragocvet village, there is an artificial accumulation (Dragocvetačko jezero), and to the north from Jagodina, a spacious flooded marsh surface.

The region belongs to the Peripannonic part of Serbia. Three landscapes types (biomes) are represented in the studied area: biome of submediterranean Oak woodlands, biome of South European deciduous montane woodlands and biome of South European deciduous woods in lowland and inundated areas (Matvejev & Puncer, 1989). The climate is moderately continental. According to data of Republic hydrometeorological service of Serbia for the region of Jagodina, period 1981-2010, the average annual air temperatures are between 11,2

and 11,7°C approximately. The warmest month is July, with a mean temperature of 22,2°C; the coldest is January with a mean temperature of 0,8°C; the mean annual precipitation is 658 mm (Anonymous, 2011).

The aim of this study was to determine the diversity of amphibians and reptiles in the area of Jagodina, to calculate the conservation status index and to assess the local endangerment of species.



Fig. 1. Serbia, showing the geographical location of Jagodina (red spot).

MATERIAL AND METHODS

The main field research has been conducted from 2013 to 2015 at 42 locations in the Jagodina region (Table 1). Accidental findings from previous years are also included in the inventory. Data from the literature were used for the species *Pelobates fuscus* and *P. syriacus*. Most animals were just observed in the field and recorded, some were captured for identification and / or measurement and then released on site. The presence of species of amphibians was determined on the basis of eggs, larvae and adult individuals. Also, the author identified animals killed by predators, cars or local people. Some killed specimens were preserved in 5 % formaline solution and stored in the author collection. Determination of species was performed using the appropriate literature (Radovanović, 1951; Arnold & Ovenden, 2002).

Table 1. Studied locations with coordinates

No	Localities	coordinates	No	Localities	coordinates
1	Bagrdanski tesnac	44°04'12"N 21°11'40"E	22	Jagodina-Lugomir river	43°58'17"N 21°16'53"E
2	Bresje	43°56'13"N 21°15'42"E	23	Jagodina-railway station	43°58'54"N 21°15'53"E
3	Bresje-Ćelijan	43°56'14"N 21°15'32"E	24	Jagodina-Štiplje road	43°59'18"N 21°12'41"E
4	Bresje-Mt. Juhor	43°55'52"N	25	Jošanica Monastery-	43°58'32"N



		21°16'01"E		river	21°08'27"E
5	Bresje-rocky	43°55'58"N 21°15'43"E	26	Juhor -Crna Grača	43°52'56"N 21°14'23"E
6	Bunar-channel	43°55'07"N 21°09'05"E	27	Juhor-Jerinin grad	43°51'57"N 21°14'27"E
7	Bukovče- creek	44°00'36"N 21°14'08"E	28	Končarevo	43°58'09"N 21°18'47"E
8	Crni vrh-Grabovita glava	44°01'21"N 21°06'27"E	29	Leštar	43°56'41"N 21°16'35"E
9	Crni vrh-Beli izvor	44°00'01"N 21°07'41"E	30	Lipar	44°00'26"N 21°12'24"E
10	Crni vrh-creek	44°01'13"N 21°07'08"E	31	Lozovik-quarry	43°57'28"N 21°07'52"E
11	Čuprija road	43°57'19"N 21°18'14"E	32	Mišević (Bešnjaja-Voljevica)	44°01'48"N 21°13'57"E
12	Donje Štiplje	44°00'10"N 21°11'03"E	33	Novo Lanište-Kameni potok	44°01'48"N 21°13'57"E
13	Donje Štiplje - river	43°58'37"N 21°12'59"E	34	Panjevački rit-channel	44°00'36"N 21°15'06"E
14	Dragocvet lake	43°56'02"N 21°12'14"E	35	Predor-V. Morava riverside	43°59'12"N 21°20'06"E
15	Đurđevo brdo	43°57'24"N 21°16'10"E	36	Predorske bare	43°59'48"N 21°20'05"E
16	Gigoš	44°02'45"N 21°12'21"E	37	Ribare	44°00'03"N 21°16'39"E
17	Glogovačke bare	44°02'18"N 21°18'10"E	38	Ribnik	44°01'03"N 21°13'37"E
18	Gornje Štiplje	44°00'54"N 21°08'00"E	39	Rit (Bukovče-Ribnik)	44°00'51"N 21°13'49"E
19	Jagodina	43°58'52"N 21°15'45"E	40	Staro Lanište	44°01'42"N 21°15'46"E
20	Jagodina-Belica river	43°57'59"N 21°15'49"E	41	Staro Lanište-Nova bara	44°02'05"N 21°15'26"E
21	Jagodina-Kolonija	43°57'07"N 21°16'43"E	42	Šantrovac	43°54'53"N 21°09'21"E

The Conservation Status Index ($I = \sum Si$) was calculated for the investigated area, where Si = conservation score of the species i . The value of conservation score of the species increases with the increase of the threatened category (Sutherland, 2000). Accordingly, IUCN species threatened categories (IUCN, 2021) were evaluated as follows: Vulnerable (VU) = 3; Near threatened (NT) = 2; Least concern (LC) = 1 (Milojković, 2006).

The local degree of endangerment was assessed on the basis of three criteria: Criterion 1: human impact (traffic) on the species - none (0), once (1) or more than once (2) recorded trampled individual on the roads; Criterion 2: Impact of climate change on the species - during field trips to the area it was noted that the habitats of the given species have changed (0), decreased (1) or occasionally do not exist (2); Criterion 3: human impact (deliberate killing) on the species - none (0), one (1) or more than one (2) killed individual was recorded (Dinov, 2015).

For each species, the influence of each of the criteria was evaluated as irrelevant - 0, medium intensity -1 and great intensity -2. Based on the sum of points, a degree of local endangerment was determined: the species that had 0 points was marked as not threatened (N); The species that had 1 or 2 points is marked as Near threatened (NT); The species that had 3 or 4 points is marked as threatened (T).

RESULTS AND DISCUSSION

Out of 21 amphibians and 24 reptiles known from the territory of Serbia (Vukov et al. 2013; Tomović et al. 2014), 13 amphibian species (62 %) and 11 reptile (46 %) were registered in the study area: three urodela, 10 anurans, two testudines, four lizards and five snakes (Table 2).

Table 2. Amphibians and reptiles found in the region of Jagodina with location of findings and local threat assessments.

Species	Locality number	Cr.1	Cr.2	Cr.3	Local degree of endangerment
<i>Salamandra salamandra</i> L.1758	9, 10, 25	1	2	0	T
<i>Lissotriton vulgaris</i> L.1758	6, 34, 39, 41	0	2	0	NT
<i>Triturus karelinii</i> Strauch, 1870	42	0	2	0	NT
<i>Hyla arborea</i> L.1758	3, 14, 17, 20, 22, 35, 36, 39, 41	0	0	0	N
<i>Bombina bombina</i> L.1761	7, 34, 39, 41	0	2	0	NT
<i>Bombina variegata</i> L.1758	6, 18	0	2	0	NT
<i>Bufo bufo</i> L.1758	2, 29	0	0	0	N
<i>Pseudepidalea viridis</i> Laurenti, 1768	7, 19, 41	2	0	0	NT
<i>Pelophylax kl. esculentus</i> L.1758	14, 17, 20, 22, 34, 36, 39, 41	0	1	0	NT
<i>Pelophylax ridibundus</i> Pallas, 1771	14, 17, 20, 22, 34, 36, 39, 41	1	1	0	NT
<i>Rana dalmatina</i> Bonaparte, 1840	4, 10, 13, 25, 26, 32, 33	0	2	0	NT
<i>Pelobates fuscus</i> Laurenti, 1768	41 (Džukić, et al. 2008)	-	-	-	-
<i>Pelobates syriacus</i> Boettger, 1889	41 (Džukić, et al. 2008)	-	-	-	-
<i>Emys orbicularis</i> L.1758	34, 36, 41	0	1	0	NT
<i>Testudo hermanni</i> Gmelin, 1789	4, 15, 24, 29, 30	2	0	0	NT
<i>Anguis fragilis</i> L.1758	4, 10, 15	0	0	0	N
<i>Ablepharus kitaibelii</i> Bibron & Bory, 1833	4, 5	0	0	0	N
<i>Lacerta viridis</i> Laurenti, 1768	1, 2, 4, 8, 15, 20, 22, 23, 24, 29	2	0	0	NT
<i>Podarcis muralis</i> Laurenti, 1768	4, 5, 19, 20, 23, 24, 31, 37, 40	1	0	0	NT
<i>Coronella austriaca</i> Laurenti, 1768	4, 15, 16, 19, 24, 29, 30	0	0	1	NT
<i>Natrix natrix</i> L.1758	2, 4, 7, 11, 18, 19, 28, 38, 39, 40, 41	2	0	1	T
<i>Natrix tessellata</i> Laurenti, 1768	2, 7, 15, 19, 29, 34	2	0	1	T
<i>Zamenis longissimus</i> Laurenti, 1768	2, 4, 12, 15, 19, 21, 29	2	0	1	T
<i>Vipera ammodytes</i> L.1758	1, 5, 8, 25, 27, 29, 31	0	1	2	T

Only two species, *P. fuscus* and *P. syriacus* were not recorded during the study period. The most widespread species among the amphibians were *Hyla arborea*, *Pelophylax ridibundus* and *Pelophylax kl. esculentus*, than, among the reptiles *Natrix natrix* and *Lacerta viridis*. The highest diversity was recorded in Laništanska bara (Nova bara), eight species of amphibians (six species in the research period) and two species of reptiles: *Lissotriton vulgaris*, *H. arborea*, *Bombina bombina*, *Pseudepidalea viridis*, *Pelophylax kl. esculentus*, *P. ridibundus*, *P. fuscus*, *P. syriacus*, *Emys orbicularis* and *N. natrix*. The largest number of reptiles was recorded at the location of Bresje (Mt. Juhor), seven species: *Testudo hermanni*, *Anguis fragilis*, *Ablepharus kitaibelii*, *L. viridis*, *Podarcis muralis*, *Coronella austriaca*, *N. natrix* and *Zamenis longissimus*.

Zoogeographic analysis showed that herpetofauna of the studied area consists of nine chorotypes (Table 3). The largest number of species with Southern-European distribution,

seven species (29,2 %); followed by Turano-European, five sp. (20,8 %); European and Central-European, per three sp. (12,5 %); Eastern-Mediterranean, two sp. (8,3 %); Europeo-Mediterranean, Turano-Mediterranean, Centralasiatic-Europeo-Mediterranean, Turano-Europeo-Mediterranean, per one sp. (4,2 %).

Table 3. Zoographic analysis of herpetofauna of Jagodina region according to chorotypes.

Chorotype	Amphibians	Reptiles
Europeo-Mediterranean	<i>Bufo bufo</i>	
Turano-Mediterranean	<i>Pelobates syriacus</i>	
European	<i>Lissotriton vulgaris</i>	<i>Anguis fragilis</i> <i>Coronella austriaca</i>
Turano-European	<i>Triturus karelinii</i> <i>Hyla arborea</i> <i>Pseudepidalea viridis</i> <i>Pelophylax ridibundus</i>	<i>Natrix tessellata</i>
Central-European	<i>Bombina bombina</i> <i>Pelophylax kl. esculentus</i> <i>Pelobates fuscus</i>	
Southern-European	<i>Salamandra salamandra</i> <i>Bombina variegata</i> <i>Rana dalmatina</i>	<i>Testudo hermanni</i> <i>Lacerta viridis</i> <i>Podarcis muralis</i> <i>Zamenis longissimus</i>
Eastern-Mediterranean		<i>Ablepharus kitaibelii</i> <i>Vipera ammodytes</i>
Centralasiatic-Europeo-Mediterranean		<i>Natrix natrix</i>
Turano-Europeo-Mediterranean		<i>Emys orbicularis</i>

The estimates of local risk factors for amphibians and reptiles in the area of Jagodina, indicates that the largest number of species is really threatened, primarily due to the negative human impact - the effect of traffic and the negative attitude of humans primarily towards reptiles (Table 2). Traffic (Cr. 1) had the greatest impact on reptiles. The following species suffered the most: *L. viridis*, *N. natrix*, *Natrix tessellata*, *Z. longissimus*, and *T. hermanni*. Of the amphibians in the spring, *P. viridis* suffered the most from traffic.

Amphibians are particularly vulnerable to climate change (Cr. 2). Habitat loss occurs primarily due to low rainfall and high temperatures, leading to declining populations. There is also general degradation, pollution and backfilling of aquatic habitats. Climate change was the greatest impact on the following species: *Salamandra salamandra*, *L. vulgaris*, *Triturus karelinii*, *B. bombina*, *Bombina variegata*, *Rana dalmatina*. The species *P. fuscus* and *P. syriacus* should certainly be added here.

Human impact - deliberate killing (Cr. 3), has been recorded in all species of snakes, and most in Horned viper *Vipera ammodytes*.

Based on the criteria for estimates of local endangerment, four species are not threatened (*H. arborea*, *Bufo bufo*, *A. fragilis*, *A. kitaibelli*), 13 species are near threatened (*L. vulgaris*, *T. karelinii*, *B. bombina*, *B. variegata*, *P. viridis*, *Pelophylax kl. esculentus*, *P. ridibundus*, *R. dalmatina*, *E. orbicularis*, *T. hermanni*, *L. viridis*, *P. muralis*, *C. austriaca*) and five are threatened (*S. salamandra*, *N. natrix*, *N. tessellata*, *Z. longissimus*, *V. ammodytes*).

Among the registered species are internationally and nationally important. According to IUCN categories (IUCN, 2021), two species are Near threatened, and 11 species of

amphibians and six species of reptiles are strictly protected by law of the Republic of Serbia (Anonymous, 2010). The total Conservation score for the area of Jagodina is 26 (13 for both groups). Because they are globally declared as Near threatened, *E. orbicularis* and *T. hermanni* have a conservation score of 2. Other listed species have status Least concern (LC) – unlikely to become extinct in the near future (Tabela 4).

Tabela 4. Conservation Status Index (I) of amphibians and reptiles in the region of Jagodina and species status in international (IUCN) and Serbian environmental legislation.

Amphibians				Reptiles			
Species	IUCN	Conservation score -Si	Serbian law	Species	IUCN	Conservation score -Si	Serbian law
<i>Salamandra salamandra</i>	LC	1	SP	<i>Emys orbicularis</i>	NT	2	SP
<i>Lissotriton vulgaris</i>	LC	1	SP	<i>Testudo hermanni</i>	NT	2	P
<i>Triturus karelinii</i>	LC	1	SP	<i>Anguis fragilis</i>	LC	1	-
<i>Hyla arborea</i>	LC	1	SP	<i>Ablepharus kitaibelii</i>	LC	1	SP
<i>Bombina bombina</i>	LC	1	SP	<i>Lacerta viridis</i>	LC	1	-
<i>Bombina variegata</i>	LC	1	SP	<i>Podarcis muralis</i>	LC	1	-
<i>Bufo bufo</i>	LC	1	SP	<i>Coronella austriaca</i>	LC	1	SP
<i>Pseudepidalea viridis</i>	LC	1	SP	<i>Natrix natrix</i>	LC	1	SP
<i>Pelophylax kl. esculentus</i>	LC	1	P	<i>Natrix tessellata</i>	LC	1	SP
<i>Pelophylax ridibundus</i>	LC	1	P	<i>Zamenis longissimus</i>	LC	1	SP
<i>Rana dalmatina</i>	LC	1	SP	<i>Vipera ammodytes</i>	LC	1	P
<i>Pelobates fuscus</i>	LC	1	SP	Conservation Status Index (I) = 13			
<i>Pelobates syriacus</i>	LC	1	SP	IUCN - The International Union for Conservation of Nature LC - Least concern, NT - Near threatened species, Strictly protected (SP) and protected (P) species by Serbian law.			
Conservation Status Index (I) = 13							

Expressed in percentages, the diversity of amphibians in the area of Jagodina (62% of the total number of amphibian species in Serbia) is the same as in the "Đerdap National Park" (Crnobrnja-Isailović et al. 2015) and higher than in the Nature reserve of special interest "Vlasina Plateau", which is 57 % (Dinov, 2015). Studied area partly belongs to Šumadija, one of the hot – spot region in Serbia, with highest species diversity of amphibians and reptiles in Serbia (Vukov et al. 2013, Tomović et al. 2014). Also, The Morava Valleys was an important refugial centre due to its morphology, characterized by a system of connected ravines and canyons, and geologic history (Matvejev, 1975).

CONCLUSION

In the area of Jagodina, which belongs to the Peripannonic part of Serbia, 13 amphibian species and 11 reptile were registered: three urodela, 10 anurans, two testudines, four lizards and five snakes. Data from the literature were used for the species *P. fuscus* and *P. syriacus*. The most widespread species among the amphibians were *H. arborea*, *P. ridibundus* and *Pelophylax kl. esculentus*, than, among the reptiles *N. natrix* and *L. viridis*. Zoogeographic analysis showed that herpetofauna of the studied area consists of nine chorotypes, with the Southern-European and Turano-European as the most dominant ones. The estimates of local risk factors for amphibians and reptiles in the area of Jagodina, indicates that the largest number of species is really threatened, primarily due to the negative human impact - the effect of traffic and the negative attitude of humans primarily towards reptiles. Human impact - deliberate killing, has been recorded in all species of snakes. Amphibians are particularly vulnerable to climate change, habitat loss, general degradation, pollution and backfilling of aquatic habitats. Among the registered species are internationally and nationally important. According to IUCN categories (IUCN, 2021), two species are Near threatened (*E. orbicularis* and *T. hermanni*), and 11 species of amphibians and six species of reptiles are strictly protected by law of the Republic of Serbia.

REFERENCES

- Anonymous, (2010). Pravilnik o proglašenju i zaštiti strogo zaštićenih i zaštićenih divljih vrsta biljaka, životinja i gljiva. "Službeni glasnik RS", br. 5/2010.
- Anonymous, (2011). Strateška procena uticaja Prostornog plana grada Jagodine na životnu sredinu. JP Direkcija za urbanizam Kragujevac, 91 pp.
- Arnold, E. N., & Ovenden., D. W. (2002). Field guide of reptiles and amphibians of Britain and Europe, (2nd ed.), London (*Harper Collins*), pp. 288.
- Crnobrnja-Isailović, J., Milojković, D., Macura, B. (2015). Vodozemci i gmizavci Đerdapa. Donji Milanovac: Nacionalni park Đerdap, 191 pp.
- Dinov, J. (2015). Bogatstvo vrsta faune vodozemaca i gmizavaca Vlasinske visoravni. Univerzitet u Nišu, Prirodno-matematički fakultet, Departman za biologiju i ekologiju, Master rad, pp. 44.
- Dodd, C. K., Jr., J. Loman, D. Cogalniceanu, Puky, M. (2012). Monitoring Amphibian Populations. Pp. 3577-3635 In: H.H. Heatwole and J. W. Wilkenson (eds.), Conservation and Decline of Amphibians: Ecological Aspects, Effect of Humans and Management. Amphibian Biology, Volume 10, Surrey Beatty & Sons, Chipping Norton, New South Wales, Australia.
- Džukić, G., Bešković, V., Sidorovska, V., Cogalniceanu, D. & Kalezić, M. (2008). Contemporary chorology of the spadefoot toads (*Pelobates spp.*) in the Balkan Peninsula. *Zeitschrift für Feldherpetologie*, 15: 61–78.
- IUCN, (2021). The IUCN Red List of Threatened Species. Version 2021-2. <https://www.iucnredlist.org> [Accessed, 22.11.2021.]
- Ljubisavljević, K., Tomović, L., Simović, A., Krizmanić, I., Ajtić, R., Jović, D., Urošević, A., Labus, N., Đorđević, S., Golubović, A., Anđelković, M., Džukić, G. (2015). Filling in the gaps in distribution data of the Snake-eyed skink *Ablepharus kitaibelii* Bibron and Bory, 1833 (Squamata: Scincidae) in Serbia. *Ecologica Montenegrina*, 2(3): 247-254.



- Margules, C. R., Pressey, R. L., Williams, P. H. (2002). *Representing biodiversity: data and procedures for identifying priority areas for conservation*. *Journal of Biosciences*, 27: 309-326.
- Matvejev, S., D., (1975). Geografske i biogeografske zakonitosti u rasprostranjenosti reliktnih životnih zajednica. *Acta biologica Jugoslavica, Ekologija*, 10 (2): 199-207.
- Matvejev, S., D. & Pucner, I., J. (1989). Karta bioma: Predeli Jugoslavije i njihova zaštita. *Prirodnjački muzej*, 36, Beograd, pp. 76.
- Miljković, D. (2006). Usporedna analiza diverziteta gmizavaca (Reptilia) nacionalnih parkova “Đerdap”, “Durmitor” i “Kopaonik”. *Diplomski rad*. Biološki fakultet, Univerzitet u Beogradu.
- Radovanović, M. (1951). Vodozemci i gmizavci naše zemlje. [amphibians and reptiles of our country]. *Beograd (naučna knjiga)*, pp. 249.
- Sutherland, W., J. (2000). *The Conservation Handbook: Research, management and policy*. Blackwell Science, Oxford & London, pp. 294.
- Tomović, Lj., Ajtić, R., Ljubisavljević, K., Urošević, A., Jović, D., Krizmanić, I., Labus, N., Đorđević, S., Kalezić, M. L., Vukov, T. & Džukić, G. (2014). Reptiles in Serbia - Distribution and diversity patterns. *Bulletin of the Natural History Museum*, 7, 129–158.
- Vukov, T., Kalezić, M. L., Tomović, Lj., Krizmanić, I., Jović, D., Labus, N. & Džukić, G. (2013). Amphibians in Serbia – Distribution and diversity patterns. *Bulletin of the Natural History Museum*, 6, 90–112.



TARIFFS AND GROWTH PROSPECT IN AFRICAN COUNTRIES

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ABSTRACT

The debate that growth in African countries have not been stable and in some instance declining in recent times have generated concern among the academic scholars and policy makers across the globe. Growth is volatile and a function of policy and macroeconomic indicators. This study investigate the effect of simple tariff average on GDP using heterogeneous panel data covering thirty eight (38) African countries for the period 2010 to 2020. The study used the random effect regression having supported by the Hasuman specification test. Thus, the robust options and time varying effect options are also applied to the model which will show the robustness of the model and variations in the coefficients and standard errors as well. The result of the study revealed that MFN Simple Average tariff rate has a negative sign indicating that Simple Average tariff rate has the tendency of lowering GDP growth rate in the region. The result also shows that real exchange rate and government stability have a negative effect on GDP. Conversely, the coefficients population growth, corruption and investment profile posit a positive effect on GDP. No doubt, there have been limited outcomes in the trade policy blue print which reduce GDP growth. More so, African countries may not have embraced the concessions or implement fully the tariff line level. Thus this has the tendency of lowering GDP growth rate far less than the estimated or projected values and that of the emerging and developed countries. Corruption having a positive sign does not reduce growth. However, it will require proper and well equipped institutions with efficient legal framework to reduce its tendency to discourage foreign confidences. However, it is also possible that the growth in investment profile shows the extent to which African countries have improved their rate investment especially domestically and abroad.

Key Words: MFN, tariffs and economic growth

1. INTRODUCTION

Africa growth performance is bedeviled amidst unprecedented global pandemic Covid-19 that halted growth prospects. For instance, real GDP growth is estimated at 3.4 percent for 2019, in recent time, the rate was projected to accelerate to 3.9 percent in 2020 and to 4.1 percent in 2021. The recent pandemic COVID has implication on volatility of macroeconomic indicators such as GDP. Tariffs and restrictions are measures embarked upon by various policy regimes to improve the economy. For instance, Sachs and Warner (1995) argued that countries that were open had experienced economic growth at a rate of 4.5 percent annually in the 1970s and 1980s while countries that were closed, barely managed to grow at a rate of 0.7 percent. Using the Sachs and Warner (1995) binary measure of openness, this position of trade openness led growth. Similarly, according to Were (2015) Africa still lags behind both in intra and inter-trade, despite the regional trade integration initiatives, however, the continent remains heavily dependent on the export of a narrow range of goods, mostly primary commodities with less value addition, most of which are also subject to price fluctuations in

the world market. Africa should take advantage of regional and global supply chains to unlock its growth and trade potentials.

2. REVIEW OF EMPIRICAL LITERATURE

Bo (2014) in a study examined the effect real exchange on economic growth using data on China employing the Augmented Dickey Fuller (ADF, co integrated VAR (CVAR) model spanning the period 1989 to 2014. In the long run, both exports and FDI have positive impacts on the real exchange rate and RGDP. Foreign exchange reserve and imports have negative impacts on the RER and real GDP.

Michael; Elitza and Livio (2016) in their analysis on .five-year average data using panel of over 150 countries covering the period 1970 to 2010 in the post Bretton Woods period and applying the ordinary least square regression technique to estimate the relationship between exchange rate and economic growth. The result of the study revealed that real exchange rate appreciation reduced GDP growth rate significantly.

Tsaurai (2017) in a study on trade openness and economic growth using three emerging markets employing panel data set from 1994 to 2014 and applying the vector error correction model (VECM), the results shows that trade openness has insignificant effect on economic growth.

Oluwatoyin and Folasade (2014) employed the panel data set to investigate the impact of trade openness and institutions on economic growth in sub-Saharan Africa (SSA) spanning the period 1985-2012 and applying the Panel Unit Root, Least Square Dummy Variables (LSDV) and the Generalized Method of Moments (GMM) technique of estimation. The authors in their analysis found trade openness has a insignificant impact on growth. Institutional quality has positive and significant effect on economic growth.

The work by Asiedu (2013) strictly on Ghana economy investigated the effect of trade openness on growth for the period 1986–2010 and employing the Autoregressive Distributed Lag (ARDL) Model. The results of the study indicate a positive and significant relationship between real GDP growth and openness in the long run but negative and insignificant in the short run.. Asiedu (2013) in the same vein found that there is a statistically significant positive relationship between population on one hand and real GDP in the long.

Ul Hak (2019) in a recent study examines the relationship between trade liberalization and economic growth for the period 1995–2016 using data on Afghanistan and applying Autoregressive distributed lag (ARDL) approach, Johansen co-integration, ordinary least square (OLS) and granger causality test. The result of the study shows that export has a positive effect on economic growth while trade liberalization and import have a negative effect on economic growth. In respect to causality, there exist a unidirectional causality link between trade openness and economic growth. In addition, causality runs from export to growth.

3. DATA AND METHODOLOGY

The study seek to investigate empirically the relationship between simple tariff average and GDP in African countries applying sample of (38) countries for the period 2010 to 2020. The sample countries includes: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bisau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo, Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Madagascar, Mauritius,



Mozambique, Namibia, south Africa, United Republic of Tanzania, Zambia, Zimbabwe. Seychelles, Burundi, Comoros, Egypt, Ethiopia, Kenya, Libya, Rwanda, Sudan, Uganda.

MFN Simple Average in percentage for All Products world integrated trade solutions (2020). Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs (2020). Institutional quality measures International Country Risk Guide 2019

Technique of Analysis

Applying the heterogeneous panel, this study seeks to employ the panel thus the behavior of the data will determine the conditions for further analysis. This study will employ the fixed effect and random effect estimation and the Hausman specification test will be used to select the most appropriate between the two regressions. More so, the robust option (vce) and time varying options prefix will be applied to ensure robustness of the model.

Model Speciation

$$GDP = \beta_0 + \beta_1 \ln mfn\text{sad} + \beta_2 \ln \text{realex} + \beta_3 \ln \text{pop} + \beta_4 \text{InstQuality} + \beta_5 \ln \text{intratr} + \beta_6 \ln \text{tot} + \varepsilon_{it} \dots \dots \dots (3.1)$$

GDP= Dependent variable

β_0 = constant or intercept

$\beta_1 \beta_2 \dots \beta_6$ = Slope coefficient with regards to independent variables ε_{it} = error term captures unobserved characteristics.

In fixed effects model, unobserved heterogeneity is considered constant over time. Some of the heterogeneous parameters includes institutional quality indices GDP real exchange rate. This constant heterogeneity is the fixed effect for this individual. This constant can be removed from the data, for example by subtracting each individual's means from each of his observations before estimating the model.

The Random effects regression model makes additional assumption that the individual effects are randomly distributed. Thus, this study also uses the random effects using time-varying and country specific prefix.

4. DATA ANALYSIS AND DISCUSSION

This section of the study looks at the diagnostic of data and the analysis of the data using the different regression models and prefix

Diagnostic test

This study also employ the testparm option to test the time-fixed effect the probability F value 0.5642 is greater than 0.05 therefore we cannot reject the null hypothesis that the coefficients of all years are jointly equal to zero thus the time fixed effect are not necessary in the fixed effect estimation. This study applied the vce(robust) option due to presence of heteroskedasticity problem thus the p value for Lagrangian-Multiplier test for serial correlation show that it is significant at 1% level indicating presence of heteroscedasticity

Table 1.

Fixed effect and random effect models

	1	2	3	4	5	6			
Inmfnsad	-1.236**	.75	-.798*	1.64	-1.236**	-1.236**	-1.180**	-.378*	1.08
Inrealx	-.239***	.144**	-.239***	-.239***	-.239***	-.236***	.210**		
Inpop	1.238***	.543**	.238***	1.238***	1.238***	1.233***	-.382*	2.50	
Inintratr	-.623**	.37	.237**	-.623***	-.623**	-.611**	.60	.196**	
Intot	0.876***	-.223**	.876***	.876**	.876**	.910**	-.194**		
Incorrupt	2.087***	-.340**	2.087***	2.087***	2.087***	2.318***	-.172*		
Inbureauq	.081*	.31	.55	.75	.87	.71	-.5950**		
Ininvespro	1.632***	.425**	1.632***	1.632**	1.632**	1.743***	.493**		
Ingovstab	-.962***	-.313**	-.962***	-.962***	-.962***	-.753**	-.326**		
	.49	.19	.56	.45	.61	.21			

Source: Author Computation Notes:*** ** *denotes statistical significance at 1%, 5% and 10% respectively p-values (in parentheses).

First, in model 1 using the ordinary least square regression model with vce robust option simple tariff average and intra trade have a negative effect on economic growth at 5% level of significance. Real exchange rate, government stability has a negative effect on economic growth. Similarly population growth, total trade, corruption and investment profile in African countries have a positive relationship with GDP.

Employing the Hausman test to determine the most appropriate model the probability value <0.05, then FE otherwise RE model should be selected. In this case, the random effect is appropriate. The model 3 is the random effect model without the vce (robust) option. Simple tariff average, real exchange rate, intra trade and government stability have negative effect on GDP while population growth, corruption, total trade and investment profile have a positive effect on GDP in African countries. Including the vce robust option, the results shows that the significance of the coefficients remained the same as in model 3. However, the standard errors vary with inclusion of vce robust option. Furthermore, employing the time varying effect prefix in the random model i.e in model 5, the result shows that only real exchange rate and government stability have a negative effect on GDP at 1% level of significance. Similarly, population, corruption and investment profile posit a positive effect on GDP at 1% level of significance. The result of model 6 is presented with random effect model, time varying effect and country specificity option. Thus, none of the coefficients posit a significant relationship with GDP at 1% level of significance.

5. DISCUSSION OF FINDINGS

Simple tariff average has a negative effect on GDP. This is in line with the finding by UI Hak (2019) but contrary to the findings by Asiedu (2013). The coefficient Real exchange rate has a negative effect of GDP. This is in line with findings by Michael; Elitza and Livio (2016) and Bo (2014). The coefficient Intra trade has a negative effect on GDP. Government stability has



a negative effect on GDP. Population, total trade, the coefficient corruption and investment profile have a positive effect on GDP. This conforms to study by Oluwatoyin and Folasade (2014)

Implication for policy

This study empirically investigate the effect of simple tariff average on GDP in African countries applying sample of (38) countries for the period 2010 to 2020. The result of the study revealed that MFN Simple Average tariff rate is negative indicating that there have been limited outcomes in the trade policy blue print which reduce GDP growth. Thus this has the tendency of lowering GDP growth rate far less than the estimated or projected values and that of the emerging and developed countries.

REFERENCES

- Asiedu, M. K (2013) Trade Liberalization and Growth: The Ghanaian Experience *Journal of Economics and Sustainable Development* 4(5), 125- 135
- Bo, T. (2014). Real exchange rate and economic growth in China: A Cointegrated VAR Approach Munich Personal RePEc Archive MPRA Paper No. 66087,
- Habib, Maurizio Michael; Mileva, Elitza; Stracca, Livio (2016). The real exchange rate and economic growth: revisiting the case using external instruments, ECB Working Paper, No. 1921, ISBN 978-92-899-2169-5, European Central Bank (ECB), Frankfurt a. M., <http://dx.doi.org/10.2866/597550>
- Oluwatoyin1, A. M and Folasade, B. A. (2014) Trade Openness, Institutions and Economic Growth in sub-Saharan Africa (SSA) *Developing Country Studies* 4(8) 18-30
- Tsaurai, K. (2017) Examining the inter-linkages between trade openness, human capital development and growth in selected emerging markets *Academy of Accounting and Financial Studies Journal* Volume 21(3)
- Ul Haq Wani, N. (2019) Nexus Between Openness to Trade and Economic Growth: An Empirical Investigation of Afghanistan *Research and Information System for Developing Countries & Institute of Policy Studies of Sri Lanka Reprints and permissions* in.sagepub.com/journals-permissions-india DOI: 10.1177/1391561419858242 journals.sagepub.com/home/sageSouth Asia Economic Journal
- Were M. (2015) Differential Effect of trade on economic growth and investment: A cross country empirical investigation *Journal of African Trade* 2:71-85 ELSEVIER Science Direct

USING THE DISCRETE LOGARITHM PROBLEM TO IMPROVE THE SECURITY OF A PUBLIC KEY CRYPTOSYSTEM

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ABSTRACT

The discrete logarithm problem is one of the hardest problem in Number Theory, that has many applications in cryptography. On the other hand, the study of cryptography has been interested cryptologists for long time because the necessity of transferring important information secretly established the existence of cryptosystems to allow receivers to interpret the exchanged data. In this manuscript, a modification of the well-known asymmetric cryptosystem called Taher cryptosystem is presented with the help of of primitive roots and a symmetric cryptosystem called Vigenere Cipher. Since the security of the last cryptosystem is based on the difficulty of the discrete logarithm proplem, because hacking or cracking this cryptosystem depends on identifying its private key, and that relies on solving discrete logarithm proplem modulo a very large prime number. This manuscript suggests a modification of Taher cryptosystem that can make this cryptosystem having a higher security than its original. It focuses on increasing the number of the keys that are used in the decryption procedure from one to three keys and on modifying the traditional encryption and decryption algorithms in a professional way that increases the efficiency and security of it. This suggested cryptosystem can be listed as one of the asymmetric cryptosystem that has a public key and two private keys,an exchanged key, and it can be applied over messages or images. This cryptosystem has a better security than any existing public key cryptosystem since breaking it relies one finding three private keys; however breaking any public key cryptosystem depends on finding its only private key.

Keywords: Cryptography; Discrete logarithm problem; Vigenere Cipher.

1. INTRODUCTION

The security of many public key cryptosystem techniques based on the difficulty solving the discrete logarithm problem (DLP) [2]. For example, the elgamal cryptosystem, which I call it in this paper” Taher cryptosystem” that was ivineted in 1985 by the Egyptian cryptologist Taher. It is described in the setting of the multiplicative cyclic group Z_p^* where p is a large prime of the field Z_p [2]. In addition, it is described using the primitive root of a large prime number. Since the discrete logarithm problem (DLP) is one of the unsolvable problems in mathematics, this cryptosystem has been used over texts, e-mails, files, and software [8]. On the other hand, Vigenere Cipher is a symmetric cryptosystem that was named after French cryptologist Blaise de Vigenere in 1553. Its security based on the privacy strength of the exchanged keyword [10]. Vigenere Cipher's encryption algorithm is $c_i \equiv m_i + v_i \pmod{n}$ where c_i is the corresponding ciphertext for the plaintext block m_i and v_i represents the keyword block for $1 \leq i < n$ [9]. Nowadays, there are many attempts to crack the widely used public key cryptosystems. One of the major attempts is to find the private keys of them that decrypt any encrypted message or data using their encryption algorithms [4]. Therefore, I suggest a new secure cryptosystem to avoid any of these attacks, and that would be by signing two secret private keys and an exchanged keyword that must be used to decrypt any encrypted message using a public key, keyword, and an encryption algorithm of this suggested cryptosystem [7].

2.1-Definition: A primitive root modulo a prime number p is the integer r that satisfies $r^x \equiv 1 \pmod{p}$ where $\phi(p) = p - 1 = x$ ($\phi(p)$ is the Euler's phi-function). Moreover, it was proven by Lagrange in 1769 that every prime number has a primitive root [4].

2.2-Definition: Assume that r is a primitive root of a prime number p , then the discrete logarithm is the integer d that satisfied $r^d \equiv h \pmod{p}$. Although, there is not efficient method to solve the discrete logarithm problem (DLP), and the best existing method requires many years to figure all its possible solutions [8].

3. THE SUGGESTED PUBLIC KEY CRYPTOSYSTEM

3.1.1. This suggested cryptosystem is a combine of a modification of Taher cryptosystem and Vigenere Cipher that can make the last cryptosystem has a higher security than any public key cryptosystem, because this cryptosystem focuses on having two private keys, an exchanged keyword, a public key, and strong encryption and decryption algorithms. The encryption algorithms consisted of modified algorithms of Taher cryptosystem and Vigenere Cipher.

3.1. The keys generation and encryption algorithm

The public and private keys of the suggested cryptosystem can be generated as the following :

- Choose a very large prime number p (usually with at least 1024-bit).
- Choose random integers a and b such that $1 < a, b \leq p-2$ with $a \neq b$.
- Choose a primitive root r of p .
- Compute f such that $f \equiv r^a \pmod{p}$.
- Compute w such that $w \equiv r^b \pmod{p}$.
- Let (r, f, w, p) be the public key .
- Let a and b be private keys.
- Select a keyword that should be exchanged between the sender and receiver, and it can be more than one word or a sentence.

To encrypt a message only the public key (r, f, w, p) and exchanged keyword are needed and to decrypt an encrypted message (ciphertext) the private keys a and b with exchanged keyword are needed.

The encryption procedure of the suggested cryptosystem is as the following:

- Let $P = \{0, 1, 2, \dots, p-1\}$ be the plaintext space (consisting of numbers).
- Let $m \in P = \{0, 1, 2, \dots, p-1\}$ be a block in the plaintext, and m is formed of the largest possible size (with even number of digits).
- Let $v \in P = \{0, 1, 2, \dots, p-1\}$ be a block in the keyword.
- For every m select a random integer k such that $1 \leq k \leq p-2$ (k could be the same for every m).
- Let the pair (x_1, y_1) be the initial ciphertext block of m that can be computed by:

$$x_1 = e_{1H}(m) \equiv (r^k)(w) \pmod{p}$$

$$y_1 = e_{2H}(m) \equiv m (f^k) [w] \pmod{p}$$
- Compute (x, y) ; the final ciphertext block of (x_1, y_1) by the following Vigenere Cipher algorithms:

$$y \equiv y_1 + v \pmod{p}$$

Note that, If l represents the number of the numerical equivalents for the keyword blocks $v_1 v_2 \dots v_l$ and q represents the number of the numerical equivalents for the plaintext blocks $m_1, m_2 \dots m_q$ such that $l < q$, then the numerical equivalents for the keyword blocks should be repeated such $v_1 v_2 \dots v_l v_1 v_2 \dots v_l v_1 v_2 \dots v_l$.

- Now the encrypted message can be sent as pairs of the form (x, y) . When the message reaches the intended receiver, it has to be decrypted.

3.2. The decryption algorithm

To decrypt the ciphertext, the private keys a and b , and the exchanged keyword are necessary for the receiver. The process as follows,

- Apply the decryption algorithm of Vigenere Cipher on every (x, y) ;

$$x_1 = d_v(x) \equiv x - v \pmod{p}$$

$$y_1 = d_v(y) \equiv y - v \pmod{p}$$

- Apply the modified decryption algorithm on (x_1, y_1) to get the plaintext block;

$$m = d_H((x_1, y_1)) \equiv [(y_1) (r)^b]^{-1} [(x_1)^a]^{-1} [(f)^b] \pmod{p}.$$

The last decryption algorithm can be verified easily by substituting the values of y_1, x_1 , and f on the right hand side to get m on the left hand side. The following shows how the plaintext block m can be recovered using the modified decryption algorithm;

$$\begin{aligned} d_H((x_1, y_1)) &\equiv [(y_1) (r)^b]^{-1} [(x_1)^a]^{-1} [(f)^b] \pmod{p} \\ &\equiv [m (f^k)(w) (r)^b]^{-1} [(r^k)(w)^a]^{-1} [(f)^b] \pmod{p} \\ &\equiv [m ((r)^a)^k (r)^b (r)^b]^{-1} [(r^k)((r)^b)^a]^{-1} [(r)^a]^b \pmod{p} \\ &\equiv [m (r)^{ak}] [(r)^b] [(r)^b]^{-1} [(r^{ka}) (r)^{ba}]^{-1} [(r)^{ab}] \pmod{p} \\ &\equiv [m (r)^{ak}] [(r)^b] [(r)^b]^{-1} [(r^{ak})]^{-1} [(r)^{ab}]^{-1} [(r)^{ab}] \pmod{p} \\ &\equiv m. \end{aligned}$$

3.3. An illustration of the suggested public key cryptosystem over English text messages

3.1.2. Suppose that a person "A" wants to encrypt and send a message "ZERO" to a person "B" whose public key is $(r, f, w, p) = (3, 26, 17, 31)$ and private keys are $a=5$ and $b=7$ with the exchanged keyword "YES".

Encryption Procedure: A person A has to do the following;

- Convert the message "ZERO" into its numerical equivalents blocks "25 04 17 14" using Table(1);
- Convert the keyword "YES" into its numerical equivalents blocks "24 04 18" using Table(1);

Table (1): The numerical equivalents of letters

Letter	A	B	C	D	...	X	Y	Z
Numerical equivalent	00	01	02	03	...	23	24	25

- Since the number of the numerical equivalents for the keyword blocks ($l=3$) less than the number of numerical equivalents for the plaintext blocks ($q=4$), then l should be increased to 4 so that $l = q = 4$ and $v_1 v_2 v_3 v_4 = 24\ 04\ 18\ 24$.
- Use the modified encryption algorithms of the suggested cryptosystem with the public key is $(r, f, w, p) = (3, 26, 17, 31)$ on every single block m_q for $q=1,2,3,4$;

$$x_{1q} = e_{1H}(m) \equiv (r^k)(w) \pmod{p}$$

$$y_{1q} = e_{2H}(m) \equiv m(f^k)[w] \pmod{p}$$

- For $m_1=25$ with choosing $k=8$;

$$x_{11} = e_{1H}(25) \equiv (3^8)(17) \pmod{31}$$

$$\equiv 111537 \pmod{31}$$

$$\equiv 30$$

$$y_{11} = e_{2H}(25) \equiv 25(26^8)(17) \pmod{31}$$

$$\equiv 25(25)(17) \pmod{31}$$

$$\equiv 23.$$

- For $m_2=04$ with choosing $k=6$;

$$x_{12} = e_{1H}(04) \equiv (3^6)(17) \pmod{31}$$

$$\equiv 12393 \pmod{31}$$

$$\equiv 24$$

$$y_{12} = e_{2H}(04) \equiv 04(26^6)(17) \pmod{31}$$

$$\equiv 06.$$

- For $m_3=17$ with choosing $k=7$;

$$x_{13} = e_{1H}(17) \equiv (3^7)(17) \pmod{31}$$

$$\equiv 10$$

$$y_{13} = e_{2H}(17) \equiv 17(26^7)(17) \pmod{31}$$

$$\equiv 12.$$

- For $m_4=14$ with choosing $k=9$;

$$x_{14} = e_{1H}(14) \equiv (3^9)(17) \pmod{31}$$

$$\equiv 28$$

$$y_{14} = e_{2H}(14) \equiv 14(26^9)(17) \pmod{31}$$

$$\equiv 10.$$

The initial ciphertext blocks will be as (x_{1q}, y_{1q}) : (30, 23), (24, 06), (10, 12), (28, 10).

- Compute the final ciphertext blocks (x_q, y_q) of the initial ciphertext blocks using Vigenere Cipher algorithms with the keyword blocks "24 04 18 24";

$$x_q \equiv x_{1q} + v_q \pmod{p}$$

$$y_q \equiv y_{1q} + v_q \pmod{p}$$

16), (28, 10), (28, 30), (21, 03).

Decryption Procedure: A person B has to do the following;

- Apply the following decryption algorithm of Vigenere Cipher on every (x_q, y_q) to get (x_{1q}, y_{1q}) with the keyword blocks "24 04 18 24";

$$x_{1q} = d_v(x_q) \equiv x_q - v_q \pmod{p}$$

$$y_{1q} = d_v(y_q) \equiv y_q - v_q \pmod{p}$$

- For $(x_1, y_1) = (23, 16)$; $(x_{11}, y_{11}) = (30, 23)$.
- For $(x_2, y_2) = (28, 10)$; $(x_{12}, y_{12}) = (24, 06)$.
- For $(x_3, y_3) = (28, 30)$; $(x_{13}, y_{13}) = (10, 12)$.
- For $(x_4, y_4) = (21, 03)$; $(x_{14}, y_{14}) = (28, 10)$.
- Apply the modified decryption algorithm of the suggested cryptosystem on (x_{1q}, y_{1q}) to get the plaintext block m_q with using his/ her private keys $a=5$ and $b=7$;

$$m_q = d_H((x_{1q}, y_{1q})) \equiv [(y_{1q})^b]^{-1} [(x_{1q})^a]^{-1} [(f)^b] \pmod{p}.$$

- For $(x_{11}, y_{11}) = (30, 23)$;

$$m_1 = d_H((30, 23))$$

$$\equiv [23[(3)^7]^{-1} [(30)^5]^{-1} [(26)^7]] \pmod{31}$$

$$\equiv [(23)(17)^{-1}(30)^{-1}(26)] \pmod{31}$$

$$\equiv [(23)(11) (30)(26)] \pmod{31}$$

$$\equiv [197340] \pmod{31}$$

$$\equiv 25$$

- For $(x_{12}, y_{12}) = (24, 06)$;

$$m_2 = d_H((24, 06))$$

$$\equiv [06[(3)^7]^{-1} [(24)^5]^{-1} [(26)^7]] \pmod{31}$$

$$\equiv [(23)(17)^{-1}(26)^{-1}(26)] \pmod{31}$$

$$\equiv [(06)(11) (06)(26)] \pmod{31}$$

$$\equiv [10296] \pmod{31}$$

$$\equiv 04$$

- Similarly, for $(x_{13}, y_{13}) = (10, 12)$; $m_3 = 17$

- Similarly, for $(x_{14}, y_{14}) = (10, 12)$; $m_4 = 14$

4. A GENERALIZATION OF THE SUGGESTED PUBLIC KEY CRYPTOSYSTEM

We can generalize the idea of the suggested public key cryptosystem in encrypting and decrypting text messages to deal with a matrix $A_{n \times m}$ after partitioning the $n \times m$ matrix into m column vectors. This vector is an $n \times 1$ matrix. In addition, any image is stored as a matrix, and

apply the suggested public key cryptosystem over images, and this states as the following:

4.1. Encryption Procedure

Assume we have stored a matrix A of some image. To encrypt A by a sender, the receiver's public key (r, f, w, p) and exchanged keyword are needed. Then he/she has to do the following;

- After partitioning A into m columns that are n x 1 matrices, let $M_z = \begin{bmatrix} m_1 \\ \vdots \\ m_n \end{bmatrix}$ be a column of A where $z=1, 2, \dots, m$.
- Convert the keyword into its numerical equivalents blocks $v_1 v_2 v_3 v_4 \dots v_n \dots v_l$ using Table(1).

- Form an n x m keyword matrix $V_{n \times m}$ such that $V = \begin{bmatrix} v_1 & v_{n+1} & v_2 & \dots \dots \\ v_2 & \vdots & v_3 & \dots \dots \\ \vdots & v_l & v_4 & \dots \dots \\ v_n & v_1 & \vdots & \dots \dots \end{bmatrix}$, and let $V_z =$

$\begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix}$ be a column of V where $z=1, 2, \dots, m$.

- For every $m_i \in M_z$ choose a random integer k_i such that $1 \leq k_i \leq p-2$, where $i= 1 \dots, n$.
- Encrypt every m_i to the pair (x_{1i}, y_{1i}) using the modified encryption algorithms of the suggested cryptosystem with the receiver's public key (r, f, w, p);

$$x_{1i} = e_{1H}(m_i) \equiv (r^{k_i})(w)(\text{mod } p)$$

$$y_{1i} = e_{2H}(m_i) \equiv m_i (f^{k_i})[w] (\text{mod } p)$$

- After applying the encrypting algorithms on all the vectors m_i in M_z , two column vectors will be produced which are $X_{1z} = \begin{bmatrix} x_{1i} \\ \vdots \\ x_{1n} \end{bmatrix}$ and $Y_{1z} = \begin{bmatrix} y_{1i} \\ \vdots \\ y_{1n} \end{bmatrix}$.

- Compute the final cipher columns which contains the column vectors (X_z, Y_z) using Vigenere Cipher algorithms ;

$$X_z \equiv X_{1z} + V_z (\text{mod } p)$$

$$Y_z \equiv Y_{1z} + V_z (\text{mod } p)$$

- Merge the columns X_z in a matrix $X_H = [X_1 X_2 \dots X_m] = \begin{bmatrix} x_{11} & \dots & x_{1m} \\ \vdots & \ddots & \vdots \\ x_{n1} & \dots & x_{nm} \end{bmatrix}$ and Y_z in a matrix

$$Y_H = [Y_1 Y_2 \dots Y_m] = \begin{bmatrix} y_{11} & \dots & y_{1m} \\ \vdots & \ddots & \vdots \\ y_{n1} & \dots & y_{nm} \end{bmatrix}.$$

Now, the encrypted matrix A can be sent as two matrices X_H and Y_H . Whenever X_H and Y_H reach the intended destination they must be decrypted by the receiver to get A back. Dealing with images, that means an image can be encrypted using the suggested public key cryptosystem and sent as two encrypted images.

To decrypt an encrypted matrix, which was formed into X_H and Y_H , by the receiver, the private keys a and b and the keyword are necessary. The original matrix $A = \begin{bmatrix} a_{11} & \cdots & a_{1m} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nm} \end{bmatrix}$ can be produced by applying the following;

- Apply the decryption algorithms of Vigenere Cipher on every (X_Z, Y_Z) with the use of the keyword columns V_Z for $z = 1, 2, \dots, m$;

$$X_{1z} = d_v(X_Z) \equiv X_Z - V_Z \pmod{p}$$

$$Y_{1z} = d_v(Y_Z) \equiv Y_Z - V_Z \pmod{p}$$

- Apply the following modified decryption algorithm on (X_{1z}, Y_{1z}) with his/ her private keys

a and b to get $M_z = \begin{bmatrix} m_1 \\ \vdots \\ m_n \end{bmatrix}$, a column vector of the plain matrix $A_{n \times m}$;

$$m_i = d_H((x_{1i}, y_{1i})) \equiv [(y_{1i})^b]^{-1} [(x_{1i})^a]^{-1} [(f)^b] \pmod{p} \text{ for } i = 1 \dots, n.$$

4.3. An illustration of the suggested public key cryptosystem over matrices

Suppose that Mike wants to encrypt and send a matrix $A = \begin{bmatrix} 10 & 02 & 07 \\ 08 & 11 & 05 \\ 13 & 22 & 09 \end{bmatrix}$, which is a partition of an image matrix, to Ahmed whose public key is $(r, f, w, p) = (3, 26, 17, 31)$ and private keys are $a=5$ and $b=7$ with the exchanged keyword "HI".

Encryption Procedure: Mike has to do the following;

- Partition A into 3 columns so that $M_1 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 10 \\ 08 \\ 13 \end{bmatrix}$, $M_2 = \begin{bmatrix} 02 \\ 11 \\ 22 \end{bmatrix}$, and $M_3 = \begin{bmatrix} 07 \\ 05 \\ 09 \end{bmatrix}$

- Convert the keyword "HI" into its numerical equivalents blocks "07 08" using Table(1).

- Form an 3 x 3 keyword matrix $V_{3 \times 3}$ such that, $V_{3 \times 3} = \begin{bmatrix} 07 & 08 & 07 \\ 08 & 07 & 08 \\ 07 & 08 & 07 \end{bmatrix}$ so that $V_1 = \begin{bmatrix} v_1 \\ v_2 \\ v_3 \end{bmatrix} = \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix}$,

$$V_2 = \begin{bmatrix} 08 \\ 07 \\ 08 \end{bmatrix}, \text{ and } V_3 = \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix}.$$

- After applying the encrypting algorithms on all the vectors m_i in each M_z , we get the following;

- For $M_1 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 10 \\ 08 \\ 13 \end{bmatrix}$ with choosing $k_1=3$ for m_1 , $k_2=4$ for m_2 , and $k_3=5$ for m_3 , then

$$X_{11} = \begin{bmatrix} 25 \\ 13 \\ 08 \end{bmatrix} \text{ and } Y_{11} = \begin{bmatrix} 16 \\ 29 \\ 24 \end{bmatrix}.$$

- For $M_2 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 02 \\ 11 \\ 22 \end{bmatrix}$ with choosing $k_1=6$ for m_1 , $k_2=7$ for m_2 , and $k_3=8$ for m_3 , then

$$X_{12} = \begin{bmatrix} 24 \\ 10 \\ 30 \end{bmatrix} \text{ and } Y_{12} = \begin{bmatrix} 03 \\ 26 \\ 19 \end{bmatrix}.$$

- For $M_3 = \begin{bmatrix} m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 05 \\ 09 \end{bmatrix}$ with choosing $k_1=9$ for m_1 , $k_2=10$ for m_2 , and $k_3=11$ for m_3 , then $X_{13} = \begin{bmatrix} 28 \\ 22 \\ 04 \end{bmatrix}$ and $Y_{13} = \begin{bmatrix} 05 \\ 22 \\ 19 \end{bmatrix}$.

- Compute the final cipher columns which contains the column vectors (X_z, Y_z) using Vigenere Cipher algorithms for all $z=1, 2, 3$;

$$X_1 \equiv X_{11} + V_1 \pmod{31} \rightarrow X_1 = \begin{bmatrix} 01 \\ 21 \\ 15 \end{bmatrix}$$

$$X_2 \equiv X_{12} + V_2 \pmod{31} \rightarrow X_2 = \begin{bmatrix} 01 \\ 17 \\ 07 \end{bmatrix}$$

$$X_3 \equiv X_{13} + V_3 \pmod{31} \rightarrow X_3 = \begin{bmatrix} 04 \\ 30 \\ 11 \end{bmatrix}$$

$$Y_1 \equiv Y_{11} + V_1 \pmod{31} \rightarrow Y_1 = \begin{bmatrix} 23 \\ 06 \\ 00 \end{bmatrix}$$

$$Y_2 \equiv Y_{12} + V_2 \pmod{31} \rightarrow Y_2 = \begin{bmatrix} 11 \\ 02 \\ 27 \end{bmatrix}$$

$$Y_3 \equiv Y_{13} + V_3 \pmod{31} \rightarrow Y_3 = \begin{bmatrix} 12 \\ 30 \\ 26 \end{bmatrix}$$

- For all $z=1, 2$, and 3 , merge the columns X_z in a matrix $X_H = [X_1 X_2 X_3]$ and Y_z in a matrix $Y_H = [Y_1 Y_2 Y_3]$; $X_H = \begin{bmatrix} 01 & 01 & 04 \\ 21 & 17 & 30 \\ 15 & 07 & 11 \end{bmatrix}$ and $Y_H = \begin{bmatrix} 23 & 11 & 12 \\ 06 & 02 & 30 \\ 00 & 27 & 26 \end{bmatrix}$ which the receiver has to decrypt.

Decryption Procedure: To decrypt an encrypted matrices X_H and Y_H by Ahmed, the private keys a and b and keyword are needed. Ahmed has to do the following;

- Partition X_H and Y_H into three columns each; $X_1 = \begin{bmatrix} 01 \\ 21 \\ 15 \end{bmatrix}$, $X_2 = \begin{bmatrix} 01 \\ 17 \\ 07 \end{bmatrix}$, $X_3 = \begin{bmatrix} 04 \\ 30 \\ 11 \end{bmatrix}$, $Y_1 = \begin{bmatrix} 23 \\ 06 \\ 00 \end{bmatrix}$, $Y_2 = \begin{bmatrix} 11 \\ 02 \\ 27 \end{bmatrix}$, and $Y_3 = \begin{bmatrix} 12 \\ 30 \\ 26 \end{bmatrix}$.

- Apply the decryption algorithms of Vigenere Cipher on every (X_z, Y_z) for $z=1,2,3$ with the use of keyword columns; $V_1 = \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix}$, $V_2 = \begin{bmatrix} 08 \\ 07 \\ 08 \end{bmatrix}$, and $V_3 = \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix}$;

$$X_{1z} = d_v(X_z) \equiv X_z - V_z \pmod{p}$$

$$Y_{1z} = d_v(Y_z) \equiv Y_z - V_z \pmod{p}$$

Therefore, $X_{11} = d_v\left(\begin{bmatrix} 01 \\ 21 \\ 15 \end{bmatrix}\right) \equiv \begin{bmatrix} 01 \\ 21 \\ 15 \end{bmatrix} - \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix} \pmod{31} = \begin{bmatrix} 25 \\ 13 \\ 08 \end{bmatrix}$

$$X_{12} = \text{dv}\left(\begin{bmatrix} 17 \\ 07 \end{bmatrix}\right) \equiv \begin{bmatrix} 17 \\ 07 \end{bmatrix} - \begin{bmatrix} 07 \\ 08 \end{bmatrix} \pmod{31} = \begin{bmatrix} 10 \\ 30 \end{bmatrix}$$

$$X_{13} = \text{dv}\left(\begin{bmatrix} 04 \\ 30 \\ 11 \end{bmatrix}\right) \equiv \begin{bmatrix} 04 \\ 30 \\ 11 \end{bmatrix} - \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix} \pmod{31} = \begin{bmatrix} 28 \\ 22 \\ 04 \end{bmatrix}$$

$$Y_{11} = \text{dv}\left(\begin{bmatrix} 23 \\ 06 \\ 00 \end{bmatrix}\right) \equiv \begin{bmatrix} 23 \\ 06 \\ 00 \end{bmatrix} - \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix} \pmod{31} = \begin{bmatrix} 16 \\ 29 \\ 24 \end{bmatrix}$$

$$Y_{12} = \text{dv}\left(\begin{bmatrix} 11 \\ 02 \\ 27 \end{bmatrix}\right) \equiv \begin{bmatrix} 11 \\ 02 \\ 27 \end{bmatrix} - \begin{bmatrix} 08 \\ 07 \\ 08 \end{bmatrix} \pmod{31} = \begin{bmatrix} 03 \\ 26 \\ 19 \end{bmatrix}$$

$$Y_{13} = \text{dv}\left(\begin{bmatrix} 12 \\ 30 \\ 26 \end{bmatrix}\right) \equiv \begin{bmatrix} 12 \\ 30 \\ 26 \end{bmatrix} - \begin{bmatrix} 07 \\ 08 \\ 07 \end{bmatrix} \pmod{31} = \begin{bmatrix} 05 \\ 22 \\ 19 \end{bmatrix}$$

- For $z, i = 1, 2, \text{ and } 3$, apply the decryption algorithm of the suggested cryptosystem on every x_{1i} and y_{1i} into $X_{1z} = \begin{bmatrix} x_{11} \\ x_{12} \\ x_{13} \end{bmatrix}$ and $Y_{1z} = \begin{bmatrix} y_{11} \\ y_{12} \\ y_{13} \end{bmatrix}$ with his private keys $a=5$ and $b=7$ to get

$$M_z = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix};$$

$$m_i = \text{d}_H((x_{1i}, y_{1i})) \equiv [(y_{1i}) (r)^{b-1} [(x_{1i})^a]^{-1} [(f)^b]] \pmod{p}$$

- For $X_{11} = \begin{bmatrix} 25 \\ 13 \\ 08 \end{bmatrix}$ and $Y_{11} = \begin{bmatrix} 16 \\ 29 \\ 24 \end{bmatrix}$;

- $m_1 = \text{d}_H((x_{11}, y_{11})) \equiv [(y_{11}) (r)^{b-1} [(x_{11})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(16) [(3)^7]^{-1} [(25)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(16)(11)(25)(26)] \pmod{31} = 10$

- $m_2 = \text{d}_H((x_{12}, y_{12})) \equiv [(y_{12}) (r)^{b-1} [(x_{12})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(29) [(3)^7]^{-1} [(13)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(29)(11)(26)(26)] \pmod{31} = 08$

- $m_3 = \text{d}_H((x_{13}, y_{13})) \equiv [(y_{13}) (r)^{b-1} [(x_{13})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(24) [(3)^7]^{-1} [(08)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(24)(11)(01)(26)] \pmod{31} = 13$

Therefore, $M_1 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 10 \\ 08 \\ 13 \end{bmatrix}$.

- For $X_{12} = \begin{bmatrix} 24 \\ 10 \\ 30 \end{bmatrix}$ and $Y_{12} = \begin{bmatrix} 03 \\ 26 \\ 19 \end{bmatrix}$;

- $m_1 = \text{d}_H((x_{11}, y_{11})) \equiv [(y_{11}) (r)^{b-1} [(x_{11})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(03) [(3)^7]^{-1} [(24)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(03)(11)(06)(26)] \pmod{31} = 02$

- $m_2 = \text{d}_H((x_{12}, y_{12})) \equiv [(y_{12}) (r)^{b-1} [(x_{12})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(26) [(3)^7]^{-1} [(10)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(26)(11)(05)(26)] \pmod{31} = 11$

- $m_3 = \text{d}_H((x_{13}, y_{13})) \equiv [(y_{13}) (r)^{b-1} [(x_{13})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(19) [(3)^7]^{-1} [(30)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(19)(11)(30)(26)] \pmod{31} = 22$

Therefore, $M_2 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 02 \\ 11 \\ 22 \end{bmatrix}$.

- For $X_{13} = \begin{bmatrix} 22 \\ 04 \end{bmatrix}$ and $Y_{13} = \begin{bmatrix} 22 \\ 19 \end{bmatrix}$;

- $m_1 = d_H((x_{11}, y_{11})) \equiv [(y_{11}) [(r)^b]^{-1} [(x_{11})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(05) [(3)^7]^{-1} [(28)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(05)(11)(25)(26)] \pmod{31} = 07$

- $m_2 = d_H((x_{12}, y_{12})) \equiv [(y_{12}) [(r)^b]^{-1} [(x_{12})^a]^{-1} [(f)^b]] \pmod{p} \equiv [(22) [(3)^7]^{-1} [(22)^5]^{-1} [(26)^7]] \pmod{31} \equiv [(22)(11)(26)(26)] \pmod{31} = 05$

- $m_3 = d_H((x_{13}, y_{13})) \equiv [(y_{13}) [(r)^b]^{-1} [(x_{13})^a]^{-1} [(f)^b]] \pmod{31} \equiv [(19)[(3)^7]^{-1} [(04)^5]^{-1} [(26)^7] \pmod{31} \equiv [(19)(11)(01)(26)] \pmod{31} = 09$

Therefore, $M_3 = \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 07 \\ 05 \\ 09 \end{bmatrix}$.

- Form the plain matrix, $A_{3 \times 3} = [M_1 M_2 M_3] = \begin{bmatrix} 10 & 02 & 07 \\ 08 & 11 & 05 \\ 13 & 22 & 09 \end{bmatrix}$.

5. DISCUSSION AND RESULT

The discrete logarithm problem is one of the secure mathematical problems that has been applied to secure many public key cryptosystems such as Taher cryptosystem and Diffie-Hellman protocol which are very secure asymmetric cryptosystems, that have only a private key and a public key. Breaking these cryptosystem relies on finding all the possible solutions for the discrete logarithm problem. Therefore, the security of those cryptosystems based on the hardness of solving and finding all the possible solutions of the discrete logarithm problem. However, the best and fastest method to find all the possible solutions of the DLP requires thousands of years, and that makes the DLP is one of best problems to be used in this cryptosystem. On the other hand, the security of the symmetric cryptosystem, Vigenere cipher, is quite good, because it depends on the privacy and secrecy of the keyword. Finding a private key by inspection or finding some solutions of its discrete logarithm problem may be possible in future. Therefore, increasing the security of cryptosystems is one of the priorities for cryptologists especially with existence of hackers and crackers. Therefore, this paper suggests a public key cryptosystem by modifying the algorithms of Taher cryptosystem and increasing the number of its private keys to three keys with the help of Vigenere cipher. Two modified encryption algorithms and a public key must be needed to encrypt any message that could be a text message and a matrix or an image in general. For the decryption process, a user has to use two decryption algorithms, two private keys whose securities depend on two different discrete logarithm problems, and an exchanged keyword, whose security relies on its secrecy and privacy(see Figure(1)). These keys must be used for decryption procedure. By applying the suggested cryptosystem on a text message or a matrix, we have concluded that this cryptosystem has a higher security of the Taher cryptosystem and Diffie-Hellman protocol; because finding three private keys depends on solving two different discrete logarithm problems and knowing the identity of the secret keyword is much more harder than figuring only one private key. Therefore, the suggested public key cryptosystem gives a better defense against any attacks more than any public key cryptosystem.

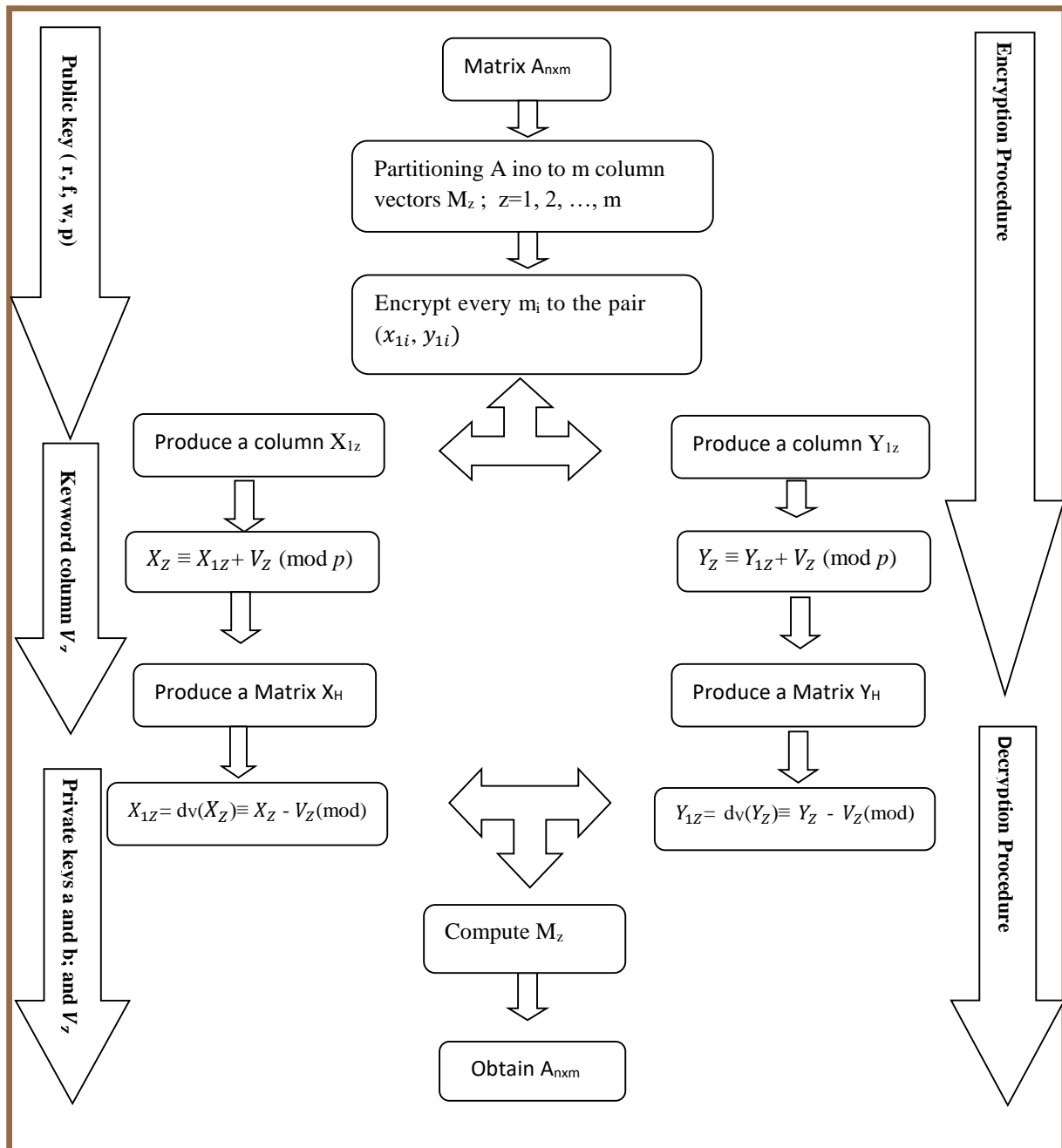


Figure 1: Encryption and Decryption Procedures of the suggested cryptosystem over a Matrix

6. CONCLUSION

This manuscript presented a suggested public key cryptosystem based on some symmetric and asymmetric cryptosystems, where its public key is contained of (r, f, w, p) as described above, and its private keys are composed of a keyword and two integers a and b (with $a \neq b$) that are particular solutions for two different discrete logarithm problems. Its security based on the hardness of solving two discrete logarithm problems and identifying the keyword. It is not difficult to solve the logarithm problems $f \equiv r^a \pmod{p}$ and $w \equiv r^b \pmod{p}$ if $f, r, p, a,$ and b are known, but it is very hard when a and b are unknown. However, it is clear that some public key cryptosystems such as Taher cryptosystem or Diffie-Hellman are faster than this suggested cryptosystem since they require less computational performances; the suggested asymmetric cryptosystem has a higher security. This suggested cryptosystem has three private keys while



Therefore, figuring three private keys much harder than figuring only one key. Moreover, all the existing kinds of the public key cryptosystems has only one private key that used in the decrypting procedure, but this suggested cryptosystem has three private keys. Then, mathematically, we can conclude that the suggested public key cryptosystem has higher security from some public key cryptosystems especially Taher cryptosystem.

ACKNOWLEDGEMENTS

I am very thankful to my family and my colleagues at the Faculty of Computer Science and Mathematics, who have encouraged me to make this research paper possible and a fabulous experience for me.

REFERENCES

- [1] Schnorr, C. P., and Markus J. “ Security of signed ElGamal encryption”. International Conference on the Theory and Application of Cryptology and Information Security. Springer Berlin Heidelberg, 2000.
- [2] Sklavos, N., and Zhang, X. *Wireless Security and Cryptography: Specification and Implementations*. United States of America: Taylor & Francis, Francis Group, LLC, 2007.
- [3] Ismail, E.S., and Hijazi M.S.N. “A New cryptosystem Based on Factoring and Discrete Logarithm Problems”. *Science Publications: Journal of Mathematics and Statistics*, vol.7, pp. 165- 168, 2011.
- [4] Rosen, K.H. *Elementary Number Theory and Its Applications*, 5th Edn. United State of America, Boston: Addison Wesley, 2005.
- [5] ElGamal, T. *A public Key Cryptosystem and Signature Scheme Based on Discrete Logarithms*. Stanford University, United State of America: Springer Berlin Heidelberg, 1984.
- [6] Gallian, J. A. *Contemporary Abstract Algebra*, 8th Edn. United State of America, Boston: Cengage Learning, 2013.
- [7] Kakish, M.J. “Authenticated And Secure El-Gamal Cryptosystem Over EllipticCurves”. *IJRRAS*, vol.10, pp.306-313, 2012
- [8] Diem, C., 2013. “On the discrete logarithm problem in elliptic curves II”. *Journal of Algebra & Number Theory*, vol. 7, pp.1281-1323, 2013.
- [9] Goyal, D., and Vishal S. “RDA Algorithm: Symmetric Key Algorithm”. *International Journal Of Information and Communication Technology Research*, vol. 2, pp.342-347, 2012.
- [10] Trappe, W., Washington, L., Anshel, M., and Boklan, K. D. *Introduction to cryptography with coding theory*. United States of America: The Mathematical Intelligencer, Springer Science+ Business Media, Inc, 29(3), 2007.



**MICRO LEVEL FLOOD CONTROL TECHNIQUES:
A CASE STUDY ON BENNI HALLA (STREAM) IN NORTH KARNATAKA OF
INDIA**

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ABSTRACT

Man proposes but God disposes. These days the entire world is suffering from uncontrollable floods. The floods are taking valuable lives and properties. Though we have sophisticated tools and techniques like several flood modeling systems through advanced software and other flood mitigation mechanisms, we are not in a position to mitigate or predict the vulnerability of floods and losing our valuable lives and properties. The major cause for such floods is “Global Warming”. The advancement and rapid growth of industries all over the world are contributing major impacts on global warming. Can we stop developing science and technology? No, we can't as it has become indispensable for a nation for its socio-economic growth and safety in these competitive days. For many years we are witnessing an increase in the temperature of the earth and ocean. According to NOAA's 2020 Annual Climate Report, the combined land and ocean temperature has increased at an average rate of 0.13 degrees Fahrenheit (0.08 degrees Celsius) per decade since 1880; however, the average rate of increase since 1981 (0.18°C / 0.32°F) is doubled. So as of now, there is an average increase of temperature of earth and ocean is about 1.52 degrees Celsius. The other causes of floods are deforestation, encroachment of watercourse bodies, urbanization, silting of watercourse bodies, etc., In addition, natural disasters like forest fires, volcanos are some of the major contributions to the increase in global warming. The cumulative effect of all these is raise in the ocean level due to the melting of glaciers. Coastal erosion is also being witnessed. This phenomenon of rising ocean levels and coastal erosion is being seen for centuries. But in the past decade, this is tremendously increased. The average global sea level is increased by 2.5 inches (63mm) compared with the world sea level of 1993 as per the satellite record. It is being observed that every year the sea level is increasing by 3.2mm. Indeed, one cannot design 100% nature-proof structures as nature is in nobody's hands. Even then do we need to address this problem? Yes, it is a must. Though we cannot mitigate flood occurrence, we can mitigate or minimize the effects of flood to save valuable lives and properties. A flood is an accumulation of flow from different sources of water. In this context, it is another thought to think of mitigating the flood accumulation at its sources i.e., to emphasize micro-level flood mitigation techniques.

Keywords: Global warming, Floods, Mitigation, Earth and ocean temperature and micro flood control techniques

INTRODUCTION

Generally, we concentrate upon the mitigation of flood more predominantly when it occurs and shows its evil effect on land and human life. Though the flood modeling systems are the key tools for predicting the flood occurrence, time and duration, and threat in the future, they all throw light on the major flood-prone zones. But it is necessary to understand that the flood

is the accumulation of water from its upstream side small streams from their origin in the catchment area. So, if the water flow at its origin i.e., on the upstream side is controlled, we can minimize the flood discharge and mitigate its vulnerability at its downstream side. The control of the flow of water on the upstream side of the catchment area depends upon the rainfall, runoff, nature of the soil, profile of ground, the slope of the area, obstructions for flow, etc., A detailed study and analysis of rainfall data and flood recorded in the past is also needed.

A. Nature of soil:

Soil is mainly classified based on:

- i) Soil particle size
- ii) The texture of the soil.
- iii) Highway Research Board (HRB) classification
- iv) Unified Soil Classification System (USCS) or I.S Classification.

Mainly the soil is classified into three groups.

- i) Coarse-grained. (Sand & Gravel)
- ii) Fine-grained (Silts and Clays)
- iii) Other organic matters. (Peat Shale, Decomposed vegetation, Cinder and other non-soil materials)
- iv) Loamy soil (Combination of Sand silt and clay)

B. The causes of the flood:

- i) Rainfall intensity.
- ii) Rainfall quantity.
- iii) Rainfall duration.
- iv) Land profile or topography of ground (Basin, Cross slope and longitudinal slope, etc.,)
- v) Climatic condition.
- vi) Global warming.
- vii) Lan use: Surface of ground (forest, Cultivated / Barren land, etc.,)
- viii) Breach of Dam, Canals, and Reservoirs, etc.,

C. Types of floods:

- River floods.
- Stormwater floods.
- Breach of dam or reservoirs.
- Excess water released from dams.
- Flash floods.



- Urban floods
- Coastal or Ocean floods etc.,

River floods: These are the most common floods which occur due to heavy rainfall. When the river watershed catches more water than its capacity, there will be an overflow of river water to the adjoining areas causing the flood.

Stormwater floods: These floods occur when there will be heavy, high intensity, and more duration rainfall at the same time the nature of the ground will not permit more precipitation of water.

Breach of dam or reservoir: When the dam or reservoirs are over flooded. If the stability of these structures is not taken care of, at the time of design or maintenance, there will be a possibility of breaching of dams or reservoirs which causes flash floods.

Excess water released from dams or reservoirs: Every dam will be designed for the M.S.L (Maximum storage level) with the freeboard as a factor of safety. But when the level of the reservoir exceeds the maximum storage capacity the excess water will have to be released from the safety of the structure. This sudden release of water causes floods in the downstream area. This will be done with due care by cautioning the inhabitants in the downstream area.

Flash flood: These are sudden floods without showing any sign of flooding. These floods occur due to sudden heavy rainfall, melting of glaciers, chocking of watershed due to landslide, thunderstorms, and breach of the dam or sudden release of excess water from the dams. Among all floods, these are the most dangerous floods as generally do not show any sign of flooding.

Urban floods: In these days the urbanization is growing very fast all over the world due to the increase in population and the modernization of human life. More and more people are being attracted by cities and towns which is the cause of migration from rural to urban. At the same time, there is a need for proper urban planning. Many cities are planned unscientifically by encroaching the watershed areas forgetting the basic science of natural acts of our nature. Encroaching the low-lying areas and watershed areas there will be tremendous waterway reduction due to which the water gets affluxes and flooding happens. Another important part of this is the improper design and maintenance of stormwater drains in urban areas. The increase in the use of plastic which is nondegradable material is choking drains and making the land impervious is also the main cause of urban flooding.

Coastal or ocean floods: Due to global warming, it is being witnessed all over the world that glaciers are melting and causing a sudden increase in sea level which is causing the coastal floods. In addition, the high tides of sea water due to storms are causing coastal floods. Further to note that tsunami due to underwater seismic effect will cause the coastal flood as witnessed unforgettable historical Japan Tsunami. **Action Plan:**

After analyzing the causes and effects of floods one can understand what action plan is needed.

All the types of floods mentioned above are likely to occur in every country. No one can design any structure as nature proof, as nature is believed to be the act of God and is under nobody's control.

But one has to struggle for existence. So, there must be a proper action plan to mitigate or minimize the effect of floods.

The action plan should include the basic information mentioned below:

- Record of past rainfall says of hundred years or so.
 - The present recording of rainfall data of every year enables the future generation for flood estimation and mitigation.
 - The nature and profile of the entire terrain of the country should be made available on hand.
 - Flood modeling software should be made available in Irrigation departments and Engineers should be well trained to use the software.
 - Formation or reshuffling of Dam Safety Committee (Including for major Canals), National Disaster Management Authorities shall be carried out every year before monsoon to review the action plan and to add or delete the personnel as required.
 - Tie up between Dam safety committee, NDMA and NGOs should be made to interact between them as these authorities are inter-related and inter-dependent.
 - Training details including training calendar, training schedule, training audits of N.G.Os should be made available to take rapid action for rescue and relief measures to be taken before, during, and after a flood. These should work under a central monitoring committee at the top level.
 - Manpower, Machinery, Tools, and others required for flood relief and rescue operations shall be well documents.
 - The documents about the safety analysis of dams, bridges, bunds, high embankments of dams, and bridge approaches should be maintained.
 - Government to be prepared with the segregated financial provision with a central monitoring committee.
- D.** The government can declare the October & November month as the “Flood Months” based on the experience to make the people to be well aware of floods and to be prepared well in advance.

E. A case study of Bennihalla in North Karnataka of India[1].



Goole map showing the basin of Bennihalla.

Table:1 Salient features of Benni halla (Stream)[1].

Sl. No	Description	Data
1	Total length of halla (Stream)	138.00km.
2	Total catchment area	5048 km ²
3	Districts covered under catchment area	Dharwad, Haveri & Gadag.
4	Major flood occurred during	October 1999 November 2007 & October 2009
5	Origin of Benni halla	In Dundasi village of Haveri District at 660.000 R. L. (Above M.S.L)
6	Tributary contributing major catchment area	Tupri halla neat Kittur of Belagavi District at R.L. 720.000 (Above M.S.L) Contributes 1031.08 km ²
7	No of streams contributing catchment area	21 Streams
8	Nature of terrain	Almost plan terrain like a soccer
9	Type of soil	Major portion is covered with Black cotton soil, (Alluvial soil with soft impervious clay)
10	Nature of flood	Flash flood

Flow of Benni halla by google map shown below:



Origin of Benni Hall at R.L 660.00 at Dundasi village.



Origin of Tupri hall contributing major CA near Kittur.

Some of the tributaries (Streams) are shown below:



An aqueduct across Benni halla at Kiresur village.



Many other small streams joining Benni halla.



Tupri hall major stream joining Bennihall in Navalagund of Dharwad District.



Major junction of Benni halla and Malaprabha river at Menasi village. Then Malaprabha river joins Krishna river at Kudalasangama.

Table:2 Effect of Benni halla [1]:

Sl.NO	Description	Data
1	No of villages affected	74
2	Affected extent of land	4121.58 Ha.
3	Approximate loss of property	2.8654 Cr. As per 1999 rates.

Some of the major damages due to flood are shown below:



Bridge damage Dharwad district – 5th October 2009



Submerged area of Gadag district - 2009





Public suffering & Joint meeting of the then Chief Minister with concerned officers.

It was a joint venture by Public works, Minor and Major Irrigation, and National Highway authorities to survey, analyze and propose flood mitigation projects. The details of the mitigation are below [1]:

Table:3 Flood mitigation projects[1]:

Sl.NO	Description	Remarks
Minor Irrigation Dept. (Estimate as per 1999-2000 rates)		
1	Construction of new tanks under M.I Dept.	8 Nos
2	Barrages	14 No – 12.78 Cr
3	Check Dams	12 No – 04.29 Cr
National Highway		
1	Construction of major bridges across NH-218 & Nh-63	2 No - 26.93 Cr
Public works department. (Estimate as per 1999-2000 rates)		
1	Improvements and reconstruction of State Highways and Major District Roads	441.10 Cr.
2	Construction, Reconstruction Widening of bridges and culverts	384.40 Cr
3	Nala training and desilting of Benni halla 138.00km length (Very important and major work)	1800.00 Cr

Thus, the then mitigation cost was estimated to the tune of 2669.50 Cr. Thus, one can imagine the financial threat only for the main infrastructure excluding the cost of rehabilitation, retrofitting, and relief funds. Above all loses a very valuable human life.

The present topic is to concentrate on micro-level flood mitigation techniques. As explained above all the mitigation measures are taken after the flood occurred. But these mitigations have functioned well and have reduced the evil effect of the Benni hall flood after 2009. But even then, there may be a possibility of a further threat of flood for which the flood mitigation at source i.e., at the origin of all tributaries and along with their flow before joining a major nala or river the flow can be checked on upstream of catchment areas itself.

The computation of discharge is carried out by empirical formulae like Dicken's, Ryve's, and Inglis formulae.

In India, the following formulae are used.

1. Ryve's formula $Q = C \cdot A^{2/3}$

Where 'C' is Ryve's constant which is 11 for North India, 14 to 19 for central India, and 22 for Western India. Thus, it can be used for the entire area of India using respective C values.

$Q = C \cdot A^{2/3}$ for Madras (Tamilnadu) using C values as 6.8 for areas within 25k m from costal, 8.5 between 25 to 160km from costal, and 10 for limited area in hills.

2. Inglis formula[3],

$Q = 125\sqrt{A}$, For small area

$Q = 125\sqrt{A - 2.6(A - 260)}$ for 160 to 1000 km²

$Q = 125A/\sqrt{(A+10)}$ for all types of areas.

3. Dickens formula,[2]

$Q = C \cdot A^{3/4}$

Q-Peak run-off in cum/sec.

C-Constant, 11-14 for annual rainfall 60-120 cm, 14-19 in Madhya Pradesh, 32 in Western ghats, and A-Catchment area in km²

Note: Since the catchment areas are too much disturbed all over the world, over the last few decades due to forestation, deforestation, silting, scouring, landslides, floods, etc., the toposheets prepared several years ago may not be suitable to consider the catchment areas and the constant value 'C' in the present days which may have to be relooked into for modification based on research.

And the general formula for discharge is $Q = A \cdot V$ (where Q is discharged, A waterway at H.F.L in sqm and V is the velocity of water m/sec). Looking at this formula it is clear that the cross-sectional area of flow shall be sufficient and the velocity shall be unobstructed. If any of these two is restricted then the discharge affluxes and there will be overflow on the adjoining lands causing flood.

The problems of flood can be converted into opportunities using the following *techniques at a micro-level*:

1. Construction check dams on the upstream of catchment areas across tributaries to use the water for drinking and minor irrigation of adjoining lands.
2. In case the streams are very small, intervening of small streams to major streams and then the construction of check dams across a major stream.
3. Construction of desilting tanks or pits in the valley portion of streams to collect the silt in the tanks and thus silting of streams can be avoided making sufficient waterway for the discharge.
4. Drilling of uncased bore wells filling with coarser filter materials like boulders and jelly and sand, all along the stream to allow the water to percolate to a deeper depth to reach permeable strata thereby charging groundwater. Due to this the water level in the nearby bore wells, open wells and reservoirs will be increased which facilitates drinking water and minor irrigation.



5. Provision of lift irrigation at check dams. The lands adjoining to check dams can be irrigated using the lift irrigation system.
6. The check dams to be used for drinking water purposes shall be provided with the filtering media on the upstream side of the catchment area to get primary filtration of water can be had during the flow itself.
7. The diversion of stream water to areas other than its catchment area to store the water and to use in the off-season either for drinking or minor irrigation purpose.
8. Growth of forest and cultivation of lands shall be promoted upstream of the catchment area to reduce the run-off thereby reducing the discharge.

To avoid urban floods, the following microlevel flood mitigation measures can be had.

Annual flood mitigation action plan should be prepared well in advance jointly with the concerned administrative and execution department heads and NDMA which should include:

- i) Drastic action plan for removal of encroachment of watercourses in the catchment area to be prepared and executed.
- ii) Separate annual action plan for desilting of stormwater drains in the city or town limits.
- iii) Provision of uncased bore wells in the drains itself with filter media to charge the groundwater table and thus, in turn, to charge the bore wells and open wells and tanks within the city limits.
- iv) Construction of large capacity G.L.S.R.s (Ground level storage reservoirs) outside or within the city limit to divert the stormwater as per the topography of the land.
- v) Mandatory rules and regulations for the provision of rainwater harvesting systems to all the infrastructures of all urban and rural areas.
- vi) Encouragement for gardening in the rural and urban areas.
- vii) Making compulsion for the record of rainfall and flood data to the concerned departments to enable to compute the future flood estimation.

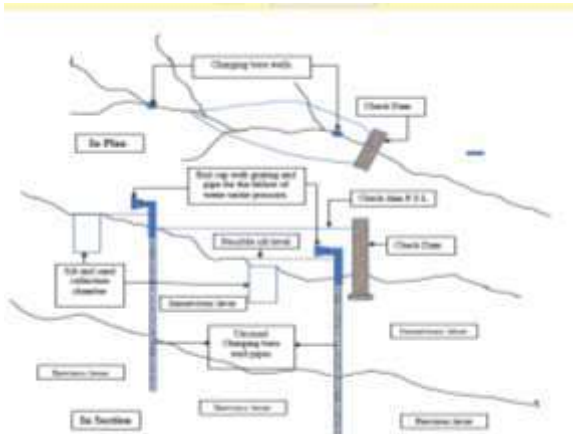
Note: It is important to note that the dams and reservoirs will be designed based on the discharge from the catchment areas. Before checking the water flow in the streams, only the flooding quantity of water shall be computed and to be checked. Otherwise, the storage capacity of the dams, reservoirs will be affected thereby discouraging the very purpose of construction of these.

We shall see some streams joining the above said Benni hall in its basin.



Schematic sketch on google map showing check dams and uncased charging bore wells across streams / tributaries of Benni halls.

Uncased bore wells filled with filter media are provided with an end funnel cap with grating with a sort length casing to filter the water and to charge the borewell under pressure due to velocity water. Behind the check dam on U/s silt and sand collection chambers are to be provided with the required dimensions to avoid silting of stream and to collect the sand to be used for other civil works.



Plan and section showing the charging bore wells filled with filter media and provided in the pervious layer,

CONCLUSIONS

1. The micro-level measure proposed above for mitigation of floods and their effect will be very apt and easy to adopt at a micro-level with cost-effective technologies.
2. The measures proposed will not only reduce the effect of floods, at the same time the water can be made use for drinking and minor irrigation projects thereby addressing the drinking water problem and also socio-economic development of a nation.



ACKNOWLEDGEMENTS

We extend our heartfelt thanks and acknowledge the Karnatak PWD and Irrigation department authorities in preparing the report on Bennihalla and submitting a comprehensive report to the government for its implication.

REFERENCES

- [1] Report by Bennihall Study Committee constituted by the Government of Karnataka India, vide Govt., Order No., ID 58 MPS 99, dated:03-12-1999, for studying the measures to minimize the damages due to Bennihalla flood and to utilize water for Irrigation purpose.
- [2] Indian Road Congress Journal Volumen50-3 August 1989 page 546.
- [3] T.R. Jagadeesh & M.A. Jayaram Design of Bridge structures. Page 6.



SOME PSYCHOLOGICAL FACTORS AS PREDICTOR OF STUDENTS' ATTITUDE TOWARDS MATHEMATICS IN TECHNICAL AND VOCATIONAL INSTITUTIONS IN IBADAN, OYO STATE, NIGERIA.

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ABSTRACT

Mathematics serves as a strong reinforcement that enables the students develop logical, abstract thinking and the ability to recognise, formulate and evaluate problems in their different fields. The knowledge gained from mathematics is expected to be applied to the courses offered in technical and vocational institutions. This article examines the effect of some psychological factors on students' attitude towards mathematics. This was designed specifically to consider the effect of interest in mathematics, mathematics phobia, and perceived usefulness of mathematics on students' attitude towards mathematics. Data were collected using students questionnaire. A correlational analysis showed positive relationship among the variables of study. Result revealed that 77% of the variation in students' attitude towards mathematics was accounted by the independent variables (interest, mathematics phobia and perceived usefulness of mathematics). It is therefore recommended that all the psychological factors examined should be treated and made right in order to improve students' attitude towards mathematics in technical and vocational Institutions

Keywords: Interest, Mathematics phobia, Usefulness of mathematics, Attitude.

INTRODUCTION

Mathematics is useful in every area of life because it affects every facet of human activity, it is used to solve problem on all facet of discipline and provides answers to questions and problems which arises every day in our daily activities. It is an instrument created to deal with situations and to face unpredicted problems (Ubiratan, 2009). This makes mathematics a precise language that helps to formulate ideas and identify underlying assumption which enables one to think, reason, analyse and articulate logically. Mathematics has also been accepted as a foundation of science and technology (Okeke, 2009, Okpalla 2008). This makes it important in the scientific and technological development of countries (Enu, Agyman, & Nkum, 2015). There is hardly any discipline that mathematics is not included, this is because mathematics skills are essential in understanding other disciplines (Patena & Dinglasan, 2013). Due to the importance that mathematics plays in understanding of other discipline, this subject becomes key in school curriculum. Despite the importance of mathematics as a subject, majority of the students go with the impression that mathematics is such a difficult subject and should be left for exceptional students. This bias of students that mathematics is a difficult subject could affect their attitude towards mathematics.

Attitude is the favourable or unfavourable response or disposition to things, people, events or ideas (Koballa, 1995). Attitude therefore is a state that influences or modifies the individual choices of personal action towards something. Positive attitude is a positive emotional disposition towards a thing, people, event or idea and a negative attitude is a negative disposition, this attitude can change and develop with time (Syedda, 2016), Hence, student's attitude towards mathematics can be defined as the emotion that the student associates with

mathematics as a course. Tahar, Ismail, Zamani, and Adnan (2010) stated that mathematics attitude is a positive or negative emotional disposition towards mathematics. Attitude towards mathematics is then referred as student's tendency to respond positively or negatively towards mathematics. It is also regarded as the belief, opinions and feelings of students concerning mathematics which can equally manifest in their behaviour. Attitudes, behaviour, and feelings are interrelated in such a way that peoples' attitudes determine their behaviour and feeling towards objects, situations, and people Mazana, Calkin, & Respickius (2019). Hence, attitude towards mathematics is what students think and believe about mathematics and learning of mathematics.

Many students show difficulties when it comes to learning mathematics as a course, the thought of having mathematics as one of the courses to offer pose a lot of problems to them. Some of them see mathematics as a subject that can only be useful in the classroom and not relevant in real world situation. This is what I have also experienced teaching mathematics at different level of education. This fact is also supported by (Udegbe, 2009) who stated that majority of students show lack of interest in learning mathematics as a course, he went further to say that in most cases students absent themselves in mathematics lesson and those who stay in class pay little or no attention to their teachers. There is the possibility that consistent and defined interest in an activity may lead to a definite attitude pattern to such activity, hence a student who have interest in mathematics might develop a positive attitude towards mathematics while a student who have no interest in mathematics might develop a negative attitude towards mathematics. The negative attitude could also be attributed to the fact that students could not perceive or identify the importance or usage of mathematics to their course of study. However, students become more involved in mathematics if they perceive the content or topics being taught are directly connected to their chosen course (Otavio and Otavio (2008).

For instance, forestry and agriculture are scientific disciplines, and as with any field of science, mathematics is fundamental to understanding of forestry and agricultural disciplines, bearing in mind that these fields combine many aspects of environmental conservation and management. For instance, forest inventory, measurement of tress, forest statistics, and application of fertilizer. Hence, forestry and agriculture are keys to management of which mathematics is needed. Since foresters and forest scientist do more than measuring trees, forestry and agricultural profession require the ability to analyse the growth and production of trees, crops, carry out research work in field of forestry and agriculture. Furthermore, mathematics is needed to build models required in the field of forestry and agriculture. For instance, general equilibrium model an aspect of mathematics was used to analyse the welfare effects associated with transgenic technologies for both the irrigated and non-irrigated rice ecosystems in Asia (Hareau, Norton, Mills and Peterson (2005). Application of mathematics knowledge is also very important in forestry measurement inventory such as measurements of trees (diameter, volume, height) measuring the quantity of fertilizer needed for the plant. Mathematics knowledge is equally needed to generate reports about existing and future tree volume for forest sustainability and to calculate estimates of timber yields before a harvest (Appah, Odumosu and Olisama 2019). Students seeing the importance or relevance of mathematics to their career choice will likely develop positive attitude to mathematics.

Mathematics questions are known as problems because of the challenges they pose in solving them. Solving these problems requires insightful thinking, critical reasoning, creativity and use of previous knowledge. Mathematics questions are quantitative in nature and involve mathematical issues requiring computations (Adedayo, 2011). These questions could be word problems which need to be translated into mathematics terms, it could be proofs of theorems, numerical figures or mathematical diagrams. Solving these problems requires skills which

include interpretation of information, planning and methodical working, checking results and trying alternative strategies. (Muir, Beswick and Williamson, 2008). Mathematical modelling is a process of problem solving that uses mathematics to explain and define events in real life, to test ideas and to make estimations about real life events (Aya, 2015). Mathematical modelling approach analyses mathematical problems in a real-world situation, therefore, interpreting mathematics solution to suit real world problem. It is one of the practices a student can engage in to move beyond computational skill (NCTM 2000). This implies that, students who are engaged in mathematics problem solving can make connections across mathematical areas as well as learning about its application outside the mathematics classroom setting. Knowledge acquired in mathematics classes play vital role in developing students' skills not only in mathematics but also in other courses (Lesh and Harel, 2003). Thus, mathematics knowledge enables students to formulate and evaluate problems in their areas of specialisation.

Despite the importance and usefulness of mathematics in the careers of students in technical and vocational institutions, their attitude to mathematics has not been enhanced, significantly. Although previous researchers have identified many factors that affect students' attitude towards mathematics such as students' personality (Osborne, Simon and Collins (2003)), students' characteristics and teachers' characteristics (Anderson (2005), Sakiz, Pape, & Hoy, (2012), Yang (2013)). This study focuses specifically on interest, mathematics phobia, and perceived usefulness of mathematics on students' attitude towards mathematics.

Purpose of the study

The focus of the present study is to determine effect of interest, mathematics phobia and perceived usefulness on students' attitude towards mathematics. This study aims to collect the empirical evidence about effect of students' interest, mathematics phobia and perceived usefulness of mathematics on students' attitude towards mathematics.

Research Question

1. What are the relationships between students' psychological variables?
2. What is the composite contribution of students' psychological variables (self-confidence, interest, mathematics phobia and perceived usefulness of mathematics) on students' attitude towards mathematics?
3. What is the relative contribution of students' psychological variables (self-confidence, interest, mathematics phobia and perceived usefulness of mathematics) students' attitude towards mathematics?

Methodology

Research Design

Correlational survey was adopted for this study. Correlational survey seeks to establish the relationship that exists between two or more variables.

Population

The target population for this study comprised of all Federal Technical and Vocational Tertiary Institution students in Ibadan, Oyo state.

Sample and sampling technique

Multi-stage sampling technique was employed to select sample for this study. Purposive sampling was used to select the three Federal technical and vocational tertiary Institutions in Ibadan. College of Forestry, College of Animal Health Production, Ibadan and College of

Agriculture, Ibadan, being the three Federal colleges offering agriculture and forestry courses in Ibadan.. Simple random sampling technique was used to select two hundred and seventy (270) students, ninety (90) students from each of the three colleges.

Instrument for Data Collection

The instrument used for collecting data in this study was the Students Questionnaire (SQ). The questionnaire consists of two sections A and B, A composed of personal data of the students and section B consists of thirty- three (33) items rated on a 5-point scale ranging from 5 = strongly agree to 1 = strongly disagree. This section B comprised of 5 items on self-confidence, 7 items on interest, 5 items on mathematics phobia, 6 items on perceived usefulness of mathematics and 10 items on students' attitude towards mathematics. This instrument was validated by 4 experts and all the observations raised were addressed before the instrument was administered to the respondents. Cronbach's Alpha was used to determine the reliability of the variables and the values obtained are all greater .70, which means that all the values are accepted to be appropriate.

Table 1: Summary of Reliability Analysis

Variables	Cronbach's Alpha	No of Items
Self-confidence	0 .80	5
Interest	0 .82	7
Mathematics Phobia	0.78	5
Perceived usefulness	0 .83	6
Attitude	0.76	10

Data Collection

The researchers administered the instruments on the students. Face to face method was adopted to make sure that the students filled the questionnaire effectively.

Data Analysis

The data collected was analysed using descriptive to determine the personal data of the respondents, Pearson Product Moment Correlation coefficient was used to determine the relationship that exist between dependent variable (attitude towards mathematics) and the independent variables (interest, mathematics phobia and perceived usefulness of mathematics) and Multiple Regression was used to determine the joint contribution of independent variables on the dependent variable as well as the relative contribution of each independent variables.

Table 2: Demographic data of the students.

Variables	Frequency (N)	Percentage (%)
Gender		
Male	145	53.71
Female	125	46.29
	270	100
Age		
16-20	110	40.74
21-25	108	40.00
Above 25	52	19.26
	270	100.00
Programme		
ND	135	50.00
HND	135	50.00
	270	

Research Question 1. What are the relationships between students’ psychological variables?

Table 2: Correlation Matrix Showing Relationship between Independent Variables and Dependent Variables

	Interest	Mathematics Phobia	Perceived usefulness of mathematics	Attitude
Interest	1.000			
Mathematics Phobia	.188**	1.000		
Perceived usefulness	.476**	.205**	1.000	
Attitude	.858**	.255**	.566**	1.000

***Significant at P<0.05**

Table 2 presents the correlation coefficients among the predictors (interest, mathematics phobia and perceived usefulness of mathematics) and criterion (attitude towards mathematics). There is positive significant relationship between students’ interest in mathematics and attitude towards mathematics ($r=0.858$), mathematics phobia and attitude towards mathematics ($r=0.255$) and also between perceived usefulness of mathematics and attitude towards mathematics (0.566). This implies that as students’ interest, mathematics phobia and perceived usefulness of mathematics improves students’ attitude towards mathematics improves.

Research Question 2: What is the composite contribution of students’ psychological variables (self-confidence, interest, mathematics phobia and perceived usefulness of mathematics) on students’ attitude towards mathematics?

Table 3: Summary of Regression Analysis Showing Composite Contribution of Combined Independent Variables on Dependent Variable.

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	7260.499	3	2420.166	280.230	.000
Residual	2124.545	243	8.636		
Total	9385.044	249			

$R=.880$ $R^2 = .774$ Adj $R^2= .771$

Table 3 shows the multiple correlation coefficients (R) of all the combined independent variables with students’ attitude to mathematics gave the value of 0.880, where R square is 0.774. The adjusted R^2 , which estimated the variance on dependent variables, gave the value of 0.771 The regression Anova produced ($F_{(3,243)} = 280.230, P<0.05$)

Research Question 3: What is the relative contribution of students’ psychological variables (self-confidence, interest, mathematics phobia and perceived usefulness of mathematics) students’ attitude towards mathematics?

Table 4: Multiple regression Analysis Showing Relative Contribution of the Independent Variables to the Dependent Variable.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	.713	.992		.719	.473
Interest	1.127	.052	.752	21.694	.000
Mathematics Phobia	.065	.027	.074	2.378	.018
Perceived usefulness	.212	.038	.193	5.537	.000

***Significant at P<0.05**

Table 4 reveals the relative contribution of each of the independent variables (interest, mathematics phobia and perceived usefulness of mathematics) to the dependent variable (students' attitude towards mathematics) as follows: interest ($\beta=0.752$, $P < 0.05$), Mathematics phobia ($\beta=0.074$, $P < 0.05$) and perceived usefulness of mathematics ($\beta=0.193$, $P < 0.05$). This implies that the three independent variables contributed significantly.

DISCUSSION

The inter-correlation analysis results for the variables studied are shown in Table 2. The result revealed the relationship among dependent (attitude towards mathematics) and independent variables (interest, mathematics phobia and perceived usefulness of mathematics), which shows that all the psychological factors considered in this study were positively correlated with students' attitude towards mathematics, which is consistent with Mazana, Montero and Casmi (2019). The highest correlation occurred between interest in mathematics and attitude towards mathematics ($r=0.858$). This indicates that these factors contribute significantly to the students' attitude towards mathematics, and that as these variables increase students' attitudes became more positive. This indicates that these factors contributed significantly to students' attitudes, and that as these variables increased students' attitudes towards mathematics became more positive.

The result in table 3 showed that the joint contribution of all the independent variables (interest, mathematics phobia and perceived usefulness of mathematics) investigated in this study with the students' attitude towards mathematics was statistically significant. It also showed $R^2 = .774$ and $Adj R^2 = .771$. This implies that 77% of the variation in students' attitude towards mathematics was accounted by the independent variables (interest, mathematics phobia and perceived usefulness of mathematics). This buttresses the assertion of Osborne, Simon and Collins (2003) that attitudes are influenced by many factors such as gender, personality

The result in table 4 showed that the entire independent variable (interest, mathematics phobia and perceived usefulness of mathematics) considered contributed significantly to students' attitude towards mathematics in technical and vocational tertiary institutions in Oyo state. The value of the standard regression weight associated with the three independent variables showed that students' interest in mathematics, mathematics phobia and students' perceived usefulness of mathematics to their course of study were the potent predictors of students' attitude towards mathematics. This implies that all the independent variables considered in this study are major predictors of students' attitude towards mathematics. However students' interest in mathematics had the greatest contribution. This could be attributed to the fact that students' interest is a very strong factor that determines their attitude towards mathematics. This agrees with Obodo (1997) that the degree and direction of students' attitude towards mathematics are largely determined by the kind of interest developed by the students. The next in contribution is students' perceived usefulness of mathematics. This could be attributed to the fact that mathematics concepts are useful in solving problem in other fields. This buttresses the assertion of Uhumuavbi & Umuru (2005) that most mathematical concepts are useful in solving problems in applied engineering and also assist science students in understanding other science subjects.

CONCLUSION

With regards to the data collected and analysed, this study revealed that students' interest, mathematics phobia and perceived usefulness of mathematics affect students' attitude



towards mathematics positively. It is therefore, recommended that these factors should be addressed and made right in order to improve students' attitude towards mathematics in technical and vocational institutions. It is therefore recommended that these factors should be considered by the authorities involved to enable students acquire positive attitude towards mathematics which will be useful in solving problems in their fields.

REFERENCES

- Adedayo, O.A., (2011) Problem solving and problem-solving techniques. Proceedings of a capacity building workshop for mathematical sciences lecturers in tertiary institutions. Pp 53-70
- Anderson, J. The relationship between students' perceptions of team dynamics and simulation game outcome an individual level analysis. *Journal of Education for Business* Vol 4 pp 85-90
- Appah O. R., Odumosu O. M. and Olisama V. O. (2019). Factors Influencing Students' Achievement in Mathematics Word Problems: a case of Federal College of Forestry, Ibadan, Nigeria. *International Journal of Education, Learning and Development* Vol.7(8), pp.91-101.
- Awofala, A. O. A. and Awolola, S. A. 2011. Curriculum value orientations and reform in the 9-year basic education mathematics curriculum. In Abonyi, O.S. (Ed)(2012) *Reforms in Stem education*. Proceedings of the 52nd annual conference of science teachers' association of Nigeria pp 297-305.
- Ayia, A., (2015) Mathematics modelling approach in mathematics education. *Universal Journal of Educational research* 3(12): 973-980, DOI: 10:13189/ujer.2015.031204.
- Enu, J., Agyman, O. K., & Nkum, D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development*, 3(3), 68-74.
- Hareau, Norton, Mills and Peterson (2005)
- Koballa, O.M. 1995. Children's attitudes towards learning Science. In: Salynn and L. Duit, eds. *Learning Science in the Schools. Research Reforming Practice* (59-84) Enhaum
- Lesh, R. and Harel, G. (2003). Problem solving modelling and local conceptual development. Revealing activities for students and teacher. *Mathematical thinking and learning: an international journal*, 5(2/3, pp 157-190.
- Okeke, N. F. (2009). Impact of laboratory facilities on students' interest and achievement in the teaching and learning of mathematics in secondary schools. *Eastern COEASU Journal of teacher education* Vol 3(1) pp 1-6
- Okpalla, J.U. 2008. Science, technology and mathematics education in tertiary institutions: needs for manpower development. *Journal of business and general education (JBUSEN)*, umunze 2(1) pp 67-70
- Mazana, M.Y., Calkin Suero Montero C.S., Casmir, R.O. (2019). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education* e-ISSN: Vol. 14 (1) 207 231 Retrieved from <https://doi.org/10.29333/iejme/3997>



- Muir, T. Beswick, K., and Williamson, J. (2008). I am not very good at solving problems. What we know and where we are going. An exploration of students' problem-solving behaviours. *Journal of mathematical Behaviour*, 27(3), 228-241.
- Obodo G. C. (1997). *Principles and Practice of Mathematics Education in Nigeria*: Enugu General Studies Division, University of Science and Technology. Pub
- Osborne, J., S. Simon and S. Collins, 2003. Attitudes Towards Science: A Review of the Literature and Its Implications. *International Journal of Science Education*, 25 (9): 1049-1079.
- Otavio R. L. F and Otavio, R. J. (2008). Mathematical modelling: from classroom to real world. Proceedings from topic study group at 11th international congress on mathematical education in Monterrey, Maxico, July 6-13, 2008.
- Patena, A. D., & Dinglasan, B. L. (2013). Students' Performance on Mathematics Departmental Examination: Basis for Math Intervention Program. *Asian Academic Research Journal of Social Science & Humanities*, 1(14), 255-268.
- Sakiz, G., Pape, S. J., & Hoy, A. W. (2012). Does perceived teacher affective support matter for middle school students in mathematics classrooms? *Journal of School Psychology*, 50(2), 235-255.
- Syyeda, F. (2016). Understanding Attitudes Towards Mathematics (ATM) using a Multimodal modal Model: An Exploratory Case Study with Secondary School Children in England. *Cambridge Open Review Educational Research e-Journal*, vol 3, 32-62.
- Tahar, Ismail, Zamani, and Adnan (2010)
- Ubirantan D'Ambrosio (2009). Mathematical modelling: cognitive, pedagogical, historical and political dimension. *Journal of mathematical modelling and application* Vol 1(1) pp 89-98
- Udegbe, G. I. (2009). Students' interest as an Important Factors in Improving the Teaching and Learning of Mathematics. Proceedings of Annul National Conference of Mathematics Association of Nigeria. Pp 77-83.
- Yang, X. (2013). Senior Secondary Students' Perceptions of Mathematics Classroom Learning Environments in China and Their Attitudes towards Mathematics. *The Mathematics Educator*, 15(1), 66-80.



KNOWLEDGE, FEAR, AND PREVENTIVE COVID-19 BEHAVIOR IN PREGNANT WOMEN IN INDONESIA

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ABSTRACT

The spread of COVID-19 is currently getting wider. It is across regions and countries, accompanied by an increase in the number of cases and many deaths every day. Circulating information affects people's knowledge about COVID-19, although this does not determine their understanding of COVID-19. Knowledge and fear will encourage a person to behave well. Good knowledge and great scare about COVID-19 can improve preventive behavior against COVID-19. The purpose of this study was to determine knowing, fears, and preventive behavior against COVID-19 in pregnant women in Simalungun Regency, North Sumatra, Indonesia. The method used in this research was a descriptive study conducted on 100 pregnant women in June-July 2021 in Tapian Dolok District, Simalungun Regency, North Sumatra, Indonesia. Simple random sampling was used in this research. Data was collected using a knowledge questionnaire about COVID-19 (15 questions), a fear questionnaire using the Fear COVID-19 Scale (FCS-19S) (7 questions), and Preventive COVID-19 Behavior Scale (PCV-19BS) questionnaire to determine preventive behavior (4 questions). The FCS-19S and PCV-19BS questionnaires used a Likert scale (1-5). The reliability of the knowledge, fears, and preventive behavior questionnaires were assessed based on Cronbach's Alpha of 0.748 each; 0.846; and 0.898, respectively. The data was presented in a frequency distribution table. The results showed that most participants (79%) had a high level of knowledge about COVID-19, most participants (72%) had a high level of fear of COVID-19, and almost all participants (95%) had a high level of preventive behavior against COVID-19. Efforts should be made to overcome fear and further research to find factors associated with fear of COVID-19.

Keywords: COVID-19, fear, knowledge, preventive behavior, pregnant women

INTRODUCTION

WHO has declared the coronavirus disease (COVID-19) as a pandemic. This situation has a broad impact on almost all aspects of people's lives. The Indonesian government has taken comprehensive steps in prevention efforts through physical distancing, social distancing, procurement of personal protective equipment (PPE), and large-scale social restrictions. Although the government has set various policies to protect citizens, many confirmed cases still increased. The government set some preventive behavior, but the people didn't obey this protocol. It can be seen from the lack of public awareness to use masks and maintain distance in public places.

Correct knowledge about COVID-19 must be a guide for the community. Many information circulating in the community about COVID-19 but not all information and news are accurate (Moudy & Syakurah, 2020). This misinformation circulating can affect people's knowledge and impact people's behavior. A study by Moudy et al. on the general public in Indonesia found that 76.9% of respondents had good knowledge about Covid-19 (Moudy & Syakurah, 2020). Austrian et al. in Kenya also found that knowledge about COVID-19 in urban slum communities was high (Austrian et al., 2020). This high level of knowledge does not guarantee correct preventive behavior.

One of the psychological aspects of the COVID-19 pandemic is fear. The government should assess fears. Without knowing the level of fear of something specific, it is hard to know whether education and prevention are needed (Ahorsu, Imani, et al., 2020). Perez's research shows that women are more afraid of COVID-19 than men (Broche-Pérez et al., 2020). Fear can be considered a weakness and a strength. The weakness of fear causes panic, and its strength is to understand and manage the risks faced (Ng & Kemp, 2020).

The magnitude of public attention and the spread of various kinds of disinformation and misinformation became the basis for us to study about description of knowledge, fear, and preventive behavior against COVID-19 in pregnant women in Simalungun Regency, Indonesia. The purpose of this study was to describe the knowledge, fear, and preventive behavior against COVID-19 in pregnant women.

METHODS

The design of this study was descriptive to explore knowledge, fear, and preventive behavior against COVID-19 in pregnant women. A study was done in June-July 2021 in Tapan Dolok district, Simalungun Regency, North Sumatra, Indonesia. The participants of this study were 100 normal pregnant women in all trimesters. The study used a simple random sampling technique.

Data collection

Data collection was done using a questionnaire directly. The questionnaire about knowledge of COVID-19 was prepared by the researcher. This questionnaire consists of 15 questions about COVID-19. This questionnaire has been tested for validity and reliability with Cronbach alpha 0.75 for internal consistency. The level of knowledge is categorized as high if the participant's answers > 75% of the correct answers and vice versa.

The fear scale was measured using the Fear of COVID-19 Scale (FCV-19S) developed by Ahorsu, Lin, et al., (2020). This questionnaire has been translated into Indonesian by the Language Center of the University of North Sumatra. This questionnaire consists of seven question items, using a Likert scale (strongly disagree = 1; strongly agree = 5). The total score ranges from 7 to 35. The results of the reliability test of this questionnaire on Indonesians is 0.85. Fear scores were categorized into two groups, namely high if the score was between 21-35 and low if the score was 7-20.

Measurement of COVID-19 prevention behavior using the Preventive COVID-19 Behavior Scale (PVC-19BS) questionnaire recommended by WHO. This questionnaire has been translated into Indonesian by the Language Center of the University of North Sumatra. Before being given to participants, this questionnaire has been tested for reliability with Cronbach's alpha 0.84. This questionnaire consists of four questions, using a Likert scale (1=strongly disagree to 5=strongly agree). Behavioral assessment is grouped into 2 categories, namely high (score 13-20) and low (4-12).

Data analysis

Processing and analyzing data using Statistical Package and Service Solution (SPSS) version 25.0 for Windows. Data were presented in percentage.

RESULT

The characteristics of participants were presented in table 1.

Table 1. Characteristics of participants

Variable	Mean ± SD (n=100)	f (%)
Age (years)	24.42 ± 4.97	
Gestational age (weeks)	26.24 ± 7.7	
Gravida		
- Primigravida		31 (31)
- Multigravida		69 (69)
Education		
- Elementary school		5 (5)
- Junior High School		21 (21)
- Senior High School		66 (66)
- University/Diploma		8 (8)
Job status		
- Housewife		94 (94)
- work		6 (6)

SD= Standard deviation

Table 1 showed that the mean age of the participants was 24.42 ± 4.97 years, the mean gestational age was 26.24 ± 7.7 weeks, the most of the participants were multigravida (69%), graduated from senior high school (66%), and housewives (94%).

Table 2. Frequency distribution of the fear scale for COVID-19

Item	Fear of COVID-19 scale (n=100)				
	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
I am most afraid of Corona	4	5	15	46	30
It makes me uncomfortable to think about Corona	5	8	21	45	21
My hands become clammy when I think about Corona	10	38	21	27	4
I am afraid of losing my life because of Corona	5	15	26	34	20
When I watch news and stories about Corona on social media, I become nervous or anxious.	6	13	30	38	13
I cannot sleep because I'm worrying about getting Corona.	8	29	36	15	12
My heart races or palpitates when I think about getting Corona.	7	24	41	20	8
Total	6.43	18.86	27.14	32.14	15.43

Based on table 2, it can be seen that 32.14% of participants agree with the statement that COVID-19 was scary.

Table 3. Frequency distribution of preventive COVID-19 behavior scale

Item	Preventive of COVID-19 Behavior scale (n=100)				
	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
To prevent the transmission of COVID-19, I often wash my hands	1	0	4	52	43
To prevent the spread of COVID-19, I stay at home if I feel unwell	3	3	1	56	37
To prevent the spread of COVID-19, I wear a mask when I leave the house	2	2	3	51	42
To prevent the transmission of COVID-19, I keep my distance if I am in a crowd	4	1	3	46	46
Total	2.5	1.5	2.75	51.25	40

Table 3 showed there were 51.25% of participants agree with preventive COVID-19 behavior.

Table 4. Frequency distribution of participants' knowledge about COVID-19, level of fear of COVID-19, and preventive COVID-19 behavior

Variable	f (n=100)	%
Level of knowledge about COVID-19		
- Low	21	21
- High	79	79
Level of fear of COVID-19		
- Low	28	28
- High	72	72
Preventive COVID-19 Behaviour		
- Low	5	5
- High	95	95

Based on table 4, it was known that most (79%) of participants have high knowledge about COVID-19, the level of fear of COVID-19 was high (72%), and almost all (95%) the participants have a high prevention behavior.

DISCUSSION

This study aims to determine the level of knowledge about COVID-19, fear, and COVID-19 prevention behavior in pregnant women. Our study found the majority of participants (79%) had high knowledge about COVID-19. At this research was conducted, the COVID-19 pandemic had entered its second year. Since it was the first announcement, various information about COVID-19 has spread to all levels of society through mass media, electronics, and social media. Much information spread and accepted by the community allows respondents to have high knowledge. Moudy also explained that the study results were almost the same, namely, 76.9% of participants had good knowledge (Moudy & Syakurah, 2020). The results of this study were in line with Austrian et al. in Nairobi, Kenya in March 2020 found that knowledge about COVID-19 was high (Austrian et al., 2020). Almost the same results were found by Hamadneh et al. in April 2020 on Syrian female refugees in Jordan. In this study, participants generally know about the prevention and transmission of COVID-19 (Hamadneh et al., 2021).

A different study reported by Degu et al. at Debre Tabor Northwest Ethiopia General Hospital was conducted in June 2020 where 52.1% of pregnant women respondents were well informed about COVID-19 (Degu et al., 2021). The results of another study at the Zona Guraghe hospital in Ethiopia in July-August 2020 also reported that the level of knowledge of pregnant women



about COVID-19 was 54.84% (Fikadu et al., 2021). There were variations in participants' knowledge level about COVID-19 from several studies. It is supposed by many factors, including the many sources of information and education from the government about COVID-19, the respondent's education level, and the respondent's desire to find another news.

In our study, there are 72% of participants with a high level of fear of COVID-19. These results were in line with a study conducted by Salehi et al. at Kamali Hospital in Alborz Province, Iran (Salehi et al., 2020). Another study found women had a higher COVID-19 fear score than men (Broche-Pérez et al., 2020). Fear of COVID-19 may be due to novelty and uncertainty about how bad the current outbreak is (Asmundson & Taylor, 2020). Fear can be a source of positive power. In general, we respond to fear rationally and irrationally. The rational response is by understanding and managing the threats or risks that occur, while the irrational response that arises is panic. Fear and panic reduce our ability to fight the virus itself. When fear creates panic and social crisis by stimulating antisocial behavior and decisions and actions that go against the best medical and scientific advice, the virus becomes "more powerful" (Ng & Kemp, 2020). Therefore, much remains to be learned, and some efforts are needed to overcome this coronaphobia (Asmundson & Taylor, 2020).

Almost all of the participants (95%) have good preventive behavior. This result was in line with Fikadu et al. found that 76.2% of pregnant women had good prevention practices, 90.6% of respondents complied with restrictions by the government related to the pandemic (Fikadu et al., 2021). Velikonja et al.'s research conducted in March 2020 in Slovenia found that participants' adherence to handwashing and coughing etiquette was 97%, avoiding crowds by 93.5%, avoiding people at risk of infection by 89.6%, and two-thirds of respondents prefer to be yourself at home. In addition, 89.9% of respondents also disinfected their hands and objects (70.8%), almost 60% provided food supplies for at least two weeks, and a quarter of respondents used masks (Velikonja et al., 2020).

Moudy et al.'s research in 2020 also found that preventive behavior was good. There were 91.7% of respondents washed hands using water and soap, avoided direct contact with sick people (83.6%), covered mouth and nose with a tissue when sneezing or coughing (81.3%), and used a mask when experiencing symptoms of respiratory distress (78.5%) (Moudy & Syakurah, 2020). This behavior can not be separated from the government's efforts to disseminate information on COVID-19 prevention at any time since the beginning of the positive confirmed case to date. Information from social media, mass media and electronic media also has a positive impact on preventive behavior.

In addition, the implementation of government policies in services also supports preventive behavior, for example, the people not served in health services and other public services if they do not wear masks, avoid crowds and maintain distance in public places. The government and community also provide handwashing facilities in the general public area. However, there are still people who have not complied with this COVID-19 prevention protocol.

CONCLUSION AND RECOMMENDATION

Some efforts should be made to overcome the fear of COVID-19. We suggest further research to find factors associated with fear of COVID-19.

ACKNOWLEDGEMENT

Thank you to the Medan Health Polytechnic of the Ministry of Health, Indonesia for funding this research.



CONFLICT OF INTEREST

There is no conflict of interest in this research.

REFERENCE

- Ahorsu, D. K., Imani, V., Lin, C., Timpka, T., Broström, A., Updegraff, J. A., Årestedt, K., Griffiths, M. D., & Pakpour, A. H. (2020). Associations Between Fear of COVID-19 , Mental Health , and Preventive Behaviours Across Pregnant Women and Husbands : An Actor-Partner Interdependence Modelling. *International Journal of Mental Health Addiction, Juni*. <https://doi.org/10.1007/s11469-020-00340-x>
- Ahorsu, D. K., Lin, C., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The Fear of COVID-19 Scale : Development and Initial Validation. *Internasional Journal of Mental Health and Addiction*.<https://doi.org/10.1007/s11469-020-00270-8>.
- Asmundson, G., & Taylor, S. (2020). Coronaphobia: Fear and the 2019-nCoV outbreak. *Journal of Anxiety Disorders, 70*(January), 3.
- Austrian, A. K., Pinchoff, J., Tidwell, J. B., White, C., Abuya, T., Kangwana, B., Ochako, R., Wanyungu, J., Muluve, E., Mbushi, F., Mwangi, D., Nzioki, M., & Ngo, T. D. (2020). practices and needs of households in informal settlements in Nairobi , Kenya. *Bull World Health Organ, April*, 1–21.
- Broche-Pérez, Y., Fernández-Fleites, Z., Jiménez-Puig, E., Fernández-Castillo, E., & Rodríguez-Martin, B. C. (2020). Gender and Fear of COVID-19 in a Cuban Population Sample. *International Journal of Mental Health and Addiction*. <https://doi.org/10.1007/s11469-020-00343-8>
- Degu, A., Nibret, G., Gebrehana, H., Getie, A., & Getnet, B. (2021). Knowledge and attitude towards the current pandemic corona virus disease and associated factors among pregnant women attending antenatal care in debre tabor general hospital northwest ethiopia: An institutional-based cross-sectional study. *International Journal of Women's Health, 13*, 61–71. <https://doi.org/10.2147/IJWH.S285552>
- Fikadu, Y., Yeshaneh, A., Melis, T., Mesele, M., Anmut, W., & Argaw, M. (2021). Covid-19 preventive measure practices and knowledge of pregnant women in guraghe zone hospitals. *International Journal of Women's Health, 13*, 39–50. <https://doi.org/10.2147/IJWH.S291507>
- Hamadneh, S., Hamadneh, J., Amarin, Z., Kassab, M., Obeidat, R., & Rawashdeh, H. (2021). Knowledge and attitudes regarding Covid-19 among syrian refugee women in Jordan. *International Journal of Clinical Practice, 75*(5), 0–3. <https://doi.org/10.1111/ijcp.14021>
- Moudy, J., & Syakurah, R. A. (2020). Pengetahuan terkait usaha pencegahan Coronavirus Disease (COVID-19) di Indonesia. *Higeia Journal of Public Health Research and Development, 4*(3), 333–346.
- Ng, K. H., & Kemp, R. (2020). Understanding and reducing the fear of COVID-19. *Journal of Zhejiang Univ-Sci B (Biomed & Biotechnol), 21*(9), 752–754.
- Salehi, L., Rahimzadeh, M., & Esmaelzadeh-saeieh, S. (2020). The relationship among fear and anxiety of COVID-19 , pregnancy experience , and mental health disorder in pregnant women : A structural equation model. *Brain and Behaviour, June*, 1–8. <https://doi.org/10.1002/brb3.1835>



Velikonja, N. K., Erjavec, K., Verdenik, I., Hussein, M., & Velikonja, V. G. (2020). Association between preventive behaviour and anxiety at the start of the COVID-19 pandemic in Slovenia. *Zdravstveno Varstvo*, 60(1), 17–24. <https://doi.org/10.2478/sjph-2021-0004>



EFFECTS OF PLANT EXTRACTS ON THE MANAGEMENT OF SEED-BORNE PATHOGENS OF COOTON (*Gossypium spp*)

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ABSTRACT

The effect of extracts from fresh leaves of four different plant species on the growth of fungal pathogens of cotton namely *Aspergillus flavus*, *Colletotricum*, *Aspergillus fumigatus*, and *Fusarium axisporum* were evaluated in the laboratory. The plants are *Azardirata indica*, *Carica papaya*, *Veronica amygdalina*, *Chromolaena odorata*. The effect of 25% concentration of these plant extracts on the mycelial growth of *Aspergillus niger*, *Aspergillus flavus*, *Collectratricum*, *Aspergillus fumigatus* and *Fusarium spp* were determined in petri dishes containing Potato Dextrose Agar mixed with plant extract. The radial growth of each of the fungus was observed for seven days i.e the first two days for growth and sporulation and the remaining five days for mycedial growth. All experiments were in a completely randomized designs (CRD) in three Replicates with a check of benomyl and the control of the experiment was without extract. The different plant extracts varied in their effect on the growth of *Aspergillus niger*, *Aspergillus flavus*, *Collectratricum*, *Aspergillus fumigatus*, and *Fusarium spp*. After seven days, *Vernonia amygdalina* and *Chromolaena odorata* had the least mycelial growth on *Fusarium spp* while *Carica papaya* had the highest growth had the highest growth on the fungus. All the plant extracts had no effect on the growth of *Colletotricum spp* as the mycelial growth of the fungus was more than that of the control. It was also observed that *A. indica* inhibit the growth of the fungus *Aspergillus fumigatus* while *Vernomia amygdalina*, *Chromolaena odorata* also had the same inhibitory effect on the fungus. *Carica papaya* had the highest mycelial growth rate on the fungus. Also, *Vernonia amygdalina* was found to be effective on the growth of *Aspergillus flavus* followed by *Carica papaya*.

Keywords: Fungal pathogens, *Azardirata indica*, *Carica papaya*, *Veronica amygdalina*, *Chromolaena odorata*

INTRODUCTION

Cotton belongs to the family *Malvaceae* and genus *Gossypium* with about 30 species of annual subshrubs, perennial shrubs or small trees distributed in the tropical and subtropical regions of Africa, Asia and Australia (Purseglove, 1974)

The word 'cotton' refers to four species in genus *Gossypium* (*Malvaceae*), *G. hirsutum* L. (Upland cotton, 90% of world plantings), *G. barbadense* L. (Pima, or Long-staple cotton), *G. arboretum* L. and *G. herbaceum* L. (Both of which are commonly cultivated in Asia), that were

domesticated independently as source of textile fibre (Brubaker *et al.*, 1999). Cotton is one of the most important crops whose product and by products play vital role in the socio-economic and political life of a country.

Cotton lint is the most important vegetable fibre in the world today (Purseglove (1974). It is woven into fabrics alone or combined with other fibres. Cotton lint also supplies yarn, cordage, ine and tyre cord. The fuzz provides linters for use in belts, upholstery, carpet, mattress, wicks, plastics lacquers, cellulose, explosives and sausage skins (Purseglove, 1974).

Cotton production has had relatively long history in Nigeria and it is grown as a cash crop by about 0.8-million farmers on a total estimated area ranging from 0.6-0.8 million hectares. There are two types of cotton staples in Nigeria, short staple (*Gossypium hirsutum*) is cultivated in Northern part of Nigeria where it required 3-4months of rainfall while long period (*Gossypium barbadense*) is cultivated in the South where it required 7-8-months cool weather and longer period of rainfall and it is more productive for economics purpose because of its high yielding potential (Fryxell, 1979).

Among the fungal diseases of cotton are *Alternaria spp*, *Areolate mildew*, *Romularia* leafspot caused by *Ascochyta spp*. anthracnose (*Colletotrichum spp*), stem blight (*Macrophosmina phaseolina*) stigmatocycosis (*Nematospora gossypii*) boll rot (*Rhizopus stolonifer*) collar rot and wilt (*Sclerotium rolfsii*) and host to other fungi isolated from bolls, stem and leaves. Cotton bacterial blight (*Xanthomonas axanopadis*) is caused by a bacterium *Xanthomonas axanopadis* Pv. Malvecearum. In the northern region infected seeds are the primary source of infection while in southern region plant debris is the main source of infection. The nematode disease of cotton is known as root knot nematode caused by *Meloidogyne incognita* and *Meloidogyne javanica* while the viral disease is caused by leaf curl virus disease. *Alternaria* leaf spot of cotton induced by *Alternaria macrospora* is an important disease of cotton in Nigeria (Nwanosike 1997). The causative agents of *Alternaria* leaf spot of cotton (Macrosporium leaf spot) are fungi *Alternaria gossypii* and *Alternaria macrospora* developing in their life cycle in only anamorphous stage. Mycelium of *Alternaria gossypii* is dark brown. Conidiospores are brown, single or in groups. Conidia are light brown, 22-27 x 9-11µm. They affect leaves, bracts in seedling and adult plants and bolls (Gorlenko, 1968).

Seedling diseases are important in the cotton (*Gossypium hirsutum* L.) cultivation because they lead to poor stand, resulting in gaps in the plant rows and the inoculum produced on them can cause diseases on the adult plants and on capsules affecting productivity and lint quality. Some of the cotton seedlings diseases are caused by the seedborne pathogens especially *Colletotrichum gossypii* South. *C. gossypii* South. var *cephalosporioides* Costa, *Fusarium moniliforme* Sheldon, *Rhizoctonia solani* Kuhn, and other less frequent seedborne fungi (Ray and McLaughlin, 1942; Klich, 1986)

Several species of *Fusarium* have been isolated from cottonseeds, most reports being about *F. moniliforme*. In the United States, *Fusarium* spp. consisting of *F. roseum* Schwabe, *F. moniliforme*, *F. oxysporum* Schlecht, and *F. solani* (Mart.) Sacc. were found to be most widely distributed and abundant in state of Mississippi (Davis, 1977)

Seed treatment with seed dressing fungicides is known to reduce the seedborne infections and subsequently protect the seed from deterioration. Chohan and Jasmit (1975) reported the efficacy of Bavistin and Benlate seed treatments at 0.3 per cent, in controlling pre and post-emergence death of seedlings due to seed-borne mycoflora of sunflower. Anilkumar and Urs (1976) reported the efficacy of mancozeb, difolatan and thiram in eradicating the seed-borne fungi of sunflower Seedling blight caused by *A. helianthi*, was controlled in the field by treatment of sunflower seeds with iprodione, benomyl, captan, chlorothalonil, mancozeb or triadimenol. Raut and Bhombe (1983) reported that benlate treatment at the rate of 0.3 per



cent was most effective against seed-borne infection of *M. phaseolina* in sunflower as compared to hot water treatment at 52°C for 10 min. Control of charcoal rot or improved seedling emergence resulting from fungicide seed treatment has been reported for many crops. Hence, this study aims to evaluate the effects of plant extracts on the seed borne fungal pathogens of cotton.

MATERIALS AND METHODS

Experimental site

The study was carried out in the Department of Crop Protection laboratory, Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State, Nigeria.

Source of extracts and seeds

Extracts samples were obtained from fresh leaves of *Azadiracta indica* (Neem leaf), *Carica papaya* (Pawpaw), *Venonia amygdalina* (Bitter leaf) and *Chrommolaena odorata* (Siam weed). The seed were obtained from long staple cotton (*G. barbadense*)

Sterilization of hardwares

Petri dishes and other glass wares were washed with detergent, rinsed with clean tap water and air dried. These were then arranged in canisters and sterilized in a Gallenkamp hot air oven at 160°C for one hour. Inoculating needle and cork borer were also sterilized before use by exposure to the blue part of burning flames of alcohol lamp until red-hot.

Preparation of medium

Potato Dextrose Agar (PDA) of 39 g was weighed in a sensitive scale. This was later dissolved in one litre of sterile distilled water. This was shaken vigorously in a conical flask covered with cotton wool and aluminium foil. The medium was then sterilized in the autoclave at 121°C and 15 psi pressure for 15 minutes and allowed to cool. Streptomycin was added to the one litre of sterilized media just before pouring into petri-dishes, to prevent the growth of bacteria, allowed to cool and solidify.

Preparation of extracts

Fresh leaves of *Azadirata indica*, *Venonia amygdalina*, *Carica papaw* and *Chromolaena odorata* of 250 g each were collected and surface sterilized with 10% sodiun hypochlorite solution and then rinsed in three changes of sterile distilled water. Extracts were prepared by blending the leaves with one litre of distilled water. These were stirred vigorously and allowed to settle for two hours, after which the extracts were filtered through a funnel with the filter paper to get the filtrates which were kept as stock solutions.

Isolation of fungal pathogen

Long staple cotton seeds collected were taken to the laboratory and were rinsed with distilled water and later transferred into 10% sodiun hypochlorite solution for 30seconds. These seeds were then washed in three other changes of sterile distilled water and blotted dry between filter papers. The sterilized samples were plated on the prepared Potato Dextrose Agar medium which was incubated and observed for growth of fungal organisms.

To obtain pure culture of the organisms, the growing organisms were then subcultured on fresh Potato Dextrose Agar medium and the pure culture identified with the assistance of the technologist after allowing four days for growth and sporulation.

Measurement of radial growth of fungus on treatment

The agar medium was melted in a hot water bath and 9 ml of melted PDA medium was mixed with 1 ml each of each plant extract in the petri dishes which was shaken gently for a short time to ensure proper mixing. Using a sterile cork borer of 5.00 mm diameter, each pure culture of the isolated fungi was placed on the PDA just at the point of intersection of two lines drawn at the back of each petri dish. Four plates were prepared for extract of each plant and the control experiment was also carried out without plant extract, a plate containing benomyl was used as check for the experiment which was also incubated. The treatment and control were incubated for seven days at room temperature during which the radial growth of mycelia was measured and recorded.

RESULTS

Table 1: Effect of plant extracts on the mycelial growth of *Fusarium oxysporum* at different hours of incubation

TREATMENT	24HRS	48HRS	72HRS	96HRS	120HRS	144HRS	168HRS
Check	0.00	0.95	0.95	0.95	0.95	0.95	0.95
C. odorata	0.80	1.75	2.50	4.11	4.50	4.85	5.35
V. amygdalina	0.90	1.65	2.40	3.55	4.40	4.40	5.05
C. papaya	1.00	2.45	4.25	5.85	6.65	7.20	7.70
C. indica	1.15	2.30	3.25	4.11	4.40	4.75	5.25
Control	12.85	7.40	7.75	8.45	8.5	9.25	9.80
LSD	0.22	0.32	0.64	1.03	1.02	0.92	1.21

Table 2: Effect of plant extracts on the mycelial growth of *Colletotricum spp* at different hours of incubation

TREATMENT	24HRS	48HRS	72HRS	96HRS	120HRS	144HRS	168HRS
Check	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Control	0.85	1.20	1.55	1.70	2.05	2.30	2.80
V. amygdalina	0.90	1.25	1.85	2.05	2.25	2.60	2.90
C. papaya	1.00	1.35	1.50	2.15	2.40	2.70	3.00
A. odorata	1.35	1.65	2.05	2.25	2.45	2.70	3.00
A. indica	1.65	1.90	2.10	2.40	2.65	2.85	3.10
LSD	0.21	0.34	0.55	0.70	0.70	0.91	0.98

Table 3: Effect of plant extracts on the mycelial growth of *Aspergillus fimigatus* at different hours of incubation

TREATMENT	24HRS	48HRS	72HRS	96HRS	120HRS	144HRS	168HRS
C. papaya	1.10	3.00	5.10	5.40	5.75	6.20	6.85
C. odorata	0.85	1.25	1.85	2.25	2.65	3.15	3.65
A. indica	0.85	1.15	1.60	1.80	2.10	2.55	2.95
V. amygdalina	0.70	1.65	2.20	2.40	2.60	2.95	3.65
Agar	4.05	4.20	4.45	4.65	5.10	5.55	6.20
Benlate	0.80	1.00	1.00	1.00	1.00	1.00	1.00
LSD (0.05)	0.34	0.39	0.47	0.51	0.51	0.64	0.54

Table 4: Effect of plant extracts on the mycelial growth of *Aspergillus niger* at different hours of incubation

TREATMENT	24HRS	48HRS	72HRS	96HRS	120HRS	144HRS	168HRS
C. papaya	1.40	2.70	3.00	3.20	3.60	3.85	4.40
C. odorata	0.95	1.80	3.00	3.45	3.85	4.35	5.20
A. indica	1.15	1.65	2.05	2.95	3.40	3.90	4.70
V. amygdalina	1.65	2.25	2.50	2.70	3.00	3.55	4.35
Agar	1.25	2.10	2.80	4.05	4.60	5.20	6.10
Benlate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LSD (0.05)	0.46	0.41	0.61	0.38	0.52	0.51	0.63

Table 5: Effect of plant extracts on the mycelial growth of *Aspergillus flavus* at different hours of incubation

TREATMENT	24HRS	48HRS	72HRS	96HRS	120HRS	144HRS	168HRS
C. papaya	1.25	2.45	3.75	4.85	5.55	6.15	7.25
C. odorata	0.90	1.30	1.95	2.25	2.45	2.80	3.15
A. indica	1.20	1.80	2.30	2.45	2.90	3.35	4.20
V. amygdalina	1.05	2.40	3.30	4.20	4.80	5.45	6.40
Agar	1.00	1.65	2.35	2.55	3.05	3.45	4.00
Benlate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LSD	0.09	0.27	0.29	0.28	0.49	0.57	0.98

DISCUSSION

The three fungi isolated from the grains of maize collected from farmers were storage fungi of maize (Christensen and Kaufmann, 1969). They were carried from the field into storage and could be carried from the farmer's store to the field. During storage, the grains could be deteriorated by fungi (Adeoti and Marley, 1995). The number of fungi isolated from the grains were few when compared with a similar trial by Adeoti and Marley (1995) when fifteen different fungi were isolated. This might be due to the use of filter paper which might not be conducive for isolating more fungi. The three fungi isolated were fast growing and might have overtaken the other fungi.

The presence of seed-borne and soil-borne pathogens have been suggested to be responsible for the low germination and lower yield of maize in rainforest area and derived savanna ecology when compared with the northern Guinea Savanna (Kassam and Kowal, 1973).

From table 1 it was observed that at 24 hours of incubation growth occurred on all the extracts tested, no growth was recorded on benlate. *C. odorata*, *A. indica*, and *V. amygdalina* reduced the growth of *Fusarium spp* while *C. papaya* recorded the highest growth. At 72 hours, 96 hours, 120 hours and 168 hours of incubation, *V. Amygdalina* had almost the same growth rate with *A. indica* with the least growth but *C. papaya* inhibit the growth of the fungus just like the growth of the check.

Table 2 shows that the plant extracts enhanced the growth of *Collectrotricum spp* more than that of the check with *A indica* the most enhancing property closely followed by *C. papaya* with *V. amygdalina* had the least inhibitory growth. All the extracts enhanced the growth of the fungus.

Table 3 shows that at 24 hours of incubation, *V. amygdalina* had the least growth of *Aspergillus variegatus* while *C. papaya* had the highest growth. At 48hours, 72 hours and 96 hours after incubation, *C. odorata*, *A. indica* and *V. amygdalina* reduced the growth of the fungus with *A. indica* having the least mycelial growth. *C. papaya* was observed to inhibit the

growth of *Aspergillum niger* at 168 hours of incubation with the same growth rate as that of the check while *A. indica* had the least mycelia growth. This observation is consistent with earlier reports that many plant products have antifungal abilities (Amadioha and Obi, 1999; Enikuomehin and Peters, 2002).

Table 4 shows that at 24 hours of inoculation, *C. odorata* had the least growth of the fungus *Aspergillus niger* while *V. amygdalina* had the highest mycelial growth rate followed by *C. papaya*. At 48 hours, 72 hours and 96 hours there was no significant difference between the effects of the extracts. At 120 hours, 144 hours and 168 hours after inoculation *V. amygdalina* had the a mycelial growth followed by *C. papaya* compared to the check.

Table 5 shows that at 24 hours after incubation, there was no significant effect of plant extract on the inhibitory growth of *Aspergillus flavus*. At 48 hours, 72 hours and 96 hours, *C. odorata* and *A. indica* inhibited the growth of the fungus while *C. papaya* and *V. amygdalina* enhanced the growth. At 144 hours and 168 hours, *C. odorata* had the least mycelial growth with *C. papaya* with the highest mycelial growth. Thus, *C. odorata* was found to have effect on the growth of the fungus.

CONCLUSION

From this study it was observed that *V. amygdalina* slightly inhibit the growth of *Fusarium spp* while *C. papaya* enhanced the growth thereby it is not effective for the control of the fungus. Also, it was also observed from this study that *Azadiracta indica*, *Veronomia amygdalina*, *Carica papaya* and *Chromoloena odorata* were not effective on the growth of *Colletotricum spp*. The extracts all enhanced the growth of the fungus when compared to the check though *C. papaya* had the highest rate of mycelial growth rate.

It was observed that *A. indica* inhibit the growth of the fungus *Aspergillus fumigatus* while *Veronomia amygdalina* and *Chromolaena odorata* also had the same inhibitory effect on the fungus. *Carica papaya* had the highest mycelial growth rate on the fungus.

Furthermore, *Venonia amygdalina* was found to be effective on the growth of *Aspergillus flavus* followed by *Carica papaya*.

RECOMMENDATION

The plant extracts having antifungal properties to all the recorded fungi are cheap and doesn't leave toxic residue in the environment, so this plant extracts showing inhibitory action on seed borne mycoflora may be used as alternative to chemical fungicides. Further research could be done on other plant parts of the plant extracts that inhibit the growth of the fungus and also on the use of dry leaf extract to check the growth of the fungus.

REFERENCES

- Adeoti, A. A. and Marley, P. S. (1995). Myco-flora Associated with Cob rots of Maize in Samaru, Zaria, Nigeria. *Nigerian Journal of Botany*, 8:57-64.
- Amadioha, A. C. and Obi, V. I. (1999). Control of Anthracnose disease of cowpea by *Cymbopogon citratus* and *Occimum gratissimum*. *Acta phyto. Entom. Hungarica*, 34:85-89.
- Anilkumar, T. B. and Urs, S. D. (1976). Seed microflora of sunflower and its control. *Mysore Journal of Agricultural Sciences*, 10:424-427.



- Brubaker, C. L., Bourland, F. M. and Wendel, J. E. (1999). The origin and domestication of cotton. In Smith, C. W. and Cothren, J. T.. (eds). Cotton: Origin, History, Technology and Production. John Wiley and Sons, Inc., New York, pp 3-31.
- Christensen, C. M. and Kaufmann, H. H. (1969). Grain Storage: The role of Fungi in Quality Loss. University of Minnesota Press, Minneapolis. 153p.
- Chohan, J. S. and Jasmit, K. (1975). Seed borne mycoflora of sunflower and control of seed borne pathogens, *Indian Journal of Mycology and Plant Pathology*, 6:210-211.
- Davis, R. G. (1977). *Fusarium* species in the internal microflora of Mississippi cotton seed. *Seed Science and Technology*, 5:587-591.
- Enikuomehin, O. A. and Peters, O. T. (2002). Evaluation of crude extracts from some Nigeria plant for the control of field disease of sesame. *Sesame indicum L. Tropical Oil Seeds J.* 7:84-93.
- Fryxell, P. A. (1979). The natural history of the cotton tribe. Texas A and M University Press, College Station and London.
- Gorlenko, M. V. 1968. Agricultural phytopathology. Moscow: Visshaya Shkola, 434p (In Russian).
- Kassam, A. H. and Kowal, D. J. (1973). Productivity of Crops in Savanna and Rainforest in Nigeria. 2 :49.
- Klich, M. A. (1986). Mycoflora of cotton seed from the Southern United State: A three year study of distribution and frequency. *Mycologia*, 78:706-712.
- Nwanosike, M. R. (1997). Studies on the *Alternaria* leaf spot of cotton, (*Gossypium spp.*, L.) induced by *Alternaria macrospora zimm*.
- Ray, W. W. and McLaughlin, J. H. (1942) Isolation and infection testes with seed and soil borne cotton pathogens. *Phytopathology*, 32:231-238.
- Purseglove, J. W. (1974). Tropical crops: Dicotyledons. Longman, London, pp 333-364.



SCIENTIFIC TOPICS IN MODERN UNIVERSAL MASS MEDIA

НАУЧНЫЕ ТЕМЫ В СОВРЕМЕННЫХ СМИ

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ABSTRACT

In the face of the pandemic audience attention focuses on scientific information.

This article presents conceptual insights as to the adequacy of mass communication and scientific activities; carefully analyzes international and national universal and popular science publications such as *NewScientist*, *Nature*, *Mirror Weekly*, *Korrespondent*, etc.; identifies common and different aspects at the formal, semantic, methodological, promotional and other levels; and reveals that the areas under research are organically very similar.

Studying the topic in depth we set a goal to examine modern mass communication activity and correspond it with the scientific one. It designed the following main objectives of the study such as to review source database, to study thoroughly websites of the most top-rated foreign and Ukrainian media, to compare their focuses, to define ways of content production and coverage of up-to-date scientific information, to compare genre possibilities of journalism with ways of presenting information in the field of science, to aim at considering the urgent issue of our time – Covid-19 pandemic in a broad media-scientific context, that involves, apart from the analysis of internet sites, representative expert sources, documentary film directing, audiovisual investigating reporting, messenger apps, social networks and other means of not only swapping information but active fake creative activities.

Methodology of the present research includes a method of analogy. Scientific and media discourses are compared as well as ways of information content in the Ukrainian and foreign mass media, chronotypes of scientific rigour, genre evocation etc. The content analysis turned out to be equally important involving defining the characteristics of various structural units in the texts of major publications. Our research has not been without modeling because the key concern of today is the pandemic and the subjects of our study, namely science and journalism are still in their infancy.

Findings. It has been found out that the main genre of scientific creativity that is a classic article is widely used and created with provision of all structural elements such as thesis statement, arguments, expert evaluations, conclusions and tips and also it is full of extensive citations, sociological representations, and results of research experiments, practical evaluation and links referring to identical information. We came to conclusions that it is the specific genre that enables media people and scientists to join their forces and efforts and to achieve the highest scientific results especially if a series of articles is turned into a longread.

Keywords: science, mass media, rationalism, scientism, article, genre, theory, thesis statement, arguments.

ОБЗОР

По нашим предположениям, массовой сциентической коммуникации положил начало известный ученый-рационалист Готфрид Вильгельм Лейбниц, который в эпоху Просвещения издавал «Acta Eruditiorum» (Котова, А. 1997). Еще в XVII веке

математики, философы, юристы, книгоиздатели могли знакомить массовую аудиторию с научными событиями, техническими новинками, рефератами научных работ и рецензиями на явления научно-технического прогресса. К работе привлекались ведущие ученые – создатели классических теорий рационализма, эмпиризма, сенсуализма, фидеизма. Мы даже склонны считать, что наука и массовая коммуникация в проявлении журналистики – явления одной парадигмы, но, очевидно, разного уровня. До эпохи Просвещения они развивались параллельно, а затем начали «пересекаться» и взаимно «накладываться».

ВВЕДЕНИЕ

В настоящее время сциентическая журналистика функционирует в различных форматах: в виде научных и научно-популярных изданий, рубрик в универсальных СМИ, блогов, хранилищ информации и т.д. По мнению исследователей, основная проблема научной журналистики – отсутствие специализированных кадров. В контексте предлагаемой нами концепции (Косюк, О. 2016), эта проблема надумана, поскольку журналисты целиком и полностью должны полагаться на мнения экспертов, а уже постскрипtum учитывать показания и впечатления других участников коммуникационного процесса. Но, безусловно, чем эрудированнее журналист, тем продуктивнее будет его деятельность. Таким образом, наше видение журналистики отличается от стереотипных представлений: массмедийная деятельность не поверхностная, релаксационная, зрелищная и т.д., а наоборот – чрезвычайно рационалистическая. Более того, возникновение журналистики – органическая потребность развития классического рационализма в интерпретациях Декарта, Спинозы, Лейбница, Мальбранша и т.д. (Косюк, О. 2018).

Принципы науки и журналистики тоже универсальны: использование доказанных фактов, достоверных источников и экспертиз; отсутствие эмоций, а следовательно, упрощений и драматизаций; использование исключительно доказанных пояснений, теорий, стратегий. А также (привычные): свобода высказываний (опираясь на факты, нужно дистанцироваться от субъективных суждений и ожидаемых выводов); право общественности на полную информацию (особенно, если от этого зависит здоровье реципиентов); только законные методы работы с аргументами и фактами (включая содержащую тайную информацию); необходимость немедленных опровержений случайных ошибок; право на нераскрытие собственных источников информации (если это не предусмотрено законодательством); надлежащая апробация теорий, способных оскорблять людей по сексуальной ориентации, языку, расе, религии, национальности и – особенно – политическим взглядам; избегание компиляций и плагиата; осторожное обращение с юридическими фактами, искажение которых способно фатально повлиять на судьбу подозреваемых; осторожное отношение к личной жизни непубличных лиц; четкое разграничение фактов, комментариев, рекламы; баланс экспертиз (включая использование всех имеющихся оппозиционных взглядов); надлежащее отношение к правам журналистов и экспертов.

Информацию для обнародования журналисты получают из пресс-релизов субъектов научной деятельности, отчетов научно-исследовательских учреждений и университетов, материалов публикаций сообществ, подписки на электронные ресурсы, энциклопедии, монографии, классические вербальные носители. Среди функций научных репортеров, обозревателей и редакторов – подбор публикаций в специализированные издания для узких, почти кастовых, кругов; продуцирование сциентических рубрик в неспециализированных СМИ; универсальный журнализм,

который не только все чаще выходит на сугубо научные темы, но и сам по себе, как мы уже отметили, подобен научной деятельности.

ИССЛЕДОВАНИЯ И ВЫВОДЫ

Цель нашей публикации – сосредоточиться на вербальной журналистике, поскольку именно она, по нашим предположениям, – органическое воспроизведение научной деятельности на доступном уровне (от научно-популярной литературы ее отличает лишь жанровая вариативность, глубина исследований и объем производства) и доказать на конкретном примере «Nature», что современная журналистика не только воспроизводит научные достижения, но и пользуется принципами, функциями, технологиями и стратегиями научности.

Проблемы сциентических аспектов журналистики исследовали Н. Зелинская, В. Ризун, А. Бойко, А. Коновец, В. Терещенко, Н. Бониц, С. Кулешов (Бойко, А. 2009). Украинские ученые сосредоточили внимание на научной журналистике. Мы же попытаемся идентифицировать науку и универсальную медиатеку, а также рассмотреть их в контексте освещения пандемии Covid-19.

Ведущий метод нашего исследования – аналогия. Сопоставляются не только сциентические и медийные дискурсы, но и способы информационного наполнения медиа, хронотипы научности, жанры и т.д. Не менее значимым оказался контент-анализ – статистическая техника для количественного описания содержания коммуникации и формирования выводов на базе систематического установления характеристик структурных единиц жанрологии. Не обошлось и без моделирования, поскольку ключевая сегодняшняя проблема – пандемия, а также объекты нашего исследования – наука и журналистика – находятся в стадии постоянного становления.

Среди рейтинговых неспециализированных изданий, качественно выстраивающих собственную деятельность за рубежом, веб-сайты BBC, «NewScientist», «Nature», в Украине – газеты «2000», «Зеркало недели», журнал «Корреспондент» и т.д. Самое старое издание о науке – «Nature» (журнал исследования природы). Это британское научно-популярное медиа, выходящее на английском с 1869 года, в 2018 году получило числовой показатель цитируемости/импакт-фактор 43.070, которого, кстати, часто не имеют даже серьезные специализированные научные СМИ.

В начале номера от 17.06.2020 (Nature. "Collections". 2020) размещены три рубрики: «Изучите наш контент», «Публикуйтесь», «Подписывайтесь». Далее передовица под названием «Почему дети избегают сложных коронавирусных осложнений», ключевая идея которой: фактор иммунитета и отсутствия осложнений – здоровые кровеносные сосуды. Далее другие материалы: «Зонд Плутон предлагает впечатляющий вид на соседнюю звезду Проксима Центавра» (новости), «Как BlackinThe Ivory акцентирует внимание на расизме в академических кругах» (новости), «Наблюдение бозе-эйнштейновских конденсатов в исследовательской лаборатории», «Ежедневный брифинг: самая крутая лаборатория Вселенной создала причудливую квантовую материю в космосе» (брифинг о природе). Реклама разбавляет серьезный контент и приглашает подписываться на издание. Рубрика журнала вертикального характера. Первый ее блок «Новости и комментарии» предлагает актуальные новости: «Латиноамериканские ученые присоединяются к гонке вакцин против коронавируса» (в центре фотография с пятью гробами в одной могиле, подпись под ней «Сейчас Бразилия занимает второе место по количеству подтвержденных случаев Covid-19»). Публикация маркируется как новость. Далее двумя блоками представлены другие

материалы: "Обновление исследований коронавируса: модифицированные мышцы могут помочь в поиске вакцин и лекарств" (новость), "Противоречивый закон о национальной безопасности Гонконга касается отдельных ученых" (новость), «Выращенные в лаборатории клетки имитируют критический момент развития эмбриона» (новость), «Займитесь кризисной тактикой, чтобы наладить поставки вакцин против Covid-19 туда, где они необходимы» (комментарий), «Зонд Плутон предлагает впечатляющий вид на соседнюю звезду «Проксима Центавра» (новости), как помним, этот материал уже опубликован в ключевом блоке новостей.

Следующая вертикаль «Последние обзоры и аналитика» представляется передовицей из сферы онкологии «Нейтрофильная сетка безопасности заставляет раковые клетки метастазировать и размножаться» (новости/взгляды). Авторы статьи описывают клетки нейтрофилы, которые в целом обеспечивают иммунитет, но, как оказалось, в определенных условиях способны стимулировать метастазирование. И хотя этот процесс еще не исследован, уже можно сделать определенные выводы и предостеречь от заболеваний. В завершение статьи представлен список использованных источников. В центре публикации – электронные адреса Эммы Норман и Иллари Маланши. Материал четко структурирован и «вложен» в сциентическую матрицу (Nolan, E. 2020). Внизу и справа ключевой материал «обрамляют» другие: «Включите переключатель терморегулятивной системы организма», «Высота горы может контролироваться тектонической силой, а не эрозией», «Квантовая материя вращается вокруг Земли», «Метаболиты опухоли мешают восстановлению ДНК в экзотическую материя», «Регенеративная медицина может проложить путь к лечению облысения», «Первоначальные структуры, найденные с помощью технологии лидарного картирования», «Как могли образоваться субъединицы ДНК и РНК, чтобы создать первый генетический алфавит», «Тысячи последовательностей обеспечивают глубокое понимание отдельных геномов». Все материалы рубрики представлены под маркером «новости/взгляды».

Еще ниже размещена, очевидно, самая важная рубрика «Последние исследования», в которой фигурируют исключительно статьи, рассчитанные на экспертное восприятие. Уже из названий видно, что эта информация не для общественности: «Каскад электронных переходов в скрученном двухуровневом графене с магическим углом», «Нейроны, регулирующие оцепенение мышцы», «Наблюдение бозе-эйнштейновских конденсатов в исследовательской лаборатории на орбит», «Неклеточные ловушки нейтрофилов помогают метастазированию рака через CCDC25», «Использование когерентности в возбужденном состоянии для синтетического управления сверхбыстрой динамикой». Все эти публикации – классические научные статьи с привычной структурой: аннотация, ключевые слова, актуальность, теоретическая база, новизна, методы, значения, апробации, ссылки на использованные источники. Видно, что материалы предназначены для серьезной наукометрической базы. Доступ к основному тексту ограничен и монетизирован. Отдельно (на боковой панели) подаются аннотация, код, ссылки на источники, информация об авторе, этические декларации, расширенные данные рисунков и таблиц, права, комментарии и т.д.

Под чисто научными статьями рубрика «Коллекции», в которой много материалов о конференциях, научных званиях и карьере, социальных медиа, работе лабораторий, издательствах, научных базах данных и, что особенно интересно, – научной коммуникации (Nature. "Collections". 2020). Эта публикация структурирована как лонгрид. В предисловии редакторы отмечают: «В основном исследователи пытаются презентовать результаты деятельности другим ученым. Однако иногда они чувствуют необходимость донести идеи до более широкой аудитории. Вот сборник статей,

популяризирующих науку среди общественности и управленцев». Рубрика содержит даже интригующие материалы. К примеру, в публикации «Чувствуете себя исчерпанным? Закройте ноутбук, остановите обсчеты – напишите стихотворение» Сэм Иллингворт объясняет, как поэзия помогает в общении и обнародовании научных поисков на примере творчества Вейчела Линдсея, а также со ссылками на «Краткие размышления о точности» чешского иммунолога и поэта Мирослава Голу презентует научные открытия в формате хайку, «Вселенная в стихах» (поэтический ежегодник чествования науки) и собственный блог (Nature. Coronavirus conversations. 2020).

Заинтересовал нас материал Пакинама Амера («Разговоры о коронавирусе: научное общение во время пандемии»), в котором исследуются моральные аспекты научной коммуникации во время пандемии, поскольку выбор между говорить-умалчивать близок к проблемам современных сциентической и военной журналистик. Тезис публикации: есть ли у ученых моральная обязанность распространять достоверную информацию о коронавирусе? (Amer, P. 2020). Ситуацию комментируют разные эксперты. Рон Дэниелс, консультант по вопросам интенсивной терапии, считает, что исследователям, работающим наряду с осторожными, не подверженными риску и призванными сдерживать панику представителями руководящих и профессиональных кругов, следует тщательно заполнять пробелы в знаниях. Ученого поддерживает американская журналистка Роксана Хамси, отмечая, что говорить правду – органическая потребность человека, независимо от наличия или отсутствия ученого статуса. В оппозиции к очерченному мнению фотожурналистка и научная писательница Тара Хаэль. Она глубоко убеждена, что окончательной правды никто никогда не знает, поэтому следует акцентировать позитивы и умалчивать сомнительные сенсации. В общем, «Коллекции» чрезвычайно важны и ценны, поскольку являются одновременно рубрикой, форумом для дискуссий и базой научных данных.

Отдельно существует еще и рубрика «Тенденции наукометрии», в которой представлены результаты ранжирования авторов и публикаций. По состоянию на 17.06.2020 пальму первенства и 4616 лайков получил материал «Оценка влияния немедикаментозных вмешательств на Covid-19 в Европе». Публикация – комплексная наработка огромного количества авторов из самых престижных университетов континента. Она содержит обширные цитирования, социологические репрезентации, результаты научно-исследовательских экспериментов, дополнительные апробации и т.д. В общем складывается впечатление, что это не статья, а концептуальная репрезентация науки будущего (Flaxman, S. 2020).

Далее размещена рубрика «Nature. Карьера». В ней объявления о различных мероприятиях: конференции, семинары, конгрессы, ассамблеи, а также сообщения о международных вакансиях, грантах и других перспективах престижных трудоустройств. И наконец, подается информация об изданиях и его работниках. Далее – пресс-релизы, способы связи с редакцией, анонсы, партнерство, тематические сортировщики, индексы, условия публикаций, пособия для потенциальных авторов, мастер-классы, реклама, анонсы, библиографические данные...

ЗАКЛЮЧЕНИЕ

В общем, «Nature» производит очень положительное впечатление: по всем параметрам это издание почти примерное. Оно может успешно конкурировать как со специализированными научными, так и с универсальными медиа. «Nature» подтверждает наше концептуальное предположение о родстве научной и



журналистской деятельности в работе с фактами и экспертизой. Следовательно, в настоящее время научная и журналистская деятельности нераздельны. Чтобы констатировать факты, свидетельствовать об экспертизах, определять диапазоны рассуждений и интерпретаций, журналистика вынуждена заимствовать весь набор научных ресурсов в областях сбора, анализа, воплощения и распространения информации. Не случайно редакции ведущих медиа активно сотрудничают с учеными, используя их в качестве штатных и специальных корреспондентов и экспертов. Поскольку ни одна деятельность уже не обходится без официальных сайтов, электронной почты, страниц в социальных сетях, гиперссылок на базы данных, то сотрудничество будет углубляться до ситуаций абсолютного «сращивания» звеньев одной сложной глобальной системы. Это видно уже на примере функционирования рейтингового издания «Nature», во многих аспектах превосходящего деятельность научных корпоративных медиа. На пути к этому ряд других мировых СМИ, активно освещающих и пытающихся решить самые актуальные проблемы человечества вроде пандемии коронавирусной инфекции. Надеемся, наша разведка ускорит процесс рационализации медиа и создаст многоаспектную перспективу исследований сциентизма в СМИ. И эти научные разработки станут источником объективных констатаций явлений и процессов эпохи Постмодерна.

ССЫЛКИ

- Flaxman, Seth and others, 2020, "Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe". *Nature*, 08 June 2020. [Online]. Available at: <https://www.nature.com/articles/s41586-020-2405-7>
- Nature. "Collections". Accessed June 17, 2020. [Online]. Available at: <https://www.nature.com/nature/collections>
- Nature. "Collections". Accessed June 17, 2020. [Online]. Available at: <https://www.nature.com/nature/collections>
- Nature. Coronavirus conversations: Science communication during a pandemic. How researchers can [tackle](#) an “infodemic” of hearsay, speculation and fake news. Accessed may 27, 2020. [Online]. Available at: <https://www.nature.com/articles/d41586-020-01589-x>
- New Scientist. "This won't be the last pandemic. Where will the next one come from?" Accessed June 17, 2020. [Online]. Available at: <https://www.newscientist.com/article/2246259-this-wont-be-the-last-pandemic-where-will-the-next-one-come-from/>
- Nolan, Emma, & Malanchi, Ilaria, 2020, "Neutrophil ‘safety net causes cancer cells to metastasize and proliferate". *Nature*, 11 June 2020. [Online]. Available at: <https://www.nature.com/articles/d41586-020-01672-3>
- Pakinam, Amer, 2020, "Feeling stuck? Close your laptop, stop your field measurements and write a poem. Sam Illingworth explains how poetry can help to communicate and celebrate your science" *Nature*, 27 September 2019. [Online]. Available at: <https://www.nature.com/articles/d41586-019-02912-x>
- Бойко А. А. & Зелінська Н. В. & Коновець О. Ф., 2009, *Наукова комунікація у мас-медіа*. Львів: 19-20. Українська академія друкарства.



- Косяк О. М., 2018, "Масовокомунікаційні складники теорій класичного раціоналізму: хронологічний критерій". *Збірник центру наукових публікацій «Велес» за матеріалами IV міжнародної науково-практичної конференції 2 частина: «Наука і сучасність: виклики глобалізації»*: 71-76. Центр наукових публікацій.
- Косяк, Оксана, 2016, "Нова функціональна модель як запорука реабілітації сучасної журналістики". *Матеріали III міжнародного інтернет-симпозіуму «Журналіст як мішень у сучасному світі»*. [Online]. Available at: <http://esnuir.eenu.edu.ua/handle/123456789/10026>
- Котова, А., 1997. Готфрид Вильгельм Лейбниц (1646-1716), *Квант: научно-популярный физико-математический журнал*, [Online]. Available at: http://kvant.mccme.ru/au/kotova_a.htm



RELATIONSHIP BETWEEN ANXIETY, DEMOGRAPHIC CHARACTERISTICS AND RANKING IN DANCESPORT

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INTRODUCTION

Emotions play a key role in the success of a competition for the strong impact on human performance (Eccles et al., 2011; Jones, 2003). As suggested by Hanin and Syrja (1995), emotional processes can follow, regulate and support the sport action, but also disturb it, a topic still central to sport psychology. Galimberti (2006) has defined the emotion as “an intense affective reaction with acute onset and short duration determined by an environmental stimulus, whose appearance causes a modification at somatic, vegetative and psychic levels”. These emotions are related to a specific moment in life because they are brief and transient (Mulligan & Scherer, 2011). In the moment preceding the competition, the athlete experiences various emotions concerning that specific moment, which can range from euphoria to anger, disappointment and frustration. They can affect both the physiological and behavioral systems, through changes in postural tone, expressive motor responses (gestures, mimicry), and instrumental motor responses (flight, avoidance), and the cognitive system.

Research has been done for years looking specifically at the relationship between negative emotion and sports performance. Negative emotions are seen as antagonistic to concentration, particularly anxiety as it can negatively affect performance. During the state of anxiety, a massive activation of the sympathetic nervous system causes a series of alterations, which contribute to an early exhaustion of the athlete's physical and mental resources. Anxiety can be cognitive or somatic. Cognitive anxiety is a mental state related to negative thoughts, memories, and expectations. It peaks half an hour before the race, and then fluctuates with the outcome of the performance. Athletes may develop cognitive anxiety due to 'unpreparedness, fear of failure, or concern about negative judgment from coaches, teammates, the public and parents. Somatic anxiety involves physiological changes, such as sweating, Fc, muscle tension, nervousness: it starts earlier and drops dramatically during the race. The relationship between cognitive, somatic, and performance anxiety has been explained in the Multidimensional anxiety theory: both affect performance, but are independent because they affect behavior differently (Martens et al., 1990). According to the Inverted U theory (Yerkes & Dodson, 1908) an increase in somatic anxiety can cause arousal at the optimal level that results in better performance outcomes, whereas a value above or below can decrease it. In contrast, cognitive state anxiety is negatively correlated with performance (Martens et al., 1990). Consequently, an increase in cognitive anxiety levels decreases performance. The optimal level of performance can only be achieved when cognitive anxiety is low, because if the athlete begins to worry the latter rises, risking a catastrophe. Instead, according to the Catastrophe model (Hardy & Parfitt, 1991) in the presence of low arousal as cognitive anxiety increases, the athlete will obtain a better performance, while in the presence of high arousal as cognitive anxiety increases we will have a lowering of performance.

Pre-competition anxiety can be measured in a variety of ways, including self-report measures using questionnaires. One instrument regularly used in research is the Competitive State Anxiety Inventory (CSAI) developed by Martens and colleagues (1980), the final version of which, the CSAI-2, thus includes three subscales, assessing somatic state anxiety, cognitive state anxiety, and self-confidence, respectively. Therefore, the assessment of anxiety in the

sport context is useful in understanding and predicting the major psychosocial factors that influence both the experience and performance of athletes prior to competition. Several studies have attempted to analyze the relationship between performance and anxiety and other associated factors. However, in the context of Dancesport the research is very limited. One study found that high-level, pre competition athletes predominantly experience positive feelings; however, it recommends focusing in the future not only on high-level athletes, but also on mid and low-level athletes (Andreeva & Karanauskienė, 2017). The purpose of this study was to examine the anxiety levels of Dancesport athletes in terms of demographic characteristics and the relationship of these variables to competition ranking.

METHODS

Design and participants

Thirty Italian athletes (age, Mean \pm standard deviation [SD] = 17 \pm 1.3 years old), participating in regional Latin Category C competitions, were involved in the study voluntarily. Twenty were female and ten were male. The training age was about 4 \pm 3 years. Their parents gave informal consent.

Measurements

The Italian version of CSAI-2R (Revised Competitive State Anxiety Inventory), formed by Martens and colleagues (1980), revised by Cox and colleagues (2003), was used to measure cognitive anxiety, somatic anxiety and self-confidence through 17 item. A detailed description is shown in **Table 1**.

Table 1. CSAI-25 Item

CSAI-2R	Italian version of CSAI-2R
1. I feel jittery (somatic anxiety).	1. Mi sento nervoso (ansia somatica).
2. I am concerned that I may not do as well in this competition as I could (cognitive anxiety).	2. Sono preoccupato di non riuscire a fare bene in questa competizione come potrei (ansia cognitiva).
3. I feel self-confident (self-confidence).	3. Mi sento sicuro di me (fiducia in me stesso).
4. My body feels tense (somatic anxiety).	4. Il mio corpo è teso (ansia somatica).
5. I am concerned about losing (cognitive anxiety).	5. Sono preoccupato per la perdita (ansia cognitiva).
6. I feel tense in my stomach (somatic anxiety).	6. Mi sento teso allo stomaco (ansia somatica).
7. I am confident I can meet the challenge (self-confidence).	7. Sono sicuro di poter affrontare la sfida (fiducia in me stesso).
8. I am concerned about choking under pressure (cognitive anxiety).	8. Sono preoccupato per il soffocamento sotto pressione (ansia cognitiva).
9. My heart is racing (somatic anxiety).	9. Il mio cuore batte forte (ansia somatica).
10. I am confident about performing well (self-confidence).	10. Sono sicuro di riuscire a fare bene (fiducia in me stesso).
11. I am concerned about performing poorly (cognitive anxiety).	11. Sono preoccupato per le prestazioni scadenti (ansia cognitiva).
12. I feel my stomach sinking (somatic anxiety).	12. Sento il mio stomaco affondare (ansia somatica).
13. I am confident because I mentally picture myself reaching my goal (self-confidence).	13. Sono fiducioso perché mi immagino mentalmente di raggiungere il mio obiettivo (fiducia in me stesso).
14. I am concerned that others will be disappointed with my performance (cognitive anxiety).	14. Sono preoccupato che gli altri rimarranno delusi dalla mia prestazione (ansia cognitiva).
15. My hands are clammy (somatic anxiety).	15. Ho le mani appiccicose (ansia somatica).
16. I am confident of coming through under pressure (self-confidence).	16. Sono sicuro di superare la pressione (fiducia in me stesso).
17. My body feels tight (somatic anxiety).	17. Il mio corpo è teso (ansia somatica).

Participants rated each item on a 4-point Likert scale ranging from one (not at all), two (somewhat), three (moderately so), to four (very much so). A low score indicates the athlete has low anxiety (high self-confidence), while a high score indicates high anxiety. Summing items in each subscale, dividing by the number of items, and multiplying by 10, calculate subscale scores. Score range is 10 – 40 for each subscale.

- To calculate the score for cognitive state anxiety, sum together the scores for the following statements: 2, 5, 8, 11, 14.
- To calculate the score for somatic state anxiety, sum together the scores for the following statements: 1, 4, 6, 9, 12, 15, 17.
- To calculate the score for self-confidence, sum together the scores for the following statements: 3, 7, 10, 13, 16.

The questionnaire was collected from the participants in the competition day before the performance.

Statistical analysis

Data were expressed as mean \pm SD. After verifying normality of the data with Shapiro Wilk test, a Pearson correlation was used to find the relationship between anxiety state, self-confidence, ranking in Dancesport competition, training experience age and athletes' age. Statistical significance was set at $P < 0.05$. Data were analyzed using SPSS (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY).

RESULTS

A detailed description of demographic characteristics participants, ranking in Dancesport and CSAI-2R score, presented as Means and SD, is shown in **Table 2**.

Table 2. Descriptive indices of demographic characteristics, ranking in Dancesport and CSAI-2R score before competition.

		Mean \pm SD
Demographic characteristics	Age	17 \pm 1.3
	Training experience age	4.2 \pm 3.1
Ranking	Ranking in Dancesport	4.8 \pm 3.3
CSAI-2R	Cognitive anxiety	26.1 \pm 8.7
	Somatic anxiety	26.2 \pm 8.2
	Self-confidence	25.4 \pm 6.9

Pearson's correlation test revealed there was a negative correlation between training experience age and state anxiety (Pearson = -0.47; $p=0.008$), ranking in Dancesport competition and state anxiety (Pearson = -0.4; $p = 0.024$), state anxiety and Self-confident (Pearson= -0.73; $p=0.000$).

Pearson's correlation test revealed there was a positive correlation between self-confident and training experience age (Pearson= 0.52; $p=0.003$). A detailed description is shown in **Table 3**.

Table 3. Correlation between demographic characteristics, state anxiety and ranking in Dancesport

		Correlation				
		Age	Training experience age	State anxiety	Ranking Dancesport	Self-confidence
Age	Pearson	1	0,255	-0,023	0,176	0,123
	Sign.		0,174	0,906	0,351	0,517
Training experience age	Pearson	0,255	1	-,474**	0,323	,526**
	Sign.	0,174		0,008	0,081	0,003
State anxiety	Pearson	-0,023	-,474**	1	-,411*	-,733**
	Sign.	0,906	0,008		0,024	0
Ranking Dancesport	Pearson	0,176	0,323	-,411*	1	0,129
	Sign.	0,351	0,081	0,024		0,498
Self confidence	Pearson	0,123	,526**	-,733**	0,129	1
	Sign.	0,517	0,003	0	0,498	

DISCUSSION

The results first showed us anxiety, both somatic and cognitive, was moderately and negatively related to training experience age. This meant that anxiety seemed to decrease as training experience age increase. According to the results of a Dancesport study (Andreeva & Karanauskienė, 2017), experienced athletes had more positive feelings, compared to negative ones. Training experience age seemed to reduce athletes' pre-competition anxiety state. A second moderate negative correlation was found between anxiety state and ranking in Dancesport competition. This meant as anxiety increased, the ranking obtained in competition decreased. Anxiety seemed to moderately affected performance. A third negative relationship, of a strong type, was found between anxiety state and self-confidence. This meant as anxiety increased, self-confidence decreased. This was because, as per the questionnaire, a higher state of anxiety corresponded to a lower level of self-confidence. A moderate positive correlation was found between self-confidence and training experience age. With a greater dance background, it appeared athletes became increasingly self-confidence. In our sample, somatic and cognitive anxiety traveled together: athletes had higher cognitive anxiety and lower somatic anxiety. A portion of the sample who had high levels of anxiety ranked worse in the Dancesport rankings, compared to those who had low levels of anxiety, who ranked among the top performers. However, this was not always the case; not surprisingly, the correlation was not high, but moderate. This implied there were athletes who, with a certain level of anxiety, have performed well in the rankings. This meant a little bit of anxiety could help you to perform well.

There were other studies, which went in the same direction, including that of Besharat & Pourbohloul (2011), which showed a negative correlation between self-confidence and somatic and cognitive anxiety, and a positive correlation with sports performance. Another study



Kolayis & Sari (2011), also demonstrated a positive correlation between training age and self-confidence, and a negative correlation between state anxiety and self-confidence. Sport psychology allowed you to improve your performance, working on the psychological dimension, to obtain a better management of anxiety in a situation of sport competition. With the same physical preparation, the difference was given by the mental attitude. Various techniques you can use to face a competition with the best possible psychophysical balance. It is only necessary to find the right one for each competitor.

The study had some limitations, including small sample size, emphasizing the need to repeat the study on a larger sample. The questionnaire measured the athlete's perceptions in pre-competition situations. Specifically, perceived intensity was measured, relating to cognitive anxiety, somatic anxiety, and confidence. Direction was not measured, i.e., whether these emotions were perceived to be facilitating or inhibiting with respect to performance. It would be interesting to assess the direction of anxiety as well, using the CSAI-2R. Another limitation resided in the inability of athletes to accurately give reports of their own excessive levels of anxiety. Krane and Williams (1987) observed that some athletes repressed their true feelings and anxiety levels, as well as manifest false levels of self-esteem. Finally, it would also be interesting to understand whether self-confidence may increase when competing in teams or pairs, compared to those competing individually.

CONCLUSION

The present study showed a negative correlation between anxiety state and training age, ranking in Dancesport and self-confidence, and a positive correlation between training age and self-confidence. The present results may have significant implications, including the importance of managing anxiety in non-professional athletes and increasing self-confidence, which are moderately related to performance, by scheduling training sessions aimed not only at physical development, but also psychological, so as to arrive at the competition prepared to the best in all respects.

REFERENCES

- Andreeva, V., & Karanauskienė, D. (2017). Precompetitive emotional state of dancesport athletes. *Baltic Journal of Sport and Health Sciences*, 2(105): 2–13.
- Besharat, M. A., & Pourbohloul, S. (2011). Moderating effects of self-confidence and sport self-efficacy on the relationship between competitive anxiety and sport performance. *Psychology*, 2(07), 760.
- Cox, Richard H., Martens, Matthew P., and Russell, William D. (2003). Measuring Anxiety in Athletics: The Revised Competitive State Anxiety Inventory–2. *Journal of Sport and Exercise Psychology*, 25, 519- 533.
- Eccles, D. W., Ward, P., Woodman, T., Janelle, C. M., Le Scaff, C., Ehrlinger, J., Castanier, C., & Coombes, S. A. (2011). Where's the emotion? How sport psychology can inform research on emotion in human factors. *Human Factors*, 53(2), 180–202. <https://doi.org/10.1177/0018720811403731>
- Galimberti, U. (2006): *Dizionario di psicologia* – Utet, Torino.
- Hanin, Y.L. & Syria, P. (1995): Performance affect in soccer players: an application of the Individual Zones of Optimal Functioning model – *International Journal of Sports Medicine*, 16, 260-265.



- Hardy, L., & Parfitt, G. (1991). A catastrophe model of anxiety and performance. *British journal of psychology* (London, England: 1953), 82 (2), 163–178. <https://doi.org/10.1111/j.2044-8295.1991.tb02391.x>
- Jones, M. V. (2003). Controlling Emotions in Sport, *The Sport Psychologist*, 17(4), 471-486.
- Kolayis, H., & Sari, I. (2011). Anxiety, self-esteem and competition ranking of judokas. *Archives of Budo* 7(1):11-15.
- Krane, V. and Williams, J.M. (1987). Performance and somatic anxiety, and confidence changes prior to competition. *Journal of Sport Behavior*, 10, 47–56.
- Martens, R., Burton, D., Vealey, R.S., Bump, L.A. and Smith, D.E. (1990). Development and validation of the Competitive State Anxiety Inventory-2. In *Competitive Anxiety in Sport* (edited by R. Martens, R.S. Vealey and D. Burton), pp. 117–190. Champaign, IL: HumanKinetics.
- Martens, R., Burton, I.T., Rivkin, F., & Simon, J. (1980). Reliability and validity of the Competitive State Anxiety Inventory (CSAI). In C.L.I. Nadeau, W.C. Halliwell, K.M. Newell. & G.C. Roberts (Eds.), *Psychology of motor behavior and sport* (91-99). Champaign, IL: Human Kinetics.
- Mulligan, K., & Scherer, K.R. (2012): Toward a Working Definition of Emotion – *Emotion Review*, 4, 345-355.
- Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology*, 18(5), 459-482. <https://doi.org/10.1002/cne.92018050>



**DETERMINATION OF THE EFFICIENCY OF DIFFERENT PGPR COMBINATIONS AT
REDUCED FERTILIZER RATE IN PAZAR-20 TEA CLONE**

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ABSTRACT

This study was established with seedlings belonging to the Pazar-20 tea clone; 16 different isolates, that isolated from acidic tea soils of the Eastern Black Sea Region, (*Bacillus subtilis* RC28, *B. Subtilis* RC63, *B. Subtilis* 39/3, *B. Subtilis* 521, *B. Megaterium* 12/1, *Paenibacillus polymyxa* RC05, *P. Polymyxa* 24/3, *P. Polymyxa* 28/3, *P. polymyxa* 68/3, *P. Polymyxa* 66/6, *P. polymyxa* RC35, *Pseudomonas fluorescens* RC77, *P. fluorescens* 48/3, *P. Fluorescens* 51/2, *P. Fluorescens* 53/6 and *B. Atrophaeus* 36/10) and 6 different combinations of bacteria, (K1, K2, K3, K4, K5, K6, which can be biological fertilizers) and a biological fertilizer application plus + 1/2 optimum NPK fertilization combined with optimum NPK (1500 mg compound 25:5:10/seedlings) and control, as a total of 9 applications, with 4 replications and 6 seedlings in each replication. In all treatments, plant height, leaf number and branch+leaf weight values measured in tea seedlings increased significantly compared to the control. In the application of biological fertilizer, K1 and K4 formulations and optimum NPK applied together with the amount of leaf chlorophyll 1/2 chemical fertilizer; The amount of anthocyanins increased statistically significantly with 1/2 NPK+K4 formulation and optimum NPK applications compared to the control. K3+1/2 NPK and optimum NPK in terms of antioxidant GR enzyme activity; GST activity 1/2 NPK+ biological fertilizer; K1, K2 and K3 formulations with G6PD enzyme activity 1/2 NPK fertilization, and K1 and K5 biological fertilizer formulations in addition to 6PGD activity 1/2 mineral fertilizer gave the best results.

Keywords: *Camellia sinensis* L., Biological fertilizer, PGPR, NPK fertilization

INTRODUCTION

Promotion of plant growth has been tried to be realized with intensive chemical agriculture inputs since the 1950s. Significant yield and yield increases in the elapsed time have been achieved in almost all cultivated plants. However, the effect of the agricultural chemicals used in the last 20 years on the pollution of the natural ecosystem has reached serious dimensions. As a result, serious studies have been carried out on sustainable and environmentally friendly agriculture alternatives and principles. Research on the dissemination of the use of plant growth promoting rhizobacteria (PGPR), which is considered the most important alternative application in this regard, has become the focus of attention. Serious studies have been carried out on sustainable and environmentally friendly agriculture alternatives and principles. For PGPRs to be successful; the ability to survive for a long time in the rhizosphere depends on the level of compatibility with the host, its interaction with the soil microflora

and environmental factors. In this respect, it is necessary to work with PGPRs in many different plant variety/cultivars and in different ecologies.

Firstly; The potential to use of PGPR for annual crops such as cereals (Jakobsen, 1997; Kumar et al., 2015; Hanif et al., 2020), legumes (Mishra et al., 2010; Swarnalakshmi et al., 2020) and vegetables (Dursun et al., 2010; Kang et al., 2019; Asghari et al., 2020) was investigated. In this regard, studies have been conducted on many PGPR isolates and many species in the form of single or multiple combinations. In almost all of the studies, it was found that the strains used could allow cultivation under biotic and abiotic stress factors depending on the host plant and rhizosphere microbiota (Murillo-Amador et al., 2006; Marulanda et al., 2010; Ahmad et al., 2011; Kumar et al 2015; Barnaval et al., 2017; Anli et al., 2020), as a bio-agent, can be effective in combating many diseases and pests (De Vasconcellos et al., 2009; Egamberdieva et al., 2015; Liu et al., 2017; Al-Zahrani et al., 2018; Meena et al., 2020), it is possible to increase the nutrient utilization efficiency of plants and enable cultivation using less chemical fertilizers (Ahmad et al., 2008; Erturk et al., 2012; Pii et al., 2015) are highlighted.

Although there are many studies on annual plants, there are few studies on a perennial plant grown in acidic soils such as tea. Erturk et al., 2008, 2014; Çakmakçı et al., 2009, 2010, 2011, 2013, 2014, 2017; Phukan et al., 2012; Chakraborty et al., 2013; Tennakon et al., 2019; Fauziah et al., 2019; Bhattacharyya et al., 2020; Wang et al., 2020). The intensive use of nitrogen, which is especially needed in large quantities for high yield, is manifested in the reductions in yield and quality, which causes nutrient imbalances in the soil, textural and structural deterioration and impoverishment of soil microbiota in tea plantations established on rainy, humid and highly sloping lands. Therefore; success in adapting environmentally friendly, sustainable agricultural principles and practices to tea cultivation, which will contribute to reducing the need for chemical fertilizers, will make a serious contribution to reducing the negative effects of conventional cultivation. For this purpose, many PGPR strains isolated from the provinces of Rize and Trabzon, where Turkey's most important tea plantations are located, identified and characterized, were tested in many tea clones as single or multiple combinations as biological fertilizers (Ertürk et al., 2008, 2014; Çakmakçı et al., 2009, 2010, 2011, 2013, 2014, 2017, Çakmakçı, 2019). In this study; the isolates obtained in previous studies (3 for each formulation) and 6 different bacterial formulations (selections were made by combining bacterial strains with complementary effects according to laboratory tests) were used. The effects of these formulations on vegetative growth parameters and leaf enzyme contents were evaluated under conditions of 1/2 reduced fertilizer dose in the experiment with 1-year-old rooted cuttings belonging to the Pazar-20 tea clone. Seedlings belonging to Pazar-20 tea clone, which is one of the most valuable Turkish tea clones in terms of productivity and quality, were preferred in this experiment.

The aim of this study was to determine the effectiveness of the formulations used in plants of the Pazar-20 clone under 1/2 reduced fertilization conditions.

MATERIAL AND METHOD

In this study, tea seedlings belonging to 1 year old Pazar-20 tea clones were used as material. Additionally 16 different bacterial isolates were used. In the preparation of bacterial combinations, nitrogen fixation, phosphate solubilizing, aminocyclopropane carboxylate deaminase activity, the carbon sources they use, and gram negative and positive characteristics of the bacteria were also taken into consideration. 6 different bioformations from 16 selected bacterial isolates K1 (*Bacillus subtilis*

RC28, *Paenibacillus polymyxa* RC05, *Pseudomonas fluorescens* RC77), K2 (*Bacillus subtilis* RC63 *Paenibacillus polymyxa* 24/3, *Pseudomonas fluorescens* 48/3, K3 (*Bacillus atrophaeus* 36/10, *Paenibacillus polymyxa* 28/3, *Pseudomonas fluorescens* 51/2), K4 (*Bacillus subtilis* 39/3, *Bacillus subtilis* RC63, *Pseudomonas fluorescens* 53/6), K5 (*Bacillus subtilis* RC521, *Paenibacillus polymyxa* 66/6, *Pseudomonas fluorescens* RC77) and K6 (*Bacillus megaterium* 12/1, *Paenibacillus polymyxa* RC35, *Pseudomonas fluorescens* 48/3) was applied together with a biological fertilizer. In addition, all the biological fertilizer applications were combined with + 1/2 optimum NPK fertilization, and a trial with 4 replications and 6 seedlings in each replication was established, in comparison to optimum NPK (1500 mg compound 25:5:10/seedling) and control. Immersion and Injection method was used. During planting, inoculation was carried out by immersing the rooted tea seedling roots completely in the bacterial suspension for 60 minutes. After planting, 5 ml of bacterial suspension (10^9 cfu ml⁻¹ diluted) was injected into the middle part of the root rhizosphere using a sterile syringe and inoculation was repeated. The diagnosis of PGPR isolates was made using the MIS diagnostic system and some biochemical tests (oksidase, catalase, nitrogen fixation, sucrose, phosphate solubilization, amilase and ACCD tests). In the research; stem diameter (mm), plant height (cm), branch+leaf weight (g/seedling), fresh leaf weight (g/seedling), dry leaf weight (g/seedling), number of leaves and (number/seedling) leaf area (cm²) were determined as vegetative development characters in both years.

After the data determined in the pot experiments were statistically analyzed using STATISTICA (StatSoft-2003) and SPSS (IBM SPSS Statistics 20) programs (especially by making variance, correlation, and multiple comparison tests), significant differences between treatments were determined using Duncan's multiple range test with a significance level of $P \leq 0.05$.

The enzyme activities in the leaves were determined as follows:

Extraction Preparation, Enzyme Activity, and Determination of Protein Content

Approximately 2 g leaf samples taken from tea plants were wrapped in aluminum foils and frozen at -80°C until used. For analysis, 2 g of leaf sample was pulverized with liquid nitrogen, 10 mL buffer was added (50 mM Tris-HCl and 1 mM EDTA, pH 7.5), the mixture was centrifuged at 4°C for 20 minutes (15,000 g) and macroparticles were removed. precipitated and the precipitate was discarded. The supernatant was used as a crude extract for measuring of enzyme activities and protein determinations. Each enzyme activity was determined spectrophotometrically (Shimadzu Spectrophotometer UV-1208) at 25°C. the protein concentration was calculated according to the Bradford method (1976) using bovine serum albumin as a standard using 595 nm absorbance measurement. Leaf enzyme measurements were repeated three times in each sample.

Assay Peroxidase (POD)

Peroxidase (POD) activity determination is based on monitoring the absorbance increase at 470 nm, caused by the colored compound, which is the product of the reaction in which guaiacol H₂O₂ is the substrate (Angelini et al., 1990). Various fresh plant materials were extracted in 0.1 M pH=7.0 cold phosphate buffer by applying 100 mg fresh weight/mL ratio, the extracts were centrifuged at 10 000 rpm for 15 minutes and the supernatants were taken and used for enzyme determination (Smith et al., 1971). In addition, 100 mL of 0.1 M phosphate buffer with pH 5.8 was taken and 15 mM guaiacol, 5 mM H₂O₂ were added and this reagent was freshly prepared and used. 3 mL of this reagent and 50 µL of the sample according to enzyme activity were taken from the extracts and the oxidation product was measured at 470 nm at 10-second intervals for 2 minutes. The increase in absorbance was

recorded at 1-minute intervals, and the increase in absorbance in the part where the absorbance increased linearly was proportional to 1 minute. The amount of enzyme that increases the absorbance by 0.01 in 1 minute at 25°C was accepted as 1 enzyme unit, and the results were expressed as enzyme units per g of leaf (EU g leaf⁻¹) (Yee et al., 2003) $POD (EU\ g\ leaf^{-1}) = (5\ mL\ homogenate / 0.5\ g\ leaf) / 10\ \mu L\ ingested\ homogenate) \times 2 \times (1/0.01) \times Absorbance\ value$; $POD (EU\ g\ leaf^{-1}) = 1000 \times 100 \times Absorbance\ value$. Secondly, in the POD reaction system, 0.05 mL enzyme extract, 2 mL water, 1 mL guaiacol as a donor, and 1 mL H₂O₂ as substrate was kept in 35 °C water for 5 minutes and measured spectrophotometrically. POD activity was defined as 0.1 units of absorbance change per minute (Mei et al., 2009).

Assay Polyphenol oxidase (PPO)

Catechol was used as a substrate. The reaction mixture; It was formed from 2 mL of phosphate buffer solution (pH 6.2, 0.05 M) + 0.5 mL of "enzyme-containing solution" + 0.5 mL of substrate (0.5 M) solution (Lee et al., 1991). After the reaction mixture was incubated for 5 minutes at 30°C, absorbance measurements were made at a wavelength of 410 nm at 15-second intervals. For this purpose, the a spectrophotometer was used. The slope of the curve reflecting the absorbance x time relationship was calculated in terms of "Absorbance min⁻¹ mL⁻¹" and expressed as "activity level" (Lee et al., 1991). In addition, in the reaction system of PPO enzyme extract, 1 mL of enzyme-containing 2 mL of citrate and phosphate buffer solution (pH=5.6, 0.1 M), 0.4 mL of proline (10 mg/mL) and 1 mL of catechol were 10 in 35 °C water. minutes and measured spectrophotometrically. The unit of PPO activity is defined as 0.1 absorbances per minute (Mei et al., 2009).

Assay Urease

For the at 37°C for 5 minutes. 0.5 mL (0.05 M) of urea was added to this sample and the entire mixture was left to stand for 20 minutes. 0.2 mL (1%) indophenol solution was added and 0.2 mL (0.5 M NaOH and 0.075% NaOCl) reagent was added, it waited for 30 minutes and the increase in absorbance was measured by spectrophotometer at 640 nm (Weatherburn, 1967).

Assay 5-Dehydroxyshikimate reductase

The absorbance of NADPH₂, which is formed according to the reaction $Shikimate + NADP + > 5\text{-dehydroshikimate} + NADPH$, is based on spectrophotometric monitoring at 340 nm (Sanderson, 1966). The reaction mixture contains 1 mM shikimic acid, 170 μM NADP⁺ and 0.1 mL enzyme solution in 2.5 mL 0.1 M glycine buffer (pH=10). An enzyme unit is defined as the amount of enzyme that catalyzes the oxidation of 1 μmol of shikimic acid in 1 minute.

Assay Alcohol dehydrogenase activity (ADH)

For the enzyme activity determination, the tea sample was homogenized with 10 mL of phosphate buffer (0.1 M, pH=7.0) and centrifuged for 15 minutes at 3000 rpm at +4°C (Smith et al., 1971). 0.2 mL of the supernatant was taken and NAD⁺ (nicotinamide adenine dinucleotide) (2.5 mM) and ethyl alcohol (10 mM) solution were added to the reaction medium to form the concentrations in the measuring cuvettes, and the change in absorbance per minute was measured in a spectrophotometer at 340 nm at 25°C. Enzyme activity was expressed as optical density change per minute (DOD 340/g tea/min) (Smith et al., 1971; Hatanaka et al., 1974).

Assay Glucose 6-phosphate dehydrogenase (G6PD)

G6PD activity in tea leaf samples was determined according to the Beutler method (Beutler, 1984). The procedure contains 0.1 mM Tris-HCl buffer (pH=7.5), 0.5 mM EDTA, 0.2 mM NADP⁺, and 0.6

mM G6P for G6PD, 0.6 mM 6PGA for 6PGD, and the volume is 1 mL. In the system, the enzyme unit is defined as 1 μ mol NADP⁺ reduction per minute.

Assay 6-phosphogluconate dehydrogenase (6PGD)

6PGD activity in tea leaves was determined according to the Beutler method (Beutler, 1984). The procedure contains 0.1 mM Tris-HCl buffer (pH=7.5), 0.5 mM EDTA, 0.2 mM NADP⁺, and 0.6 mM G6P for G6PD, 0.6 mM 6PGA for 6PGD, and the volume is 1 mL. In the system, the enzyme unit min is defined as 1 μ mol NADP⁺ reduction. Leaf enzyme activity was determined spectrophotometrically.

Assay Glutathione reductase (GR)

GR activity in tea leaves was determined according to the method developed by Carlberg and Mannervik (1985). Leaf enzyme activity was determined spectrophotometrically. The system contains a total volume of 1 mL of 0.75 mM Tris-HCl buffer (pH=7.0), 1 mM EDTA, 1 mM GSSG and 0.1 mM NADPH. One enzyme unit is defined as the oxidation of 1 μ mol of NADPH per minute.

Assay Glutathione S-transferase (GST)

Leaf GST enzyme activity was determined spectrophotometrically. Glutathione S-transferase activity in tea leaves prepared by using the method given above, Habig et al. (1974), 1 mL volume of reaction medium contained 0.1 M potassium phosphate buffer (pH=6.5), 1.0 mM GSH, 1.0 mM CDNB, and 1% pure ethanol. An enzyme unit was defined as the formation of 1 μ mol of GS-DNB (glutathione-dinitrobenzene complex) per minute at 340 nm.

RESULTS AND DISCUSSION

MIS Diagnosis and biochemical test results of bacteria in the combinations used in the experiment are shown in Table 1. The seedling growth and yield parameters of the first year of the experiment are given in Table 2.

Table 1. Some characteristics of bacteria in the combinations used in the experiment with 1-year-old seedlings in Pazar-20 tea clone.

Strain No	MIS Diagnostic Result	Comb .	OK test	CAT test	Nitrogen fix.	Sucrose test	Phosphate solub. Test	Amilase test	ACCD
RC28	<i>Bacillus subtilis</i>		Z+	K+	+	+	+	+	2
RC05	<i>Paenibacillus polymyxa</i>	K1	-	+	K+	-	-	-	2
RC77	<i>Pseudomonas fluorescens</i>		K+	K+	K+	Z+	+	-	4
RC63	<i>Bacillus subtilis</i>		+	K+	K+	-	Z+	+	3
24/3	<i>Paenibacillus polymyxa</i>	K2	+	K+	+	-	-	Z+	TY
48/3	<i>Pseudomonas fluorescens</i>		K+	+	Z+	-	+	-	2
36/10	<i>Bacillus atrophaeus</i>		-	K+	K+	+	+	+	6
28/3	<i>Paenibacillus polymyxa</i>	K3	-	+	K+	+	Z+	Z+	2
51/2	<i>Pseudomonas fluorescens.</i>		K+	K+	K+	+	+	-	4
39/3	<i>Bacillus subtilis</i>		Z+	K+	K+	+	Z+	Z+	4
RC63	<i>Bacillus subtilis</i>	K4	+	K+	K+	-	Z+	+	3
53/6	<i>Pseudomonas fluorescens</i>		K+	K+	K+	Z+	+	-	2
RC52	<i>Bacillus subtilis</i>		-	K+	K+	+	-	+	3
66/6	<i>Paenibacillus polymyxa</i>	K5	+	+	K+	-	-	-	4
RC77	<i>Pseudomonas fluorescens</i>		+	+	K+	K+	+	-	2
12/1	<i>Bacillus megaterium</i>		Z+	K+	+	-	K+	-	TY
RC35	<i>Paenibacillus polymyxa,</i>	K6	Z+	+	K+	Z+	Z+	-	TY
48/3	<i>Pseudomonas fluorescens</i>		K+	+	Z+	-	+	-	2

OK: oksidase; CAT: catalase; ACCD: aminosiklopropan carboksilat deaminase activity; TY: No test; +:positive, K+: Strong positive; Z+: weak positive

Compared to the control, plant height, leaf number and branch+leaf weight values measured in tea seedlings increased significantly in all treatments. The stem diameter, which is an important growth parameter in tea seedlings, increased with all applications except K2+1/2 NPK and K3+1/2 NPK, and the increase rates were found to be significant (Table 2).

While the highest value in terms of stem diameter was measured in seedlings applied K6+1/2 NPK, it was followed by 1/2 dose mineral fertilizer application with K1 combination. In the study, the highest branch+leaf weight, fresh and dry leaf weight values were achieved with optimum NPK application and 1/2 dose NPK+K1 combination applications.

Table 2. The effect of different biological fertilizer combinations and reduced chemical fertilizer applications on growth and yield parameters in Pazar-20 clone (2013)

Treatment*	Trunk diameter (mm)**	Plant Height (cm)	Branch+leaf weight (g/seedling)	Fresh leaf Weight (g/seedling)	Dry leaf weight (g/seedling)	Number of Leaves (number/seedling)	Leaf area (cm ²)
Control	5.97 d	45.6 c	27.42 e	19.42 e	9.20 e	54.1 e	26.2 d
NPK	6.62 bc	71.2 ab	42.77 a	27.51 a	12.68 a	64.2 ab	34.8 b
BG+1/2NPK	6.72 bc	72.2 ab	35.38 bc	21.69 cd	10.46 cd	67.6 a	31.6 bc
K1+1/2 NPK	6,85 ab	68.0 ab	41.70 a	26.50 a	12.06 ab	59.8 b-e	36.9 b
K2+1/2 NPK	5.88 d	72.3 ab	32.67 cd	20.45 de	9.92 de	56.3 de	42.5 a
K3+1/2 NPK	6.32 cd	63.7 b	32.95 cd	21.44 cd	9.77 de	54.3 e	27.7 cd
K4+1/2 NPK	6.51 bc	66.3 ab	31.58 d	20.40 de	9.72 de	57.7 c-e	31.6 bc
K5+1/2 NPK	6.51 bc	75.0 a	36.29 b	23.02 bc	10.85 cd	61.6 b-d	35.4 b
K6+1/2NPK	7.27 a	67.3 ab	37.12 b	24.65 b	11.30 bc	62.7 a-c	36.9 b
Avarage	6.51	66.8	35.32	22.78	10.66	59.83	33.7

*Control: No bacteria and chemical fertilizer; NPK (1500 mg compound per pot with 80 kg compound calculation per decare 25:5:10/seedling); ½ NPK (750mg compound per pot, 25:5:10/seedling)

**The differences between the means indicated with the same letter are not significant (p< 0.05) in their group

Leaf chlorophyll (SPAD) and anthocyanin (ACI) content, leaf GR, GST, G6PD and 6PGD enzyme activity values are given in Table 3 in the study; first year (2013), the amount of leaf chlorophyll was revealed in the application of biological fertilizer, K1 and K4 formulations and optimum NPK applied with 1/2 dose of chemical fertilizer (Table 3). The amount of anthocyanins increased statistically significantly compared to the control with 1/2 dose NPK+K4 formula and optimum NPK applications. According to preliminary evaluations, it has been revealed that additional chemical fertilizer can reduce bacterial activity, especially in K2 and K3 formulations. K3+1/2 NPK and optimum NPK in terms of antioxidant GR enzyme activity; GST activity 1/2 dose of NPK+ biological fertilizer; In terms of G6PD enzyme activity 1/2 dose of optimum NPK fertilization, K1, K2 and K3 formulations and in terms of 6PGD activity, in addition to 1/2 dose mineral fertilizer, K1 and K5 biological fertilizer formulations came to the fore (Table 3). First year (2013), leaf PPO, POD, urease, ADH and DSK enzyme activity results are given in Table 4. The polyphenol oxidase (PPO) activity

in tea leaves increased statistically significantly compared to the control only with optimum NPK application, but other applications were in the same group with the control (Table 4). While the POD activity in terms of enzyme unit per g/leaf and mg/protein, optimum 1/2 NPK application and the combination of K2, K4, K5 and K6 bacterial formulations increased significantly compared to the control, other applications gave similar results with the control application in terms of POD activity.

Table 3. Effect of reduced chemical fertilizer applications with different biological fertilizer combinations on leaf chlorophyll, anthocyanin content, GR, GST, G6PD and 6PGD enzyme activity in Pazar-20 clone (2013)

Treatment	Clorophyll (SPAD) content*	Pigment (ACI) content	Enzym activity EU/mg protein			
			GR	GST	G6PD	6PGD
Kontrol	76.07 c	20.10 d	1.87 cd	1.84 c	0.86 c	0.95 d
NPK	83.44 b	28.06 ab	4.30 a	2.47 b	1.73 b	1.72 c
BG +1/2NPK	90.86 a	25.27 bc	2.28 c	5.89 a	1.82 b	2.32 b
K1+1/2 NPK	85.23 ab	23.02 cd	2.95 b	2.51 b	2.77 a	2.99 a
K2+1/2NPK	79.66 bc	23.32 cd	3.21 b	1.26 d	2.67 a	1.60 c
K3+1/2NPK	76.00 c	22.99 cd	4.52 a	1.81 c	0.64 c	0.64 d
K4+1/2NPK	83.97 b	29.59 a	3.24 b	2.05 c	2.63 a	0.72 d
K5+1/2NPK	80.75 bc	20.65 d	1.42 d	2.49 b	2.07 b	2.46 ab
K6+1/2NPK	79.62 bc	24.15b-d	2.97 b	2.57 b	1.88 b	1.67 c
Average	81.73	24.13	2.97	2.54	1.89	1.67

*The differences between the means indicated with the same letter are not significant ($p < 0.01$) in their group

The most suitable result in terms of urease activity per g/leaf, which caused a significant increase compared to the control, gave the K1, K4, K5 and K6 formulations; Urease enzyme content per g/protein increased statistically significantly with biological fertilizer, K1 and K5 applications compared to the control. Compared to the control, K1+1/2 NPK application significantly increased the ADH enzyme activity per unit leaf weight measured in tea seedlings. While DSK reductase activity as enzyme unit per g/leaf and mg/protein increased significantly in seedlings inoculated with K2, K3 and K5 bacterial formulations with 1/2 NPK application compared to the control, other applications gave similar results with the control application and in the same group. (Table 4).

The growth and yield parameters of 2014 for this experiment established in Pazar-20 tea clone are given in Table 5. According to the results of the second year of the study, compared to the control, the highest plant height increased with all applications, especially in the application of K6+1/2 NPK, and the increase rates were found to be significant.

Stem diameter, which is an important indicator of development in tea seedlings, increased with all applications except K2 and K3 formulations, the highest increase was measured in K1 and K6 formulation with 1/2 NPK, but the differences between applications other than K2 and K3 were not found to be significant and fell into the same group. (Table5). Branch+leaf weight increased in all applications except K2+1/2 NPK, the highest increase was seen in K6 and K5 formulation, and the rates of increase were found to be significant ($p \leq 0.05$). Similarly, the wet and dry leaf weight values increased significantly ($p < 0.01$) with applications other than the K2 formulation, and the highest efficiency was observed in K1, K5, K6, K4 and optimum mineral applications used with 1/2 NPK

fertilizer, respectively in fertilizer applications. The second leaf area of the tea seedlings increased statistically significantly compared to the control with the applications other than K2 and K3, and the third leaf area of the tea seedlings except K2, K3 and K4. The most effective applications in terms of leaf area were NPK fertilization, 1/2 NPK fertilization and K1 and K6 applications (Table 5).

Table 4. Effect of reduced chemical fertilizer applications with different biological fertilizer combinations on leaf PPO, POD, urease, ADH and DHSK enzyme activity in Pazar-20 clone (2013)

Treatment	Poliphenol oksidase (PPO)		Peroksidase (POD)		Ürease		Alcohol dehydrogenase (ADH)		5- Dehydroxy Shikimate reductase (DHSK)	
	(EU/g leaf)*	(EU/mg protein)	(EU/g leaf)	(EU/mg protein)	(EU/g leaf)	(EU/mg protein)	(EU/g yaprak)	(EU/mg protein)	(EU/g yaprak)	(EU/mg protein)
Kontrol	7.24 b	0.062 bc	15.45 d	0.16 cd	0,76 d	0.008 c	1.25 bc	0.049 a	2.35 de	0.089 c
NPK	9.49 a	0.121 a	21.14 cd	0.14 d	0,92 cd	0.012 bc	0.89 d	0.021 c	2.59 cd	0.092 bc
BG+1/2NPK	7.15 b	0.066 bc	14.52 d	0.13 d	1.43 a	0.017 a	1.28 bc	0.043 ab	1.60 e	0.053 d
K										
K1+1/2	7.37 b	0.063 bc	17.68 d	0.14 d	1.20 a-c	0.015 ab	1.82 a	0.055 a	2.70 cd	0.088 c
NPK										
K2+1/2	8.04 b	0.051 c	42.65 a	0.21 b	1.01 b-d	0.010 c	1.37 b	0.043 ab	3.86 ab	0.122 ab
NPK										
K3+1/2	5.78 c	0.049 c	23.00 cd	0.20 bc	0.73 d	0.007 c	1.50 ab	0.059 a	3.47 bc	0.121 ab
NPK										
K4+1/2	7.42 b	0.060 bc	34.82 ab	0.33 a	1.06 bc	0.008 c	1.33 bc	0.050 a	3.13 b-d	0.115 bc
NPK										
K5+1/2	7.99 b	0.045 c	27.86 bc	0.16 cd	1.27 ab	0.018 a	0.79 d	0.025 c	4.66 a	0.149 a
NPK										
K6+1/2NPK	8.63 ab	0.073 b	26.98 bc	0.21 b	1.09 bc	0.011 c	0.98 cd	0.030 bc	3.21 b-d	0.102 bc
PK										
Avarage	7.68	0.066	24.90	0.19	1.05	0.012	1.25	0.042	3.06	0.103

*The differences between the means indicated with the same letter are not significant ($p < 0.05$) in their group

Table 5. The effect of reduced chemical fertilizer applications with different biological fertilizer combinations on growth and yield parameters in Pazar-20 clone (2014)

Treatment	Trunk Diameter (mm)	Plant Height (cm)	Branch+ leaf weigth (g/seedling)	Fresh leaf weigth (g/seedling)	Dry leaf weigth (g/seedling)	Second leaf area (cm ²)	third leaf area (cm ²)
Control	7.09 cd	59.2 d	39.19 d	21.8 d	12.8 e	12.8 c	21.7 bc
Optimum NPK	8.21 a	73.2 ab	51.42 bc	31.2 ab	16.6 ab	15.9 a	25.5 a
BG+1/2NPK	8.05 ab	71.2 bc	48.07 c	28.8 b	15.4 bc	14.6 ab	24.7 a
K1+1/2 NPK	8.33 a	73.1 ab	51.27 bc	33.1 a	17.5 a	15.1 ab	25.6 a
K2+1/2 NPK	6.89 d	72.2 a-c	41.39 d	23.6 cd	13.6 de	12.8 c	21.1 c
K3+1/2 NPK	7.17 b-d	69.9 c	48.09 c	25.9 c	14.9 cd	13.0 c	22.0 bc
K4+1/2 NPK	7.90 a-c	72.7 a-c	50.77 bc	32.9 a	16.9 ab	14.4 b	23.4 ab
K5+1/2 NPK	8.01 ab	72.1 a-c	52.57 b	31.2 ab	18.1 a	14.6 ab	24.3 a
K6+1/2NPK	8.27 a	74.8 a	55.90 a	33.0 a	17.3 a	14.8 ab	25.1 a
Avarage	7.77	70.9	48.74	29.06	15.9	14.2	23.7
<i>ID</i>	*	*	*	**	**	*	*

*: $p \leq 0,05$ Important, **: $p \leq 0,01$ Very important

The chlorophyll value measured in tea leaves in May increased, and in November, the biological fertilizer applied with 1/2 NPK fertilizer increased compared to the control with the applications other than K2 and K3 formulations and the increase rates were found to be significant. Leaf anthocyanin content values showed a statistically significant increase in K5, K6 and K1 applications compared to

the control. When the yield and growth parameters were evaluated collectively, it was revealed that additional chemical fertilizer in K2 and K3 formulations could reduce the bacterial activity and did not provide a significant increase, similar to the results in the first year of the study (Table 6). Tea leaf antioxidant (GR, GST and POD) and oxidative pentose phosphate pathway (G6PD and 6PGD) enzyme activity values in the 2nd year of the experiment are given in Table 6. According to the second year data of the study, all applications tested in this trial set significantly increased the leaf GR, GST, G6PD and 6PGD enzyme activities compared to the control. In terms of antioxidant GR enzyme activity, K6 and K3+1/2 NPK and optimum NPK; GST activity 1/2 NPK+ biological fertilizer and K5; K1 formulation with G6PD enzyme activity 1/2 NPK fertilizer, K1 and K5 formulations in addition to 1/2 NPK fertilizer in terms of 6PGD activity and K2 and K4 formulations in terms of POD activity came to the fore. POD enzyme activity increased with only K2, K4 and K6 inoculations compared to the control, and leaf POD activity measured in other applications was determined to be the same or lower than the control (Table 6). The second year results of the study on tea leaf antioxidant (GR, GST and POD), oxidative pentose phosphate pathway (G6PD and 6PGD) and enzyme activity values are given in Table 6. According to the second year data of the study, all applications tested in this trial set significantly increased the leaf GR, GST, G6PD and 6PGD enzyme activities compared to the control. In terms of antioxidant GR enzyme activity, K6 and K3+1/2 NPK and optimum NPK; GST activity 1/2 NPK+ biological fertilizer and K5; K1 formulation with G6PD enzyme activity 1/2 NPK fertilizer, K1 and K5 formulations in addition to 1/2 NPK fertilizer in terms of 6PGD activity and K2 and K4 formulations in terms of POD activity came to the fore. POD enzyme activity increased with only K2, K4 and K6 applications compared to the control, and leaf POD activity measured in other applications was found to be the same or lower than the control (Table 6).

Table 6. The effect of reduced chemical fertilizer applications with different biological fertilizer combinations on leaf chlorophyll, anthocyanin content, GR, GST, G6PD and 6PGD enzyme activity (2014)

Treatment	Clorophyll (SPAD) content		Anthocianin (ACI) content	Enzym activity EU/mg protein				
	May*	November		GR	GST	G6PD	6PGD	POD
Control	48.4 c	71.1 cd	22.2 d	1.75 f	1.55 f	0.95 d	0.99 d	0.20 cd
Optimum NPK	58.3 a	76.8 ab	23.5 b-d	3.27 b	2.52 c	1.30 c	1.50 bc	0.16 de
BG+1/2NPK	55.2 b	75.1 a-c	23.5 b-d	2.42 de	3.66 a	1.76 b	1.76 b	0.14 e
K1+1/2 NPK	58.2 a	76.8 ab	24.2 a-c	3.32 b	2.31 cd	2.79 a	2.79 a	0.18 de
K2+1/2 NPK	48.5 c	72.2 b-d	22.6 cd	2.36 de	1.92 e	1.71 b	1.30 c	0.32 a
K3+1/2 NPK	45.5 d	70.2 d	21.8 d	2.79 c	2.20 d	1.75 b	1.34 c	0.20 cd
K4+1/2 NPK	55.4 b	77.1 a	23.0 cd	2.62 cd	2.22 d	1.75 b	1.51 bc	0.35 a
K5+1/2 NPK	57.4 ab	79.7 a	25.3 a	2.24 e	3.41 b	1.81 b	2.59 a	0.23 bc
K6+1/2NPK	59.9 a	79.7 a	25.1 ab	3.62 a	2.33 cd	1.73 b	1.55 bc	0.26 b
Average	54.09	75.4	23.5	2.71	2.46	1.73	1.70	0.23

* The differences between the means indicated with the same letter are not significant ($p < 0.05$) in their group

In this study established in Pazar-20 tea clone, NPK application per unit leaf of polyphenol oxidase activity, K2 and K6 formulations increased statistically significantly compared to the control, while PPO activity per unit protein increased only with the K6 formulation, other applications were in the same group as the control (Table 7).

In terms of both units of measurement, POD activity increased significantly compared to the control with K2 and K4 bacterial formulations in addition to the optimum 1/2 NPK application, while other applications gave similar results with the control application in terms of POD activity. Biological fertilizer and K5 formulation, which caused a significant increase compared to the control, gave the best result in terms of urease activity per unit leaf and protein.

Table 7. The effect of reduced chemical fertilizer applications with different biological fertilizer combinations on leaf PPO, POD, urease, ADH and DSK enzyme activity in Pazar-20 clone (2014).

Treat ment*	Poliphenol Oksidase (PPO)**		Peroxidase (POD)		Ürease		Alcohol dehydrogenase (ADH)		5-Dihydroxy Shikimate reductase (DSK)	
	(EU/g/le af)	(EU/mg protein)	(EU/g Leaf)	(EU/mg protein)	(EU/g leaf)	(EU/mg protein)	(EU/g leaf)	(EU/mg protein)	(EU/g leaf)	(EU/mg protein)
Cont.	7.26 cd	0.062 b-d	16.16 d	0.167 cd	0.806 c	0.012 cd	1.30 b-d	0.058 b	2.52 d	0.098 d
NPK	9.02 ab	0.067 b-d	22.11 cd	0.151 d	0.973 bc	0.012 cd	0.96 d	0.030 cd	2.79 cd	0.100 cd
BG	7.58 bc	0.083 ab	16.13 d	0.139 d	1.324 a	0.020 a	1.39 bc	0.047 bc	2.16 d	0.097 d
K1	8.08 a-c	0.069 bc	18.50 d	0.148 d	1.272 ab	0.018 a-c	2.08 a	0.083 a	2.91 b-d	0.098 d
K2	8.90 ab	0.055 cd	42.47 a	0.213 bc	1.068 a-c	0.011 d	1.99 ab	0.079 a	4.16 a	0.123 a-c
K3	6.12 d	0.056 cd	24.06 cd	0.212 bc	0.776 c	0.013 b-d	2.11 a	0.086 a	3.85 a	0.133 ab
K4	7.86 bc	0.066 b-d	36.42 ab	0.347 a	1.121 ab	0.012 cd	1.62 b	0.061 b	3.69 ab	0.133 ab
K5	7.98 bc	0.045 d	29.14 bc	0.218 b	1.349 a	0.019 ab	1.03 d	0.028 d	4.51 a	0.146 a
K6	9.46 a	0.099 a	28.22 c	0.228 b	1.155 ab	0.011 d	1.07 cd	0.033 cd	3.63 a-c	0.116 b-d
Av.	8.03	0.067	25.91	0.203	1.094	0.014	1.51	0.056	3.36	0.116

*Applications other than control and NPK were used with 1/2 NPK (750 mg compound 25:5:10/seedling)

**The differences between the means indicated with the same letter are not significant ($p < 0.05$) in their group

Compared to the control, K1, K2 and K3 formulations and 1/2 NPK application significantly increased the alcohol dehydrogenase enzyme activity per unit leaf and protein measured in tea seedlings, while the increase or decrease in other applications was not significant and was found to be similar to the control. While 5-dehydroxishikimate reductase activity as enzyme unit per unit leaf and protein per unit protein significantly increased in seedlings inoculated with 1/2 dose NPK application together with K2, K3, K4 and K5 bacterial formulations compared to control, other applications gave similar results with control application and entered the same group (Table 7).

As it is known, tea is a species that needs nitrogen especially for high level vegetative development throughout the year. Providing at least a certain part of this need with biological fertilizers containing mixtures of bacteria will contribute to the environment in many areas, which will also meet an important need in terms of human health and safe food. The use of different PGPR strains, which claim to be the most important alternative especially in the search for reducing the need for chemical fertilizers, has been studied in many plant species in recent years. It has been determined that *Pseudomonas* spp AF-54 isolate in sunflower is an important biological fertilizer application option to increase crop yield when used together in reduced NP fertilization (Majed et al., 2018). In a similar study conducted on chile peppers, it was emphasized that the same amount of product can be obtained with the yield obtained from a full dose fertilizer application if PGPR isolates are applied with a reduced fertilizer dose of 80, 80 and 100% in N, P and K, respectively (Batool and Altaf, 2017). It has been reported that the combined application of chemical fertilizers + PGPR isolates in maize can reduce the need for phosphorus by 1/2 (Yazdani et al., 2009). It has been reported that approximately 19-47% of the nitrogen needed in the rice plant can be provided by *Azospirillum* application (Choudhury and Kennedy, 2004). In a parallel study; It has been emphasized that 25% of the

nitrogenous fertilizer needed in mustard cultivation can be provided by application some PGPR isolates (Dutta et al., 2017). Similar determinations were made in wheat, barley (Belimov et al., 1995, Shaharooma et al., 2008) and sorghum plant (Alagawadi and Gaur, 1992). It has been reported that the use of microorganism-containing biological fertilizer / AMF in tea cultivation is an application that can reduce the use of chemical fertilizers (Nepolean et al., 2012). Again, in another study conducted in different ecologies of tea plants, it was determined that a reduction of 33-50% nitrogen fertilizer depending on different soil types can continue cultivation without any decrease in yield and quality (Tennakoon et al., 2019). It has been determined that inoculation with some species of *Azospirillum* and some phosphate solvent isolates can lead to an increase in both quality and yield, even in the case of a reduction of 25% fertilizer for nitrogen and 50% for phosphorus (Saikia et al., 2011). It has been emphasized that inoculation with the same type of bacteria in a different location can sustainably continue in the case of reducing chemical fertilizers in tea cultivation (Easwaran et al., 2002).

CONCLUSION

In the study, the highest branch+leaf weight, fresh and dry leaf weight values were achieved with optimum NPK application and 1/2 dose NPK+K1 combination applications in 2013 (Table 2). In the second year (2014), K6+1/2 NPK application produced the highest values (Table 5).

This showed that the production of K1 (*Bacillus subtilis* RC28 + *Paenibacillus polymyxa* RC05 + *Pseudomonas fluorescens* RC77) and K6 (*Bacillus megaterium* 12/1 + *Paenibacillus polymyxa* RC35 + *Pseudomonas fluorescens* 48/3) bioformulations in the tea plant grown for its fresh leaves can be achieved even if the required fertilizer is reduced by half. The plant growth promoting activity of these bacteria used in the formulations was established by multiple mechanisms (Table 1). These are the fixation of the free nitrogen of the atmosphere to the soil, phosphate dissolution and ACC deaminase activity. Thanks to these activities, it has been revealed in many studies that both vegetative growth parameters, leaf chlorophyll content and leaf enzyme activities are positively affected (Chakraborty and Chakraborty, 2012). Similar results have been reported in studies with similar tea clones in different ecologies (Çakmakçı et al., 2015, 2017; Çakmakçı, 2019) or in trials with various tea clones in different locations (Fauziah et al., 2019; Bhattacharyya et al., 2020).

Growth and development parameters such as plant height, stem diameter, leaf area, fresh leaf weight, dry leaf weight, branch+leaf weight of the Pazar-20 tea clone of chemical and biological fertilizers and bacterial inoculations used in the study were determined. When the results obtained are examined in general, statistically significant results were obtained. Additionally, it was observed that especially bacterial inoculations increased the activities of glutathione reductase and glutathione S-transferase enzymes, two important enzymes of glutathione metabolism. The activities of glucose 6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase, the irreversible enzymes of the pentose phosphate pathway, were also increased, with minor exceptions. Almost all of the increases were found to be statistically significant. Both the positive effects on growth factors and the positive effects on antioxidant enzyme activities have shown that the tested applications have properties that can be used in organic agriculture.

As a result, it was determined that the active bacteria among the tested bacteria positively affected the growth of tea seedlings and increased the enzyme activities of the leaf antioxidant and oxidative pentose phosphate pathway. It can be said that bacteria, which have a positive effect on enzyme



activity, can increase the tolerance of the tea plant against environmental stress conditions such as free radical damage, low and high temperatures, oxygen level, air pollution, heavy metals, high light intensity, magnesium deficiency and drought.

ACKNOWLEDGMENTS

This work is financially supported by the Scientific and Technological Research Council of Turkey (TOVAG; 112 O 313 project).

REFERENCES

- Ahmad, R., Arshad, M., Khalid, A. & Zahir, Z.A. (2008). Effectiveness of organic-/bio-fertilizer supplemented with chemical fertilizers for improving soil water retention, aggregate stability, growth and nutrients uptake of maize (*Zea mays* L.). *Journal of Sustainable Agriculture*, 31(4), 57-77.
- Ahmad, M., Zahir, Z.A., Asghar, H.N. & Asghar, M. (2011). Inducing salt tolerance in mung bean through coinoculation with rhizobia and plant-growth promoting rhizobacteria containing 1-aminocyclopropane-1-carboxylate deaminase. *Can. J. Microbiol.*, 57, 578–589.
- Al-Zahrani, H. S. M., Elbeshehy, E. K. F., Aldhebiani, A. Y. & Elbeaino, T. (2018). Effect of Cucumber mosaic virus (CMV) infection on antineoplastic alkaloids from periwinkle (*Catharanthus roseus* L.) cultured in the Mecca region and resistance induction by plant-growthpromoting rhizobacteria (PGPR). *Biotechnol. Equip.* 32, 49–57. doi: 10.1080/13102818.2017.1395298
- Alagawadi, A.R. & Gaur, A.C. (1992). Inoculation of *Azospirillum brasilense* and phosphate solubilizing bacteria on yield of sorghum (*Sorghum bicolor* L. Moench) in dry land. *Trop. Agric. (Colombo)* 69 347-35.
- Anli, M., Baslam, M., Tahiri, A., Raklami, A., Symanczik, S., Boutasknit, A., Ait-El-Mokhtar, M., Ben-Laouane, R., Toubali, S. & Ait Rahou, Y. (2020). Biofertilizers as strategies to improve photosynthetic apparatus, growth, and drought stress tolerance in the date palm. *Front. Plant Sci.* 11, 516818.
- Asghari, B., Khademian, R. & Sedaghati, B. (2020). Plant growth promoting rhizobacteria (PGPR) confer drought resistance and stimulate biosynthesis of secondary metabolites in pennyroyal (*Mentha pulegium* L.) under water shortage condition. *Sci. Hortic.* 263:109132. doi: 10.1016/j.scienta.2019.109132
- Barnawal, D., Bharti, N., Pandey, S.S., Pandey, A., Chanotiya, C.S. & Kalra, A. (2017). Plant growth-promoting rhizobacteria enhance wheat salt and drought stress tolerance by altering endogenous phytohormone levels and TaCTR1/TaDREB2 expression. *Physiol. Plant.* 161, 502–514.
- Batool, S. & Altaf, M.A. (2017). Plant growth promoting rhizobacteria (PGPR) reduces application rates of fertilizers in chili (*Capsicum frutescens* L.) cultivation. *J. Hortic.* 4, 215.
- Belimov, A., Kojemiakov, A.P & Chuvarliyeva, C.V. (1995). Interaction between barley and mixed cultures of nitrogen fixing and phosphate solubilizing bacteria. *Plant Soil* 173, 29–37



- Bhattacharyya C., Banerjee S., Acharya U., Mitra A., Mallick I., Haldar A., Haldar S., Ghosh A. & Ghosh A. (2020). Evaluation of plant growth properties and induction of antioxidative defense mechanism by tea rhizobacteria of Darjeeling, India. *Scientific Reports* <https://doi.org/10.1038/s41598-020-72439-z>.
- Çakmakçı, R., Ertürk, Y., Dönmez, F., Erat, M., Haznedar, A. & Sekban, R. (2009). Plant Growth Promoting Bacteria for Organic Tea Production. Improvement. *Advances in Bioinoculation, Biopesticide Production Formulation and applications on International Thematic Workshop Symposium*. 20th-22 October 2009, Islamabad, Pakistan 9-17 p.
- Çakmakçı R., Dönmez M.F., Ertürk Y., Erat M., Haznedar A. & Sekban R. (2010). Diversity and biotechnological potential of culturable bacteria from the rhizosphere of Turkish tea grown in acidic soils. *Plant and Soil* 332:299-318, 332(1), 299-318.
- Çakmakçı, R., Ertürk, Y., Atasever, A., Ercişli, S., Şentürk, M., Haznedar, A. & Sekban, R. (2011). The use of Plant Growth Promoting Rhizobacteria for Organic Tea Production in Turkey. *Proceeding of Tea Organic Low Carbon International Symposium Guangyuan, China, June 6-9, 2011*, p: 89-97
- Çakmakçı R., Ertürk Y., Sekban R., Haznedar A. & Varmazyari A. (2013). The Effect of Single and Mixed Cultures of Plant Growth Promoting Bacteria and Mineral Fertilizers on Tea *Camellia Sinensis* Growth Yield and Nutrient Uptake. *Soil Water Journal, Social Issue for AGRICASIA*, 2(1), 653-662.
- Çakmakçı R., Ertürk Y., Atasever A., Kotan R., Erat M., Varmazyari A., Türkyılmaz K., Haznedar A. & Sekban R. (2014). Development of plant growth-promoting bacterial based bioformulations using solid and liquid carriers and evaluation of their influence on growth parameters of tea. 9th Int. Soil Science Congress on “The Soul of Soil and Civilization” 14-16 October 2014, Antalya/TURKEY. Pp:800-808.
- Çakmakçı R., Ertürk Y., Varmazyari A., Atasever A., Kotan R., Erat M., Türkyılmaz K., Sekban R. & Haznedar A. (2015). The effect of mixed cultures of plant growth promoting bacteria and mineral fertilizers on tea (*Camellia sinensis* L.) growth, yield, nutrient uptake, and enzyme activities. *International Congress on “Soil Science in International Year of Soils” 19-23 October 2015 Sohi, Russia. Vol :1, pp:67-71*.
- Çakmakçı, R., Ertürk Y., Varmazyari A., Atasever A., Kotan R., Haliloğlu K., Erat M., Türkyılmaz K., Sekban R. & Haznedar A. (2017). The effect of bacteria-based formulations on tea (*Camellia sinensis* L.) growth, yield, and enzyme activities. *Annals of Warsaw University of Life Sciences – SGGW Horticulture and Landscape Architecture No 38, 2017: 5–18 (Ann. Warsaw Univ. of Life Sci. – SGGW, Horticult. Landsc. Architect. 38, 2017* .
- Çakmakçı R. (2019). The Variability of the Predominant Culturable Plant Growth Promoting Rhizobacterial Diversity in the Acidic Tea Rhizosphere Soils in the Eastern Black Sea Region. *Alinteri J. of Agr. Sci.* 34(2): 175-181
- Chakraborty, U. C., Chakraborty, A. P., Sunar, K. & Dey, P. L. (2013). Plant growth-promoting rhizobacterial strain-mediated induced systemic resistance in tea. *Indian J. Biotechnol.* 12, 20–31.
- Choudhury, A.T.M.A. & Kennedy, I.R. (2004). Prospects and potentials for systems of biological nitrogen fixation in sustainable rice production. *Biol. Fertil. Soils* 39, 219–227.



- De Vasconcellos, R.L.F. & Cardoso, E.J.B.N. (2009). Rhizospheric streptomycetes as potential biocontrol agents of *Fusarium* and *Armillaria* pine rot and as PGPR for *Pinus taeda*. *Biocontrol*, 54, 807–816.
- Dursun, A., Ekinçi, M. & Dönmez, M.F. (2010). “Effects of foliar application of plant growth promoting bacterium on chemical contents, yield and growth of tomato (*Lycopersicon esculentum* L.) and cucumber (*Cucumis sativus* L.)”, *Pakistan Journal of Botany*, 42 (5), 3349-3356.
- Dutta, J., Handique, P. J., & Takur, D. (2015). Assessment of culturable tea rhizobacteria isolated from tea estates of assam, india for growth promotion in commercial tea cultivars. *Frontiers Microbiology*, 6, 1252.
- Easwaran, S., Rajalingam, G.V., Kumar, N., Thangaraj, M. & Rajarajan, A. (2002). Integrated nutrient management in tea. In: Sreedharan, K., Vinodkumar, P.K. & Jayarama, C.B.M. (Eds.), *Proceedings of the 15th Plantation Crops Symposium*. Mysore, India, pp. 287–294.
- Egamberdieva, D., Jabborova, D., and Hashem, A. (2015). *Pseudomonas* induces salinity tolerance in cotton (*Gossypium hirsutum*) and resistance to *Fusarium* root rot through the modulation of indole-3-acetic acid. *Saudi J. Biol. Sci.* 22, 773–779. doi: 10.1016/j.sjbs.2015.04.019
- Ertürk Y, Ercisli S. Sekban, R., Haznedar, A. & Dönmez M.F. (2008). The effect of Plant Growth Promoting Rhizobacteria PGPR on rooting and root growth of tea *Camellia sinensis var Sinensis* cuttings. *Romanian Biotechnological Letters.*, 13(3), 3747-3756.
- Ertürk, Y., Ercisli S. & Çakmakçı R. (2012). Yield and growth response of strawberry to plant growth promoting rhizobacteria inoculation. *Journal Plant Nutrition* 35:817-826.
- Ertürk Y., Çakmakçı Y., Sekban R. & Haznedar A., (2014). Biological Fertilizer Researches For Organic Tea Culture in Turkey (Period: 2007- 2013). ABST. International Mesopotamia Agriculture Congress / 22-25 September 2014 Diyarbakır – Turkey, s 1004-1005.
- Fauziah F., Setiawati M.R., Pranoto E., Susilawati D.N. & Rachmiati Y. (2019). Effect of indigenous microbes on growth and blister blight disease of tea plant. *J. of Plant Protection Research* 53(4):529-534. doi:10.24425/jppr.2019.131264.
- Hanif, M. K., Malik, K. A., Hameed, S., Saddique, M. J., Fatima, K. & Naqqash, T. (2020). Growth stimulatory effect of AHL producing *Serratia* spp. from potato on homologous and non-homologous host plants. *Microbiol. Res.* 238:126506. doi: 10.1016/j.micres.2020.126506
- Jacopsen C.S. (1997). Plant protection and rhizosphere colonization of barley by seed inoculated herbicide degrading *Burkholderia (Pseudomonas) cepacia* DBO1(pRO101) in 2,4-D contaminated soil. *Plant Soil* 189:139-144.
- Kang, S.-M., Hamayun, M., Khan, M. A., Iqbal, A. & Lee, I.J. (2019). *Bacillus subtilis* JW1 enhances plant growth and nutrient uptake of Chinese cabbage through gibberellins secretion. *J. Appl. Bot. Food Qual.* 92, 172–178. doi: 10.5073/JABFQ.2019.092.023
- Kumar, A., Maurya, B. R. & Raghuwanshi, R. (2015). Characterization of bacterial strains and their impact on plant growth promotion and yield of wheat and microbial populations of soil. *Afr. J. Agric. Res.* 10, 1367–1375. doi: 10.5897/AJAR2014.8894
- Liu, Y., Chen, L., Wu, G., Feng, H., Zhang, G. & Shen, Q. (2017). Identification of root-secreted compounds involved in the communication between cucumber, the beneficial *Bacillus*



- amyloliquefaciens*, and the soilborne pathogen *Fusarium oxysporum*. Mol. Plant Microbe Interact. 30, 53–62. doi: 10.1094/MPMI-07-16-0131-R
- Majeed, A., Abbassi, M.K., Hameed, S., Yasmin, S., Hanif, M.K., Naqqash, T. & Imran, A. (2018). *Pseudomonas* sp. AF-54 containing multiple plant beneficial traits acts as growth enhancer of *Helianthus annuus* L. under reduced fertilizer input. Microbiol. Res. 216, 56–69.
- Marulanda, A., Azcón, R., Chaumont, F., Ruiz-Lozano, J.M. & Aroca, R. (2010). Regulation of plasma membrane aquaporins by inoculation with a *Bacillus megaterium* strain in maize (*Zea mays* L.) plants under unstressed and salt-stressed conditions. Planta 232, 533–543.
- Meena, M., Swapnil, P., Divyanshu, K., Kumar, S., Tripathi, Y.N., Zehra, A., Marwal, A. & Upadhyay, R.S. (2020). PGPR-mediated induction of systemic resistance and physiochemical alterations in plants against the pathogens: Current perspectives. J. Basic Microbiol. 60, 828–861.
- Mishra, M., Kumar, U., Mishra, P. K., & Prakash, V. (2010). Efficiency of plant growth promoting rhizobacteria for the enhancement of *Cicer arietinum* L. growth and germination under salinity. Advances in Biological Research, 4(2), 92–96.
- Murillo-Amador, B., Troyo, D. E., Garcia, H. J. L., Lopez, A. R., & Avila, N. Y. S. (2006). Effect of NaCl salinity in the genotypic variation of cowpea (*Vigna unguiculata*) during early vegetative growth. Scientia Horticulturae, 108, 432–431.
- Nepolean, P., Jayanthi, R., Vidya Pallavi, Balamurugan, A., Kuberan, T., Beulah, T. & Premakumar, R. (2012). Role of biofertilizers in increasing tea productivity. Asian Pac. J. Trop. Biomed. S1443–S1445.
- Pii, Y., Mimmo, T., Tomasi, N., Terzano, R., Cesco, S. & Crecchio, C. (2015). Microbial interactions in the rhizosphere: Beneficial influences of plant growth-promoting rhizobacteria on nutrient acquisition process. A review. Biol. Fertil. Soils, 51, 403–415.
- Phukan I., Madhab M., Sarmah S.R., Bordoloi M., Nair S.C. & Dutta P. (2012). Exploitation of PGP microbes of tea for improvement of plant growth and pest suppression: A novel approach. Two Bud 59(1):69-74.
- Saikia, D.N., Sarma, J., Dutta, P.K. & Baruah, D.K. (2011). Sustainable productivity of tea through conservation of bio-mass, addition of bio-fertilizers and reduction of inorganic fertilizer. Two Bud 58, 109–117.
- Shaharooma, B., Naveed, M., Arshad, M. & Zahir, Z.A. (2008). Fertilizer dependent efficiency of Pseudomonads for improving growth, yield and nutrient use efficiency of wheat (*Triticum aestivum* L.). Appl. Microb. Biotechnol. 79, 147–155
- Swarnalakshmi, K., Yadav, V., Tyagi, D., Dhar, D.W., Kannepalli, A. & Kumar, S. (2020). Significance of plant growth promoting rhizobacteria in grain legumes: Growth promotion and crop production. Plants 9, 1596.
- Tennakoon P.L.K., Rajapaksha R.M.C.P. & Hettrachchi L.S.K. (2019). Tea yield maintained in PGPR inoculated field plants despite significant reduction fertilizer application. Rhizosphere 10:100-146, doi:10.1016/j.rhisph.2019.100146



- Wang M., Sun H., Xu L. & Xu Z. (2020). Bacterial diversity in tea plant (*Camellia sinensis*) rhizosphere soil from Qinling Mountains and relationship with environmental elements. *Plant Soil*. <https://doi.org/10.1007/s11104-020-04822-8>.
- Yazdani, M., Bahmanyar, M., Pirdashti, M. & Ali, M. (2009). Effect of phosphate solubilization microorganisms (PSM) and plant growth promoting rhizobacteria (PGPR) on yield and yield components of corn (*Zea mays* L.). *Int. J. Agric. Biosyst. Eng.* 3 (1), 50–51

MASSIVE INTRACRANIAL HEMORRHAGE MIMICKING ST-ELEVATION MYOCARDIAL INFARCTION IN AN ELDERLY PATIENT

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ABSTRACT

Patients with acute cerebrovascular ischemia or hemorrhage often admit to the emergency department confusion or losing consciousness; thus, it is sometimes out of the question to obtain anamnesis from them. However, ST elevation on electrocardiogram is very rare in acute cerebrovascular events. Therefore, it is difficult to make an accurate diagnosis after differential diagnosis in such cases.

The timing of the correct diagnosis plays a crucial role in the management of the patient with confusion and loss of consciousness. In this case, we present a case of massive intracranial hemorrhage (ICH) who was referred to the emergency department with loss of consciousness and had findings mimicking ST-segment elevation myocardial infarction (STEMI) on admission electrocardiogram (ECG). As the therapeutic strategy for ICH differs from STEMI, accurate and timely diagnosis of ST-segment elevation associated with intracranial hemorrhage is vital. Therefore, the clinician should take serial electrocardiograms and, if possible, should perform cerebral tomography immediately for differential diagnosis.

Keywords: Electrocardiogram, intracranial hemorrhage, ST-elevation myocardial infarction

CASE

A 81-year-old male patient without any cardiovascular risk factors or history of any disease, pre-medication, or trauma referring to the emergency department with headache, nausea, and mild confusion, had an arterial pressure of 160/100 mmHg with A Glasgow Coma Scale 13. The patient, who developed unconsciousness after vomiting, was intubated. The initial ECG revealed an ST elevation on precordial V1-V6 leads without reciprocal ST changes in inferior leads (**Figure 1**). After cardiology consultation, echocardiography revealed global hypokinesia with an ejection fraction of 40%. Among the laboratory parameters, troponin I was 3,602 ng/mL and CK-MB 55 U/L, creatinine 1.2 mg/dL, blood urea nitrogen of 32 mg/dL, a hemoglobin level of 12 K/ μ L and a platelet count of 189 K/ μ L. Because the preliminary diagnosis was an acute cerebrovascular accident, cranial computed tomography (CT) was performed first. Detecting thalamo-capsular massive intracranial hemorrhage opening into the lateral and other ventricles of the cerebrum on the cerebral CT (**Figure 2**) and ST-segment resolution with T wave inversion in the follow-up ECGs of the patient confirmed our preliminary diagnosis of ST-segment elevation associated with ICH (**Figure 3a and 3b**). Therefore, coronary angiography was not performed considering follow-up ECGs changes due to ICH. After neurosurgery and interventional radiology consultation, the bleeding was a hematoma opening into the ventricle, suggesting that there may be hypertension-related bleeding without any other vascular pathology, and cerebral angiography was not required. Control echocardiography showed a similar ejection fraction of 42% with global hypokinesia. The patient, whose intracranial hemorrhage was regressed relatively, but brain edema same on control cerebral CT on the third day, was given the optimal medical

therapy with rehabilitation support. However, he died on the fifth day of admission due to severe brain edema and respiratory failure.

DISCUSSION

There are several reasons for ST-segment elevation apart from the acute coronary syndrome. Left ventricular hypertrophy, acute pericarditis, early repolarization, acute pulmonary embolism, hypothermia, hyperkalemia, left bundle branch block, ventricular aneurysm, Brugada syndrome, antiarrhythmic drug use, or rarely intracranial hemorrhage can cause ST-segment elevation on the electrocardiogram. Electrocardiographic abnormalities such as QTc prolongation and ST/T morphological changes frequently occur after intracerebral hemorrhage, and these changes are probably related to the location of the cerebral lesion (1,2). It was suggested that neurocardiogenic effects due to increased sympathetic nervous system activity on the heart, increased catecholamine level, and coronary vasospasm may be responsible for the electrocardiographic changes observed in intracranial events, including ICH (3,4). In a comparative study, ischemic electrocardiographic changes on ECG were observed in nearly 50% of the patients with intracranial hemorrhage when patients with a history of heart disease were excluded (5). However, although ST-segment elevation can be observed on ECG in patients with cranial hemorrhage, especially subarachnoid hemorrhage (SAH), this condition is rare (4,6). Accurate and timely diagnosis of ST-segment elevation associated with intracranial hemorrhage may be vital, particularly in patients who present with unconsciousness and have ST-segment elevation on the ECG at presentation. In terms of intracranial hemorrhage, the medical treatment approach is conversely different from the treatment approach of myocardial infarction that includes dual antiplatelet drugs. It should be kept in mind that in the presence of ST-segment elevation in ICH, especially SAH, increased cardiac markers such as troponin I and reciprocal changes in ECG may be detected, thus, anticoagulant therapy should be avoided until the diagnosis is confirmed. Moreover, serial ECGs should be taken in addition to cerebral CT to confirm the differential diagnosis.

In conclusion, emergency cranial CT and serial ECGs should also be obtained in patients presenting with confusion and losing conscious, in case of ECG findings pointing to possible STEMI. ECG findings and clinical manifestation should warn the clinician about the possibility of ST-segment elevation associated with ICH, and the clinician should manage the appropriate therapy accordingly. Emergency coronary catheterization or the use of antiplatelet agents should be avoided in such patients before cerebral CT because these approaches may worsen intracranial bleeding. Instead, serial ECG recording and detection of ST/T resolutions on ECG are helpful factors in making a correct diagnosis confirming the ICH on cerebral CT.

REFERENCES

1. Liu Q, Ding Y, Yan P, Zhang JH, Lei H. Electrocardiographic abnormalities in patients with intracerebral hemorrhage. *Acta Neurochir* 2011;111: 353-6.
2. Yamour BJ, Sridharan MR, Rice JF, et al. Electrocardiographic changes in cerebrovascular hemorrhage. *Am Heart J* 1980; 99: 294-300.
3. Person AD, Brady WJ. Electrocardiographic manifestations of CNS events. *Am J Emerg Med* 2000; 18: 715-20.
4. Sommargren CE. Electrocardiographic abnormalities in patients with subarachnoid hemorrhage. *Am J Crit Care*. 2002; 11(1): 48-56.

5. Doğan A, Tunç E, Öztürk M, Erdemoğlu AK. Comparison of electrocardiographic abnormalities in patients with ischemic and hemorrhagic stroke. *Anatol J Cardiol.* 2004; 4(2): 135-40.
6. Bailey WB, Chaitman BR. Images in clinical medicine. Electrocardiographic changes in intracranial hemorrhage mimicking myocardial infarction. *N Engl J Med.* 2003; 349(6): 561.

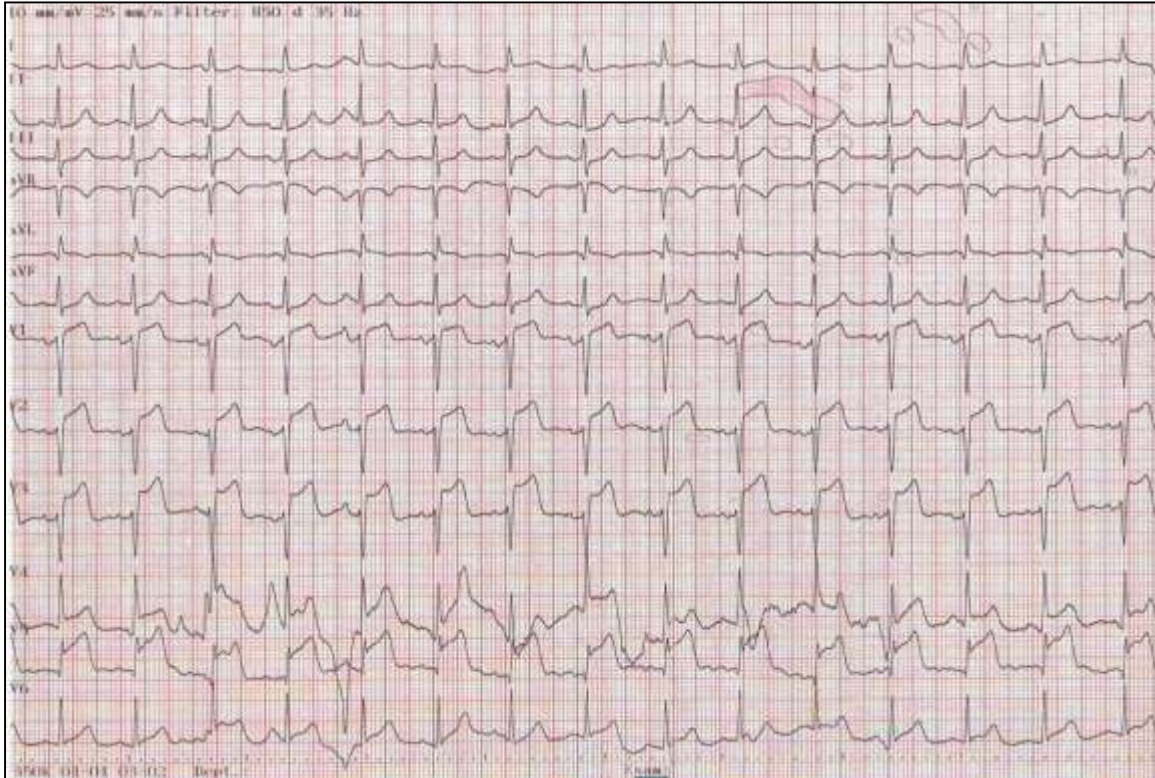


Figure 1. The initial ECG revealed an ST elevation on precordial V1-V6 leads

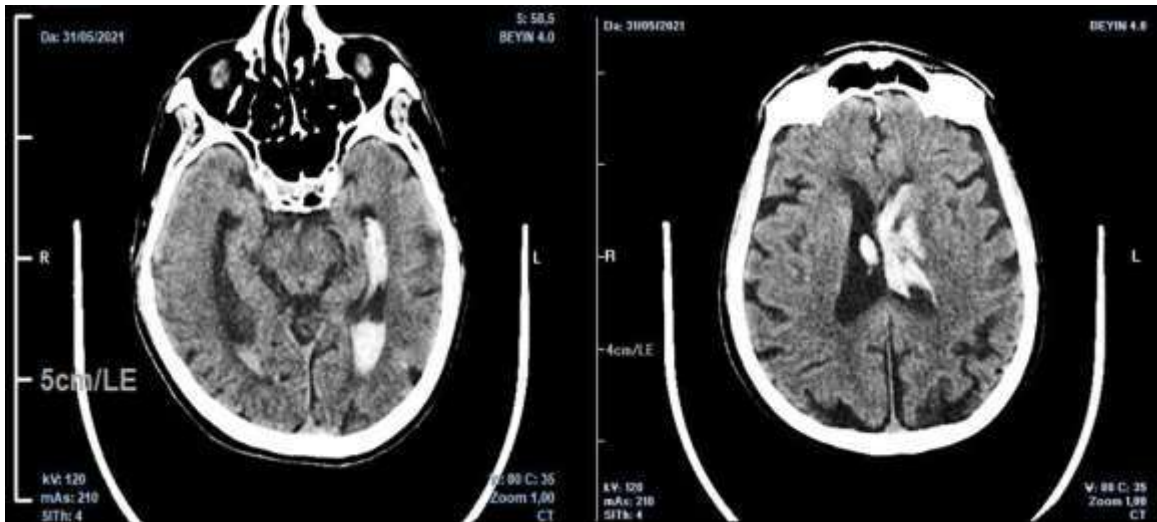


Figure 2. Thalamo-capsular massive intracranial hemorrhage opening into the lateral and the other ventricles of the cerebrum on initial cerebral CT

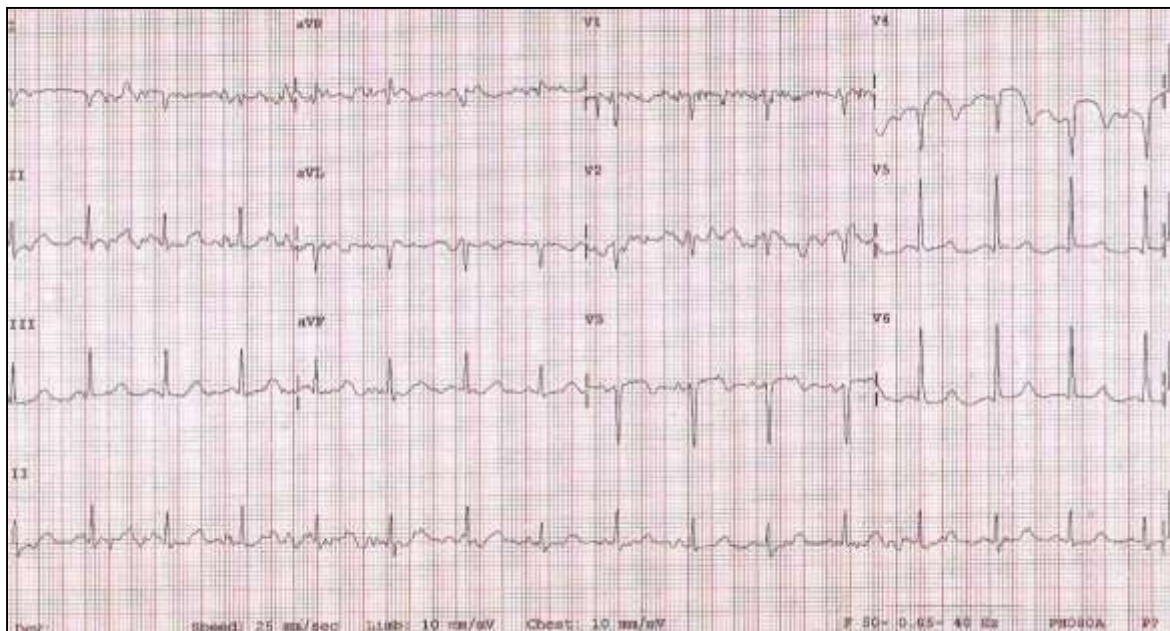


Figure 3a. ST/T wave changes at 40 minutes on follow-up ECGs on the first day of hospitalization

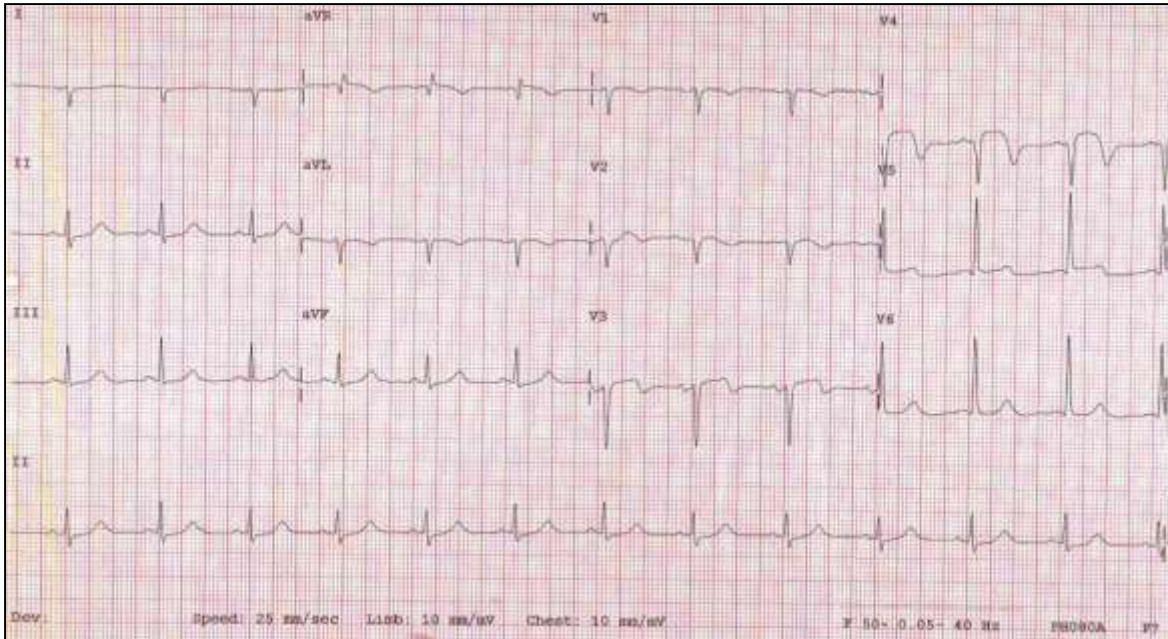


Figure 3b. ST/T wave changes at and 3rd hour on follow-up ECGs on the first day of hospitalization

ERGOTERAPİ TEMELLİ BİLİŞSEL REHABİLİTASYON MÜDAHALESİ MULTİPL SKLEROZLU BİREYLERİN BİLİŞSEL BECERİLERİNİ VE OKUPASYONEL PERFORMANSLARINI NASIL ETKİLİYOR?

HOW DOES OCCUPATIONAL THERAPY-BASED COGNITIVE REHABILITATION
INTERVENTION AFFECT THE COGNITIVE SKILLS AND OCCUPATIONAL
PERFORMANCE OF INDIVIDUALS WITH MULTIPLE SCLEROSIS?

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ÖZET

Multipl Skleroz (MS), merkezi sinir sisteminin inflamasyonu ve progresif demiyelinizasyonu ile karakterize olan kronik, otoimmün ve nörodejeneratif bir hastalıktır. Hastalığın seyrine bağlı olarak bireylerin var olan bilişsel becerileri farklı düzeylerde etkilenim göstermektedir. Bilişsel becerilerinin etkilenmesiyle birlikte bireyler günlük yaşamda okupasyonel performans zorlukları yaşamaktadır. Literatüre bakıldığında bilişsel rehabilitasyon müdahalesi sonrası bireylerin okupasyonel performanslarını inceleyen az sayıda çalışma vardır. Bu çalışmada Multipl Skleroz'lu (MS) bireylerde Ergoterapi temelli bilişsel rehabilitasyon müdahalesinin bireylerin bilişsel fonksiyonlar ve okupasyonel performans düzeylerine etkisi incelenmiştir. Çalışmaya MS tanısı almış olan, 18-65 yaş arası, Standardize Mini Mental Test'ten 24 puan ve altını alan, Genişletilmiş Özürlülük Durum Skalası'na (EDSS) göre 2-6,5 puan arası olan, hastalığının akut atak döneminde olmayan toplam 10 kişi dahil edilmiştir. Katılımcılara 3 ay boyunca haftada 3 defa ve her seans 45 dakikadan oluşacak şekilde oryantasyon, görsel algı, uzaysal algı, motor praksis, görsel motor organizasyon ve düşünme becerilerini içeren Ergoterapi temelli bilişsel rehabilitasyon müdahalesi uygulanmıştır. Bireylerin müdahale öncesi ve sonrasında bilişsel fonksiyonları değerlendirmek için Loewenstein Ergoterapi ve Kognitif Değerlendirme Skalası (LOTCA); okupasyonel performans düzeylerini değerlendirmek için Kanada Aktivite Performans Ölçümü (KAPÖ) kullanılmıştır. Bilişsel rehabilitasyon müdahalesi öncesi ve sonrası bireylerin LOTCA ve KAPÖ memnuniyet puanlarında istatistiksel olarak anlamlı iyileşmeler görülmüştür ($p<0,05$). Sonuç olarak MS'li bireylerde Ergoterapi temelli bilişsel rehabilitasyon müdahalesinin bireylerin bilişsel becerilerini geliştirmenin yanı sıra günlük yaşamdaki okupasyonel performans memnuniyet düzeylerine olumlu bir etkisinin olduğu görülmüştür. Bu doğrultuda bilişsel rehabilitasyon müdahalesinin etkinliği için daha fazla örneklem sayısı, randomize kontrollü ve uzun süreli takip çalışmaları gereklidir.

Anahtar Kelimeler: Multipl Skleroz; Bilişsel rehabilitasyon; Ergoterapi.

ABSTRACT

Multiple Sclerosis (MS) is a chronic, autoimmune and neurodegenerative disease characterized by inflammation and progressive demyelization of the central nervous system. Depending on

the course of the disease, the existing cognitive skills of individuals are affected at different levels. As their cognitive skills are affected, individuals have occupational performance difficulties in daily life. Looking at the literature, there are few studies examining the occupational performance of individuals after cognitive rehabilitation intervention. In this study, the effect of occupational therapy-based cognitive rehabilitation intervention on individuals with Multiple Sclerosis (MS) on cognitive functions and occupational performance levels were investigated. A total of 10 patients who diagnosed with MS, aged 18-65, scored 24 or less on the Standardized Mini Mental Test, scored between 2 and 6.5 according to the Extended Disability Status Scale (EDSS), were not in the acute attack phase of their disease were included. Occupational therapy-based cognitive rehabilitation intervention, including orientation, visual perception, spatial perception, motor praxis, visual motor organization and thinking skills, was applied to the participants 3 times a week for 3 months and each session consisted of 45 minutes. Loewenstein Occupational Therapy and Cognitive Assessment (LOTCA) to evaluate cognitive functions of individuals before and after the intervention; Canadian Occupational Performance Measurement (COPM) was used to assess occupational performance levels. Statistically significant improvements were observed in the LOTCA and COPM satisfaction scores of individuals before and after the cognitive rehabilitation intervention ($p<0.05$). As a result, it has been observed that occupational therapy-based cognitive rehabilitation intervention in individuals with MS has a positive effect on satisfaction levels of occupational performance in daily life, as well as improving the cognitive skills of individuals. Accordingly, larger sample size, randomized controlled and long-term follow-up studies are required for the effectiveness of cognitive rehabilitation intervention.

Keywords: Multiple Sclerosis; Cognitive rehabilitation; Occupational therapy.

1.GİRİŞ

Multipl Skleroz (MS), merkezi sinir sisteminin inflamasyonu ve progresif demiyelinizasyonu ile karakterize olan kronik, otoimmün ve nörodejeneratif bir hastalıktır (Rilo ve diğerleri, 2018). Miyelin kılıf hasarı sonucu sinir iletimi kesintiye uğramasıyla etkilenen bölgeye göre motor, duysal, görsel, psikolojik, ağrı, otonomik ve bilişsel gibi farklı klinik belirtiler ortaya çıkmaktadır (Kalmar, Gaudino, Moore, Halper ve Deluca, 2008; Victor, Ropper ve Adams, 2001; Fisk, Pontefract, Ritvo, Archibald ve Murray, 1994). MS’te bilişsel bozuklukların görülme sıklığı % 43 ile % 65 arasında değişmektedir (Rao, Leo, Bernardin ve Unverzagt, 1991; Lyon-Caen, Jouvent ve Hauser, 1986). Hastalarda en çok etkilenen bilişsel işlevler; bellek, dikkat, bilgi işleme, bilgi işlem hızı ve yürütücü işlevler olarak belirlenmiştir (Guimarães ve Sá, 2012). Okupasyonel performans, kültürel olarak tanımlanmış, kişinin yaşı ve kendisiyle uyumlu ve anlamlı olan günlük yaşam aktiviteleri seçme, organize etme ve bunları yapma yeteneğidir (American Occupational Therapy Association, 2020). Yapılan bir çalışmada bilişsel problemlere sahip olan MS’li bireylerin serbest zaman ve üretkenlik aktivitelerine katılmasında zorluk çektiği tespit edilmiştir (Rao ve diğerleri, 1991). Bireylerin bilişsel problemlerinin günlük yaşam aktiviteleri üzerindeki etkisini azaltmak için rehabilitasyon yaklaşımları kullanılması gerekmektedir (Kesselring ve Beer, 2005). Ergoterapi alanında da kullanılan bu yaklaşımlar, bilişsel problemlerin bireylerin günlük yaşamları üzerindeki etkilerini azaltmaktadır. (Bagert, Camplair ve Bourdette, 2002; Amato, Portaccio ve Zipoli, 2006). Bugüne kadar, MS’li bireyler için, bilişsel problemlerin etkilerini azaltan, günlük yaşam aktivitelerindeki bağımsızlığı artıran az sayıda müdahale gerçekleştirilmiştir (Rosti-Otajärvi & Hämäläinen, 2014). Bu doğrultuda çalışmanın amacı ergoterapi temelli bilişsel rehabilitasyon müdahalesinin MS’li bireylerin bilişsel fonksiyonlarını ve okupasyonel performanslarını nasıl etkilediğini incelemektir.

2.GEREÇ VE YÖNTEM

Çalışmaya Multipl Skleroz tanısı almış, 18-65 yaşları arası, Genişletilmiş Özürlülük Durum Skalasına (EDSS) göre 2-6,5 arasında puan almış olan, Mini Mental Durum Testi'nden 24 puan ve altını almış olan ve akut atak döneminde olmayan toplam 10 birey dahil edilmiştir.

2.1.Veri Toplama Araçları

Sosyodemografik Bilgi Formu

Bireylerden değerlendirme öncesinde alınan bilgiler kaydedilmiştir. Bu bilgiler içerisinde yaş, cinsiyet, medeni durum, çalışma durumu, eğitim durumuna dair bilgiler yer almıştır.

Genişletilmiş Özürlülük Durum Skalası (EDSS)

Piramidal fonksiyonlar, serebellar fonksiyonlar, beyin sapı fonksiyonları, duyuusal fonksiyonlar, mesane-bağırsak fonksiyonları, görsel fonksiyonlar, serebral/mental fonksiyonlar ve diğer fonksiyonları içeren sekiz kategoriden oluşur. 0 (normal)' dan 10(MS'e bağlı ölüm)'a kadar dereceleri vardır (Kurtzke, 1983).

LOTCA (Loewenstein Occupational Therapy Cognitive Assessment)

Oryantasyon, görsel algılama, görsel motor organizasyon, düşünme yeteneği, dikkat basamaklarını içermektedir. Sonucu her bir alt test için ve toplamda alınan puanlar değerlendirilerek hesaplanır (Itzkovich, Elazar, Averbuch, Katz ve Rahmani, 1993).

KAPÖ(Kanada Aktivite Performans Ölçümü)

KAPÖ bireyin aktivite performans problemlerini belirlemek, performans ve memnuniyeti düzeylerini ölçmek için kullanılan bir araçtır (Law, Baptiste, McColl, Opzoomer, Polatajko ve Pollock, 1990). Türkçe geçerlilik ve güvenilirlik çalışması MS'li bireylerle yapılmıştır (Torpil, Ekici-Çağlar ve Bumin, 2017).

2.2.Müdahale

Çalışmaya katılan 10 kişiye haftada 3 kez, 45 dakikadan oluşan seanslarla ergoterapi temelli bilişsel rehabilitasyon müdahalesi uygulanıp bireyler müdahale öncesinde ve sonrasında değerlendirilmiştir. Müdahale programı oluşturulurken müdahale öncesinde yapılan değerlendirmeler ve KAPÖ ile belirlenen günlük yaşam aktiviteleri ışığında bilişsel işlevlerindeki problemler tespit edilmiştir. Aktivitelerin bilişsel gereklilikleri olan dikkat, hafıza, oryantasyon, görsel algı, hesaplama alanlarına yönelik bilişsel terapi programı oluşturulmuştur. Müdahaleler iç içe geçmiş şekilleri tanıma, resimler arası farkları bulma, 2 ve 3 boyutlu model dizaynı, kompleks şemadaki istenen sayıyı ya da şekli bulma, örüntü tamamlama, iz sürme, çivili tahta üzerinde istenilen şekli oluşturma, karışık kartlardan hikaye oluşturma, yapboz oluşturma, ATM simülasyonu oluşturup istenen paranın çekilmesi, haritadan istenen yeri tarif etme ve geri çağırılması, market broşüründen istenilen ürünlerin bütçeye göre hesaplanıp uygun yemek içeriğinin yapılması, sesli olarak okunan metinlerdeki istenilen harfleri duyunca uyarma, hafıza kartlarıyla eşleştirme, renkli kartları isme ve renge göre sıralama, seans başlarında söylenen kelimelerin geri çağırılması gibi çalışmalar bireysel olarak uygulanmıştır. Seanslar sırasında aktivitenin derecelendirilmesi, daha izole bir ortamın kullanılması, renkli objeler ya da zıt renklerin kullanılması, motivasyonel destek, ipuçları, feedbackler ve zincirleme teknikleri kullanılarak düzenli olarak tekrar edilmiştir. Ayrıca kompansatuar stratejilerden olan takvim, alarm, günlük planlayıcı, ilaç hatırlatıcı, anı defteri, akıllı telefon uygulamaları ve haritalardan yararlanılmıştır.

3.BULGULAR

Bireylerin yaş ortalaması $45,7 \pm 5,7$ yıl, EDSS skoru ise $2,5 \pm 1,25$ puan olarak hesaplanmıştır. Bireylerin müdahale öncesi ve sonrası LOTCA puanları arasında istatistiksel olarak anlamlı bir farklılık bulunmaktadır ($p < 0,05$) (Tablo 1).

Tablo 1. LOTCA değerlendirmesinin tedavi öncesi ve sonrası puanlarının sonuçları

	Öncesi		Sonrası		p
	Ort.±S.S.	Medyan	Ort.±S.S.	Medyan	
LOTCA	62,6±4,97	61	64,5±4,68	63,5	0,012

Bireylerin günlük yaşamda zorluk yaşadığı okupasyonlar Tablo 2’de belirtilmiştir.

Tablo 2. Bireylerin KAPÖ’ye göre zorlandığı okupasyonlar

Performans Alanları	Aktiviteler	N	%
Kendine Bakım			
	Düzenli ilaç kullanma	3	15
	Makyaj yapma	2	10
	Araba kullanma	2	10
	Bisiklet kullanma	1	5
	Toplu taşıma kullanma	1	5
	Tıraş olma	1	5
	Pantolon giyme	1	5
	Ayakkabı bağlama	1	5
	Saç tarama	1	5
	Saç boyama	1	5
	Tırnak kesme	1	5
	Eşarp bağlama	1	5
	Oje sürme	1	5
İş ve Üretkenlik			
	Markette ürün seçme	4	20
	Para hesabı	4	20
	Yemek hazırlama	3	15
	Çamaşır yıkama	2	10
	Ev süpürme	2	10
	Sofra hazırlama	2	10
	Örgü örme	1	5
	Bilgisayar kullanma	1	5
	Çay koyma	1	5
	Bulaşık yıkama	1	5
	Yazı yazma	1	5
	Kıyafet katlama	1	5
Serbest Zaman			
	Telefon kullanma	5	25
	Arkadaşlarla buluşma	3	15
	Kitap okuma	2	10

Bitki yetiştirme	2	10
Tavla oynama	1	5
Resim yapma	1	5
Sinemaya gitme	1	5
Hayvan besleme	1	5

Bireylerin müdahale sonrası KAPÖ performans ve memnuniyet puanlarında istatistiksel olarak anlamlı bir farklılık bulunmaktadır ($p < 0,05$) (Tablo 3).

Tablo 3. KAPÖ değerlendirmesinin tedavi öncesi ve sonrası puanlarının sonuçları

	Öncesi		Sonrası		p
	Ort.±S.S.	Medyan	Ort.±S.S.	Medyan	
KAPÖ Performans	2,76±0,76	2,6	5,3±0,66	5,4	0,01
KAPÖ Memnuniyet	4,52±0,72	3,6	6,33±0,72	5,45	0,01

4. TARTIŞMA

Çalışmada MS'li bireylere uygulanan ergoterapi temelli bilişsel rehabilitasyonun bilişsel fonksiyonlara ve okupasyonel performans düzeylerine etkisinin incelendiği çalışmada uygulanan müdahalenin; bireylerin genel olarak bilişsel fonksiyonlarının arttığı ve okupasyonel performans düzeylerine olumlu bir etkisinin olduğu belirlenmiştir.

Çalışmanın önemli bir sonucu olarak bilişsel rehabilitasyon sonrasında bireylerin bilişsel fonksiyonlarından en fazla dikkat komponentinde iyileşme görülmüştür. Benzer olarak yapılan bir çalışmada bireylere 3 ay boyunca haftada üç kez dikkat ve yürütücü işlevlere yönelik bilişsel rehabilitasyon programı uygulanmıştır. Çalışma sonucunda bireylerin bilişsel fonksiyonlarından en fazla dikkat düzeylerinde anlamlı iyileşmeler elde edilmiştir (Mattioli, Stampatori, Zanotti, Parrinello ve Capra 2010). Çalışmada bireylerin bilişsel durumlarını değerlendirmek için LOTCA ölçeği uygulanmıştır. LOTCA ölçeği daha kapsamlı bir şekilde bilişsel durumu değerlendirirken ayrıca bireyin günlük yaşam aktivitelerindeki performans düzeyini belirlemek için daha uygun bir ölçektir. Ayrıca literatürde LOTCA ölçeğinin bilişsel durum değerlendirmesinde kullanılmasına az rastlanılmaktadır. Çalışmada uygulanan müdahale sonrası bilişsel fonksiyonlar açısından ayrıntılı olarak görsel algılama, görsel motor organizasyon ve düşünme yeteneği ve dikkat alt başlıklarında anlamlı iyileşmeler görülürken oryantasyon alt basamağında bir iyileşme görülmemiştir.

Çalışmanın bir diğer önemli bulgusu uygulanan bilişsel rehabilitasyon müdahalesi sonrası bireylerin okupasyonel performans düzeylerinde anlamlı iyileşmeler görülmesidir. KAPÖ ile belirlenen günlük yaşam aktivitelerindeki problemlerin temelinde bilişsel fonksiyonların yatması göze çarpmıştır. Uygulanan bilişsel rehabilitasyon müdahalesi sonucunda bireylerin genel olarak KAPÖ performans ve memnuniyet puanlarının arttığı belirlenmiştir. Çalışmaya paralel olarak yapılan bir çalışmada fonksiyonel aktivitelerdeki öğrenme ve hafıza komponentleri ile ilgili 20 kişiye müdahale uygulanmıştır. Bireylerin günlük yaşam aktivitelerindeki performanslarında, bilgiyi öğrenme ve geri çağırmasında anlamlı bir iyileşme kaydettiğini öne sürmüştür (Goverover, Chiaravallotti ve Deluca, 2008).

Bu çalışmanın bir limitasyonu ise bireylerin seanslara erişimde problem yaşanması olarak belirlenmiştir. Seansların kış aylarında gerçekleştirilmesinden ve olumsuz hava koşullarından dolayı hizmete erişim açısından zorluk yaşanmaktaydı. Bu sebeple planlanan terapi günlerinin dışına çıkılarak farklı günlerde telafinin yapılmasından dolayı zaman zaman genel programın yoğunlaşması ve aksaması durumu yaşanmıştır. Diğer bir limitasyon ise bazı bireylerin akut dönemde olmamasına rağmen kullandığı ilaçlardan dolayı birkaç seansta halsizlik, isteksizlik ve dikkat dağınıklığı göze çarpılmaktaydı.

Sonuç olarak literatürde ergoterapi açısından bilişsel rehabilitasyon ve MS popülasyonu ile ilgili çalışmalara az rastlanılmaktadır. Bu çalışmayla birlikte MS'li bireylerde bilişsel rehabilitasyonun bilişsel fonksiyonlar ve okupasyonel performansta öneminin büyük olduğu ve bilişsel problemi olan MS'li bireylerin ergoterapi programlarında daha büyük bir yer alması gerektiği düşünülmektedir.

KAYNAKLAR

1. Amato MP, Portaccio E, Zipoli V. (2006). Are there protective treatments for cognitive decline in MS? *J Neurol Sci.*;245(1-2):183-6.
2. American Occupational Therapy Association. (2020). *Occupational Therapy Practice Framework: Domain Et Process.*
3. Bagert B, Camplair P, Bourdette D. (2002). Cognitive dysfunction in multiple sclerosis: natural history, pathophysiology and management. *CNS Drugs*, 16(7):445-455.
4. Fisk JD., Pontefract A., Ritvo PG., Archibald CJ., Murray TJ. (1994). The Impact of Fatigue on Patients with Multiple Sclerosis. *The Canadian Journal of Neurological Sciences.*;21:9-14.
5. Goverover Y, Chiaravalloti Nd, DeLuca J. (2008). Self-generation to improve learning and memory of functional activities in persons with multiple sclerosis: meal preparation and managing finances. *Arch Phys Med Rehabil*;89:1514–1521.
6. Guimarães, J., Sá, M.J. (2012). Cognitive dysfunction in multiple sclerosis. *Front. Neurol.*;3, 74.
7. Itzkovich, M., Elazar, B., Averbuch, S., Katz, N., Rahmani, L., (1993). LOTCA Loewenstein Occupational Therapy Cognitive Assessment: Maddac Inc.
8. Kalmar JH, Gaudino EA, Moore NB, Halper J, Deluca J. (2008). The relationship between cognitive deficits and everyday functional activities in multiple sclerosis. *Neuropsychology*; 22: 442-49.
9. Kesselring J, Beer S. (2005). Symptomatic therapy and neurorehabilitation in multiple sclerosis. *Lancet Neurol.*;4(10):643-52.
10. Kurtzke JF. (1983). Rating neurologic impairment in multiple sclerosis: an Expanded Disability Status Scale (EDSS). *Neurology*;33(11): 1444– 52.
11. Law, M., Baptiste, S., McColl, M., Opzoomer, A., Polatajko, H., Pollock, N. (1990). The Canadian occupational performance measure: an outcome measure for occupational therapy. *Canadian Journal of Occupational Therapy*, 57(2), 82-87.
12. Lyon-Caen O, Jouvent R., Hauser S. (1986). Cognitive Function in Recent-Onset Demyelinating Diseases. *Arch Neurol*;43(11):1138-1141.



13. Mattioli F, Stampatori C, Zanotti D, Parrinello G, Capra R. (2010). Efficacy and specificity of intensive cognitive rehabilitation of attention and executive functions in multiple sclerosis. *J Neurol Sci.*;288(1-2):101-105.
14. Rao SM, Leo GJ, Bernardin L, Unverzagt F. (1991). Cognitive dysfunction in multiple sclerosis. I. Frequency, patterns, and prediction. *Neurology*;41:685-91.
15. Rilo O, Peña J, Ojeda N, Rodríguez-Antigüedad A, Mendibe-Bilbao M, Gómez-Gastiasoro A, DeLuca J, Chiaravalloti N, Ibarretxe-Bilbao N. (2018). Integrative group-based cognitive rehabilitation efficacy in multiple sclerosis: a randomized clinical trial. *Disability and Rehabilitation.* 40:2, 208-216.
16. Rosti-Otajärvi, E. M., & Hämäläinen, P. I. (2014). Neuropsychological rehabilitation for multiple sclerosis. *The Cochrane database of systematic reviews*, (2), CD009131.
17. Torpil, B. Ekici-Gamze Ç., Bumin G. (2017). Multipl Skleroz'lu Bireylerde Kanada Aktivite Performans Ölçümü'nün Türkçe Kültürel Adaptasyonu, Geçerlilik ve Güvenilirliği.
18. Victor M., Ropper AH., Adams RD. (2001). *Adams & Victor's Principles Of Neurology* 7th edition. United States:Mcgraw-Hill Companies.

İNSANİ BİR KRİZ OLARAK KORONAVİRÜS SALGINININ ORTAYA ÇIKIŞI İNSAN KAYNAKLARI YÖNETİMİNDEKİ KÖTÜYE GİDİŞİ DURDURABİLİR Mİ?

CAN THE EMERGENCE OF THE CORONAVIRUS OUTBREAK AS A
HUMANITARIAN CRISIS STOP THE ABUSE IN HUMAN RESOURCES
MANAGEMENT?

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ÖZET

2020 yılının ilk aylarında şiddetli solunum yetmezliğine sebep olan Covid-19 bulaşıcı hastalığı iş dünyasında köklü değişikliklere sebep olmuştur. Hem tüketiciler hem de işletmeler virüse yakalanma ihtimaline karşı tutum ve alışkanlıklarını değiştirmeye başladıkça milyonlarca çalışan işini kaybetmiştir. İşletmeler 21.yüzyıl dünyasında her ne kadar rekabet edebilmek için mekanik yapıdan organik bir yapıya geçmiş olsalar da böylesine uzun soluklu bir kaosa hazırlıklı değillerdi. 21.yüzyıl yönetim biliminin paradigmaları daha ilk çeyreğini tamamlamadan ilk kez yaşanan insani bir krizde tökezlemiş ve artık geleneksel olarak adlandırılabilen yönetim metotlarının bu yüzyılda sürdürülebilirliğini yitireceğinden kuşku kalmamıştır. Milyonlarca çalışan iş yeri koşullarını evlerine taşıyarak çalışma şekillerini kökten değiştirmiştir. Diğer taraftan çalışma koşullarını ev ortamına taşıyamayan kişilerse salgınla burun buruna yaşama zorunluluğuyla hayatlarını devam ettirmek durumunda kalmıştır. Geleneksel insan kaynakları yönetimi teorisyenleri ve uygulayıcıları salgının neden olduğu maliyetleri çalışma hayatına adaletsiz bir şekilde dağıttığını anlamak ve bu gerçeğe yüzleşmek mecburiyetindedir. Koronavirüs pandemisinin olumsuz sosyoekonomik sonuçlarının sorumluluğunu sadece insan kaynakları yönetimi uygulamalarına yüklemek çok da doğru olmayacaktır. Halkın refahından sorumlu devlet yöneticilerinin yetersiz öngörüye sahip olmaları ve kaliteli politika üretmemeleri virüsle alakalı tıbbi bilimsel çalışmalarla ters orantılı olduğu ortadadır. Ancak insan kaynakları yönetimi (İKY) ile ilgilenen, öğreten ve uygulayanlar için bu insani krizden ders çıkarmamak ve yenilikler için çabalamamak kötü olan durumun gelecekte daha da kötüleşmesine katkıda bulunacaktır. İnsan kaynakları yöntemi 1980'lerden beri süregelen paradigma değişiklikleriyle çalışan refahından, verimlilikten ve disiplinden öteye geçerek daha hayati bir işletme işlevi haline dönüşmüştür. İnsan kaynakları yönetimi artık operasyonel mükemmelleşmeyle de ilgilenmektedir. Bürokrasinin ve prosedürlerin insan kaynakları yönetiminin işlev hızını yavaşlattığı da bir gerçektir. Yapay zeka teknolojisinin sosyal ve ekonomik değişimler üzerindeki etkileri üzerine yapılan çalışmalar Koronavirüs salgınıyla ilgili araştırmaların seyrini değiştirmiştir. Bu değişim insan kaynakları yönetimi için yapılan işin ve yapma biçiminin yeniden gözden geçirilmesi için adeta bir fırsat olduğu söylenebilir. Fırsatı kaçırmamak adına insanın yeniden işletmenin bir fonksiyonu olan insan kaynağı yönetimine geri döndürülmesi gerekliliğinin altı çizilmelidir. Zira Covid-19'un etkisi kalıcı olacaktır. Bugün artık Koronavirüs salgınından etkilenmeyen bir organizasyon ya da kimse kalmamıştır. Salgın sürecinde örgütlerin uyguladığı insan kaynakları yönetimi metotları

ve bu İKY uygulamalarının Koronavirüs salgınına cevap verebilirliğinin araştırılması çok acil öneme sahiptir. Bu çalışmanın amacı; salgının işgücü piyasasında ortaya çıkardığı derin eşitsizlikleri araştırmak ve geleneksel insan kaynakları yönetimi uygulamalarının distopik bir hayat düzenine neden olduğunu savunmaktır.

Anahtar Kelimeler: Salgın hastalık, İnsan Kaynakları, Paradigma değişikliği.

ABSTRACT

The Covid-19 contagious disease, which caused severe respiratory failure, has caused radical changes in the business world in the early months of 2020. Millions of employees have lost their jobs as both consumers and businesses begin to change their attitudes and habits towards the possibility of contracting the virus. Although businesses had switched from a mechanical structure to an organic structure in order to compete in the 21st century world, they were not prepared for such a long-term chaos. The paradigms of the 21st century management science have stumbled upon a humanitarian crisis for the first time of their meeting before completing its first quarter. And there is no doubt that the management methods that can be called as traditional and that methods will lose their sustainability in the 22nd century. Millions of employees have radically changed the way they work by moving workplace conditions to their homes. On the other hand people who could not bring their working conditions to the home had to continue their lives living face to face with the epidemic. Traditional human resource management theorists and practitioners are obliged to realize that the epidemic has unfairly distributed the costs to working life and they have to face with this reality. It would not be right to blame only human management practices for the negative socio-economic consequences of the coronavirus pandemic. It is obvious that the insufficient foresight of the state administrators responsible for the welfare of the people and their inability to produce quality policies are inversely proportional to the number of scientific publications related to the virus. However, for those who are interested in teaching and practicing HRM, not learning from this humanitarian crisis and not striving for innovations will contribute to the worsening of this bad situation in the future. Human resources management has transformed into a more vital business function by going beyond employee's welfare, productivity and discipline with the ongoing paradigm changes since the 1980s. HRM is now also concerned with operational excellence. It is also a fact that bureaucracy and procedures slow down the rate of function of HRM. Studies on the effects of artificial intelligence technology on social, economic and social changes have changed the route of the studies with the coronavirus epidemic. It can be said that this change is almost an opportunity to reconsider the work that is done and the way of doing it for HRM. In order not to miss the opportunity, it should be underlined that the human being should be returned to human resource management, which is a function of the business. Because the effect of Covid-19 will be permanent. Today, there is no organization or person left unaffected by the coronavirus epidemic. It is very urgent to investigate the human resource management methods applied by organizations during the epidemic process and the responsiveness of these HRM practices to the coronavirus epidemic. The aim of this study; to investigate the deep inequalities caused by the epidemic in the labor market and to argue that traditional HRM practices cause a dystopian life order.

Keywords: Epidemic, Human Resources, Paradigm change.

GİRİŞ

2020 yılına girdikten birkaç ay içinde şiddetli solunum yetmezliğine sebep olan Covid-19 bulaşıcı hastalığı iş dünyasında köklü değişikliklere sebep olmuştur. Hem tüketiciler hem de

işletmeler virüse yakalanma ihtimaline karşı tutum ve alışkanlıklarını değiştirmeye başladıkça milyonlarca çalışan işini kaybetmiştir. İşletmeler 21.yüzyıl dünyasında her ne kadar rekabet edebilmek için mekanik yapıdan organik bir yapıya geçmiş durumdalar diyse da böylesine uzun soluklu bir kaosa hazırlıklı değillerdi. 21.yüzyıl yönetim biliminin paradigmaları daha ilk çeyreğini tamamlamadan ilk kez yaşanan bir insani krizde tökezlemiş ve artık geleneksel olarak adlandırılabilir yönetim metotlarının 22.yüzyılda sürdürülebilirliğini yitireceğinden kuşku kalmamıştır.

Milyonlarca çalışan iş yeri koşullarını evlerine taşıyarak çalışma şekillerini kökten değiştirmiştir. Diğer taraftan çalışma koşullarını ev ortamına taşıyamayan kişilerse salgınla burun buruna yaşama zorunluluğuyla hayatlarını devam ettirmek durumunda kalmıştır. Geleneksel insan kaynakları yönetimi teorisyenleri ve uygulayıcıları salgının neden olduğu maliyetleri çalışma hayatına adaletsiz bir şekilde dağıttığını idrak etmekle mükellef olmakla beraber bu gerçekle yüzleşmek mecburiyetindedir.

Koronavirüs pandemisinin olumsuz sosyoekonomik sonuçlarının sorumluluğunu sadece insan yönetimi uygulamalarına yüklemek çok da doğru olmayacaktır. Zira politika yapıcılarının zayıf muhakemesi (Valizade et al., 2021), virüsün yayılma ve bilimsel araştırma sayılarının hızlarıyla ters orantılı olarak halk sağlığından sorumlu yöneticilerin yavaş hareket etmeleri de diğer önemli faktörler arasındadır. Ancak İKY ile ilgilenen, öğreten ve uygulayanlar için bu insani krizden ders çıkarmamak ve yenilikler için çabalamamak kötü olan durumun gelecekte daha da kötüleşmesine katkıda bulunacaktır.

İKY teorisinin iş yerinde verimlilik adı altında dayattığı bazı yönleri (Atinkson, 1984; Lepak ve Snell, 1999) ekonomik eşitsizliklere yol açan ve emeği değersizleştiren hatta emeğin metalaşmasını yasal hale getiren siyasi ve ekonomik güçler için bir mekanizma olarak hareket etmektedir. Homoekonomikus insan tipi insan kaynağının yönetiminde de ahlaki değerlerden uzaklaşmaya katkıda bulunmuştur (Dundon ve Rafferty, 2018, Quade ve diğerleri, 2020). Homoekonomikus insan tipinin diğer bir ifadeyle bireyciliğin zemin oluşturduğu eşit olmayan maliyet ve kar paylaşımı Koronavirüs salgını tarafından gün yüzüne çıkmıştır.

GELENEKSEL İKY VE EKONOMİK EŞİTSİZLİK

Gelişmiş ülkelerin gelir dağılımındaki eşitsizlik 1970'lerin sonundan itibaren artmış ve bugün tarihinin en yüksek seviyelerine çıkmıştır (A. B. Atkinson, 2015). Dünyadaki toplam iş gücünün iki katına çıkmasına neden olan finansal küreselleşme ve rutin işlerin sayısını azaltan teknolojik değişiklikler nedeniyle sendikalarla pazarlık gücünün zayıflamış, firmaların yönetim ve kontrolündeki değişiklikler eşitsizliğin temelini oluşturmuştur.

Son 25 yılda meydana gelen İKY metotlarındaki farklılaşmalar eşit olmayan kar ve zarar ortaklığıyla da tabir edilebilecek yönelimi artırmıştır (Willman ve Pepper, 2020). Atkinson'un esnek firma ve Lepak'in insan kaynakları mimari modelleri bunlardan bazılarıdır.

Atkinson esnek firma modelinde çalışanlar arasında ayırım yaparken çizdiği ayrı ayrı dairelere vasıflı, yarı-vasıflı ve vasıfsız işçileri kategorilendirirken acımasızca davranmış merkez dairedaki sınıf dışındaki çalışanları adeta doğadaki herhangi bir madde yerine koyarak, deyim yerindeyse kullanıldıktan sonraki hayatlarını hiçe saymıştır.

İK mimari modelinin mantığı işgücünün önemli bir kısmı taşeronlaştırılırsa işçiler işlerini daha iyi yapacakları üzerine kurgulanmıştır. Modele göre; iş arzı çoksa düşük ücretli, süreli sözleşmeli, düşük ücretli, az iş güveline sahip, az eğitilmiş kişilerce yerine getirilen görevler daha işlemsel hale gelir. Kısacası İK mimari modeli etkinliğe ve etkililiğe odaklanmaktadır. Gerçek şudur ki işlemsel metotlarla uzun vadeli stratejiler gerçekleştirilemez. ABD

şirketlerinde çalışan işçilerin neredeyse yarısı çalıştıkları şirketin çalışanı değildir (Cappelli, 2020).

Bu iki uygulamanın temel hedefi olan emeğin maddeleştirilmesi İK fonksiyonun emeğin maddeleşmesine hizmet ettiği ve meşrulaştırdığı gerçeğidir (B. Kaufman, 2015). Teoriler, eşitsizliği teşvik eden yönetsel yöntemlere düşüngen dayanak olmuş ve örgütlerin verimli olarak kabul edilmesi için emeği metalaştırmanın gerekliliğini yasallaştırmıştır (Spencer, 2020).

ÇALIŞMA HAYATINDAKİ EŞİTSİZLİK VE KORONAVİRÜS'LE İMTİHAN

Dünya Sağlık Örgütü ülkelere salgının önüne geçmek ve kontrol altında tutmak amacıyla test yapmalarını önermiştir. Virüslü kimseleri tespit ederek izole edilmesi uyarısında bulunmuştur. Politika yapımcıların büyük çoğunluğu DSÖ'nün uyarısına uyma noktasında tökezlemiş hemen harekete geçme kabiliyeti gösterememiştir. Netice itibarıyla neredeyse tüm sosyal ve ekonomik faaliyetler yasaklanarak “evde kal” emri çıkarılmıştır.

“evde kalma”nın etkisi çabuk görülmüş; işsizlik artmış, evde çalışma programları oluşturulmuş ve bazı işçiler kısa süreli çalışma uygulamasında istihdam edilmiş, devletlerin kısmi destekleriyle hayatta kalmaya çalışan işler olmuştur. Evden çalışmaya geçilince maaşlarında kesinti ve iş kaybı yaşayanlar arasında da eşitsizlikler gözlemlenmiştir.

Esnek firma ve İK mimari modellerinin benimsendiği politikalara sahip gelişmiş ülkelerden Birleşik Krallık ve Amerika Birleşik Devletleri'nde Nisan 2020'de işçilerin yaklaşık % 20'si işten çıkarılmıştır. İşçinin yaptığı görevlerin % 40'ından daha azının evde tamamlanabileceği bir iş yapması işten çıkarılacağına göstermiştir (Adams-Prassl ve diğerleri, 2020).

Evden çalışmayan işçilere, geçici sözleşmeli işçi ünvanlandırması yoluyla tipik olarak tek kullanımlık mal muamelesi yapılmıştır. Çalışma saatlerinde esnek olmaları beklenen işçilerin de gelir kaybı yaşama olasılığı daha da artmıştır (Adams - Prassl ve diğerleri, 2020). Almanya'da, işten çıkarmaya alternatif olarak çalışma süresini kısaltmaya yönelik uzun süredir devam eden düzenlemeler işten çıkarmaları azaltırken evden çalışmayan işçilerin çok daha düşük bir kısmının işlerini kaybetmesini sağlamıştır (Adams - Prassl ve ark. , 2020). Pandemi öncesi daha fazla sendikalaşmaya sahip ülkeler pandemiden etkilenen işçilere daha fazla gelir desteği sağlamıştır (Valizade ve diğerleri, 2021).

İKY'DEKİ EŞİTSİZLİKLER

Bir çok ekonomik faaliyetin pandemi nedeniyle ara verildiği bir dönemde düşük ücretli işçiler normal olarak çalışmaya devam etmektedirler. Bu kesim; gıda üretimi, satışı, dağıtım yapanlar, sağlık dünyasındaki ve bakım evlerindeki yardımcı personel, güvenlik güçleri ve ulaşım faaliyetlerini gerçekleştiren işçilerdir. Bu çalışanların düşük piyasa değerine karşılık topluma sağladığı fayda onlarca kat yüksektir. Bu farklılıkları yaratan İKY uygulamalarının günümüzde kabul edilebilir olup olmadığı tartışılmalıdır (Winton ve Howcroft, 2020).

Postpandemik dünyada toplumların gözden geçirmesi gereken pek çok sorun vardır. Sosyal adalet bağlamında önemli bir konu da şudur; normal olarak çalışmaya devam etmek zorunda olan işçilerin Koronavirüs sebebiyle hastalanma ve ölme olasılıkları diğer çalışma çağındakilere olan oranları hiç hesaba katılmış mıdır?

İK politikaları sayesinde işverenlerin sorumlu davranmayı düşünmedikleri gibi işçilerden hastalandıklarında da işe gelmelerini bekledikleri aksi halde işten çıkarılacaklarını dayattıkları ve geçici personel kullanarak salgının etkisini daha da vahimleştirdiği açığa çıkmıştır (Bland & Kelly, 2020; Laughland & Holpuch, 2020; ONS, 2020b).

ABD Gıda Çalışanları Birliği Derneği, 2020 Temmuz ayında Koronavirüs nedeniyle gıda sektöründe çalışan en az 225 çalışanın hayatını kaybettiğini vurgulamıştır (Samaha ve diğerleri, 2020).

Birleşik Krallık'tan elde edilen kanıtlar (ONS, 2020) şu şekildedir; COVID-19'dan ölüm riski belli meslek grubundaki erkekler için daha yüksek çıkmıştır. Bu meslek grupları; fabrikalarda temizlik ve paketleme yapanlar, güvenlik görevlileri, otobüs, kamyonet ve taksi şoförleri, aşçılar, pazarlamacılar, gıda üretiminde çalışanlar, araç tamircileri ve elektrikçileri, bakım işçileri, kamu hizmetinde büroda çalışanlarıdır

Bakım evlerinde çalışan personelinin işten çıkarılma korkusuyla çalışmak zorunda kalması ve personele hastalık ücreti hakkının verilmemesi, Birleşik Krallık'taki bakım evlerinde COVID-19'un yayılmasına katkıda bulunmuştur (ONS, 2020b).

Singapur'da kötü çalışma koşullarındaki göçmen işçilerin daha da düşük maliyetle çalıştırılabilmesi için oluşturulan barınaklarda kullanılan sağlıksız ve sıkışık yaşam alanlarının bir sonucu olarak ikinci bir enfeksiyon dalgası yayılmıştır (Ratcliffe, 2020).

Yukarıdaki örneklerin çoğu, insan yönetiminin kayıt dışı istihdamla adının anıldığı sektörlerden gelmektedir. Bu nedenle emeğin değersiz ve cansızlaştırmasından İKY teorisinin pandemi sırasındaki sonuçlarından doğrudan sorumlu olmadığı savını güçlendirmiştir (Spencer, 2020).

Yöneticiler çalışanları ve toplumları artan sağlık risklerine maruz bırakan eylemleri gerçekleştirirken bilinçli olarak etik dışı davranmadığı düşünülmektedir. Uygulanan İKY uygulamaları sonuçları yeterince dikkate alınmadan alınan kararlardır. İKY araştırmacılarının ve uygulayıcılarının İK'nın emeği kıymetsizleştirmedeki rolünü ve bu sömürü tarzı metotların nasıl önüne geçilebilir üzerine tartışılmaları gerekmektedir.

KRİZLE YÜZLEŞEN GELENEKSEL İKY

İngiltere merkezli Personel Geliştirme Derneği (CIPD) CEO'su Peter Cheese, işletmelerin artık zaten organik bir yapıda olduğundan salgının örgütlerin çalışanların mutluluğunu daha çok düşünmeye zorladığını ve geleneksel İKY uygulamalarının kendi kendini güncellemek zorunda kalacağını öne sürmüştür (Warren, 2020). Bu düşünce realistik gözükmemektedir. Hemen her kesimden kimse personel çalıştırma uygulamalarındaki eşitsizliklerin farkındadır. Korkutucu olan salgın nedeniyle artan işsizlik işverenlere daha fazla işgücü piyasası fırsatı yaratacak ve emeğin sıradan bir madde gibi algılanması için daha fazla olanak tanıyacaktır.

Emeği değersizleştirmeden iş kalitesini iyileştirmeye yönelik bazı çalışmalar başarılı olabilir. İnsanoğlu tamamıyla kontrol edemediği güçler tarafından yönetilen makineler değil iradeye sahip etik değerleri olan bir varlıktır (Archer, 2007; Sayer, 2011).

Amerika Birleşik Devletleri (SHRM, 2014), Birleşik Krallık (CIPD, 2020), Avustralya (AHRI, 2016) ve Kanada'daki (CPHR, 2016) İK meslek kuruluşları, etik olmanın ne anlama geldiğine dair tanımları içeren şablonlara sahiptir. Bu şablonların içeriğini İK uzmanlarının insan onuru ve adalet ilkelerini nasıl dikkate alması gerektiği bilgisini oluşturmaktadır. Bu etik kuralların ne kadar uygulandığına dair çok az delil ve dolayısıyla araştırma vardır. İK uygulayıcılarının belirlenen kurallara uymasını sağlayacak herhangi bir denetim mekanizması yokken belirlenen kurallar neye hizmet etmektedir?

Evden çalışma modelinin uzun vadeli sonuçları neler olacaktır (Kniffin ve diğerleri, 2021)? Bazı işverenler evden çalışmayı sürdürmeyi iş gücü maliyetlerini düşürmek için bir fırsat olarak görmektedirler (Comboy, 2020).

Korona virüs salgınıyla birlikte; örgütlerin verimli çalışması için etkili ve etkin yeteneklere ulaşma zorunluluğu, insan kaynakları fonksiyonunun operasyon düzeyinden politika oluşturucu seviyeye geçişi, Performans değerlendirme ve ücret yönetimi uygulamalarının postpandemik dünyaya uyumu ve entegrasyonu önemini ve aciliyetini yüksek düzeye çıkarmıştır.

Pandemi işgücünün metalaşması ile ilişkili olarak daha fazla işgücü piyasası ortaya çıkarmakla kalmamış aynı zamanda işyerindeki eşitsizlikleri de artırmıştır. Örgütlerin değişime karşı gösterdiği dirençle herhangi bir karmaşa durumunda yeniden örgütlenebilme kabiliyeti arasında ters yönde bir ilişki de söz konusudur. Bunu işletmelerin iç ve/veya dış çevrelerinde meydana gelen tepkimelerde gösterebildiği reflekslerindeki yüksek yahut düşük düzeyde hassasiyet olarak olarak metaforikleştirmek mümkündür. Bir başka deyişle örgütlerin uyum yeteneği, hayati bir yetenek olarak sistemde “yapısal katılık” olmadığının bir göstergesidir (Koçel, 1999:280). 22.yüzyıl dünyasına adım adarken sanayi devrimi sonrasına ait değişmez gerçek denilebilecek ve sorunların salt formülü yoktur. Pandemi krizini fırsata çevirmek İK teorisyenleri, araştırmacılarıyla ve uygulayıcılarının elindedir. Çalışanlar da hayat boyu öğrenmeyi kendilerine şair edinmeleri gerekmektedir. Yetkinlik kazanmaları için bireysel inisiyatif almaya istekli olmalı ve işi bizzat kendileri deneyimleyerek yapmaları onları geliştireceği düşünülmektedir (Yıldırım, Taş Ve Çiçek, 2019: 56-57).

İKY’NİN TEMEL FONKSİYONLARI AÇISINDAN PANDEMİ DÖNEMİNDE MEYDANA GELEN DEĞİŞİMLER

İnsan kaynakları yönetimi 1980’lerden beridir süregelen paradigma değişiklikleriyle çalışan refahından, verimlilikten ve disiplinden öteye geçerek daha hayati bir işletme işlevi haline dönüşmüştür. İKY artık operasyonel mükemmelleşmeyle de ilgilenmektedir. Bürokrasi ve prosedürler İKY’nin işlev hızını yavaşlattığı da bir gerçektir. Bu gerçek İK’nın insan sermayesinin maliyetlerini kontrol etmeye zorlamaktadır. Yapay zeka teknolojisinin sosyal, ekonomik ve sosyal değişimler üzerindeki tesirleri üzerine yapılan çalışmalar Koronavirüs salgınıyla çalışmaların seyrini değiştirmiştir. Bu değişim İKY için yapılan işin ve yapma biçiminin yeniden gözden geçirilmesi için adeta bir fırsat olduğu söylenebilir. Fırsatı kaçırmamak için insanın yeniden işletmenin bir fonksiyonu olan insan kaynağı yönetimine geri döndürülmesi gerekliliğinin altı çizilmelidir. Zira Covid-19’un etkisi kalıcı olacaktır.

Uzaktan çalışmayla görevlendirmeler yapmak, personelini ücretsiz izine göndermek zorunlu kapanmalar yapmak zorunda kalan işletmelerden son teknolojiyi uygulayan ve teknolojiyi adeta sürekli kucaklayan İK departmanına sahip olanlar bu kaotik duruma hızla cevap verip işletme fonksiyonunu tanımlamasını yerine getirebilmiştir.Salgınla birçok iş sürecinin robotlaşması ve dijitalleşmesi gerektiğinin farkına varan İK yöneticilerin dikkatleri operasyonel mükemmelleşmeye çevrilmiştir.

İKY yazılım program ve uygulamaları ve otomasyonu etkili bir şekilde kullanılırsa; işe alınma, işten çıkarılma, bordro işlemleri, izin takipleri, vardiyalı çalışmaların programlanması, performans değerlendirme gibi İK süreçleri asgari hata ile tamamlanarak ve asgari bir beşeri dokunuşa ihtiyaç duyar. Bu sayede İKY liderleri strateji geliştirirken makineler için değil insanlar için eğitim ve geliştirme faaliyetleri planlarlar. Dolayısıyla insan yeniden ait olduğu birime dönerek ait olduğu işletmenin ihtiyaç duyduğu bir kaynak olur.

Koronavirüs salgınının İKY üzerinde kalıcı etkisi işletmelerin uzaktan çalışmayı kabullenmelerini gerektirmektedir. İnternet ve bilişim teknolojilerinin benimsenmesi kuruluşlar için gereklilik olmaktan çıkmış olup salgın nedeniyle yakın veya uzun vadede salgın öncesi çalışma metotlarına dönüş ihtimali oldukça zayıftır. Dolayısıyla teknolojinin kabulü zorunluluk halini almıştır. Sosyal mesafe korunmaya devam edecek uzaktan çalışma daha etkili hale

getirilecektir. Uzaktan çalışmanın daha verimli hale getirilmesinden kasıt; gereksiz vakit alıcı uzunluktaki, görüntü kalitesi düşük, çalışma konusundan uzak ve çalışmanın özünden başka noktalara gidilmiş uzaktan çalışma fireleri olarak adlandırılabilir hatalardan arındırılmasıdır.

Postpandemik dönemde kurum ve kuruluşların yanı sıra çalışanların da tam zamanlı uzaktan, yarı zamanlı ve esnek çalışma metotlarını örgütlerinin ve kendilerinin ihtiyaçları doğrultusunda hibrit olarak gerçekleştirmeleri gerekecektir. İç ve dış çevrede meydana gelen değişimlere kolay adapte olan İşletmelerin hibrit modellerle çalışmaya pandemi öncesinden gönüllü olduklarından bahsetmek mümkündür.

Çalışanların davranışlarını her ayrıntısıyla yönetmenin bir yöntemi yoktur. Bunun yerine çalışma kültürü oluşturulmalıdır. Gerekli eğitimi almış ve belirli bir deneyime sahip İKY yöneticilerine salgın hastalıkla ihtiyaç daha da artmıştır. Eğitimli İKY yönetici ve liderlerinin oluşturduğu çalışma kültürü her türlü kaosa dayanaklı, esnek bir yapıdadır. Bu yapıyı hava yastığının trafik kazalarındaki fonksiyonu gibi metaforikleştirmek mümkündür. Evrensel nitelikteki bir çalışma kültürü beklenmedik kaza anında olabildiğince hızlı bir şekilde açılan hava yastıklarına sahip, insan hayatına zararı minimuma indirgeyen ve hatta yoluna devam edebilir bir araç gibidir.

Ek olarak bu kültüre sahip örgütler zamandan ve mekandan bağımsız olarak işlerini yürütebilir ve üretkenlikleri artabilmektedir. Çalışma kültürünün oluşturulması ve geliştirmesi zaman alıcı olsa da gelecek riskleri bertaraf edebilmek için emek ve sermaye harcanmasına değmektedir. Kültür oluşturma ve geliştirmenin zaman alıcı olmasının sebebi işlerin yapıma şeklidir. Bürokrasinin de desteğiyle tüm işletme faaliyetleri sahip olması gereken esnekliğe ulaşmak durumundadır.

Tüm kurum ve kuruluşlar iç ve/veya dış çevrelerinin istek ve ihtiyaçlarına hızla adapte olabilmek, onlara cevap verebilmek için; çalışanlarının güçlendirilmesi, liderliklerinin paylaşılması, sağlıklı iletişim ağlarının kurulması, personellerinin teknolojiyi kullanabilme fırsatlarının tanınması, çalışanın insan olmasından ötürü duygularına önem verilmesi, örgütlerin finansal sağlıklarının korunması ve örgütsel dayanıklılığın desteklenmesi gibi faktörlere azami özen ve önem göstermek zorundadırlar.

Sadece lider ve yöneticilerin yapması gerekenler yeterli olmayacaktır. Çalışanların da yöneticilerin rollerini kolaylaştırıcı güvenilir bilgiler elde etmeleri, yeniliklere direnç yerine uyum göstermeleri ve sürekli öğrenmeleri gerekmektedir.

KAYNAKLAR

- Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2020). Inequality in the impact of the coronavirus shock: Evidence from real time surveys. *Journal of Public Economics*. 189, 1–33.
- Archer, M. (2007). *Making our way through the world*. Cambridge University Press.
- Atkinson, J. (1984). Manpower strategies for flexible organisations. *Personnel Management*, 16, 28–31.
- Bland, A. and Kelly, A. (2020). Boohoo booms as Leicester garment factories are linked to lockdown. *The Guardian*.
- Comboye, J. (2020). Will Facebook's salary-by-location move set precedent for tech? [//content/1c52a7a2-aa65-11ea-abfc-5d8dc4dd86f9](https://www.theguardian.com/technology/2020/sep/15/facebook-salary-by-location)
- Dundon, T., & Rafferty, A. (2018). The (potential) demise of HRM? *Human Resource Management Journal*, 28(3), 377–391



- Kaufman, B. (2015). Market competition, HRM, and firm performance: The conventional paradigm critiqued and reformulated. *Human Resource Management Review*, 25(1), 107–125.
- Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., Bamberger, P., Bapuji, H., Bhave, D. P., Choi, V. K., Creary, S. J., Demerouti, E., Flynn, F. J., Gelfand, M. J., Greer, L. L., Johns, G., Kesebir, S. et. al. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action.. *American Psychologist*, 76, (1), 63–77.
- Koçel, T. (1999). “İşletme Yöneticiliği”, İstanbul: Beta Yayınları.
- ONS (2020b). Impact of coronavirus in care homes in England: 26 May to 19 June 2020. Office for National Statistics.
- ONS. (2020a). Coronavirus (COVID-19) related deaths by occupation, England and Wales: Deaths registered up to and including 20 April 2020 provisional analysis of deaths involving the coronavirus (COVID-19), by different occupational groups, among males and females aged 20 to 64 years in England and Wales. *Statistical Bulletin*.
- Ratcliffe, R. (2020, April 23). 'We're in a prison': Singapore's migrant workers suffer as COVID-19 surges back. *The Guardian*
- Samaha, A., Baker, K., Mac, R., Gray, R. (2020). Who died for your dinner? Buzzed news.
- Spencer, D. A. (2020). Economics and 'bad' management: The limits to performativity. *Cambridge Journal of Economics*, 44(1), 17–32.
- Valizade, D., Stuart, M., & Ali, M. (2021). 'We are not all in this together': Understanding international inequalities in the impact of the COVID-19 pandemic on work and employment. (CERIC Working Paper). University of Leeds
- Warren, C. (2020). Work in a post-viral age. *Work*. 25.
- Willman, P., & Pepper, A. (2020). The role played by large firms in generating income inequality: UK FTSE 100 pay practices in the late twentieth and early twenty-first centuries. *Economy and Society*, 49(4), 516–539
- Winton A. and Howcroft, D. (2020). What COVID-19 tells us about the value of human labour.
- Yıldırım, Taş Ve Çiçek, 2019: 56-57) -Yetkinlik Algısı ve Çalışan Performansı İlişkisinde Özsaygının Aracılık Etkisi Bartın Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,2019 cilt 10 sayı 20, 128-153)

ELEKTRONİK KAYNAKLAR

<https://policyatmanchester.shorthandstories.com/value-of-human-labour/>

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/causesofdeath/bulletins/coronaviruscovid19relateddeathsbyoccupationenglandandwales/deathsregistereduptoandinclusing20april20202020>

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/impactofcoronavirusincarehomesinenglandvivaldi/26mayto19june2020>

<https://www.buzzfeednews.com/article/albertsamaha/july-4th-barbecue-food-coronavirus>

<http://dx.doi.org/10.1037/amp0000716>



<https://www.theguardian.com/uk-news/2020/jul/04/boohoo-booms-leicester-garment-factories-linked-lockdown>

<https://doi.org/10.1016/j.jpubeco.2020.104245>

<https://www.theguardian.com/world/2020/apr/23/singapore-million-migrant-workers-suffer-as-covid-19-surgesback>

<https://www.tandfonline.com/doi/full/10.1080/13678868.2020.1752493>



WINE GRAPE PRODUCTION IN TURKEY, EVALUATION OF DEVELOPMENTS IN THE WINE SECTOR, AND FORECASTS

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ABSTRACT

Turkey is a country that has the potential to compete in the global wine market with its many wine grape varieties and suitable ecology. Grape production area in Turkey is 417,041 hectares and the grapes production is 3.93 million tons. The wine grapes constitutes 12% of the total grapes production. The increase rate in Turkey's total wine production is 6.49% in the 2015-2019 period. Turkey's wine production amount in 2018 is 30,000 tons. In addition, wine export value was \$10 million, while the wine import value was also \$10 million. Turkey is a country with a very low share in world wine production (0.21%) with a domestic market volume of 64.3 million liters and an export volume of 2.9 million liters.

Turkey's self-sufficiency ratio in wine was calculated as 100.44%, Import Dependency Index as 3.94% and, Exportability Index as 4.38%. A projection of Turkey's wine import and export amounts in 2020-2028 period was prepared with Box-Jenkins estimation model. ARIMA results indicated that the amount of wine export would decline in years. Based on those results, while the export amount of wine was 4,252 tons in 2019, Turkey's wine export amount was estimated to decrease by 5.73%, reaching 3 833 tons in 2020-2024 period. While there are supports such as premium and treatment payments in the European Union, there is not any support for wine grape in Turkey (Uysal et al, 2015; Uysal 2017). Wine grape producing farms are small sized in Turkey and grape producers have not a role in determining sales price of wine grape.

Increase of amount of quality and wine grape varieties and especially suitable local grape varieties will enhance Turkey's competitiveness. In order to increase the potential and the competitiveness of the food sector, premiums should be given to the raw material producer and the producer should be encouraged.

Wine routes can be combined with gourmet tourism and healthy aging tourism by mitigating the heavy taxation in the sector. Mitigation of taxation burden can also increase export, It is essential for wine sector to allow promotions in integrated activities such as wine routes (Thracian-vineyard routes, Urla vineyard route/Izmir), eco-tourism, gastronomy tourism, healthy aging tourism, vintage festivals and wine-cheese tasting events.

Keywords: Wine grape, wine, ARIMA, balance analysis, swot analysis.

INTRODUCTION

Turkey is a country that has the potential to compete in the global wine market with its many wine grape varieties and suitable ecology. Grape production area in Turkey is 417,041 ha and the grapes production is 3.93 million tons which 12% of the total amount of the grape production is used for wine production (TOB, 2020). The highest amount of wine grape in 2019 was Denizli province with 90 thousand tons of production (TURKSTAT, 2020). Turkey's wine production amount was 30 thousand tons in 2018 and the income of wine export was \$10 million, while the wine import value was also \$10 million (ITC, 2020). The amount of export in 2019 was 4 252 tons, while this amount is expected to decrease to 3 883 tons in 2024.

According to International Organisation of Vine and Wine (OIV) data from 2019, 57% of grape produced in the world was used for wine, 36% for table and 7% for drying; while 39% of grape produced in Turkey was used for drying with/without seeds, 50% for table and 11% for wine and grape juice. The aim of this study is to analyze the current situation of wine grape production and to evaluate of developments in Turkish wine sector and forecasts.

PRODUCTION

In terms of grape production area in countries, Spain ranked first in 2018 with 1.12 million ha area. The viticulture area of Spain counted for 15.70% of world viticulture area, while Turkey, ranking fifth, counted for 5.83% of world viticulture area. In addition, viticulture area in Spain increased by 20.68% in 2014-2018 period, while it decreased by 10.72% in Turkey. The viticulture area in Greece, being one of the countries having more than 100 thousands hectares viticulture area, increased by 60.49% in those years.

Being the top grape producers in the world, the share of China in total grape production was 16.93% (13.39 million tons) and Turkey (4.97%). World's grape production increased by 7.06% in 2014-2018 period, while grape production in Turkey decreased by 5.80% in the same years (Table 1).

Table 1. Amounts of grape production by top ten countries (thousand tons)

Country	2014	2015	2016	2017	2018	2014/2018 Change (%)
1.China	11 731	13 164	12 629	13 083	13 397	14.20
2.Italy	6 930	7 915	8 201	7 170	8 514	22.84
3.USA	7 152	6 964	6 982	6 699	6 890	-3.65
4.Spain	6 223	5 799	6 102	5 387	6 673	7.25
5.France	6 205	6 258	6 028	5 011	6 198	-0.11
6.Turkey	4 175	3 650	4 000	4 200	3 933	-5.80
7.India	2 585	2 602	2 590	2 922	2 920	12.94
8.Argentina	2 635	2 416	1 758	1 965	2 573	-2.35



9.Chile	2 633	2 700	2 200	2 000	2 500	-5.06
10.Iran	2 252	2 400	1 866	1 766	2 032	-9.75
World	73 910	76 347	74 090	73 008	79 126	7.06

Source: FAO, 2020.

The amount of grapes produced in Turkey on 417 041 ha area was 3.93 million tons in 2018 and the yield was 9.43 tons/ha, still below world average (11.05 tons/ha) (FAO, 2020). Turkey's average annual relative increase in grape production was determined as 1.05% for 2004-2019 period. Wine grape counted for only 11% of the total production. This ratio reached to maximum (13.37%) in 2007 (Table 2).

Accordingly, the amount of grapes used for wine production in Turkey was 3.2% of total grape production in 2018. This ratio for the same year was 57% worldwide; 99.6% in France, 96.0% in Spain, 86.5% in Italy and, 65.6% in the USA. The countries allocating the least share after Turkey for wine production among the top 17 grape producer countries in the world are respectively India (1.5%) and Egypt (0.5%) (OIV, 2019).

Table 2. Grape production amounts in Turkey by intended consumption (2004-2019)

Year	Wine		Drying		Table		Total
	Quantity (ton)	%	Quantity (ton)	%	Quantity (ton)	%	
2004	370 000	10.57	1 230 000	35.14	1 900 000	54.29	3 500 000
2010	461 508	10.85	1 543 962	36.29	2 249 530	52.87	4 255 000
2011	465 320	10.83	1 562 064	36.36	2 268 967	52.81	4 296 351
2012	400 659	9.46	1 613 833	38.11	2 219 813	52.42	4 234 305
2013	455 229	11.35	1 423 578	35.49	2 132 602	53.16	4 011 409
2014	445 127	10.66	1 563 480	37.45	2 166 749	51.89	4 175 356
2015	423 527	11.60	1 334 563	36.56	1 891 910	51.83	3 650 000
2016	472 534	11.81	1 536 862	38.42	1 990 604	49.77	4 000 000
2017	488 000	11.62	1 603 000	38.17	2 109 000	50.21	4 200 000
2018	463 647	11.79	1 524 091	38.75	1 945 262	49.46	3 933 000
2019	451 000	11.00	1 599 000	39.00	2 050 000	50.00	4 100 000

Source: TOB, 2020.

Considering amount of wine grape production by provinces in Turkey, Denizli ranked first with 90 tons of production. This amount of production in Denizli counted for 19.98% of Turkey's total wine grape production. Provinces following Denizli in terms of amount of wine grape production are respectively Kilis (11.87%), Nevşehir (10.15%), Tokat (9.46%), Elazığ (8.37%), Çanakkale (6.34%), Tekirdağ (5.90%) and İzmir (4.58%). An increase by 242.30% in wine grape production occurred in Uşak between 2015 and 2019 was the highest increase among all provinces. The increase in the total amount of wine grape production in Turkey was 6.49% in the same period (Table 3).

Table 3. Amount of wine grape production by provinces in Turkey (tons)

Province	2015	2016	2017	2018	2019	2015/2019 Change (%)
Denizli	31 790	74 661	94 555	73 160	90 097	183.41
Kilis	70 633	77 052	67 051	20 300	53 531	-24.21
Nevşehir	53 101	49 427	52 458	53 419	45 769	-13.81
Tokat	26 868	31 905	38 166	46 519	42 687	58.88
Elazığ	41 644	31 718	19 047	41 891	37 770	-9.30
Çanakkale	23 252	23 314	26 585	32 449	28 589	22.95
Tekirdağ	24 318	25 176	29 556	30 800	26 594	9.36
İzmir	18 285	21 834	25 605	29 741	20 662	13.00
Others	133 636	137 447	134 977	135 368	105 301	-21.20
Turkey	423 527	472534	488 000	463 647	451 000	6.49

Source: TURKSTAT, 2020.

Turkey, with many various wine grape varieties and favourable ecology, has a high potential for competing in the global wine market. Wine grape varieties in the regions are given at Table 4.

Table 4. Wine grape varieties in regions

	Regions				
	Marmara and Thrace	Aegean	Central Anatolia	Mediterranean	Southeastern
White Vine	Clairette, Pinot Chardonnay, Riesling Semillion, Beylerce Yapıncak, Vasilaki	Semillion Bornova Misketi Sultaniye	Emir Hasandede Narince Kabarcık	Kabarcık, Dökülgen	Kabarcık, Dökülgen Rumi
Red Wine	Pinot Noir Adakarası Papazkarası Karışeker (kuntra) Gamay Karalahna Cinsaut	Carignane Calkarası Grenache Merlot Cabernet Alicante Bouschet	Öküzgözü Boğazkere Kalecik Karası Papazkarası Dimrit Sergikarası Burdur Dimriti	Sergikarası Boğazkere	Horozkarası Öküzgözü Boğazkere Sergikarası

Source: Anonymous, 2019.; Ateş ve Uysal, 2017.

World wine production reached its maximum in 2018 with 292 million hl (29.2 billion L) where the top three wine producer countries of the world are Italy, France and Spain (Table 5). These countries count for 50.6% of the world wine production in 2018, but Italy (49.1 mhl), France (46.6 mhl), and Spain (40.7 mhl), which together account for 53% of the world wine production in 2020 (OIV, 2020).

Table 5. Major wine producer countries and respective production amounts (million hl)

Country	2014	2015	2016	2017	2018	2017/2018 Change (%)
Italy	44.2	50.0	50.9	42.5	54.8	29
France	46.5	47.0	45.3	36.3	48.6	34
Spain	39.5	37.7	39.7	32.5	44.4	37
USA	23.1	21.7	23.7	23.3	23.9	2
Argentina	15.2	13.4	9.4	11.8	14.5	23
Chile	9.9	12.9	10.1	9.5	12.9	36
Australia	11.9	11.9	13.1	13.7	12.9	-6
Germany	9.2	8.8	9.0	7.5	10.3	38
South Africa	11.5	11.2	10.5	10.8	9.5	-12
China	13.5	13.3	13.2	11.6	9.1	-22
Portugal	6.2	7.0	6.0	6.7	6.1	-10
Russian F.	5.1	5.6	6.6	5.8	5.5	-4
Romania	3.7	3.6	3.3	4.3	5.1	18
World	270	275	270	249	292	17

Source: OIV, 2019 (*Countries producing more than 5 million hl of wine; OIV uses the following factor for the formula for calculating the amount of wine made of grapes: 1 325 kg of fresh grape is used for making 1 hectolitre of wine).

Turkey's share in world wine production was 0.21% according to average of years 2012-2016. Wines with bottle packaging counted for 70% of total wine production value and 54% of total wine production amount of the world in 2016.

Considering the amounts of wine production in six-year periods between 2001 and 2018; average annual relative decrease in 2001-2006 and 2013-2018 periods were 1.24% and 0.56% respectively. An average annual relative increase by 7.65% took place in 2007-2012 period. In addition, the amount of wine production increased by 14% in 18-year period according to production index (Table 6).

Table 6. Amount of wine production in Turkey (tons) (2001-2018)

Year	Amount of Production (tons)	Index (2001=100)	Year	Amount of Production (tons)	Index (2001=100)	Year	Amount of Production (tons)	Index (2001=100)
2001	26 829	100	2007	21 302	79	2013	31 380	117
2002	26 162	98	2008	24 531	91	2014	44 707	167
2003	22 548	84	2009	23 250	87	2015	56 017	209
2004	26 724	100	2010	27 950	104	2016	39 402	147
2005	25 982	97	2011	28 490	106	2017	24 862	93
2006	25 215	94	2012	31 230	116	2018	30 512	114
Average Annual Relative Decrease (2001-2006)	-1.24%		Average Annual Relative Increase (2007-2012)	7.65%		Average Annual Relative Decrease (2013-2018)	-0.56%	

Source: FAO, 2020.

FOREIGN TRADE

World's wine trade has showed an increasing trend in the last 20 years. World's wine trade reached \$35.86 billion with the increase by 177.87% that took place between the years of 2001 and 2019 (Figure 1). Top wine exporters in the world are France, Italy and Spain (ITC, 2020).

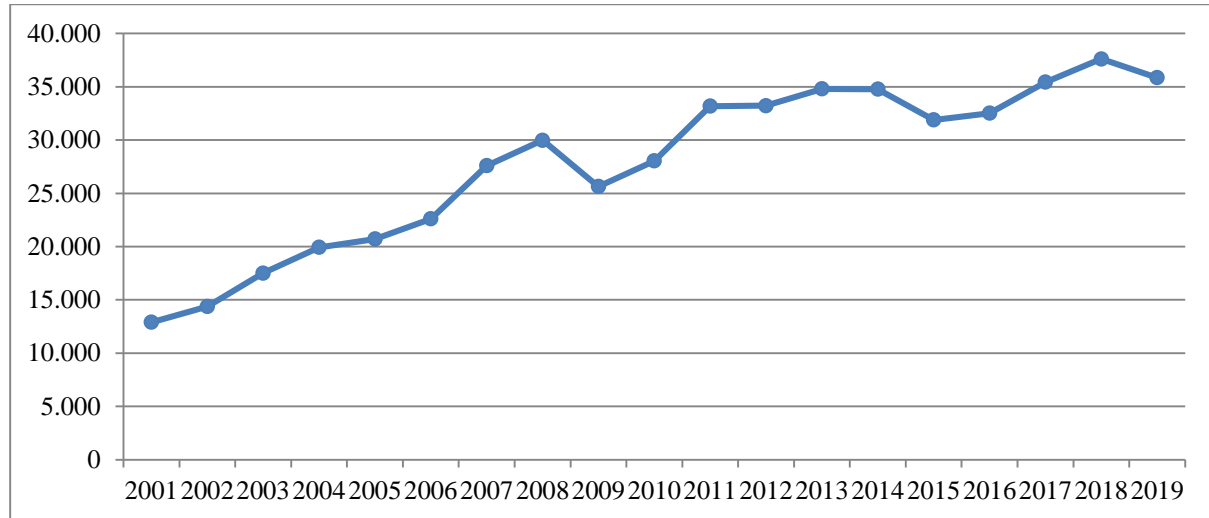


Figure 1. World's wine trade (million \$)

France became the first exporter with \$10.97 billion income generated from wine export in 2019 and took 30.61% share from world wine export value which is very high compared to Turkey's 0.03% share in world wine export. In addition, France's wine export value increased by 19.38% in 2015-2019 period, while Turkey's export value decreased by 6.22% in the same period. Also Georgia, being one of the border neighbors of Turkey, increased its export value by 138.02% in the same period. In terms of wine export, France was followed by Italy (\$7.20 billion), Spain (\$3.07 billion) and Australia (\$2.09 billion) (Table 7).

Chile has achieved to export wine worth \$1.9 billion in the global market worth \$35.8 billion thanks to its 30-year government policy, despite not being a wine consumer itself. Turkey's wine export is only in the ethnic market and has a volume of \$10 million. In addition, the foreign trade balance in alcoholic beverages is changing in favor of import.

Table 7. Wine export values by countries (million \$)

Country	2015	2016	2017	2018	2019	2015/2019 Change (%)
France	9 184	9 171	10 282	11 066	10 965	19.38
Italy	5 976	6 226	6 785	7 370	7 203	20.52
Spain	2 965	2 961	3 270	3 514	3 067	3.42
Australia	1 651	1 712	2 046	2 181	2 085	26.31
Chile	1 843	1 853	2 018	1 994	1 929	4.69
USA	1 543	1 569	1 482	1 448	1 385	-10.20
New Zealand	1 071	1 121	1 197	1 192	1 217	13.58
Germany	1 069	1 040	1 142	1 226	1 157	8.17
Portugal	816	801	878	1 015	917	12.46
United kingdom	673	656	723	825	838	24.50



Argentina	817	817	806	829	798	-2.43
South Africa	704	664	719	788	663	-5.89
Singapore	434	455	475	504	518	19.31
Netherlands	263	303	327	380	355	34.86
Georgia	93	112	170	184	222	138.02
Austria	160	165	188	217	217	35.83
Turkey	11	10	10	10	10	-6.22
World	31 899	32 520	35 444	37 621	35 826	12.31

Source: ITC, 2020.

It was determined that numbers of wine brands are also high in countries with high export value (Table 8). Based on, the number of active wine brands of Turkey-origin is 64. The number of active wine brands with property rights owned by Turkey is 195. These data suggest that there is a significant correlation between the income generated from wine export of countries and the brand values they own. 1 766 wine types and 1 445 agricultural products have geographical indications protected in the EU. Demand on geographical indication protected wines, rose and sparkling wines and wines produced with environmentally-friendly practices is increasing in the EU's wine consumption trends. Efforts should be exerted to increase the number of the EU protected geographical indications in wine sector of Turkey. There are not any wine types originated in Turkey that have protected geographical indications at international level. But, there are geographical indications of 14 kinds of grapes in Turkey. These are Öküzgözü, Boğazkere, Kalecik Karası, etc. In recent years, the grapes of Bornova Misket (7 December 2020) and Denizli Çal Karası (7 April 2021) received geographical indications (Turkish Patent and Trademark Office, 2021).

The Economist reported that the quality of wines in Turkey had increased in the last ten years, and wine producers using new technologies and services of foreign consultants started to receive international awards. In 2019, 8 companies in Turkey received wine awards at international level

(SARAPDER, 2020).

Table 8. Number of wine brands of major wine exporter countries

Country	Number of brands with property rights owned	Number of brands of country-origin	Number of Wines with Protected Geographical Indication
France	14 631	4 461	436
Italy	13 918	2 071	527
Spain	9 566	938	140
Turkey	195	64	-

Source: WIPO, 2020; EC, 2020. (\$36.74 billion),

The USA ranked first with \$6.49 billion import value in world wine import value (\$36.74 billion).

It was followed by United Kingdom (\$4.42 billion), Germany (\$2.88 billion) and China (\$2.45 billion). The value spent by the USA on wine import increased by 15.37% in 2015-2019 period, while the value spent by Turkey decreased by 9.49% in the same period. Russia had the highest increase (72.51%) in wine import value in the same period (Table 9).

Table 91. Wine import values of countries (million \$)

Country	2015	2016	2017	2018	2019	2015/2019 Change (%)
USA	5 623	5 793	6 173	6 449	6 487	15.37
United Kingdom	4 541	4 082	4 115	4 372	4 424	-2.59
Germany	2 787	2 779	2 919	3 172	2 883	3.45
China	2 040	2 366	2 795	2 855	2 445	19.85
Canada	1 800	1 774	1 886	1 997	1 949	8.30
Japan	1 490	1 503	1 616	1 691	1 811	21.52
Netherlands	1 303	1 245	1 286	1 380	1 339	2.78
Switzerland	1 068	1 069	1 164	1 215	1 212	13.44
Russia	672	728	1 003	1 051	1 160	72.51
Belgium	1 011	1 003	1 087	1 154	1 133	12.08
Hong Kong	1 391	1 553	1 533	1 539	1 124	-19.17
France	763	832	952	1 137	988	29.47
Sweden	690	710	727	785	771	11.82
Denmark	631	632	655	747	735	16.43
Singapore	526	490	582	659	621	18.15
Australia	553	545	612	627	584	5.74
Turkey	11	7	8	9	10	-9.49
World	32 668	32 951	35 734	38 105	36 740	12.47

Source: ITC, 2020.

Turkey's wine export amount decreased by 4% between 2001 and 2019. However, its export value increased by 89% in the same period and reached 9.89 million dollars in 2019 (Table 10). The amount of wine export in the first 10-month period of 2020 was 2 079 tons with \$5.32 million export value (TGDF, 2020). According to ITC (2020) data, Belgium ranked first Turkey's wine export with 18% share. Belgium was followed by United Kingdom (14%), Germany (10%), the USA (7%), China (4%) and Australia (1%), respectively. In addition, The Turkish Republic of Northern Cyprus was the destination of 19.27% of Turkey's wine export.

Turkey's wine import amount increased by 2.730% 2001-2019 period and reached 3 000 tons (ITC, 2020).(Table10). Moreover, the increase in import value was 6.680% which was quite higher than the increase in export value (89%). France ranked first with 40% share in terms of Turkey's wine import values (ITC, 2020). Italy (31%), Chile (15%), Moldova (2%) and Portugal (2) are the other important countries in Turkey's wine import.

Table 10. Turkey's wine export and import amount (2001-2019)

Year	Amount of Export		Amount of Import	
	Quantity (ton)	Index (2001=100)	Quantity (ton)	Index (2001=100)
2001	4 414	100	106	100
2002	5 101	116	106	100
2003	4 912	111	101	95
2004	4 384	99	890	840
2005	4 489	102	1 351	1 275
2006	4 630	105	1 573	1 484

2007	4 880	111	1 219	1 150
2008	3 768	85	1 451	1 369
2009	3 818	86	1 067	1 007
2010	3 466	79	1 728	1 630
2011	3 847	87	1 808	1 706
2012	3 871	88	2 191	2 067
2013	4 557	103	1 957	1 846
2014	4 241	96	2 741	2 586
2015	4 472	101	2 208	2 083
2016	4 212	95	2 036	1 921
2017	4 228	96	2 430	2 292
2018	4 158	94	2 666	2 515
2019	4 252	96	3 000	2 830

Source: ITC, 2020.

World's wine consumption in 2018 was determined to be 246 million hectoliters (mhl). The USA ranked first (33 million hl) in wine consumption by countries in 2018 and it was followed .France(26.8 million hl) and Italy (22.4 million hl) (OIV,2019). Among the countries with over 3 million hl of wine consumption, Portugal ranked first in terms of consumption per capita with 58.8 litres, followed by France with 50.7 litres (OIV, 2020). Domestic consumption in Turkey was 0.9 litre per capita and consumption by approximately 30 million tourists visiting the country was included in this amount (Gurses, 2019). In addition, share of wine in total alcoholic beverage consumption in 2012-2013 period was found to be 7% in a study conducted by Uysal et al. (2015). Wine consumption in Turkey has also decreased by 25% due to Covid-19 Pandemic.

RESEARCH AND FINDINGS

In order to evaluate the Turkey grape wine imports and exports trend, ARIMA model, Balance analysis and SWOT analysis were considered.

ARIMA Model

A projection of Turkey's wine import and export amounts in 2020-2028 period was calculated with Box-Jenkins estimation model. The optimal model was chosen by considering that Theil inequality coefficient was less than 1; values of MAPE, Akaike criterion, Hannan-Quinn and Schwars criterion were lower than the other models during the selection of the most suitable estimation model. Accordingly, ARIMA (2,1,1) model was chosen as the optimal model for estimation of wine import. ARIMA results indicated that the amount of wine export would decline in years. Based on those results, Turkey's wine export amount was estimated to decrease by 5.73%, reaching 3 833 tons in 2020-2024 period (Table 11).

ARIMA results indicated that the amount of wine import would decline in years. Accordingly, Turkey's wine import amount was estimated to decrease by 19.90%, reaching 2 403 tons in 2020-2024 period (Table 11). These results indicated that the decrease in import amount would be more than the decrease in the export amount (5.73%) in 2020-2024 period.

Table 112. Projection of Turkey's wine export and import amount in 2020-2024 period

Year	Estimated Amount of Export (ton)	Estimated Amount of Import (ton)
2020	4 119	3000
2021	4 016	2652
2022	3 957	2666
2023	3 910	2382
2024	3 883	2403

Balance Analysis

Values of SSR, IDIDX and EIDX in wine are given at Table 12. Based on this data, Turkey's self-sufficiency ratio in wine was found as 100.44%, import dependency index 3.94% and exportability index as 4.38%.

Table 12. Self Sufficiency Index in wine (2019)

Parameters	Formulas	Values (L)
Production		73 583 698
Imports		2 888 779
Export		3 211 073
Consumption	Consumption = Production+Import-Export	73 261 404
Self-Sufficiency Ratio (SSR)	SSR= Production/Consumption	100.44%
Import Dependency Index (IDIDX)	IDIDX= Imports/Consumption	3.94%
Exportability Index (EIDX)	EIDX= Exports/Consumption	4.38%

Source: Based on data from Ministry of Agriculture and Forestry Department of Tobacco and Alcohol (2020).

According to exportability index calculated to evaluate how much of production in wine sector was exported, Turkey was a net exporter in wine trade in 2001-2011 period while it lost this advantage in recent years. The trade balance [(Export Value) - (Import Value)] in 2019 was negative. Also, the share of export in production ranged from 9 to 23% in years (Table 13).

In 2001-2018 period, annual relative decrease (average 0.35%) occurred in Turkey's wine export amount while an annual relative increase took place in wine production amount (average 0.76%). Average annual relative decrease of foreign trade surplus was 7.63% in the same period.

Table 13. Trade balance and exportability of wine

Years	Export Value (thousand \$) (1)	Import Value (thousand \$) (2)	Trade Balance (thousand \$) [(1)-(2)]	Export Amount/Pr oduction Amount (%)	Amount of export (tons)	Amount of production (tons)
2001	5 230	152	5 078	16,45	4 414	26 829
2002	6 114	185	5 929	19,50	5 101	26 162
2003	7 303	160	7 143	21,78	4 912	22 548
2004	7 861	1 550	6 311	16,40	4 384	26 724
2005	8 414	2 634	5 780	17,28	4 489	25 982
2006	8 535	3 238	5 297	18,36	4 630	25 215

2007	9 204	3 132	6 072	22,91	4 880	21 302
2008	7 964	4 561	3 403	15,36	3 768	24 531
2009	7 750	3 197	4 553	16,42	3 818	23 250
2010	7 362	5 610	1 752	12,40	3 466	27 950
2011	8 757	7 076	1 681	13,50	3 847	28 490
2012	9 271	9 281	-10	12,40	3 871	31 230
2013	11 663	9 646	2 017	14 52	4 557	31 380
2014	11 161	15 528	-4 367	9,49	4 241	44 707
2015	10 543	11 386	-843	7,98	4 472	56 017
2016	10 125	7 024	3 101	10,69	4 212	39 402
2017	9 762	8 093	1 669	17,01	4 228	24 862
2018	10 147	8 758	1 389	13,63	4 158	30 512
2019	9 887	10 306	-419			

Source: Based on FAO (2020) and ITC (2020) data.

SWOT Analysis

Wine sector is associated with employment of two million people. Raw materials of this sector are supplied directly from agriculture, enabling it to export without need to import. Problems of the sector need to be handled with this understanding, and the sector should not be considered only as alcohol production. One of the most important problems of the sector is the disorganization among its stakeholders. Therefore, an analysis of strengths, weaknesses, opportunities and threats (SWOT) has been applied in the present wine chain in order to identification of potential needs of the sector.

The SWOT analysis of the wine sector results has been shown in Table 14. Information and opinions were exchanged with stakeholders of the sector including grape producers, company owners, employees, tourism entrepreneurs, consultancy company managers and hotel owners.

Table 14. SWOT Analysis for Turkey wine sector

Strengths	Weaknesses
<ul style="list-style-type: none"> - Turkey's competitiveness potential thanks to many varieties of wine grapes and favourable ecology, - Turkey's geostrategic position as a bridge between Asia and Europe, - Demand of tourists visiting Turkey on wines native to Turkey, - Production of many local grape varieties as well as starting production of world-famous and quality-certified grape varieties recently in Turkey, - Presence of local varieties for production of quality wine, - Presence of varieties with favourable origins for controlled quality production such as Kalecik Karası, Öküzgözü, Boğazkere, Karalahna, Narince and Emir, - Low labour cost in production of wine grape, - Increase in good practices for quality grape production, - Improvement of boutique wineries and development of their marketing possibilities, - Awards of boutique wines at international platforms. 	<ul style="list-style-type: none"> - Inadequate importance attributed to viticulture in Turkey and to production of grape varieties for wine making in Turkey, - Natural-conditions-dependant production, - Challenges in quality raw material supply, - Insufficient use of the potential for integration of viticulture, wine and other grape derivatives into tourism activities (Agro/Eco-Tourism), - Special Consumption Tax applications, - Unregistered production and trade, - Restriction of serial production due to popularity of small-sized enterprises, resulting in higher costs, - Being dependant on import in terms of supporting industries (supply of cork and special boutique style bottles from abroad), - Unorganized sector, - Cost increase stress on companies during periods of fluctuations in foreign exchange rates, - Exclusion of wine sector and tasting in agro-festivals in the country, - Turkey's having competitive advantage only over Germany in EU market, - Inadequacy of existing legislation,

	<ul style="list-style-type: none"> - Lack of a specific regulation on wine grape production, - Vineyards not owned by wine producers, - Vineyards not registered in the land registry system, - Lack of government policies for the sector, - Lack of cooperation between institutions.
Opportunities	Threats
<ul style="list-style-type: none"> - Pursuit of new varieties and increasing interest in regional wines in foreign market. 	<ul style="list-style-type: none"> - Taxation rates applied to wine production in Turkey around 4 times of average rates in EU, - Strong competitors in the world, - Lack of support for wine grape production which could create the highest added value to the economy among all viticulture products, - Widespread unfair competition.

CONCLUSION

The results showed that approximately 57% of grapes are used for wine in the world, while the ratio of grapes used for wine to total amount of grape production in Turkey is only 3%. This ratio is 99.6% in France, 96.0% in Spain, 86.5% in Italy and 65.6% in the USA. The countries allocating the least share after Turkey for wine production among the top 17 grape producer countries in the world are respectively India (1.5%), Egypt (0.5%) and Iran (0.0%). In this regard, it is clear that the added value generated from grape production in Turkey is way below the world average and countries having brand value in wine. Whereas Turkey ranks fifth with 6% share in world's viticulture. In addition, Turkey's share in world's grape production is 5%. However, the viticulture area of Turkey decreased by 11%, and amount of production decreased by 6% in 2004-2018. In wine production point of view, Denizli province leads the wine sector with 20% share in Turkey's wine production while Kilis (12%), Nevşehir (10%) and Tokat (9%) provinces count for 50% of Turkey's total wine production.

Data Analysis indicates that there is a positive correlation between the wine export value of a country and the number of wine brands and wine origins with protected geographical indication in the country. The number of active wine brands of Turkey-origin is 64. France takes 31% share from the world's wine export value, ranking the first among wine exporters with \$11 billion wine export income. While Turkey has only 0.03% share in world's wine export with \$10 million wine export value. In order to success of Turkey, supports provided for the sector should be revised and improvement policies should be developed to enable Turkey to compete in global wine market and increase wine export income.

Wine sector will have an important role in transition to high added value products in Turkey. Registration of vineyards, detection of grape varieties to be grown in each region, and implementation of an origin controlled designation system are of critical importance for wine sector.

The policies to be developed by considering the current conditions in wine grape production in Turkey will enable regional variety classification of wine grapes, although not to the extent of protection provided by the classification systems implemented in France (Appellation d'Origine Controlee) and Italy (Denominazione di Origine Controllata).

Development of the sector depends on elimination of raw material, heavy taxation and international marketing problems. It is essential for wine sector to allow promotions in integrated activities such as wine routes, eco-tourism, gastronomy tourism, healthy aging tourism, vintage festivals and wine-cheese tasting events. The government needs to implement moderate policies in this field, and not to neglect a sector with a huge potential of

creating added value. Turkey is likely to be an important country in wine market through improvement of productivity and quality as well as focusing on promotion and marketing.

REFERENCES

- Anonymous, 2019. Food & Agriculture: Wine. TR Ministry of Trade, Ankara.
- Ates, F., Uysal, H., 2017. Determinations of Adaptation Level of Wine Grape Varieties in Terms of Climatic Data in Wine Growing Regions of Turkey. 40th World Congress of Vine and Wine, BIO Web of Conferences 9, 01027.
- EC, 2020. European Commission, DOOR. <https://ec.europa.eu/> (Date of access: 26 November 2020).
- FAO, 2020. Food and Agriculture Organization of the United Nations. <http://www.fao.org/home/en/> (Date of access: 07 November 2020).
- Gurses, U., 2019. Turkiye'nin Sarap Dosyasi. <https://ugurses.net/2019/08/12/turkiyenin-sarap-dosyasi/> (Date of access: 26 November 2020).
- ITC, 2020. International Trade Centre, Trade Map, <https://www.intracen.org/> (Date of access: 8 November 2020).
- OIV, 2019. 2019 Statistical Report on World Vitiviculture. <http://www.oiv.int/public/medias/6782/oiv-2019-statistical-reportonworldviticiviculture.pdf> (Date of access: 23 November 2020).
- OIV, 2020. International Organisation of Vine and Wine Intergovernmental Organisation, <https://www.oiv.int/public/medias/6370/state-of-the-world-viticiviculture-oiv-2018-ppt.pdf> (Date of access: 23 November 2020)
- SARAPDER, 2020. Sarap Ureticileri Dernegi. <http://www.sarapureticileri.org/> (Date of access: 23 November 2020).
- TGDF, 2020. Federation of Food and Drink Industry Associations of Turkey. <https://www.tgdf.org.tr/> (Date of access: 18 December 2020).
- TOB, 2020. Ministry of Agriculture and Forestry, Bitkisel Uretim Verileri. (<https://www.tarimorman.gov.tr/>) (Date of access: 8 November 2020)
- Turkish Patent and Trademark Office, 2021. Cografi Isaretler Portali. <https://www.ci.gov.tr/> (Date of access: 18 November 2021).
- TURKSTAT, 2020. Bitkisel Uretim Istatistikleri. <http://www.tuik.gov.tr> (Date of access: 08 November 2020).
- Uysal, H., Karabat, S., Saner, G., Gumus, S., Atis, E., 2015. Recent Developments in Wine Grape Production and Marketing in Turkey. 38th World Congress of Vine and Wine, July 5th-10th, Mainz-Germany.
- WIPO, 2020. World Intellectual Property Organization, Global Brand Database. <https://www.wipo.int/> (Date of access: 8 November 2020).

METAL KAPI İMALATINDA İŞ SAĞLIĞI VE GÜVENLİĞİ UYGULAMALARI, RİSK ANALİZİ VE ÇÖZÜM ÖNERİLERİ

OCCUPATIONAL HEALTH AND SAFETY APPLICATIONS, RISK ANALYSIS AND SOLUTION SUGGESTIONS IN METAL DOOR MANUFACTURING

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ÖZET

Bu çalışmada metal sektöründe faaliyet gösteren KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesi içerisinde yer alan asansör kapısı üretim hatlarını içeren imalathane ile ilgili üretim süreci faaliyetleri esas alınarak iş sağlığı ve güvenliği uygulamaları, risk analizi ve çözüm önerileri araştırılmıştır. Üretim iş akışına bağlı olarak sınıflandırılmış ve süreç boyunca karşılaşılan ergonomik, fiziksel, kimyasal, biyolojik, iş ekipmanları kaynaklı, makine ve araç gereçlerin kullanımından doğan potansiyel tehlikeler tanımlanmıştır. Risk değerlendirme metodu olarak L tipi karar matrisi kullanılmıştır. Gerçekleştirilen gözlemler doğrultusunda ramak kala olay, iş kazası ve meslek hastalıklarını engellemek için alınması gereken tedbirler belirlenmiştir. Yapılan risk değerlendirmesi sonucunda risklerin kabul edilebilir seviyeye çekilmesi için iyileştirme önerileri oluşturulmuştur. Fabrikada geçmişe yönelik iş kazası incelemesi yapılmış olup, kök neden analizi yapılmıştır. Ayrıca, kazaların personelde ve firmada yarattığı olumsuzluklar, yaralanmalar araştırılmış çözüm önerileri geliştirilmiştir. İş kazalarının yaşanmasını engellemek adına alınması gereken tedbirler analizler ile ilgili firmaya sunulmuştur.

Anahtar Kelimeler: Metal sektörü, İş güvenliği, Risk Değerlendirme, L Tipi Karar Matrisi

ABSTRACT

In this study, occupational health and safety practices, risk analysis and solution suggestions were investigated based on the production process activities related to the workshop, which includes the elevator door production lines in the KIRIKER Metal Elevator Industry and Trade Limited Company, operating in the metal sector. It has been classified depending on the production workflow and the potential hazards arising from the use of ergonomic, physical, chemical, biological, work equipment, machinery and tools encountered during the process have been defined. L-type decision matrix was used as the risk assessment method. In line with the observations made, measures to be taken to prevent near misses, work accidents and occupational diseases were determined. As a result of the risk assessment, improvement suggestions were made in order to reduce the risks to an acceptable level. A retrospective work accident investigation was carried out at the factory, and a root cause analysis was carried out.

In addition, the negativities and injuries caused by the accidents in the personnel and the company have been researched and solutions have been developed. The measures to be taken in order to prevent occupational accidents were presented to the company concerned with the analysis.

Keywords: Metal Industry, Occupational Safety, Risk Assessment, L-Type Decision Matrix

1. GİRİŞ

Sürekli gelişerek artan üretim faaliyetleri ve çok sayıda fabrika, tesis, üretim alanı büyük bir rekabet ortamı oluşturmuştur. Bu rekabet ortamında teknolojinin devamlı olarak ilerlemesiyle insana duyulan ihtiyaç günden güne azalsa da insan emeği her daim kullanılmaktadır (Aydoğan,2015). Firmalar arasında oluşan rekabetin temeli çalışmak ve üretim üzerine olmuştur. Zamanla iş birliğinin azaldığı, rekabetin büyüdüğü çağımızda insan hayatının öncelikli olma şartı aksatılmaya başlanmıştır (Karamık ve Şeker, 2015). Buna bağlı olarak da çalışma hayatında iş kazalarının yaşanma sıklığında artış gözlemlenmiştir.

İş kazalarının sebepleri arasında; nitelikli iş güvenliği eğitiminin verilmemesi, firmadaki yönetimin iş güvenliği kültürünün oluşmasında pasif kalması, verilen işin en kısa sürede ve yüksek kârla yapılmak istenmesi, operatörlük / özel eğitim gerektiren (mesleki yeterlilik) makinaların kullanımında eğitim almış personel istihdam edilmemesi, personelleri zorlayan mesai saatleri, personelden kaynaklanan kendisine temin edilen kişisel koruyucu donanımları kullanmaması olarak örnek verilebilir.

İşveren tarafından ‘işin olabildiğince hızlı ve yüksek kârla tamamlanması’ baskısı, personellerde iş sağlığı ve güvenliği kültürünün oluşmasında büyük engel oluşturmaktadır. Verilen işi hızlı bir şekilde bitirmek için yapılan çalışmalarda can ve mal kayıplarına sebep olan kazalar artmakta dolayısıyla işverene; personel kaybı, iş günü kaybı ve maliyet olarak kayıp yaşatmaktadır. İş güvenliği kültürünün “işçinin güvenli ortamda çalışmasını, kazalara sebep olabilecek sağlıksız ortam koşullarını gidermeyi hedeflerken aslında işveren açısından da önemi büyük olan iş verimliliğine büyük ölçüde katkıda bulunur” fikrini doğrulamaktadır.

Bir disiplin olarak iş sağlığı ve güvenliği üç kavram etrafında biçimlenmektedir. Bunlar; bireyin sağlığı, bireyin güvenliği ve bireyin çalışma faaliyetleridir. Sağlık ve güvenliğini temin edilmesi ve bir bütün halinde bireyin korunması, insanın temel yaşamsal haklarından biridir. Hatta geri kalan bütün hakların mevcudiyeti ve kullanımı bu hakkın sağlanmasına bağlıdır. Bu durum çalışma yaşamında da geçerli olup iş sağlığı ve güvenliği alanında uygulama alanı bulmaktadır. Yaşama hakkı hem ulusal hem de uluslararası mevzuatta, uluslararası anlaşmalarda en fazla tekrarlanan ve güvence altına alınması gereken temel unsurdur. Bu nedenle yaşam hakkı çerçevesinde sağlığın ve güvenliğin korunması göz ardı edilemez. Çalışma yaşamı insanların yaşamlarını sürdürecektir maddi gelir elde etmesi, manevi tatmin sağlayabilecek bir çalışma içinde bulunması açısından yaşamın içinde bulunan bir etkinliktir. Bu aşamada değişmekte olan nokta, çalışmanın yoğunluğu, şekli ve birey için yaşamsal önceliğidir. İş yerindeki çalışma koşulları ağır olduğunda bazı hastalıkların ilerlemesine sebep olmakta ya da ortaya yeni hastalıkların çıkmasına yol açmaktadır. Bu nedenle çalışma alanlarında önlemler alınması ile hastalıkların oluşumunun engellenmesi ve hastalıkların ilerlemesinin yavaşlatılması mümkün olabilmektedir (Akkaya, 2017).

İş Sağlığı ve Güvenliğine yönelik uygulamaların iş yaşamında daha etkin olarak kullanılabilmesi için hem devletin hem de işverenin sağlık-güvenlik alanında yatırımlar yapması gerekmektedir. Bu yatırımlar sonucunda iş kazaları ve meslek hastalıklarında azalma

görülebilecek, böylece işletmelerde verimlilik düzeyi de yükselecektir. Mevcut finansal kaynakların bir kısmının iş güvenliğine yönelik eğitimler ve organizasyona ayrılması, üretimde ve verimde artış sağlanabilir, finansal gelişim ve kalkınma çok daha hızlandırılabilir (Ulucan,2016).

İş sağlığı ve güvenliği bütün mesleklerde çalışmakta olan kişilerin ruhsal, fiziksel, sosyal iyilik durumlarının en üst seviyeye ulaştırılması; bu seviyede devam ettirilmesi, çalışanların çalışma koşulları sebebiyle sağlıklarında bir bozulma oluşmasının önlenmesi amacıyla yapılan çalışmaları ifade etmektedir. Dünya Sağlık Örgütü sağlığı, “hastalık ve sakatlığın olmaması yanında fiziksel sosyal ve ruhsal yönden de tam bir iyilik hali” olarak açıklamaktadır. İnsan Hakları Evrensel Bildirgesi 3. maddede özgürlüğün, yaşamının ve bireysel güvenliğinin herkesin hakkı olduğu ifade edilmektedir. Bildirgenin 25. maddesinde her bireyin kendisi ve ailesi için beslenme, giyinme, barınma, tıbbi destek alma, sosyal hizmetler alabilme gibi sağlık ve refahını sağlayacak uygun bir hayat düzeyine sahip olması; aynı zamanda hastalık, dulluk, sakatlık, işsizlik, yaşlılık ya da geçim olanaklarından iradesi dışında mahrum kalması durumunda güvenliğinin sağlanmasına hakkı olduğu ifade edilmektedir. İş sağlığı ve güvenliğinin temelde üç amacı vardır. Bunlardan birincisi; çalışanların her halükarda korunması, güvenli ve sağlıklı bir çalışma ortamı meydana getirilmesi, çalışanların sağlığının refahının ve güvenliğinin sağlanması yönünde gelişmeler sağlanmasıdır. İkincisi; örgütsel yapının korunması, kaza ya da çeşitli olumsuzlukların oluşmadan önce öngörülmesi ve bu yönde önlemler alınarak ortaya çıkabilecek doğrudan ya da dolaylı zararların en aza indirilmesi, verimin artırılmasıdır. Üçüncü amaç ise üretimin devamlılığının sağlanması ve korunması, aynı zamanda verimin artırılmasıdır. İnsanın en temel hakkı olan yaşam hakkına risk oluşturan ve çoğunlukla ortaya iş kazaları, meslek hastalıkları şeklinde çıkan tehlikelerden çalışanların korunması, zararlı unsurların tespit edilmesi ve ortadan kaldırılması, asgari düzeye indirilmesi, tehditlerin öngörülmesi ve önlenmesi mümkün olmayan durumlarda ortaya çıkan olumsuz sonuçların en aza indirilmesi yönünde çaba gösterilmesi gerekmektedir. Kısacası çalışma için güvenli, sağlıklı ve güzel bir çalışma ortamı sağlanmalıdır (Akıllı ve Aydoğdu, 2013).

Bu çalışma, personel sayısı bakımından kalabalık ve insan gücünün kullanıldığı metal sanayinde gerçekleştirilmiştir. Bilindiği üzere metaller, kendine has parlaklığa sahip, ısıyı ileten, yüksek elektriği ileten, oksijenle bir araya gelerek genel olarak bazik oksitler veren, katyon oluşturma eğilimine sahip elementler olarak ifade edilmektedir (Wikipedia, Metal).

Türkiye’de metal sanayi bütün sanayi kolları içinde iş gücü potansiyeli, finansal büyüklük ve stratejik açıdan önemli olması sebebiyle en önemli sanayi koludur. Metal sanayi içinde döküm, demir çelik, otomotiv, savunma, beyaz eşya, yedek parça vb. yedek parçaların üretimini yapan ve hatta insan yaşamı için vazgeçilmez ürünleri üreten birçok sektör yer almaktadır (Sezer,2006; Şen,2010).

Türk demir çelik sektörü, endüstriyel sektörlerdeki toplam istihdamın %2’sine Gayri Safi Milli Hâsılanın (GSMH) %3’üne, , toplam ihracatın %12’sine sahiptir. Sektör bu açıdan en fazla ihracat yapan sektörler arasında üçüncü sıradadır (ÇSGB,2011).

Bu çalışmada, metal sanayinde kullanılan iş güvenliği ve uygulamaları gözlemlenmiş, firmaya yönelik risk analizi hazırlanmış ve iş kazalarını önlemek adına çözüm önerileri araştırılmıştır. Ham madde olarak st 37 numaralı çelik sac kullanılan ve asansör kapısı imalatı yapan Kıraker Metal Asansör Sanayi Limited Şirketi araştırma yeri olarak belirlenmiştir. İş kazalarını önlemek üzere alınmış olan iş güvenliği tedbirleri ve uygulamaları incelenmiş, L tipi karar matrisi

yöntemi ile risk analizi yapılmıştır. Fabrikada yaşanan iş kazaları, kaza raporları, kaza tutanakları ve kök neden analizleri incelenmiş, kazayı oluşturan durumlar ve kaza sonuçları firma yetkilileri ile değerlendirilmiştir. Aynı tip kazaların tekrarlanmaması ve yeni iş kazaları yaşanmaması için alınması gereken önlemler öneri halinde firma yetkililerine sunulmuştur.

2. MATERYAL METOD

Bu çalışmada L tipi Risk Değerlendirme metodu kullanılmıştır. Bu yöntem için ilk önce tehlike listesi oluşturulur. Tehlikeye maruz kalacak kişi sayısı, maruziyet süresi, tehlike sonucunda oluşacak can ve mal kayıpları gibi unsurlar göz önünde bulundurularak olası bütün sonuçlar belirlenir. Tehlike kaynaklı oluşacak kazaların ortaya çıkma olasılığı geçmiş yıllarda ki tecrübelerle bakılarak araştırılır (Ceylan ve Başhelvacı, 2011).

Listedeki her tehlikenin şiddeti ve sebep olacağı kazaların olabilirliği sayısal ifadeler ile tanımlanır. Bu şekilde; risk faktörü, şiddet ve olabilirliğin çarpımı sonucu belirlenir (Ceylan ve Başhelvacı, 2011). Risk faktörü = Olabilirlik X Şiddet formülü ile hesaplanır. Olayın gerçekleşme ihtimali Çizelge 2.1'deki tablo ile derecelendirilir.

Çizelge 2.1. L tipi Matris Yöntemi Risk Analizi, Tehlike olabilirliğinin belirlenmesi (Ceylan ve Başhelvacı, 2011)

OLABİLİRLİK	DERECELENDİRME BASAMAKLARI
Çok Küçük (1)	Hemen hemen hiç
Küçük (2)	Çok az (yılda 1 kez)
Orta (3)	Az (yılda birkaç kez)
Yüksek (4)	Sıklıkla (Ayda bir)
Çok Yüksek (5)	Çok sıklıkla (haftada bir, hergün)

Olayın gerçekleşme durumunda oluşacak sonuçlar ise Çizelge 2.2'deki tablo ile derecelendirilir.

Çizelge 2.2. L tipi Matris Yöntemi ile Risk Analizi, Şiddet Değerleri (ceylan ve Başhelvacı, 2011)

OLABİLİRLİK	DERECELENDİRME BASAMAKLARI
Çok Hafif (1)	İş saati kaybı yok, ilkyardım gerektiren
Hafif (2)	İş günü kaybı yok, kalıcı etkisi olmayan ayakta tedavi ilk yardım gerektiren
Orta (3)	Hafif yaralanma, yatarak tedavi
Ciddi (4)	Ciddi yaralanma, uzun süreli tedavi, mestek hastalığı, uzuv kaybı
Çok Ciddi (5)	Ölüm, sürekli iş göremezlik

Çizelge 2.1 ve Çizelge 2.2.'deki tablolarla risk matrisi oluşturulur.

Çizelge 2.3. Risk Tablosu (Ceylan ve Başhelvacı, 2011)

RİSK	ETKİ (ŞİDDET)				
	1 (Çok Hafif)	2 (Hafif)	3 (Orta)	4 (Ciddi)	5 (Çok Ciddi)
1 (Çok Düşük)	1 Önemsiz Riskler	2 Düşük	3 Düşük	4 Düşük	5 Orta
2 (Düşük)	2 Düşük	4 Düşük	6 Orta	8 Orta	10 Yüksek
3 (Orta)	3 Düşük	6 Orta	9 Orta	12 Yüksek	15 Yüksek
4 (Yüksek)	4 Düşük	8 Orta	12 Yüksek	16 Çok Yüksek	20 Çok Yüksek
5 (Çok Yüksek)	5 Orta	10 Yüksek	15 Yüksek	20 Çok Yüksek	25 Katlanılamaz

Çizelge 2.4. Tehlikelerin Öncelik Değerleri Tablosu (Anonim, 2019b)

I.Öncelikli Tehlikeler	II.Öncelikli Tehlikeler	III. Öncelikli Tehlikeler	IV.Öncelikli Tehlikeler
25,20,16	15,12,10	9,8,6,5	4,3,2,1

Risk analizi yapıldıktan sonra belirlenen tehlikeler ve neden oldukları riskler değerlendirilir. Yukarıda verildiği üzere 1. 2. 3. Ve 4. Öncelikli tehlikeler belirlenerek oluşturdukları riskli durumları ortadan kaldırmaya yönelik çalışmalara başlanır. Uygulanan düzeltici ve önleyici faaliyetlerle birlikte, riskler tamamen yok edilemese de kabul edilir bir değere indirilmesi hedeflenir. Bu maddelerin sürekli kontrolü ve takibi yapılır.

3. BULGULAR

Araştırma çalışması KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesinde yapılmıştır. Çalışma süresi boyunca fabrikada uygulanan ve uygulanmayan iş güvenliği uygulamaları araştırılmıştır. Fabrika tarafından hayata geçirilen uygulamalara değinilmiştir. Fabrikada yaşanmış iş kazaları araştırılmış, kaza sonuçları firma ile değerlendirilmiştir.

KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesinde uygulanan İSG faaliyetleri aşağıdaki gibidir.

- İş Sağlığı ve Güvenliği yıllık çalışma planı,
- İş Sağlığı ve Güvenliği Eğitimleri
- Kişisel Koruyucu Donanım teslimleri,
- Periyodik / İşe Giriş Sağlık Muayeneleri,
- İş Sağlığı ve Güvenliği Uyarı Levhaları,
- Mesleki Yeterlilik Belgeleri,
- İlk Yardım Personeli Eğitim ve Sertifikası,

- Yangın Söndürme Sistemleri,
- Forkliftle çalışmalarda alınan tedbirler,
- Depolama bölümünde alınan tedbirler,
- Boyahane bölümü için alınan tedbirler,
- Kaynak bölümünde alınan tedbirler,
- Risk Değerlendirmesi

a. İş Sağlığı ve Güvenliği Yıllık Çalışma Planı

KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesi 6331 sayılı İSG Kanunu'nun tehlikeli sınıf için geçerli olan yönetmeliklere uygun olarak faaliyette bulunmasına ve üretim esnasında gerekli mevzuatın uygulanması için yıllık çalışma planı hazırlanmaktadır (İş Sağlığı ve Güvenliği Hizmetleri Yönetmeliği, 2010). Bu planda; günlük, aylık ve yıllık faaliyetler belirtilir. İş Sağlığı ve Güvenliği Faaliyetlerinin tamamı, KKD teslim, İSG eğitimleri, sağlık muayeneleri, tatbikatlar, periyodik ölçümler ve risk analizi yıllık çalışma planını oluşturmaktadır. Amaç, yıllık çalışma planını eksiksiz uygulamak ve yıl sonunda eksikliklerin giderilip giderilmediğini anlamaktır.

b. İş Sağlığı ve Güvenliği Eğitimi

Çalışanların iş sağlığı ve güvenliği eğitimlerinin usul ve esasları hakkında yönetmelik (Resmi Gazete, 2018) örnek alınarak işçi işe başladığı ilk gün, işyeri ve yapacağı işle alakalı oryantasyon eğitimini aldıktan sonra İş Güvenliği Uzmanı, iş güvenliği uygulamaları, üretim sahasında karşılaşılabileceği olumsuz durumlar, makinaları kullanırken uyması gereken kurallar, kullanması gereken kişisel koruyucu donanımlar ve bunların doğru kullanımı, acil durum eylem planında belirtilmiş olan acil durumlarda görev ve sorumlulukları konusunda eğitim verir.

İşyeri Hekimi ise, personel işe alınmadan önce sağlık kontrolünü yapmakla, İş Sağlığı hakkında eğitim ve meslek hastalıkları hakkında bilgi vermek zorundadır. İş Güvenliği Eğitimleri günlük, aylık, yıllık olarak planlanır ve uygulanır.

c. Kişisel Koruyucu Donanım Teslimi

6331 sayılı iş güvenliği kanunu uyarınca (Kişisel Koruyucu Donanımların İşyerlerinde Kullanılması Hakkında Yönetmelik, 2013) üretim hattında çalışan / üretim hattına işin yürütümü ile girmek zorunda kalan büro personelleri dahil kişisel koruyucu donanım kullanmaktadır. Yapılan işe uygun çelik burun ayakkabı, eldiven, iş elbisesi ve kulak tıkacı kullanma zorunluluğu bulunmaktadır. Kaynak atölyelerinde kaynak gözlüğü, işe uygun ayakkabı, eldiven ve maskesi, depolama biriminde baret, boyahane koruyucu tulum, maske ve gözlük, torna ve talaşlı üretim yapan bölümde de göz koruyucu gözlük kullanma zorunluluğu bulunmaktadır. Bu kişisel koruyucu donanımlar teslim tutanağı ile personele verilirken kayıt altına alınmaktadır. Kırık/Yırtık/Aşınmış donanımlar yenisiyle değiştirilebilmektedir, firma donanımları sürekli tedarik etmektedir.

d. Periyodik/İşe Giriş Sağlık Muayeneleri

İşbaşı yapacak personel sağlık taramasından geçirilir ve tarama sonuçları işyeri hekimi ile paylaşılır. İşbaşı yapacak olan işçinin pozisyon gereği işin ifası ile ilgili bir problem oluşturacak kronik bir rahatsızlık, alerji vakası, daha önce geçirmiş olduğu iş kazası ya da maluliyet durumunun olup olmadığı değerlendirilerek personelin işe uygunluğuna karar verilir. Bu

karardan sonra personelim üretim hattında hangi birimde çalışıp çalışmayacağı belirlenir, buradaki amaç personelin sağlığını korumaya yöneliktir. İşyeri hekiminin talebine bağlı ve periyodik olarak bu sağlık taramaları tekrarlanır, amaç meslek hastalıklarının önüne geçmektir.

e. İş Güvenliği Uyarı Levhaları

Çalışma ve Sosyal Güvenlik Bakanlığı'nın Sağlık ve Güvenlik İşaretleri Yönetmeliği doğrultusunda (Resmi Gazete,2013) fabrika içerisinde güvenlik levhaları ve acil yolları, ilkyardım işaretleri ve uyarı/ikaz işaretleri asılı bulunmak zorundadır.

KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesinde iş güvenliği kültürünü oluşturmak, çalışan personellerin iş güvenliği uygulamalarının takibini sağlaması ve emniyetli çalışma algısında süreklilik adına üretim, ofisler, depolama ve yemekhane dahil fabrikanın çeşitli bölümlerinde iş güvenliği levhaları asılıdır.

f. Mesleki Yeterlilik Belgeleri

Fabrika içinde bazı meslek gruplarında (torna, freze, kaynak, forklift sürücülere vb.) çalışan bütün işçiler mesleki zorunluluk belgesi almışlardır. Personeller, yetkilendirilmiş belgelendirme kuruluşlarından teorik ve pratik eğitim alıp, sınavlara tabi tutulup, yeterlilikleri sağladıkları takdirde başarılı sayılırlar. Böylelikle mesleğinde donanımlı, kalifiye ve bilinçli işçilerle yapılan işin verimi artarken, kaza oluşma olasılığı da düşmektedir (Mesleki Yeterlilik Kurumu,2019).

g. İlkyardım Personeli Eğitimi ve Sertifika

KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesi tehlikeli sınıfta bulunmaktadır. Fabrikada toplam 144 işçi çalışmaktadır. Her 15 işçi için 1 ilkyardım sertifikalı personel çalıştırma zorunluluğu bulunmaktadır. Bu sebeple 9 işçiye ilkyardım eğitimi aldırılmış ve bu işçiler eğitim sonrası sınava girerek başarılı olup İlkyardım Personeli Sertifikası almışlardır. Bu sertifikaların geçerliliği 3 yıldır.

h. Yangın Söndürme Sistemleri

'İşyeri Bina ve Eklentilerinde Alınacak Sağlık ve Güvenlik Önlemlerine İlişkin Yönetmelik' doğrultusunda, yönetmeliğin birinci kısmında belirtilen asgari güvenlik şartları baz alınarak, fabrika genelinde 250m² başına 6kg CO₂ yangın tüpü bulundurulmakta ve yangın durumunda bu tüplerin nasıl kullanılacağına dair eğitim ve tatbikat her yıl yapılmaktadır. Fabrika üretim sahasında 12, ofis kısmında ise 3 adet yangın dolabı bulunmaktadır. Forkliftlerin üzerinde ayrıca yangın tüpü bulunmaktadır.

i. Forkliftle Çalışmalarda Alınan Tedbirler

Fabrika içerisinde yayalar ve forkliftlerin geçiş yollarını ayırmak amacı ile, yaya ve forklift geçiş yolu sarı yol çizgisi boyası ile ayrılmıştır. Böylelikle forkliftlerin personellere çarpma riski azalmıştır.

j. Depolama Bölümünde Alınan Tedbirler

Fabrikanın depolama bölümünde kullanılacak levhalar ve sevkiyatı sağlanacak çelik kapılar bulunmaktadır. Bu malzemeler sınıflandırılıp, paketlenerek raflarda istiflenmektedir.

k. Boyahane Bölümünde Alınan Tedbirler

Boyahane bölümünde kullanılan boyaların Malzeme Güvenlik Bilgi Formları (MSDS) malzemelerin kullanıldığı alanda bulundurulmaktadır. Burada çalışacak personel tam yüz

koruması sağlanan bir siperlik, çelik burun ayakkabı ve boya tulumu giymektedir. Sürekli havalandırma yapılmaktadır.

l. Kaynak Bölümünde Alınan Tedbirler

Kaynak bölümünde TIG(Argon) ve Punta kaynak kullanılmaktadır. Kaynak atölyesi fabrikada belirli bir yere konumlandırılmıştır. Sürekli havalandırma sağlanmaktadır. Kaynakçılar; kaynak maskesi, koruyucu eldiven, koruyucu iş elbisesi ve çelik burunlu iş ayakkabısı ile çalışma yapmaktadır.

m. Risk Değerlendirmesi

‘İş Sağlığı ve Güvenliği Risk Değerlendirmesi Yönetmeliği’ kapsamında riskler belirlendikten sonra risk değerlendirme yapılır. Öncelikli tehlikeler saptanarak oluşturdukları riskleri ortadan kaldırmaya yönelik çalışmalara başlanır. Bu risklerin tamamı yok edilemeyebilir, böyle bir durumda birtakım önlemler alınıp riskler kabul edilebilir seviyeye indirilmesi hedeflenir. Bu tehlikelerin sürekli takibi yapılır.



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
1.FABRİKA GENELİ													
1.1	Genel	Yollar, Acil Çıkış kapıları	Yaralanma	3	4	12	II.	İşletme içinde geliş gidiş yolları belirlenmelidir. Acil çıkış yollarına uyarı levhası asılacak, önlerine malzeme konmayacaktır. Acil çıkış kapıları yönetmeliğe uygun olmalıdır. Geçiş yollarına malzeme istiflenmemelidir.	50 gün	1	4	4	Uygun
1.2	Genel	Acil Durumlar	Yaralanma	3	4	12	II.	Acil durum ekibinde olan personeller görevlerini bilmelidir. Kurtarma, İletişim, Tahliye ve Yangın ekipleri belirlenmelidir. Bu ekiplere ilgili eğitim aldırılmalıdır.	50 gün	1	4	4	Uygun
1.3	Genel	İSG Eğitimleri	Bilinçsiz Davranışlar	5	4	20	I.	İşbaşı yapan personel üretim hattına girmeden İSG eğitimi verilmelidir, bunların 2 yılda bir yenileme süreleri takip edilmeli ve eğitim sonunda sertifikalandırılmalıdır.	Sürekli Kontrol	1	4	4	Uygun
1.4	Genel	Sağlık Muayeneleri	Meslek Hastalıkları	5	4	20	I.	İşbaşı yapan personelin İşyeri Hekimi tarafından sağlık tetkiklerinin değerlendirilmesi ve periyodik olarak gözlemlenmesi gerekmektedir.	Sürekli Kontrol	1	4	4	Uygun



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risik Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
1.5	Genel	Görev dışı çalışmalar	İş kazaları	3	4	12	II.	Personeller görev tanımını dışında çalışma yapmamalıdır. Mesleki yeterlilik gerektiren işleri, Mesleki yeterlilik eğitimi ve belgesi almış olan personeller yapmalıdır.	Sürekli Kontrol	1	4	4	Uygun
1.6	Genel	Acil Durumlar	Geç müdahale, Müdahale zorluğu	4	4	16	I.	Tesis genelinde acil çıkış kapıları belirlenmelidir, bölüm bölüm hangi çıkış kapısının kullanması gerektiği personellere tebliğ edilmelidir.	45 gün	1	4	4	Uygun
1.7	Genel	Acil Durumlar	Geç Müdahale sonucu yaralanma	5	5	25	I.	Acil Durumlar için kroki ve tahliye planı hazırlanmalı, fabrika genelinde personelin görebileceği noktalara asılmalıdır.	45 gün	1	5	5	Uygun
1.8	Genel	Oryantasyon Eğitimi	İş kazası, Meslek Hastlığı	3	4	12	II.	Personellere işe girişte işbaşı eğitimi (oryantasyon) verilmelidir. Tehlikeli sınıfta olduğu için 2 yılda bir İSG eğitimleri tekrarlanmalıdır.	Yıllık Eğitim Planı	1	4	4	Uygun



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
1.9	Genel	Yüksekte çalışma	Yüksekten düşme, Malzeme düşmesi,	5	5	25	I.	Yüksekte yapılan çalışmalarda gerekli güvenlik önlemleri alındıktan sonra çalışmaya başlanmalıdır. Bu konuda gerekli eğitim ve deneyime sahip çalışanların görevlendirilmesi sağlanmalıdır. Merdiven, platform, sepetli vinç ya da diğer araçlar kullanılmadan önce gerekiyorsa uygun kişisel koruyucu donanımlar (tam vücut tipi emniyet kemeri, baret vs.) kullanılmalıdır. Geçiş güzergahları üzerinde yüksekte çalışma yapılacak ise uyarı levhaları, emniyet şeridi gibi önlemler alınmalıdır.	Sürekli Kontrol	1	5	5	Uygun
1.10	Genel	Aydınlatma ekipmanlarının etanj kaplı olmaması	Elektrik çarpması, Yangın	4	4	16	I..	İşletmede mevcut aydınlatma gereçlerinde etanj kaplama olmayanlara kaplama yapılmalıdır. Temizliği sürekli yapılmalıdır. Herhangi bir arızada bakım-onarımı yetkili kişilerce yapılması sağlanmalıdır. Parlayıcı, patlayıcı malzeme bulundurulduğu takdirde sistemler ex-proof malzeme ile kaplanmalıdır. Özellikle tozdan, sisten, buhardan ve kimyasaldan etkilenme ihtimali olan aydınlatma ekipmanlarının en kısa zamanda etanj kapaklar yardımı ile kapatılması sağlanmalıdır.	Sürekli Kontrol	1	4	4	Uygun



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Rsik Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
1.11	Genel	Personel	İş Kazası	4	4	16	I.	İşçilerin görev tanımları belirlenecek ve görevlerinin dışında iş yapmaları engellenecektir.	Sürekli Kontrol	1	4	4	Uygun
1.12	Genel	Personel (Sağlık)	Yaralanma	4	5	20	I.	İlkyardım için gerekli cihaz ve ekipmanlar tesis içerisinde her bölümde bulundurulmak zorundadır. Solüsyon ve malzemelerin son kullanma tarihleri güncel olmak zorundadır.	45 gün	1	4	4	Uygun
2. ELEKTRİK													
2.1	Elektrik	Elektrikli makinelerde çalışmalar	Ağır yaralanma, Yangın, Maddi hasar, Kayıp	5	5	25	I.	Bozuk izolasyon kabloları yenilenmeli, açıkta kablo bulundurulmamalıdır. Kablolar kablo kanalı vasıtası ile makinaların üzerinden geçirilmelidir. Her makine için ayrı şase topraklaması, gövde topraklamaları yapılmalıdır. Periyodik kontrolleri yetkili kişiler tarafından senede 1 kez yapıp raporlanmalıdır. Elektrikle çalışma yapan personeller CE uygunluğu olan yalıtkan ayakkabı, eldiven kullanmalıdır, Çalışma talimatlarına uyulmalıdır. Elektrikle çalışan makinalar direkt panodan elektrik alamazlar, bunlar için seyyar makinalara priz sistemi yapılmalıdır. Sabit makinaların topraklamaları sabit olmalıdır.	Periyodik Kontrol	1	5	5	Uygun



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
2.2	Elektrik	Elektrikli el aletleri ile çalışmalarda işg tedbirleri	Takılma, Düşme, Yalanma	5	5	25	I.	Yakınında yanıcı gazlar, sıvılar, gazlar ya da tozlar olan, dolayısıyla patlama riskine sahip olan yerlerde elektrikli el aletleriyle çalışmaktan kaçınılmalıdır. Aletlerin kullanımı sırasında konuklar, stajyerler ya da bu faaliyeti izlemek isteyen kişilerin kullanıcı tarafından uzak tutulması gerekir. Elektrikli el aletleri ıslak yerlerde ya da yağmurda bırakılmamalı, aletin asılması ve taşınması sırasında prizden fişin çekilmesi için kablosu kullanılmamalıdır.	Sürekli Kontrol	1	4	4	Uygun
2.3	Elektrik	Elektrikli el aletleri çalışma	Yaralanma ile Elektrik Çarpması	5	5	25	I.	Kapatma ve açma şalterinde arıza olan aletlerin kullanımından kaçınılmalıdır. Personel dikkatli hareket etmeli ve aleti makul bir çerçevede kullanmalıdır. Personel bir ilaç ya da alkol aldığı anda aleti kullanmamalıdır.	45 gün	1	4	4	Uygun
2.4	Elektrik	Panolar	Elektrik Çarpması, Yangın	4	5	20	I.	Elektrik pano önlerinde çalışanı sistemin gerilim seviyesine göre gelen elektrik akımına karşı koruyacak izole halı olmalıdır. Bu malzeme çalışma alanına göre zemin genişliği (öngörülen 1m.) yeterli ölçüde, kalınlığı gerilim seviyesine uygun (4 mm = 40kV'luk test gerilimine dayanıklı), üst yüzeyi kaymaya sebep olmayacak şekilde olmalıdır.	45 gün	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



2.5	Elektrik	Açık uçlu kablo kullanımı	Elektrik çarpması, Yangın	5	5	25	I.	Hiçbir koşulda açık uçlu kablolar olmamalıdır. Özellikle topraklama kabloları kesilip devre dışı bırakılması elektrik çarpması ve elektrik kaynaklı yangına sebep olacağından asla böylesi bir tehlikeli durum oluşturulmamalıdır. Aşınmış kırık prizler-elektrik anahtarları, açık uçlu kablolar, izolasyonu aşınmış elektrik kabloları, açık hatlar gibi tesiste bulunan bu durumlar, uygun donanımlı eğitim almış belgeli elektrik işi yapan kişilerce ortadan kaldırılmalıdır.	Sürekli Kontrol	1	5	5	Uygun
2.6	Elektrik	Seyyar çekme, çoklu dönüştürücülerde İSG tedbirleri	Takılma, Düşme, Elektrik Çarpması Yangın,	5	5	25	I.	İşyerlerinde, sürekli taşınabilen ya da çekme iletken kullanımından kaçınılmalıdır. İş gereğince geçici süre ile kullanımı gerektiğinde iş güvenliği önlemleri alınmalıdır. Taşınabilir iletkenlerin kullanılması gereken yerlere yeteri sayıda ve uygun şekilde topraklanmış elektrik prizleri tesis edilmelidir. Kablolar mekanik darbelere, düşme-takılma risklerine güvenliği tehlikeye düşürmeyecek şekilde korunmalıdır. Uzatma kabloları hiçbir şekilde kalıcı kablolama yerine geçirilmemelidir. Her uzatma kablosu doğrudan bir prize takılacak ve sadece cihaz veya aydınlatma aracına bağlanacaktır. Esnek kordonlar ve uzatma kabloları sabit cisimlere tutturulmamalı, tavanlar, duvarlar, döşemelerden geçirilmemeli, fiziksel zarara uğramasından kaçınılmalıdır.	Sürekli Kontrol	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



2.7	Elektrik	Su, Buhar, Nem, Toz teması	Elektrik çarpması, Elektrik kaynaklı yangın	2	5	10	II.	Elektrik işletme araçları en azından su damlalarına karşı korunmuş tipte olmalıdır. Bunlar yoğunlaşma suyu toplanmayacak biçimde yapılmalıdır. Fiş-priz düzenlerin yalıtkan korunacağı bulunmalıdır. Bunların kullanıldıkları yerdeki olağanüstü etkiler metal bir korunacağı gerektirebilir. Bu durumda metal koruncaklı fiş-priz düzeni kullanılmalıdır. Döşemelerine, duvarlarına ve donatımına temizlik amacıyla su fışkırtılan yerlerde bulunan ve üzerlerine doğrudan su püskürtülen işletme araçları en azından su demetlerine karşı korunacak tipte olmalıdır. Yıpratıcı etkisi olan buhar ve dumana açık metal parçalara, örneğin koruyucu boya yada dayanıklı gereçler kullanılarak korozyona karşı korunmalıdır. (Elektrik İç Tesisleri Yönetmeliği- VII- Özel İşletme Yerleri Ve Tesislere Ait Ek Hükümler - Madde 61 - Nemli Ve Islak Yerler)	Sürekli Kontrol	1	5	5	Uygun
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Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
3. MAKİNELER													
3.1	Bakım	Bakım/Onarımın yetkisiz kişilerce yapılması	Sıkışma, kesilme, yaralanma	5	4	20	I.	Bakım-onarım ve temizlik ekipleri oluşturulmalı ve bu ekipler ilgili faaliyetler konusunda yetkin ve eğitimli kişiler olmalıdır. Bakım-onarım işlerinde halledilebilir durumlar dahi olsa yetkisiz müdahalelerden kaçınılmalıdır. Yapılacak işlerde mutlaka etiketleme-kilitleme sistemi uygulanmalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.2	Giyotin	Giyotin makasta elektriksel tehlikeler	Elektrik çarpmasıuzuv kesilmesi	3	4	12	II.	Giyotin makas TS- EN 13985+A1 (Takım Tezgahları- Güvenlik- Giyotin Makaslar) standardına uygun olmalıdır. Giyotin makas ile çalışmalarda güvenli çalışma, bakım-onarım ve temizlik işleri tedarikçi firma tarafından önerilen talimatları uygun olarak yapılmalıdır. Ayak pedalı üzerinin koruyucusu istemsiz basılmaya karşı her zaman olmalıdır. Pedal operatörün kolay ulaşacağı şekilde olmalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.3	Giyotin	Giyotin makasta elektriksel tehlikeler	Elektrik çarpmasıuzuv kesilmesi	2	5	10	II.	Emniyet sistemleri, koruyucular ve sensörler her zaman aktif olmalıdır. Makine bakım ve temizliği düzenli olarak yapılmalı, arızalar derhal amirlere bildirilmelidir. Eksiklikler giderilene kadar kullanılmamalıdır.	Sürekli Kontrol	1	5	5	Uygun



Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Rsik Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
3.4	CNC Punch	CNC Punch ile çalışmalarda talimatlara uyulmaması	Uzuv kopması, Muhtelif iş kazaları	5	5	25	I.	Tedarikçi kılavuzu içinde yer alan tüm talimatlara uyulmalıdır. Operatörler bu talimatlara göre hareket etmelidir. Makine operatörü yetkili ve ehliyetli kişiler olmalıdır. Elektrik, güvenlik ve mekanik sistemlerinin düzenli olarak bakım, kontrol ve temizlikleri kılavuzdaki talimatlara uygun yöntem ve sürelerde yapılmalıdır. Makine güvenlik sistemleri devre dışı bırakılarak çalışmaya izin verecek şekilde olmamalıdır. Her daim elektrik aksamları-kabloları, kontrol düğmeleri kontrol edilip çalışır durumda olması sağlanmalıdır. Üretime başlamadan önce programın simülasyonu yapılmalıdır. Tezgah tablasına sac malzemeler konulurken ellerin kesilmemesi için el koruyucu eldiven (TS EN 388+A1) kullanılmalıdır. Çalışmaya başlamadan önce hava basıncı, yağ seviyeleri, motorlar vb. kontroller yapılmalı. Levha uygun ebatlarda olmalıdır. Tezgâh çevresinin emniyetli olup olmadığı kontrol edilmelidir. Makine çalışma basıncı ideal seviyelerde olup olmadığı kontrol edilmelidir. Ağır parçalar tek kişi tarafından kaldırılmamalıdır. İşlem sırasına dikkat edilmelidir. Amacı dışında kullanılmamalıdır.	Sürekli Kontrol	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Rsik Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



3.5	Eksantrik Pres	Eksantrik presle çalışmalarda isg tedbirlerine uyulmaması	İşitme kaybı, Uzun Sıkışması, Elektrik çarpması	3	4	12	II.	Fren sistemleri, yaylar ve kayışlar düzenli aralılarla kontrol edilmelidir. Şartlandırıcının hava basıncı, su birikmesi ve yağ seviyesi düzenli olarak kontrol edilmelidir. Gevşeyen koç kızakları civataları talimatlarda yer alan hususlara uygun sıkılmalıdır. Presin çalışma konumu belirlenmelidir. Çift el sistemiyle çalışılacaksa çift el tertibatı her zaman iki el ile kullanılmalı ve farklı yöntemlerde bu sistemin prensibine aykırı uygulamalar (bant yapıştırmak gibi) yapılmamalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.6	CNC Abkant	CNC Abkantla güvensiz çalışmalar	Uzun sıkışması, uzun kopması	4	4	16	I.	CNC abkant presi çalıştırmadan önce bükme kalıpları üzerinde bulunan metal parçaları, toz gibi maddeler iyi biçimde temizlenmelidir. Pres çalışır haldeyken yalnızca çalışan prese yaklaşmalıdır. Kontrol panelinde programı yaptıktan sonra gerekli şartlar uygunsa makinenin motoru açılmalıdır. Malzeme sac kalınlığı bildirilen ölçüden fazla olmamalıdır. İş parçası ortalı şekilde konulmalıdır. Amacı dışında kullanılmamalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.7	CNC Abkant	CNC Abkantla güvensiz çalışmalar	Uzun sıkışması, uzun kopması	2	5	10	II.	Kısa kalan iş parçasını bükerken baş parmak kullanılmalı hatta mümkünse bu işe uygun parmak kullanmadan parçayı tutacak aparat temin edilmelidir.	Sürekli Kontrol	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



3.8	Punta Kaynak	Punta kaynakla çalışmalarda isg tedbirlerine uyulmaması	Duman ve gaz soluma, Göz haasasiyeti Patlama, Yangın	3	4	12	II.	Kaynak makinasını sadece eğitimi almış yetkin personeller kullanılmalıdır. Kaynak işine uygun iş elbisesi, koruyucu burunlu iş ayakkabısı, kaynak işinin niteliğine uygun koruyucu eldiven, solunum koruyucu maske, ışın ve kıvılcıma karşı koruyucu siperlik/vizör kullanılmalıdır.	Süreklili Kontrol	1	4	4	Uygun
3.9	Punta Kaynak	Punta kaynakla çalışmalarda isg tedbirlerine uyulmaması	Duman ve gaz soluma, Göz haasasiyeti Patlama, Yangın	4	4	16	I.	İşin yapıldığı etki alanı yakınında yanıcı tip malzemeler bulundurulmamalıdır. Makine tabanı zemine sabit olmalıdır. Makine topraklama bağlantısı mutlaka olmalıdır. Her kullanım öncesi elektrik kabloları, kaynak kabloları gözle kontrol edilmelidir.	Süreklili Kontrol	1	4	4	Uygun
3.10	Punta Kaynak	Punta kaynakla çalışmalarda isg tedbirlerine uyulmaması	Duman ve gaz soluma, Göz haasasiyeti Patlama, Yangın	2	5	10	II.	Amacı dışında kullanılmamalıdır. Operasyon noktasına uzuv temasından kaçınılmalıdır. Kaynak işi yapılan bölüme yaklaşılması için diğer personeller uyarılmalıdır. Kaynak makinasının uçları arasında malzeme yokken pedala basılmamalıdır.	Süreklili Kontrol	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risk Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



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3.11	Gazaltı Kaynak	Gazaltı kaynakla çalışmalarda isg tebirlerine uyulmaması	Elektrik çarpması Parlama	4	5	20	I.	Tedarikçi kılavuzu içinde yer alan tüm talimatlara uyulmalıdır. Periyodik ve temizliği tedarikçi kılavuzundaki talimatlar doğrultusunda belirtilen yöntem ve sürelerde yapılıp kayıt altına alınmalıdır. Kaynak makinasını sadece eğitimi almış yetkin personeller kullanılmalıdır. İşin yapıldığı etki alanı yakınında yanıcı tip malzemeler bulundurulmamalıdır. Amacı dışında kullanılmamalıdır.	Sürekli Kontrol	1	5	5	Uygun
3.12	Gazaltı Kaynak	Gazaltı kaynakla çalışmalarda isg tebirlerine uyulmaması	Yangın	3	5	15	II.	Kuru, sağlam izolasyona sahip eldiven ve iş önlüğü giyilmelidir. Islak ve hasar görmüş eldiven ve iş önlüğü kullanılmamalıdır. Elektroda çıplak elle dokunulmamalıdır. Elektrik taşıyan parçalara temas edilmemelidir. Çalışma yüzeyiyle operatörün temasını kesecek kadar büyük, elektriksel açıdan yalıtkan, yanmaz, hasarsız ve kuru izolasyon malzemesi kullanılmalıdır.	Sürekli Kontrol	1	5	5	Uygun
3.13	Gazaltı Kaynak	Gazaltı kaynakla çalışmalarda isg tebirlerine uyulmaması	Kaynak teli yaralanmaları, yanık	2	5	10	II.	Elektrot pensesine birden fazla elektrot bağlanmamalıdır. Makine çalışırken elektroda, topraklama bağlantısına veya makineye bağlı olan gerilim altındaki iş parçasına dokunmayın. Kendinizi elektroda, topraklama bağlantısına veya iş parçasına karşı yalıtın. Kaynak yapılan alan sürekli havalandırılmalıdır. Makine kullanılmadığı durumlarda kapalı tutulmalıdır.	Sürekli Kontrol	1	5	5	Uygun
Tehlike No.	Risk Analizi Yapılan Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risik Puanı	Öncelik Sırası	Alınması Gereken Önlemler	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç



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3.14	CNC Torna	CNC Torna tezgahı ile çalışmalarda güvensiz hareketler	Parça sıçraması Elektrik çarpması	3	4	12	II.	Makine emniyet-güvenlik sistemleri devre dışı bırakılarak çalışmaya izin verecek şekilde olmamalıdır. Her daim elektrik aksamları-kabloları, kontrol düğmeleri kontrol edilip çalışır durumda olması sağlanmalıdır. Emniyet gözlüğü veya yüz vizörü, koruyucu burunlu ayakkabı, sarkan ve bol olmayan iş elbisesi kullanılmalıdır. Kimyasalların etkisini azaltmak için, iyi havalandırılmış yerlerde ve mikroskopik parçacıkları filtre edebilen toz maskesi kullanılmalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.15	CNC Torna	CNC Torna tezgahı ile çalışmalarda güvensiz hareketler	Parça sıçraması Elektrik çarpması	4	4	16	I.	Tezgah çevresindeki hurda malzeme, yağ, gres yağı vb. temizlenmelidir. Tezgah ayarları yapılırken güç kaynağı bağlantısı kesilmelidir. Emniyet donanımı yerine takılmadan makine asla çalıştırılmamalıdır	Sürekli Kontrol	1	4	4	Uygun
3.16	CNC Torna	CNC Torna tezgahı ile çalışmalarda güvensiz hareketler	Parça sıçraması Elektrik çarpması	3	5	15	II.	Operasyon sırasında takımları ayarlamaya sökmeye çalışılmamalıdır. Operatör her zaman uykusunu almış ve dikkatli bir şekilde çalışmalıdır. Tezgah çalışırken üzerine yaslanmayın.Hareketli parçalara asla dokunmayın, yakınında durmayın. Düğme ve anahtarlara ıslak ve yağlı ellerle dokunmayın. Makine topraklama bağlantısı mutlaka olmalıdır Tezgah çalışırken ön kapı mutlaka kapalı olmalı, açılmamalı ve kapı açılınca sistemi durduran siviçler iptal edilmemelidir..	Sürekli Kontrol	1	5	5	Uygun



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Tehlike No.	Risk Analizi Yapı Bölüm	Tehlikeler	Tehlike Sonucu	Tehlike olasılığı	Tehlike şiddeti	Risik Puanı	Öncelik Sırası	Açıklama	Termin	Tehlike Olasılığı	Tehlike Şiddeti	Risk Puanı	Sonuç
3.17	Freze Tezgahı	Freze tezgahı ile yapılan çalışmalarda isg tedbirlerine uyulmaması	Parça sıçraması	3	4	12	II.	Uygun olmayan takım ve aksesuarlar kullanılmamalı ve zorlanmamalıdır. Amaç dışı kullanıma izin verilmemelidir. Operatör tezgah çalışır durumda iken tezgah yanından ayrılmamalıdır. Operasyon sırasında parmaklar döner parçalardan ve kesici takımlardan uzak tutulmalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.18	Freze Tezgahı	Freze tezgahı ile yapılan çalışmalarda isg tedbirlerine uyulmaması	Elektrik çarpması	3	4	12	II.	İş parçaları üzerinde kontroller yapılırken makine tamamen durdurulmalıdır. İş parçalarının mengeneye sıkıca bağlı olmasından emin olunuz. Mil daima temiz tutulmalı ve ekipmana uygun doğru yağ ile yağlanmalıdır. Metal talaşlarını temizlemek için (makine çalışırken temizlik yapılmaz) uygun bir fırça kullanılmalıdır.	Sürekli Kontrol	1	4	4	Uygun
3.19	Freze Tezgahı	Freze tezgahı ile yapılan çalışmalarda isg tedbirlerine uyulmaması	Dolanma Ezilme	4	4	16	I.	Tezgah tablasının etrafı kabin ile kapatılarak çapak fırlamasına karşı önlem alınmalıdır. Çalışma etki alanının diğer çalışanlara ve ziyaretçilere talaş-parça fırlamasına karşı siperle/paravanla kapatılması sağlanmalıdır. Makina yağlarına karşı deri ve iltihaplardan korunmak için temizliğe özen gösterilmelidir. El aletleri tezgah tablası üzerinde bırakılmamalıdır. Çalışır haldeyken makine üstüne sarkılmamalıdır. Operatör bol kıyafet giymemeli ve sarkan aksesuarlar, takı-yüzük-bileklik-saat vb. aksesuarlar kullanılmamalıdır.	Sürekli Kontrol	1	4	4	Uygun

4. SONUÇ VE ÖNERİLER

KIRIKER Metal Asansör Sanayi ve Ticaret Limited Şirketi İşletmesinde yapmış olduğum araştırma neticesinde, L tipi matris yöntemi ile risk analizi yaparak, üretim faaliyetleri sırasında meydana gelebilecek tehlikeler belirlenmiştir. Daha önceleri iş kazası ile sonuçlanmış tüm durumlar ve kazalara sebep olabilecek tehlikeleri ortadan kaldırmaya ve en aza indirmeye yönelik iş güvenliği uygulamaları kontrollü ve düzenli olarak uygulanmaya başlanmıştır.

Fabrikada en çok iş kazası yaşanan makinalardan başlanarak kontrol önlemleri ve termin süreleri belirlenmiştir. Yapılan risk analizinden ziyade, daha önce yaşanmış iş kazalarının sebepleri araştırılarak tekrar yaşanmaması için çalışma başlatılması yönünde karar alınmıştır.

- İşçilere, çalıştıkları departmana özel koruyuculuğu olacak şekilde, eldiven, kulaklı, iş gözlüğü, iş elbisesi gibi ekipmanların tedarikinin sürekli yapılması ve üretim hattında işçilerin düzenli kullanıp kullanmadığı kontrol edilmelidir.
- Ofis çalışanları ve fabrika ziyaretçilerinin üretim hattına girmesi engellenmeli, zorunlu girişler durumunda da ziyaretçi formu tutulması, üretime girecek 3. Şahısların da İSG tedbirleri ile alakalı bilgilendirilmesi gerektiği kararlaştırılmıştır.

Fabrikada artarda, mesleki yeterlilik gerektiren pres makinasının, mesleki yeterliliği olmayan farklı bir birimden personel tarafından kullanılması sebebiyle iş kazası yaşanmıştır. Kazayı yaşayan işçiler iş günü kaybı yaşamış, günlerce çalışamaz hale gelmiştir. Diğer işçilerin psikolojik zarar görmeleri, üretimin sekteye uğraması ile maddi hasar yaşanmıştır. Bunun gibi kazalar göz önüne alındığında iş verimliliğinde düşüş olduğu gözlemlenmiştir. Bunların önüne geçebilmek adına fabrika yönetimi ile, her ne sebep olursa olsun personelin sadece görevli olduğu birimde çalışması gerektiği üzerine anlaşmaya varılmıştır.

Meydana gelen iş kazalarının çok büyük miktarlara ulaşan gizli ve görünür maliyeti bulunmaktadır. Aynı zamanda çalışanların yaşamını yitirmesi yahut iş göremez hale gelmesi çok ciddi yaşamsal sorunlara yol açmakta, bu çalışanların ailelerinin de mağdur olmasına sebep olmaktadır. Bu nedenle iş sağlığı ve güvenliği alanında yapılan faaliyetlerin temel amacı; çalışanların mesai saatleri boyunca sağlıklı ve güven içinde çalışmasının, mesai bitiminde evlerine sorunsuzca gitmelerinin sağlanmasıdır. İş sağlığı ve güvenliği kavramı her ne kadar bir mevzuata sahip olsa da mevzuat zorunluluğu yerine, geliştirici ve iyileştirici bir uygulama olarak benimsenmelidir. Güvenliğin ve sağlığın desteklenmesi için bir araç olarak değerlendirilmelidir. Unutulmamalıdır ki iş güvenliğine yönelik çalışmalar işletmeler için ek bir maliyet değildir; aksine çalışma ortamının sağlıklı olması, risk ve tehlikeler için önlem alınmaması, meslek hastalıkları ve iş kazaları asıl maliyet unsurlarıdır (Akıllı ve Aydoğdu, 2013).

İş yerlerinde güvenliğin ve iş sağlığının mevcut olabilmesi için işçi, işveren ve devletin ortak çabası kaçınılmazdır. Öncelikli olarak devletin en iyi biçimde hazırladığı ve olabildiğince eksiksiz bir mevzuat hazırlanması gerekmektedir. Ardından söz konusu mevzuatın iş yerlerinde kullanılması ve uygulanması zorunlu hale getirilerek hem işverene hem de işçiye bu konuda detaylı bilgi verilmelidir. Denetim sisteminin baştan savma olmaması, önlemeye yönelik politikalara ağırlık verilmesi, iş güvenliğinin bir bilinç olarak çalışanlara ve işverenlere aktarılması ve çalışanların bu yönde gelişiminin sağlanması gerekmektedir. İş güvenliği ile ilgili denetim, yasa koyma, yaptırım sağlama vb. konularda devletin uygulama yetkisi bulunmaktadır. Öncelikli olarak işverenlerin, sendikaların, çalışanların ve bütün toplumun iş sağlığı ve güvenliği konusunda bilgilendirilmesi, bilinçlendirilmesi gerekmektedir (Balçık,2014).

Toplumsal hayat ve toplumsal hayatın gereklerine uyumlu hareket edebilme yeteneği, insanları diğer canlılardan ayıran en önemli özelliklerden biridir. Toplumsal hayatın sürdürülmesinde en

temel gerekliliklerden bir tanesi, bireylerin yaşama ve çalışma alanlarının, bu alanlara ait kuralların belirli sınırlar çerçevesinde belirlenmiş olmasıdır. Çalışma yaşamı bireyin günlük yaşamının büyük bir kısmını kaplamaktadır. Gereklilikler sebebiyle çalışma şartları gittikçe katılaşmaktadır. Bu durum sonucunda hem fiziksel hem de ruhsal birçok risk ortaya çıkmaktadır. İş sağlığı ve güvenliği, çalışma yaşamını olduğu kadar sosyal yaşamı da şekillendirmekte, değiştirmekte ve çalışma yaşamının yansımalarını barındırmaktadır. Çalışma hayatına taşınan her teknolojik yenilik hem işlerini kolaylaştırmakta hem de yeni risklerin ortaya çıkmasına neden olmaktadır. Bir başka deyişle teknolojinin gelişmesine bağlı olarak hem çalışma alanlarında yeni korunma yöntemleri geliştirilmekte, hem de iş riskleri aynı oranda artmaktadır. Daha yaygın bir biçimde kullanılır hale gelen kimyasallar, iş hayatında çalışanlar arasında her geçen gün yaygın hale gelen strese bağlı psikolojik sorunlar, iş sağlığı ve güvenliğini hayati bir hale getirmektedir. Bunların yanı sıra üretimde yeni teknoloji kullanımı, üretim maliyetlerinin artmasına neden olmuştur. Çünkü yeni teknolojilerin kullanılabilmesi için bu teknolojilere bütçe ayrılması gerekmektedir. Ayrılan bütçenin dengelenebilmesi için seri üretim yapılması gerekmekte, bu da iş saatlerini ve iş yükünü artırmaktadır. Bu aşamada işletme tarafından, bünyesinde çalışan kişilerin motivasyonlarının, maddi ve manevi beklentilerinin karşılanması oldukça önemlidir ve bu çerçevede iş sağlığı ve güvenliği uygulamaları devreye girmektedir. Çalışma şartlarının evrensel standartlara uygun olması, istihdamın yapılacak işe uygun olarak gerçekleştirilmesi, bu alandaki toplumsal duyarlılıklar, iş sağlığı ve güvenliğini zorunlu hale getiren sosyal unsurlardır (Akkaya, 2017).

İş sağlığı ve güvenliği konusunda devletin önemli bir rolü bulunmaktadır. Bu sorunun çözülmesi için devletin gerekli denetimleri yapması ve yaptırımları uygulaması gerekmektedir. Ayrıca işverenlere mali yardım yapılarak iş sağlığı ve güvenliği sisteminin aktive edilmesi sağlanmalıdır. Bunların yanında işverenler, işveren vekilleri, alt işverenler iş sağlığı ve güvenliği ile ilgili eğitime tabi tutulmalı ve bu sayede sistem çok daha yürür hale getirilmelidir. Gerekli hallerde ve şüpheli durumlarda devletin denetim mekanizmasının son derece aktif ve hızlı şekilde çalışması gerekmektedir. Sorun olağanüstü önlemlerle, toplumsal bir yaklaşımla, planla, sabırla ve orta valide çözümlenmelidir. Özellikle çalışanların sanayileşme sonucunda ortaya çıkan tehlikelerden, bedenine, yaşamına yönelik ya da sağlığına yönelik risklerden ve zararlardan korunması bir zorunluluktur. Çünkü meslek hastalıkları ve iş kazaları çalışanın gelirinden olmasına neden olabilmekte, dahası işçinin sakat kalması ya da hayatını kaybetmesi durumunda işçinin ailesi de zor durumda kalmaktadır. İş sağlığı ve iş güvenliğine önem verilmemesi durumunda meslek hastalıklarının ve iş kazalarının artacağı unutulmamalıdır. Bu da iş kazalarına maruz kalan kişilerin psikolojilerinin de zarar görmesine yol açacaktır. İş kazaları ve meslek hastalıkları hem çalışan için hem işletme için hem de devlet için ciddi bir sorundur ve ciddi bir maliyete sebep olmaktadır. Bu nedenle çalışma alanında iş sağlığı ve güvenliğinin korunması, sürdürülmesi, en üst düzeyde uygulanması hem işverenler hem de devlet için hukuki bir zorunluluk olarak değerlendirilmektedir.

KAYNAKÇA

1. 6331 sayılı İş Sağlığı ve Güvenliği Kanunu, Resmi Gazete Tarih: 30/6/2016, Sayı:28339.
2. Akıllı, H., Aydoğdu, Ö. (2013). İş Sağlığı ve Güvenliğinin Önemi. Maden Tetkik ve Arama Genel Müdürlüğü, Enerji Hammadde Etüt ve Arama Dairesi Başkanlığı – Ankara https://www.mta.gov.tr/v3.0/sayfalar/hizmetler/kutuphane/ekonomi-bultenleri/2013_16/245.pdf



3. Akkaya, M. A. (2017). Bilgi Merkezlerinde İş Sağlığı ve Güvenliğinin Önemi ve Uygulanabilirliğine İlişkin Bir Durum Değerlendirmesi. *Türk Kütüphaneciliği* 31(4), 501-519
4. Aydoğan, M., 2015. Teknoloji ve İnsan Emeği. *Kurumsal Aktarım Dergisi*, <http://kuramsalaktarim.com/teknoloji-ve-insan-emeği/>
5. Balçık, M., 2014 Yeni Yüzyıl Üniversitesi, Sağlık Bilimleri Enstitüsü, Bitirme Projesi
6. Ceylan H., Başhelvacı V., S., 2011. Risk Değerlendirme Tablosu ile Risk Analizi: Bir Uygulama. *Uluslararası Mühendislik Araştırma ve Geliştirme Dergisi*, 3(2), 25-33.
7. Erol, S. (2015). İş Sağlığı ve Güvenliği Konusunda İşveren, Çalışan Ve Devletin Rolü. (ASSAM - UHAD), 4, 115-138.
8. Karamık S., Şeker U., 2015. İşletmelerde İş Güvenliğinin Verimlilik Üzerine Etkilerinin Değerlendirilmesi, *Gazi Üniversitesi Fen Bilimleri Dergisi*, 3(4), 75-84.
9. Kişisel Koruyucu Donanımların İşyerlerinde Kullanılması Hakkında Yönetmelik, 2013. Kişisel koruyucu donanımların değerlendirilmesi ve seçilmesi. *Resmi Gazete*, Sayı:28695
10. Mesleki Yeterlilik Kurumu (MYK). Mesleki Yeterlilik Belgesi Zorunluluğu Nedir? <https://www.myk.gov.tr/index.php/tr/myk-meslek-yeterllk-belges-zorunluluu-sayfasi/>,
11. Şen M. K, Türkiye'nin Lokomotifleri Metal Sanayi, Türk Metal Sendikası, <http://www.turkmetal.org.tr/default.asp?page=arastirmalar&id=312>, 2010.
12. Sezer M, Dünya Metalurji Sektöründe Gelişmeler, Sarkuysan, 2006
13. T.C. Çalışma ve Sosyal Güvenlik Bakanlığı, İş Teftiş Kurulu Başkanlığı, Metal Sektöründe Çalışan İşçilerin Çalışma Koşullarının İyileştirilmesi Programlı Teftişi Sonuç Raporu, Ankara, 2011.
14. T.C. Bilim, Sanayi ve Teknoloji Bakanlığı, Verimlilik Genel Müdürlüğü, Kurumsal Performansı Artırmanın Bir Yolu Olarak İş Sağlığı ve Güvenliği, Ankara, 2013.
15. Ulucan H., 2016, ÇSGB, İş Sağlığı ve Güvenliği Uzmanlık Tezi
16. <https://tr.wikipedia.org/wiki/Metal>, (Erişim Tarihi: 15/ 11/ 2021)

SOLUNUM SİSTEMİ HASTALIKLARINDA HEMŞİRELİK SÜRECİNİN ÖNEMİ **THE IMPORTANCE OF THE NURSING PROCESS IN DISEASES OF THE** **RESPIRATORY SYSTEM**

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ÖZET

Hemşirelik, hastaların tedavisinin uygulanması ve koruyucu, iyileştirici sağlık hizmetlerinin sürdürülmesini amaçlayan, bu doğrultuda hasta bakım uygulamalarını sergileyen profesyonel bir meslektir. Bakım uygulamaları hasta semptomlarının hafifletilmesinde, doğru tedavi yaklaşımlarının benimsenmesinde, tedavi sonrası rehabilitasyonun sağlanmasında, bireyin tam iyilik haline kavuşmasında ve yaşam kalitesinin artırılmasında son derece önemlidir. Bu nedenle hemşirelik bakımının planlı ve sistematik bir biçimde uygulanması ve değerlendirilmesi gerekir.

Hemşirelik Süreci (HS), hemşirelik uygulamalarının sağlıklı/hasta birey açısından bakım gereksinimlerinin belirlenerek bireye özgü bakımı ön plana çıkaran, uygulamaların kanıta dayalı ve sistematik olarak gerçekleştirildiği bir süreçtir. HS, bireyin ya da ailenin sorunlarının belirlenmesi, bu sorunlara göre hemşirelik tanısına karar verilmesi, tanıya uygun hemşirelik girişimlerinin planlanması, girişimlerin uygulanması ve değerlendirilmesini içerir. Bu aşamalar klinik problemlerin çözümünde oldukça önemlidir.

Bireyde ortaya çıkan hastalıklar, hastanın yaşam aktivitelerini olumsuz etkileyen ve yaşam kalitesini düşüren klinik problemler olarak değerlendirilir. Hemşireliğin önemli rollerinden biri de klinik problemlere yönelik uygun teknikleri kullanarak sorunları çözmektir. Özellikle kronik hastalıklar uzun tedavi ve bakımın yanında bireyin sistematik olarak takibini de gerektirir. Kronik hastalıklar arasında ise solunum sistemi hastalıkları ülkemizde ve dünyada üçüncü sırada ölüm nedeni olan; nefes darlığı, öksürük, ağrı, yorgunluk gibi önemli semptomlar ortaya çıkaran ciddi hastalıklardır. Solunum iyi oksijenlenme ile tüm vücut fonksiyonlarının sağlıklı bir şekilde çalışmasını sağlarken, yetersizliği zamanla diğer sistem hastalıklarının da ortaya çıkmasına yol açabilir. Bu nedenle solunum sistemi hastalıklarında ortaya çıkan/çıkabilecek semptomların belirlenerek uygun bakımın planlanması ve yürütülmesi gerekir.

Solunum sistemi gibi hayati organların ortaya çıkaracağı klinik problemler, belirli bir düzen içerisinde değerlendirilmeli ve aciliyetine göre tedavi ve bakımı planlanmalıdır. Ancak hemşirelerin yoğun çalışma koşulları ve hasta sayısındaki süreğen artış, bakım aktivitelerinin zamanında ve uygun şekilde yürütülememesine neden olabilmektedir. HS sayesinde düzenli ve sistematik hasta yaklaşımı ile kanıta dayalı uygulamaların sağlanması mümkün olabilmektedir. Yapılan çalışmalarda HS ile verilen hemşirelik bakımının hasta çıktılarını iyileştirdiği görülmüştür. Bu nedenle özellikle solunum sistemi gibi önemli hastalıkların

değerlendirilmesi ve bakım uygulamalarının sunulmasında HS ilk sırada düşünülmesi gereken yaklaşımlardan olmalıdır.

Anahtar Kelimeler: Hemşirelik süreci, Hemşirelik bakımı, Solunum sistemi.

ABSTRACT

Nursing is a professional career aimed at the implementation of patient treatment and the maintenance of preventive, curative health services, demonstrating patient care practices in this direction. Caring practices are extremely important in alleviating patient symptoms, adopting the right treatment approaches, ensuring rehabilitation after treatment, achieving the full well-being of the individual and improving the quality of life. For this reason, nursing care should be applied and evaluated in a planned and systematic manner.

The Nursing Process (NP), nursing practice healthy/ill assess the needs of the individual, highlighting the personalized care in terms of maintenance, applications, evidence-based process and systematically performed. NP includes identifying the problems of an individual or family, deciding on a nursing diagnosis based on these problems, planning diagnostic nursing initiatives, implementing and evaluating initiatives. These stages are quite important in solving clinical problems.

Diseases that occur in an individual are considered as clinical problems that negatively affect the patient's life activities and reduce the quality of life. One of the important roles of nursing is to solve problems by using appropriate techniques for clinical problems. In particular, chronic diseases require long-term treatment and care, as well as systematic monitoring of the individual. Among chronic diseases, respiratory system diseases are the third place cause of death in our country and in the world; such as shortness of breath, cough, pain, fatigue are serious diseases that cause important symptoms. Breathing provides a healthy functioning of all body functions with good oxygenation, while its insufficiency can lead to the appearance of other system diseases over time. For this reason, it is necessary to plan and carry out appropriate care by identifying the symptoms that occur/may occur in diseases of the respiratory system.

Clinical problems that vital organs such as the respiratory system will cause should be evaluated in a certain order and treatment and care should be planned according to the urgency. However, the intensive working conditions of nurses and the continuous increase in the number of patients may cause the maintenance activities to not be carried out in a timely and appropriate manner. Thanks to NP, it is possible to provide evidence-based practices with a regular and systematic patient approach. In the studies conducted, it has been seen that nursing care provided with NP improves patient outcomes. For this reason, NP should be one of the approaches that should be considered first, especially in the evaluation of important diseases such as respiratory system and in the presentation of care practices.

Keywords: Nursing process, Nursing care, Respiratory system

GİRİŞ

Hemşirelik, çalışma alanı insan olan ve bakıma temellenmiş profesyonel bir meslektir.¹⁻³ Hemşirelik mesleğinin uygulamalı bir sağlık disiplini olması nedeniyle hastaların tedavisinin yapılması, koruyucu ve iyileştirici sağlık hizmetlerinin sürdürülmesi ve bu doğrultuda hasta bakım uygulamalarının sergilenmesini mesleğin en önemli amaçları arasındadır.⁴ Bakım, yalnızca hemşireliğe özgü değil, hemşirelik için özgündür. Hemşirelik mesleğine profesyonel bir kimlik kazandırılması, bilimsel bir temele oturtulması, bakım hizmetinin planlı ve etkin olması için sorun çözme süreci olarak adlandırılan HS'nin kullanımı önemlidir.^{4,5} HS, hemşirelik bakımına bilimsel yöntemlere dayalı sistemli bir yaklaşım sağlar.⁴ Hemşirelik bakımının sistemli bir şekilde uygulanması sayesinde olumlu pek çok hasta çıktısının olduğu bildirilmiştir.⁶⁻¹⁰ Özellikle kronik hastalıkların sistemler üzerine eklenerek ilerlemesi, yıllar içinde prognozun kötüleşmesi ve tedavi/bakım uygulamalarının karmaşıklaşması nedeniyle düzenli ve programlı hasta değerlendirmesine ihtiyaç duyulmaktadır. Bu ihtiyaçlar hemşireliğin en önemli felsefesini oluşturan bakımın, planlı ve sistematik uygulanmasını gerekli kılmaktadır.

HEMŞİRELİK SÜRECİ

Dünya Sağlık Örgütü (DSÖ) HS'yi, hemşirelik bakımı uygulamalarında bilimsel problem çözümüyle yönteminin sistemli bir biçimde kullanılması olarak tanımlamıştır. Problem çözümü yöntemi; her disiplinde mevcut bir sorunun çözümlenmesi için kullanılmaktadır. Diğer bir deyişle bu yöntem, sorun çözümlemede sistematik bir yaklaşımdır.² Süreç kelimesi ise bir işlemin gidişi anlamına gelir, dinamik bir süreci ifade eder.⁴ Hemşirelik süreci hemşirelerin problem çözümünde kullandığı bir yöntemdir.¹¹ Bilimsel bir problem çözme yöntemi ve devamlılık arz eden süreci bir araya getiren HS, sağlıklı ya da hasta bireyin problemlerine sistematik ve mantıksal olarak yaklaşım sergilenmesini gerektirir.¹² Diğer bir ifadeyle HS; bakım hizmetinin etkin, planlı, profesyonel ve bilimsel yaklaşımlarla sunulabilmesi için bilimsel yöntemlerin kullanılarak sorun çözme süreci olarak tanımlanır. Sağlıklı ya da hasta bireyin hemşirelik bakım ihtiyaçlarının belirlenmesi HS'nin temelini oluşturur.⁵ Hemşirelik mesleğine profesyonel bir kimlik kazandıran HS, bilimsel olarak düşünme ve araştırmayı gerektiren birey/aileye özgü olarak planlanıp, uygulanan ve değerlendirilen dinamik bir süreçtir. HS, kritik düşünme ve hasta bireyin problemlerin çözümünde hemşireler tarafından kullanılan bilimsel bir yaklaşımdır.^{2,4,13} Bu yaklaşım hemşirelik kuramcıları tarafından da ele alınarak yorumlanmış ve belirli aşamalarda kullanıma sunulmuştur.

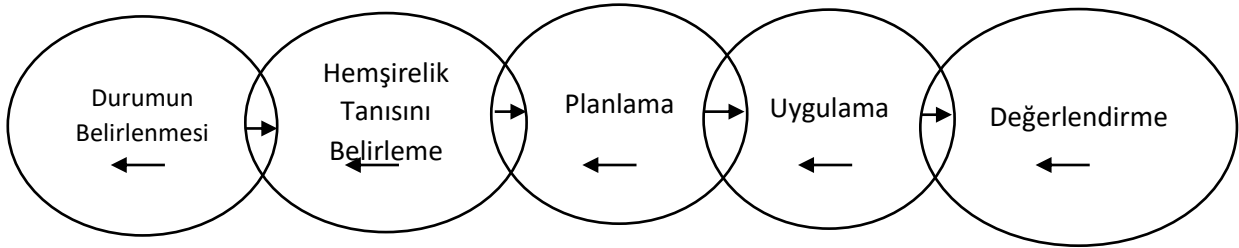
HEMŞİRELİK SÜRECİNİN TARİHÇESİ

Hemşireliğe meslek niteliğini kazandıran hemşirelik süreci kavramı ilk kez 1955'te Lydia Hall tarafından ileri sürülmüş, 1960 yılında Ida Jean Orlando hemşirelik sürecini ele almış, 1967'de Yura ve Walsh sürecin dört aşamasını oluşturmuştur.¹⁴ Tanı teriminin kullanımı ile ilgili tartışmalar 1970'den 1980'e kadar sürmüştür. Tanılamanın yalnızca hekimlerin kullanılabileceği görüşü 1980'lere kadar devam etmiştir. Hemşirelerin hasta tanılama konusunda yetkili olduğu düşünülmemiştir. Bugünkü ismi ile Kuzey Amerika Hemşirelik Tanılama Birliği (North America Nursing Diagnosis Association: NANDA), hemşirelik tanı listesini ilk kez 1997 yılında yayınlamış ve bu görüşleri değiştirmiştir.¹⁵ Hemşirelik alanındaki profesyonel organizasyonlar da hemşirelik sürecinin kullanımını desteklemiştir. Örneğin; 1980 de Amerikan Hemşireler Birliği (American Nurses Association: ANA) tarafından yayınlanan "Hemşireliğin Sosyo Politik Durumu" isimli kitabında tanı ve tedavi aracılığı ile hemşirelik

tanımlanmıştır.¹⁶ Amerikan Yoğun Bakım Hemşireliği Derneği 1990 yılında hemşirelik tanısını, hemşirelik uygulamalarının kavramsallaştırılmış bir ifadesi olarak ele almıştır. ANA 1991 yılında, “Klinik Hemşirelik Uygulamalarının Standartları”nı yeniden düzenleyerek yayınlamıştır. Bu yayında veri toplama, tanılama, sonuçları belirleme, planlama, uygulama ve değerlendirme aşamalarını içeren hemşirelik bakımı yer almıştır.¹⁶

HEMŞİRELİK SÜRECİ BASAMAKLARI

Hemşirelik süreci gelişim gösterirken önce dört daha sonra beş aşamalı olarak ele alınmıştır. ANA ise HS aşamalarına “beklenen sonucun tanımlanması” basamağının eklenmesiyle yapılan HS’nin daha etkili olacağını belirtse de sonrasında beş aşamalı HS’nin kullanımına karar verilmiştir.¹⁷ Bu aşamalar; ilk değerlendirme, tanımlama, planlama, uygulama ve değerlendirmedir.



Şema 1. Hemşirelik Sürecinin Aşamaları.²

Hemşirelik süreci hasta ile karşılaşılan ilk andan itibaren başlar. Hastanın ayrıntılı anamnezi, yaşadığı problemleri araştırılır ve bu problemlere uygun hemşirelik tanısı belirlenir. Hemşirelik girişimleri uygulandıktan sonra hasta sonuçları değerlendirilir. Bazı durumlarda beklenen hasta sonuçları elde edilemeyebilir. Bu durumda hemşire uyguladığı aşamaları yeniden gözden geçirerek beklenen hasta sonuçlarını elde etmeye çalışır. Böylece sistematik HS sayesinde hastanın öncelikleri daha kolay belirlenir ve uygulamada gerekli düzenlemeler kolaylıkla yapılabilir. Bu nedenle HS aşamalarının her birinin daha dikkatli incelemeye ihtiyacı vardır.^{2,4,18}

Tablo 1. Hemşirelik Süreci Aşamaları⁴

I. Durumun belirlenmesi	<ul style="list-style-type: none">• Sistemli veri toplama• Verilerin organizasyonu• Verileri doğrulama• Verileri yorumlama
II. Hemşirelik Tanısını Belirleme	<ul style="list-style-type: none">• Verileri analizi• Bireyin mevcut/potansiyel sağlık problemlerinin saptanması• Bakım önceliklerini belirlenmesi• Hemşirelik tanısı belirleme
III. Planlama	<ul style="list-style-type: none">• Bireyin hangi hemşirelik uygulamalarına gereksinimi olduğuna karar verme• Bakım amaçları belirleme• Hemşirelik girişimlerinin önceliklerini planlama• Bakım planını ekip arkadaşlarıyla paylaşma

IV. Uygulama	<ul style="list-style-type: none">• Bağımlı/bağımsız hemşirelik girişimleri belirleme• Bakım planına göre hemşirelik bakımı uygulama• Uygulamadan sonra hasta gözleme• Planlamada yer alan ama uygulanmayan hemşirelik girişimlerini değerlendirme
V. Değerlendirme	<ul style="list-style-type: none">• Amaçlar ile sonuçları karşılaştırma• Uygulanan hemşirelik girişimlerinin etkinliğini değerlendirme• Değerlendirmeye göre bakım sonlandırma, değiştirme ya da devam etme.

I. Durumun Belirlenmesi

Hemşirelik sürecinin ilk aşaması, bireyin/ailenin bakım gereksinimlerinin saptanması için yapılan ön değerlendirmedir. HS'nin son aşaması olan bakım planının “değerlendirmesi” ile karıştırılmamalıdır. HS'nin ilk aşamasından itibaren eleştirel düşünme becerilerinin kullanılması önemlidir. Eleştirel düşünce, bir ya da birden fazla problemi görmeyi, kapsamlı durum değerlendirmesi yapmayı, problemin tanınmasını ve çözümünü kolaylaştırır. Sorunları değerlendirme hemşirenin sağlıklı/hasta birey/aile ile ilk karşılaştığı andan itibaren başlar ve aralıksız devam eder. Bireyin/ailenin bedensel, akılsal, sosyal, duygusal ve fonksiyonel durumu hakkında tüm bilgiler toplanır. Bu toplanan bilgilerin tümüne veri denir. Veri toplamak için en uygun ortam sağlıklı/hasta birey/ailenin bulunduğu ortamdır. Hemşirelik sürecinin tüm aşamalarına temel olabilmesi için, verilerin doğru ve eksiksiz toplanması çok önemlidir. Veriler objektif ve subjektif olarak gruplandırılabilir. Subjektif veri hastanın/ailenin ifade ettikleridir. Objektif veriler ise hemşire veya diğer ekip üyelerinin görüşme, gözlem, fiziksel değerlendirme yoluyla topladıkları veriyi, yapılan tanı işlemlerini ve laboratuvar sonuçlarını kapsar.^{2,19}

II. Tanılama

Hemşirelik tanısının belirlenmesi, HS'nin ikinci aşamasıdır. Bu aşamada belirlenen hemşirelik tanıları, hemşirelik aktivitelerine temel oluşturur. Hemşirelik tanıları, hemşirenin bağımsız olarak uygun hemşirelik yaklaşımları ile önlemek, hafifletmek ya da çözümlenmek için yasal olarak ele almaya yetkili olduğu, birey ve grupların var olan ya da potansiyel sağlık problemleridir.² Hemşirelik tanısının belirlenmesi aşamasında toplanan veriler analiz edilerek yorumlanır. Belirti ve bulguların ne anlama geldiği belirlenir. Bu aşamada, hemşirenin düşünme becerisi, ilgili bilgi ve deneyimlerini hatırlayıp ilişki kurabilme yeteneği çok önemlidir. Verilerin analizi yapıldıktan sonra tanı hipotezi kurulur. Belirlenen bu hipotezin NANDA'nın kabul ettiği hemşirelik tanıları ile uygunluk gösterip göstermediğine bakılır. Seçilen tanıya özgü tanımlayıcı özellikler, hastanın belirti ve semptomları ile karşılaştırılır. Eğer en az bir tanesi uygunluk sağlıyor ise hemşirelik tanısı belirlenmiş olur. Uygunluk sağlanmadığında, o hipotezden vazgeçilir ve yeniden daha kapsamlı veri toplanır.^{18,19}

III. Planlama

Hemşirelik sürecinin üçüncü aşamasını oluşturur. Bu aşama bireysel, organize ve amaca yönelik olarak nasıl bir hemşirelik bakımı verileceğine karar verme zamanıdır. Planlama aşaması; önceliklerin belirlenmesi, bakım amaçlarının/uzun vadeli beklenen sonuçların belirlenmesi, hemşirelik girişimlerine karar verilmesi ve bakım planının yazılmasını kapsar.^{2,18,19}

IV. Uygulama

Bakım planının uygulama aşaması planlanan girişimlerin yerine getirilmesidir. Bu aşamada planlanan girişimler, hastanın kendisi, ailesi ya da ekibin diğer üyeleri tarafından yerine getirilse de tüm sorumluluk bakım planı yapan hemşireye aittir. Planlanan tüm aktiviteler, bakım planına uygun olarak yapılır. Tüm uygulamaların temel amacı, problemin etiyojisini gidermek ya da hafifletmektir. Uygulama esnasında, hemşire devamlı olarak hastanın hemşirelik bakımına verdiği yanıtı değerlendirir. Bu sırada bakım planında, hastanın tepkisine göre düzenleme yapılabilir.^{18,19}

V. Değerlendirme

Hemşirelik sürecinin bu son aşaması, planda belirlenen hedefe yönelik hemşirelik girişimlerinin başarılı olup olmadığının değerlendirilmesidir. Diğer bir ifade ile beklenen sonuçlar/hedefler değerlendirmede yol göstericidir. Hemşire değerlendirme aşamasında kendine şu soruları sorar;

- Hemşirelik tanısı doğru belirlenmiş miydi?
- Hasta belirlenen zamanda beklenen sonuçlara ulaştı mı?
- Hemşirelik tanısı çözüme ulaştı mı?
- Hastanın, hemşirelik bakım gereksinimleri karşılandı mı?
- Hemşirelik girişimine devam edilecek mi, değiştirilecek mi, durdurulacak mı?
- Bakım planında yer almayan yeni bir problem ortaya çıktı mı?
- Hedefe ulaşmayı etkileyen faktörler nelerdir?
- Beklenen sonuçlarda değişiklik yapılması gerekiyor mu?

Bu sonuçların yanıtları hastadan, ailesinden, diğer hemşirelerden ve ekibin üyelerinden alınır.¹⁸ Sonuçların etkili olabilmesi için gözlenebilir, ölçülebilir, ulaşılabilir olması gerekir. Bakım sonuçlarının kayıtları anlaşılabilir, iyi ya da az gibi belirsiz ifadeler olmamalıdır.⁴

Hemşirelik süreci uygulamaları başlangıçta, zaman alan ve zor olarak görünmesine rağmen; kullanıldığında hemşirelik bakımının sunulması noktasında pek çok yararı vardır.⁴

Bu yararlar;

- Bireyin gereksinimleri doğrultusunda bakım hizmeti almasını sağlar.
- Bakımın devamlılığını sağlar. Doğru formüle edilmiş hemşirelik bakım planı bir hemşireden diğerine bakımın sürdürülmesini kolaylaştırır.
- Bakım amaçlarına ulaşmak için gerekli özel hemşirelik uygulamalarını belirlemeyi sağlar. Böylece bakıma yön verir.
- Bireyi kendi bakımına katılma konusunda teşvik eder.
- Ekip üyeleri arasında bireyin ihtiyaçları konusunda iletişim sağlar.
- Hemşirenin farklı rollerini uygulama fırsatı verir. Hemşirenin veri toplama aşamasıyla birlikte hasta merkezli çalışmaya ve dolayısıyla alışlagelen işlemlerin dışına çıkarak hasta gereksinimlerine odaklanmış uygulamaları gerçekleştirme olanağı sağlar. Böylece hemşireler mesleki doyumu elde eder.
- Sürekli araştırma ve geliştirme gerekliliğini doğurur.
- Bakımın kalitesini artırır.

- Sistematik hizmet sunumu zaman kaybını önler, sonuca ulaşmayı kolaylaştırır. Bakımın kayıt edilmesini kolaylaştırır.
- Devamlı öğrenme fırsatı verir.
- Vardiya değişim raporlarında hemşireler tarafından bilgi alışverişini organize eder.
- Hastanın taburculuk ihtiyaçlarının belirlenmesine yardımcı olur.
- Hemşirelerin kayıt tutmasını sağlar.
- Hastaya verilen bakımın daha objektif olarak değerlendirilmesini sağlar.

SOLUNUM SİSTEMİ HASTALIKLARINDA HEMŞİRELİK SÜRECİ

Kronik hastalıklar, ortaya çıkması aniden olmayan, bir ya da daha fazla sistemde geriye dönüşsüz yapı ve fonksiyon bozukluğuna yol açan ve hastalıkların birbiri üzerine eklendiği uzun dönem bulaşıcı olmayan sağlık sorunlarıdır.²⁰ Kronik hastalıklar günümüzde giderek artmaktadır. Dünyada kronik hastalık nedeniyle her yıl 41milyon insanın öldüğü bildirilmekte ve bu sayı tüm ölümlerin % 71'ine denk gelmektedir.²¹ Dünyada olduğu gibi ülkemizde de nüfusun yaşlanması ve beklenen yaşam süresinin uzamasına paralel olarak, hastalık yükü giderek artmakta ve bu hastalıkların büyük bir bölümünü kronik hastalıklar oluşturmaktadır. Bu hastalıklar arasında ise solunum sistemi hastalıkları ciddi bir yer tutmaktadır. Ölüme sebebiyet veren kronik hastalıklar sıralamasına bakıldığında solunum sistemi hastalıkları hem dünyada hem de Türkiye'de üçüncü sırada yer almaktadır. Dünyada kronik hastalıklara bağlı ölümlerin yılda 4.1 milyonu solunum sistemi hastalıkları nedeniyle olmaktadır.²¹ Türkiye'de ise solunum sistemi hastalıkları nedeniyle 2017 yılında 52. 568 kişinin öldüğü ve bu sayının kronik hastalıklara bağlı ölümlerin %13'ünü oluşturduğu bildirilmiştir.²² Son yıllarda yapılan araştırmalar solunum sistemi hastalıklarının ve buna bağlı ölümlerin giderek arttığını göstermektedir.²³

Solunum sistemi hastalıkları, burun, ağız, yutak ve gırtlığın oluşturduğu üst solunum yolları ile akciğer, soluk borusu gibi alt solunum yolları organlarının fonksiyonlarında bozulma ile karakterize hastalıklardır. Bu hastalıklar genellikle kronik obstrüktif akciğer hastalığı (KOA), astım ve solunumsal enfeksiyonlar olarak görülmektedir.^{24,25} Sağlıklı bir solunum sisteminin tüm doku ve organlara sağladığı iyi oksijenlenme ile tüm vücut fonksiyonlarının uygun bir şekilde çalışması sağlanırken, yetersizliği zamanla diğer sistem hastalıklarının da ortaya çıkmasına yol açabilir. Bu nedenle ilk olarak solunum sistemi hastalıklarının erken dönemde belirlenmesi diğer sistem fonksiyonlarının korunmasında önemlidir. Solunum sistemi hastalıklarında ortaya çıkan ortak semptomlar genel olarak nefes darlığı, öksürük, balgam, hırıltılı solunum, ağrı, yorgunluk olarak bildirilmektedir.^{23,24} Bu bulgular bireyin günlük yaşam aktivitelerini olumsuz olarak etkilerken, hastanın tedavi ve bakım uygulamalarını da zorlaştırmaktadır.²⁶ Bundan dolayı hemşirelik bakımında hastada ortaya çıkan problemleri doğru belirleme, uygun çözüm önerileri geliştirme, kritik düşünme, hızlı karar verme ve işlemleri dikkatli bir şekilde sürdürmek önemlidir. HS solunum sistemi problemlerini çözmede kullanılması gereken en önemli rehberlerden biridir.⁴

Solunum sistemi hastalıklarında HS'nin kullanım amaçları; hastanın bakımını koordine etme, ihtiyaçlarının dökümantasyonunu sağlama, bakım planı boyunca karar verme, hasta problemlerini tanımlama ve amaçları belirleme, hemşirelik bakımının değerlendirilmesinde kullanılabilecek amaçları listeleme, bakımın eksik, hatalı ve yanlış olma riskini azaltma, tanı verileri, problem listesi, diğer hemşirelerin ve sağlık profesyonellerinin tedavileri ile ilgili iletişimi sağlamaktır.⁴ Bu amaç doğrultusunda hemşirelik bakım modellerinin kullanılması da hemşirelik bakım kalitesini ve etkinliğini artırarak hastalığın seyrini hafifletip, tedavinin

devamlılığını sağlayabilir.¹⁰ KOAH'lı hastalara Henderson Hemşirelik Modeli ile verilen hemşirelik bakımının hastayı bütüncül olarak değerlendirebildiği ve semptomları hafifletmede etkili olduğu bildirilmiştir.⁷ Farklı bir çalışmada ise solunum sistemi hastalarında NANDA tanılarının kullanılması ile sistematik hemşirelik girişimlerinin uygulanması ve çıktıların bu doğrultuda değerlendirilmesi ile hastaya kaliteli hemşirelik bakımının verildiği belirtilmiştir.⁶ Akciğer rahatsızlığı yaşayan hastaya Bakım-Öz-Tedavi Modeli ile verilen hemşirelik bakımının hastanın bilgi eksikliğini giderdiği, tedavinin devamlılığını sağladığı, şikâyetlerinin azaldığı ve bakım ihtiyaçlarının karşıladığı görülmüştür.²⁷ Günümüzde henüz tedavi yaklaşımı net olarak bilinmeyen Covid-19'un solunum sistemini ciddi şekilde etkilemesi nedeniyle HS ile problemin sistemli bir şekilde planlanması gerekmektedir. Yapılan bir çalışmada Covid-19 tanılı yeni doğanların hemşirelik bakımının HS ile yürütülmesi, hastaların ihtiyaçlarını belirlemede ve karşılamada holistik yaklaşımı sağlayarak bakımın planlanmasını kolaylaştırmıştır.²⁸

SONUÇ VE ÖNERİLER

Hemşirelik süreci bireyin hastalığında uygulanan bakımda bilimsel yaklaşıma dayalı çözüm yöntemleri bulan, bakımın özünü oluşturan, dinamik ve sistemli bir yaklaşımdır. Bireyin ya da toplumun farkında olduğu/olmadığı, var olan/olmayan problemlerin belirlenmesi ve karşılanmasında kullanılan basamaklar dizisidir. Birçok aşamadan geçen hemşirelik süreci güncelliğini ve dinamikliğini korumaktadır. Profesyonel hemşireliğin gelişimine, hasta bakım sürecinde sistematik ve bütüncül bir yaklaşım sergilemeye katkı sağlamaktadır. Solunum sistemi gibi önemli sistemlerin hemşirelik faaliyetlerinin sürdürülmesinde ciddi faydalar sağladığı bilinmektedir. Bu nedenle HS felsefesinin kavranması lisans sürecinde önemle üzerinde durulması gereken bir konudur. Ders müfredatlarında HS felsefesine mutlaka kapsamlı olarak yer verilmelidir. Meslek hayatına başlayan hemşirelere ise hizmet içi eğitimlerle hemşirelik sürecindeki güncel gelişmeler aktarılmalı, örnek vakalarla ve çalışmalarla beyin fırtınaları yapılmalıdır. Özellikle bu alanda yapılan kanıta dayalı uygulama sayısı ve içeriği zenginleştirilerek klinik kullanımı artırılmalıdır.

KAYNAKLAR

1. Dinç L. Bakım Kavramı ve Ahlaki Boyutu. Sağlık Bilimleri Fakültesi Hemşirelik Dergisi. 2010;s.74-82.
2. Birol L. Hemşirelik Süreci. Ankara: Özyurt Matbaacılık; 2018.
3. Durna Z. Kronik Hastalıklar ve Bakımı. Ankara: Nobel Tıp Kitabevleri; 2020.
4. Ay F. Mesleki Temel Kavramlar, Hemşirelik Süreci. İçinde: Akça FA, Editör. Temel Hemşirelik Kavramlar, İlkeler, Uygulamalar. İstanbul: İstanbul Medikal Yayıncılık, 2008; s.35-71.
5. Erer M.T, Akbaş M, Yıldırım G. Hemşirelik Sürecinin Evrimsel Gelişimi Hemşirelik Süreci. Lokman Hekim Dergisi. 2017; s.1-5.
6. Turhal E, Koç Z. Koah Tanısı Alan Bir Bireyin Nanda'ya Göre Hemşirelik Tanıları ve NIC Girişimleri: Olgu Sunumu. Sağlık ve Toplum. 2021; 31(3):294-204.
7. Bozkurt C, Yıldırım Y, Şenuzun Aykar F, Fadıloğlu Z. Henderson Hemşirelik Modeli'ne Göre Kronik Obstrüktif Akciğer Hastalığı Olan Bireyin Değerlendirilmesi. Cumhuriyet Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi. 2021; (6)1:59-68.

8. Gökçe Eskin S, Kahraman A. Neuman Sistemler Modeline Göre Hemodiyaliz Hastasının Hemşirelik Bakım Planı Örneği. *Nefroloji Hemşireliği Dergisi*.2021;16(2): 73-86.
9. Pamuk Cebeci S. Esansiyel Hipertansiyonu Olan Bireyde Watson İnsan Bakım Modeli: Olgu Sunumu. *Eurasian JHS*. 2021; 4(2):113-120.
10. Karasu F, Aylaz R. Kronik Obstrüktif Akciğer Hastalarında Pender'in Sağlığı Geliştirme Modeli. *Sağlık Bilimleri Dergisi*. 2021; 30(2):209-14
11. Aydemir Gedük E. Hemşirelik Mesleğinin Gelişen Roller. *HSP*.2018; 5 (2):253-258.
12. Taşçı S. Hemşirelikte Problem Çözme Süreci. *Sağlık Bilimleri Dergisi*. 2005; 73-78.
13. Özer N. Kritik Düşünme. *Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi*. 2002; Cilt:5, Sayı:2.
14. Sabuncu N, Babadağ K, Taşocak G, Atabek T. Hemşirelik Süreci. İçinde: Seçim H. Editör. *Hemşirelik Esasları. Açıköğretim Fakültesi Yayınları No: 225*. 1991; s.58-71.
15. American Nursing Association. Erişim tarihi; 13.10.2021 <https://www.omicsonline.org/societies/north-american-nursing-diagnosis-association/>
16. Guide to Nursing's Social Policy Statement: Understanding the Profession from Social Contract to Social Covenant. Erişim tarihi;13.10.2021 <https://www.nursingworld.org/nurses-books/guide-to-nursings-social-policy-statement-understanding-the-profession-fr/>
17. The Nursing Process. Erişim tarihi;13.10.2021 <https://www.nursingworld.org/practice-policy/workforce/what-is-nursing/the-nursing-process/>
18. Taşçı S, Birol L. Hemşirelik Süreci. İçinde: Akdemir N, Birol L, Editör. *İç Hastalıkları ve Hemşirelik Bakımı*. Ankara:Özyurt Matbaacılık. 2019; s.75-86.
19. Basit G. (2020). Bakımın Rehberi: Hemşirelik Süreci. *Necmettin Erbakan Üniversitesi Genel Sağlık Bilimler Dergisi*.2020; s.77-90.
20. Akdemir N, Ünsar S. Kronik Hastalıklar ve Hemşirelik Bakımı. İçinde: Akdemir N, Birol L, Editör. *İç Hastalıkları ve Hemşireliği Bakımı*. Ankara: Özyurt Matbaacılık. 2019; s.254-267.
21. World Health Organization (2017). Erişim tarihi; 13.10.2021 <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
22. Türkiye İstatistik Kurumu (TÜİK). Erişim tarihi; 13.10.2021 <https://data.tuik.gov.tr/Bulten/Index?p=Olum-Nedeni-Istatistikleri-2018-30626>
23. Kocabaş A, Atış S, Çöplü L, et al. Kronik Obstrüktif Akciğer Hastalığı (KOA) Koruma, Tanı ve Tedavi Raporu 2014. *Türk Toraks Dergisi*. 2014;15(2):1-11.
24. Sütçü H, Birol L. Solunum Sistemi Hastalıkları ve Hemşirelik Bakımı. İçinde: Akdemir N, Birol L, Editör. *İç Hastalıkları ve Hemşireliği Bakımı*. Ankara:Özyurt Matbaacılık. 2019; s.391-421.
25. Alkan A, Erdem R, Kuh Z. Solunum Yolları Hastalıklarının Toplumsal Görüngüleri Üzerine Nitel Bir Araştırma. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*. 2021; s.1353-1379.
26. Karakoç Kumsar A, Taşkın Yılmaz F.Kronik Hastalıklarda Yaşam Kalitesine Genel Bakış. *Erciyes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi*. 2014; Cilt 2, Sayı 2.



27. Soydan D, Çam Yanık T, Çelebioğlu A. Akciğerde Kitle ve Pnömoni Tanılı Bireyin Bakım-Öz-Tedavi Modeli'ne Göre Hemşirelik Bakımı: Olgu sunumu. Balıkesir Sağlık Bilimleri Dergisi. 2020; 9(2):127-132.
28. Demir N.N, Ak B. COVID-19 Tanısı Almış İkiz Yenidoğan Olgusunun Bakımı: Hemşirelik Süreci ve Kavram Haritası. Journal of Innovative Healthcare Practices. 2021; 2(1):45-54.

**AKADEMİK PERSONELİN İNTERNET/MOBİL BANKACILIĞININ
GÜVENİRLİĞİ HAKKINDAKİ TUTUM VE DAVRANIŞLARINI ARAŞTIRILMASI**
INVESTIGATION OF ACADEMIC'S ATTITUDES AND BEHAVIORS ABOUT THE
RELIABILITY OF MOBILE AND INTERNET BANKING

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ÖZET

Teknolojideki gelişmelerle birlikte bankacılık sektöründe elektronik bankacılık yaygın kullanılmaya başlanmıştır.

İnternet bankacılığı, Türkiye’de ilk olarak 1998 yılında kullanılmaya başlanmıştır. Geleneksel bankacılık işlemlerini büyük ölçüde kolaylaştıran internet bankacılığını kullananlar, mevduat işlemleri, yatırım hesabı işlemleri, para transferleri, vergi ve fatura ödemeleri gibi birçok işlemi şubeye gitmeden kolayca yapabilmektedirler.

İnternet bankacılığı bankalara şube sayısını azaltmasına imkân vermesi nedeniyle maliyetleri düşürmeyi sağlamaktadır. İnternet bankacılığının avantajları yanında, güvenlik gibi çok önemli bir olguyu da beraberinde getirmektedir. İnternet bankacılığı dolandırıcılığında en çok kullanılan metotlar arasında phishing (oltalama), e-mail (sahte e-posta), keylogger (tuş kaydetme) ve screenlogger (ekran kaydetme) gibi yöntemler bulunmaktadır. Bu yöntemleri kullanan internet bankacılığı dolandırıcıları, müşterilerin hesap numara ve şifrelerini bularak, bu hesaplar üzerinde işlem yapabilmektedirler. Bankalar ise bu gibi durumlara karşı müşterilerini uyarmakta ve güvenlik önlemlerini artırma yolunda her geçen gün yeni çözüm yolları bulmaktadırlar.

Bu çalışmada akademik personelin internet/mobil bankacılığın güvenirligi konusundaki tutum ve davranışları araştırılmaktadır. Bunun için araştırmacı tarafından hazırlanan anket ile veriler toplanmıştır. Söz konusu ankette ilk bölümde, çalışmaya katılan akademik personelin sosyo-demografik özellikleri, ikinci bölümde internet ve mobil bankacılığı tercih ve görüşlerine ilişkin sorular yer almaktadır. Anketin son bölümünde ise, internet ve mobil bankacılığı güvenirligi konusundaki tutum ve algılarına yönelik 30 maddeden oluşan ifadeler bulunmaktadır. Bu ifadelere verilecek cevaplar 5’li Likert tipi ölçek şeklinde hazırlanmıştır.

Elde edilen veriler ile faktör analizi uygulanacak ve 30 madde alt boyutlarda toplanacak ve bu alt boyutlara verilecek cevaplar ile akademik personelin internet ve mobil bankacılığının güvenirligi konusundaki tutumları ile yaş, cinsiyet, akademik unvanlarına göre farklılık olup olmadığı araştırılacaktır.

Anahtar Kelimeler: İnternet Bankacılığı, Mobil Bankacılık, Akademik Personel.

ABSTRACT

With the developments in technology, electronic banking has started to be used widely in the banking sector.

Internet banking was first used in Turkey in 1998. Those who use internet banking, which greatly facilitates traditional banking transactions, can easily perform many transactions such

as deposit transactions, investment account transactions, money transfers, tax and bill payments without going to a branch.

Internet banking allows banks to reduce the number of branches, thereby reducing costs. In addition to the advantages of internet banking, it also brings with it a very important phenomenon such as security. Among the most used methods in internet banking fraud, there are methods such as phishing, e-mail, keylogger and screenlogger. Internet banking fraudsters using these methods can find the account numbers and passwords of the customers and make transactions on these accounts. Banks, on the other hand, warn their customers against such situations and find new solutions every day to increase their security measures.

In this study, the attitudes and behaviors of academic staff about the reliability of internet/mobile banking are investigated. For this, data were collected with a questionnaire prepared by the researcher. In the first part of the questionnaire, there are questions about the socio-demographic characteristics of the academic staff participating in the study, and questions about the preferences and opinions of internet and mobile banking in the second part. In the last part of the questionnaire, there are 30-item statements about their attitudes and perceptions about internet and mobile banking reliability. The answers to these statements were prepared in the form of a 5-point Likert type scale.

With the data obtained, factor analysis will be applied and 30 items will be collected in sub-dimensions, and it will be investigated whether there is a difference according to the answers to these sub-dimensions and the attitudes of academic staff about the reliability of internet and mobile banking, and age, gender, academic titles.

Keywords: Internet Banking, Mobile Banking, Academic Staff.

1. GİRİŞ

Günümüzde önemli bir öneme sahip olan bankacılık sektörü her geçen gün daha da büyümektedir. Bankalar, yatırımcılara alternatif yatırım fırsatları ve ihtiyaç duydukları fon kaynaklarını sunarlar ve istihdam oluşturmasıyla da ekonomiye önemli katkı sağlamaktadırlar. Teknolojinin gelişmesiyle bankaların hizmete sunduğu elektronik bankacılık uygulamaları, son dönemde yaygın olarak kullanılan ve geliştirilmeye çalışılan bir alan olarak ön plana çıkmaktadır.

Teknolojinin ve buna bağlı iletişim olanaklarının sürekli gelişim göstermesiyle yeni ve çok fonksiyonlu cihazlar yaygınlaşmaktadır. Teknolojik yeniliklerin hızlı ve etkin bir şekilde işletme faaliyetlerine entegre edildiği sektörlerin başında bankacılık gelmektedir. Ayrıca teknolojiye dayalı hizmet çeşitliliği açısından da bankacılık sektörü öncü sektörlerden biridir.

Özellikle 2000’li yıllardan sonra teknolojideki hızlı değişim, birçok yeni elektronik aracı çalışma hayatına sokmuştur. Elektronik bankacılığın ilk uygulamalarında ATM, POS cihazı, cep telefonu gibi araçlar üzerinden sınırlı işlemler gerçekleştirilmiştir. Günümüzde var olan sistemler daha da geliştirilip işlem çeşitliliği artırılmıştır. Bunun yanında internet, cep telefonu, televizyon, kiosk gibi yeni e-bankacılık kanalları da müşterilerin hizmetine sunulmuştur.

Türkiye’de internet bankacılığı ile ilgili yapılan çalışmalar, daha çok banka müşterilerinin bu uygulamalara bakış açısını ve müşterilerin interaktif bankacılık kullanımını etkileyen faktörleri tespit etmeye yöneliktir.

2. LİTERATÜR TARAMASI

Çınar vd. (2012), Erzincan Üniversitesi'nde görev yapan akademisyenlerin internet bankacılığı ile ilgili düşünce, tutum ve davranışlarını tespit etmeye çalışmışlardır. nkacılığı konusundaki algı ve tutumları tespit ve analiz edilmeye çalışıldığı için anket yöntemi tercih edilmiştir. Çalışmadan, internet bankacılığı kullanan akademisyenlerin internet bankacılığı aracılığıyla Hesap bilgilerini kontrol, kredi kartı işlemleri, para transferi ve fatura ödemeleri yaptığı belirlenmiştir. İnternet bankacılığı kullanan akademisyenlerin internet bankacılığını tercih etme nedenleri ise, zamandan tasarruf, sıra beklemeden hızlı işlem yapabilme, kullanımının kolaylığı, her an erişilebilmesi ve işlem dökümünün görülebilmesi olarak ifade edilmiştir.

Bayrakdaroğlu (2012), internet bankacılığının kullanımını etkileyen faktörleri ve bu faktörlerin müşterilerin demografik özellikleri ile olan ilişkileri araştırmışlardır. Çalışmada internet bankacılığı kullanımını etkileyen faktörlerin bireylerin demografik özelliklerine göre önem derecesinin değişip değişmediği belirlenmeye çalışılmıştır. Bu amaçla yapılan t testi ve ANOVA analizlerine göre kullanım kolaylığı, bilgisayar kullanma yeterliliği, güven, farkında olma, sosyal çevrenin etkisi, güvenlik ve gizlilik gibi bazı faktörlerin demografik özelliklere göre anlamlı farklılıklar taşıdığı tespit edilmiştir.

Aliyeva (2016), çalışmasında bankanın tarihsel gelişimi, fonksiyonları, banka hesap türleri, internetin tarihsel gelişimi, internetin bankacılıkla ilişkisi ve bankacılıkta internetin olumlu ve olumsuz yönleri incelemiştir.

Yurttadur ve Süzen (2016), internet bankacılığına yönelik müşteri tercihlerini inceledikleri çalışmalarında, katılımcıların, internet bankacılığı hizmetini değerlendirdikleri erişim ve kullanım kolaylığı, öğrenme kolaylığı, işlem çeşitliliği, internet sitesinin yetersizliği, güvenlik, ödeme ve finansal işlemler boyutlarının, cinsiyet, yaş, eğitim durumu, medeni durum ve ailenin toplam gelirine gör anlamlı farklılık gösterip göstermedikleri araştırılmıştır. Kadınların internet bankacılığını yaşam tarzı olarak görmelerinin, erkek katılımcılara göre daha yüksek olduğu sonucu elde edilmiştir.

Armağan ve Temel (2016) yaptıkları çalışmada, genç yaş grubundaki kişilerin, eğitim düzeyi yüksek kişilerin internet bankacılığı hizmetlerinden daha fazla yararlandığı sonucunu elde etmişlerdir. Ayrıca, kullanıcıların internet bankacılığının zaman tasarrufu bakımından avantajlı, internet bankacılığına daha yatkın olan kullanıcıların yararlandıkları hizmet sayısının daha yüksek olduğu, en çok önem verilen konu ise kullanım kolaylığı ve güvenlik olduğu belirlenmiştir.

Boz vd. (2017), A ve B kişilik tiplerinin olan internet bankacılığına olan güven üzerinde farklı etkiye yol açıp açmadığını araştırmışlardır. Çalışma Uşak ilinde 359 kişiyle yapılmıştır. Çalışmadan, B tipi kişiliğe sahip müşterilerin internet bankacılığına güvenme düzeyinin A tipine göre daha yüksek olduğu sonucu elde edilmiştir.

Koçak ve Özbek (2019), Burdur ili Bucak ilçesinde bir banka müşterilerinin elektronik bankacılık algısı, beklenti ve düşüncelerini belirlemeye çalışmışlardır. Çalışmada, müşterilerin demografik yapıları, elektronik bankacılık ile ilgili bilgi düzeyleri, elektronik bankacılığa karşı tutumları, elektronik bankacılığı tercih etmeyenlerin kullanmama nedenleri, bilgi kaynakları, elektronik bankacılık ile ilgili tecrübeleri, yaptıkları işlemler, elektronik bankacılıktan yararlanma nedenleri ve elektronik bankacılık hizmetlerinden memnuniyet düzeyleri tespit edilmiştir.

Dayı ve Kendirli (2020), banka müşterilerinin internet bankacılığı kullanımını ile ilgili görüşlerinin internet bankacılığını tekrar kullanma niyetleri üzerindeki etkisini incelemişlerdir. Çalışmada internet bankacılığının yaygınlaşma tutumunun, tekrar kullanma niyetini olumlu

yönde anlamlı bir şekilde etkilediği belirlenmiştir. İnternet bankacılığı güvenliğine ilişkin tutumun ise tekrar kullanma niyeti üzerinde olumsuz yönde etkilediği sonuce elde edilmiştir.

Berber ve Nakiboğlu, (2021), bireysel banka müşterilerinin online bankacılığa yönelik tutum ve davranışlarını incelemişlerdir. Araştırmadan bireysel banka müşterilerinin online bankacılığa yönelik tutumlarının olumlu oldukları, katılımcıların cinsiyet ve online bankacılıkta en çok yaptıkları işlemlere göre online bankacılığa yönelik tutum ve davranışlarında farklılıkların olmadığı belirlenmiştir. Yaş, medeni durum, öğrenim durumu ve online bankacılık kullanım sıklığı bakımından fark olduğu belirlenmiştir.

Akan vd. (2021), bireysel bankacılık ürünlerinin kullanım talebinin akademik unvana göre farklı olup olmadığını araştırdıkları çalışmada, tasarruf mevduat durumu, kredi kartı kullanımı, kredili mevduat hesabı, kredi kullanım durumu ve internet bankacılığı kullanımı ile akademik unvan arasında anlamlı bir ilişki tespit edilmiş, mobil bankacılık kullanımı ile akademik unvan arasında ise anlamlı bir ilişkinin bulunmadığı belirlenmiştir.

3. İNTERNET BANKACILIĞI

Teknolojinin ve internetin gelişimi, çoğu sektörü olduğu gibi bankacılık sektörünü de önemli oranda etkilemiştir. İnternet bankacılığı, günümüzde fiziksel şubelerden yapılan hemen hemen tüm işlemlerin internet üzerinden gerçekleştirilmesi olarak tanımlanmaktadır. Diğer bir tanıma göre de internet bankacılığı “bankacılık hizmetlerinin, uzaktan dağıtım kanalı olarak, internet üzerinden sunulması” olarak tanımlanmaktadır. İnternet bankacılığı, banka işlemlerinin sadece sanal ortama taşınmasından daha fazla anlam ifade etmektedir. Müşteriler işlemlerini yapmak için konum değiştirmek ve fazla zaman harcamak zorunda kalmamaktadırlar. Hızlı ve kolay bir şekilde istedikleri yerden banka hizmeti alabilmektedirler. Bankalar da şubelerinin yüklerinin azalması ve müşterilere daha hızlı hizmet verebilme kolaylığı sonucu müşterilerini, internet şubelerine yönlendirmeye çalışmaktadırlar.

Bankacılık hizmetleri, birçok bakımdan internette hizmet sunmaya uygundur. İşlemlerin büyük ölçüde fiziksel olmaması hizmetlerin internet üzerinden sunulabilmesindeki en büyük avantajdır. Bu şekilde maliyetlerin düşürülebilmesi ve hizmetlerin daha iyi sunumu mümkün olmaktadır. İşlemler ve sorgulamalar çalışanlara ihtiyaç duyulmadan gerçekleştirilebilir. İnternet bankacılığı sayesinde maliyetler, harcanan zaman ve oluşabilecek hataları azaltılır. Müşteriler hizmetleri daha hızlı ve kolay şekilde alabilmektedirler. Ayrıca müşteriler istedikleri bilgilere daha detaylı bir şekilde ulaşma imkânına sahiptirler.(Uzundağ,2013)

3.1.İnternet Bankacılığının Gelişimi

İnternet bankacılığı bankalar için, pazar bilgisi elde etme, bankacılık hizmetlerini müşteriye ulaştırma ve müşteri ile olan iletişimi artırma hedefleri nedeniyle cazip olarak görülmüştür. Ancak bu sistemin kullanılabilmesi için güçlü bir altyapıya gereksinim duyulmaktadır. Bunun için bankalar teknolojiye ve özellikle yazılımlara yatırımlarını arttırmaktadır. Bankaların internet bankacılığı yapmaları için farklı nedenleri vardır. Özellikle müşterisini rakiplerine kaptırmamak ve rekabet ortamında rakiplerden geri kalmama isteği bankalar için öncelikli hedeflerdir.

Genel olarak da internet bankacılığının dört ana aşamasından söz etmek olanaklıdır;

- 1.Aşama; İnternetin bilgi ve pazarlama amaçlı kullanılmasıdır. Bu aşamada müşterilerden gelen şikâyetler sistemde kaydedilmektedir.

- 2.Aşama; Müşteri kazanma üzerine odaklanılması ve basit interaktif hizmetlerin sunulmaya başlanmasıdır. Bu aşamada, daha önce toplanan bilgilerin yeni müşteriler kazanma adına değerlendirilmesi önem kazanmaktadır.
- 3.Aşama; İnternet üzerinden hemen hemen tüm bankacılık hizmetlerinin verilmeye başlanması ve bankanın web sistemine bağlanması sürecidir. Müşterilere hemen hemen tüm işlemler internet üzerinden sunulmaktadır.
- 4.Aşama; Müşteri veritabanının oluşturulması ve geliştirilmesi karlılık analizlerinin yapılması sürecidir. Bu şekilde pazarın bölümlenmesi ve hedef kitlelerin belirlenmesi daha kolay hale gelmektedir. Bu dört aşamanın ardından öngörülen bir diğer aşama da elektronik para çekimi hizmetlerini kapsamaktadır. Bu aşamaya göre internet bankacılığı paranın fiziksel olarak ortadan kalkmasını sağlayacak dev bir adımdır (Uzundağ,2013).

Türkiye’de aktif dijital bankacılık Müşteri Sayıları Tablo 1’de verilmiştir.

Tablo-1 Aktif Dijital Bankacılık Müşteri Sayıları

	Temmuz- Eylül 2020	Nisan- Haziran 2021	Temmuz- Eylül 2021
Aktif dijital müşteri sayısı (bin kişi)	62.741	70.776	73.440
-Kurumsal (bin kişi)	2.703	3.065	3.110
-Bireysel (bin kişi)	60.038	67.711	70.330

(Türkiye Bankalar Birliği/ İstatistiki Raporlar /İnternet ve Mobil Bankacılık İstatistikleri /Kasım 2021)

Tablo 1 ‘e göre Temmuz-Eylül 2021 dönemi içinde az bir kez giriş (log-in) işlemi yapmış aktif bireysel dijital bankacılık müşteri sayısı 70 milyon 330 bin kişidir. Bu sayının 2 milyon 143 bin kişisi “sadece internet bankacılığı” işlemi yaparken 60 milyon 235 bin kişisi “sadece mobil bankacılık” işlemi yapmıştır. Hem internet hem mobil bankacılık işlemi yapan kullanıcı sayısı ise 7 milyon 952 bin kişidir. Aktif bireysel dijital bankacılık müşterileri 47 milyon erkek (yüzde 68), yaklaşık 23 milyon kadın (yüzde 32) müşterilerden oluşmaktadır.

3.2. İnternet Bankacılığını Kullanmaya Yol Açan Faktörler ve İnternet Şubesinin Faydaları

İnternet bankacılığını kullanmaya teşvik eden birçok faktörler:

- Kullanıcılar tarafından daha avantajlı görülmesi
- Kullanıcıların çalışma ortamları ile yaşam tarzlarına uygunluğu
- Güvenlik ve risk algısı
- Kullanıcıların daha önceki internet deneyimleri

Yapılan çalışmalarda gerek Türkiye’de gerekse de dünya bankacılık sektöründe güvenlik internet bankacılığı kullanan bireylerin kaygı kaynağı olduğu ve sunulan hizmetin kalitesini önemli düzeyde etkilediği belirlenmiştir (Özdemir,2017)

Gelişen teknolojiye uyarlık sağlayan bankalar tarafından sunulan internet bankacılığı hizmetinin birçok faydaları vardır. Bunlar aşağıda maddeler halinde sayılmıştır.

- İnternet hizmeti müşteriye kendini daha önemli olduğunu hissettirir. Bu hizmeti kullanan müşteri sanal şubeyi istediği şekilde özelleştirir ve istediği dilde kullanma imkânı bulur.
- İnternet bankacılığı bireysel bankacılık maliyetlerini azaltır.

- Banklar açışınan son derece önemli olan bireysel müşteri kayıtlarından oluşan veri tabanını oluşturur.
- Bankacılık işlemlerinin daha hızlı yapılmasına imkân tanır.
- Banka işlemlerini şubelere gitmeksizin ve sıra beklemeksizin yapma fırsatı sunar.
- İstenildiğinde detaylı rapor alınmasına imkân tanır.
- Müşteriler tarafından yapılan işlemleri banka personeli dâhil herkesten saklı tutar.
- Verimliliği artırır.
- Bireylerin kendi kayıtlarını tutabilmesine olanak sağlar.
- Müşteriler tarafında izni dışında yapılan işlemlerden daha hızlı haberdar olmasını sağlar.
- Mesai saatlerine bağlı olmaksızın istenilen ortamda bankacılık işlemlerini yapma imkânı sunar.
- İstenildiğinde kredi başvurusu ve kullanılması fırsatı sunar.

3.3. Türkiye’de İnternet Bankacılığı İstatistikleri

Türkiye’de İnternet Bankacılığı istatistikleri Tablo 2’de verilmiştir.

Tablo-2 İnternet Bankacılığını Kullanan Müşteri Sayısı

	Temmuz-Eylül 2020	Nisan-Haziran 2021	Temmuz- Eylül 2021
Bireysel müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	10.758	10.476	10.095
Kayıtlı (B) (en az 1 kez login olmuş)	72.585	77.818	79.660
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	23.347	23.652	23.758
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	15	13	13
Kurumsal müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	1.340	1.372	1.364
Kayıtlı (B) (en az 1 kez login olmuş)	4.464	4.957	5.060
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	1.805	1.956	1.946
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	30	28	27
Toplam müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	12.098	11.849	11.459
Kayıtlı (B) (en az 1 kez login olmuş)	77.049	82.774	84.721
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	25.152	25.609	25.704
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	16	14	14

İnternet bankacılığı yapmak üzere sistemde kayıtlı ve en az bir kez giriş işlemi yapmış bireysel müşteri sayısı Eylül 2021 itibariyle, 79 milyon 660 bin kişidir. Son bir yıl içerisinde en az bir kez giriş işlemi yapmış bireysel müşteri sayısı ise 23 milyon 758 bin kişidir.

Temmuz-Eylül 2021 dönemi içinde en az bir kez internet bankacılığı giriş işlemi yapmış aktif bireysel müşteri sayısı 10 milyon 95 bin kişidir. Bu miktar kayıtlı olan toplam bireysel müşteri sayısının yüzde 13’ünü oluşturmaktadır.

İnternet bankacılığı yapmak üzere sistemde kayıtlı olan ve en az bir kez giriş işlemi yapmış kurumsal müşteri sayısı, Eylül 2021 itibariyle 5 milyon kişi olarak gerçekleşmiştir. Bunların 1

milyon 364 bini (yüzde 27'si) Temmuz-Eylül 2021 dönemi içerisinde en az bir kez giriş işlemi yapmıştır. Son bir yıl içerisinde en az bir kez giriş işlemi yapmış kurumsal müşteri sayısı ise yaklaşık 2 milyon kişidir.

İnternet bankacılığı için kayıt yaptıran ve en az bir kez giriş işlemi yapmış toplam (bireysel ve kurumsal) müşterilerin yüzde 14'ü Temmuz-Eylül 2021 döneminde en az bir kez internet bankacılığı işlemi yapmıştır. Toplam (bireysel ve kurumsal) aktif müşteri sayısı bir önceki döneme göre 390 bin kişi, bir önceki yıla göre ise 639 bin kişi azalmıştır.

3.4. Mobil Bankacılık İstatistikleri

Türkiye'de Mobil Bankacılık istatistikleri Tablo 2'de verilmiştir.

Tablo-3 Mobil Bankacılığı Kullanan Müşteri Sayısı

	Temmuz-Eylül 2020	Nisan- Haziran 2021	Temmuz-Eylül 2021
Bireysel müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	57.353	65.411	68.187
Kayıtlı (B) (en az 1 kez login olmuş)	88.969	102.195	106.709
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	67.981	76.652	79.545
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	64	64	64
Kurumsal müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	2.018	2.407	2.468
Kayıtlı (B) (en az 1 kez login olmuş)	3.684	4.639	4.858
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	2.521	3.093	3.186
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	55	52	51
Toplam müşteri sayısı (bin kişi)			
Aktif (A) (son 3 ayda 1 kez login olmuş)	59.371	67.819	70.655
Kayıtlı (B) (en az 1 kez login olmuş)	92.654	106.834	111.566
Kayıtlı (C) (son 1 yılda en az 1 kez login olmuş)	70.501	79.745	82.731
Aktif (A) / kayıtlı (B) müşteri oranı (yüzde)	64	63	63

Mobil bankacılık yapmak üzere sistemde kayıtlı olan ve en az bir kez giriş işlemi yapmış toplam müşteri sayısı Eylül 2021 itibarıyla 111 milyon 566 bin kişidir. Bunların 70 milyon 655 bin kişisi (yüzde 63'ü) Temmuz-Eylül 2021 dönemi içerisinde en az bir kez giriş işlemi yapmıştır. Son bir yıl içerisinde en az bir kez giriş işlemi yapmış mobil bankacılık müşteri sayısı ise 82 milyon 731 bin kişidir.

4. YÖNTEM VE VERİLER

4.1. Araştırmanın Önemi

Bu çalışmanın amacı, akademisyenlerin internet bankacılığına bakış açılarını, kullanım oranlarını, internet güvenliği ilgili endişelerini ve daha güvenli bir internet bankacılığı için aldıkları tedbirleri saptamak ve konuyla ilgili istatistiksel bilgileri göz önüne sermektir.

4.2. Evren ve Örneklem

Araştırmanın evrenini, 2018-2019 öğretim yılında Eskişehir Osmangazi Üniversitesinde görev yapan akademisyenlerin tamamı (1619 kişi) oluşturmaktadır. Araştırmada, yığının özelliklerini yansıtmak için belirlenebilmesi amacıyla tabakalı örnekleme yönteminden yararlanılmıştır. Bu bağlamda örneklem sayısı 1619 kişi içinden rasgele 308 kişi olarak belirlenmiştir.

4.3. Veri Toplama Aracı

Araştırmada, internet bankacılığı kullanmayan akademisyenler ile kullanan akademisyenlerin tutum ve davranışları istatistiksel testler ile değerlendirilecektir. Genel tarama modelleri içerisinde anket yöntemi uygulanmıştır. Anket üç bölümden oluşmaktadır. İlk bölümde katılımcılar demografik özellikleri ile ilgili soruları yanıtlanmışlar, ikinci bölümde tercih, yaklaşım ve görüşlerine ilişkin yanıtlar vermişlerdir. Üçüncü bölümde ise internet bankacılığı konusundaki algı ölçülmüş. Burada katılımcılardan 30 ifadeden oluşan ölçeği çok olumludan, çok olumsuzu doğru; “(5) Kesinlikle katılıyorum, (4) Katılıyorum, (3) Kararsızım, (2) Katılmıyorum, (1) Kesinlikle katılmıyorum” şeklinde 5’li Likert Ölçeği ile değerlendirmeleri istenmiştir.

4.4. Faktör Analizi

Faktör analizi, birbirleriyle orta düzeyde ya da oldukça ilişkili değişkenleri birleştirerek az sayıda ancak bağımsız değişken kümeleri elde etmede amprik bir temel sağlayan bir tekniktir. Böylece pek çok değişkenin birkaç küme ya da boyuta indirgenmesi mümkün olmaktadır. Bu boyut ya da kümelerden her birine faktör adı verilir. Faktör analizi, aynı yapıyı ya da niteliği ölçen değişkenleri bir araya toplayarak ölçmeyi az sayıda faktör ile açıklamayı amaçlayan bir istatistiksel tekniktir. Faktör analizi bir faktörleşme ya da ortak faktör adı verilen yeni kavramları (değişkenleri) ortaya çıkarma ya da maddelerin faktör yük değerlerini kullanarak kavramların işlevsel tanımlarını elde etme süreci olarak da tanımlanmaktadır

Faktör analizinde açıklayıcı ve doğrulayıcı faktör analizi olmak üzere iki genel yaklaşım vardır. Açıklayıcı faktör analizinde, araştırmacının, ölçme aracının ölçtüğü faktörlerin sayısı hakkında bir bilgisi yoktur. Belli bir hipotezi sınamak yerine, ölçme aracıyla ölçülen faktörlerin doğası hakkında bir bilgi edinmeye çalışılmaktadır. Doğrulayıcı Faktör Analizinde ise, genellikle ölçme araçlarının geliştirilmesi ve geçerlik analizleri esnasında kullanılmaktadır. Doğrulayıcı faktör analizinin, daha çok klasik faktör analizi çalışmalarından sonra uygulanan bir yöntemdir (Albayrak, 2018; Tatlıdil, 2002; Özdamar, 2002; Hair vd, 1990; Kalaycı,,2005; Patır, 2009; Alpar, 2011).

5. BULGULAR

5.1. Demografik Bilgiler

Tablo 4. Katılımcıların Demografik Bilgileri

Tablo 4.Katılımcıların Demografik Bilgileri (Devam)

		f	%			f	%	
Cinsiyet	Kadın	142	46.1	Çalışma S.	1 yıldan az	9	2,9	
	Erkek	166	53.9		1-5 yıl	48	15,6	
	Toplam	308	100.0		5-10 yıl	82	26,6	
Yaş	25 ve altı	7	2.3		10-15 yıl	45	14,6	
	25-31	51	16.6		15-20 yıl	54	17,5	
	32-38	58	18.8		20 yıl ve sonrası	70	22,7	
	39-45	79	25.6		Toplam	308	100,0	
	46-52	71	23.1		Evet	293	95,1	
	52 ve üzeri	42	13.6		Mobil Kullanım	Evet	293	95,1
	Toplam	308	100.0			Hayır	15	4,9
				Toplam		308	100,0	
Aylık gelir	3000-4000	1	0.3	Erişim	3G veya 4.5G	194	63,0	
	4001-5000	31	10.1		Kablosuz ağ	90	29,2	
	5001-6000	126	40.9		Kablolu Servisler	9	2,9	
	6001 ve üzeri	150	48.7		Toplam	293	95,1	
	Total	308	100.0					
Medeni Durum	Bekar	67	21.8	Kullanım süresi	Kullanmayan	15	4,9	
	Evli	241	78.2		1 yıldan az	2	0,6	
	Toplam	308	100.0		1-2 yıl	5	1,6	
Akademik Ünvan	Okutman	3	1,0		2-3 yıl	23	7,5	
	Arş.Gör.	66	21,4		3-4 yıl	65	21,1	
	Öğr.Gör.	10	3,2		5 yıl ve sonrası	198	64,3	
	Arş.Gör.Dr.	37	12,0		Toplam	293	95,1	
	Öğr.Gör.Dr.	14	4,5		En çok Kullanılan İnternet bankacılığı	Ziraat Mobil	5	1,6
	Dr.Öğr.Üyesi	71	23,1			VakıfBank Mobil	2	0,6
	Doç.Dr.	65	21,1			İş Cep	251	81,5
	Prof.Dr.	42	13,6	MobilDeniz		24	7,8	
	Toplam	308	100,0	ONB Finansbank		3	1,0	
Akademik Birim	Mahmudiye Atçılık MYO.	2	0,6	Yapı Kredi Mobil		2	0,6	
	Eğitim Fakültesi	58	18,8	Diğer		6	1,9	
	Fen Edebiyat Fakültesi	76	24,7	Toplam		293	95,1	
	İİBF	43	14,0	Kullanma Nedeni		Güvenli olması	8	2,6
	İlahiyat Fakültesi	13	4,2			Hızlı olması	83	26,9
	Mühendislik Mimarlık F.	50	16,2		Bankaya gitmeye gerek kalmaması	165	53,6	
	Sağlık Bilimleri F.	8	2,6		Günün her saatinde işlem yapması	37	12,0	
	Tıp F.	38	12,3		Toplam	293	95,1	
	Turizm F.	10	3,2					
	Ziraat F.	5	1,6					
	Fen Bilimleri Ens.	2	0,6					
	Sosyal Bilimler Ens.	3	1,0					
	Toplam	308	100.0					

Yapılan İşlem	Hesaba havale /para aktarma(EFT)	148	48,1
	Fatura ödeme	95	30,8
	E-alışveriş	10	3,2
	Yatırım araçları satın alama/ yönetme	7	2,3
	Kredi kartı işlemleri	24	7,8
	Vadeli /vadesiz hesap işlemleri	8	2,6
	Hisse senedi alım/satım altın/döviz alım/satım	1	0,3
	Toplam	293	95,1
Kullanmama Nedeni	Güvenli bulmuyorum	7	2,3
	Kullanmayı bilmiyorum	1	0,3
	Gerek duymuyorum	4	1,3
	İhtiyaçlarıma cevap vermiyor	3	1,0
	Toplam	15	4,9

Tablo 4 incelendiğinde; katılımcıların %46.1’i kadın, %53.9’u erkektir. Katılımcıların %2.3’ü 25 ve altı, %16.6’sı 25-31 yaş aralığında, %18.8’i 32-38; %25.6’sı 39-45; %23.1’i 46-52; %13’6’sı da 52 ve üzeri yaş grubundadır.

5.2. Faktör Analizi Sonuçları

Bayanların stadyumda futbol maçı izlemeleri etkileyen unsurları belirlemek için 30 maddelik anket uygulanmış ve faktör analizi ile incelenmiştir.

Faktör analizinde örneklem büyüklüğünün yeterliliğini test etmek için ise Kaiser-Meyer- Olkin (KMO) testi yapılmalıdır. KMO ölçütü 0.90-.1.00 arasında ise “mükemmel”, 0.80-0.89 arasında ise “çok iyi”, 0.70-0.79 arasında ise “iyi”, 0.60-0.69 arasında ise “orta”, 0.50-0.59 arasında ise “zayıf” ve 0.50’nin altında ise “kabul edilemez” dir. Çalışmadan elde edilen KMO değeri 0.916 olup, örneklemin yeterliliğinin mükemmel olduğu söylenilebilir. Verilerin Faktör analizine uygun olup olmadığını belirlemek için Bartlett Küresellik Testi yapılmıştır. Bartlett testinde, korelasyon matrisi birim matristir şeklinde ifade edilen sıfır hipotezinin reddedilmesi gerekir. Bartlett Küresellik testi ile, sonucuna göre, hesaplanan kare istatistiği değeri 6017.002’dir ($p < 0.01$) Buradan sıfır hipotezi reddedilmiştir ve verilerin faktör analizine uygun olduğu ifade edilebilir. Faktör analizi sonucunda özdeğeri 1’den büyük olan 6 faktör ortaya çıkmıştır (özdeğerleri sırasıyla, 37.97, 10.123, 5.730, 4.403, 3.961, 3.397). Bu 6 faktörün varyans açıklama oranı %65.584’tür.

Tablo 5: Faktör Analizi Sonuçları

Soru	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
Faktör 1			
4. İnternet bankacılığı aracılığıyla gerçekleştirdiğim işlemler kontrol etmesem dahi güvenilirdir.	37.90	0.720	0.909
2. İnternet bankacılığı üzerinden yaptığım işlemlerde kendimi güvende hissediyorum.		0.719	
7. İnternet bankacılığında hep doğru finansal bilgiler verilmektedir.		0.692	
8. İnternet bankacılığındaki kimlik tanımlama metotları oldukça güvenlidir.		0.691	
6. İnternet bankacılığını vermiş olduğu bilgi hizmetinden dolayı güveniyorum.		0.681	
5. İnternet bankacılığı işlemleri banka şubelerinde yapılan işlemlerden daha güvenlidir.		0.677	
1. İnternet bankacılığı üzerinden yaptığım işlemler güvenlidir		0.674	
11. Mobil bankacılık işlemlerini güveniyorum.		0.588	
3. Kullandığım internet bankacılığı sistemi kişisel bilgilerin güvenliğine önem veriyor.		0.547	

Faktör 2	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
9.Kullandığım internet bankacılığı sitesine güvenmiyorum.	10.123	0.823	0.830
16. Mobil bankacılık uygulamalarında sunulan ekran kullanımı güvenlik açısından uygun şekilde oluşturulmamıştır.		0.722	
17. Mobil bankacılık işlemleri oldukça karmaşık olduğu için yaptığım işlemlerde kendime güvenmiyorum		0.695	
15. Kullandığım mobil bankacılık uygulamasına güvenmiyorum.		0.645	
18. Mobil bankacılık hizmetlerini güvenlik açısından yetersiz buluyorum.		0.637	
22.Mobil/internet bankacılığı sayesinde kart ve hesap bilgilerime güvenli bir şekilde erişebiliyorum.		-0.558	
23.Mobil/internet bankacılığı sayesinde ödeme işlemlerimi güvenli bir şekilde gerçekleştirebiliyorum.		-0.511	
Faktör 3	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
26.Mobil/internet bankacılığına çevremdeki insanların karşılaştığı olumsuz deneyimler sebebiyle güvenmiyorum.	5.730	0.893	0.771
25.Mobil/internet bankacılığına daha önce yaşamış olduğum olumsuz deneyimlerden dolayı güvenmiyorum.		0.848	
27.Mobil/internet bankacılık ile sunulan hizmetler güvenlik açısından beklentilerimi karşılamamaktadır.		0,616	
21. Banka çalışanlarına güvenmediğim için mobil/internet bankacılığı kullanıyorum		0.496	
Faktör 4	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
19.Mobil/internet bankacılık hizmetlerinin güvenilirliği sayesinde şubeye gitmeye ihtiyaç duymuyorum.	4.403	0.672	0.819
12. Mobil bankacılık hizmetlerinin güvenlik sistemleri sayesinde bilgilerimin yabancı kişilerin eline geçmesinden endişe duymuyorum.		0.577	
13. Mobil bankacılık işlemlerinin sağladığı doğrulama kodu hizmeti işlemlerimi daha güvenli gerçekleştirmemi sağlıyor.		0.562	
14. Mobil bankacılık işlemlerinin sağladığı doğrulama kodu hizmeti işlemlerimi daha güvenli gerçekleştirmemi sağlıyor.		0.547	
Faktör 5	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
28. Mobil/İnternet bankacılığı hizmetlerinin işlem güvenilirliği sayesinde gelecek yıllarda şubelerin ve ATM'lerin yerini alacağını düşünüyorum.		0.732	0.693
24. Mobil/İnternet bankacılığı üzerinden işlemleri kendim gerçekleştirdiğimde hata payının azalıyor olması beni güvende hissettiriyor.		0.552	
20. Mobil/internet bankacılığı ile ilgili güvenlik sorunları neticesinde karşılaşılabilecek yasal yaptırımlar hakkında bilgi sahibiyim.		0.483	
Faktör 6	Varyans açıklama Oranı (%)	Faktör ağırlığı	Cronbach Alfa
29.Mobil/İnternet bankacılığı hizmetlerinin sanal dolandırıcılık tehditlerine karşı (hackerlik) güvenilir olduğuna inanmıyorum.		0.681	0.637
30. Mobil/İnternet bankacılığı hizmetlerinde yaşanan sanal dolandırıcılık tehditlerine karşı sigorta yaptırmayı düşünüyorum.		0.657	
10. İnternet bankacılığı işlemlerini anlamadığım için güvende hissetmiyorum		-0.598	

KMO:0.916; Bartlett Küresellik Testi:6017.002 (p<0.01), Cronbach Alfa:0.731

Birinci faktörün varyans açıklama oranı %37.97'dir. Birinci faktörde 9 madde yer almıştır. İkinci faktör de 7 madde yer almıştır ve varyans açıklama oranı %10.123'tür. Üçüncü faktörün varyans açıklama oranı % 5.73 olup, 4 madde bu faktörde toplanmıştır. Dördüncü faktörün varyans açıklama oranı % 4.403'tür. Bu faktörde 4 madde toplanmıştır. Beşinci faktörün varyans açıklama oranı %3.961 ve bu faktörde 3 madde yer almaktadır. Altıncı faktörde 3 madde yer almakta olup, varyans açıklama oranı %3.397'dir.

Ayrıca, Tablo 5'te her faktörde yer alan maddelerin faktör yükleri ile her bir faktöre ilişkin Cronbach Alpha güvenilirlik katsayıları yer almaktadır. Faktör yüklerinin -0.598 ile 0.893 arasında değiştiği görülmektedir. Herbir faktörün, faktör yükleri ayrı ayrı incelendiğinde, 1. Faktörün, faktör yükleri 0.547 ile 0.720; 2. Faktörün, faktör yükleri 0.511 ile 0.823; 3. Faktörün, faktör yükleri 0.496 ile 0.893; 4. Faktörün, faktör yükleri 0.547 ile 0.672; 5. Faktörün, faktör yükleri, 0.483 ile 0.732 ve 6. Faktörün faktör yükleri -0.598 ile 0.681

Her bir faktörün Cronbach Alpha güvenilirlik katsayıları incelendiğinde, katsayıların 0.637 ile 0.909 arasında değiştiği görülmektedir. Bu durum, her bir faktörün güvenilir olduğunu göstermektedir.

6.SONUÇ VE ÖNERİLER

Bu araştırmada farklı akademik ünvanı, farklı yaş, cinsiyet, medeni durum gelir, çalışma süresi, en çok kullanılan mobil internet bankacılığı, en çok hangi işlemleri yaptıkları gibi farklı gruplarından tutumları elde edilmiştir. Çalışma sonucunda 39-45 yaş aralığındaki akademisyenlerin, internet bankacılığı hizmetlerinden daha fazla yararlandığı ortaya çıkmıştır.

Araştırma sonucunda elde edilen bulgulara göre;

- 39-45 yaş aralığındaki kişilerin, internet bankacılığı hizmetlerinden daha fazla yararlandığı,
- 39-45 yaş aralığındaki kişilerin internet bankacılığını en çok kullanan yaş grubu olduğu,
- İnternet sağlayıcısı olarak en çok tercih ettikleri 3G veya 4.5G olduğu,
- Katılımcıların %64.3'ü 5 yıl ve sonrası mobil/internet bankacılığı kullandığı,
- Akademisyenlerin en çok İş cep'i kullandıkları görülmüş,
- En fazla gerçekleşen internet bankacılığı işlemlerinin hesaba havale yapma/para aktarma(ETF), fatura ödemeleri, kredi kartı işlemleri gibi ödemelerin yapılması olduğu,
- İnternet bankacılığı kullanan tüketicilerin güven düzeyinin yüksek olduğu, kullanmayı tercih etmeyenlerinse güven açısından temkinli yaklaştıkları ve ön yargıya sahip oldukları ortaya çıkmıştır.

Araştırmamızda faktör analizi yapılmıştır. Uygulanan anketin Cronbach's Alpha değeri 0.70 den büyük çıktığı için güvenilir olduğu söylenilebilir.

Bankalar, internet bankacılığı konusunda müşterilerini daha fazla bilgilendirmeli, farkındalığın artmasına katkı sağlamalı ve özendirici tedbirler alarak çalışmalarını yoğunlaştırmaları gerekmektedir.

İnternet bankacılığının önündeki en büyük sıkıntı bu güven algısıdır. Bu konuda banka yöneticilerine, çalışanlarına, devlete ve müşterilere görevler düşmektedir. Bankalar bu hususta güvenlik tedbirlerini artırıcı çalışmalar yapabilir, devlet güven zeminini artırıcı bir takım önlemler alabilir, banka çalışanları müşterilerin endişelerini giderici ve teşvik edici yönlendirmelerde bulunabilirler.

KAYNAKÇA

- Akan, Y., Kanca, O. C., Köksel, B., ve Korkulu, A., (2021) “Akademisyenlerin Bireysel Banka Ürünlerini Kullanım Talepleri: Atatürk Üniversitesi Örneği”, *Journal of Emerging Economies and Policy*, 6(1), 137-147.
- Albayrak, A.S. (2006) “Uygulamalı Çok Değişkenli İstatistiksel Teknikler”, Asil Yayın Dağıtım, Ankara.
- Aliyeva, B. (2016), Bankacılık Sisteminde İnternetin Olumlu Ve Olumsuz Yönleri İnönü Üniversitesi Uluslararası Sosyal Bilimler Dergisi Cilt 5, Sayı 1, 2016, s. 237-252.
- Alpar, R. (2011) “Uygulamalı Çok Değişkenli İstatistiksel Yöntemler”, Detay Yayıncılık, Ankara.
- Armağan, E. ve Temel, E. (2016), “Türkiye’de İnternet Bankacılığı Kullanımında Demografik Faktörlerin Tüketici Algısına Etkisi Üzerine Ampirik Bir Çalışma”, *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, 14(2), 411-436.
- Bayrakdaroğlu, A. (2012), “Bireylerin İnternet Bankacılığı Kullanımını Etkileyen Faktörlerin Belirlenmesi Üzerine Bir Alan Araştırması”, *Business and Economics Research Journal* Volume 3 (4), 57-75.
- Berber, M., Nakiboğlu, A. (2021), “Bireysel Banka Müşterilerinin Online Bankacılığa Yönelik Tutum ve Davranışlarının İncelenmesi”, *Manisa Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, 19(3), 33-48.
- Boz, H.; Kaynar, İ.; Özen, E. ve Şenyıldız, L. (2017). “A ve B Kişilik Tiplerinin İnternet Bankacılığına Duyulan Güvene Etkisi Var Mıdır?”, *Vol:3, Issue:13; pp:435-444*
- Çınar, O., Yavuz S., Aslan, İ., (2012), “Akademisyenlerin İnternet Bankacılığı Hakkındaki Tutum, Düşünce Ve Davranışları: Erzincan Üniversitesi Örneği”, *SÜ İİBF Sosyal ve Ekonomik Araştırmalar Dergisi*, 12 (23), 103-124.
- Dayı, F. ve Kendirli, S. (2020), “İnternet Bankacılığı Kullanım Faktörlerinin Tekrar Kullanma Niyeti Üzerindeki Etkisi: Öğrenim Durumu Karşılaştırması”, *Ankara Hacı Bayram Veli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 22 (2), 460-483.
- Hair, J.F., Anderson, R.E., ve Tatham, R.L. (1990) “Multivariate Data Analysis”, Macmillan Publishing Company.
- Kalaycı, Ş. (2005) “SPSS Uygulamalı Çok Değişkenli İstatistik teknikleri, Asil Yatın dağıtım, Ltd.Şti., İstanbul.
- Kazancı, T. 2013. *Mobil Bankacılıkta Güvenlik Sorunlarının Analizi*. Yüksek Lisans Tezi. İstanbul Üniversitesi Fen Bilimleri Enstitüsü.
- Koçak S.B., Özbek C.Y., (2019), “Banka Müşterilerinin İnternet Bankacılığı Algısı ve Hizmetlerine Dönük Görüşleri Üzerine Bir Araştırma: Burdur İli Bucak İlçesi Örneği”, *Bankacılık ve Finansal Araştırmalar Dergisi*, 6(2), 87-99.
- Koçoğlu, B. 2017. *Türkiye’de İnternet Bankacılığının Etkinliğinin İncelenmesi*. Yüksek Lisans Tezi. İstanbul Teknik Üniversitesi Sosyal Bilimler Enstitüsü.
- Özdamar, K., (2002) “Paket Programları ve İstatistiksel Analiz”, Kağan Kitap Evi, Eskişehir.
- Özdemir, E. 2017. *Sektörel Rekabet Açısından Türkiye’de İnternet Bankacılığının Önemi*. Yüksek Lisans Tezi. Beykent Üniversitesi Sosyal Bilimler Enstitüsü.



- Patır, S.(2009) ” Faktör Analizi İle Öğretim Üyesi Değerleme Çalışması” ,Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 23(4), 69-86.
- Tatlıdil, H. (2002) ”Uygulamalı Çok Değişkenli İstatistiksel Analiz”, Hacettepe Üniversitesi İstatistik Bölümü, Ankara.
- Türkiye Bankalar Birliği, İnternet Bankacılığı ve Mobil Bankacılık İstatistikleri, 2020.
- Uzundağ, Ş. 2013. *Türkiye’de İnternet Bankacılığının Gelişimi Ve İnternet Bankacılığına İlişkin Tüketici Davranışları Analizi*. Yüksek Lisans Tezi. Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü.
- Yurttadur, M. ve Süzen, E. (2016), “Türkiye’de Banka Müşterilerinin İnternet Bankacılığına Yaklaşımlarının İncelenmesi Üzerine Bir Uygulama”, Tüketici ve Tüketim Araştırmaları Dergisi, 8 (1), 93-120.

CO₂ EMİSYONU, ENERJİ TÜKETİMİ VE EKONOMİK BÜYÜME ARASINDAKİ NEDENSELLİK İLİŞKİSİNİN ARAŞTIRILMASI: TÜRKİYE ÖRNEĞİ

INVESTIGATION OF THE CAUSAL RELATIONSHIP BETWEEN CO₂ EMISSIONS, ENERGY CONSUMPTION AND ECONOMIC GROWTH: THE EXAMPLE OF TURKEY

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ÖZET

Son yıllarda dünyada en çok tartışılan konuların başında küresel ısınma ve iklim değişikliği gelmektedir. Küresel ısınmanın nedenlerinden birisi de sera gazı salınımıdır. Havaya salınan sera gazları arasında en çok pay karbondioksittir (CO₂). Karbondioksit salınımının artması da nüfus artışından, taşıt sayısının artmasından, orman alanlarının azalmasından, ekonomik üretimde ve ulaşımda fosil yakıtların (kömür, petrol, doğal gaz) kullanılmasından kaynaklanmaktadır.

Sera gazlarının atmosfere salınımının azaltılması için enerjinin tasarruf edilmesi, baca gazı arıtma tesislerinin kurulması ya da bacalara filtreler takılması, yenilenebilir enerji kaynaklarının daha çok kullanılmasının sağlanması, ulaşımda bireysel araçlar yerine motorlu taşıtların kullanılmasının özendirilmesi gibi çalışmalar yapılmaktadır.

Bu çalışmada Türkiye için kişi başına CO₂ emisyonu (metrik ton), birincil enerji tüketimi (kg-petrol eşdeğeri) ve ekonomik büyümeyi temsil eden kişi başına Gayri safi Yurtiçi Hasıla (2017 fiyatlarıyla ABD Doları) serileri arasındaki nedensellik ilişkisi araştırılmıştır. Kullanılan veriler yıllık olup 1990-2019 dönemini kapsamaktadır.

Kişi başına CO₂ emisyonu verileri Türkiye İstatistik Kurumu verilerinden alınarak, nüfusa oranlanarak araştırmacı tarafından hesaplanarak oluşturulmuştur. Enerji Tüketimi verileri enerji bakanlığı, enerji işleri genel müdürlüğü enerji denge tablaolatından elde edilmiştir. Son olarak kişi başına Gayri safi Yurtiçi Hasıla (2017 fiyatlarıyla ABD Doları) serisi de dünya bankasının internet sitesinden elde edilmiştir.

Seriler arasındaki nedensellik ilişkisi araştırılmadan önce, incelenen serilerin durağan olup olmadıkları ADF ve PP birim kök testi ile araştırılacaktır. Tüm serilerin düzeyde mi yoksa birinci farkı alındıktan sonra mı durağan hale geldiği araştırılacaktır.

Daha sonra, incelenen zaman serileri arasında uzun dönemde ilişki olup olmadığını belirlemek üzere Johansen (1988) ve Johansen ve Juselius (1990, 1992) eşbütünleşme analizi kullanılacaktır. Eşbütünleşme analizi sonucunda incelenen seriler arasında uzun dönemli bir ilişkinin olup olmadığı araştırılacaktır. Daha sonra seriler arasındaki nedensellik ilişkisinin varlığı incelenecektir.

Anahtar Kelimeler: Enerji Tüketimi, CO₂ Emisyonu, Ekonomik Büyüme, Nedensellik Analizi, Eşbütünleşme Analizi

ABSTRACT

Global warming and climate change are among the most discussed issues in the world in recent years. One of the causes of global warming is greenhouse gas emissions. Among the greenhouse

gases emitted into the air, the largest share is carbon dioxide (CO₂). The increase in carbon dioxide emissions is due to the increase in population, the increase in the number of vehicles, the decrease in forest areas, the use of fossil fuels (coal, oil, natural gas) in economic production and transportation.

In order to reduce the emission of greenhouse gases into the atmosphere, studies such as saving energy, installing flue gas treatment plants or installing filters in the chimneys, ensuring more use of renewable energy sources, encouraging the use of motor vehicles instead of individual vehicles in transportation are carried out.

In this study, the causality relationship between per capita CO₂ emissions (metric tons), primary energy consumption (kg-oil equivalent) and Gross Domestic Product per capita (US Dollars in 2017 prices) series representing economic growth) was investigated for Turkey. covers the 1990-2019 period.

Per capita CO₂ emission data was obtained from the data of the Turkish Statistical Institute and calculated by the researcher by proportioning to the population. Energy Consumption data was obtained from the energy balance sheet of the ministry of energy, general directorate of energy affairs. Finally, the series of Gross Domestic Product per capita (in 2017 prices in US Dollars) was obtained from the website of the world bank.

Before investigating the causality relationship between the series, whether the studied series are stationary or not will be investigated by ADF and PP unit root tests. It will be investigated whether all series become stationary at the level or after taking the first difference. Then, Johansen (1988) and Johansen and Juselius (1990,1992) cointegration analysis will be used to determine whether there is a long-term relationship between the examined time series. As a result of the cointegration analysis, it will be investigated whether there is a long-term relationship between the series examined. Then, the existence of a causal relationship between the series will be examined.

Keywords: Energy Consumption, CO₂ Emission, Economic Growth, Causality Analysis, Cointegration Analysis

1. GİRİŞ

Günümüzde çevre korumasına yönelik çalışmalar önemli bir yere sahiptir. Çevreyi korumak için yapılan çalışmaların başında ise ser gazı salınımlarının azaltılması gelmektedir. Dünyadaki, sera gazlarının %76'sını oluşturan CO₂ en önemli kirletici gaz olarak bilinmektedir.

CO₂ salınımının en önemli nedeni ise sanayide ve ulaşımda kullanılan fosil yakıtlardır. Ülkeler CO₂ salınımını azaltmak üzere ulaşımda tamamen elektrikli ya da elektrik-benzin karması (hybrid) sistemlere geçiş yapmaktadır. Böylece fosil yakıt kullanımından kaynaklanan CO₂ salınımı azaltılabilecektir.

Sera gazlarının atmosfere salınımının azaltılması için enerjinin tasarruf edilmesi, baca gazı arıtma tesislerinin kurulması ya da bacalara filtreler takılması, yenilenebilir enerji kaynaklarının daha çok kullanılmasının sağlanması, ulaşımda bireysel araçlar yerine motorlu taşıtların kullanılmasının özendirilmesi gibi çalışmalar yapılmaktadır.

Sera gazlarının azaltılması için hazırlanan Kyoto Protokolü 1997'de imzalanmış ve 2005 yılında yürürlüğe girmiştir. Protokole göre, 2008-2012 döneminde, sera gazı salınımlarının 1990'daki değere göre %5,2 azaltılmasına karar verilmiştir.

Bu çalışmada Türkiye için kişi başına CO₂ emisyonu (metrik ton), birincil enerji tüketimi (kg-petrol eşdeğeri) ve ekonomik büyümeyi temsil eden kişi başına Gayri safi Yurtiçi Hasıla (2017

fiyatlarıyla ABD Doları) serileri arasındaki nedensellik ilişkisi araştırılmıştır. Kullanılan veriler yıllık olup 1990-2019 dönemini kapsamaktadır.

2. LİTERATÜR TARAMASI

Çil Yavuz (2014), Türkiye için 1960-2007 dönemi yıllık verileri kullanarak, kişi başına CO₂ emisyonu, kişi başı gelir ve kişi başı enerji tüketimi arasındaki Johansen eşbütünleşme testi ve Gregory-Hansen eşbütünleşme testi ile araştırmıştır. Johansen testine göre incelenen değişkenler arasında uzun dönemli ilişkinin olduğu belirlenmiştir.

Bozkurt ve Akan (2014), Türkiye için 1960-2010 dönemi verileri kullanarak CO₂ emisyonu, enerji tüketimi arasındaki ilişkiyi araştırmışlardır. Çalışmadan, CO₂ emisyonunun ekonomik büyümeyi negatif etkilediği ve enerji tüketiminin de ekonomik büyümeyi pozitif etkilediği sonucu elde edilmiştir.

Büyükyılmaz ve Mert (2015), Türkiye için 1960-2010 yılları arasında kişi başı CO₂ emisyonu, kişi başı yenilenebilir enerji tüketimi ve kişi başı gayri safi yurtiçi hâsıla arasındaki ilişkiyi MS-VAR modeli ile modellemiştir. Çalışmadan, incelenen değişkenler arasındaki ilişkinin doğrusal olmadığı, ilişkilerin rejimlere göre değişiklik gösterdiği ve değişkenler arasında çift yönlü bir nedensellik ilişkisinin olduğu sonucu elde edilmiştir.

Çetintaş vd. (2016), Türkiye’de 1960-2011 dönemi için enerji tüketimi, ekonomik büyüme ve şehirleşme oranının karbondioksit emisyonu üzerindeki uzun ve kısa dönemdeki etkilerini araştırmışlardır. Çalışma sonucuna göre, incelenen değişkenler arasında uzun dönemli bir ilişki bulunmuştur. Uzun dönemde enerji tüketimi, ekonomik büyüme ve şehirleşme oranının CO₂salınımını aynı yönlü etkilediği; kısa dönemde ise ekonomik büyüme ve şehirleşme oranının CO₂ üzerinde etkisinin olmadığı belirlenmiştir.

Erdoğan ve Ganiev (2016), Orta Asya ülkeleri için CO₂ salınımları ile ekonomik ve finansal gelişme ve fosil yakıt enerji tüketimi arasındaki ilişkiyi 1992-2013 dönemi verileri kullanarak panel veri analizi ile incelemiştir. Çalışmadan, Orta Asya ülkeleri için ters-U biçimindeki Çevresel Kuznets eğrisinin geçerli olduğu belirlenmiştir. Ayrıca, enerji tüketimi ve şehirleşmenin CO₂ salınımlarını pozitif etkilediği ve finansal gelişme ve ticari açıklığın CO₂ salınımlarını azaltmada önemli faktörler olduğu sonucu elde edilmiştir.

Gökmenoğlu ve Taşpınar (2016), Türkiye için 1974-2010 dönemi verilerini kullanarak, CO₂emisyonu, enerji tüketimi, ekonomik büyüme ve doğrudan yabancı yatırım (DYY) değişkenleri arasındaki ilişkiyi incelemiştir. Sınır testi ile değişkenler arasındaki uzun dönemli ilişki olup olmadığı araştırılmıştır. Toda-Yamamoto nedensellik testine göre, CO₂ emisyonu ve DYY arasında ve enerji tüketimi ve CO₂ emisyonu arasında iki yönlü; ekonomik büyüme ve enerji tüketiminden DYY’ye doğru tek yönlü ilişkini olduğu ve ekonomik büyümeyi enerji tüketimine doğru da tek yönlü nedensellik ilişkisinin olduğu sonucu elde edilmiştir.

Kızılkaya (2017), Türkiye için CO₂ emisyonu, ekonomik büyüme, doğrudan yabancı yatırım ve enerji tüketimi değişkenleri arasındaki ilişkiyi, 1970-2014 dönemi yıllık verileri, ARDL sınır testi ile araştırmıştır. Uzun dönemde, ekonomik büyüme ve enerji tüketiminin CO₂ emisyonu üzerinde pozitif etkisinin olduğu belirlenmiştir. Ayrıca, doğrudan yabancı yatırımın CO₂ emisyonu üzerinde anlamlı bir etkisinin olmadığı sonucu da elde edilmiştir.

Aykırı ve Bulut (2019), Türkiye ekonomisine giren doğrudan yabancı yatırımların CO₂ emisyonu ile ilişkisini araştırmışlardır. Bu amaçla, ekonomik küreselleşme, kişi başına gelir ve doğrudan yabancı yatırımların CO₂ emisyonu üzerindeki uzun dönemdeki belirleyiciliği FMOLS, DOLS ve CCR yöntemleriyle analiz edilmiştir. Çalışma sonuçları incelendiğinde,

ekonomik küreselleşme, kişi başına gelir, doğrudan yabancı yatırımlar ve CO₂ emisyonu arasında uzun dönemli ilişki olduğu belirlenmiştir. Ayrıca, Türkiye ekonomisi için ekonomik küreselleşme, kişi başına gelir ve paralelinde artan doğrudan yabancı yatırımların kirliliği arttırdığı tespit edilmiştir. Doğrudan yabancı yatırımların, CO₂ emisyonu üzerindeki en fazla olumlu etkiye sahip olduğu elde edilen bir başka sonuçtur.

Eyüboğlu ve Uzar (2020), Türkiye için 1960-2014 dönemi için CO₂ emisyonu, turist sayısı, enerji tüketimi ve ekonomik büyüme serileri arasındaki ilişkiyi araştırmıştır. Çalışmada ADL, ARDL eşbütünleşme testleri kullanılmıştır. Çalışmadan, uzun dönemde ve kısa dönemde turizm, ekonomik büyüme ve enerji tüketiminin CO' üzerinde pozitif etkisi olduğu belirlenmiştir.

Balcı İzgi (2020), Türkiye için (1980-2014) dönemi verileri ile ardl sınır testi yaklaşımını kullanarak Kuznets benzeri bir ilişkiyi test ettiği çalışmada, ekonomik büyümenin çevre kirliliğini pozitif yönde etkilediği sonucunu elde etmiştir. Değişkenler arasındaki nedensellik ilişkisinin yönü ekonomik büyümeden karbondioksit emisyonuna doğru olup, parabolik olmayan doğrusal şekilde olduğu belirlenmiştir.

Erkişi ve Çelik (2020), Türkiye için CO₂ emisyonu, yenilenemeyen enerji tüketimi ve iktisadi büyüme arasındaki ilişkileri araştırmışlardır 1990-2015 dönemi veriler analiz edilmiştir. VAR Granger Nedensellik Analizi ile değişkenler arasındaki kısa dönem nedensellik analiz edilmiştir. Çalışmaya göre, kısa dönemde yenilenemeyen enerji tüketiminden, CO₂ salınımına doğru tek yönlü pozitif bir ilişkinin varlığı belirlenmiştir. Yenilenemeyen enerji tüketimi, kısa dönemde CO₂salınımını etkileyen tek değişkendir. Enerji tüketimi ile iktisadi büyüme arasında bir ilişki bulunamamıştır.

Okumuş (2020), Türkiye için 1968-2014 yıllarını kapsayan dönem için tarımsal katma değer, ekonomik büyüme, yenilenemez ve yenilenebilir enerji tüketimi, kentleşme oranı, dışa açıklık oranı ve CO₂ emisyonu arasındaki ilişkiyi ARDL sınır testi kullanarak araştırmıştır. Elde edilen sonuçlara göre, incelenen değişkenler arasında uzun dönemli bir ilişki saptanmıştır. Uzun dönemde CO₂ emisyonunu tarımsal katma değer, yenilenemez enerji tüketimi, ticari serbestleşme ve kentleşme değişkenlerinin hem kısa hem de uzun dönemde arttırdığı belirlenmiştir. Yenilenebilir enerji tüketiminin kısa dönemde CO₂ emsyonunu azaltıcı etkisi olduğu da elde edilen bir başka sonuçtur.

Kılınç ve Altıparmak (2020), Avrupa Birliği'ne üye 21 ülke ve Türkiye özelinde; kişi başına düşen GSYH, nüfus, birincil enerji tüketimi, sosyo-ekonomik hedeflere göre Ar-Ge enerji harcamaları, çevre vergileri ile CO₂ emisyonu arasındaki ilişki 2005-2014 dönemi için dinamik panel veri tahmin yöntemleri kullanarak araştırmışlardır. Çalışmadan elde edilen sonuçlara göre, seçilen 21 Avrupa Birliği ülkesinde ve Türkiye'de, çevre vergileri ve sosyo-ekonomik hedeflere göre Ar-Ge enerji harcamaları CO₂ emisyonunu olumsuz yönde ve kişi başına düşen GSYH ve birincil enerji tüketiminin ise CO₂ emisyonunu olumlu yönde etkilediği belirlenmiştir.

Konuk ve Eryer (2021), Türkiye ekonomisi için sağlık harcamaları, çevre ve ekonomik büyüme arasındaki ilişki 1980-2019 dönemi Johansen Eşbütünleşme analizi ile araştırılmıştır. Türkiye'de karbondioksit değişkeninde de %1'lik artışın da sağlık harcamalarını %2,62 oranında arttırdığı belirlenmiştir.

Sancar ve Atay Polat (2021), Türkiye, Brezilya, Meksika, Çin, Hindistan ve Güney Afrika'da 2000-2016 arası dönemde CO₂ emisyonları, ekonomik büyüme ile sağlık harcamaları arasındaki ilişki Panel Veri analizi kullanılarak incelenmiştir. Çalışma sonuçlarına göre, sağlık harcamaları ile ekonomik büyüme arasında çift yönlü, sağlık harcamaları ile CO₂ emisyonları

arasında çift yönlü ve ekonomik büyüme ile CO₂ emisyonları arasında çift yönlü ilişki olduğu belirlenmiştir.

3. VERİLER VE YÖNTEM

Bu çalışmada, Türkiye için kişi başına CO₂ emisyonu (metrik ton), birincil enerji tüketimi (kg-petrol eşdeğeri) ve ekonomik büyümeyi temsil eden kişi başına Gayri safi Yurtiçi Hasıla (2017 fiyatlarıyla ABD Doları) serileri arasındaki nedensellik ilişkisi araştırılmıştır. Kullanılan veriler yıllık olup 1990-2019 dönemini kapsamaktadır.

3.1. Birim Kök Testleri

Ekonomik olaylara ilişkin birçok zaman serisi birim kök içermektedir. Bunun anlamı serinin durağan olmadığını göstermektedir. Birim kök testleri zaman serilerinin durağanlığını incelenmesinde önemli bir yere sahiptir. Bunun nedeni, durağan olmayan değişkenlerle kurulan regresyon denkleminin yanıltıcı sonuçlar vermesidir. Eşbütünleşme testleri için serilerin aynı dereceden durağan olmaları gerekmektedir. Bu nedenle incelenecek serilerin durağanlık dereceleri birim kök testleri ile belirlenmektedir. Birim kökün var olup olmadığını belirlemek üzere en çok kullanılan testler Dickey ve Fuller (1979,1981), Phillips ve Perron (1988), Kwiatkowski vd. (1992) tarafından geliştirilmiştir.

Bu çalışmada ADF ve Phillips-Perron birim kök testleri kullanılarak serilerin durağanlığı ve bütünleşme dereceleri araştırılmıştır. Burada,

H₀: Seri birim kök içermektedir (seri durağan değildir) hipotezi

H₁: Seride birim kök yoktur (seri durağandır) alternatif hipotezine karşı sınanmaktadır (Enders, 2004).

Çalışmada incelenen veri setine göre bağımlı değişkenin GSYİH olacak şekilde en uygun model kurulurken doğrusal-doğrusal (DD), doğrusal-logaritmik (DL), logaritmik-doğrusal (LD) ve logaritmik-logaritmik (LL) modeller arasından Tablo 1'e bakılarak tercih edilmiştir.

Tablo 1. En Uygun Modelin Kurulması

MODEL Çeşitleri	1. Aşama						2. Aşama		
	t (p)	F (p)	s(y)	R ²	HKT	AIC	LM	JB	White
DD	+	0,000	433,781	0,963	5268652	15,047	0,001	0,345	0,671
DL	+	0,000	586,49	0,932	9631080	15,651	0,000	0,251	0,122
LD	+	0,000	0,037	0,981	0,039	-3,669	0,003	0,407	0,307
LL	+	0,000	0,049	0,968	0,068	-3,117	0,001	0,403	0,904

Tablo 1 incelendiğinde GSYİH bağımlı değişkeni için Logaritmik-Logaritmik modele göre gerekli kriterleri bir tık daha iyi sağlayan Logaritmik-Doğrusal model en uygun modeldir. Ancak kurulacak modelde otokorelasyon probleminin olduğu da görülmektedir. Bu bilgiler ışığında en uygun model Eşitlik (1)'deki gibidir.

$$LGSYİH = 7,589 + 1,024Enerji + ut \quad (1)$$

Kurulacak LD modelde CO₂ değişkeni katsayısı %5 anlamlılık düzeyine göre istatistiksel olarak anlamsız çıktığından dolayı analizin bundan sonraki aşamasında modelden çıkartılmıştır. Ayrıca GSYİH bağımlı değişkenini Enerji değişkeninin pozitif yönde etkilediği görülmektedir.

İncelenen değişkenlere ait en uygun model kurulduktan sonra ADF ve PP birim kök testleri yardımıyla değişkenlerin durağanlık derecelerini belirlenmiştir. Analiz sonucu değişkenlerin hesaplanan ADF ve PP birim kök test istatistik olasılık değerleri Tablo 2'de verilmektedir.

Tablo 2. Değişkenlerin ADF ve PP Birim Kök Test İstatistik Olasılık Değerleri

Model Cinsi	Değişkenler	ADF		PP		Durağanlık Derecesi
		Düzye	1. Fark	Düzye	1. Fark	
Sabit + Trend	LGSYİH	0,324	0,000*	0,311	0,001*	I(1)
	Enerji	0,103	0,003*	0,184	0,000*	I(1)

*: İlgili serilerin hangi seviyede durağan olduğunu göstermektedir.

Hesaplanan ADF ve PP test istatistik olasılık değerleri 0.05 değerinden küçük olduğunda “değişkenler durağan değildir” şeklinde kurulan H0 hipotezi %5 anlamlılık düzeyinde reddedilir. Tablo 2 incelendiğinde hesaplanan olasılık değerleri 0.05 değerinden büyük olduğundan tüm değişkenlerin düzeyde değil birinci farkında (I(1)) durağan olduğu görülmüştür.

3.2. Eşbütünleşme Analizi

Eşbütünleşme, iki ya da daha fazla makroekonomik değişkenin uzun dönemde birlikte hareket etmesidir. Engle ve Granger (1987), regresyon analizi kullanılarak eşbütünleşme ilişkilerini tahmin edilmesini önermiştir. Eğer incelenen değişkenler eşbütünleşik ise, denge ilişkisinden olan sapma 0. dereceden bütünleşiktir (durağandır). Banerjee vd. (1993)’ne göre, eşbütünleşme, böyle denge ilişkilerinin yapısının istatistiksel ifadesidir. X_t ve Y_t serisi aynı dereceden bütünleşik değilse, bu iki seri arasında uzun dönemli ilişki yoktur ve bu iki seri arasındaki doğrusal ilişkiden elde edilen hata terimi durağan değildir. Bir başka ifade ile bu iki seri birlikte hareket etmiyor ya da birbirilerinden uzaklaşıyor demektir (Maddala ve Kim, 1998).

Eğer bir seri birinci fark alınmadan durağan ise seri düzeyde durağandır ve I(0) olur. X ve Y, I(1) (birinci dereceden farkı alınmış) olan iki zaman serisi olmak üzere, bu iki serinin doğrusal birleşimi de I(1) olacaktır. Ancak bazı koşullar altında iki I(1) değişkeninin doğrusal birleşimi I(0) olan bir değişken ortaya çıkarabilir. Bu durumda bu iki değişkene eşbütünleşik seriler (cointegrated series) denir. Yani, X_t ve Y_t serileri I(1) ise ve

$$\varepsilon_t = Y_t - \alpha X_t \quad (2)$$

denkleminde ε , I(0) ise X_t ve Y_t serileri eşbütünleşiktir denir ve CI(1,1) ile gösterilir. Denklemde yer alan α eşbütünleşme katsayısıdır. Eğer değişken sayısı ikiden fazla ise, eşbütünleşme vektörü adını alır (Cromwell ve diğerleri,1994). Engle ve Granger (1987), tek denkleme dayalı eşbütünleşme analizini geliştirmiştir. Daha sonra Johansen (1988), çoklu eşbütünleşme vektörünün tahmin edilmesi için VAR (Vector Autoregressive) modelinde en çok olabilirlik yöntemine dayanan bir test geliştirmiştir. Johansen yöntemi olarak adlandırılan yaklaşım iki amaç için kullanılmaktadır. Bu amaçlar:

1. İlgilenilen değişkenler arasındaki en fazla sayıda eşbütünleşme vektörünü belirlemek,
2. Eşbütünleşme vektörü ve ayarlama parametrelerinin en çok olabilirlik (maximum likelihood) tahminlerini elde etmektir (Holden ve Thompson, 1992).

3.3. Eşbütünleşme Analizi Sonuçları

Her iki serinin de birinci dereceden durağan olduğu belirlendikten sonra, eşbütünleşmenin olup olmadığını belirlemek üzere Johansen (1988), Johansen ve Juselius (1990:169-210,1992) tarafından önerilen eşbütünleşme tekniği uygulanmıştır. Johansen metodunu uygulamadan önce VAR modelinin gecikme uzunluğu belirlenmesi gerekir. Bunun için çeşitli kriterler söz konusudur. Bu kriterlerden, Likelihood Ratio (LR), Akaike’nin Final Prediction Error kriteri

(FPE), Akaike Bilgi Kriteri (AIC) Schwarz Bilgi Kriteri (SC) ve Hannan-Quinn Bilgi Kriteri (HQ) yardımıyla VAR modelinin gecikme uzunluğu belirlenmiştir.

İncelenen değişkenler arasında uzun dönemli ilişki olup olmadığını anlamak için değişkenler aynı düzeyde durağan olduğundan Johansen eşbütünleşme testleri (λ_{\max} ve λ_{trace}) yapılmıştır.

Veri setine göre maksimum gecikme uzunluğu 2 alındığında bilgi kriterleri arasından en küçük değeri veren Akaike ve Schwarz Bilgi Kriterlerine göre kurulan VAR modellerinde otokorelasyon olup olmadığı da kontrol edildikten sonra optimal gecikme uzunluğu 1 bulunmuştur. Buna göre hesaplanan Johansen eşbütünleşme test istatistik olasılık değerleri Tablo 3’de verilmiştir.

Tablo 3. İncelenen değişkenlerin Eşbütünleşme Test İstatistik Olasılık Değerleri

Optimal Gecikme Uzunluğu	Bilgi Kriteri	Johansen Model Tipi	λ_{trace}	λ_{\max}
1	AIC	Linear (Intercept + Trend)	0,0224*	0,0201

*: %5 anlamlılık düzeyine göre değişkenler arasındaki uzun dönemli ilişkiyi ve mevcut ilişkinin yönünü göstermektedir.

Hesaplanan λ_{trace} ve λ_{\max} test istatistik olasılık değerleri 0,05 değerinden küçük olduğunda “seriler durağan değildir” şeklinde kurulan H_0 hipotezi %5 anlamlılık düzeyinde reddedilir. Tablo 3 incelendiğinde hesaplanan λ_{trace} ve λ_{\max} test istatistik olasılık değerleri 0,05 değerinden küçük olduğu için modelde yer alan değişkenler arasında uzun dönemli ilişkinin olduğu saptanmıştır.

Aynı dereceden durağan, kurduğumuz modelde uzun dönemli ilişki saptandığı için değişkenler arasında kısa dönemli ilişki olup olmadığını ve ilişkinin yönünü belirlemek amacıyla Granger nedensellik analizinden VECM modeli tercih edilmiştir. Analiz sonucu değişkenler arasında oluşan nedensellik analizi olasılık değerleri ve oluşabilecek ilişkinin yönü Tablo 4’de verilmiştir.

Tablo 4. Değişkenlere ait VECM Granger Nedensellik Analiz Olasılık Değerleri

Bağımlı Değişken	Bağımsız Değişkenler	Olasılık Değerleri	Nedensellik Yönü
D(LGSYİH)	D(Enerji)	0,1812	
D(Enerji)	D(LGSYİH)	0,0070*	LGSYİH → Enerji

*: %5 anlamlılık düzeyine göre değişkenler arasındaki kısa dönemli ilişkiyi ve mevcut ilişkinin yönünü göstermektedir.

Hesaplanan VECM test istatistiği olasılık değeri 0,05 değerinden küçük olduğunda “değişkenler arasında kısa dönemli ilişki yoktur” şeklinde kurulan H_0 hipotezi %5 anlamlılık düzeyinde reddedilir. Tablo 4 incelendiğinde çalışmamızın amacı kapsamında bağımlı değişken GSYİH olduğunda olasılık değerleri 0,05’den büyük olmasından dolayı incelenen değişkenler arasında kısa dönemli ilişki saptanmamış ve Enerji değişkeninin GSYİH değişkenini incelenen dönemde etkilemediği görülmüştür. Ancak Enerji değişkeni bağımlı değişken olduğunda olasılık değerleri 0,05’den küçük olmasından dolayı incelenen değişkenler arasında kısa dönemli ilişki saptanmış ve GSYİH değişkeninin Enerji değişkenini incelenen dönemde etkilediği (tek yönlü kısa dönemli ilişki) görülmüştür.

4.SONUÇ VE ÖNERİLER

Bu çalışmada Türkiye için 1990-2019 dönemi yıllık veriler kullanılarak, CO₂ emisyonu, enerji tüketimi ve ekonomik büyüme serileri arasındaki nedensellik ilişkisi araştırılmıştır.

Serilerin logaritmik dönüşümleri yapılarak, serilerin durağan olup olmadıkları ADF ve Phillips-Perron kök testleri kullanılarak araştırılmıştır. GSYİH bağımlı değişkeni için Logaritmik-Logaritmik modele göre gerekli kriterleri bir tık daha iyi sağlayan Logaritmik-Doğrusal model en uygun model olarak belirlenmiştir. Kurulacak Log-doğrusal modelde CO₂ değişkeni katsayısı %5 anlamlılık düzeyine göre istatistiksel olarak anlamsız çıktığından dolayı analizden çıkartılmıştır. Ayrıca GSYİH bağımlı değişkenini Enerji değişkeninin pozitif yönde etkilediği görülmüştür.

İncelenen değişkenler arasında uzun dönemli ilişki olup olmadığını anlamak için değişkenler aynı düzeyde durağan olduğundan Johansen eşbütünleşme testleri yapılmıştır. Eşbütünleşme testi sonucuna göre, GSYİH ve enerji tüketimi değişkenleri arasında uzun dönemli ilişkinin olduğu saptanmıştır. Daha sonra, değişkenler arasında kısa dönemli ilişki olup olmadığını ve ilişkinin yönünü belirlemek amacıyla Granger nedensellik analizinden VECM modeli kullanılmıştır. Bağımlı değişken GSYİH olduğunda, incelenen değişkenler arasında kısa dönemli ilişki belirlenmiştir. Buradan, enerji tüketimi değişkeninin GSYİH değişkenini incelenen dönemde etkilemediği ifade edilebilir. Enerji tüketimi değişkeni bağımlı değişken olduğunda ise, incelenen değişkenler arasında kısa dönemli ilişki olduğu saptanmıştır. Buradan, incelenen dönemde GSYİH değişkeninin enerji tüketimi değişkenini etkilediği (tek yönlü kısa dönemli ilişki) görülmüştür.

KAYNAKÇA

- Aykırı M. ve Bulut , Ö.U. (2019), “Ekonomik Küreselleşme ve Doğrudan Yabancı Yatırımların CO₂Emisyonu Üzerindeki Belirleyiciliği: Türkiye Örneği” İğdır Üniversitesi Sosyal Bilimler Dergisi, Ek Sayı, Aralık 2019 69-90
- Banerjee, A., Dolada, J.J., Galbraith, J.W. , Hendry, D.F. (1993), “Co-Integration Error Correction and The Econometric Analysis of Non- Stationary Data”. Oxford University Press, Dublin.
- Bozkurt C., Akan, Y. (2014), “Economic Growth, CO₂ Emissions and Energy Consumption: The Turkish Case.”, International Journal of Energy Economics and Policy, 4(3), 484-494.
- Büyükyılmaz, A., Mert, M. (2015), “CO₂ Emisyonu, Yenilenebilir Enerji Tüketimi ve Ekonomik Büyüme Arasındaki İlişkinin MS-VAR Yaklaşımı ile Modellenmesi: Türkiye Örneği”, Zeitschrift für die Welt der Türken Journal of World of Turks, 7 (3), 103-117.
- Çetintaş H., Bicil, İ.M. Türköz, K. (2016), “Türkiye’de CO₂Salınımları Enerji Tüketimi ve Ekonomik Büyüme İlişkisi”, Finans Politik ve Ekonomik Yorumlar, 53 (619), 57-67.
- Çil Yavuz ,N., (2014),” CO₂ Emission, Energy Consumption, and Economic Growth for Turkey: Evidence from a Cointegration Test With a Structural Break”, Energy Sources, Part B: Economics, Planning, and Policy, 9(3), 229-235.
- Dickey D.A., Fuller, W.A., (1979), “Distribution of the Estimators for Autoregressive Time Series with a Unit Root”, Journal of American Statistical Association, 74, 427-431.
- Dickey D.A., Fuller, W.A., (1981),” Likelihood Ratio Statistics For Autoregressive Time Series With Unit Root”. Econometrica, 49(4), 1057-1073.

- Enders, W., (2004), “Applied Econometric Time Series. 2’nd Edition John Wiley and Sons Inc. USA.
- Engle, R.F., Granger, C.W..J., (1987), “Co-Integration and Error Correction Representation, Estimation, and Testing”. *Econometrica*, 55(2), 251-276.
- Erdoğan M., Ganiev, J., (2016), “Orta Asya Ülkelerinde CO₂ Emisyonu, İktisadi ve e Finansal Gelişme Ve Fosil Yakıt Enerji Tüketimi İlişkisi”, *Turkish Studies*, Volume 11(21), 471-486.
- Erkişi, K. , Çelik, D., (2020). “The relationship between CO₂ emission, non-renewable energy consumption and economic growth: A case of Turkey.”, *Manas Sosyal Araştırmalar Dergisi*, 9(2), 844-857.
- Eyüboğlu. K. , Uzar, U., (2020), “The impact of tourism on CO₂ emission in Turkey”, *Current Issues in Tourism*, 23(13), 1631-1645.
- Gökmenoğlu, K. Taşpınar, N., (2016), “The relationship between CO₂ emissions, energy consumption, economic growth and FDI: The case of Turkey”, *The Journal of International Trade and Economic Development*, 25(5), 706-723.
- Holden, K. Thompson, J., (1992), “Cointegration:An Introductory Survey”, *British Review of Economic Issues*, 14 (33).
- İzgi. B.B. (2020), “ARDL Yaklaşımıyla Türkiye’de Çevre Kirliliği ve Geleneksel Kuznets Eğrisi (EKC) Literatürüne Bir Bakış,” *Çukurova Üniversitesi İİBF Dergisi*, 24 (1), 111-125.
- Johansen, S., (1988), “Estimation and Hypothesis Testing of Cointegrated Vectors in Gaussian Vector Autoregressive Models”, *Econometrica*, 59, 1551-1580.
- Johansen, S., Juselius, K., (1990), “Maximum Likelihood Estimation and Inferences on Cointegration with Applications to the Demand for Money”, *Oxford Bulletin of Economics and Statistics*, 52, 169-210.
- Kılınç, E.C., Altıparmak, H. (2020), Çevre Vergilerinin CO₂ Emisyonu Üzerindeki Etkisi Üzerine Bir UygulamaODÜ Sosyal Bilimler Dergisi, 10(1), 217-227.
- Kızılkaya, O., (2017), “ The Impact of Economic Growth and Foreign Direct Investment on CO₂ Emissions: The Case of Turkey”, *Turkish Economic Review*, 4(1), 106-118.
- Konuk, T., Eryer, A., (2021). “Ekonomik Büyüme Ve CO2 Emisyonunun Sağlık Harcamaları Üzerine Etkisi: Türkiye Örneği”, *International Journal of Disciplines Economics and Administrative Sciences Studies*, 7(30),402-410.
- Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., Shin, Y., (1992). “Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root”, *Journal of Econometrics*, 54, 159-178.
- Maddala, G.S.,Kim, In-Moo, (1998), “Unit Roots, Cointegration and Structural Change”, Cambridge University Press, United Kingdom.
- Okumuş, İ. (2020), “Türkiye’de Yenilenebilir Enerji Tüketimi, Tarım ve CO₂ Emisyonu İlişkisi”, *Uluslararası Ekonomi ve Yenilik Dergisi*, 6(1) 2020, 21-34.
- Phillips, P.C.B., Perron, P., (1988). “Testing for a unit root in time series Regression”. *Biomètrika*, 75(2),336-346.



Sancar, C., Atay Polat, M., (2021), “CO₂ Emisyonları, Ekonomik Büyüme ve Sağlık Harcamaları İlişkisi: Türkiye ve Seçilmiş Ülke Örnekleri İçin Ampirik Bir Uygulama”, *Manas Sosyal Araştırmalar Dergisi*, 10(1), 236-252.



EFFECTS OF DIETARY INCLUSION OF PROCESSED AND RAW SWEET LUPIN SEED (*LUPINUS ANGUSTIFOLIUS*) ON GROWTH AND CARCASS PERFORMANCES OF BROILER CHICKENS

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ABSTRACT

The experiment was conducted with the objectives to evaluate the effect of substitution of soybean meal as partial replacement of processed and whole lupin (*Lupinus angustifolius*) seed meal on performance of Cobb 500 breed of broilers and to evaluate the economic benefit of the substitution. Two hundred unsexed day old chicks with similar weight were randomly assigned to four treatment diets in completely randomized design with 5 replicates. Four dietary supplement treatments were 0% lupin seed meal (T1), 15% raw (whole) lupin seed meal (T2), 15% heat treated dehulled lupin seed meal (T3) and 15% heat treated lupin seed meal (T4). The CP content of SM, RLSM, HTDLSM, and HTLSM were 43.13, 33.48, 37.08, and 35.38 %, respectively. Dietary treatments had similar CP content of for T2, T3, and T4 24.07, 23.92, 23.64 and 23.58%, respectively. The daily dry matter (DM) intake (72.51, 67.87, 70.45, 68.01g/day for T1, T2, T3, and T4, respectively) was significance difference ($P < 0.0001$) among the treatments. The intake of crude protein, ether extract, and metabolizable energy was significantly ($P < 0.0001$) higher for T3 (15% HTDLM) compared with other lupin diets T2 (15% RLSM) and T4 (15% HTLSM). This could be due to the combined effect of heat treatment and dehulling gives nutrient dense product. The final body weight, average daily gain (ADG) and total body weight gain which were higher for T1 and T3 and lower for T2 and T4. The mean values of ADG were 36.17, 33.62, 34.43, and 33.46 g/head/day for T1, T2, T3, and T4, respectively. Dressing percentage were 69.56, 66.04, 68.00 and 66.38 % for T1, T2, T3, and T4, respectively. Thus, substitution of SM with HTDLM could be used as alternative source of protein where SM is scarce and unavailable for feeding Cobb 500 broiler chickens.

Keywords: *Lupinus angustifolius*, growth performance, feed intake, carcass characteristics, nutrient intake

INTRODUCTION

Poultry production in smallholder developing countries nowadays becomes one means of income generating sector. However, the bottle neck problem of this sector is limited availability and cost of feed supply. Intensive poultry feeding is dependent on conventional protein sources such as soybean meal, which has high protein content (42–46%) with a balance of essential amino acids that corresponds to the nutritional requirements of birds (Juodka *et al.*, 2017, Struti *et al.*, 2021). Moreover, conventional protein sources are becoming less available and more expensive, thus the need to investigate possible alternatives for poultry diets. Having these disadvantages of soybean meal, it needed to look another alternative protein source in poultry feeds that could completely or partially replace soya

components with high biological value that can be obtained locally and at lower cost than soy in poultry feed formulation. An alternative protein source for soybeans might be lupines (*Lupinus* spp.) seeds. Worldwide, there are four species of lupine that have been successfully cultivated: *Lupinus albus* and *Lupinus luteus* in Europe, *Lupinus angustifolius* in Australia, and *Lupinus mutabilis* in America (Struti *et al.*, 2021). The proteins from lupines have all indispensable amino acids and are well-digestible (Sujak *et al.*, 2006). Furthermore lupin is a good source of nutrients, not only proteins but also lipids, dietary fiber, minerals, and vitamins (Zielinska *et al.* 2008). Although shortage of protein sources limit livestock production in Ethiopia, the contribution of lupin as livestock feed has remained negligible (Gebremdhin *et al.* 2014).

Whole lupine seed cannot be used as a single source of protein in diets for broilers due to its high level of non-starch polysaccharides (NSP), which increase viscosity of intestinal content and affect feed intake and utilization (Mierlita *et al.*.,2013) . Nalle *et al.*, (2011) suggested that it is possible to include high levels of lupine in diets for broilers by removing the hull and/or by using enzymes to degrade NSP. Dehulling improves seed nutritional value, increasing protein and oil contents and decreasing fiber concentration. However, there are few reports about chemical composition and AME of dehulled lupine seed and the combined effect of heat treatment and dehulling on chemical composition and performance of broiler chicken. Dehulling consists of the removal of hulls from whole seeds by mechanical processes. By dehulling lupins, approximately 60–70% of the crude fiber content is reduced, including non-starch polysaccharides (Mieczkowska, 2005), which may indicate that processing potentially increase seed nutritional values. Thus, the objective of the experiment was to evaluate the effect of feeding differently processed alkaloid free sweet blue lupin (*lupinus angustifolius*) seed meal (raw, heat treated dehulled and heat treated) included in equal inclusion level on growth and carcass characteristics of broiler chickens.

MATERIALS AND METHODS

Experimental feed preparations

Processing of sweet lupin (*Lupinus angustifolius* cv. *Vitabor*) seeds

The three forms of lupin seed were raw lupin seed meal, heat treated dehulled lupin seed meal and heat treated lupin seed meal. First, the raw seed were grounded using hammer mill to the desired particle size. Secondly, the raw lupin seed were roasted on metal pan at a temperature of 130 °C for 15 minutes; it was then allowed to cool down. After cooling, the roasted seed was grounded using hammer mill as described by (Laudadio *et al.*, 2009). Thirdly, the seed was dehulled with the aid of a roller mill and the hulls were separated from the cotyledons by air (wind). The dehulled seed was then grounded using hammer mill as described by (Laudadio *et al.*, 2009).

Table 1. Formulation of starter and finisher diets (as fed basis, %)

Ingredients	Starter ration				Finisher ration			
	T1	T2	T3	T4	T1	T2	T3	T4
Maize grain	49.0	48.1	47.4	48.48	52.4	50.0	50.0	51.1
Wheat grain	7.5	4.9	6.4	6.20	4.0	3.6	4.4	7.0
Wheat short	5.3	3.0	3.5	3.40	7.7	4.8	6.6	2.8
Soybean meal	32.2	22.4	21.2	20.90	30.3	21.0	18.4	18.5
RLSM	-	15.0			0	15.0	0	0
HTDLSM	-		15.0			0	15.0	0



HTLSM	-			15.00	0	0	0	15.0
Animal Fat	4.0	4.5	4.5	4.00	4.0	4.0	4.0	4.0
Salt	0.3	0.3	0.3	0.30	0.3	0.3	0.3	0.3
Limestone	1.5	1.5	1.5	1.50	1.1	1.1	1.1	1.1
VMP	0.12	0.12	0.12	0.12	0.1	0.1	0.1	0.1
Lysine	0.1	0.10	0.1	0.1	0.1	0.1	0.1	0.1
Total	100.00	100.00	100.00	100.00	100	100	100	100
ME (kcal/kg)	3515	3539	3570	3527	3545	3538	3568	3571
CP (%)	21.2	21.1	21.4	21.1	20.5	20.1	20.6	20.3

RLSM =Raw Lupin Seed Meal, HTDLSM = Heat treated Dehulled Lupin Seed Meal, HTLSM = Heat treated Lupin Seed Meal; T1= 0 % LSM, T2= 15% RLSM, T3= 15 % HTDLSM, T4= 15% HTLSM, VMP = Vitamin Mineral Premix.

Experimental treatments and design

The experiment was conducted as a completely randomized design consisting of four dietary treatments each replicated five times. The experimental diets contained the controlled diet (T1) consisting of maize-soybean meals and three experimental diets (T2, T3 and T4) in which the protein from soybean meals were partially replaced by sweet lupin seed (*Lupinus angustifolius* cv. Vitabor) of raw, heat treated dehulled and heat treated seed at a rate of 15% respectively.

Experimental birds and management

Day old 200 Cobb-500 broiler chicks of similar body weight were used for the feeding trial. They were purchased from Alema Farms from Debre Zeit. Chicks were vaccinated for against major poultry viral and bacterial diseases: Newcastle disease, infectious bursal disease (Gumboro) and others were according to National Veterinary Institute recommendation.

Data on feed intake feed conversion ratio (FCR) and body weight

Broiler chickens were fed on replicate basis *ad libitum* and each day a measured amount of feed was offered at 08.00 AM and 16.00 PM. The amount of feed offered was adjusted on weekly basis. The leftover feed was always collected in the next morning before feed is offered and weighed. Feed intake was then determined by subtracting the leftover from the offered feed. Body weight was taken at the beginning of the experiment (considered as initial weight) and then on weekly basis in the morning at 7:00 AM before feeding. The body weight taken at the end of the experiment was considered as final body weight. Total body weight gain was then computed by subtracting the initial body weight from the final. Feed conversion ratio (FCR) values were calculated as a ratio of total feed intake (TFI) to total body weight gain (TBWG).

Carcass Analysis

At 56 days, two birds were randomly selected from each replicate, fasted overnight and slaughtered. The dressed carcass weight of birds were measured after removing head and shank, and the dressing percentage were calculated as the proportion of dressed carcass weight to slaughter weight multiplied by hundred.

Chemical analysis

Samples of raw, heat treated dehulled and heat treated sweet blue lupin seed, and feeds offered were analyzed for the contents of dry matter (DM), ash, ether extract (EE) and crude fiber (CF) (AOAC, 1995). Nitrogen free extract (NFE) were calculated by difference of organic matter and the sum of CF, EE and CP. The metabolizable energy (ME) of diets was

estimated using the equation of (ME = 3,951+54.40 fat – 88.70 CF – 40.80 ash) were made in duplicates Wiseman (1987).

Statistical analysis

The experimental data collected on feed intake, body weight gain, feed conversion ratio, carcass analysis and partial budget analysis were subjected to one way analysis of variance in Complete Randomize Design (CRD) using the general linear model (GLM) procedure of SASV.9 (2002).

The following model was fitted to analyze the experimental data:

$$Y_{ij} = \mu + t_i + \epsilon_{ij}$$

Where; Y_{ij} = response variable, μ = overall mean, t_i = treatment effect, and ϵ_{ij} = random error.

The treatment means were separated using tukey's treatment comparison test at a significant level of $\alpha = 5\%$

RESEARCH AND FINDINGS

Chemical composition of experimental diets

Table 2 shows the chemical composition of experimental diets (treatments) and the feed ingredients. Since the diets were formulated to be similar in protein and energy contents. The ether extract (EE) content was slightly higher in T4 followed by T2, T3 and T1. The relatively higher EE content of T4 could be due to higher EE content of heat treated lupin seed meal. The dietary treatments were similar in terms of crude fiber (CF) content, but slightly higher in T2 (raw lupin seed meal).

Table 2. Chemical Composition of feed ingredients and experimental diets (% DM)

Feed ingredients	DM (%)	Ash %DM	OM %DM	CP %DM	EE %DM	CF %DM	NFE %DM	ME (kcal/kgDM)
Soybean meal	92.6	10.3	82.3	43.1	12.5	12.5	14.1	3102
Maize	92.3	4.3	87.9	10.5	4.9	3.1	70.1	3729
Wheat grain	92.1	7.6	84.5	16.1	4.6	7.8	56.2	3213
Wheat short	90.9	8.8	82.2	15.9	3.3	13.0	49.9	2621
RLSM	91.9	8.7	83.1	33.5	11.7	13.1	24.9	3064
HTLSM	92.4	9.6	82.8	35.4	12.8	12.5	22.2	3146
HDLSM	92.3	8.4	83.9	37.1	12.9	11.2	22.7	3316
Starter								
T1	92.6	7.9	84.6	21.1	6.9	6.6	49.9	3417
T2	92.6	7.9	84.7	21.1	7.2	6.9	49.5	3403
T3	92.6	7.8	84.8	21.4	7.3	6.6	49.5	3444
T4	92.6	8.0	84.6	21.1	7.9	6.8	49.5	3420
Finisher								
T1	92.6	7.6	84.9	20.5	6.7	6.6	51.2	3415
T2	92.5	7.6	84.9	20.8	7.0	6.9	50.2	3404
T3	92.5	7.4	85.1	20.6	6.9	6.6	50.9	3439
T4	92.6	7.5	85.2	20.3	7.3	6.5	51.2	3458

NFE = DM-(CP+EE+CF+Ash), DM = dry matter; CP = crude protein; EE = ether extract; CF = crude fiber; NFE = nitrogen free extract; ME = metabolizable energy; RLSM =raw lupin seed meal; HDLSM=heat treated dehulled lupin seed meal; HTLSM = heat treated lupin seed meal; SM= soybean meal;T1 = diets soybean based diet (control); T2 = diets containing 15%

of raw lupin meal; T3 = diets containing 15% of heat treated dehulled lupin meal; T4 = diets containing 15% of heat treated lupin meal;

Feed Intake

There was very highly significant ($p < 0.0001$) difference in feed intake among the chickens in the first week of experiment in which T4 diet were lower than the other experimental diets whereas T1 was higher and T3 are intermediate between T1 and T2. In the 2nd, 3rd, 4th, 5th, 6th, 7th and 8th week of there were also significant different between experimental diets feed intake. In those weeks of experiment T1 were significantly ($p < 0.05$) higher for those receiving experimental diet while T3 except 3rd and 4th week of experiment it is comparable with T1 while the chickens reared under T2 and T4 were lower feed intake as compared to T1 and T3. The feed intake was higher among the chickens receiving T1 diet while the lupin based diets were lower.

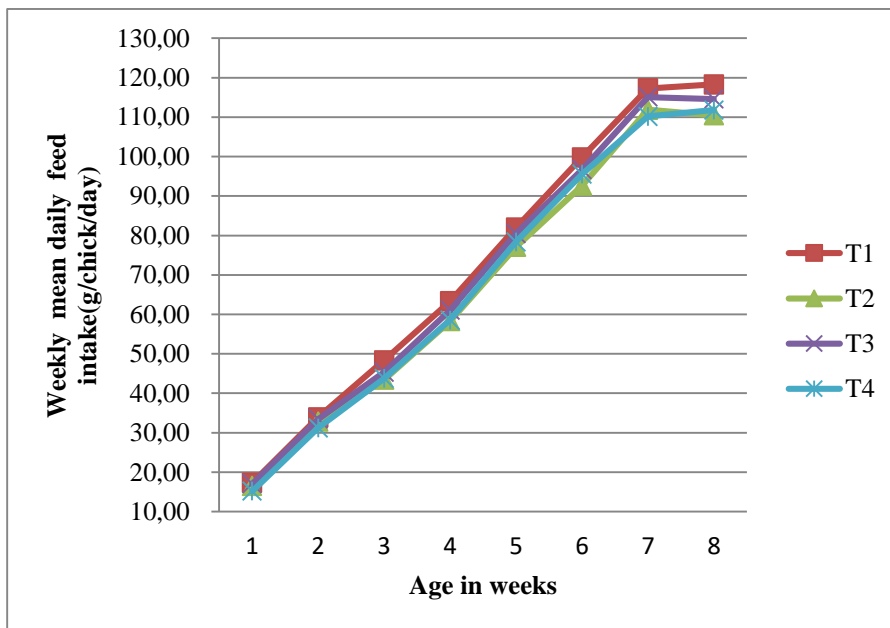


Figure 1. Effect of differently processed lupin seed meal based diets on weekly feed intake of broilers

Feed intake and performance of birds

As shown in table 3, there was no significance difference in initial body weight of birds among the treatment diets. On the other hand the result indicates final body weight (g/chick), total body weight gain (g/chick) and daily body weight gain (g/chick/day) were significantly higher ($p < 0.05$) value for those receiving T1 diet and T3 were also comparable with T1. However, the chickens that are reared under T2 and T4 are lower than the above two treatment diets in the three parameters mentioned. There were no significant differences in feed conversion ratio among the dietary treatments. However, numerically T1 and T3 are the similar value which might be justifiable that HDLM in the diet were similar feed to gain ratio with soybean meal.

Table 3. Body weight (g/chick), feed intake (g/chick), feed conversion ratio (g feed/g gain) of Cobb 500 broiler chickens fed different processing methods of sweet lupin seed.

Parameters	T1	T2	T3	T4	SEM	p-value
Initial BWT(g/chick)	40.7	40.7	40.7	40.7	0.1	0.95
Final BWT(g/chick)	2066 ^a	1923 ^b	1968 ^{ab}	1914 ^b	72.8	0.02
Total	2025 ^a	1882 ^b	1927 ^{ab}	1873 ^b	72.9	0.017
BWG(g/chick/8wks)						
Daily body weight gain (g/chick/day)	36.2 ^a	33.6 ^b	34.4 ^{ab}	33.5 ^b	1.3	0.017
Total Feed Intake (TFI) (g/bird)	4060 ^a	3800 ^c	3945 ^b	3811 ^c	55.3	<.0001
FCR(g feed/g gain)	2.0	2.02	2.05	2.03	0.01	ns

^{a, b} Means within the same row bearing different superscript letters are significantly different ($p < 0.05$); BWT= body weight; BWG= body weight gain; FCR= feed conversion ratio; T1 = diets without lupin seed meal; T2 = diets containing 15% of raw lupin meal; T3 = diets containing 15% of heat treated de hulled lupin meal; T4 = diets containing 15% of heat treated lupin meal; SEM = standard error of the mean.

Carcass characteristics of chickens

The result indicated that there was significant difference among the treatments in slaughter weight of the chickens (Table 4). The result indicated that T1 were significantly ($p < 0.05$) higher in slaughter weight while those receiving T3 diets were comparable with T1. However, those received T2 and T4 are lower than T1 and T3. The results showing to the weight of the wing, back and thorax , neck, and gizzard also indicates that there were significant difference and higher for T1 and while T3 were comparable with T1 however, T2 and T4 were lower value as compared to T1 and comparable to T3. Moreover, the result also shows that there is no significant difference in the weight of thigh, drumsticks and breast meat among the dietary treatments. Furthermore, dressing percentage was significantly higher for T1 while T3 and T4 are comparable with T1 whereas T2 had lower value.

Table 4. The effect of experimental diet on various carcass characteristics of broiler chickens slaughtered at a period of eight weeks of experiment.

Parameters	T1	T2	T3	T4	SE	P-value
Slaughter Weight	2046 ^a	1902 ^{ab}	1947 ^{ab}	1867 ^b	95.2	0.0465
Carcass Weight	1424 ^a	1258 ^b	1325 ^{ab}	1239 ^b	79.1	0.0080
Thighs	184	172	180	171	8.9	0.1106
Wing	73.4 ^a	68.7 ^{ab}	70.6 ^{ab}	68.4 ^b	2.7	0.0309
Drumsticks	159	151	156	147	7.7	0.1103
Breast meat	289	270	279	265	22.2	0.3574
Keel bone meat	160	152	158	152	5.8	0.1072
Back & thorax	159 ^a	150 ^{ab}	153 ^{ab}	149 ^b	4.9	0.0321
Neck	48.9 ^a	45.6 ^{ab}	46.9 ^{ab}	45.3 ^b	1.9	0.0313
Gizzard	42.8 ^a	39.8 ^{ab}	40.9 ^{ab}	39.6 ^b	1.7	0.0336
Dressing %	69.6 ^a	66.0 ^b	68.0 ^{ab}	66.4 ^{ab}	1.8	0.0239



CONCLUSION AND REFERENCES

The substitution of soybean meal by heat treated dehulled lupin seed meal at 15% improved performance and no significant differences were observed in major commercial carcass component of Cobb 500 broiler chickens.

AOAC. (1995). Official Method of Analysis. 16th edn. Association of Official Analytical Chemists, Arlington, VA: AOAC International.

Gebremedhn Beyene, Negassi Ameha, Mengistu Urge and Awet Estifanos (2014). Replacing soybean meal with processed Lupin (*Lupinus Albus*) meal as poultry layers feed. *Livestock Research for Rural Development* 26 (11).

Juodka. R., Nainiene R, Juskiene V, Juska R, Stuoige I, Leikus R, (2017). Effects of different amounts of blue lupine (*L. angustifolius*) in the diets of heavy-type turkeys on their growth rate, carcass and meat qualities. *Brazilian J. of Poultry Science*, Special Issue Nutrition / 117-124.

Laudadio, V., V.Tufarelli, M. Dario1, E. Cazzato, G. Di Modugno (2009). Evaluation of dehulled and micronized lupin (*Lupinus albus L.*) and pea (*Pisum sativum L.*) seed meal as an alternative protein source in diets for pre-laying hens. Book proceedings of 2nd Mediterranean Summit of WPSA. Pp495-498

Mieczkowska, A., A.J.M. Jansman, R.P. Kwakkel & S. Smulikowska. (2005). Effect of dehulling and alphagalactosidase supplement on the ileal digestibility of yellow lupin based diets in broiler chickens and adult roosters. *Journal of Animal and Feed Sciences* 14: 297-304.

Mierlita, D., Diana Popovici (2013). Effect of partial substitution of soybean meal with lupine seeds on growth and economic efficiency of broilers. *Lucrări Științifice-Seria Zootehnie, vol. 59: 60-65.*

Nalle CL, Ravindran V, Ravindran G. (2011). Nutritional value of narrow-leafed lupin (*Lupinus angustifolius*) for broilers. *Br Poult Sci*; 52:775-81.

SAS (Statistical Analysis Systems), 2002. Statistical Analysis Systems for mixed models. SAS Institute Inc, Cary, NC, USA.

Struti, Danut Ioan, Andrea Bunea, Ioan Mircea Pop, Tudor Andrei Papuc & Daniel Pantea Mierlita (2021). The Influence of Dehulling on the Nutritional Quality of Lupine Seeds (*Lupinus albus L.*) and the Effect of Their Use in the Feed of Laying Quails on the Live Performance and Quality of Eggs, *Animals* 2021, 11, 2898: 1-22, <https://doi.org/10.3390/ani11102898>

Sujak A, Kotlarz A, Strobel W. (2006). Compositional and nutritional evaluation of several lupin seeds. *Food Chem.* 98:711–719.

Wiseman J. (1987). Meeting nutritional requirements from available resources. Pp. 132 In: J. Wiseman (Ed). *Feeding of Non ruminants Animal*. Butterworth. London.

Zielinska D, Frias J, Piskuła M K, Kozłowska H & Zielinski H, Vidal-ValverdeC (2008). Evaluation of the antioxidant capacity of lupin sprouts germinated in the presence of selenium. *European Food Research and Technology*, 2008; 227: 1711–1720.



SOME STRATEGIES FOR UTILIZING SOCIAL MEDIA IN TEACHING & LEARNING ENGLISH FOR ACADEMIC PURPOSES IN NIGERIA Joseph

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ABSTRACT

This paper evaluated the uses of social media in teaching and learning English language in Nigeria. It was based on the Uses and Gratification Theory and adopted a qualitative approach in its focus on how social media could be effectively utilized in teaching and learning English. The paper established a link between social media and literacy and also discussed the importance of social media in the teaching and the learning of English. It proposed four (4) strategies that could enhance the use of social media in both teaching and learning of English in different contexts in Nigeria, including English for Academic Purposes (EAP). These are: using social media for visual scaffolding, providing learners with opportunities of multiple literacies, using social media for effective preparation/use in lesson planning, and utilizing social media as virtual classroom. The authors concluded that although social media have potentials for distracting learners, their significance in teaching and learning is rising significantly. They recommended, among others, that English language professionals should continuously develop their ICT/literacy skills and progressively integrate appropriate social media platforms in their lesson plans.

Keywords: Social media, literacy, ICT, EAP, teaching English, learning English

INTRODUCTION

Communication technology has changed rapidly and radically through the widespread use of computers and communication satellites. Individuals have joined corporate bodies, the military, and mass media outlets in relying heavily and benefitting immensely from information communication and technology (ICT). Personal computers and hand-held devices have expanded the frontiers of literacy and the requirements of reading skills. ICT has impacted immensely on the traditional literacy practices of reading, writing, computation, etc. and has opened frontiers of new literacies (Ahaotu, 2018). The Internet, satellite television, cell phone, fax machines, scanners, automated teller machines (ATMs), etc. are very strong defining factors of life and literacies in our contemporary society. Modern communication technology ties humanity together as the nervous system ties the parts of the human organism together. Today,



we are connected with every other human being on the planet in a way people never have been before. Space and time are gradually being reduced and in the underlying concept of Mcluhan's (1967) view of electronic technology, the world has become a small space in which people can communicate quickly and know every event that takes place. Mobile applications (Apps) connect people all over the world and enable users to stream live events, chat in real time, and access an unimaginable horde of information in the process through social media platforms such as Facebook, Twitter, Instagram, YouTube, WhatsApp, Tik Tok, VisKit, etc. These Apps have also become principle avenues of literacy and communications among humans.

Transnational human communication principally happens in English and has further boosted the growth of English into a global language. Graddol (2006) suggested that English is so widely used that approximately 5 billion of the world's estimated 7 billion population use the language in one form or the other. According to Mcluhan "time has ceased and space has vanished". Interestingly, when Mcluhan was expressing this views, the Internet was yet to be developed. The idea of a "global village" has gained prominence again amidst the emergence of the Internet and digital telecommunication media that seem to promote the idea of an integrated global community. People can converse and interact almost as well as if they were in the same location no matter where they are in the world. The coordination of tasks have now become easier than it was before the advent of the computer and Internet ages.

According to Sapir (1921), language is "purely human and non-instinctive method of communicating ideas, emotions and desires by means of a system of voluntarily produced symbols". Various authors have identified different functions of language. For instance, Brown and Yule (1983) identified the transactional and interactional functions of language. The transactional function of language corresponds to the use of language to express content, while the interactional function of language corresponds to the use of language to express social relations and personal attitudes. Crystal (1977) also identified some other functions of language such as the emotive or expressive functions of language and social interactions. These different functions of language can be narrowed to the following basic functions of language: ideational, interpersonal and textual. Language performs an ideational function when it is used to express or convey a speaker's experience of the real world, reactions, cognition and perceptions as well as his linguistic acts of speaking and comprehension. The interpersonal function of language entails the use of language to establish and maintain social relations while textual function of language is the use of language to put thoughts together in a cohesive manner; usually in a text. Umera-Okeke and Ahaotu (2018, p. 18) identified nine roles of language in human society and these are as follows:

1. It helps the child/human to explore the environment and the world.
2. It is the ultimate tool for learning.
3. It is the ultimate tool for socialization
4. It engenders creativity through imaginative thought.
5. It sustains scientific experimentation/inventions.
6. It has health, economic, safety, etc. benefits.
7. It is a means of instruction.
8. It is a means of exclusion (Bamgbose 2006, p. 72). Examples are in the use of language proficiency tests such as Test of English as Foreign language (TOEFL), International English Language Testing System (IELTS), Pearson Test of English (PTE), etc. for admission into educational programmes and for the evaluation of immigration and employment applications.



9. Language enables participation in the affairs of the community.

Language as used by humans is the principal distinguishing characteristic between humans as higher creatures and other classes of tool-using Homo sapiens such as the gorilla. The four language skills are: speaking, writing, listening, and reading. Speaking has already been described above as the primary mode of language use; together with writing it constitutes what is commonly described in the terminology of English language teaching (ELT) as productive language skills. The term “productive language skill” is a reference to the inherent nature of both speaking and writing to produce texts; which require reception and decoding through listening and reading. On the other hand, listening and reading are classified in the literature as receptive language skills: they are receptive and interpretative of the productive spoken and written modes.

The media, which is an umbrella term for various means of communication, use language to perform these functions. Language and its multifunctional capabilities are the primary tool of the media. The earliest forms of personal media, speeches and gestures had the benefits of being easy to use and did not necessarily need any complex technology. Communication technology in the 21st century has removed the weaknesses of not being able to communicate with larger audiences simultaneously. Listening, reading, writing, and speaking are the four language skills that are used in communication events. Social media represents the development of online communities of interest where citizens of different countries can build a network for communication without physical barriers. The pool of participants on these networks is often referred to as ‘netizens’; a blend of the words ‘network’ and ‘citizen’.

Since the introduction of the global system for mobile telecommunication (GSM) and the Internet into Africa, Nigeria has been a major beneficiary of the services. Scores of papers have been written by linguists and other social science practitioners on mobile telecommunication and its impact on the social life of the people. According to Shea, (2015), social media are forms of electronic communication which facilitate interaction based on certain interest and characteristics. According to Shea they are media for social interaction, using highly accessible and scalable publishing techniques, web-based technologies to transform and broadcast media monologues into social dialogues. They support the democratization of knowledge and information and transform people from content consumers to content producers. The social media elements of the new media have become the highest activity on the internet. (Shea, 2015). The rapid growth of its activities that has been observed in recent years is indicative of its early entry into mainstream culture and integration into the daily lives of many people. This observation establishes a nexus between social media and reading culture.

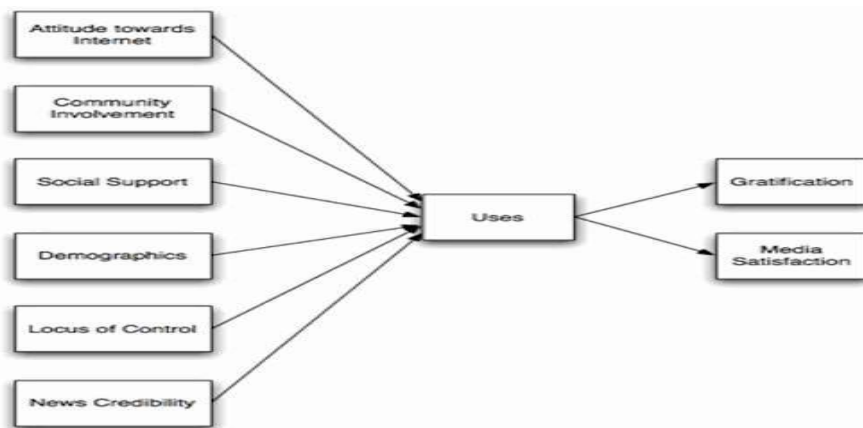
THE USES AND GRATIFICATION THEORY (U>)

This paper is based on the Uses and Gratification Theory (U>). Elihu Katz introduced the Uses and Gratification Approach in which he advanced a view that people use the mass media for their own benefits. Katz, Blumler, and Gurevitch (1973–1974) developed U> approach to account for the fact that people use the mass media because they have certain expectations they wish to satisfy; and so, they seek out specific outlets that they believe would best help them achieve this. This perspective caused a paradigm shift on mass communication from studies on how the mass media influences consumers to studies on how audience preferences determines mass media content. The theory is an approach to understanding why people actively seek out specific media outlets and contents for gratification purposes. The theory discusses how users proactively search for media that would not only meet a given need but also enhance knowledge, social interaction and diversity. A major assumption is that media users (subscribers) take an active role in interpreting and integrating media into their own lives.

The theory also holds that the individuals take advantage of media to meet their needs. The major focus of this theory is the media users (subscribers) who derive some level of satisfaction or reward from using particular contents of particular media (Katz, Blumler, & Gurevitch 1973; Okenwa, 2002).

Katz, Blumler, & Gurevitch (1973) take a non-prescriptive and non-predictive perspective on media effects. They postulated that individuals mix and match uses with goals, according to specific context, needs, social background and so on. Thus, they are seen as active participants in the media consumption process. Uses and gratification theory suggests that media users play an active role in choosing and using the media. Users take an active part in the communication process and are goal oriented in their media use. The theorists are of the view that a media user seeks out a media source that best fulfils the need of the user. Uses and Gratification theory assumes that the user has alternative choices to satisfy the need. This is illustrated in Figure 1 below as follows:

Figure 1: Audience control of mass media content



Source: Wordpress.com

Interest in the gratifications provided by media goes back to the beginning of empirical mass communication research. The last few years have witnessed something of a revival of direct empirical investigations of audience uses and gratifications around the world. More recent studies have a number of different starting points, but each attempts to press towards a greater systematization of what is involved in conducting research in this field. Each major piece of Uses and Gratification research has yielded its own classification scheme of audience functions when placed side by side, they reveal a mixture of shared gratification categories and notions peculiar to individual research teams. The differences are due in part to the fact that investigators have focused on different levels of study (e.g, medium or content) and different materials (e.g. different programmes or programme types on television) in different cultures. Instead of depicting the media as severely circumscribed by audience expectations, the uses and gratifications approach highlights the audience as a source of challenge to producers to cater more richly to the multiplicity of roles that it has disclosed.

The Uses and Gratification studies can be useful in understanding consumer's motivation and concerns in the context of traditional media such as radio and television. However, only few researchers have explored uses and gratifications application in the Internet context. For example, people who browse websites for information such as on university admission

demonstrate uses and gratifications behaviours similar to those obtained in studies of traditional media such as the television.

Katz, Blumler, and Gurevitch's (1973) identified five components comprising the Uses and Gratifications Approach. These are:

1. The audience is conceived as active.
2. In the mass communication process, much initiative in linking gratification and media choice lies with the audience member.
3. The media compete with other sources of satisfaction.
4. Methodologically speaking, many of the goals of mass media use can be derived from data supplied by individual audience members themselves.
5. Value judgments about the cultural significance of mass communication should be suspended while audience orientations are explored on their own terms.

They further streamlined the goals of media use into five and explained that the audience always seeks:

1. Information or education
2. Identification with characters of the situation in the media environment
3. Entertainment
4. Enhanced social interaction
5. Escape from the difficulties of daily life

The following is a graphic illustration and a textual explanation of examples of audience needs as conceived in U>:

Figure 2: Audience needs as conceived in U>

Katz, Gurevitch and Haas (1973) saw mass media as a means by which individuals connect or discern themselves with others. They developed 35 needs taken from the largely speculative literature on the social and psychological functions of the mass media and put them into five categories:

- **Cognitive Needs:** Acquiring information, knowledge and understanding e.g. television (news), videos, movies, documentaries or based on history
- **Affective Needs:** Emotion, pleasure, feelings e.g. Movies, television (soap operas, sitcoms)
- **Personal Integrative Needs:** Credibility, stability, status e.g. Video
- **Social Integrative Needs:** Family and friends e.g. Internet (e-mail, instant messaging, chat rooms, social media)
- **Television Release Needs:** Escape and diversion e.g. Television, movies, video, radio, internet



Source: Slideshare.com

According to Figure 3, U> conceives of audience needs in terms of a pyramid with self-actualization at its peak and psychological needs at its base. Between these two are values of safety/security, love/belonging, and self-esteem. The values expressed here are in consonance with the factors that influence social media use by undergraduates in Nigeria. Katz, Gurevitch, and Haas (1973) viewed the mass media as a means of both social inclusion and exclusion since individuals may stay either connected or disconnected with society through the use or non-use of the mass media. They developed several needs that people seek to fulfill through the mass media and categorized them into the following five groups:

1. Cognitive Needs: Getting information, understanding, and knowledge such as from news, documentaries, and histories from television and radio. In contemporary times, this would include social media outlets and the World Wide Web.
2. Affective Needs: Getting emotional satisfaction such as is possible from television soap operas, movies, and sitcoms. Comedy skits and streaming videos also provide affective needs to the audience.
3. Personal Integrative Needs: Getting personal stability, status, and credibility.
4. Social Integrative Needs: getting connected with family and friends through the Internet (emails, chat rooms, instant messaging, and social media).
5. Tension Release Needs: Getting escape and diversion such as can be derived from television, video, internet, radio, and movies.

The goal-directed U> approach is appropriate for this research given the challenged context where the data was collected. Social media access is readily available and the undergraduate students use it learning English: they choose to use both English and social media for the purpose of communication. This is because in U> theory, the users of any media are seen as actively influencing the effect process, since they selectively choose, attend to, perceive and retain the media messages on the basis of their needs, belief and so on. Applied to this study, the theory suggests that undergraduate learners of English in Nigeria would use the social media to derive certain gratifications; which include the development of their learning and ability to communicate in English. U> has found modern application in mobile telephones, social media, the Internet, instant messaging, online gaming, etc.

SOCIAL MEDIA AND LITERACY

Onukaogu (2012) identified two models of literacy – the autonomous and the ideological models. The autonomous model of literacy focuses on reading, writing, and arithmetic; without emphasis on intellectual, cultural and environmental impacts and requirements of the concept. In the ideological model, literacy has a wider perspective and the intellectual and social perspectives of learning, knowledge, attitudes, and skills are emphasized. He cited Rassol's (1999) view that the definitions of literacy are dynamic because social changes in history, ideology, and technology determine the literacy components in a society. Egbe 2019 and Ahaotu (2018) adopted the ideological perspective of literacy. According to Egbe;

Literacy is therefore not a linear, fixed, contained and closed process; literacy is cultural and contextual, dynamic, and constantly changing and expanding just like language. Literacy is like one watching a masquerade. You need to go around with the masquerade to have a full and complete view of the masquerade. Literacy is not simply scholastic English-based reading and writing abilities or practices. Literacy is a continuum of learning and so we should be talking about levels and degrees of literacies within a given context and culture. There is no one



instrument to measure literacy across all contexts and across all cultures all the time throughout all the ages. (2019, p.23).

The authors agree with Egbe's view cited above and further posit that social media represents an important component of digital and computer literacies. Social media skills have increasingly become one of the important sets of skills, knowledge, and attitudes required for individuals to function effectively in society. This view places a premium on participation in social media activities as part of the social expectations of literate persons.

IMPORTANCE OF SOCIAL MEDIA IN THE TEACHING/LEARNING OF ENGLISH

The influence of social media resources on undergraduate reading culture and writing skills cannot be over-emphasized in the teaching and learning of English language in Nigerian universities. Some of these include:

- a) Enhancing the teaching ability of English language teachers by mediating in the learning environment. The problems of large EAP classes are avoided as learners focus on their devices alone.
- b) Social media resources bridge communication gaps between the teachers and learners in in conventional EAP classrooms by assisting the learners to focus on concepts since they can concentrate less on note taking.
- c) Even the time usually spent on note making would be directed to re-listening to the voice notes with the advantage of greater comprehension.
- d) Mobile devices as instructional material help English language teachers to reduce the amount of talking and thus make their teaching more interesting and successful.
- e) Social media provides opportunity for learners to see, hear and handle, thereby catering for the learning styles of different students inclined towards visual, auditory, and tactile/kinesthetic; creating a higher degree of interest and interaction among learners of English.
- f) Social media stimulates self-activity on the part of learners in a manner that reduces boredom that often leads to students sleeping during lectures.
- g) Social media promotes Communicative Approach (CA) to language teaching; it enhances the role of the teacher as coordinator, director, and facilitator of learning experiences of the students, rather than as the sole dispenser of knowledge.
- h) Learners get a better chance of diversified literacies (Egbe, 2019; Ahaotu, 2018; Egbe, 2018) and they develop both traditional and digital literacy skills by learning via social media.
- i) Timid students would find their voices and participate more actively in social media learning because everyone is invisible

SOCIAL MEDIA AND DEVELOPMENTAL INSTRUCTION IN UNDERGRADUATE ENGLISH

In the English language curricula, developmental instruction could be offered to students who are progressing satisfactorily while corrective and remedial instructions may be offered to other students who are experiencing difficulties. General English is the type of English taught at the secondary school level while developmental English is taught to university undergraduates in



the form of English for academic purposes (EAP) and English for specific purposes (ESP). Describing the ESP program in Saudi Arabia, Wilson (1986) noted as follows:

Students may well be acquainted with language as ritual from their previous learning experience at secondary level. At the tertiary level their need is to use English as a tool in their professional studies and it is unlikely that this can efficiently be met by yet more ritualistic language practice. (p. 13)

Nwokolo and Ahaotu (2019) corroborated Wilson's observation when they submitted:

The EAP curriculum centres on the need to provide training on language skills required in university-level education and also by students' specific courses of study. These include the four language skills: speaking, listening, writing, and reading. It must be emphasized that EAP focuses on the academic level of these skills in contrast with the non-academic, ritualistic approach at lower levels. (p.58)

However, this researcher observed that Nigerian undergraduates undertake general level learning of English in the forms of language specific instructions in departments such as English Studies and Linguistics. Social media has become an important tool in the teaching and learning of both general English and ESP undergraduate English. Prior to the beginning of COVID-19 pandemic in December, 2019, both students and their lecturers made significant use of social media platforms for various teaching and learning activities. This practice was more popular among participants in part-time and distant learning programmes of universities and colleges. Lecturers and students of regular programmes also combined conventional classroom and online teaching and learning methods. But with the global lockdown to control the pandemic in early 2020, online teaching and learning became the major form of education across the world. Online learning was adopted for schools in Nigeria and in the University of Port Harcourt, the 2019/2020 academic session was completed via online learning mode. Various institutions adopted different online learning and conferencing platforms such as Google Classroom and Zoom for virtual teaching and learning. Social media platforms, such as WhatsApp, and Telegrams, were also prominently used for virtual teaching and learning.

In teaching and learning via social media networks, the lecturer would need to create a group or direct the course representative (course rep) to do so. Both the lecturer(s) and the course rep become the administrators (admins) of the group and students in the class are then required to create individual accounts to enable admins to add or invite them to the group.

STRATEGIES FOR EFFECTIVE UTILIZATION OF SOCIAL MEDIA IN TEACHING/LEARNING EAP IN NIGERIA

Any school English language program, regardless of any complexity, requires special planning. Responsibility for execution of the various aspects of the program must be assigned. Cooperation of staff members is essential. Program goals and instructional techniques must be cooperatively determined by the personnel. In simple terms, instructional resources for effective English language learning relate to both the human and the non-human materials that are involved in the transmission of information, knowledge, ideas, opinions, etc. to the learner within a classroom/learning situation. The human resources refers to personnel while non-human resources are Information Communication Technology (ICT) materials and instructional technology resources that are utilized in teaching. The use of media in teaching covers such materials as books, newspapers, radio, television, motion pictures and magazines. To these are added such means of communication that carry advertisements like the billboards, direct mails, catalogues, the radio, etc. Social media is an aspect of the use of media in teaching and learning



and it focuses on the utilization of interactive media such as Facebook, WhatsApp, Telegrams, etc. in education.

Instructional resources are materials, places and persons; which are components of the teaching-learning situation that enhance teaching and learning. They are the diverse materials, people, equipment etc.; which can be used by the teacher to promote teaching and facilitate learning. Teachers and students use them in the teaching and learning process in order to make the process more effective and productive. They are real things and representation of real things which stimulate one or more of the senses and which enrich the teaching and learning of English process.

From the foregoing views, instructional resources are a collection of human and non-human resources which could be used by both the teacher and the learner for effective classroom interaction. That is, instructional resources could be referred to as teaching resources, learning resources, educational resources, and curriculum resources among others, that enhance teaching learning activities. Thus, instructional resources make teaching and learning processes interesting, effective, motivating, efficient and productive.

In view of the importance of social media in ELT listed above, teachers must effectively strategize to achieve maximum utilization of social media devices in teaching and learning English. Otherwise, social media could become counter-productive and disruptive of teaching and learning. This paper proposes the following strategies for the efficient utilization of social media resources in qualitative teaching and effective learning of English.

A. USE SOCIAL MEDIA FOR VISUAL SCAFFOLDING

It is important to establish and utilize social media devices for visually scaffolding learning; rather than as the goal of learning. Scaffolding is a teaching approach in which learning content is presented in a series of ideas and levels of contexts that enables the learner to reach new learning goals at each new level. This is similar to the use of scaffolds; which is built around a structure to enable builders reach new levels/heights in building construction and sundry civil engineering. In visual scaffolding, the language of instruction should be made more understandable for the learners. This could be achieved by the display of drawings or photographs that enable students to connect the words they hear to the visual images displayed on the screen. ELT professionals may include carefully selected images that scaffold the topic as well as internet links of other teaching/learning aids; which students could follow to access more information. Nigerian undergraduates widely use both mobile communication technology/social media and would therefore not find it difficult to integrate the ideas into learning. In order to scaffold learning, lecturers can share text samples, graphics/images, and video clips via social media as both teaching aid and store of information.

B. CREATE OPPORTUNITIES TO DEVELOP MULTIPLE LITERACIES FOR THE LEARNERS

The use of social media in EAP should incorporate the development of multiple literacies in learners because modern living requires the efficient development of multiple literacy skills and effective communication. Competence in traditional literacy tripods of reading, writing, and arithmetic alone is no longer enough to communicate effectively and participate meaningfully in the affairs of society. EAP lecturers should adopt strategies that would assist students in the development of their digital skills, computer skills, communication skills, computational skills, civic and leadership skills, etc. as these are important requirements of modern living. (Ahaotu,



2018). These include engaging the students in activities that promote interaction via the exchange of voice notes, video clips, images/graphic illustrations, typing, finding information on the Internet, evaluation of figures, and cultural content. These would not only make the lessons interesting and interactive but will also enhance overall literacy skills of the learners. Teachers should plan to be positively innovative in the use of social media in teaching English. For example, it is not just enough to instruct students via social media; they should also be tasked and evaluated on creating communication-based content via the same medium.

C. INTEGRATE SOCIAL MEDIA IN LESSON PLANNING:

English language professional should utilize lesson plans to achieve maximum effectiveness in integrating social media resources in language teaching. MALL integrates electronic and face-to-face pedagogies that lecturers may utilize to include file images, voice notes, texts, pictures, short videos and other media. At the planning stage of the lecture, lecturers could strategize to utilize these resources (such as graphic organizers: line graphs, pie/bar charts) to enhance language learning and teaching. For instance, graphic organizers are visuals or pictures created to represent ideas, text or connections between texts. They aid comprehension by enabling readers to label aspects of a text, using languages from that text to visually illustrate the connection between events and characters. Some of these could be used to support students in reading.

The use of graphic organizers in reading analysis enables students to examine text from a variety of perspectives. The graphics presented here are examples of organizers that support readers in making sense of text, relating it to past experiences, and understanding connections made in text. Students can work in cooperative groups to create graphic organizers and discuss the meanings of materials they are reading. Seeing the structure of text represented visually supports students who are having difficulty with comprehension and helps them to work through vocabulary and concepts that are unclear to them. Using graphic organizers can encourage students to become more analytic in their reading and to reflect more deeply on the meaning and contextual clues found in text. It also supports English learners by presenting confusing vocabulary and concepts in an organized visual format.

D. USE SOCIAL MEDIA AS VIRTUAL CLASSROOM

Online classes have become a popular mode of teaching and learning in different parts of the world. It was especially utilized in distance learning programmes until the COVID-19 pandemic made it a more popular option in 2019. In a virtual classroom, teaching and learning are conducted via pre-selected online learning platforms. Examples of online teaching and learning platforms include: Google Suite (Google Classroom, Google Documents, and Google Slides), Kahoot!, Vocaroo, Baamboozle, Oodlu, Whiteboard, Ourbox, Flipgrid, Kaizena, Webligraphy, and New EdTech Classroom YouTube Channel. Social media applications This is an important strategy to enhance the use of social media in teaching and learning, especially in the types of challenging situations prevalent in Northern Nigerian schools in 2021. Terrorists and kidnappers raid universities and other institutions of learning in Northern Nigeria and take large numbers of both lecturers/teachers and students hostage. Social media as virtual classroom would ameliorate the challenges of teaching and learning EAP in overcrowded inconvenient spaces. It would also reduce the risk of spreading COVID-19 by curtailing physical contact as well as the hazards of being kidnapping perpetrated by terrorists, herdsmen, and bandits all over Nigeria.



CONCLUSION

Social media presents significant benefits in language teaching and learning and this study has demonstrated some of these. The four language skills (speaking, listening, reading, and writing) may benefit from the positive influences of the use of social media in teaching and learning if EAP lecturers and students adopt relevant strategies that enhance the uses of social media in teaching and learning. The language skills receive significant boosts as learners use social media on which they predominantly use English. These positive implications on language learning could be enhanced by integrating more of social media and other forms of mobile assisted language learning into curriculum design as well as lesson plans of individual teachers.

Overall, students and lecturers in Nigeria would benefit significantly from the effective use of social media in EAP. Lecturers could use the virtual classroom as an alternative to decongest the usually over-crowded EAP classrooms. Even where the lectures are delivered through blended virtual and conventional methods, it would still reduce over-crowding and the various challenges associated with it. A virtual classroom would be an effective panacea for teachers and learners in Nigeria's challenging educational system where insurgency, kidnapping of lecturers and students, and the persistent COVID-19 pandemic jointly make physical classroom teaching and learning more hazardous.

RECOMMENDATIONS

The use of social media and interactive strategies make significant difference in students' attitude towards language learning and also improves effectiveness of teaching. Therefore, this paper recommends as follows:

1. Teachers of English owe themselves the responsibility of continually seeking ways to develop their professional abilities in a changing world, especially in Nigeria where there is little opportunity of government-sponsored professional development. The rising profile of social media in education challenges English language professionals to improve their ICT skills. They should learn more of social media to cope with the needs of using the knowledge in teaching.
2. Social media should be actively integrated into lessons and teachers should consciously include both content of the media and the applications in their lesson plans. Social media posts and pages could be used as teaching aids while controlled learning activities could be based on selected social media platforms.
3. Teachers could cue in on the general student love of social media to engage learner interest on a variety of topics that could be linked to social media.

REFERENCES

- Ahaotu, J. O. (2018). Multiple roads to literacy in Nigeria: A professional association perspective. *JELTAN, Journal of English Language Teachers Association of Nigeria*. 8, 97 – 108.
- Brown, G. & Yule, G. (1983). *Discourse analysis*. Cambridge: Cambridge University press.
- Crystal, D. (1977). *An Encyclopedia dictionary of language and languages*. London: Penguin Group.
- Egbe, G. B. (2019). *Of new Englishes and new literacies*. Veritas University Abuja, Inaugural Lecture Series No.1, Abuja: Veritas University Press.



- Katz, E, Blumler, G. & Gurevitch., M. (1973). Uses and Gratifications Research. *Public Opinion Quarterly* 4 (37) (1973–1974): 509-523. JSTOR. Web. 14 Oct. 2016. <http://jstor.org/stable/2747>
- McLuhan, M. (1967). *Understanding Media*. New York: Mentor.
- Nwokolo, C. & Ahaotu, J. O. (2019). Enhancing the Learning Outcome of EAP Students with Language Disorders: A Proposal. *Working papers: Journal of English Studies*, 8 (2) September, 2019. Pp. 210-218.
- Okenwa, S. (2002). *The mass media: research issues and methodology*. Nsukka: AIExpress Publishers.
- Onukaogu, C. E. (2012). *Electoral literacy empowerment and the attainment of sustainable development: Quo vadis Nigeria?* Obafemi Awolowo University Ile-Ife, Inaugural Lecture Series 248. Ife: Obafemi Awolowo University Press.
- Sapir, E. (1921) *Language*. New York: Harcourt Brace and Company Ltd.
- Umera-Okeke, N. P. & Ahaotu, J. O. (2018). *Perspectives on the Socio-pragmatics of English in Nigeria*. Port Harcourt: Sofiata Publishers.
- Williamson, K. (1984). *Practical orthography in Nigeria*. Ibadan: Heinemann.

**ERNESTO LACLAU VE CHANTAL MOUFFE’UN SİYASAL YAKLAŞIMLARI:
POST-MARKSİZM VE RADİKAL DEMOKRASİ**

POLITICAL APPROACHES OF ERNESTO LACLAU AND CHANTAL MOUFFE: POST-
MARKSİZM AND RADICAL DEMOCRACY

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ÖZET

Postmodernizm modernizmin temel prensipleri olan akılcılık, rasyonalite gibi kavramlardan bir kopuşu temsil eder ve Aydınlanma düşüncesinin rasyonalitesine karşı dünyanın temelsiz, çeşitli, belirsiz nitelikte ve farklı yorumlara dayalı olduğu iddiasını ortaya atar.

Ernesto Laclau ve Chantal Mouffe’un kurucuları olduğu Post-Marksizm de bu bağlamda postmodern bir ideolojidir. 1970’li yıllarda neo-liberal politikaların hegemonyasının hakim konuma geldiği görülmüş, böylece de Sosyalizm ideolojisinin sonuna gelindiğine dair güçlü bir kanı egemen olmuş ve Marksist teori çıkmaza girmiştir. Postmodern düşünürler olarak Laclau ve Mouffe ise Marksist geleneğin kapitalizme bir alternatif oluşturmasını sağlayabilmek amacıyla yeni eğilimleri uyarlayarak Marksizm’i yeni bir değişimle ortaya koymuşlar, böylece Post-Marksizm ortaya çıkmıştır.

Post-Marksizm Marksizm’in sınıf temelli yaklaşımına ve ekonomik altyapının üstyapıları belirleyici kesinliklerine karşı çıkmakta, Marksizm’in klasik yorumunu eleştirmektedir. Post-Marksizm’in en dikkat çekici özelliği işçi sınıfına duyduğu derin güvensizliktir. Bu ideolojiye göre işçi sınıfı yerine feministler, çevreciler, sendikalar, partiler, etnik gruplar gibi pek çok farklı unsurlar toplumsal değişim için önemli merkezler haline gelebilirler. Bu yaklaşıma dayanarak işçi sınıfının devrimci niteliğini kaybettiğini ve artık temel özne olamayacağını düşünen Laclau ve Mouffe, toplumdaki farklılıklar üzerinden sol ideolojiyi yeniden kurgulamışlardır.

Bu kurgulamayı yaparken de toplumdaki antagonizmalardan yararlanmışlardır. Antagonizma zıtlıklar anlamına gelmektedir. Antagonizmaları yaklaşımlarının temeline yerleştirmişler, homojen bir toplumda demokrasinin yaşayamayacağını, heterojenliğin demokrasinin birinci şartı olduğunu öne sürmüşlerdir. Toplumda oluşan çatışmalar asla çözümlenemeyecek çatışmalardır. Bu çatışmaların çözümsüz oluşu da bir kusur değil, aksine demokrasinin canlılığını gösteren bir unsurdur.

Laclau ve Mouffe çekişmeci çoğulculuk ismini verdikleri bu teoriyi ortaya atarken, uzlaşmacı yaklaşımlara da karşı çıkarlar. Toplumdaki farklılıklar uzlaşmaya giden bir çizgiye gelmemelidirler. Böyle bir durum demokrasiyi baltalayan bir sonuç doğurur.

Günümüzde sınıfların değil, birbirinden çok farklı özellikler gösteren çeşitli grupların mücadelesine tanık olunurken Marksizm’in de bu konjonktürel duruma uygun hale getirilmesi onu neo-liberalizme bir alternatif yapma çabasıyla kaynaklanmaktadır. Post-Marksizm adı verilen bu çaba solun yeniden canlandırılması için atılmış önemli bir adımdır.

Bu çalışmada klasik Marksizm’in krizine değinilecek, krizden çıkmak için klasik Marksizm’in eleştirildiği noktalar gösterilecek, Post-Marksizm’in dayandığı temeller ele alınacak, Post-Marksizm’in temel taşı olan antagonizma kavramı açıklanacak, hegemonya

kavramı üzerinde durulacak ve son olarak da liberalizm ile demokrasi arasında var olduğu iddia edilen çelişkilere değinilecektir.

Anahtar Kelimeler: Post-Marksizm, Radikal demokrasi, Laclau, Mouffe, Antagonizma

ABSTRACT

Post-Marxism represents a break with the main principles of modernity, with concepts such as reason and rationalism, and argues, against the rationalism of Enlightenment thought, that the world is based on unfounded, diverse, vague, and different interpretations.

Post-Marxism, a post-modern ideology founded by Ernesto Laclau and Chantal Mouffe, among others, can be considered in this context. By 1970s, there was a growing realization that neoliberal policies had become hegemonic, the idea that Socialism had come to an end as an ideology gained prominence, and the Marxist theory was at an impasse. Laclau and Mouffe, on the other hand, as post-modern thinkers, offered a new type of Marxism by adapting new tendencies, in order to allow the Marxist tradition to keep serving as an alternative to capitalism, thus giving rise to the emergence Post-Marxism.

Post-Marxism rejects the class-based approach of Marxism and its conviction that the economic base determines the superstructure, criticizing the classical interpretation of Marxism. The most prominent feature of Post-Marxism is its deep distrust of the working class. According to this ideology, many different social groups besides the working class can become important drivers of social change, including environmentalists, labor unionists, parties, and ethnic groups. Based on this approach, Laclau and Mouffe thought that the working class lost its revolutionary character, and reimagined the left ideology on the basis of social differences.

In doing so, they utilized the antagonisms or oppositions in society. They placed antagonisms at the center of their approach, arguing that democracy cannot survive in a homogeneous society and heterogeneity is a prerequisite for democracy. Social conflicts are conflicts that can never be resolved. That these conflicts are unresolvable is not a defect; to the contrary, it is an indicator of democratic vitality.

By offering this theory of contentious pluralism, Laclau and Mouffe also oppose conciliatory approaches. Social differences are not supposed to move towards conciliation as it would hinder democracy.

The contemporary world witnesses conflicts between groups with many different characteristics, not just among classes, and the updating of Marxism to fit these conditions is part of an effort to turn it into a realistic alternative to neoliberalism. This effort called Neo-Marxism is an important step taken to rejuvenate the left.

This study will discuss the crisis of classical Marxism, review the criticisms directed at classical Marxism in order to overcome this crisis, clarify the foundations of Post-Marxism, explain the concept of antagonism, which plays a key role in Post-Marxism, dwell upon the concept of hegemony, and finally, discuss the proposed contradictions between liberalism and democracy.

Keywords: Post-Marxism, Radical Democracy, Laclau, Mouffe, Antagonism

GİRİŞ

Postmodernizm, modernizmin temel ilkeleri olarak nitelenen akılcılık, rasyonalite gibi fikirlerden uzaklaşmayı getirmiş ve Aydınlanma düşüncesinin rasyonalitesine karşı dünyanın temelsiz, çeşitli, belirsiz nitelikte ve farklı yorumlara dayalı olduğu iddiasıyla ortaya çıkmıştır (Batı, 2010: 3). Laclau ve Mouffe'un kurucuları olduğu post-Marksizm de bu bağlamda postmodern bir ideoloji olup Marksizm'in sınıf temelli, ekonomik altyapının üstyapıları belirleyici kesinliklerine karşı çıkararak ve Marksizm'in klasik yorumunu eleştirerek ortaya çıkmıştır.

Post-Marksizm işçi sınıfına duyduğu güvensizlik ile dikkat çeker. İşçi sınıfının konjonktürel şartlar gereği devrimin lokomotifini olma özelliğini kaybettiğini düşünen Laclau ve Mouffe temel özne olma rolünü işçi sınıfından alarak toplumdaki farklı grupları özne konumuna oturturlar. Bu parametre üzerinden Marksizm'i yeniden kurgularlar (Batı, 2010: 8).

Bu kurgulamayı yaparken de toplumdaki antagonizmalardan yararlanmışlar, antagonizmaları yaklaşımlarının temeline yerleştirmişler, homojen bir toplumda demokrasinin yaşayamayacağını, heterojenliğin demokrasinin birinci şartı olduğunu öne sürmüşlerdir. Toplumda oluşan çatışmalar asla çözümlenemeyecek çatışmalardır. Bu çatışmaların çözümsüz oluşu da bir kusur değil, aksine demokrasinin canlılığını gösteren bir unsurdur.

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Bu çalışmada klasik Marksizm'in krizine değinilecek, krizden çıkmak için klasik Marksizm'in eleştirildiği noktalar gösterilecek, post-Marksizm'in dayandığı temeller ele alınacak, post-Marksizm'in temel taşı olan antagonizma kavramı açıklanacak, hegemonya kavramı üzerinde durulacak ve son olarak da liberalizm ile demokrasi arasında var olduğu iddia edilen çelişkilere değinilecektir.

1. KLASİK MARKSİZM'İN KRİZİ VE ELEŞTİRİSİ

Günümüzde demokrasi tartışmalarında demokrasi kavramı çeşitli sıfatlarla nitelenerek farklı demokrasi tanımları ortaya atılmaktadır. Bunlardan biri olan radikal demokrasi düşüncesi de Ernesto Laclau ve Chantal Mouffe adlı iki postmodern düşünür tarafından geliştirilmiştir.

1970'li yıllarda neo-liberal politikaların hegemonyasının hakim konuma geldiği, böylece de sosyalizm ideolojisinin sonuna gelindiğine dair güçlü bir kanı egemen olmuş, bunun sonucunda da Marksist teorinin çıkmaza girdiği düşünülmüştür. Laclau ve Mouffe ise bu çıkmazın halledilebilmesi için iki yol öngörürler. Birincisi, kapitalizmin geldiği noktayı yok saymak ve klasik Marksizm'in kabuğuna çekilmek; diğeryse, Marksist geleneğin kapitalizme bir alternatif oluşturmasını sağlayabilmek amacıyla yeni eğilimleri uyarlayarak Marksizm'i bir dönüşüme tabi tutmaktır (Laclau ve Mouffe, 2015: 8).

Birinci yolu izleyen sol partilerin birçoğu piyasa ekonomisine müdahale etmenin tehlikeli olduğu, mülkiyet haklarının dokunulmaz olduğu gibi katı kurallar karşısında alternatif geliştiremedikleri için sağa kaymaya mahkum olmaktadır (Mouffe, 2002: 18).

İkinci yol olan neo-liberalizme yeni bir alternatif oluşturmak amacıyla sosyalizmin geliştirilmesi içinse, eski sosyalizm paradigmasının eleştirilmesi gerekmektedir. Laclau ve Mouffe'a göre Marksizm'in ortodoks yorumu sosyalizmi konjonktürel şartlara uygun olmayan bir hale getirmektedir. Bu bakımdan bu düşünürler, sosyalizmin bu boyutunun

eleştirisi üzerinden düşüncelerini kurgulamaktadırlar. Sosyalizmin çöktüğü ve liberal demokrasinin galip geldiğine dair pek çok açıklamalar yapılırken, aslında bu çöküş, dünyada etnik, dinsel ve milliyetçi çatışmaların hızla artmasına yol açmıştır. Ortaya çıkan bu çatışmalar da sosyalizm eleştirilerine kaynaklık etmiştir (Mouffe, 2008: 13).

Ortodoks Marksizm’de temel sınıf işçi sınıfı olup ekonomik temele indirgemecilik yaklaşımı katı bir şekilde benimsenmekte ve ekonomik altyapının üstyapıyı belirlediği bir model uygulanmaktadır. Bunlara ek olarak toplumsal ilişkiler de sınıf indirgemeciliği üzerinden değerlendirilmektedir (Duman, 2013: 186-190). Marksizm’in bu niteliklerinden dolayı üstyapılardaki niteliklerin gözden kaçırılma tehlikesi doğabilmektedir.

Marksizm’in sınıf temelli yaklaşımında, ekonomik, politik ve ideolojik üç düzey esas alınarak çözümlenmelere varılmasını ve üretim güçleri ile üretim ilişkileri arasındaki çelişkiler üzerinden kurgulamalar yapılmasını, Laclau ve Mouffe “*çökelmiş fetişler*” olarak tabir ederler ve bunların yerine konulabilecek alternatifler geliştirmeye çalışırlar (Laclau ve Mouffe, 2015: 9).

Marksizm’in işçi sınıfına dayalı paradigmasına karşılık, işçi sınıfına verilen ayrıcalıklı rolün günümüz dünyasında bir anlamı olmadığı ve toplumda ortaya çıkan bütün grupların sosyal değişimin itici gücü olabileceği yaklaşımı getirilmektedir. Feministler, çevreciler, sendikalar, partiler gibi oluşumlar da toplumsal değişim için önemli merkezler haline gelme potansiyeline sahiptirler. Günümüz dünyasında çok farklı toplumsal grupların ortaya çıkması, yalnızca sınıf temeline dayalı bir yaklaşımı geçersiz kılmaktadır (Batı, 2010: 9).

Marksizm’in ortodoks yorumunun eleştirilmesi ile üretilen yeni anlayışa post-Marksizm denilmektedir. Marksizm’in güncel sorunlar altında yeniden ele alınması için Marksist teorinin ortodoks yorumunun kavramlarının dönüştürülmesi olarak algılanan bir post-Marksizm yakıştırmasını Laclau ve Mouffe kabul ederek benimsemişlerdir. Post-Marksist düşüncenin temel odak noktaları ise, çoğulculuk anlayışı, kimlik siyasetinin geliştirilmesi ve evrensel olarak geçerli olan yargıların reddedilmesidir (Laclau, 2015: 10). Böylece sınıf farklılığına dayalı bir ideoloji çoğulculuk ve farklılık siyaseti ile dönüştürülmek istenmektedir.

2. POST-MARKSİST DÜŞÜNCENİN ARKA PLANI

Marksizm’in klasik yorumuna bir tepki olarak doğan post-Marksizm için Laclau ve Mouffe’un çalışmaları temel alınmaktadır. Ancak, post-Marksist düşüncenin arka planı ve birikimi daha eskiye dayanmaktadır. Bu noktada Bernstein, Sorel ve Gramsci’ye bakılma gereksinimi doğmaktadır.

Bernstein, proletarya diktatörlüğü ve zora dayanan devrim fikrini sosyalist düşünceden soyutlama çabası içerisindedir. Klasik Marksist teoride, gerçekleşeceği düşünülen sınıflar arası kutuplaşma ortaya çıkmamış, hatta tam tersine orta sınıflar güçlenmiş, böylece proletarya diktatörlüğünün kurulması ideali gerçekleşmemiştir. Bundan dolayı da Bernstein’da klasik Marksizm’e karşı eleştirel bir düşünce doğmuştur (Duman, 2013: 177-178). Laclau ve Mouffe ise klasik Marksizm’in sınıf temelli yaklaşımını yadsırken Bernstein’dan etkilenmişlerdir.

Sorel’in düşüncesine baktığımızda, klasik Marksist düşüncede yer alan kapitalizmin yıkılacağı ve komünist bir idealin tedrici olarak gerçekleşeceği tezini reddettiğini görürüz. Sorel’i bu düşünceye yönelten, işçi sınıfının beklenen kutuplaşma içerisinde sivrileceği tezinin gerçekleşmemesi ve işçi sınıfının demokratik değerler içerisinde kapitalist sisteme

entegre olmuş olmasıdır. Bunun sonucunda Sorel, işçi sınıfının yükselmesi için mücadele paradigmasını terk etmiştir (Laclau, 2005: 64-65).

Gramsci, Laclau ve Mouffe'a, siyasal mücadelenin yalnızca sınıflar arası mücadeleden ibaret olmadığı, toplumsal grupların her birinin mücadele içinde yer alabileceği yönünde geliştirdikleri teze “hegemonya” düşüncesi ile katkı sağlamaktadır. Gramsci'den önemli ölçüde etkilenen düşünürler, sınıf mücadelesi yerine hegemonik mücadele paradigmasını oturturlar. Hegemonya ve Sosyalist Strateji kitabında düşünürler, Gramsci'nin kendi düşünceleri açısından önemini şöyle vurgularlar: “Gramsci örneği, yeni bir kavramsal cephanelik üreten bir girişim olarak sayılabilecek tek örnektir. Mevzi savaşı, tarihsel blok, kolektif irade, hegemonya, entelektüel ve ahlaki önderlik kavramları Hegemonya ve Sosyalist Strateji'deki fikirlerimizin hareket noktası oldular.” (Laclau ve Mouffe, 2015: 10, 80-85).

3. SINIF MÜCADELESİNİN REDDİ VE HEGEMONYA

Klasik Marksizm'de altyapı üstyapı kurumlarını belirler. Altyapıda bulunan unsurlar ekonomi ve üretim araçlarıdır. Devlet ise zora dayalı bir üstyapı kurumu olup altyapı tarafından belirlenir. Gramsci'de ise devlet zora dayanmakla birlikte, çeşitli üstyapı kurumlarının da desteğini alarak egemenliğini aynı zamanda rızaya dayandırmaktadır. Din, sendikalar, eğitim kurumları gibi üstyapı kurumları tarafından üretilen rıza ile devletin hegemonyası inşa edilmektedir (Gülenç, 2010: 148).

Sosyalizm ideallerine ulaşmak için de karşı hegemonik bir sürece ihtiyaç olup, bu karşı hegemonik sürecin temel taşı olarak da işçi sınıfı belirlenmiştir. Klasik Marksizm'de olduğu gibi Gramsci'de de sınıf temelli olarak özneler belirlenir ve hegemonya anlayışı da sınıf temellidir. “Politik mücadele hala sınıflar arasındaki bir sıfır-toplam oyunudur” (Laclau ve Mouffe, 2015: 120).

Laclau ve Mouffe, Gramsci'nin hegemonya kavramından etkilenerek radikal demokrasi teorisini hegemonya kavramı üzerine inşa etmişler ve Gramsci'deki hegemonyanın demokratik çoğulcu niteliğini alarak teorilerini oluşturmuşlardır. Onlara göre hegemonyanın oluşumu süreci antagonizmaların kesişimi ile meydana gelir. Antagonizmaların kesişimi ile kastedilen de, bütün öznelerin ve grupların bir arada bulunduğu bir durumda farklılıkların çatışmasıdır. Ancak bu çatışma olumlu bir çatışma olup, bütün gruplar ve farklılıklar değerli görülmekte ve bir arada yaşamaları sağlanmaktadır. Laclau ve Mouffe'un düşüncesinde hegemonya farklı bir bağlama kaymıştır. Gramsci'deki hegemonya sınıf temeline dayanmasına karşılık Laclau ve Mouffe'un hegemonyası sınıf temelli bir yaklaşımı reddeder (Kaygalak, 2001: 37-38).

Laclau ve Mouffe'un hegemonyasında en önemli görülen unsur heterojenliğin sağlanması ve idame ettirilmesidir. Tek bir grubun ya da sınıfın hegemonyasının toplumda geçerli olması kabul edilemez bir durumdur. Böyle bir durum meydana gelirse heterojenliğe dayalı olan hegemonya ortadan kalkmış olur. Bu heterojenliğin sağlanması, toplumsal mücadelenin sınıf temeli dışındaki öznelere yönelebilmesi için de sınıflar ötesi alanda bir hegemonya yaratılmalıdır (Gülenç, 2010: 151). Laclau ve Mouffe'un düşüncesinde hegemonya tek tipleştirilmeye karşı olup çoğulcu bir karaktere sahiptir. Bu bağlamda hegemonyayı, “demokratik değerlerin hegemonyası” olarak tanımlarlar (Batı, 2010: 12).

Onlara göre, hegemonya daima kararsız ve muğlak bir yapıdadır (Laclau, 2000: 107). Bu kararsız zemin, hegemonyanın oluşmasını sağlar. Belli bir karar ya da kararlar geçerli ise, artık tek bir grubun hâkimiyeti söz konusudur ki, bu da hegemonyanın önünde engeldir.

Hegemonik ilişkinin özelliklerini incelediğimizde bazı sonuçlara varabiliriz. Hegemonik ilişki sözleşme teorileri ile açıklanamaz. Çünkü toplum sözleşmesi, toplumdaki antagonizmaları ortadan kaldırır (Laclau, 2005: 66). Ayrıca hegemonik ilişki, Marksizm'deki proletarya kavramı ile de ilgili değildir. Çünkü son kertede devletin ortadan kalkması üzerinde uzlaşmış bir durum ortaya çıkarmaz. Laclau ve Mouffe'a göre hegemonik ilişki siyasetin kurucu temelidir. Hegemonyanın kendine özgü bir evrensel boyutu da bulunmaktadır. Ancak bu evrensellik, evrensellik ile tikellik arasındaki gerilim ve çelişkilerin sürmesi ile var olur (Laclau ve Mouffe, 2015: 15-16). Bu evrensellik bir grubun kesin olarak ele geçirdiği bir evrensellik değil, her an tersine çevrilebilir bir özellik arz eden bir evrenselliştir. Her hegemonik düzen, karşı hegemonyaların kurulması için meydan okumalara açıktır (Mouffe, 2013: 26).

4. ÖZNE-KONUMLARIN ÇOĞULLUĞU VE ANTAGONİZMA

Radikal demokrasi, Aydınlanma düşüncesinin tek tipleştirici kalıplarını reddeder. Laclau ve Mouffe'a göre, evrensel ile tikel olan kıyaslanamaz. Ancak, evrensel, tikel olmadan olmaz. Düşüncülere göre evrensel ile tikel olan arasındaki çelişki, radikal demokrasinin üzerine oturduğu zemindir. Çelişkinin çözümü yoktur. Olmaması da zaten evrensel olanın değil, farklı tikelliklerin bir arada bulunmasıyla evrensel olanın oluşturulması demektir. Bir tikelliğin tek gerçek olarak yansıtılması, diğerlerini yanlıslamaya, dolayısıyla da demokrasinin en baştan güdük kalmasına sebep olacaktır (Laclau, 2000: 30-38, 76).

Laclau ve Mouffe, feodal bir toplumdan demokratik topluma doğru olan evrimde Aydınlanma düşüncesinin evrenselci ve özgürlükçü söylemler ve yaklaşımlar geliştirmesinin o dönemin konjonktürel şartları açısından yararlı olduğunu ve demokratik değerlerin oluşumuna zemin hazırladığını belirtirler. Ancak, günümüzde demokrasinin evrilmesinde ve gelişmesinde Aydınlanma'nın evrenselci düşünceleri engel teşkil etmektedir. Radikal demokrasi, Aydınlanma'nın evrenselciliğinin kabul etmediği bütün farklılıkların kabulünü gerektirir (Mouffe, 2008: 29-30).

Bunu sağlamak için de radikal demokrasi postmodern felsefe ile irtibatlı olarak ele alınmıştır. Böylece postmodern felsefenin Aydınlanma'nın dar kalıplarını genişletmesi radikal demokrasinin oturacağı bağlamı belirlemiştir (Laclau, 2000: 21-22).

Onlara göre politikanın öznesi salt işçi sınıfı değil, hegemonik oluşum içerisinde bir araya gelen diğer öğelerdir. Bu öğeler çeşitli grupları barındırır: barış eylemcileri, feministler, çevreciler, etnik gruplar gibi (Kaygalak, 2001: 43).

Laclau ve Mouffe bu özne konumlarının bir arada bulunmasını anlatmak için “*çekişmeci çoğulculuk*” kavramını ortaya atmışlardır. Çekişmeci çoğulculukta antagonizmalar devreye girer. Antagonizma ise zıtlıklar demektir. Laclau ve Mouffe'un hegemonyasında antagonizma kavramı merkezi bir yer tutar (Mouffe, 2015: 26-29).

Laclau ve Mouffe, antagonizma kavramı için Carl Schmitt'e başvururlar. Schmitt'te dost ve düşman ayrımı vardır. Siyaseti dost ve düşman ayrımı üzerine kurgular. İki tür antagonizma vardır. Birincisi, düşmanlar arasındaki antagonizmadır ki, burada taraflar arasında ortak bir simgesel alan yoktur. Birbirlerinin yok edilmesine dayanır. İkincisi ise, Laclau ve Mouffe'un yaklaşımında benimsedikleri antagonizmalardır ki, düşmanlar arasında değil, hasımlar arasında meydana gelir. Hasım, dost-düşman (friendly enemies) kavramıyla da ifade edilebilir. Ortak paydaları olduğu için dost, ortak payda alanlarını farklı biçimlerde değiştirmek istedikleri için de düşman konumundadırlar (Mouffe, 2013: 18-19, 28).

Laclau ve Mouffe, hasımlar/dost-düşmanlar arasındaki antagonizmaları siyaset açısından ontolojik bir olgu olarak görürler. Diğer bir deyişle, siyasetin demokratik anlamda var olabilme koşulu antagonizmaların var olabilmesine bağlıdır. Mouffe bu durumu şöyle açıklar: “..demokratik devrimin derinleştirilmesinde radikalleştirilmiş çoğulculuk fikrini bir araca dönüştürerek, rasyonalizm, bireycilik ve evrenselcilikle ilişkiyi kesmek zorunda olduğumuzu ileri sürüyorum. Toplumsal ilişkilerde var olan tâbiyet biçimlerinin çeşitliliğini kavramak, cinsiyet, ırk, sınıf, cinsellik, çevre ve diğerleri etrafında dönen farklı demokratik mücadelelerin eklenilebileceği bir çatının tesis edilebilmesi, sadece bu koşulda olanaklı olacaktır.”(Mouffe, 2008: 21).

Bu bakış açısının karşısında ise evrenselci bir yaklaşımı benimseyen Rawls ve Habermas gibi isimler vardır. Bu isimler “müzakereci demokrasi” yaklaşımını geliştirmişlerdir. Onlara göre, müzakere yoluyla uzlaşmaya gidilmesi esas olup, buna karşı çıkanlar demokrasinin altını oymuş olmaktadır (Mouffe, 2013: 21). Müzakereci demokrasi anlayışıyla Rawls ve Habermas, liberal değerler ile demokrasi arasında bağ kurmak amacındadırlar. Bunu yapmak için de kamusal alanda bir araya gelinerek müzakere kuralları geliştirilmelidir. Böylece liberal haklar korunurken halk egemenliği de gerçekleşmiş olacaktır. Habermas’a göre, temel insan hakları ile halk egemenliği aynı kökene dayalıdır, aralarında çelişki doğuracak bir durum yoktur. Fakat Mouffe, Habermas’ın demokrasiyi, Rawls’un da liberalizmi öne çıkardığını, onların savundukları tezlerin başarısız olduğunu düşünür (Mouffe, 2002: 20).

Radikal demokrasi savunucuları olan Laclau ve Mouffe, bu noktadan müzakereci demokrasi yaklaşımına karşı çıkmaktadırlar. Hasımları yok edilecek birer düşman olarak görmemekle birlikte, onları karşılıklı anlaşılacak ve onlarla uyulacak özneler olarak da görmezler. Onlara göre, hasımlıklar bakidir. Bu da demokrasinin esas şartıdır. Müzakereci demokrasi savunucuları uyumsuzluk ve antagonizmaları demokrasinin düşmanı olarak görürken, Laclu ve Mouffe, antagonizmaların olmamasını demokrasinin yok olmasına götüren bir başlangıç olarak görürler (Üstüner, 2007: 320). Rawls, “iyi düzenlenmiş bir toplum” idealini savunur. Mouffe, Rawls’un bu tasavvurunu “liberal ütopya” olarak tabir eder. Buna göre hasımlar arasındaki ihtilaf bile kamu alanından silinmelidir. Mouffe, Rawls’un bu düşüncesinin sebebi olarak -politikaya dair yanlış bir anlayış olarak- politikayı rakip çıkarlar arasında bir orta yol, bir uzlaşma bulunabileceği ve politikayı yalnızca çıkar paylaşımı alanı olarak görme eğilimini gösterir (Mouffe, 2002: 40).

Laclau ve Mouffe, başını Ulrich Beck ve Anthony Giddens’in çektiği bir yaklaşım olan *Üçüncü Yol* siyasetini de reddederler. Üçüncü Yol olarak bilinen anlayış, artık sol ve sağ olarak var olan ayrımın geçersiz olduğunu, antagonizmaların ortadan kalktığını savunur. Küreselleşme süreci ile birlikte enformasyon toplumu doğmuş ve günümüzde karşıtlıkların değil, homojenitenin olduğu bir siyaset anlayışı doğmuştur. Böylece siyaset artık teknik sorunların oluşturduğu bir olguya dönüşmüştür. Onlara göre, demokratik bir siyaset artık farklılıkların değil, karşılıklı uyumun bir yansıması olmalıdır. Oysa radikal demokrasi, küreselleşme süreciyle sınırların ortadan kalkması nosyonunu reddeder ve yeni siyasal sınırlar getirir. Radikal demokrasi, toplumdaki konsensüs olgusunun kutsallaştırılmasına karşı çıkar. Küreselleşme ile ortaya çıktığı düşünülen homojen toplum düşüncesi değiştirilemez bir yazgı, bir dogma olarak gösterilmesi demokrasi için büyük bir tehlikedir (Laclau ve Mouffe, 2015: 18). Sağ ve sol arasında var olduğu düşünülen bulanıklaşmayı demokrasinin ilerlemesi bir yana, demokrasinin tehlike altında olduğunu gösteren bir işaret olarak yorumlarlar. Artık sağ-sol ayrımı siyasal değil, ahlaki kategorilerle ifade edilir bir duruma gelmiştir. Sağ-sol yerine “doğru-yanlış” ayrımı konulmuştur. Bunun sonucu ise bir doğru tanımlanıp diğerlerinin yanlış olduğu bir zemin yaratarak demokrasinin öldürülmesidir (Mouffe, 2013: 11-12).

Laclau ve Mouffe, çekişmeci çoğulculuk ve radikal demokrasi yaklaşımının demokrasinin geleceği için en güvenilir yol olduğunu savunurlar. Yukarıda bahsedilen müzakereci

yaklaşımlar ve üçüncü yol arayışları toplumdaki antagonizmaları yok saymakta ya da bunların uzlaşma yoluyla ortadan kaldırılabilmesine inanmaktadırlar (Üstüner, 2007: 321). Ancak Laclau ve Mouffe, antagonizmaları yok saymanın onların gerçek dünyada yok olmaları anlamına gelmediğini söylerler. Onlara göre toplumsal antagonizmaları yok saymak, hasımlar/dost-düşmanlar arasındaki antagonizmayı düşmanlar arasındaki antagonizmaya çevirme tehlikesi taşımaktadır. Bu da düşmanlar arası savaş durumuna kadar giden tehlikeli bir duruma kapı aralar. Hasımlar/dost-düşmanlar arasındaki antagonizmalar ise sonu belli bir uzlaşma ile bitmeyen antagonizmalar kesişimidir. Fakat bu sonsuzluk bir kusur değil, aksine demokrasinin canlılığının devam ettiğini gösteren bir işarettir (Mouffe, 2002: 41-44).

Hasımlar/dost-düşmanlar, fikirleri ile çatıştığımız, ancak fikirlerini savunma hakkını sorgulamadığımız kimselerdir. Bu çatışma hiçbir zaman çözülemeyecek bir çatışmadır. Bu çatışma sonucunda karşı tarafın fikirlerinin kabul edilme ya da onlara kayıtsız kalınma zorunluluğu yoktur (Mouffe, 2013: 29). Hasımlar/dost-düşmanlar meşru düşmanlardır. Ancak aralarında hiçbir zaman anlaşma olamayacağı türünden bir yargıya varmak da doğru değildir. Fakat anlaşma ve uzlaşmalar, devam eden çatışma ortamında “geçici soluklanmalar” olarak algılanmalıdır (Mouffe, 2002: 106-107). Radikal demokrasi yaklaşımında esas olan çatışma ve antagonizmalardır. Uzlaşmalar ise istisna halidir ve devamlı bir niteliğe bürünmeleri faydadan çok zarar getirir.

Mouffe, diyalojik/müzakereci yaklaşım ile antagonistik yaklaşım ayrımını şu şekilde aktarır: *“Hasımlar çatışırlar, hatta çok sert bir şekilde çatışırlar, fakat paylaşılan bir kurallar bütünü uyarınca çatışırlar ve pozisyonları, tamamıyla uzlaşmaz olsalar bile, meşru perspektifler olarak kabul görür. ‘Diyalojik’ ve ‘agonistik’ perspektifler arasındaki temel fark, ikincisinin amacının mevcut iktidar ilişkilerini adamakıllı dönüştürmek ve yeni bir hegemonya kurmak olmasıdır.”* (Mouffe, 2013: 64).

5. LIBERAL DEMOKRASİ ÇELİŞKİSİ

Antik dönemde doğrudan demokrasi yönteminin uygulanması esas olmasına karşın modern dönemde doğrudan demokrasi yöntemlerinin uygulanmasının imkânsız olmasından dolayı temsili demokrasi benimsenmiştir. Modern demokrasi, iktidarın halkın elinde bulunmasını sağlamakta, ama bunu liberal ilkeler içerisinde şekillendirmektedir. Bunu yaparken de özgürlük ve insan haklarına vurgu yapan bir söylem çerçevesi çizmektedir (Mouffe, 2002: 14).

Liberal değerler ile demokratik değerler arasında bir uyumsuzluk ve bir çelişki olduğu kimi çevrelerce kabul edilmektedir. Bu görüşü ilk ortaya atan Schmitt’tir. Evrensel bir bakış açısıyla insanlık kavramına atıfta bulunan liberal eşitlik görüşü ile ‘biz’ ve ‘onlar’ arasındaki demokratik eşitlik görüşünün farklı olduğunu savunur Schmitt. Ona göre liberalizm demokrasiyi, demokrasi de liberalizmi yadsır ve parlamenter demokrasi birbirini yadsıyan liberalizm ve demokrasinin bir eklemlenmesinden ibaret olduğu için uzun vadede yaşaması imkansızdır. Liberal eşitlik anlayışı herkesin insan haklarından doğan eşitliğini varsayar. Oysa demokrasi eşitsizlik ilişkisini ve farklılığı gerektirir. Ayrıca, liberalizm politik bir kavram olmayan insanlık kavramına gönderme yaparken, demokrasinin temel kavramı halktır (Üstüner, 2007: 318).

Schmitt’ten etkilenen Mouffe’a göre de, liberalizm ve demokrasi farklı geleneklerdir. Bugün bunları birbirini zorunlu kılan ideolojiler olarak görmemize rağmen aralarında zorunlu bir ilişki bulunmamaktadır. İki geleneğin birbirine eklemlenmesi tarihsel şartlar gereği olmuştur. Hatta iki kanadın temsilcileri arasında karşılıklı sert tartışmalar meydana gelmiştir. İki geleneğin savunucuları da kendi geleneklerini merkeze yerleştiren yaklaşımlar

benimsemişlerdir. Liberaller, demokrasiyi barışın ve özgürlüklerin korunmasında bir araç olarak görmüşler, demokrasinin liberal kurumları tehlikeye atmadığı sürece geçerli olabileceğini savunmuşlardır. Demokratlar ise, liberal kurumları burjuva özgürlüklerinin bir aracı olarak görmüşlerdir (Mouffe, 2002: 15).

Mouffe, Siyasal Üzerine İsimli çalışmasında, Schmitt'ten yararlanma biçimini şu şekilde anlatır: “Ben, Schmitt'i takip edip liberal demokratik siyaseti reddetmek yerine, Schmitt'in liberal bireycilik ve rasyonalizm eleştirisini yeni bir liberal demokratik siyaset anlayışı geliştirmek için kullanıp 'Schmitt'le birlikte Schmitt'e karşı' düşünmeyi öneriyorum.” (Mouffe, 2013: 22). Mouffe, Schmitt'in liberal demokrasiyi tamamen reddeden görüşünü olduğu gibi kabul etmeyip, onu liberal demokrasiyi derinleştirmek için kullanmıştır.

Demokrasiyi yalnızca yönetim ve insan hakları ile özdeşleştirmek halk egemenliğini dışlayan bir yaklaşımdır. Bu sorun Laclau ve Mouffe'a göre liberal demokratik değerlerin derinleştirilmesi ile çözülebilir. Bu da yalnızca hükümet bağlamında liberal demokrasi ile değil, vatandaşların kamusal karar verme mekanizmasına katılımlarının derinleştirilmesi ile sağlanabilir. Liberal demokraside alınan kararlar bazı hakları tehlikeye düşürebilir. Oysa liberal demokraside insan hakları ve özgürlüğü korumak için halk egemenliğine sınırlar konulmaktadır. Çelişki burada yatmaktadır (Mouffe, 2002: 16). Liberalizm ve demokrasinin bağdaştırılması için ikisinden birinin taviz vermesi gerekmektedir. Halk egemenliği ile özgürlükler ve insan hakları arasında baskın bir tercih yaparak yaklaşımın temeline bu iki nosyondan biri konulması gerekmektedir.

Laclau ve Mouffe'a göre solun görevi liberal demokratik ilkeleri reddetmek değildir. Sol, liberal demokrasiyi çoğulcu ve radikal demokrasi ile derinleştirmelidir (Laclau ve Mouffe, 2015: 270). Diğer yandan, liberal ideoloji de toplumdaki diğer özneler gibi hegemonik mücadele içerisinde bir özne konumunda olabilir. Bu, liberalizm ve demokrasinin tamamıyla uzlaştırılmamasının sonucudur. Ancak bu durum radikal demokrasi açısından doğru ve değerli olandır (Mouffe, 2008: 165). Böylece liberalizm ve demokrasinin aslında birinden birinin baskın olması gereken ya da birinden birinin vazgeçilmesi gereken taraf olmadığı, ikisinin de radikal demokrasi koşulları altında farklı özneler olarak var olabileceği ve böylece çekişmeci çoğulculuk tezine uygun bir siyasal ortam yaratılabileceğini savunurlar.

SONUÇ

20. yüzyılın sonunda liberal demokrasi genel olarak kabul edilmiş tek geçerli yönetim biçimi konumundadır. Ancak Mouffe, liberal demokrasinin tam olarak antagonizmaların yok edildiği bir ideale ulaşip ulaşmadığını sorgular. Bunun cevabının olumsuz olduğunu belirtir ve liberal demokrasi üzerinde sağlanan konsensüsün gücünün net olmadığı ve dayanma süresinin sınırlı olduğunu vurgular. Hatta bu konsensüsün bozulmaya yaklaştığına dair bazı hoşnutsuzlukların olduğunu düşünmektedir. Geleneksel partilerin kendi çıkarlarını savunmadığını düşünen insanların sayısı artmaktadır (Mouffe, 2002: 85).

Küreselleşme sürecinin getirdiği birleşmiş bir dünya yanılması terk edilmeli ve çok-kutuplu bir dünya düzeni kurulmalıdır. Tek bir hegemonik iktidar bulunduğu sürece, diğer milletlerin görüşlerini sormak ya da sormadan tek başına hareket etmek yalnızca tek hegemonik gücün tekelinde olacaktır (Mouffe, 2013: 133).

Laclau ve Mouffe, sınırsız bir çoğulculuğa da karşı olup, buna bazı sınırlamalar getirirler. Bazı talepler dışlanması gereken, meşru olmayan taleplerdir. Demokratik toplumun var olmasını sağlayan kurumları sorgulayan ya da bu kurumların ortadan kalkmasını isteyen talepler meşru talepler olarak görülemez. Bunu talep edenler de hasım/dost-düşman

kategorisinden düşman kategorisine geçmiş olurlar (Mouffe, 2013: 138-139). Laclau ve Mouffe demokrasinin kurallarını kabul edenleri oyuna dahil ederler.

Radikal demokratik yaklaşıma göre bir diğer koşul da hiçbir toplumsal öznenin diğerleri üzerinde üstünlük iddiası olmamalıdır. Bir özne tüm toplumu temsil etme iddiasıyla ortaya çıkarsa bu demokrasiye aykırı bir yaklaşım olacaktır (Üstüner, 2007: 323).

Laclau ve Mouffe sosyalist görüş içerisinden bazı eleştiriler de almaktadırlar. Laclau ve Mouffe'un sosyalist ideolojiyi özünden uzaklaştırdıkları, liberal bir düzleme yaklaştırdıkları yönünde eleştiriler yapılmaktadır. Ekonomik ve toplumsal yaşamda sınıfsal eşitsizliklerin sürdüğü günümüzde, Laclau ve Mouffe'un toplumdaki mülkiyet ilişkilerine bağlı ekonomik ve toplumsal sömürü biçimlerini görmezden gelerek, siyaseti adeta bir kimlik mücadelesine dönüştürmesi eleştirilen bir noktadır (Kaygalak, 2001: 53).

Düşünelere yöneltilen başka bir eleştiri ise, toplumsal dönüşümün önemli konuları hakkında bir yol çizmemiş olmalarıdır. Mülkiyet gibi temel sorunların çözümü post-Marksist literatürde yer bulmamaktadır. Radikal demokrasinin mülkiyet ilişkilerini dönüştürme noktasında ileri sürdüğü bir fikir olmaması onun bir eksikliği olarak anılmaktadır (Adaklı, 2001: 13-32).

Eksikliklerine ve aldığı eleştirilere rağmen, Laclau ve Mouffe, solun neo-liberalizm karşısında aldığı mağlubiyet noktasında sol ideolojiyi günün koşullarına entegre etmek için çabalamışlardır. Bu çaba sonucunda klasik Marksizm'deki sınıf temelli yaklaşımdan çıkılarak toplumdaki farklılıkların bir arada yaşamasını sağlayacak ve farklılıkların demokratik bir süreçte devam etmesini sağlayacak bir ideoloji ortaya çıkmıştır.

KAYNAKÇA

- Adaklı, Gülseren; “Post-Marksizmin Kuramsal ve Siyasal Açmazları”, *Praksis* (Sayı 1, 2001), ss. 13-32.
- Batı, Uğur; “Liberal Demokrasinin Dönüşümü ya da Post-Marksist Teorinin Zafiyeti: Radikal Demokrasi Projesinin Eleştirisi”, *Akademik Bakış Dergisi*, Sayı 22 (Ekim-Kasım-Aralık 2010), ss. 1-20.
- Duman, Fatih; “Sosyalizm”, *Siyasal İdeolojiler*, Der. Ömer Çaha, Bican Şahin (Ankara, Orion Kitabevi, 2013).
- Gülenç, Kurtul; “Post-Marksizm, Radikal Demokrasi ve Eleştirileri”, *Yeditepe'de Felsefe*, Ed. Saffet Babür (Sayı9, İstanbul, 2010), ss. 138-189.
- Kaygalak, Sevilay; “Post-Marksist Siyasetin Sefaleti: Radikal Demokrasi”, *Praksis*, (2001, sayı:1), ss. 33-59.
- Laclau, Ernesto; *Evrensellik, Kimlik ve Özgürleşme*, Çev. Ertuğrul Başer (İstanbul, Birikim Yayınları, 2000).
- Laclau, Ernesto; Mouffe, Chantal; *Hegemonya ve Sosyalist Strateji*, Çev. Ahmet Kardam (İstanbul, İletişim Yayınları, 2015).
- Laclau, Ernesto; “Kimlik ve Hegemonya: Siyasal Mantıkların Oluşumunda Evrenselliğin Rolü”, *Olumsuzluk, Hegemonya, Evrensellik*, Der. Judith Butler, Ernesto Laclau, Slavoj Žižek, Çev. Ahmet Fethi (İstanbul, Hil Yayın, 2005).
- Mouffe, Chantal; *Demokratik Paradoks*, Çev. A. Cevdet Aşkın (Ankara, Epos Yayınları, 2002).



Mouffe, Chantal; *Dünyayı Politik Düşünmek*, Çev. Murat Bozluolcay, (İstanbul, İletişim Yayınları, 2015).

Mouffe, Chantal; *Siyasal Üzerine*, Çev. Mehmet Ratip (İstanbul, İletişim Yayınları, 2013).

Mouffe, Chantal; *Siyasetin Dönüşü*, Çev: Fahri Bakırcı, Ali Çolak (Ankara, Epos Yayınları, 2008).

Üstüner, Fahriye; “Radikal Demokrasi: Liberalizm mi, Demokrasi mi? Evet, Lütfen!”, *ODTÜ Gelişme Dergisi* (Sayı 34, Aralık 2007), ss. 313-336.

FOTOVOLTAİK MODÜL İLE ÜRETİLEN DC ENERJİNİN İÇ MEKAN AYDINLATMASINDA DOĞRUDAN KULLANIMI VE SİSTEMİN EKONOMİK ANALİZİ

DIRECT USE OF DC ENERGY PRODUCED BY PHOTOVOLTAIC MODULE IN INDOOR LIGHTING AND ECONOMIC ANALYSIS OF THE SYSTEM

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ÖZET

Türkiye’de konutlarda tüketilen toplam elektrik enerjisinin %20’si aydınlatmada kullanılmaktadır. Aydınlatma sistemlerinde günümüz teknolojisine uygun LED lambalar kullanılarak ve fotovoltaik sistemlerden enerji ihtiyacı karşılanarak binaların daha az ve yenilenebilir enerji kullanmaları sağlanmaktadır. Güneş enerjisinden elektrik üreterek konutlarda aydınlatma ihtiyacının karşılanması için fotovoltaik sistemlerin kullanımı bina enerji performansını iyileştirmektedir. Bu yüksek potansiyelden yola çıkarak çalışmamızda güneş enerjisinden üretilen elektrik ile bina içi aydınlatma ihtiyacı DC olarak karşılanmıştır. Şebekeden bağımsız olarak tasarlanan sistem ile DC dağıtım yapılmış olup DC olarak aydınlatmada harcanmıştır. Yapılan çalışmada bir konutun aydınlatılması için kompakt floresan lamba ve LED lambaların kullanılması sonucu tüketilen elektrik enerjisi ve CO₂ salınım değerleri karşılaştırılmıştır. Aydınlatma için kompakt floresan lamba yerine LED lambaların kullanımı ile yıllık 301.12 kW elektrik enerjisi tasarruf edilmiştir ve 180.7 kg CO₂ salınımı azalmıştır. LED lambaların kullanım ömrünün uzun olması ve DC sistemin minimum güçte kurulması nedeniyle, şebekeye bağlı kompakt floresan lamba sistemine göre geri ödeme süresi daha düşük ve ekonomik olarak daha avantajlıdır.

Anahtar Kelimeler: Güneş Enerjisi, Fotovoltaik Sistem, Bağımsız Sistem, Enerji Yönetimi, LED Aydınlatma

ABSTRACT

In Turkey, 20% of the total electrical energy consumed in residences is used for lighting. By using LED lamps in accordance with today's technology in lighting systems and by meeting the energy need from photovoltaic systems, buildings are provided to use less and renewable energy. The use of photovoltaic systems to meet the lighting needs of residences by generating electricity from solar energy improves the energy performance of the building. In our study, starting from this high potential, the electricity produced from solar energy and the need for indoor lighting were met as DC. With the system designed independently from the mains, DC distribution was made, and DC was spent in lighting. In the study, the consumption of electrical energy and CO₂ emission values because of the use of compact fluorescent lamps and LED lamps for lighting a house were compared. With the use of LED lamps for lighting instead of compact fluorescent lamps, 301.12 kW of electrical energy was saved annually and 180.7 kg of CO₂ emissions were reduced. Due to the long lifetime of the LED lamps and the minimum

power of the DC system, the payback period is lower and more economically advantageous than the grid-connected compact fluorescent lamp system.

Keywords: Solar Energy, Photovoltaic System, Standalone System, Energy Management, LED Lighting

1. GİRİŞ

Yenilenebilir enerji kaynaklarına yönelim dünyada olduğu gibi Türkiye’de de hızla artmaktadır. Güneş enerjisi, bulunabilirliği ve ulaşılabilirliği nedeniyle dünyadaki ana yenilenebilir enerji kaynaklarından biridir. Güneş enerjisi temiz, kirlilik içermeyen, bol miktarda bulunabilen, kolay ulaşılabilir bir kaynaktır. Bu kaynak ile elektrik üretim sistemleri daha az bakım gerektirir [1]. Üretilen elektrik enerjisinin büyük bir kısmı binalarda kullanılmaktadır. Binalarda aydınlatmada harcanan enerji miktarı oldukça fazladır [2]. Fotovoltaik (PV) paneller ile konutların enerji talebinin karşılanmasına yönelik uygulamalar yaygınlaşmaktadır [3]. Binada enerji talebinin bir kısmının güneş enerjisi ile karşılanması sektörde enerji tüketimini azaltacaktır [4]. Enerji maliyetini en aza indirmek için yerel olarak kullanılacak güneş enerjisi miktarını en üst düzeye çıkarmak, çevreci olan bu kaynağın ekonomiye kazandırılmasını sağlayacaktır [5].

PV sistemler, şebeke bağlantılı ve şebekeden bağımsız olarak iki gruba ayrılmaktadır [6]. PV sistemler ile gece ve bulutlu günlerde yükün enerji talebini karşılayabilmesi için enerjinin depolanması gerekmektedir [7]. Enerji arzının sürekliliği sağlamak günlük talebin üzerinde elektrik enerjisi depolayabilen aküler sisteme dahil edilmektedir [8]. Sistem verimini artırmak için PV sistem elemanları ve özellikle modüller üzerinde çalışmalar yapılmaktadır [9].

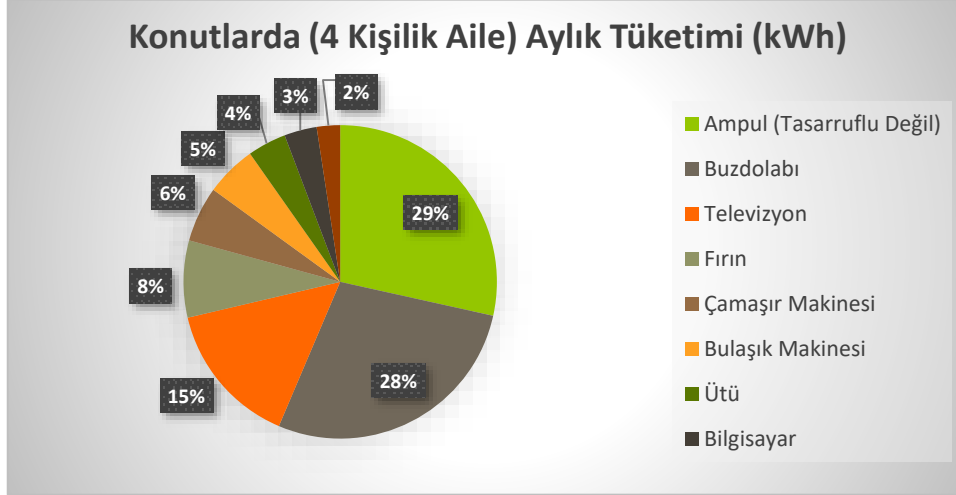
İşler ve ark. yaptıkları çalışmada şebekeden bağımsız PV sistemi TRNSYS ile modellemişlerdir. Modellerinde (akü, invertör, regülatör ve panel) gibi sistem elemanlarının bağlantılarını yaparak simülasyon sonuçlarını almışlardır. Çalışmalarında gerçeğe en yakın matematiksel akü ve panel modelini belirlediklerini savunmuşlardır [10]. PV direk DC armatürlere bağlayan bir alçak gerilim şebekesi ile dağıtımın geliştirilmesi, elektrik enerjinin verimli kullanılmasına fırsat verecektir. Ayrıca modüllerin gün ışığından yararlanma süresinin artırılması sistemin performansını iyileştirmektedir [11].

Bu çalışmada konutlarda aydınlatmada kullanılan kompakt floresan lamba ve LED lambaların elektrik tüketim değerleri, CO₂ salınımları ve işletme maliyetleri incelenmiştir. LED lambaya göre konutun elektrik ihtiyacının PV panelden karşılanması ve bunun ekonomik olarak değerlendirilmesi yapılmıştır. TRNSYS simülasyon programı kullanılarak PV sisteminin bir yıllık elektrik üretim değerleri elde edilmiştir. Konutların aydınlatma ihtiyacının LED lambalardan karşılanması ve elektrik enerjisinin PV panellerden elde edilmesi ile binalarda enerji verimliliğinin artırılması amaçlanmaktadır.

1.1. Konutlarda Enerji Kullanımı

Konutlarda ısınma, soğutma, elektrikli ev aletleri ve aydınlatma gibi enerji tüketen sistemlerden dolayı elektrik enerjisi kullanılmaktadır. Konutlarda enerji ihtiyacı şehir içi enerji dağıtım hattından kayıtlı kullanıcılar tarafından alınmaktadır. Konutlar enerji ihtiyacının tamamını, bağlı olduğu elektrik şebekesinden sağlamaktadır. Konutlarda yeterli alanın olması durumunda elektrik enerjisi ihtiyacını güneş enerjisinden karşılamak için PV paneller kullanılabilir. Binalarda güneş enerjisi ile elektrik üretimi yapılması düşünüldüğünde yapılan hesapta; çamaşır makinesi, bulaşık makinesi, TV, bilgisayar, ütü, saç kurutma makinesi, klima ve aydınlatma güç kullanımına bağlı ortalama aylık 250 kWh çıkmaktadır.

Şekil 1’de konutlarda enerji tüketiminin %29’u aydınlatmada kullanılmakta olduğu görülmektedir. İşyerlerinde bu oran daha düşüktür. Bu durumun sebebi işyerlerinde üretim süreçlerinde kullanılan ve enerji tüketimi yüksek olan makinelerdir. Elektrik tüketiminin tamamının PV sistemden karşılanması için yapılması gereken yatırım yüksek çıkmaktadır. Bu yüksek maliyet PV sistemlerin konutlarda kullanım oranını düşürmektedir. Düşük maliyetli sistemler ile elektrik ihtiyacının bir kısmını karşılamak ise kullanıcılar için alternatif bir çözüm sunmaktadır. Ayrıca sistem yükünü azaltmak ve yenilenebilir enerji kullanımını arttırmak için bir fırsattır.

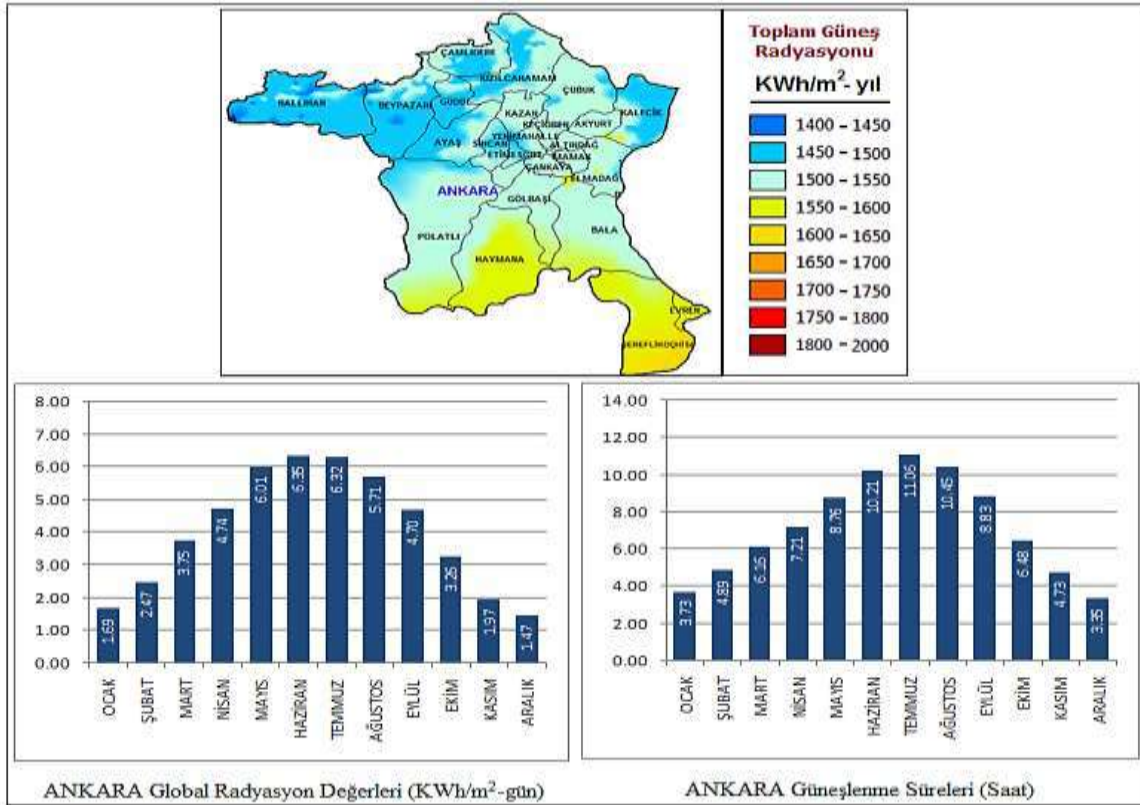


Şekil 1. Konutlarda elektrik tüketimi dağılımı [12]

Dünyada, enerji kaynaklarının azalması ve enerji maliyetlerinin artması kaynakların verimli kullanılmasını gerekli kılmıştır. Türkiye’de toplam tüketilen elektrik enerjisinin %25’lik kısmı konutlarda gerçekleşmektedir. Konutlarda tüketilen elektrik enerjisinin %20’si aydınlatmada kullanılmaktadır [13, 14]. Bu nedenle konutlarda aydınlatma için yapılacak bir iyileştirme elektrik üretim, iletim ve dağıtım sistemi üzerindeki yükü azaltacaktır.

1.2. Ankara İli İçin Güneş Enerjisi Potansiyeli

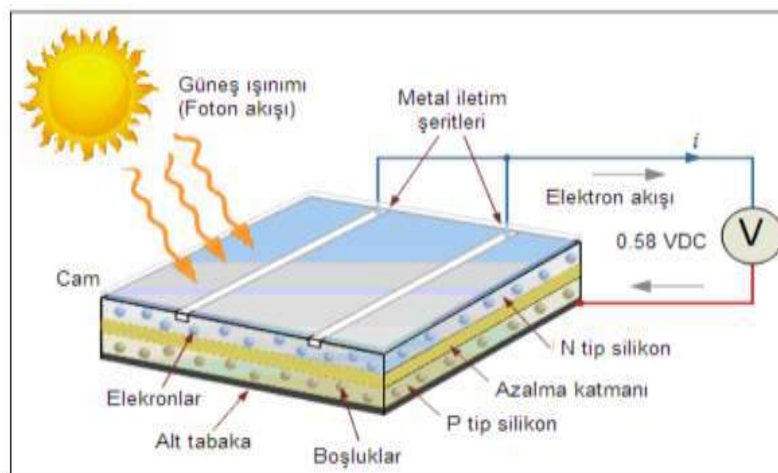
Türkiye coğrafi konumu nedeniyle güneş ışınımı yüksek olan bir ülkedir. Ankara ise güneş enerjisi potansiyeli yüksek bir ildir. Şekil 2’de aylara göre Ankara ili için radyasyon değerleri ve güneşlenme süreleri görülmektedir. Ankara ilinin yıllık ortalama global güneş radyasyonu değeri 4.03 kWh/m²-gün, güneşlenme süresi 7.15 saattir.



Şekil 2. Ankara için aylık radyasyon değerleri ve güneşlenme süreleri [15]

1.3. Fotovoltaik Modüller

PV modüller son yıllarda güneş enerjisinden elektrik üretmek amacıyla yaygın olarak kullanılmaktadır. Güneş ışığı veya suni ışık ile enerji taşıyan fotonlar oluşur. Fotonlar yarı iletken malzemelerin yüzeyine ulaşır ve atomlardan elektron koparır. Koparılan elektron boşluk çiftleri, modülün uçlarında elektro motor kuvvet oluştururlar. Güneş ışınımının yüzeye gelişiyile başlayan bu etki güneş ışınımının devam etmesiyle süreklilik oluşturur [16]. PV modülün yapısı ve çalışma ilkesi Şekil 1'te gösterilmektedir.



Şekil 2. PV modülün yapısı ve çalışma ilkesi [16]

1.4. DC ile Aydınlatma

Konutlarda aydınlatma sistemi ve sistemin otomasyonu enerji tüketim miktarını etkilemektedir. Öncelikle yapının her bir hacmi için aydınlatma ihtiyacı, yapının kullanım amacına uygun

olarak belirlenmelidir. Aydınlatma ihtiyacının karşılanması için aydınlatma gereçleri belirlenirken, aydınlatma gerecinin aydınlatma verimliliği, lümeni, gücü, aydınlatma şekli ve güvenlik unsuru dikkate alınmalıdır. Doğrudan gün ışığı ile sağlanan aydınlatmanın yeterli olduğu hacimlerde günlük aydınlatma gerecinin çalışma süresi belirlenerek günlük tüketim belirlenmelidir. Gün ışığından faydalanma süresinin ve miktarının artırılması enerji tüketimini azaltır ve ayrıca iç ortam görüşünü artırırken sağlık açısından da yararları bulunmaktadır. Yapay aydınlatma gerektiren hacimlerin günlük tüketimleri belirlenirken ortalama kullanım süresine bağlı güç tüketimi hesaplanmaktadır. LED lambalar kompakt floresan lambalara göre uzun ömürlü, işletme maliyeti düşük, zamanla aydınlatma kaybı düşük, sıcaklık değişiminden az etkilenen ve enerji verimli sistemlerdir.

Aydınlatma sistemleri verimli çalışabilmesi için aşağıdaki özelliklere sahip olmalıdır,

- Aydınlatmada doğrudan gün ışığı kullanımını artırılmalıdır.
- İç aydınlatma ihtiyacına uygun aydınlatma yapılmalıdır.
- Verimli aydınlatma gereçleri kullanılmalıdır.
- Sadece belirli bir bölgenin yüksek aydınlatılma ihtiyacı varsa, o bölge için ilave aydınlatma gereci kullanılmalıdır.
- Az kullanılan hacimlerde sensörlü aydınlatma gereci kullanılmalıdır.
- Gün ışığına bağlı otomatik kısılma sağlayan aydınlatma gereci tercih edilmelidir.
- Aydınlatma ihtiyacı, alan sorunu olmayan yerlerde PV sistem ile karşılanmalıdır.

2. YÖNTEM

Ankara ili şartlarında bulunan brüt 120 m² net 107 m² kullanım alanına sahip bir konutun aydınlatma ihtiyacı belirlenmiştir. Aydınlatma ihtiyacının kompakt floresan lamba (CFL) ve LED lambaya göre tüketim değerleri hesaplanmıştır. CFL lambalar şebeke bağlantılı olup konutun aydınlatma için gerekli elektrik enerjisini şebekeden çekmektedir. LED lambalar ise şebekeden bağımsız 12 V DC dağıtım hattından enerji ihtiyacını karşılamaktadır. DC aydınlatmadan tüketilen elektrik enerjisi doğrudan şebekeden bağımsız PV sistemden karşılanmaktadır.

PV modüller ile bir konutta iç hacimlerin aydınlatma ihtiyacının karşılanması için aydınlatma ihtiyacı hesaplanarak ekonomik bir PV sistemi tasarlanmıştır. Öncelikle iç hacmin aydınlatma ihtiyacı belirlenmiştir. Belirlenen aydınlatma ihtiyacına göre günlük tüketim seviyesine göre PV panel boyutu belirlenmiştir. Sistemin günlük enerji ihtiyacı için depolama sistemi hesaplanarak optimum sistem boyutları tayin edilmiştir. Şebekeden bağımsız olarak tasarlanan sistem DC gerilim olarak aydınlatma sisteminde kullanılmıştır. Böylelikle ekonomik olarak iç hacimlerin aydınlatılması sağlanacak olup güneş enerjisinden faydalanabilmek için ekonomik bir sistem tasarımı gerçekleştirilmiştir. TRNSYS simülasyon programı ile Ankara ili şartlarında PV sisteminin bir yıllık elektrik üretim değerleri elde edilmiştir.

İki farklı ışık kaynağı olan CFL ve LED lambaların etkinlik faktörü ve kullanım ömürleri Tablo 1'de verilmiştir. Her iki lamba için de etkinlik faktörü ve ekonomik ömür değerlerinin ortalamaları alınmıştır.

Tablo 1. CFL ve LED lambaların karşılaştırılması

Işık kaynağı	Etkinlik faktörü [Lm/W]	Ekonomik ömür (saat)
Kompakt floresan lamba CFL)	40-65	6.000-12.000
LED lamba	80-160	25.000-100.000

İki farklı ışık kaynağı olan CFL ve LED lambaların aydınlatacağı iç hacimlerin alanları ve aydınlık düzeyi (lux) ihtiyacına göre lambaların tüketim değerleri Tablo 2’de verilmiştir. Tabloda CFL ve LED lambaların mekandaki iç hacimlerin kullanım amacına göre lux değerleri belirlenmiş ve bu aydınlatma değerlerini sağlayacak lambalar seçilmiştir. Günlük ortalama 5 saat tüketim değerine göre CFL ve LED lambaların günlük tüketim değerleri sırası ile 1440 ve 615 W olarak hesaplanmıştır. CFL ve LED lambaların arasındaki günlük tüketim farkı 825 W olarak bulunmuştur. CFL lambalar yapılan hesaplamalara göre 5 yıl LED lambaların ise 33 yılda bir değiştirilmesi gerekmektedir. LED lambaların ilk yatırım maliyetleri CFL lambalardan daha yüksektir fakat elektrik tüketimleri daha az ve kullanım süreleri daha uzundur.

Tablo 2. Konutun aydınlatma ihtiyacının belirlenmesi ve lambaların tüketim değerleri

Aydınlatılacak Mekân	Alan (M ²)	Lux	Lümen	LED (W)	CFL (W)
Salon	20	100	2000	17	40
Oturma odası	21	100	2000	17	40
Yatak odası	16	100	1500	13	30
Çocuk odası	8	300	2400	20	48
Mutfak	8	200	1600	14	32
Giriş	23	100	2200	19	44
Banyo	6	300	1800	15	36
WC	3	100	300	3	6
WC giriş	2	300	600	5	12
Toplam	107	1600	14400	123	288

LED lambalar ile aydınlatılacak konutun elektrik ihtiyacının PV panellerden elde edilmesi için gerekli hesaplamalar yapılarak sistemin kapasitesi belirlenmiştir.

PV panelden elde edilecek maksimum güç (P_{max}) aşağıdaki Eşitlik 1’de hesaplanmıştır.

$$P_{max} = DF \cdot V_{OC} \cdot I_{SC} = I_{mp} \cdot V_{mp} \quad (1)$$

Burada DF doldurma faktörü, V_{OC} açık devre voltajı (V), I_{SC} kısa devre akımı (A), I_{mp} maksimum akım (A) ve V_{mp} maksimum voltaj (V) olarak ifade edilmektedir.

PV sisteminden yıllık elde edilecek güç (P_{yil}) için Eşitlik 2 kullanılmıştır.

$$P_{yil} = P_{kurulu} \cdot GS_{ort} \cdot 365 \quad (2)$$

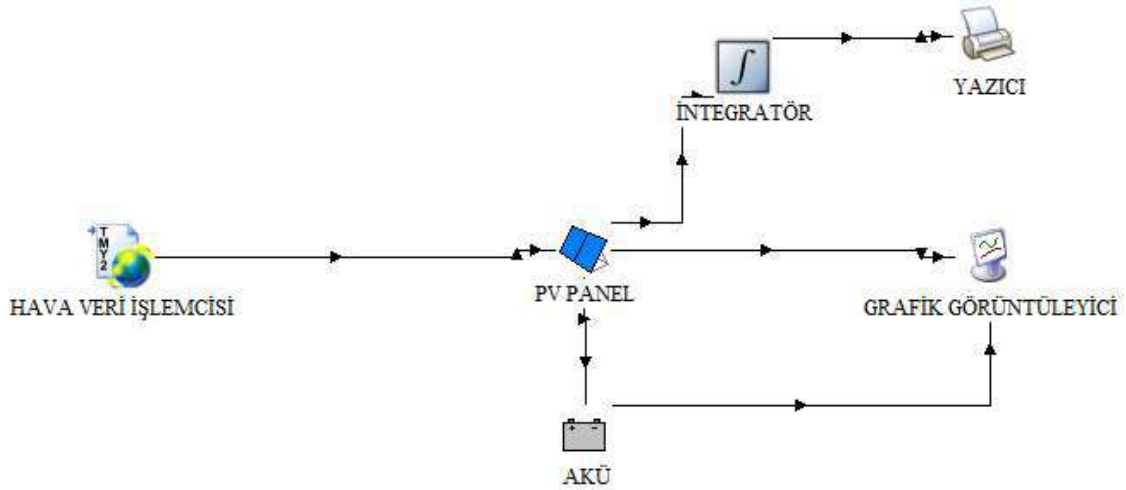
P kurulu sistemin kurulu gücü ve GS_{ort} yıllık ortalama güneşlenme süresi (saat) olarak ifade edilmektedir [13, 14].

Konutun iç aydınlatma ihtiyacı LED lambalar ile 12 V DC dağıtım sistemi ile karşılanması halinde Tablo 3’te verilen sistem bileşenlerine ihtiyaç duyulmaktadır. Tabloda sistem bileşenlerinin özellikleri ve maliyetleri verilmiştir. Sistemde bir adet 190 W PV panel, 1 adet 10 Ah şarj regülatörü, 1 adet 70 Ah jel akü ve bağlantı için solar kablo ile bağlantı elemanları kullanılmıştır. Sistemin kurulum maliyeti 2300 ₺ olarak belirlenmiştir.

Tablo 3. PV sisteminin bileşenleri ve maliyetleri

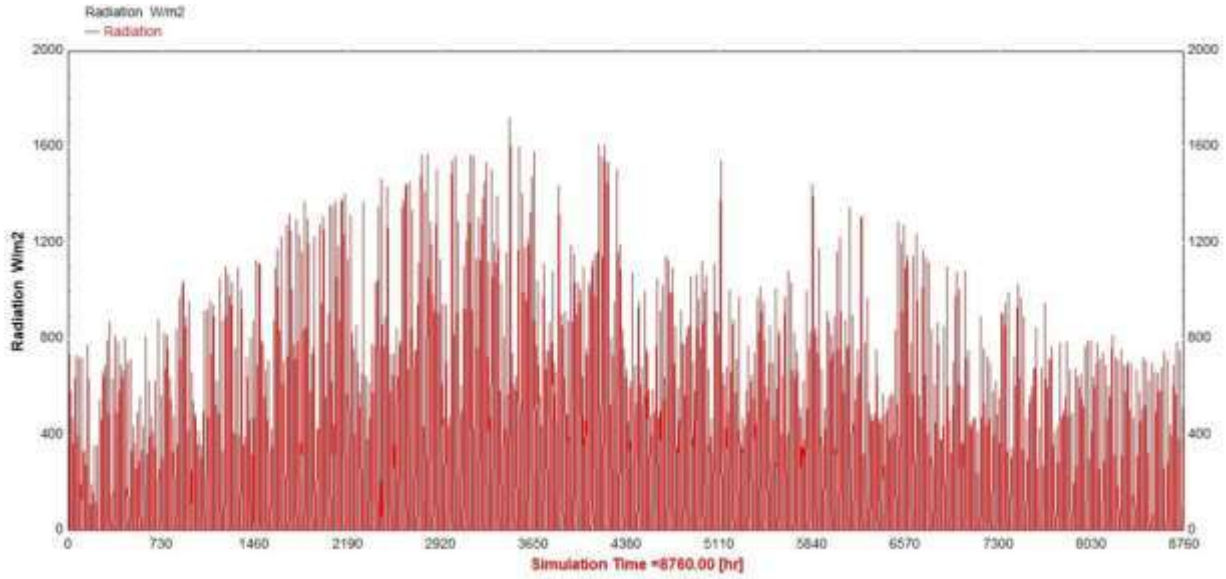
Sistem Bileşenleri	Özellikler	Adet	Maliyet (₺)
Fotovoltaik panel	190 W	1	800
Jel Akü	70 Ah	1	900
Şarj regülatörü	10 Ah	1	200
Bağlantı ekipmanı	6 mm ²	50 m	400
Toplam			2300

PV sistemi TRNSYS’de modellenerek Ankara ili şartlarında bir yıllık elektrik üretim miktarı 190 W gücünde bir panel için hesaplanmıştır. Şekil 4’te hava veri işlemcisi, PV panel, akü, integratör, yazıcı ve grafik görüntüleyici bileşenlerinden oluşan PV sisteminin TRNSYS modeli verilmiştir.



Şekil 4. PV sisteminin TRNSYS modeli

TRNSYS programı ile elde edilen Ankara ilinin bir yıllık radyasyon değeri Şekil 5’te görülmektedir. Yaz aylarında radyasyon değeri artarken kış aylarında azalmaktadır.



Şekil 5. Ankara ili bir yıllık güneş radyasyon değeri

TRNSYS programı kullanılarak Ankara ili şartlarında PV sisteminin bir yıllık elde edilen elektrik üretim değerleri aylara göre Tablo 4’de verilmiştir. Temmuz ayı en yüksek elektrik üretim değerine sahip olup 49.863 kW, ocak ayı en düşük elektrik üretim değerine sahip olup 11.461 kW olarak bulunmuştur. DC dağıtım sistemine sahip LED aydınlatmanın yıllık ihtiyacı olan 135 kW elektrik tüketim değerine karşılık PV sistem 367.402 kW elektrik enerjisi üretmiştir.

İlkbahar, yaz ve sonbahar aylarında elektrik üretimi elektrik tüketimin üstündedir. Güneş ışınımı yüksek olması nedeniyle aydınlatmada tüketilen elektrik enerjisi, sistemden karşılanabilmektedir. Çalışmamızda PV panel boyutu ilk bahar ortalaması ışınım değerlerine göre seçilmesinden dolayı, yaz aylarındaki yüksek ışınım ve uzun güneşlenme süreleri ile fazladan elektrik enerjisi üretilmektedir. Kış aylarında ise ışınım oranlarına bağlı elektrik üretimi azalmakta ve bu nedenle tüketim üretimi geçmektedir. Bu durumun sebebi kış aylarında düşük ışınım ve güneşlenme süresine bağlı oluşan kayıplardır. Çözüm olarak PV panel gücü artırılabilir fakat bu durum sistem maliyetini arttırmaktadır. Ayrıca panel boyutlarını büyütmeden, DC sistemde şarj koruma devreye girdiğinde; otomatik olarak sistem şebekeden beslenecektir ve düşük maliyetle bu soruna çözüm olunacaktır.

Tablo 4. PV sistemin Ankara iline göre aylık üretilen elektrik değerleri

Aylar	Üretilen Elektrik (kW)
Ocak	11.461
Şubat	16.824
Mart	23.620
Nisan	34.096
Mayıs	39.661
Haziran	45.721
Temmuz	49.863
Ağustos	44.958
Eylül	34.108
Ekim	25.087
Kasım	17.645
Aralık	12.896
Toplam	367.402

CFL yerine LED lamba kullanılması durumunda yıllık 180.7 kg CO₂ salınımı azalacaktır. Sistemin tamamen PV panellerden karşılanması durumunda 315 kg CO₂ salınımı engellenmiş olacaktır. Bu miktarlar Türkiye’de bulunana tüm konutlar için düşünüldüğünde çevreye olan olumlu etkisi açısından oldukça büyük öneme sahiptir.

3. SONUÇLAR

Ankara ili şartlarında bulunan brüt 120 m² net 107 m² kullanım alanına sahip bir konutun aydınlatma ihtiyacının CFL ve LED lambaya göre tüketim değerleri hesaplanmıştır. Kompakt floresan lambalar aydınlatma için gerekli elektrik enerjisini şebekeden çekmektedir. LED lambalar ise gerekli elektrik enerjisini şebekeden bağımsız 190 W PV panelden karşılamaktadır.

- Aydınlatma için kompakt floresan lamba yerine LED lambaların kullanımı ile yıllık 301.12 kW elektrik enerjisi tasarruf edilirken 180.7 kg CO₂ salınımı azalmıştır. Sistemin tamamen PV panellerden karşılanması durumunda ise yıllık 315 kg CO₂ salınımı azalacaktır.
- CFL ve LED lambaların günlük tüketim değerleri sırası ile 1440 ve 615 W olarak hesaplanmıştır. CFL lambalar 5 yıl LED lambaların ise 33 yılda bir değiştirilmesi gerekmektedir. LED lambaların ilk yatırım maliyetleri yüksektir fakat elektrik tüketimlerinin düşük olması ve uzun kullanım süreleri CFL lambalardan daha ekonomik ve avantajlı olmalarını sağlamaktadır.
- PV panellerden üretilen elektrik miktarı temmuz ayında en yüksek 49.863 kW, ocak ayında en düşük 11.461 kW olarak bulunmuştur.
- LED lambaların kullanım ömrünün uzun olması ve DC sistemin minimum güçte kurulması nedeniyle, şebekeye bağlı kompakt floresan lamba sistemine göre geri ödeme süresi ekonomik olarak daha avantajlıdır.
- 12 V ile dağıtımın yapılması konutlarda aydınlatma sistemi kaynaklı güvenlik sorunlarını azaltacaktır.
- PV sistem, konutun tüm ihtiyaçları düşünülerek yüksek güçte tasarlanarak kurulum yapıldığında çıkan maliyetin ekonomik olarak avantajlı olmamasından dolayı tercih edilmemektedir. Konutlarda sadece iç aydınlatma ihtiyacının PV sistemden karşılanması ile düşük maliyet çıkacaktır ve sistemin yaygınlaşmasına olanak sağlayacaktır. PV sistemden konut başına sağlanan yarar tüm konutlarda uygulanması halinde yıllık PV elektrik üretimini artıracak ve enterkonnekte sistem üzerinde olumlu etkiler görülecektir. Ayrıca konutlarda aydınlatma ihtiyacının PV sistem ile karşılanması konut kullanıcılarının çevreye daha duyarlı olmasını ve tasarruf bilincinin oluşmasına katkı sağlayacaktır.

4. ÖNERİLER

- Yüksek verimli PV sistemler ile konutlarda ve işyerlerinde DC dağıtım ile aydınlatma ihtiyacı karşılanabilir.
- Aydınlatma ihtiyacının gün ışığından maksimum düzeyde karşılanması için akıllı sistemler tasarlanabilir.
- PV ve aydınlatma sistemlerinin optimizasyonu yapılarak daha etkin kullanımı sağlanabilir.
- Daha verimli ve uzun ömürlü LED lambaların geliştirilmesi PV sistem maliyetini azaltacaktır.

KAYNAKÇA

1. Sudhakar Babu, T., K. Sangeetha, and N. Rajasekar, *Voltage band based improved particle swarm optimization technique for maximum power point tracking in solar photovoltaic system*. Journal of Renewable and Sustainable Energy, 2016. **8**(1).
2. Li, D.H.W., T.N.T. Lam, and K.L. Cheung, *Energy and cost studies of semi-transparent photovoltaic skylight*. Energy Conversion and Management, 2009. **50**(8): p. 1981-1990.
3. Bahçeci, S. and F. Daldaban, *Konutlarda PV ve Enerji Depolama Sistemiyle Talep Yönetiminin Ekonomik Analizi*. El-Cezeri Fen ve Mühendislik Dergisi, 2020. **7**(1): p. 67-78.
4. Hoseinzadeh, P., et al., *Energy performance of building integrated photovoltaic high-rise building: Case study, Tehran, Iran*. Energy and Buildings, 2021. **235**.
5. Mavromatidis, G., K. Orehounig, and J. Carmeliet, *Evaluation of photovoltaic integration potential in a village*. Solar Energy, 2015. **121**: p. 152-168.
6. Isen, E. and A.F. Bakan, *Highly efficient three-phase grid-connected parallel inverter system*. Journal of Modern Power Systems and Clean Energy, 2018. **6**(5): p. 1079-1089.
7. Gelen, A. and M. Ayık, *Gerçek bir PV Sistem için Akü Şarj Devresi Tasarımı*. International Journal of Multidisciplinary Studies and Innovative Technologies, 2019. **3**(2): p. 196-198.
8. Lokeshreddy, M., et al., *Comparative study on charge controller techniques for solar PV system*. Energy Procedia, 2017. **117**: p. 1070-1077.
9. Kayabaşı, R., *Fotovoltaik modüllerde yüzey sıcaklığının modül verimliliğine etkisi*. Artıbilim: Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi Fen Bilimleri Dergisi, 2021. **4**(1): p. 1-13.
10. İşler, Y.S. and M. Salihmuhsin, *Şebekeden Bağımsız PV Sistemin TRNSYS ile Gerçek Zamanlı Modellenmesi* Kahramanmaraş Sutcu Imam University Journal of Engineering Sciences, 2018. **21**(1): p. 66-76.
11. Doulos, L.T., et al., *Minimizing energy consumption for artificial lighting in a typical classroom of a Hellenic public school aiming for near Zero Energy Building using LED DC luminaires and daylight harvesting systems*. Energy and Buildings, 2019. **194**: p. 201-217.
12. *Elektrik piyasası sektör raporu konutlarda elektrik tüketimi dağılımı*. 2021.
13. Sümengen, Ö. and A.K. Yener, *Konutlarda lamba seçiminin enerji performansı açısından değerlendirilmesi*. TMMOB VII. Ulusal Aydınlatma Sempozyumu ve Sergisi, 2015. **21 - 24 Kasım**: p. 12-9.
14. *Directive on Energy Performance of Buildings*. Official Journal of the European Communities, 2002. **91. Brüksel**.
15. *Türkiye güneş enerjisi potansiyel atlası*, <https://gepa.enerji.gov.tr/MyCalculator/pages/6.aspx>. 2021.
16. Öztürk, H.H. and H.K. Küçükerdem, *Güneş enerjisinden fotovoltaik yöntemle elektrik üretiminde güç dönüşüm verimi ve etkili etmenler*. 2018: Bassin.

COVID-19 PANDEMİSİNİN SAĞLIĞA ETKİLERİNİ DERİNLEŞTİREN BİR FAKTÖR OLARAK SOSYAL SAVUNMASIZLIK

THE SOCIAL VULNERABILITY AS A DEEPENING FACTOR OF COVID-19'S IMPACTS ON HEALTH

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ÖZET

Sosyal açıdan savunmasız toplumlar; beslenme, barınma, eğitim, sağlık gibi birçok hizmete erişim açısından risk altındadır. Ayrıca kriz durumu yaratan afetler ve salgın hastalıklar; sosyal savunmasızlığın toplum üzerindeki olumsuz etkilerini daha da derinleştirmektedir. Hastalık ve ölüm oranları gibi değişkenler açısından durum incelendiğinde, sosyal savunmasızlığın sağlık üzerindeki etkilerinin mücadele edilmesi gereken önemli zorluklar doğurduğu söylenebilir. Bu derlemede sosyal savunmasızlık durumu ile; COVID-19 hastalığına yakalanma, koruyucu önlemlere uyma, aşılama ve ölüm arasındaki ilişkinin açıklanması amaçlanmıştır.

Anahtar kelimeler: COVID-19, Pandemi, Sağlık Durumu, Sağlığın Sosyal Belirleyicileri

ABSTRACT

Socially vulnerable societies; are at risk in terms of nutrition, shelter, education, health and access to many services. In addition, disasters and epidemics that create a crisis situation; further deepens the negative effects of social vulnerability on society. When the situation is examined in terms of variables such as morbidity and mortality rates, it can be said that the effects of social vulnerability on health pose significant challenges that need to be tackled. In this review; It is aimed to explain the relationship between social vulnerability and contracting COVID-19 disease, complying with protective measures, vaccination and death.

Keywords: COVID-19, Health Status, Pandemics, Social Determinants of Health

GİRİŞ

COVID-19 pandemisi, 2020 yılının başından bu yana devam eden önemli bir halk sağlığı krizidir. Dünya Sağlık Örgütü (DSÖ) tüm dünyada bugüne kadar yaklaşık 250 milyonu aşkın insanın COVID-19 hastalığına yakalandığını, 5 milyondan fazla insanın ise hayatını kaybettiğini bildirmiştir (WHO, 2021). Küresel düzeyde etkili olan pandeminin zaman içerisinde sadece tıbbî bir sorun olarak değerlendirilemeyeceği, aynı zamanda sosyal ve

ekonomik sonuçları olan bir sağlık krizi olduğu da görülmüştür (Banerjee & Bhattacharya, 2021). Pandemilerin her zaman toplumun fay hatlarını takip ettiği ve normal koşullarda bile toplum sağlığını şekillendiren eşitsizlikleri açığa çıkardığı ve çoğu zaman derinleştirdiği bilinmektedir (Wade, 2020). Pandeminin biyolojik etkisinin dışında yarattığı sosyal ve ekonomik sorunlar; toplumun sağlık sorunlarına ve sosyal problemlere karşı daha kırılgan olmasına ve savunmasız hale gelmesine yol açabilmektedir.

Savunmasızlık; çevresel ve sosyal değişikliklerle ilişkili stresörlere maruziyet açısından daha çok risk taşıma ve bu stresörlere uyum sağlayamama durumu şeklinde tanımlanmaktadır (Adger, 2006). Sosyal savunmasızlık, COVID-19 gibi sosyal ve toplumsal sonuçları olan sağlık krizlerinin ya da afetlerin yarattığı sağlık eşitsizliklerini açıklayan bir kavramdır (Kim & Bostwick, 2020). Toplumda sosyal savunmasızlığın belirleyicileri; sosyoekonomik durum, demografik özellikler, konut ve hijyen olanakları, epidemiyolojik göstergeler ve sağlık hizmeti olanakları ile ilişkili göstergelere dayanarak belirlenmektedir (Acharya & Porwal, 2020). Sosyal savunmasızlık, sadece riske maruziyeti belirleyen değil, aynı zamanda toplumun tehlike ve afetlere yanıt verme, başa çıkma ve iyileşme yeteneğini etkileyen sosyal, ekonomik, demografik ve coğrafi özellikleri de ifade etmektedir (Kim & Bostwick, 2020). Bu nedenle COVID-19 gibi sağlık krizlerine yanıt vermede, sosyal savunmasızlık kavramının anlaşılması önem arz etmektedir. Ayrıca, sosyal savunmasızlığın; mevcut ve gelecekteki pandemilere hazırlıklı olma ve pandeminin yarattığı sorunların telafi edilmesini engelleyen faktörleri belirlemeyi kolaylaştırdığı için ele alınması gereken bir kavram olduğu ifade edilmektedir (Kashem vd., 2021).

Tüm dünyada COVID-19 virüsü sosyal savunmasız bireyleri eşitsiz biçimde ve daha ciddi derece etkilemiştir ve etkilemeye de devam etmektedir. Bireylerin ve ailelerin savunmasızlığını artıran koşulların düzeltilmemesi nedeniyle COVID-19 pandemisi sona erse bile virüsün savunmasız bireyler arasında endemik halde devam etmesine yol açabileceği vurgulanmaktadır (Nayak vd., 2020). Birey, aile ve toplumun sosyal açıdan savunmasız oluşu; COVID-19 virüsü ile enfekte olması, COVID-19 bulaşından koruyucu önlemlere uymama davranışı, COVID-19 aşısının olunamaması ve COVID-19 nedeniyle gerçekleşen ölüm oranlarını da etkileyebilmektedir.

Bu derlemenin amacı; sosyal savunmasızlık durumu ile COVID-19 hastalığına yakalanma, koruyucu önlemlere uyma, aşılama ve ölüm arasındaki ilişkiyi açıklamaktır.

SOSYAL SAVUNMASIZLIK VE COVID-19 HASTALIĞI İLE ENFEKTE OLMA

Pandemi sürecinde tüm dünyanın en çok üstünde durduğu ve endişelerin kaynağı haline gelen konu; virüsün özellikleri ve virüsle enfekte olma sürecidir. Literatürde, bireyin savunmasız oluşunun COVID-19 virüsü ile enfekte olmayı kolaylaştıran en önemli faktörlerden biri olduğu vurgulanmıştır. Sosyal savunmasızlığın beraberinde getirdiği; kötü konut koşulları, kötü beslenme, kalabalık hanede yaşama, düşük hane halkı geliri ve başka hastalık ya da sakatlıkların da bulunmasının, COVID-19 ile enfekte olma ihtimalini artırdığı belirlenmiştir (Banerjee & Bhattacharya, 2021). Yapılan bir çalışmaya göre odaların birden fazla kişi tarafından kullanılması, park ve bahçe gibi açık alana erişimin ve mahallede yürüyebilme olanağının olmamasının, hane halkının kalabalık olmasının, internet erişiminin yetersiz olmasının COVID-19 bulaşı ile ilişkili olduğu bildirilmiştir (Kashem vd., 2021). COVID-19 ile enfekte olma açısından kırsal ve kentsel alanda farklılıklar olduğu vurgulanmıştır. Buna göre kentsel alanda; yoksulluk, işsizlik, kalabalık hanede yaşama ve ulaşım araçlarına erişememe durumu yüksek oranda COVID-19 hastalığına yakalanma ve ölüm oranı ile ilişkili iken kırsal alanda; azınlık olmak ve konuşulan dilin farklı olması COVID-19 vaka sayısını daha yakından etkileyen etmenlerden biri olarak kabul edilmektedir (Khazanchi & Beiter, 2020). Başka bir çalışmada;

düşük eğitim düzeyi ve hizmet sektöründe çalışıyor olma, yüksek COVID-19 bulaşı ile ilişkili bulunmuştur (Kashem vd., 2021). Sosyal savunmasızlık açısından riskli grupların sadece COVID-19 hastalığına yakalanma oranlarının artışı ile değil aynı zamanda sağlık hizmetlerine erişemedikleri için mevcut hastalıklarının derinleşmesi sorunu ile karşı karşıya kaldığı belirlenmiştir (Singh vd., 2021). Ayrıca sosyal savunmasızlığın COVID-19 hakkında bilgiye ve COVID-19 testine erişimi zorlaştırdığı ve sosyal savunmasızlığın yetersiz test imkânı ve tarama ile birleşince bu gruplarda hastalanma ve ölme riskini artırdığı bildirilmiştir (Banerjee & Bhattacharya, 2021).

SOSYAL SAVUNMASIZLIK VE COVID-19’DA KORUYUCU ÖNLEMLERE UYMA

Pandemi sürecinde COVID-19 bulaşından korunmak için alınması gereken tedbirler; sosyal mesafe, kalabalık ortamlardan kaçınma, el yıkama ve hijyen olarak önerilmiştir (WHO, 2021a). Ancak sosyoekonomik bazı unsurlar bireylerin COVID-19 önlemlerine uymalarını zorlaştırmıştır. Yapılan bir çalışmada; evsizliğin COVID-19 bulaş önlemi olarak tarif edilen sosyal mesafe, el yıkama, hijyen önlemlerini almak için ciddi bir engel olduğu ve eve kapanma önerisine uymanın evsiz insanlar için imkansız olduğu bildirilmiştir (Banerjee & Bhattacharya, 2021). Ayrıca pandemi sürecinde ağırlaşan ekonomik sorunlar, gıdaya erişememe ve işsizlik nedeniyle; bireylerin COVID-19 önlemlerine uymayı ihmal ettikleri bildirilmiştir (Banerjee & Bhattacharya, 2021). Çin’de, bulaş önlemlerine uyumun incelendiği bir çalışmada; yüksek eğitim düzeyi ve gelire sahip hanelerin bulaş önlemlerine daha iyi uyum sağladığı; kalabalık olan, yaşlı ve kadınların olduğu hanelerde ise bulaş önlemlerine uyumun daha zayıf olduğu belirlenmiştir (Ye vd., 2021).

SOSYAL SAVUNMASIZLIK VE COVID-19 AŞISI

Sosyal savunmasızlık, COVID-19 bulaş önlemlerine uyma davranışı kadar, küresel düzeyde hastalıkla mücadelede önemli bir faktör olan COVID-19 aşısı olma durumunu da etkilemektedir. Amerika’da sosyal savunmasızlığın yüksek olduğu gruplarda COVID-19 aşısı olma oranının daha düşük olduğu belirlenmiştir. Bu çalışmaya göre; işsiz, yoksul, düşük eğitim düzeyine sahip, kalabalık hanede yaşayan, kurum, bakımevi, prefabrik ev ya da barınakta yaşayanlarda COVID-19 aşısı olma oranının %65’in altında kaldığı saptanmıştır. Ayrıca, tüm eyaletlerde tamamen aşılana bireyler olmasına rağmen, sosyal savunmasızlık durumuna bağlı olarak aşılama oranları düşük kalmıştır (Hughes vd., 2021). Amerika’da yapılan bir başka çalışmada ise; özellikle kent ya da kasaba merkezi dışında yaşayanlarda, çocuklarda, tek ebeveynli ailelerde ve engelli bireylerin olduğu hanelerde aşılama oranlarının daha düşük olduğu belirtilmiştir (Barry vd., 2021). Çarpıcı bir diğer bulgu ise; aşılama klinik testlerinde etnik azınlıkların ve yaşlıların yeterince temsil edilmediği, bulaşıcı hastalık yükü fazla olan bireylerin COVID-19 ve diğer aşılar için aşı denemelerine adil bir şekilde dahil edilmesinin gerekli olduğu bildirilmiştir (Flores vd.,2021)

SOSYAL SAVUNMASIZLIK VE COVID-19’A BAĞLI ÖLÜM

Sosyoekonomik ve toplumsal koşullar tarafından belirlenen sosyal savunmasızlık, COVID-19 virüsü ile enfekte olma ve hastalanma ihtimalini artıran bir unsur olduğu gibi COVID-19’a bağlı ölümlerle de ilişkilidir. Yapılan bir çalışmada yaş ve komorbidite dışarıda bırakıldığında, sosyal savunmasızlığın COVID-19 nedeniyle ölüm oranını %63 artırdığı belirlenmiştir (Nayak vd., 2020). Chicago’da yaşayan Afrikalı Amerikalılarda hem sosyal savunmasızlığın hem de COVID-19 ölüm oranının yüksek olduğu, sosyal savunmasızlığın COVID-19 ölüm oranını artırdığı belirlenmiştir (Kim & Bostwick, 2020). Başka bir çalışmada ise, en savunmasız gruplarda toplumun tümüne göre, COVID-19’a yakalanma oranı 4.9 kat; COVID-19’dan ölme oranı ise 4.7 kat daha fazla olduğu belirlenmiştir (Khazanchi & Beiter, 2020).

Yerleşim birimlerinin gelişmişlik düzeyi, COVID-19 ölümleri ilgili bir başka faktördür. Brezilya’da yapılan bir çalışmada belediyelerin %44.8’inin COVID-19 vakası bildirdiği ve bunlardan %14.7’sinin ölümle sonuçlandığı bildirilmiştir. COVID-19 vakası bildiren belediyelerin %56.2’sinin çok düşük insani gelişime sahip olduğu ve %52.8’inin yüksek savunmasızlığa sahip olduğu belirlenmiştir. Bu nedenle gelişmemiş, daha savunmasız ve daha küçük yerleşim yerlerinin; COVID-19 vaka ve ölüm oranı açısından daha yüksek risk taşıdığı söylenebilir (De Souza vd., 2020).

SONUÇ

Sosyal savunmasızlık durumu; birey ve toplumları hastalık, sakatlık, ölüm ve daha bir çok sağlık sorunu açısından doğrudan ve/veya dolaylı olarak etkilemektedir. Küresel bir halk sağlığı krizi olarak yaşanan COVID-19 pandemisi ise, ülkelerin eşitsizliklerle bir kez daha yüzleşmesine neden olmuştur. COVID-19 pandemisinde sosyal açıdan savunmasız bireylerin virüs ile enfekte olma, koruyucu önlemlere uymama, aşı olamama ve ölüm açısından daha büyük risk altında olduğu görülmüştür.

Sonuç olarak COVID-19 pandemisinin; küresel olarak olumsuz etkileri sürmekte iken, sosyal açıdan savunmasız toplumlarda bu durumun daha derin ve karmaşık bir şekilde yaşandığı ve yaşanmaya devam edeceği söylenebilir. Literatürde sosyal savunmasız toplumsal gruplarda pandeminin yarattığı sorunların çözümü için barınak ve yiyecek desteği, hijyenik ortam için temel kaynakların sağlanması, savunmasız gruplarda testlerin yaygınlaştırılması ve bu gruplarda ruh sağlığı desteği sunulması, sağlık sorunlarına yol açan sosyal faktörlerin ele alınması, savunmasız bölgelere pandeminin etkilerini hafifletmek ve toplumu bunun gibi krizlere hazırlıklı hale getirmek için politika üretilmesi ve bu bölgelere daha fazla kaynak ayrılması önerilmektedir. (Acharya & Porwal, 2020; Banerjee & Bhattacharya, 2021; Kashem vd., 2021). Buna göre hem yerel hem de ulusal düzeyde pandeminin halk sağlığı üzerindeki doğrudan ve dolaylı etkileri ile baş edebilmek için sosyal savunmasızlık kavramının dikkate alınması ve bununla ilgili çalışmaların yapılması önerilir.

KAYNAKLAR

- Acharya, R., Porwal, A. (2020). A vulnerability index for the management of and response to the COVID-19 epidemic in India: An Ecological Study. *Lancet Glob Health*, 8, e1142-51. doi.org/10.1016/S2214-109X(20)30300-4
- Adger, W.N. (2006). Vulnerability. *Glob. Environ. Change*, 16, 268e281.
- Banerjee, D., Bhattacharya, P. (2021). The hidden vulnerability of homelessness in the COVID-19 pandemic: Perspectives from India. *International Journal of Social Psychiatry*, 67, 3–6. doi.org/10.1177/0020764020922890
- Barry, V., Dasgupta, S., Weller, D., et al. (2021). Patterns in COVID-19 Vaccination Coverage, by Social Vulnerability and Urbanicity - United States, December 14, 2020-May 1, 2021. *MMWR. Morbidity and Mortality Weekly Report*, 70, 818–824. doi.org/10.15585/mmwr.mm7022e1
- De Souza, C.D.F., Machado, M.F., do Carmo, R.F. (2020). Human development, social vulnerability and COVID-19 in Brazil: A study of the social determinants of health. *Infectious Diseases of Poverty*, 9, 124-134. doi.org/10.1186/s40249-020-00743-x



- Flores, L.E., Frontera, W.R., Andrasik, M.P., et al. (2021). Assessment of the Inclusion of Racial/Ethnic Minority, Female, and Older Individuals in Vaccine Clinical Trials. *JAMA Network Open*, 4, e2037640. doi:10.1001/jamanetworkopen.2020.37640
- Hughes, M., Wang, A., Grossman, M., et al. (2021). County-Level COVID-19 Vaccination Coverage and Social Vulnerability-United States, *MMWR*, 70, 431-436.
- Kashem, S.B., Baker, D.M., Gonzalez, S.R., Lee, C.A. (2021). Exploring the nexus between social vulnerability, built environment, and the prevalence of COVID-19: A case study of Chicago. *Sustainable Cities and Society*, 75, 1-9. doi.org/10.1016/j.scs.2021.10326
- Khazanchi, R., Beiter, E.R. (2020). County-Level Association of Social Vulnerability with COVID-19 Cases and Deaths in the USA. *J Gen Intern Med*, 35, 2784-7. doi.org/10.1007/s11606-020-05882-3
- Kim, S.J., Bostwick, W. (2020). Social Vulnerability and Racial Inequality in COVID-19 Deaths in Chicago. *Health Education & Behavior*, 47, 509-513. doi.org/10.1177/1090198120929677
- Nayak, A., Islam, S., Mehta, A., Ko, Y., Patel, S., Goyal, A., Sullivan, S., Lewis, T., Vaccarino, V., Morris, A., Quyyumi, A. (2020). Impact of Social Vulnerability on COVID-19 Incidence and Outcomes in the United States. medRxiv, doi.org/10.1101/2020.04.10.20060962).
- Singh, K., Kondal, D., Mohan, S. et al. (2021). Health, psychosocial, and economic impacts of the COVID-19 pandemic on people with chronic conditions in India: a mixed methods study. *BMC Public Health*, 21, 685. doi.org/10.1186/s12889-021-10708-w
- Wade, L. (2020). An unequal blow. *Science*, 368, 700–703.
- World Health Organization (2021a). Web sayfası. Erişim: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public> Erişim tarihi: 12.11.2021
- World Health Organization (2021). Web sayfası. Erişim: <https://covid19.who.int/> Erişim tarihi: 12.11.2021
- Ye, Y., Wu, R., Ge, Y. et al. (2021). Preventive behaviours and family inequalities during the COVID-19 pandemic: a cross-sectional study in China. *Infect Dis Poverty*, 10, 100. doi.org/10.1186/s40249-021-00884-7

**Be(BH₄)₂ BİLEŞİĞİNİN HİDROJEN DEPOLAMA VE FİZİKSEL
ÖZELLİKLERİNİN TEORİK OLARAK İNCELENMESİ**

**THEORETICAL INVESTIGATION OF HYDROGEN STORAGE AND PHYSICAL
PROPERTIES OF Be(BH₄)₂**

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ABSTRACT

In this study, Be(BH₄)₂ (GHD is calculated as ~20.84 wt%) compound in the Fd-3m space group was investigated. The hydrogen storage, structural, electronic and mechanical properties of this hydride compound were calculated using a generalized gradient approach based on density functional theory. The atomic positions in equilibrium and the lattice constant were obtained within the scope of structural properties. Electronic band structures, total and partial state densities were calculated and plotted. Within the scope of mechanical properties, second order elastic constants, Bulk modulus, Young's modulus, Shear modulus, B/G ratio and Poisson's ratio of this hydride compound were obtained.

Keywords: Hydride, Electronic structure, Density Functional Theory

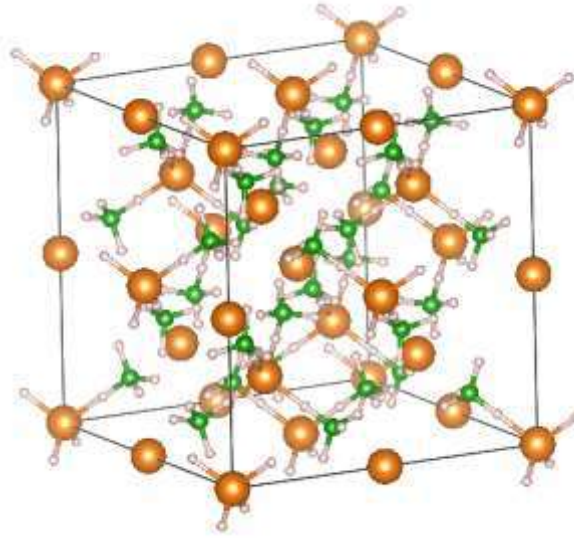
ÖZET

Bu çalışmada Fd-3m uzay grubundaki Be(BH₄)₂ (GHD is calculated as ~20.84 wt%) bileşiği araştırıldı. Bu hidrit bileşiğin hidrojen depolama, yapısal, elektronik ve mekanik özellikleri yoğunluk fonksiyonel teorisine dayalı genelleştirilmiş gradient yaklaşımı ile hesaplandı. Yapısal özellikler kapsamında denge durumundaki atomik pozisyonlar ve örgü sabiti elde edildi. Elektronik bant yapıları, toplam ve kısmi durum yoğunlukları hesaplandı ve çizildi. Mekanik özellikler kapsamında bu hidrit bileşiğin ikinci mertebeden elastik sabitleri, Bulk modülü, Young modülü, Shear modülü, B/G oranı ve Poisson oranı elde edildi.

Anahtar Kelime: Hidrit, Elektronik yapı, Yoğunluk Fonksiyonel Teorisi,

GİRİŞ

Berilyum Borohidrit genellikle çoğu ciltte hemen mevcuttur. Berilyum Borohidrit, son derece yüksek bir toplam hidrojen depolama kapasitesine sahiptir. Orijinal olarak, Be(BH₄)₂, BeMe₂'nin diboran ile reaksiyonu ve daha uygun olarak, BeCl₂'nin alkali metal borohidritler ile mekanokimyasal değişim tepkisi ve ardından 140 °C'de vakum damıtma yoluyla hazırlanmıştır. Berilyum Borohidrit çok kararsızdır, hava ve nem ile temas ettiğinde patlar. Ne yazık ki berilyumun yoğun toksisitesi ve Be(BH₄)₂'nin çok yüksek reaktivitesi, bu malzemeyi düşük bozunma sıcaklığına ve yüksek frekansa rağmen hidrojen depolaması için uygunsuz hale getirir [1].



Şekil 1. Be(BH₄)₂ Bileşiğinin Kristal Yapısı

Hidrojen, yüksek yanma ısısı ve temiz yanması nedeniyle çok umut verici bir enerji taşıyıcısı olarak kabul edilir. Hidrojen depolaması, özellikle normal koşullar altında yüksek kapasiteli bir depolama ve hidrojen enerjisinin kullanımı için anahtar bir elementtir. Bu nedenle, hidrojeni verimli bir şekilde emebilen (absorbe edebilen) bir malzeme geliştirmek önemlidir. Farklı malzeme türleri arasında metal/intermetalik hidrit depolama malzemeleri umut verici adaylar olarak görülmektedir [2-4].

YÖNTEM

Bu çalışmada hesaplamaları yürütmek için yoğunluk fonksiyonel teorisi kullanıldı [5-6]. Minimum enerji, denge hacimleri ve yapısal özellikleri hesaplamak için Quantum-Espresso yazılım paketi kullanıldı[7]. Değişim korelasyon potansiyeli için Perdew-Burke-Ernzerhof, genelleştirilmiş gradyan yaklaşımı (PBE-GGA) kullanıldı [8]. Tüm elementlerin psödopotansiyelleri Rappe grubundan alınmıştır [9]. Brillouin bölge entegrasyonu, $8 \times 8 \times 8$ k-noktalı ağ kullanılarak gerçekleştirildi. Elektronik dalga fonksiyonlarının açılımı için kesme enerjisi 40 Ry alınmıştır. Elektronik yük yoğunluğunun değerlendirilmesi için kinetik enerji 400 Ry'ye ayarlandı. 0,02 Ry bulaşma parametresi ile Fermi seviyesine kadar entegrasyon gerçekleştirmek için Methfessel-Paxton bulaşma yöntemi benimsenmiştir [10]. Kafes dinamik hesaplamaları, yoğunluk fonksiyonel pertürbasyon teorisi (DFPT) kullanılarak yapılmıştır [11-12]. Malzemelerin elastik sabitleri, stres-sonlu gerinim tekniği kullanılarak bozulmuş ve bozulmamış kafes hücresi arasındaki enerji farkından elde edildi. Elastik sabitleri elde etmek için kullanılan denklemler aşağıda verilmiştir.

SONUÇ, TARTIŞMA

Elastik sabitler, bir maddenin önemli parametreleridir ve genellikle yapısal kararlılık hakkında değerli bilgiler sağlar. Bir kübik sistem için birbirinden bağımsız üç tane elastik sabiti (C_{11} , C_{12} , C_{44}) vardır.

Tablo 1. Be(BH₄)₂ bileşiği için hesaplanan elastik sabitler

Materials	Referans	<i>a</i>	C ₁₁	C ₁₂	C ₄₄
Be(BH ₄) ₂	This work	11.227	184.37	-2.82	-411.21

Malzemelerin elastik parametreleri, stabilite, anizotropik davranış, iç kuvvetler, süneklik ve kırılabilirlik gibi bileşiklerin mekanik özelliklerini anlamak için çok önemlidir [13]. Bir malzemenin elastik sabitleri (C_{ij}), dışarıdan uygulanan bir kuvvete karşı tepkisini tanımlar. Malzemenin deformasyona karşı kabiliyetini gösterir. Kübik sistem için üç bağımsız elastik sabit vardır; Tablo 1'de sunulan C₁₁, C₁₂ ve C₄₄.

C₁₁, aksenal sıkıştırmayı temsil eder, C₁₂ ve C₄₄, sırasıyla, kesme modülünü ve sıkıştırmada genişlemeyi temsil eder. Bu sabitler, bir malzemenin mekanik kararlılığını şu şekilde tanımlar:[14]

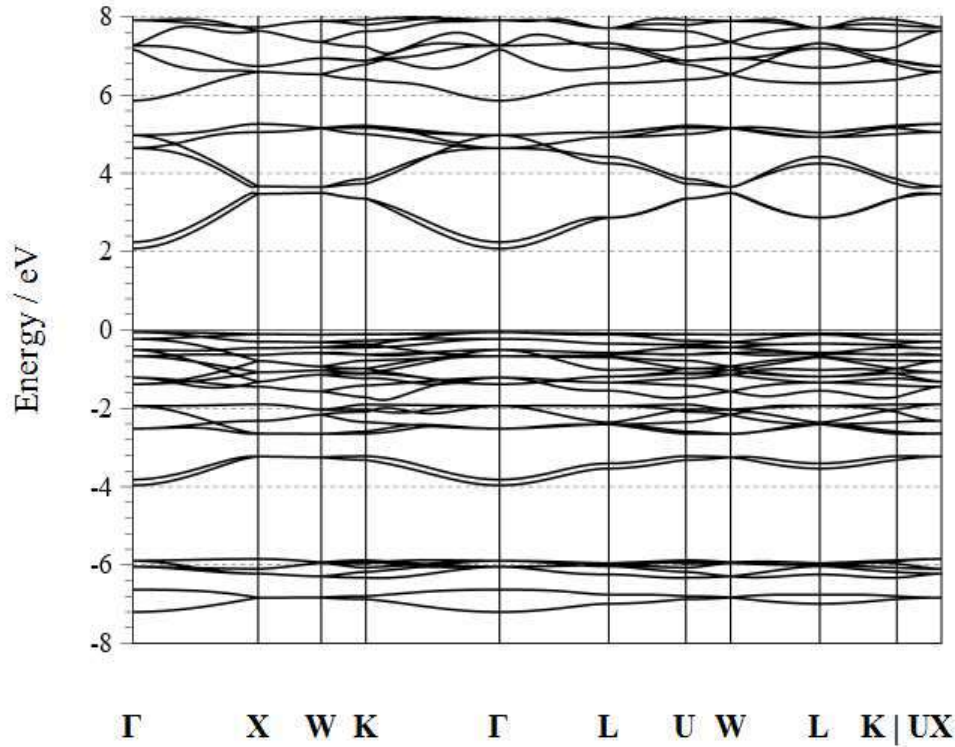
Born kararlılık kriteri;

$$C_{11}>0, C_{44}>0, C_{11}+2C_{12}>0, C_{11}-C_{12}>0 \text{ şeklindedir.}$$

Tablo 2. Be(BH₄)₂ bileşiği için hesaplanan elastik sabitler

Materials	Referans	B	G	E	B/G	σ
Be(BH ₄) ₂	This work	5.957	7.30	201.4	0.816	12.79

Tablo 2'de elastik özellikleri incelendiğinde; C₁₁, C₁₂ ve C₄₄ değerlerinin born kararlılık kriterlerini sağlamadığı çıkan negatif değerlerden anlaşılmaktadır. Dolayısıyla bu malzemenin incelenen F-d3m yapısı için mekanik olarak kararsız olduğu söylenebilir. Yine elastik sabiti değerlerinden yararlanarak elde edilen Bulk, Young, Shear modülü, hesaplanmış ve tabloda verilmiştir. B/G oranından bu malzemenin yapısının kırılabilir olduğu 1.75 değerinden küçük olmasından anlaşılmaktadır. Ayrıca poisson oranının 5 sınır değerinden çok yüksek çıkması ise atomlar arasındaki bağlanmanın olmadığını göstermektedir. Dolayısıyla bu malzemenin F-d3m yapısında mekanik olarak kararsız olduğu bu sonuçlardanda anlaşılmaktadır.



Şekil 2. Be(BH₄)₂ elektronik bant yapısı

Şekil 2’de Be(BH₄)₂ ‘nin çizilen elektronik bant eğrilerinden görüldüğü üzere Fermi Enerji seviyesinin hemen altında iletkenlik ve valans bantları arasında bir yasak enerji aralığı görülmektedir. Bu yasak enerji aralığı düzeyi ise 3.814 eV olarak hesaplanmıştır. Bundan dolayı bu malzemenin F-d_{3m} yapısı için yarı iletken olduğu söylenebilir. Ayrıca valans bandının maximumu ile iletkenlik bandının minimumu Gamma noktası üzerine denk gelmekte olduğundan direkt bant geçişine sahip olduğu şekilden açık bir şekilde görülmektedir. Dolayısıyla Be(BH₄)₂ için direk geçişli yarıiletken olduğunu söylemek mümkündür.

SONUÇLAR

Sonuç olarak F-d_{3m} yapısı incelenen bu malzemenin direkt geçişli bir yarıiletken olduğu görülmüştür. Ayrıca elastik sabitlerinden ise mekanik olarak kararsız olduğu sonucuna varılmıştır. Hidrojen oranı yüksek olmasına rağmen elastik (mekanik) özelliklerinden dolayı hidrojen depolama malzemesi olarak F-3dm yapısı için uygun bir malzeme değildir.

KAYNAKLAR

- [1]. <https://www.americanelements.com/beryllium-borohydride-17440-85-6>
- [2]. Sakintuna B, Lamari-Darkrim F, Hirscher M. Metal hydride materials for solid hydrogen storage: a review. *Int J Hydrogen Energy*. 2007;32(9):1121.
- [3]. Li X, Zhang YH, Yang T, Xu JY, Zhao DL. Hydriding/dehydriding properties of NdMgNi alloy with catalyst CeO₂. *J Rare Earths*. 2016;34(4):407.
- [4]. Sahli I, Ghodbane O, Abdellaoui M. Electrochemical hydrogenation of CeZr₂Cr₄Ni₅based alloys. *Mater Res Bull*. 2017;85:10.



- [5]. P. Hohenberg, W. Kohn, Inhomogeneous Electron Gas, *Phys. Rev.* 136 (3B) (1964) B864–B871.
- [6]. W. Kohn, L.J. Sham, Self-consistent equations including exchange and correlation effects, *Phys. Rev.* 140 (4A) (1965) A1133–A1138.
- [7]. G. Paolo, et al., Quantum Espresso: a modular and open-source software project for quantum simulations of materials, *J. Phys.: Condens. Matter* 21 (39) (2009) 395502.
- [8]. J.P. Perdew, K. Burke, M. Ernzerhof, Generalized Gradient Approximation Made Simple, *Phys. Rev. Lett.* 77 (18) (1996) 3865–3868.
- [9]. K.F. Garrity, et al., Pseudopotentials for high-throughput DFT calculations, *Comput. Mater. Sci.* 81 (2014) 446–452.
- [10]. M. Methfessel, A. Paxton, High-precision sampling for Brillouin-zone integration in metals, *Phys. Rev. B* 40 (6) (1989) 3616.
- [11]. S. Baroni, P. Giannozzi, A. Testa, Green's-function approach to linear response in solids, *Phys. Rev. Lett.* 58 (18) (1987) 1861–1864.
- [12]. S. Baroni, et al., Phonons and related crystal properties from density-functional perturbation theory, *Rev. Mod. Phys.* 73 (2) (2001) 515–562.
- [13]. S. Al, N. Arikan, A. Iyigor, Investigations of Structural, Elastic, Electronic and Thermodynamic Properties of X₂TiAl Alloys: A Computational Study, *Zeitschrift fur Naturforschung A* 73 (9) (2018) 859–867.
- [14]. A.H. Reshak, et al., First-principles calculations of structural, elastic, electronic, and optical properties of perovskite-type KMgH₃ crystals: novel hydrogen storage material, *J. Phys. Chem. B* 115 (12) (2011) 2836–2841.

DETERMINATION OF SOME TRACE ELEMENTS IN EWE MILK YOGHURT ANALYZED BY ICP-OES

ICP-OES İLE ANALİZ EDİLEN KOYUN YOĞURTLARINDA BAZI ESER ELEMENTLERİN BELİRLENMESİ

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ABSTRACT

Yoghurt is a fermented food that is produced owing to the bacterial activity of lactic acid bacteria in milk. Yoghurt, which has a rich content, is evaluated in many areas as a functional food. This study aims to specify the nutritional level in terms of some trace element contents of ewe milk yoghurts. The content of zinc, copper, manganese, nickel, chromium, cobalt in yoghurts purchased in bazaars in Şanlıurfa, Turkey have been identified by using inductively coupled plasma optical emission spectrometry (ICP-OES) after microwave digestion. The mean Zn, Cu, Mn, Ni, Cr, Co values in ewe milk yoghurt samples were determined as 4849.6±1392.7, 56.46±82.75, 1.19±0.06, 0.23±0.05, 0.15±0.01, 5.2 mg/kg wet weight, respectively. Daily consumption of yoghurt (112.7 g/person/day) subscribes significantly to the dietary intake of trace elements. This study showed that yoghurt consumption contributes to human health in terms of some trace elements.

Key words: Ewe, yoghurt, trace element, ICP-OES, dietary intake

ÖZET

Yoğurt, süttteki laktik asit bakterilerinin bakteri aktivitesi nedeniyle üretilen fermente bir gıdadır. Zengin bir içeriğe sahip olan yoğurt fonksiyonel bir gıda olarak pek çok alanda değerlendirilmektedir. Bu çalışma, bazı eser element içerikleri açısından koyun sütünden yapılan yoğurtların besin düzeylerini belirlemeyi amaçlamaktadır. Türkiye, Şanlıurfa'da pazarlardan satın alınan koyun sütü yoğurtlarında çinko, bakır, manganez, nikel, krom, kobalt içerikleri mikrodalgada yakma işlemi sonrası indüktif eşleştirilmiş plazma optik emisyon spektrometresi (ICP-OES) kullanılarak belirlenmiştir. Yoğurt örneklerinde ortalama Zn, Cu, Mn, Ni, Cr, Co değerleri sırasıyla 4849.6±1392.7, 56.46±82.75, 1.19±0.06, 0.23±0.05, 0.15±0.01, 5.2 mg/kg yaş ağırlık olarak belirlenmiştir. Günlük yoğurt tüketimi (112.7 g/kişi/gün), eser elementlerin diyet alınımına önemli ölçüde katkıda bulunur. Bu çalışma koyun sütünden yapılan yoğurt tüketiminin bazı eser elementler açısından insan sağlığına katkı sağladığını göstermiştir.

Anahtar kelimeler: Koyun, yoğurt, eser element, ICP-OES, diyet alımı

INTRODUCTION

Yoghurt is a fermented food that is produced owing to the bacterial activity of lactic acid bacteria in milk. It is thought that yoghurt was originally developed by nomadic Turks as a result of the natural souring and coagulation of milk stored in small ruminant overalls. Yoghurt

was introduced to the Middle East, Anatolia and Europe by the Turks in the 16th century (Baysal, 2002). Yoghurt contains a significantly high concentration of trace elements essential for the human organism (Cashman, 2006). Since most of the minerals in yoghurt are in ionic form, the bioavailability of the minerals in yoghurt is evident for the human organism (Zamberlin et al., 2012; Samaržija, 2015). Compared to cow yoghurt, ewe yoghurt has higher nutritional importance for human nutrition (Samaržija, 2015). Concentrations of essential trace elements in ewe's milk are higher than in cow's milk. Elemental content of ewe yoghurt depends on milk; vary significantly depending on factors such as diet, breed, geographical location, lactation stage, age. Therefore, ewe yoghurt is a concentrated food high in minerals, which has attracted increasing attention and led to the expansion of the dairy industry (Ljoljić et al., 2020). Since ewe milk production is seasonal, ewe milk yoghurt is scarce in the market compared to cow milk yoghurt. Production of ewe milk yoghurt is traditionally common in Turkey, Greece, Bulgaria, and the Middle East. Demand for fermented foods produced from ewe's milk has been increasing in Turkey in recent years. Many methods are used for elemental analysis in ewe milk and products. ICP-OES technique allows the determination of elements, without any modification in the sensitivity. It is attributed to extensive dynamic set, multi-element ability, large detection capacity, and reduced dependency on matrix combination do it optimal for elemental analyzes in foods (Borella et al., 1998). The objective of this study was to determine the values of some trace elements in ewe yogurt by ICP-OES.

MATERIAL AND METHOD

Collection of samples

47 yoghurt samples were collected from markets and markets that sell retail yoghurt in Şanlıurfa. Yoghurt samples brought to the laboratory in the cold chain were placed in sterile glass jars and stored at +4 °C until analysis. In this study, the method of Paksoy et al.'s study was modified and applied (Paksoy et al., 2018).

Preparation of Samples

A microwave solvent with Teflon containers (CEM Corporation, USA) was used for the combustion of trace elements (zinc, copper, manganese, nickel, chromium, cobalt). Operating conditions for microwave digestion were performed in the order presented in Table 1.

Table 1. Operating conditions for microwave digestion.

Stage	Temperature (°C)	Time (min.)	Power (Watt)
1	120	7	1600
2	150	10	1600
3	210	20	1600

For the digestion process, two ml of yoghurt samples were weighed on a precision scale and placed in the teflon container of the microwave system. It was placed in the microwave device by adding 3 mL of nitric acid (HNO₃) and 2 mL of hydrogen peroxide (H₂O₂). Yoghurt samples were thawed in the microwave with an appropriate program. Thawed samples were transferred to an unused 50 mL sterile falcon tube and diluted to 50 mL with ultrapure water.

Analysis of Samples

Trace elements (zinc, copper, manganese, nickel, chromium, cobalt) were analyzed with ICP-OES (Optima 7000 S10, Perkin Elmer, USA). Each analysis was performed in duplicate on the

ICP-OES device and the average of these two replicates was taken. A standard reading was made for every 10 samples during the analyses, and the accuracy of the instrument was maintained until the end of the analysis. The data were evaluated by calculating the limit of detection (LOD) and the limit of quantification (LOQ). Wavelengths used for the trace elements were: Zn 213.857 nm; Cu 213.598 nm; Mn 257.610 nm; Ni 230.299 nm; Cr 205.560 nm; Co 238,636 nm.

Results and Discussion

The mean values of trace elements in ewe yogurt are presented in Table 2. Zinc, chromium, manganese and nickel were found in all ewe yogurt samples. Copper was detected in 38 samples, while cobalt was found above the detection limit in only 1 sample.

Table 2. Trace element contents of ewe yoghurts

Element	Positive sample number	Minimum	Maximum	Mean±SD
Zn (µg/kg)	47	2136	8754	4849.6±1392.7
Cu (mg/kg)	38	4.48	482.2	56.46±82.75
Cr (µg/kg)	47	120	183	150.1±11.6
Mn (mg/kg)	47	1.16	1.6	1.19±0.06
Ni (mg/kg)	47	0.15	0.334	0.23±0.05
Co (µg/kg)	1	5.2	5.2	-

Zinc is an essential element for growth and the immune system. It helps the functioning of the hormone insulin, is an important co-factor for the functioning of many other hormones and many cellular enzymes important for DNA and RNA synthesis (Roohani et al., 2013). In this study, the mean Zn value in ewe yoghurt samples is 4849.6±1392.7 µg/kg. The mean value of Zn in ewe yoghurt samples is lower than the mean value of Zn (7.42±1.04 mg/kg) reported by Güler and Şanal (2009) and the mean value of Zn (72.99±21mg/kg) reported by Erkaya ve Şengül (2012) but higher than the mean value of Zn (398±30 µg/100g) reported by Ljoljić et al.(2020) in ewe yoghurt samples. Copper is an essential trace element for growth, cardiovascular system, lungs, neuro-endocrine system and iron metabolism, but at high concentrations it has toxic effects for metabolism(Singh et al., 2015; Paksoy et al., 2018). As a result of contamination, Cu can reach high levels in milk and dairy products (Özturan and Atasever, 2018). In this study, the mean Cu value in ewe yoghurt was determined as 56.46±82.75 mg/kg. The reported mean value of Cu in ewe yoghurt samples of Güler and Şanal's study (2009) was 0.61±0.21mg/kg. The value reported by the researchers for Cu is lower than the Cu average reported in this study. The possible reason for this may be the equipment used in yoghurt making. Chromium is an element responsible for stabilizing blood sugar levels in metabolism, protein and cholesterol synthesis, and supports muscle formation, delays aging, and supports against bone resorption. In its deficiency, problems in the use of glucose in the body, in parallel with this, symptoms such as anxiety, nervous disorders and weakness can be seen (Navarro-Alarcón et al. 2005). In our study, the mean Cr value in ewe yoghurt samples is 150.1±11.6 µg/kg. The reported mean value of Cr in ewe yoghurt samples in Güler and Şanal's study (2009) was 1.03±0.56 µg/kg. The mean value of Cr reported by the researchers is higher than the mean value found in this study. Manganese plays a role in many processes in the body, such as bone formation, hormone functions, blood sugar regulation, and immune system functions (Navarro-Alarcón et al. 2005). It also helps to heal wounds and absorb nutrients from the intestines. In our study, the mean Mn value in ewe yoghurt samples is 1.19±0.06 mg/kg.

The mean value of Mn in ewe yoghurt was higher than the amount of Mn found by some researchers in ewe yoghurts (Güler and Şansal, 2009; Erkaya and Şengül, 2012; Ljoljić et al., 2020). Nickel helps the body absorb the iron it needs and prevents anemia, strengthens bones and helps build a strong skeleton. It is found in high concentration especially in RNA structure as nucleic acid (Babaahmadifooladi et al., 2020). In this study, the mean Ni value in ewe yoghurt samples is 0.23 ± 0.05 mg/kg. The mean value of Ni in ewe yoghurt was lower than the amount of Ni found by some researchers in ewe yoghurts (Şanal et al., 2011; Erkaya and Şengül, 2012). Compared to other studies, the low Ni average may be due to the production process. Cobalt helps in the production of vitamin B12 and red blood cells, It protects the central nervous system, helps prevent vascular occlusion and high blood pressure, and supports the functioning of the liver and pancreas (Onasanya et al., 2020). Co was detected in only one of the ewe yoghurts analyzed in this study, and the detection value was $5.2 \mu\text{g/kg}$. Güler and Şanal (2009) reported that they found the mean value of Co in ewe yoghurt at the level of 0.38 ± 0.22 mg/kg. When compared with this result of the researchers, the value detected in a yoghurt sample in this study is lower.

CONCLUSION

The demand for ewe yoghurt, which is more preferred than milk, is increasing day by day. The data of this study showed that ewe yoghurt, which is more demanding in terms of flavor and aroma, is also a good source of essential trace elements in its content. Despite this, the limited number of studies on the chemical composition and especially element content of ewe yoghurt indicates that more studies are needed. Because this study data shows that the element content of ewe yoghurt is affected by factors such as production process and geography.

REFERENCES

- Babaahmadifooladi, M., Jacxsens, L., De Meulenaer, B., & Du Laing, G. (2020). Nickel in foods sampled on the Belgian market: identification of potential contamination sources. *Food Additives & Contaminants: Part A*, 37(4), 607-621.
- Baysal A., 2002 , “Yoğurt: Küreselleşen Türk Besini”, Türk Mutfak Kültürü Üzerine Araştırmalar, Türk Halk Kültürünü Araştırma ve Tanıtma Vakfı Yayınları Yayın No: 30. 1-8, Ankara
- Borella, P., Bargellini, A., Caselgrandi, E., Menditto, A., Patriarca, M., Taylor, A., & Vivoli, G. (1998). Selenium determination in biological matrices. *Microchemical journal*, 58(3), 325-336.
- Cashman K.D. (2006). Milk minerals (including trace elements) and bone health. *International Dairy Journal* 16: 1389-1398.
- Erkaya, T., & Şengül, M. (2012). A Comparative Study on Some Quality Properties and Mineral Contents of Yoghurts Produced From Different Type of Milks. *Kafkas Üniversitesi Veteriner Fakültesi Dergisi*, 18(2).
- Güler, Z., & Şanal, H. (2009). The essential mineral concentration of Torba yoghurts and their wheys compared with yoghurt made with cows', ewes' and goats' milks. *International Journal of Food Sciences and Nutrition*, 60(2), 153-164.



- Ljoljić, D. B., Zamberlin, Š., Špehar, I. D., Luetić, V., & Samaržija, D. (2020). The concentration of zinc, iron and manganese in the ewe's milk and yoghurt. *sa55*, 405.
- M. Singh, P. Yadav, V.K. Garg, A. Sharma, B. Singh, and H. Sharma, —Quantification of minerals and trace elements in raw caprine milk using flame atomic absorption spectrophotometry and flame photometry, *Journal of food science and technology*, 52(8), pp. 5299-5304, 2015.
- Navarro-Alarcón M., Gil-Hernandez F., Gil-Hernández A. (2005). Tratado de nutrición. Selenio, manganeso, cromo, molibdeno, yodo y otros oligoelementos minoritarios (Vol. II). Madrid: Acción Médica.
- Onasanya, G. O., Umar, M., Umar, A., & Ikeobi, C. O. N. (2020). Evaluation of lead and cobalt residues in locally processed yoghurt from native dairy cattle raised under traditional system of management. *Nigerian Journal of Animal Production*, 47(5), 84-91.
- Özturan, K., Atasever, M., (2018). Süt ve ürünlerinde mineral maddeler ve ağır metaller. *Atatürk Üniversitesi Veteriner Bilimleri Dergisi*, 13(2), 229-241.
- Paksoy, N., Altun, S. K., & Durmaz, H.(2018). Copper Concentrations Of Cow's And Sheep's Milk Collected In Harran Lowland Of Turkey. *International Journal of Scientific & Technology Research*, 7(7), 61-63.
- Roohani N., Hurrell R., Kelishadi R., Schulin R. (2013). Zinc and its importance for human health: An integrative review. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences* 18(2): 144–157.
- Samaržija D. (2015). Značenje fermentiranih mlijeka u proizvodnji i prehrani In: Bašić, Z ed. (2015) *Fermentirana mlijeka*. Zagreb: Hrvatska mljekarska udruga, 1-25.
- Şanal, H., Güler, Z., & Park, Y. W. (2011). Profiles of non-essential trace elements in ewe and goat milk and their yoghurt, torba yoghurt and whey. *Food Additives and Contaminants: Part B*, 4(4), 275-281.
- Zamberlin Š., Antunac N., Havranek J., Samaržija D. (2012). Mineral elements in milk and dairy products. *Mljekarstvo* 62(2): 111-125.

ANALYSIS OF SOME TRACE AND TOXIC ELEMENT CONCENTRATIONS OF SHEEP MILK BY USING AN INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETER

İNDÜKTİF EŞLEŞTİRİLMİŞ PLAZMA OPTİK EMİSYON SPEKTROMETRESİ KULLANILARAK KOYUN SÜTÜNÜN BAZI ESER VE TOKSİK ELEMENT KONSANTRASYONLARININ ANALİZİ

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ABSTRACT

In sheep farming, especially in extensive livestock systems, monitoring of trace and toxic element concentrations is important to determine the nutritional condition of animals, besides the nutritional importance of milk and the amount of potentially toxic element residues in dairy products. In this study, the concentrations of trace elements (zinc, copper, chromium, manganese, nickel, cobalt) and toxic elements (lead, cadmium) in raw milk samples (n = 51) obtained from sheep raised in Şanlıurfa province were determined by ICP-OES. Zinc, copper, chromium, manganese, nickel levels in raw milk samples were determined as 4967.9 ± 2968.2 , 228.7 ± 332.1 , 155.8 ± 39.3 , 1180 ± 30.4 , 0.22 ± 0.05 µg/L, respectively. Cobalt was found below the detection limit in milk samples. Generally, the levels of the trace elements were within the ranges reported in other studies in sheep milk. Lead was detected in all milk samples, with an average level of 0.11 ± 0.03 µg/L, which was below the maximum limits set in the Turkish Food Codex. Therefore, it did not pose any risk for human consumption. Cadmium was determined at the level of 5.12 µg/L in only one sample. The maximum amount of cadmium allowed in the Turkish Food Codex Communiqué on Determination of the Maximum Levels of Certain Contaminants in Foodstuffs is 0.01-1.0 for various foods. mg/kg and the value determined in this study is within the safe limits. As a result, it was determined that the sheep milk analyzed in this study did not threaten public health in terms of toxic elements, and the levels of trace elements were comparable with other study data.

Key words: Sheep milk, trace element, toxic element, ICP-OES

ÖZET

Koyunculukta, özellikle ekstansif besi sistemlerinde, eser ve toksik element konsantrasyonlarının takibi, hayvanların beslenme durumu ve ayrıca sütün besin değeri ve süt ürünlerindeki potansiyel olarak toksik element kalıntılarının miktarını belirlemek için önemlidir. Bu çalışmada, Şanlıurfa ilinde yetiştirilen koyunlardan elde edilerek satışa sunulan çiğ süt örneklerinde (n = 51) eser element (çinko, bakır, krom, mangan, nikel, kobalt) ve toksik element (kurşun, kadmiyum) konsantrasyonları ICP-OES ile belirlendi. Çiğ süt örneklerinde çinko, bakır, krom, manganez, nikel düzeyleri sırası ile 4967.9 ± 2968.2 , 228.7 ± 332.1 ,

155.8±39.3, 1180±30.4, 0.22±0.05 µg/L olarak tespit edildi. Süt örneklerinde kobalt elementi deteksiyon limitinin altında bulundu. Genel olarak, eser elementlerin konsantrasyonları, dünya çapındaki koyun sütlerinde yakın zamanda yapılan diğer araştırmalarda rapor edilen aralıklar içindeydi. Süt örneklerinin tamamında kurşun tespit edilmiş olup ortalama 0.11±0.03 µg/L düzeyinde bulundu ve Türk Gıda Kodeksinde belirlenen maksimum limitlerin altındaydı. Bu nedenle insan tüketimi için herhangi bir risk oluşturmadı. Kadmiyum ise yalnızca 1 örnekte 5.12 µg/L düzeyinde belirlendi. Türk Gıda Kodeksi, Gıda Maddelerinde Belirli Bulaşanların Maksimum Seviyelerinin Belirlenmesi Tebliği'nde izin verilen maksimum kadmiyum miktarı çeşitli gıdalar için 0.01-1.0 mg/kg arasında olup bu çalışmada belirlenen değer güvenli sınırlar içerisindeydi. Sonuç olarak bu araştırmada analiz edilen koyun sütlerinin toksik elementler bakımından halk sağlığını tehdit etmediği, eser elementlerin düzeyleri ise diğer çalışma verileri ile kıyaslanabilir olduğu tespit edildi.

Anahtar kelimeler: Koyun sütü, eser element, toksik element, ICP-OES

INTRODUCTION

Milk is a biological liquid that is secreted from the mammary glands in order to feed the infant, and contains all the nutrients in its composition in a sufficient and balanced ratio for nutrition and growth (Paksoy, 2017). Sheep milk basically contains proteins mostly consisting of casein, essential fatty acids, lactose in disaccharide structure and many basic chemical components such as vitamins and minerals (FAO, 2017). Sheep milk is a food that people have benefited from for centuries, but in recent years, when functional foods have become widespread, sheep milk will play a very important role in providing benefits to human health (Mohapatra et al., 2019). Ovine milk and its products are also used for medical purposes, especially for babies (Haenlein, 2001). Although the medical importance of sheep's milk is increasing day by day, the number of studies in this field is limited. However, the requisition for sheep milk is growing in the global market. Sheep milk amounts to 36.5 of the world's total small ruminant milk production (FAO, 2017). Sheep milk, which constitutes 6.6% of the 22 million 960 thousand tons of milk production in Turkey according to 2019 TUIK data, makes significant contributions to the country's dairy industry (TUIK, 2019). Many researchers have reported that sheep milk has rich content in terms of essential elements (Zhang et al., 2006; Molik et al., 2008; Barlowska et al., 2011). Especially sheep milk is a significant source of minerals, particularly calcium, phosphorus, potassium, magnesium, sodium, chloride and iodine (Mohapatra et al., 2019). The number of studies reporting the levels of elements such as copper, zinc, manganese, nickel, cobalt, cadmium, and lead in the composition of sheep's milk is quite low. However, trace elements such as copper and zinc are essential for many biological functions in metabolism. The lack of these trace elements conduces remarkably to the global disease charge; whereas, high concentrations of these trace elements can also have adverse health effects. The necessity and toxicity of elements vary from element to element and from species to species (Kazi et al., 2009). The possible harms of toxic elements in the composition of sheep's milk, which is a food whose importance for human health is increasing day by day, should also be investigated. At the same time, the diet of sheep is mostly grassland, so these animals may be considered as bio-indicators of the environment and their milk can be a helpful method to monitor environmental pollution (Llobet et al., 2003). Toxic elements like lead, cadmium, and nickel whose toxic effects are renowned (Mohapatra et al., 2019) are well deployed in the environment and small ruminants are subjected to their accumulation by ingesting feed, water, and grass (Pšenková and Toman, 2021; Rahimi et al., 2013; Najarnezhad and Akbarabadi, 2013). The aim of the presented study was to determine the concentration of some trace and toxic elements in sheep milk of Şanlıurfa province.

MATERIALS AND METHODS

The material of this study consisted of 51 sheep's milk offered for sale in Şanlıurfa. Purchased raw milk samples were placed in 50 mL polyethylene tubes frozen and stored in a deep freezer at -19 °C until analysis.

The digestion procedure of the milk samples, which was carried out with the aim of completely burning the organic content and dissolving the elements in the acid, was achieved by a 3-stage burning process in a CEM XPress brand microwave oven (Altun et al. 2018). For this purpose, all plastic and glass equipment to be used in both incineration and analysis were kept in 5% HNO₃ and then rinsed with ultrapure water and dried. The milk samples, which were taken out of the deep freezer and brought to room temperature, were homogeneously pipetted into the teflon carriers of the microwave oven as 1 ml each. Then, 4 mL of HNO₃ (65% v/v) and 2 mL of H₂O₂ (30% v/v) were added to each teflon carrier, respectively;

Stage 1: 10 min at 120°C 1600 Watts

Stage 2: 5 minutes at 180 °C 1600 Watts

Stage 3: 20 min at 210 °C 1600 Watt combustion was carried out at

The sample solutions, which were taken out of the microwave oven and cooled into the room temperature, were taken into 50 mL polyethylene tubes and their pH was increased above 1.0 by adding up to 50 mL of ultrapure water. The analysis of zinc, copper, chromium, manganese, nickel, cobalt, lead and cadmium elements in raw milk samples prepared for analysis was performed with ICP-OES (Optima 7000 DV Perkin-Elmer). The standard curve of the device was drawn with the lowest 1 µg/L and the highest 30 mg/L standard (Merck and Perkin Elmer) solution. Analysis of each sample was performed in the ICP-OES device in 7 minutes. In this study, the mean and standard deviation analysis of the samples were performed using the SPSS 11.0 (SPSS Inc., Chicago, IL, USA) package program.

RESULTS

The descriptive numbers of zinc, copper, chromium, manganese, nickel, cobalt, lead, and cadmium values of 51 sheep raw milk sold in Şanlıurfa province analyzed with ICP-OES within the scope of the study are summarized in Table 1.

Table 1. Sheep milk trace and toxic element concentrations

Element	Positive sample number	Minimum	Maximum	Mean±SD
Zn (µg/L)	51	778	12650	4967.9±2968.2
Cu (µg/L)	45	9.82	1260	228.7±332.1
Cr (µg/L)	51	125	418	155.8±39.3
Mn (µg/L)	51	1150	1290	1180±30.4
Ni (µg/L)	51	86.4	290.2	220±50.3
Co (µg/L)	-	<LOD	<LOD	<LOD
Pb (µg /L)	51	0.018	0.203	0.11±0.03
Cd (µg/L)	1	5.12	5.12	-

Considering the element levels of the sheep milk samples used in the study are checked out it is seen that the concentration order of the trace elements examined is Zn>Mn>Cu>Ni>Cr and cobalt is below the detection limit. Although lead, one of the toxic elements, was found in all samples, it was determined that it was below the safe contamination limit determined for raw milk.

DISCUSSION

The mean concentrations of trace and toxic elements in sheep's milk are listed in Table 1. When we analyzed Table 1, it is prominent that the content of the toxic elements in the milk of this research was very low, below the LOQ limit except for lead. A similar status was stated in the research of Antunovič et al. (2005) that, normally, milk of sheep includes nominal concentrations of toxic elements. The level of toxic elements in milk is affected by factors such as environmental causes, feeding rations, and manufacturing processes (Anastasio et al., 2006). The average Zn level in the sheep milk analyzed in this study was 4967.9 ± 2968.2 $\mu\text{g/L}$, and the data were similar when compared with the sheep milk collected from four different sites in southern part of Italy (Miedico et al. 2016). In a study conducted by Pšenková and Toman in 2020 in Western Slovakia with 30 sheep milk using ICP-AES method, Zn levels were found to be between 5.08 ± 2.42 mg/L (Pšenková and Toman, 2021). The average data in this study is in line with our findings. The Zn levels (778-12650 mg/L) were also in agreement with those reported for sheep milk from Konya, Mardin, Şanlıurfa provinces of Turkey (1.52-6.68 mg/L) (Paksoy et al., 2018). Copper was qualified by a great variation comparatively with the data reported in the literature. Especially, the concentrations of Cu in the this study were vaguely higher, in sheep milk samples (9.82-1260 $\mu\text{g/L}$), matched to the results acquired by Miedico et al. (2016) (41-1040 ng/g), comparable to that found by Ivanova (2011) (0.24-0.34 mg/L). In sheep milk of Bulgarian breeds (Tetevska and Strednostaroplaninska sheep), Gercthev and Mihaylova (2012) reported lower concentrations of Cu (0.040 and 0.043 mg/100 g). Saber and El Hofy (2018) reported that the mean concentration of Cu in sheep milk from Bedouin areas at El-Beheria governorates, Egypt, was 0.59 ± 0.05 mg/L (Saber and El Hofy, 2018). The average Cr level of the sheep milk analyzed in this study was 155.8 ± 39.3 $\mu\text{g/L}$, and the data were lower when compared with the Cr levels of Ile de France breed milk (0.290 mg/kg) collected from the Northeast part of Hungary (Póti et al. 2012). The concentrations of Cr analyzed in this study were higher than those described for fresh sheep milk of Karakachan breed, raised in the region of the Middle Rhodopes (0.05-0.06 mg/L) (Ivanova et al., 2011). The mean Mn level of the sheep milk analyzed in this study was 1180 ± 30.4 $\mu\text{g/L}$, and the data were higher when compared with the Mn levels of sheep milk (89.6 ng/g) collected from the southern part of Italy (Miedico et al. 2012). Also mean Mn level of this study is higher than the mean level (0.016 mg/L) of Saber and El Hofy's study results. The mean concentration of Ni in sheep milk samples was 220 ± 50.3 mg/L which was higher than the study reported by Pšenková and Toman (2021) for sheep milk (<0.1 mg/kg). Co was found below the detection limit in this study. Low levels of Co in sheep milk samples were reported by Miedico et al. (2016) with a mean level of 3.88 ng/g. In this study, Cd was found at the level of 5.12 $\mu\text{g/L}$ in only one milk sample. Concentrations of Pb and Cd in this study were lower than those reported by Poti et al. (2012) (0.023 mg/kg and 0.012 mg/kg). Additionally, Pšenková and Toman (2020) reported lower mean Pb and Cd concentrations (<0.1 mg/kg and <0.04 mg/kg) from western Slovakia. The Pb concentrations were in agreement with those reported for sheep milk samples from Iran (12.1 ng/mL) (Rahimi et al., 2013).

CONCLUSIONS

The levels of trace elements disclosed mean concentrations comparable to the other reported research in the world. The concentrations of these elements require further studies in sheep milk and dairy products. It was determined that the cadmium and lead amounts of sheep milk determined in this study did not exceed the maximum allowed in the Turkish Food Codex, Communiqué on Determination of the Maximum Levels of Certain Contaminants in Foodstuffs and were within safe limits.



REFERENCES

- Altun, S. K., Paksoy, N., Hatice, K. A. R. A., & Şakak, A. (2018). Macro-Elements in Raw Sheep Milk Samples from Şanlıurfa, Turkey. *Manas Journal of Agriculture Veterinary and Life Sciences*, 8(1), 31-36.
- Anastasio A, Caggiano R, Macchiato M, Paolo C, Ragosta M, Paino S, Cortesi ML (2006) Heavy metal concentrations in dairy products from sheep milk collected in two regions of southern Italy. *Acta Veterinaria Scandinavica*, 47(1), 1–6.
- Antunović Z, Bogut I, Sencic D, Katic M, Mijic P (2005) Concentrations of selected toxic elements (cadmium, lead, mercury and arsenic) in ewe milk in dependence on lactation stage. *Czech Journal of Animal Science*, 50(8):376
- Barłowska, J., Szwajkowska, M., Litwińczuk, Z., & Król, J. (2011). Nutritional value and technological suitability of milk from various animal species used for dairy production. *Comprehensive Reviews in Food Science and Food Safety*, 10(6), 291-302.
- Food and Agriculture Organization, 2017 Food and Agriculture Organization FAOSTAT Statistics Database Accessed on 11/3/2020.
- Gerchev, G., & Mihaylova, G. (2012). Milk yield and chemical composition of sheep milk in Srednostaroplaninska and Tetevenska breeds. *Biotechnology in Animal Husbandry*, 28(2), 241-251.
- Haenlein, G. F. W. (2001). Past, present, and future perspectives of small ruminant dairy research. *Journal of Dairy Science*, 84(9), 2097-2115.
- Ivanova, S. (2011). Dynamical changes in the trace element composition of fresh and lyophilized ewe's milk. *Bulgarian Journal of Agricultural Science*, 17(1), 25-30.
- Kazi, T. G., Jalbani, N., Baig, J. A., Kandhro, G. A., Afridi, H. I., Arain, M. B., ... & Shah, A. Q. (2009). Assessment of toxic metals in raw and processed milk samples using electrothermal atomic absorption spectrophotometer. *Food and Chemical Toxicology*, 47(9), 2163-2169.
- Llobet, J. M., Falco, G., Casas, C., Teixido, A., & Domingo, J. L. (2003). Concentrations of arsenic, cadmium, mercury, and lead in common foods and estimated daily intake by children, adolescents, adults, and seniors of Catalonia, Spain. *Journal of Agricultural and Food Chemistry*, 51(3), 838-842.
- Mohapatra, A., Shinde, A. K., & Singh, R. (2019). Sheep milk: A pertinent functional food. *Small Ruminant Research*, 181, 6-11.
- Molik, E., Murawski, M., Bonczar, G., & Wierzchoś, E. (2008). Effect of genotype on yield and chemical composition of sheep milk. *Animal Science Papers and Reports*, 26(3), 211-218.
- Najarnezhad, V., & Akbarabadi, M. (2013). Heavy metals in raw cow and ewe milk from north-east Iran. *Food Additives & Contaminants: Part B*, 6(3), 158-162.
- Paksoy, N. (2017). Akçakale Ve Halfeti İlçelerinde Yetiştirilen İvesi Koyunlarda Süt Demir Düzeylerinin Değerlendirilmesi. *Veterinary Journal of Mehmet Akif Ersoy University*, 2(1), 17-23.
- Póti, P., Pajor, F., Bodnár, Á., & Bárdos, L. (2021). Accumulation of some heavy metals (Pd, Cd and Cr) in milk of grazing sheep in north-east Hungary. *Journal of Microbiology, Biotechnology and Food Sciences*, 2 (1), 389-394.



- Pšenková, M., & Toman, R. (2021). Determination of Essential and Toxic Elements in Raw Sheep's Milk from Area of Slovakia with Environmental Burden. *Biological Trace Element Research*, 199(9), 3338-3344.
- Rahimi, E. (2013). Lead and cadmium concentrations in goat, cow, sheep, and buffalo milks from different regions of Iran. *Food Chemistry*, 136(2), 389-391.
- Saber, A. S., & El Hofy, H. R. (2108). Determination of some chemical compositions and heavy metal residues in sheep and goat milk. *Animal Health Research Journal*, 6 (4), 12-19.
- TUİK, <https://data.tuik.gov.tr/Bulten/Index?p=Hayvansal-Uretim-Istatistikleri-2019-33873>.
- Zhang, R. H., Mustafa, A. F., & Zhao, X. (2006). Effects of feeding oilseeds rich in linoleic and linolenic fatty acids to lactating ewes on cheese yield and on fatty acid composition of milk and cheese. *Animal Feed Science and Technology*, 127(3-4), 220-233.

ÇOCUKLUK ÇAĞI OBEZİTESİ VE SAĞLIK SORUNLARI CHILDHOOD OBESITY AND HEALTH PROBLEMS

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ÖZET

Çocukluk çağı obezitesi çocuğun vücut ağırlığının yaşına göre önerilenden en az %10 fazla olduğu durumdur. Hastalık koruma ve önleme merkezi çocuklardaki kilo dağılımını, Beden Kütle İndeksi (BKI) persantil eğrilerine göre yapmış ve BKI >85-95. persantil arasında olan çocuklar hafif şişman, BKI>95. persantil olanlar obez olarak tanımlanmıştır. Çocuklarda obezite oluşmasında genetik ve çevresel faktörler, bedensel hareketlilik, beslenme tarzı gibi davranışsal etmenler belirleyicidir. Dünya çapında 5 yaş altında yaklaşık 39 milyon, 5-19 yaş grubunda ise 340 milyon civarında fazla kilolu ve obez çocuk bildirilmektedir. Türkiye’de ise çocukluk çağı obezite sıklığı 0-5 yaş grubunda %8,5 iken, 6-18 yaş grubunda %8,2 olarak bildirilmiştir. Ciddi sayılara ulaşan bu durum, çocuklarda önemli sağlık sorunlarını da beraberinde getirmektedir.

Fazla kilolu/obez çocuklarda en fazla kardiyovasküler sorunlar, tip 2 diyabet, psikolojik ve sosyolojik sorunlar, metabolik sendrom, uyku apnesi, hipoventilasyon, safra kesesi taşları, kas-iskelet sisteminde bozuklukları ve stria gibi sağlık sorunları ortaya çıkmaktadır. Ciddi klinik sorunları da beraberinde getiren çocukluk çağı obezitesi, yetişkinlik obezitesi ve komplikasyonları için de risk faktörüdür. Literatürdeki çalışmalarda obez çocuklarda kardiyovasküler risk faktörlerinin normal kilodaki çocuklara göre daha yüksek olduğu, tip 2 diyabetli çocuk sayısında artış yaşandığı, metabolik sendrom oranının ciddi seviyelerde yükseldiği gösterilmiştir. Ayrıca çocukluk çağı obezitesinin yetişkinlik obezitesine neden olabileceği düşüncesi, gelecek nesillerde erken morbidite ve artan mortalite ihtimalini de beraberinde getirmektedir. Bu durum ise gelecekte ciddi sağlık sorunları ve ekonomik yük oluşturacağı anlamına gelmektedir. Bu nedenle tüm sağlık çalışanlarına obezitenin önlenmesi, erken dönemde tedavi edilmesi ve sağlık sorunları yaşayan bireylere bakım verilmesi konusunda önemli görevler düşmektedir.

Obezite, hemşirelerin de dahil olduğu multidisipliner bir yaklaşım ile tedavi edilmektedir. Hemşirelerin tedavi sürecinde sağlık bakım hizmetlerinin koruyucu, tedavi ve rehabilite edici aşamalarında sorumlulukları bulunmaktadır. Obezite tedavisinde, hastalık ortaya çıkmadan sağlıklı bireye sunulacak koruyucu hizmetler, son derece önemlidir. Hemşirelerin eğitim ve bakım verici rolü ile obezitenin neden olabileceği sağlık sorunları ve ekonomik yükü önemli oranda azaltılabileceği bildirilmiştir. Bu nedenle hemşireliğin önemli bir rolü olan koruyucu sağlık hizmetlerinin, sağlıklı bireyin/toplumun oluşturulması ve güçlendirilmesi için uygulanması gereklidir.

Anahtar Kelimeler: Pediatrik obezite; Hastalık; Hemşirelik

ABSTRACT

Childhood obesity is a condition in which the child's body weight is at least 10% more than recommended by age. The center for disease protection and prevention conducted a weight distribution in children according to the Body Mass Index (BMI) percentile curves, and BMI >85th-95th percentile curves children who are overweight, BMI >95th percentile curves children have been described as obese. Genetic and environmental factors, physical mobility, behavioral factors such as eating style are decisive in the formation of obesity in children. About 39 million children under the age of 5 and about 340 million overweight and obese children in the 5-19 age group are reported worldwide. In Turkey, the incidence of childhood obesity was reported as 8.5% in the 0-5 age group and 8.2% in the 6-18 age group. This condition, which has reached serious numbers, also brings about significant health problems in children.

Overweight/obese children with a maximum of cardiovascular problems, type 2 diabetes, psychological and sociological issues, metabolic syndrome, sleep apnea, hypoventilation, gallstones, Nov-skeletal system disorders and health problems such as striae are emerging. Childhood obesity, which also brings with it serious clinical problems, is also a risk factor for adult obesity and its complications. In the literature, it has been shown that cardiovascular risk factors are higher in obese children than in children of normal weight, there is an increase in the number of children with type 2 diabetes, and the rate of metabolic syndrome increases at serious levels. In addition, the idea that childhood obesity can cause adult obesity also leads to the possibility of early morbidity and increased mortality in future generations. This means that in the future it will create serious health problems and an economic burden. For this reason, important tasks are assigned to all health workers in terms of preventing obesity, treating it at an early stage, and providing care to individuals experiencing health problems.

Obesity is treated with a multidisciplinary approach, including nurses. Nurses have responsibilities in the preventive, therapeutic and rehabilitative stages of health care during the treatment process. In the treatment of obesity, preventive services that will be provided to a healthy person before the disease occurs are extremely important. It has been reported that with the educational and caring role of nurses, obesity can significantly reduce the health problems and economic burden that can be caused by. For this reason, it is necessary to implement preventive health services, in which nursing has an important role, to create and strengthen a healthy individual/ society.

Key Words: Pediatric obesity; Disease; Nursing

GİRİŞ

Halk Sağlığı Genel Müdürlüğü (HSGM) tarafından beslenme “sağlığı korumak, geliştirmek ve yaşam kalitesini yükseltmek için vücudun gereksinimi olan besin öğelerini yeterli miktarlarda ve uygun zamanlarda almak için bilinçli yapılması gereken bir davranış” olarak tanımlanmıştır. Beslenme aynı zamanda açlık duygusunu bastırmak, karın doyurmak ya da canının istediği şeyleri yemek içmek değildir’ şeklinde ifade edilmiştir.¹ Başka bir tanımda ise yeterli ve dengeli beslenme, vücudun en küçük yapı taşı olan hücrelerin düzenli olarak çalışabilmesi için, günlük olarak tüketilen besinlerden sağlanan protein, karbonhidrat, yağ, vitamin, mineral ve su gibi besin öğelerinin yeterli miktarda ve düzenli olarak alınması şeklinde açıklanmıştır.²

Beslenme sağlık üzerinde kısa sürede gözle görülebilen değişiklikler oluştururken uzun vadede pek çok etki gösterebilir. Beslenmenin bu etkisi anne karnında başlayarak kişinin hayatının sonuna kadar devam eder.³ İyi bir beslenme tutumunun gebelikten itibaren hem bebeğe hem de anneye pek çok olumlu etkisi bulunur. Bunların başında sağlıklı hamilelik ve doğumla birlikte sağlıklı bebek ve çocuk gelişimi gelir. Hayata sağlıklı başlangıç yapmak sağlıklı yetişkinliğin en önemli adımıdır. Bu süreçteki sağlıklı beslenme, yetişkinlik dönemindeki güçlü bağışıklık sistemi, diyabet ve kardiyovasküler gibi bulaşıcı olmayan hastalıkların düşük riski ve uzun ömürlü olmak ile ilişkilidir.⁴ Ancak tam aksi olan durumlarda karşımıza çıkan dengesiz beslenme ise çeşitli hastalıklara zemin hazırlayabilir. Alınması gereken besin öğelerinden herhangi birinin yeterli miktarda alınmaması ya da fazla alınması dengesiz beslenme olarak tanımlanır. Bu beslenme tarzı sadece besinlerin uygunsuz tüketiminden değil aynı zamanda yanlış pişirme tekniklerinden de etkilenir.^{1,5} Bireylerin sağlıklı beslenme tarzına sahip olmasında beslenme tutumu kadar besine ulaşılabilirlik de son derece önemlidir.

Günümüz dünyasında özellikle düşük ve orta gelirli ülkeler hem beslenme yetersizliği hem de aşırı kilolu olmayı içeren malnütrisyon ile karşı karşıyadır.⁴ Beş yaş altındaki çocukların üçte ikisi beslenme kalitesinin kötülüğünden dolayı malnütrisyon ve gizli açlık riskindeyken, üçte biri yetersiz beslenmiş, çelimsiz, bodur veya aşırı kiloludur.⁶ Bunun yanı sıra obezite de hem yetişkinlerde hem de çocuklarda önemli bir beslenme bozukluğu olarak karşımıza çıkmaktadır. Dünya Sağlık Örgütü (DSÖ) obeziteyi sağlıklı olumsuz etkileyen anormal veya aşırı yağ birikimi olarak tanımlamaktadır.⁷ Vücutta bulunan yağ miktarını pratik olarak ölçmek pek mümkün değildir. Bundan dolayı obezite tanısı koyabilmek için Beden Kütle İndeksi (BKI) kullanılmaktadır. BKI kilogram cinsinden vücut ağırlığının, metre cinsinden boyun karesine bölünmesiyle hesaplanır. Yetişkinlerde BKI değeri ≥ 25 olanlar fazla kilolu, ≥ 30 olanlar obez, ≥ 40 olanlar morbid obez, ≥ 50 olanlar ise süper obez olarak tanımlanır.⁸ Hastalık koruma ve önleme merkezi çocuklardaki kilo dağılımını, Beden Kütle İndeksi (BKI) persantil eğrilerine göre yapmış ve BKI $> 85-95$. persantil arasında olan çocuklar hafif şişman, BKI > 95 . persantil olanlar obez olarak tanımlanmıştır.⁹

DÜNYA'DA VE TÜRKİYE'DE ÇOCUKLUK ÇAĞI OBEZİTESİ

Küresel hastalık yükü raporuna göre 2017'de obezite salgın olarak tanımlanmıştır. Bu durumun nedeni olarak, aşırı kilo ve obezite kaynaklı ölümlerin yılda 4 milyonu aşması gösterilmiştir.⁷ HSGM ise çocukluk çağı obezindeki artışların alarm verici düzeyde olduğunu belirtmiştir. 1970'li yıllar ile günümüz karşılaştırıldığında çocukluk çağı obezitesinin 10 kat fazla olduğu dikkat çekmektedir.¹⁰ Dünya genelinde 5 yaş altında yaklaşık 38,2 milyon çocuk fazla kilolu veya obezdir. Fazla kilolu veya obez olan 5-19 yaş grubundaki çocuk ve adolesanlarda bu sayı 340 milyonu geçmektedir.¹¹ 38 ülkenin üye olduğu DSÖ Avrupa Çocukluk Çağı Obezite Gözetim Girişimi ilkökul çağındaki çocukların fazla kilolu veya obez olma eğilimlerini ölçen önemli bir projedir.^{12,13} Bu proje sonuçlarına göre okul çağı çocukları arasında en yüksek obezite prevalansı %35,2 ile (6-9 yaş grubu) İspanya ve %31,5 ile (7-9 yaş grubu) Portekiz'dedir. En düşük prevalans ise %15,2 ile (7-9 yaş grubu) Slovakya, %18,1 ile (7-9 yaş grubu) Fransa, %18,3 ile (6-9 yaş grubu) İsviçre ve %18,5 ile (9 yaş) İzlanda'ya aittir.¹³ Türkiye'de ise çocukluk çağı obezite sıklığı 0-5 yaş grubunda %8,5 iken 6-18 yaş grubunda %8,2'dir.¹⁴

OBEZİTENİN ÇOCUK SAĞLIĞI ÜZERİNE ETKİSİ

Milattan önce 410 yılında Hipokrat “ani ölüm şişmanlarda zayıflara göre daha sık görülür” diyerek fazla kilolu/obez olmanın olumsuz yönüne dikkat çekmiştir.¹⁵ DSÖ ayrıca dünyada mortalite için küresel riske yol açan beş neden arasında obeziteye de yer vermiştir.¹⁶ Bir zamanlar sadece yüksek gelirli ülkelerin bir sağlık sorunu olarak görülen obezite günümüzde orta ve az gelirli ülkelerde de sorun haline gelmektedir.⁷ Genetik ve çevresel faktörler, bedensel hareketlilik, beslenme tarzı gibi davranışsal etmenlerden oluşan obezite bulaşıcı olmayan hastalıkların artmasına ve yaşam süresinin kısalmasına sebep olmaktadır. Bedensel, ruhsal ve sosyal yönden tam bir iyilik halinin oluşmasına engel olan obezitenin, beraberinde kırktan fazla sağlık sorununu getirdiği bildirilmektedir.¹⁷⁻²⁰ Obezite yetişkinlerde tip 2 diyabet, kardiyovasküler hastalıklar, kanser, osteoartrit ve diğer sağlık sorunlarına yol açmaktadır. Obez çocuklar ise yetişkinlikte bu hastalıklar açısından yüksek risk grubunu oluşturmaktadır.²¹ Bu nedenle obezitenin çocukluk çağına mümkün olan en erken dönemde önlenmesi ya da tedavi edilmesi, ileride ortaya çıkabilecek hastalıkların önüne geçmede ve ekonomik yükü azaltmada son derece önemlidir.^{19,20,22} Tedavi edilemeyen çocukluk çağı obezitesi çeşitli komplikasyonlar oluşturabilir. Bu komplikasyonlar arasında en fazla kardiyovasküler hastalıklar, diyabet, metabolik sendrom, psikolojik ve sosyal problemler yer alırken uyku apnesi, ortopedik rahatsızlıklar, safra kesesi taşları, gastroözofajial reflü, psödötümör serebri ve polikistik over sendromu gibi çeşitli sağlık problemleri de görülmektedir.^{19,20}

♣ Kardiyovasküler Hastalıklar

Obezite tıpkı erişkinlerde olduğu gibi çocukları da kardiyovasküler hastalıklar bakımından tehdit etmektedir.²³ Obezitedeki metabolik değişimler lipoprotein metabolizmasını bozar. Obez bireylerde yüksek yoğunluklu lipoprotein (High Dansite Lipoprotein: HDL) oranı düşük konsantrasyonlarda bulunur. Serbest yağ asitlerinin portal dolaşımında yükselmesi karaciğerin yükünü artırırken karaciğerdeki serbest yağ asitleri, düşük yoğunluklu lipoproteinleri (Low Dansite Lipoprotein: LDL) artırır. Obez bireylerde sıkça görülen hiperinsülineminin sonucu olarak LDL parçalanır. LDL metabolizmasındaki bu değişim aterosklerotik sürecin başlamasına sebep olur. Obez bireylerde meydana gelen bu lipoprotein mekanizmasındaki bozulmalar koroner arterlerde ateroskleroza yol açarak kardiyovasküler hastalıkların alt yapısını oluşturur.²⁴ Yapılan çalışmalarda obezitenin sol ventrikül hipertrofisine, diyastolik ve sistolik fonksiyon bozukluğuna sebep olarak konjestif kalp yetmezliği gelişimine neden olduğu gösterilmiştir.²⁵ Bireydeki kilo artışı yağ miktarının artması ile gerçekleştiğinde koroner kalp hastalığı, inme ve hipertansiyon geçirme riski artmaktadır. Literatürde yapılan çalışmalarda her 1 kiloluk artış ile kalp hastalıklarının oluşma riskinde %1’lik artış olması arasında anlamlı ilişki bulunmuştur.^{19,26,27} Fazla kilolu/obez olan çocuklar ile olmayanların karşılaştırıldığı bir çalışmada²⁷, fazla kilolu/obez olan çocuklarda daha yüksek kan basıncı ve arter damarlarında sertlik yaşama olasılığının arttığı bulunmuştur. Literatürde obeziteye ek olarak hipertansiyon, dislipidemi, insülin direnci, ateroskleroz ve kardiyomiopati olmasının kardiyovasküler hastalık riskini daha da artırdığı bildirilmiştir.²³ 169 obez çocukla yürütülen bir çalışmada çocukların %10’unda glikoz tolerans bozukluğu, %47,3’ünde dislipidemi ve %21,8’inde hipertansiyon saptanmıştır.²⁸ Kardiyovasküler risk faktörleri açısından obez kız ve erkek çocuklarının karşılaştırıldığı farklı bir çalışmada ise cinsiyet açısından fark bulunmazken; çocuklarda hipertrigliseridemi, hiperkolesterolemi, LDL yüksekliği, HDL düşüklüğü, hipertansiyon ve bozulmuş açlık glikozu ortaya çıkmıştır.²³

♣ Diyabet

Diyabet, pankreasın beta hücrelerinden salgılanan insülin hormonunu üretmediği veya vücudun insülini kullanmadığı zaman meydana gelen kronik bir hastalıktır.²⁹ Obez bireylerin

çoğunda diyabet görülmesi son zamanlarda ‘DİABESİTY’ teriminin kullanımını da gündeme getirmiştir. Pankreasın β hücrelerinin otoimmün yıkımı tip 1 diyabet ile ilişkilendirilen metabolik bozuklukla sonuçlanan insülin sekresyonu eksikliğine yol açar. Bu duruma ek olarak, pankreasın α hücre fonksiyonları da anormaldir ve aşırı glukagon salgılanır. Hipergliseminin glukagon sekresyonunu azaltması beklenirken tip 1 diyabetli hastalarda glukagon hiperglisemi tarafından baskılanmaz. Yüksek glukagon seviyeleri, insülin eksikliğine bağlı metabolik kusurları şiddetlendirir. Yapılan çalışmalar sonucunda tip 1 diyabetli çocuklarda fazla kilolu/obez prevalansı ABD’de %39, Kanada’da %35, Polonya’da %30, Türkiye’de ise %18 olarak bulunmuştur.^{30,31}

Vücutta yağ miktarının artması insülin direnci ve beta hücrelerinde yetmezliğe yol açıp tip 2 diyabetin oluşmasına neden olur.¹⁹ Tip 2 diyabetlilerin %80’inden fazlasının obez olması, obezite ile insülin direnci arasında mutlak bir ilişki olduğunun göstergesidir. Tip 2 diyabet orta-ileri yaş hastalığı olarak kabul edilmesine rağmen son yıllarda yaşam tarzı değişikliklerine bağlı olarak çocuklarda da görülme sıklığı oldukça artmıştır.³²⁻³⁵Yapılan bir çalışmaya göre fazla kilolu/obez olan çocuklarda tip 2 diyabet prevalansı, prepubertal grupta %2 ve pubertal grupta %4,3 olarak bildirilmiştir.²⁸

♣ **Metabolik Sendrom**

Metabolik Sendrom insülin direnci, hipertansiyon, dislipidemi ve obezitenin bir arada bulunmasını ifade etmektedir.³⁶Sendromun tanımı konusunda fikir birliği olmasına rağmen fizyopatolojisi tartışmalıdır. Genel olarak kabul gören hipoteze göre metabolik sendrom obezite ile ilişkilendirilir. Ayrıca metabolik sendrom kardiyovasküler hastalıklar ve diyabet için risk faktörü olarak kabul edilir.³⁶Klinik bulguları arasında obezite, yüksek kan basıncı, artmış trigliserid seviyesi ve HDL düzeylerinde düşüklük vardır.¹⁵Tanısı için bozulmuş lipid dengesi, artmış kan basıncı, obezite veya bozulmuş kan glikozundan en az üç tanesinin olması yeterlidir. Çocuklar için de önemli bir tehdit oluşturan metabolik sendrom yaşam tarzındaki olumsuz değişimlerle beraber artarak epidemik hale gelmiştir.³⁷Sarı ve ark. yaptığı bir çalışmada obez çocuklar arasındaki metabolik sendrom oranı %43 olarak bulunmuştur. Kızlardaki metabolik sendrom oranı erkeklerle kıyaslandığında daha yüksektir.³⁸

♣ **Psikolojik ve Sosyal Problemler**

Fazla kilolu/obez bireylere karşı sosyal tepkiler dünya çapında farklılık göstermektedir. Gelişmekte olan bazı ülkelerde fazla kilolu/obez olma başarılı ve varlıklı olmayı simgelerken, Kuzey Amerika ve Avrupa’da özellikle çocuk ve kadınlarda düşük kazanç ve fırsatlara erişememe ile ilişkilendirilen stigmaya neden olur.³⁹

Obez çocuklarda düşük benlik saygısı, anksiyete bozuklukları, beden imajı bozukluğu ve depresif belirtiler dahil olmak üzere psikolojik sıkıntıları yaşama olasılığı daha yüksektir. Bir çalışmada fazla kilolu/obez çocukların normal kilodaki çocuklara göre daha çok psikolojik sorun deneyimledikleri, kızlarda erkeklerden daha fazla risk olduğu ve psikolojik morbidite riskinin yaşla birlikte arttığı ifade edilmiştir.⁴⁰Fazla kilolu/obez çocuklar sosyal çevresinde bulunan insanlar tarafından kilolarıyla ilgili zorbalığa, alay edilmesine maruz kalabilir. Bu davranışlar dışlanma hissi ile olumsuz bir benlik kavramına bağlı olarak sosyal fonksiyonlarda bozulma, içe kapanma, akran ilişkilerinden uzaklaşma gibi akademik ve sosyal sorunlara neden olabilir. Yapılan çalışmalarda⁴¹ fazla kilolu/obez çocukların normal kilolu çocuklara göre okula bağlılıklarının ve ders başarılarının daha düşük bulunması, bu düşünceleri desteklemektedir.

♣ **Diğer Sağlık Sorunları**

Obezitenin yol açabileceği diğer sağlık sorunları arasında solunum sistemi, gastrointestinal sistem ve kas-iskelet sistemi gibi vücudun önemli sistemlerindeki değişiklikler dikkat

çekmektedir. Solunum sisteminin etkilenmesi çocuklarda uyku apnesi ve hipoventilasyon görülmesine neden olabilir. Boyun çevresi ve farenjiyal bölgedeki yağ deposundaki artışın uyku apnesine neden olduğu düşünülmektedir. Yapılan bir araştırmada kilo kaybının uyku apnesinde dikkat çekici azalmalara neden olduğu gösterilmiştir.¹⁵Obez çocuklarda gastrointestinal sistem komorbiditelerinden gastroözofageal reflü, karaciğer yağlanması, kolesistit ve safra kesesi taşı görülme riski normal kilolu çocuklara göre daha yüksek bulunmuştur. Karaciğer yağlanması potansiyel olarak hepatik fibroz ve siroza ilerleyebilecek önemli bir sorundur.³⁶Fazla kilolu/obez çocuklarda kas-iskelet sorunlarının normal kilolu çocuklara göre daha sık ortaya çıktığı, özellikle spinal komplikasyonlar, Blount hastalığı ve akut kırıkların görülme sıklığı arttığı bilinmektedir.³⁶

ÇOCUKLUK ÇAĞI OBEZİTESİNE HEMŞİRELİK YAKLAŞIMI

Hemşireler obezite tedavisinde sağlık bakım hizmetlerinin koruyucu, tedavi ve rehabilite edici uygulamalarını sergilerken mesleğin eğitici, bakım verici ve destek sağlayıcı rollerini de kullanmalıdır.^{22,42} Hemşirelerin çocuklarda obeziteye neden olan değiştirilebilir sağlık davranışları ve sağlıklı beslenmelerine etki eden faktörleri çocuğun ailesi ile birlikte değerlendirmesi gerekir. Özellikle çocuğun beslenmesini düzenleyen aile üyelerinin beslenme tutumları konusunda yapacakları beslenme ve sağlık eğitimi obezite ile mücadelede kilit noktadır. Çocukluk çağı obezitesini önleme ve tedavi programlarında ailelerin yer alması başarıyı arttırdığı için bu süreçte hemşireler aileler ile çalışmaya önem verir.²²Bu doğrultuda hemşirelerden çocukluk çağı obezitesi ile mücadelede birincil, ikincil ve üçüncül koruma düzeylerine yönelik girişimler uygulaması beklenir.

Birincil Koruma

Obez olmayan bireylerde obezite ile ilgili patolojik değişimlerin oluşmasını önlemek amacıyla uygulanır. Gebe kadın gebeliği boyunca hem kendi fizyolojik ihtiyaçlarını karşılamak hem de fetüsün normal büyüme ve gelişmesini sağlamak için sağlıklı beslenmek zorundadır.⁴³Obez kadınlar gebe kaldıklarında çok sayıda komplikasyonlar ile karşılaşabilirler. Bunlardan bazıları gestasyonel diyabet (GDM), fetal izlem güçlüğü fetal makrosomia, fetal anomaliler ve doğum travmasıdır. Bu komplikasyonlar aşırı kilo artışı ile paraleldir. Obez gebelerde daha yüksek bulunan insülin direncinin GDM'ye neden olduğu düşünülmektedir. Obezite ve diyabet fetal makrosomiya neden olur. Hemşire prenatal bakımda kilo, diyet ve komplikasyonlar bakımından gebeyi değerlendirir ve tüm organ ve sistemleri kapsayan bakım verir.⁴⁴

Doğumdan sonra ise sonra anne sütü ile beslenme obeziteyi engelleyen diğer önemli bir noktadır. Bu nedenle yeni doğan ve bebeklik döneminde obezitenin önlenmesi adına en uygun hemşirelik girişimi anne sütünün önemine yönelik verilen beslenme danışmanlığıdır.²²Çocuk ve ergenlerde ise sağlıklı ve dengeli beslenme alışkanlığı, bedensel aktivitenin artırılması, sedanter yaşamın azaltılması ile ideal olan kiloyu koruyup sürdürmek için aileyi de içine alan eğitim programı oluşturur.⁴⁵

İkincil Koruma

Erken teşhis ve kişiye özel uygulamaları içerir. Sağlık taramaları ve periyodik muayenelerden oluşan ikincil koruma obezitenin neden olabileceği sağlık sorunlarının oluşma riskini azaltır. Bu kapsamda gerçekleştirilen müdahalelerin amacı, aşırı kilo alımından korunmaya yönelik bireysel yeterliliği arttırmak ve olumlu sağlık davranışlarını geliştirmektir. Hemşireler periyodik muayene sonrası çocuğun fazla kilolu/obez olduğunu belirledikten sonra çocuğun yaşına uygun sağlıklı beslenme ve bedensel aktivite eğitimini aileyi de dahil edecek şekilde planlar. Gerekli durumlarda diyetisyen ile iş birliği yapar.^{19,22,45}

Üçüncül Koruma

Fazla kilolu/obez bireylerin mevcut kilosunu azaltmak ve daha fazla kilo alımını önlemek amacıyla gerçekleştirilen uygulamaları içermektedir. Bu aşamada kişi multidisipliner olarak değerlendirilir. Sağlık ekibinde doktor, hemşire, diyetisyen, psikolog ve egzersiz danışmanı yer alır. Hemşire çocuk ve ailede oluşan risk faktörlerinin fiziksel, sosyal ve psikolojik olarak olumsuz etkilerini en aza indirgeyip tam iyilik halinin oluşturulmasına yardımcı olur.^{19,22,45,46}

Obezite yönetiminde asıl amaç davranış değişikliği oluşturmaktır. Davranış değişikliği ise beslenme ve egzersiz alışkanlıkları şeklinde ele alınır. Hemşire çocuğun fazla kilolu veya obez olduğunu belirledikten sonra bütüncül bir yaklaşım ile değerlendirir. Çocuğun günlük beslenme, inaktivite ve aktivite durumlarını içeren sosyal ve çevresel etmenleri inceler.¹⁹Bu etmenleri iyileştirmeye dair planlayacağı beslenme ve egzersiz eğitimlerine aileleri de dahil ederek uygulanabilir olmasını sağlar. Hemşireler sağlıklı beslenmede çocuklar için önemli rol model olan ailelerin yemek hazırlama ve yeme sürecine çocuklarla beraber dahil olmasını önerir⁴⁷ ve sağlıklı besin seçimi, porsiyon büyüklüğü, besin çeşitliliği gibi konularda danışmanlık yapar.²² Bu konuda hemşire liderli yapılan bir çalışmada okul öncesi çocuklara yönelik Piaget'in kuramına dayalı geliştirdikleri beslenme eğitimi sonunda beslenme bilgi puanlarını artırdığını, besin tüketim sıklıklarında olumlu gelişmeler olduğunu saptamışlardır.⁴⁸

Sağlıklı beslenmenin yanı sıra fiziksel aktivite de çocukluk çağı obezitesini ve obeziteye bağlı sağlık sorunlarının oluşmasını önler. Hemşireler bu bağlamda fiziksel hareketliliğin faydalarını hem aileye hem de çocuğa aktarır. Çocukların fiziksel aktiviteleri uygulamasını kolaylaştırmak için ebeveynlerin de dahil olmasını sağlar.²² Günlük yaşamlarında sedanter yaşamın azaltılmasına ve hareketliliğin artırılmasına dair öneriler çocuğun genel sağlık durumu göz önünde bulundurularak verilir. Örneğin okula yürüyerek ya da bisiklet kullanarak gitmesi, bir spor faaliyetine dahil olması, arkadaşları ile fiziksel bir aktivite planlamaları istenebilir.⁴⁹ Hemşire liderli yapılan çalışmalarda fiziksel aktivite konusunda bilgilendirme, aerobik, kuvvet, denge ve germe egzersizi gibi alternatiflerin sunulması⁵⁰ ve sınıf içinde müzik eşliğinde hareket etme ve evde oynanabilen hareketli oyunların oynanması ile sedanter yaşamın azaldığı ve fiziksel aktivite davranışlarının geliştiği bulunmuştur.⁵¹

SONUÇ

Günümüzde sıkça karşılaştığımız kronik bir hastalık olan çocukluk çağı obezitesi hem çeşitli kronik hastalıkların meydana gelmesine hem de yetişkinlik obezitesinin oluşmasına neden olur. Bu yüzden çocukluk döneminde koruyucu önlemlerin alınması veya erken tedavinin sağlanması oluşabilecek komplikasyonları ortadan kaldırma konusunda oldukça önemlidir.

Sağlığın korunması ve geliştirilmesi için hemşirelerin ilk hedefi obezite oluşmasını engellemek ve obezite konusunda farkındalığı yüksek bir toplum oluşturmaktır. Bu kapsamda çocukluk çağı obezitesini etkileyen faktörler araştırılmalı özellikle çocuğun beslenmesinden birincil seviyede sorumlu olan kişilerin de beslenme tutumu değerlendirilmelidir. Fark edilen yanlış uygulamalarda çocuk ve aile üyesi birlikte ele alınarak obeziteyi önlemeye dair eğitim planları oluşturulmalıdır. Çocukların BKİ ölçümlerini düzenli olarak kontrol edilmesi risklerin erken dönemde fark edilmesini sağlar. Gerekli durumlarda aile ve çocuk için beslenme ve egzersiz danışmanlığı da yapılmalıdır.

Doğumdan çocukluk çağının sonuna kadar olan süreçte BKİ takiplerinin kayıt altında tutulması çocukluk çağı obezitesini önlemek için önemli bir adımdır. Özellikle okul çağı çocuklarının beslenme ve fiziksel aktivitelerini yakından takip etme fırsatı olan okul sağlığı hemşirelerinin bu konuda aktif görev almaları son derece önemlidir. Bu nedenle toplumsal

düzye sađlık politikaları belirlenirken bakanlıkların, ilgili kurum ve kuruluşların konuya hassasiyetle yaklaşması ve okul sađlığı hemşireliğine yönelik gerekli adımların atılması beklenmektedir.

KAYNAKLAR

1. Halk Sađlığı Genel Müdürlüğü. Erişim tarihi; 08.10.2021 <https://hsgm.saglik.gov.tr/tr/beslenme/yeterli-ve-dengeli-beslenme-nedir.html>
2. Karaađaođlu N, Samur G. Anne ve çocuk beslenmesi. Ankara: Pegem Akademi;2020.
3. Yörüsün T. Ö, Koçyiđit E. K, İçer M. A, Bozkurt O, Köksal E. Okul öncesi çocukların sađlıklı besin ve aktivite seçimleri ile vücut ağırlığı ilişkisi. Gazi Sađlık Bilimleri Dergisi. 2017; 2(3): 19-26.
4. World Health Organization. Erişim tarihi; 19.10.2021 <https://www.who.int/health-topics/nutrition>
5. Ünsal A. Beslenmenin önemi ve temel besin öğeleri. Kırşehir Ahi Evran Üniversitesi Sađlık Bilimleri Dergisi. 2019; 2(3):1-10.
6. United Nations International Children's Emergency Fund (2019). Erişim tarihi; 19.10.2021 <https://www.unicef.org/reports/state-of-worlds-children-2019>
7. World Health Organization, Erişim tarihi; 23.10.2021 https://www.who.int/health-topics/obesity#tab=tab_1
8. Türkiye Endokrinoloji ve Metabolizma Derneđi. Erişim tarihi; 23.10.2021 <https://temd.org.tr/hastalar-icin/7-sismanlik>
9. Centers for Disease Control and Prevention (2021). Erişim Tarihi; 13.11.2021 <https://www.cdc.gov/obesity/childhood/defining.html>
10. Halk Sađlığı Genel Müdürlüğü, Erişim tarihi; 25.10.2021 <https://hsgm.saglik.gov.tr/tr/obezite/dunyada-obezitenin-gorulme-sikligi.html>
11. World Health Organization (2021). Erişim tarihi; 25.10.2021 <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
12. World Health Organization. Erişim tarihi; 07.11.2021 <https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/activities/who-european-childhood-obesity-surveillance-initiative-cosi>
13. World Health Organization Regional Office for Europe. WHO European Childhood Obesity Surveillance Initiative (COSI). Report on the fourth round of data collection 2015–2017. 2021.
14. Türkiye Beslenme ve Sađlık Araştırması: Beslenme Durumu ve Alışkanlıklarının Deđerlendirilmesi Sonuç Raporu. Ankara, Sađlık Bakanlığı Sađlık Araştırmaları Genel Müdürlüğü. Şubat,2014.
15. Serter R. Obezite atlası. S.B. Ankara Eđitim ve Araştırma Hastanesi Endokrinoloji ve Metabolizma Kliniđi. Ocak,2003.
16. World Health Organization. Global health risks: Mortality and burden of disease attributable to selected majör risks. World Health Organization. 2009
17. Törüner, E. Büyükgöneç, L. Çocuk Sađlığı ve Temel Hemşirelik Yaklaşımları. Ankara: Nobel Tıp Kitabevleri;2012.

18. Sahoo, K., Sahoo, B., Choudhury, A. K., Sofi, N. Y., Kumar, R., Bhadoria, A. S. Childhood obesity: Causes and consequences. *Journal of Family Medicine and Primary Care*. 2015; 4(2): 187
19. Yıldız D, Fidancı B. E, Suluhan D. Çocukluk dönemi obezitesi ve önleme yaklaşımları. *TAF Preventive Medicine Bulletin*. 2015; 14(4):338-45.
20. Türkiye çocukluk çağı (7-8 yaş) şişmanlık araştırması (COSITUR) 2013. Sağlık Bakanlığı, Türkiye Halk Sağlığı Kurumu, Milli Eğitim Bakanlığı, Hacettepe Üniversitesi, Sağlık Bakanlığı Yayın No: 921, Ankara, 2014.
21. World Health Organization. Regional Office for Europe. The challenge of obesity in the WHO European Region and the strategies for response. 2007.
22. Erdim L, Ergun A, Kuğuoğlu S. Çocuklarda obezitenin önlenmesi ve yönetiminde hemşirenin rolü. *Sağlık Bilimleri ve Meslekleri Dergisi*. 2014; 1(2):115-126
23. Taşçılar M. E, Hacıhamdioğlu B, Soyarslan M, Abacı A. Obez çocuklarda metabolik sendrom prevalansı ve kardiyovasküler risk faktörlerinin sıklığı. *Gülhane Tıp Dergisi*. 2010; 52:32-35.
24. Aballay L. R, Eynard A. R, Díaz M. D. P, Navarro A, Muñoz, S. E. Overweight and obesity: a review of their relationship to metabolic syndrome, cardiovascular disease, and cancer in South America. *Nutrition Reviews*. 2013; 71(3):168-179.
25. Akyüz E. Çocukluk çağı obezitesinde kardiyovasküler risk faktörlerinin değerlendirilmesi. Konya: Selçuk Üniversitesi Meram Tıp Fakültesi ;2009
26. Freedman, D. S., Mei, Z., Srinivasan, S. R., Berenson, G. S., Dietz, W. H. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study. *The Journal of Pediatrics*. 2007; 150(1): 12-17
27. Lawlor D, Martin R, Gunnell D, et al. Association of body mass index measured in childhood, adolescence, and young adulthood with risk of ischemic heart disease and stroke: findings from 3 historical cohort studies. *The American Journal of Clinical Nutrition*. 2006; 83(4):767-773.
28. Atabek M. E, Pirgon O, Kurtoglu S. Prevalence of metabolic syndrome in obese Turkish children and adolescents. *Diabetes Research and Clinical Practice*. 2006;72(3):315-321.
29. International Diabetes Federation (2020). Erişim tarihi; 08.11.2021
<https://www.idf.org/aboutdiabetes/what-is-diabetes.html>
30. Ozougwu J. C, Obimba K. C, Belonw, C. D, Unakalamba C. B. The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. *Journal of Physiology and Pathophysiology*. 2013;4(4):46-57.
31. Özkaya V. Tip 1 diyabetes mellitus' lu çocuk ve adölesanlarda insülin direnci, obezite sıklığı (double diyabet) ve obezite risk faktörlerinin incelenmesi. İstanbul: İstanbul Medipol Üniversitesi; 2021
32. Yalın H, Demir H. G, Olgun N. Diyabetle mücadelede diyabet risklerinin belirlenmesi ve tanılama. *The Journal of Turkish Family Physician*. 2011;2(2):41-49.
33. Kabalak T.ve Çetinkalp Ş. Tip2 diabetes mellitus. İçinde: İmamoğlu Ş, Ersoy C, editörler. *Diabetes Mellitus*, İstanbul: Deomed Medikal Yayıncılık, 2009; s.54-72.

34. Satman I. Diabetes mellitus epidemiyolojisi. İçinde: İmamoğlu Ş, Ersoy C, editörler. Diabetes Mellitus, İstanbul: Deomed Medikal Yayıncılık,2009; s.11-35.
35. Dabelea, D., Mayer-Davis, E. J., Saydah, S., Imperatore, G., Linder, B., Divers, J., Hamman, R. F. Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. *Jama*. 2014; 311(17): 1778-1786.
36. Yanovski, J. A. Pediatric obesity. An introduction. *Appetite*. 2015; 93: 3-12.
37. Nalbantoğlu Elmas Ö. Obez ve fazla kilolu çocuklarda ve adölesanlarda metabolik sendrom tanı kriterlerinin karşılaştırılması. Malatya: İnönü Üniversitesi; 2011
38. Sarı E, Yıldız F. M, İnalhan M, Sezer G. R, Sarı İ. Fazla kilolu ve obez çocuklarda insülin direnci ve metabolik sendrom prevalansı. *Zeynep Kamil Tıp Bülteni*. 2012; 43(3): 114-119.
39. James W. P. T, Jackson-Leach, R, Mhurchu C. N, Kalamara E, Shayeghi M, Rigby N. J, et al. (2004). Overweight and obesity (high body massindex). Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. 2004;s.497-596.
40. Reilly J. J, Methven E, McDowell Z. C, Hacking B, Alexander D, Stewart L, Kelnar C. J. Health consequences of obesity. *Archives of Disease in Childhood*. 2003; 88(9):748-752.
41. Ergül Ş, Kalkım A. Önemli bir kronik hastalık: Çocukluk ve ergenlik döneminde obezite. *TAF Preventive Medicine Bulletin*, 2011; 10(2):223-230.
42. Tedik, S. E. Fazla kilo/obezitenin önlenmesinde ve sağlıklı yaşamın desteklenmesinde hemşirenin rolü. *Türkiye Diyabet ve Obezite Dergisi*. 2017; 1(2): 54-62
43. Uzdil Z, Özenoğlu A. Gebelikte çeşitli besin öğeleri tüketiminin bebek sağlığı üzerine etkileri. *Balıkesir Sağlık Bilimleri Dergisi*. 2015; 4(2):117-121.
44. Apay S, Pasinlioğlu T. Obezite ve gebelik. *TAF Preventive Medicine Bulletin*, 2009; 8(4):345-350.
45. Yeşilfidan D, Adana F. Halk sağlığı hemşireliği bakış açısı ile ergenlerde obezite. *Hemşirelik Bilim Dergisi*. 2019; 2(2):38-44.
46. Kahraman, A., Bolşık, B. Çocuk ve ergenlerde obezite ve hemşirelik yaklaşımı. *Uluslararası Hakemli Kadın Hastalıkları ve Anne Çocuk Sağlığı Dergisi (JACSD)*. 2017; 4: 78-94.
47. Ackley B. J, Ladwi, G. B, Makic M. B. F. Hemşirelik Tanıları El Kitabı: Bakım Planlamasında kanıta dayalı rehber. (Gürhan N, Polat ü, Fidancı B, Çev.) Ankara: Nobel Tıp Kitapevleri; 2019: s.621-625
48. Başkale, H. Okul öncesi çocuklara verilen beslenme eğitiminin çocukların beslenme bilgisine, davranışlarına ve antropometrik ölçümlerine etkisi. İzmir: Dokuz Eylül Üniversitesi ;2010
49. Söğüt, S. C. The Role of thenurse in the management of nutrition and physical activity in adolescents. *Recent Studies in Health Sciences*. 2019; s. 556-564.
50. Erdim L. Fazla Kilolu çocuklara yönelik beslenme ve egzersiz programının Etkisi. İstanbul: Marmara Üniversitesi ;2012



51. Meydanlıođlu A. Hemşire Liderli “Sađlık İin Beslenme ve Fiziksel Aktivite Programı” nın ocukların beslenme ve fiziksel aktivite dzeylerine etkisi. İstanbul: Marmara niversitesi ;2013

UYDU GÖRÜNTÜLERİ KULLANILARAK GÖRÜNTÜ AYRIŞTIRMA YÖNTEMİ İLE ÇATI GÜNEŞ ENERJİSİ POTANSİYELİNİN TAHMİNİ

ESTIMATION OF ROOFTOP SOLAR ENERGY POTENTIAL WITH IMAGE SEGMENTATION USING SATELLITE IMAGES

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ÖZET

Günümüz dünyasında gelişen teknoloji ile birlikte artan enerji ihtiyacı, yenilenebilir enerji potansiyelinin belirlenmesine olan talebi artırmıştır. Kurulum maliyetinin düşük olması, bakım süreçlerinin kolaylığı ve kurulum alanı avantajı gibi etkenler fotovoltaik modülleri en önemli yenilenebilir enerji kaynaklarından biri haline getirmekte ve talebi artırmaktadır. Bu kapsamda, güneş enerjisinden elektrik üretmek için kullanılan fotovoltaik sistemlerde elektrik enerjisi üretim kapasitesinin belirlenmesi çalışmaları giderek önem kazanmıştır. Fotovoltaik panel ile elektrik enerjisi üretim kapasitesi belirlenmesi amacıyla belirli konumlar için veya şehir ölçeğinde tahmin yapılabilmesi amacıyla farklı tekniklerle çok sayıda çalışma yapılmaktadır. Yapılan çalışmalar ile fotovoltaik panel kullanımının yaygınlaştırılması ve tüketilen enerji miktarında yenilenebilir enerji kaynaklarından elde edilen enerji oranının artırılması hedeflenmektedir. Bu çalışmada uydu görüntüleri üzerinden görüntü işleme yöntemi kullanılarak binaların üzerinde bulunan çatılar için fotovoltaik enerji kapasitesi belirlenme işlemi gerçekleştirilmiştir. Coğrafi bilgi olarak kullanılan enlem-boylam değerleri sayesinde istenilen yakınlaştırma seviyesinde ve boyutlarda elde edilen uydu görüntüsünün renk özü, doygunluk ve parlaklık değerleri (HSV) renk modeli yöntemi ile görüntü ayrıştırma yöntemi öncesi optimum seviyelere getirilerek verimli sonuç elde edilmesi amaçlanmıştır. Segmentasyon yöntemi ile arka plan ve ön plan görüntüleri elde edilerek kenar belirleme algoritmasının uygulanabilmesi için uygun görüntü elde edilmiştir. Kenar belirleme algoritması ile görüntüdeki çatı alanlarına ait kenarlar belirlenmiş ve konum değeri merkez alınarak fotovoltaik kapasitesi tahmin edilmek istenen çatı dışındaki alanlar hesaplama dışında bırakılmıştır. Merkez çatı alanına ait kenarları belirlenmiş görüntü elde edildikten sonra bu çatı alanının büyüklüğü hesaplanmıştır. Bu kapsamda değerlendirme yapabilmek için Düzce Üniversitesi Mühendislik Fakültesi'nin çatı alanı fotovoltaik kapasitesi klasik fiziksel hesaplama yöntemi ile hesaplanmıştır. Hesaplanan alan için yerleştirilebilecek fotovoltaik panel sayısı için maliyet ve enerji tahmini yapılmıştır. Aynı alan için fotovoltaik enerji kapasitesi uydu görüntülerinin görüntü işleme tekniği ile işlenmesi sonucunda yeniden hesaplanmış ve elde edilen sonuçlar karşılaştırılmıştır. Elde edilen sonuçlara göre çatılara yerleştirilecek fotovoltaik panel kapasitesinin belirlenmesi konusunda görüntü ayrıştırma ile görüntü işleme yönteminin güvenilir alternatif bir çözüm yöntemi olduğu görülmüştür.

Anahtar Kelimeler: fotovoltaik potansiyel, görüntü ayrıştırma, uydu görüntüsü

ABSTRACT

In today's world, the increasing energy need with the developing technology has increased the demand for the estimation of renewable energy potential. Factors such as low installation cost, ease of maintenance processes and advantage of installation space make photovoltaic modules one of the most important renewable energy sources and increase demand. In this context, studies on the estimation of electrical energy production potential for generating electricity from solar energy with photovoltaic systems have become increasingly important. To estimate the solar photovoltaic capacity, many studies have been done with different techniques for certain locations or at urban level. With these studies, it is aimed to expand the use of photovoltaic panels and increase the rate of energy obtained from renewable energy sources in the amount of energy consumed. In this study, the solar photovoltaic energy capacity determined for the roofs of the buildings by using the image segmentation method on the satellite images. The latitude-longitude values used as geographical information for obtaining satellite images and by using hue, saturation and value (HSV) color model it is aimed to obtain optimal image before applying the image segmentation method. Foreground and background images obtained with the segmentation method, and a suitable image obtained for the application of the edge detection algorithm. By applying the edge detection algorithm, the edges of the roof areas in the image obtained and the areas outside the roof, for which the photovoltaic capacity to be estimated by taking the latitude-longitude value as the center, excluded from the calculation. After obtaining the image of the central roof area with the determined edges, the size of this roof area calculated. To evaluate the results of the study, the photovoltaic capacity of roof area of Duzce University Engineering Faculty calculated by manually with the classical physical calculation method. Cost and energy estimates made for the number of photovoltaic panels that can be placed for the calculated area. Photovoltaic energy capacity for the same area calculated by applying image segmentation technique and the results compared. According to the results obtained, it has been seen that the image processing with image segmentation method is a reliable alternative solution method for determining the number of photovoltaic panels that can be placed to roof and estimating the rooftop solar photovoltaic potential of the roof area.

Keywords: solar photovoltaic potential, image segmentation, satellite imagery

1. GİRİŞ

Gelişen teknoloji ile artan enerji ihtiyacı ve fosil yakıtların çevreye olan zararlı etkileri sonucu yenilenebilir enerji kaynaklarının kullanımı giderek önemli hale gelmektedir [1]. Fotovoltaik (PV) modüller, güneş hücreleri ya da güneş panelleri sayesinde Güneş'ten elektrik elde etme yöntemidir. Kurulum maliyetinin düşük olması, bakım süreçlerinin kolaylığı ve kurulum alanı avantajı gibi etkenler fotovoltaik modülleri en önemli yenilenebilir enerji kaynaklarından biri haline getirmekte ve talebi artırmaktadır. Belirli bir alan için fotovoltaik enerji kapasitesi tahmini sistem kurulumunun ekonomikliğinin değerlendirilebilmesi, verimli enerji yönetimi ve sisteme entegrasyonu ve elektrik şirketlerine veri sağlaması açısından önem arz etmektedir [2]. Manuel veri toplama yöntemi kullanılarak PV panel kapasite tahmini için yüksek hassasiyetli bir saha araştırması yapılabilir ancak bu yöntem fazla zaman ve iş gücü gerektirecek ve ekonomik olmayacaktır [3]. Bunun yerine PVGIS ve PVWATTS gibi çeşitli programlar, coğrafi bilgi sistemi verileri, derin öğrenme algoritmaları, nesne tabanlı sınıflandırma yöntemini kullanan LiDAR teknolojisi ve görüntü işleme uygulamaları kullanılmaktadır. Bu yöntemler kullanılarak kurulacak olan sistemin kapasite ve maliyet tahmini için çalışmalar yapılmıştır.

Yenilenebilir enerji kaynaklarının enerji üretimini doğru bir şekilde simüle etmek için Avrupa Komisyonu tarafından geliştirilen PVGIS ve Ulusal Yenilenebilir Enerji Laboratuvarı (NREL)

tarafından geliştirilen PVWatts, ücretsiz ve kullanımı nispeten basit olan iki popüler PV tahmin uygulamasıdır [4]. PVGIS uygulamasının temel amacı, Avrupa ve Afrika için büyük bir veritabanı ve ülke haritaları ile yer istasyonları ve uydulardan elde edilen veriler ile güneş ışınımı hesaplaması sağlamaktır. PVWATTS uygulaması Amerika ile Asya ve Hindistan'ın bir kısmını kapsayacak bölgeye NREL'den elde edilen verileri sunarak kullanıcıya konum, temel tasarım parametreleri ile aylık ve yıllık elektrik üretim tahmini sonuçlarını gösterir [5]. PVGIS ve PVWATTS uygulamalarının temel eksikliği sadece belirli bölgeler için hizmet sağlıyor olmalarıdır. Diğer bir çalışmada, kamuya açık yüksek çözünürlüklü uydu görüntülerinin semantik segmentasyon yöntemi ile şehir ölçeğinde çatı güneş enerjisi potansiyelini tahmin etmek için derin öğrenme tabanlı bir çalışma yapılmıştır [6]. Bölgesel ölçeklerde yapılan bir başka çalışmada kentsel alanlar için nüfus ve bina yoğunluğu, arazi kullanımı gibi kolay elde edilebilir temel istatistiksel veriler ve coğrafi bilgi sistemi ile kentsel alanlarda genel olarak kullanılan temel çatı tiplerini kapsayan verileri kullanarak Pv kapasite tahmini yapılmıştır [7]. İstatistiksel veriye dayalı tahminden farklı olarak, nesne tabanlı sınıflandırma yöntemi ile LiDAR uygulaması kullanılarak çatı tipleri ve yüzeyleri belirlenerek PV panel için uygun alanların tespit bir çalışma yapılmıştır [8]. Ancak LiDAR verilerinin sisteme uygulanması zor ve elde edilmesi ekonomik değildir [9].

Bu çalışmada enlem ve boylam değerleri ile elde edilen uydu görüntüleri kullanılarak belirlenen konum için fotovoltaik sistem kapasitesi ve maliyet tahmini yapılmış ve uygulama sonucu elde edilen değerler ile manuel hesaplama yöntemi ile elde edilen değerler karşılaştırılarak uygulama verimliliği değerlendirilmiştir.

2. MATERYAL VE METOT

Bu çalışma görüntü elde etme, görüntü filtreleme, görüntü ayrıştırma ve çatı alanı kenar belirleme, çatı alanı hesaplama ve fotovoltaik kapasite ile maliyet tahmini olmak üzere 5 aşamadan oluşmaktadır.

2.1 Görüntü Elde Etme

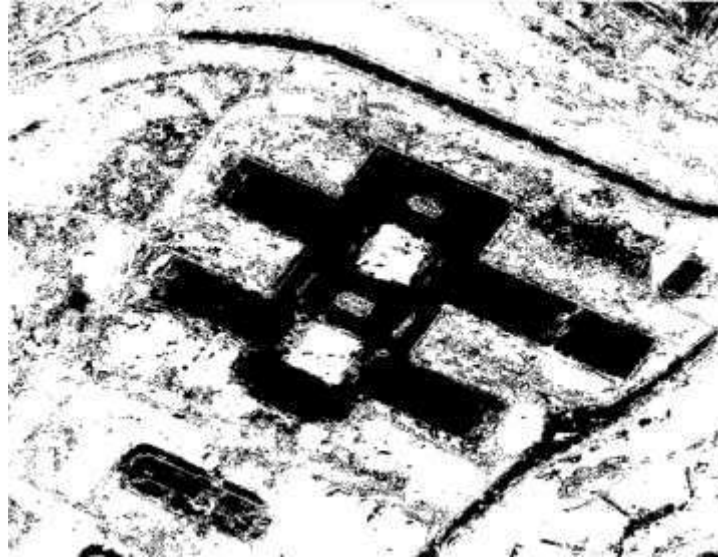
Fotovoltaik kapasitesi tahmin edilmek istenen çatı alanına ait görüntü Google Haritalar Uygulama Programlama Arayüzü (API) aracılığıyla elde edilmiştir. API, bir yazılımın diğer yazılımlar içerisinde belirli/tanımlı fonksiyonları kullanabilmesi adına oluşturulmuş bir arayüzdür. Google haritalar Static API kullanılan API key ile veri isteğine yanıt olarak GIF, PNG veya JPEG formatında görüntü döndürmektedir. Her istek için haritanın konumunu, görüntünün boyutunu, yakınlaştırma düzeyini, haritanın türünü ve haritadaki konumlara bağlı işaretçilerin yerleşimini belirtmektedir. Bu çalışmada arayüz uygulaması ile örnek alan olarak Düzce Üniversitesi Mühendislik Fakültesi uydu görüntüsü 18. yakınlaştırma seviyesinde, 640x640 büyüklüğünde ve PNG formatında elde edilmiş ve veri seti olarak kaydedilmiştir (Şekil 1.).



Şekil 1. Örnek alana ait elde edilmiş uydu görüntüsü.

2.2 Görüntü Filtreleme

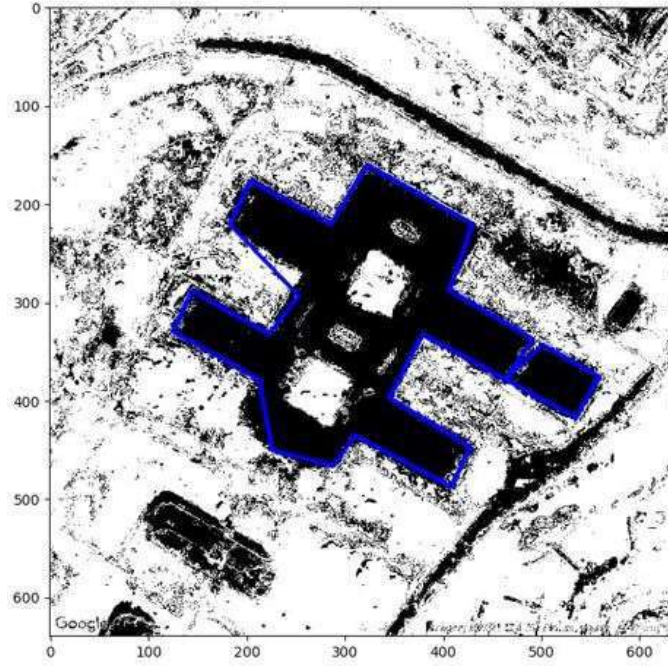
Kırmızı, yeşil, mavi (RGB) renk uzayı renkleri farklı tonlardaki üç ana rengin (kırmızı, yeşil, mavi) karışımı ile tanımlarken HSV renk uzayı ise renk özü, doygunluk ve parlaklık terimleri ile rengi tanımlar. RGB ve HSV karşılaştırıldığında herhangi bir bilgisayarlı görme/görüntü işleme uygulamasında belirli renkteki bir nesneyi ayırt etmek istediğimizde HSV renk uzayını kullanmak daha elverişlidir. Elde edilen görüntü üzerinde çatı kenarları ve alan belirlenmesinde verimli sonuç elde edebilmek amacıyla görüntüye renk özü, doygunluk ve parlaklık (HSV) renk uzayı ile filtreleme uygulanmıştır (Şekil 2.).



Şekil 2. HSV renk uzayı ile filtrelenmiş uydu görüntüsü.

2.3 Görüntü Ayırıştırma ve Çatı Alanı Kenar Belirleme

Görüntü ayırıştırma nesne bulma ve tanıma için görüntü analizinin en önemli adımlarından biridir. Görüntü ayırıştırma bir görüntünün birbirleriyle çakışmayan anlamlı parçalara ayrılması işlemidir [10]. Uygulamada HSV renk uzayı ile filtrelenmiş görüntü öncelikle ön plan ve arka plan parçalarına ayrılmış ve OpenCV uygulama kütüphanesi ile enlem-boylam değerleri ile belirlenen konum merkez alınarak çatı kenar çizgileri elde edilmiştir (Şekil 3.).



Şekil 3. Merkez konuma ait çatı kenarları belirlenmiş görüntü.

2.4 Çatı Alanı Hesaplama

Elde edilen uydu görüntüsünde enlem değeri ve yakınlaştırma seviyesi değerleri ile görüntüdeki her bir pikselin metrekare cinsinden büyüklüğü hesaplanmıştır. Uydu görüntülerinde alan hesabı yapılırken Dünya'nın şeklinden dolayı her enlem değeri için piksel büyüklüğü değişmektedir. Dünyanın çapının 6378137 metre olduğu varsayımı ile piksel büyüklüğü ve alanı elde edilmiştir. Piksel alanı elde edildikten sonra kenar çizgisi içerisinde kalan toplam piksel sayısı elde edilmiş ve toplam çatı alanı belirlenmiştir.

2.5 Fotovoltaik Kapasite ve Maliyet Tahmini

Sistem fotovoltaik kapasite tahmini yapılırken çalışmanın ana amacı çatı alanı tahmini üzerinden hesaplama yapabilmek olduğundan çatı tipi, yönü ve eğimi net olarak elde edilmediğinden bu değerler için bölgeler için ortalama katsayılar belirlenmiş ve verimli sonuç elde edebilmek amaçlanmıştır. Maliyet tahmini karşılaştırması ise toplam fotovoltaik panel sayısı üzerinden yapılmıştır. Elde edilen örnek alana ait uydu görüntüsü için uygulama çıktısı ve manuel hesaplama yöntemi ile elde edilmiş değer Tablo 1'de gösterilmiştir.

Tablo 1. Manuel Hesaplama ve Uygulama Çıktısı Sonuçları.

	Çatı Alanı (m ²)	Panel Sayısı	Günlük Enerji Üretimi (kWp)	Yıllık Enerji Üretimi (MWp)
Manuel Hesaplama	11850	2920	3270	1177
Uygulama Çıktısı	11300	2784	3118	1122

Elde edilen sonuçlara göre alan hesabı tahmininde %95.35, panel sayısına göre maliyet tahmininde ise %97.09 oranında doğru sonuç elde edilmiştir.

3. SONUÇ VE ÖNERİLER

Bu çalışma uydu görüntüsü üzerinden çatı alanı belirlenmesi ve fotovoltaik kapasite tahmini ile değerlendirme yapabilmek amacıyla hazırlanmıştır. Çalışma sonucunda tahmini panel sayısı elde edilerek manuel hesaplama sonuçları ile karşılaştırma yapılmıştır. Karşılaştırma

sonuçlarına göre uydu görüntüsü üzerinden görüntü ayrıştırma yöntemi ile fotovoltaik kapasite tahmininin alternatif bir çözüm yöntemi olabileceği görülmüştür. Uygulamaya çatı tipi belirlenmesi, adres üzerinden konum elde ederek tahmin yapılması ve çatı eğimi belirlenmesi eklenerek daha verimli sonuçlar elde edilebilir.

KAYNAKLAR

- [1] Mardani, A., Jusoh, A., Zavadskas, E. K., Cavallaro, F., & Khalifah, Z. (2015). Sustainable and renewable energy: An overview of the application of multiple criteria decision making techniques and approaches. *Sustainability*, 7(10), 13947-13984.
- [2] Gassar, A. A. A., & Cha, S. H. (2021). Review of geographic information systems-based rooftop solar photovoltaic potential estimation approaches at urban scales. *Applied Energy*, 291, 116817.
- [3] Li, P., Zhang, H., Guo, Z., Lyu, S., Chen, J., Li, W., ... & Yan, J. (2021). Understanding rooftop PV panel semantic segmentation of satellite and aerial images for better using machine learning. *Advances in Applied Energy*, 4, 100057.
- [4] Psomopoulos, C. S., Ioannidis, G. C., Kaminaris, S. D., Mardikis, K. D., & Katsikas, N. G. (2015). A comparative evaluation of photovoltaic electricity production assessment software (PVGIS, PVWatts and RETScreen). *Environmental Processes*, 2(1), 175-189.
- [5] Šuri, M., Huld, T. A., & Dunlop, E. D. (2005). PV-GIS: a web-based solar radiation database for the calculation of PV potential in Europe. *International Journal of Sustainable Energy*, 24(2), 55-67.
- [6] Zhong, T., Zhang, Z., Chen, M., Zhang, K., Zhou, Z., Zhu, R., ... & Yan, J. (2021). A city-scale estimation of rooftop solar photovoltaic potential based on deep learning. *Applied Energy*, 298, 117132.
- [7] Wiginton, L. K., Nguyen, H. T., & Pearce, J. M. (2010). Quantifying rooftop solar photovoltaic potential for regional renewable energy policy. *Computers, Environment and Urban Systems*, 34(4), 345-357.
- [8] Huang, Y., Yu, B., Hu, Z., Wu, J., & Wu, B. (2012, June). Locating suitable roofs for utilization of solar energy in downtown area using airborne LiDAR data and object-based method: A case study of the Lujiazui region, Shanghai. In *2012 Second International Workshop on Earth Observation and Remote Sensing Applications* (pp. 322-326). IEEE.
- [9] Baluyan, H., Joshi, B., Al Hinai, A., & Woon, W. L. (2013). Novel approach for rooftop detection using support vector machine. *International Scholarly Research Notices*, 2013.
- [10] GÜVENÇ, U., ELMAS, Ç., & DEMİRCİ, R. (2008). Renkli görüntülerin otomatik ayrıştırılması. *Politeknik Dergisi*, 11(1), 9-12.

INVESTIGATION OF EROSION CORROSION OF DIFFERENT BIOMATERIALS BY FINITE ELEMENT ANALYSIS

FARKLI BIYOMALZEMELERİN EROZYON KOROZYONUNUN SONLU
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ABSTRACT

Biomaterials are natural or synthetic materials that are used to fulfill or support the functions of living tissues in the human body and that come into contact with body fluids (blood, etc.) periodically or continuously. Biomaterials are essential for the survival of people suffering from acute heart disease, arthritis, osteoporosis, and other joint complications, as well as corrosion of biomaterials. In this study, it is aimed to determine the effect of liquid fluid on erosion corrosion in 304 stainless steel, 316L stainless steel and Ti6Al4V elbow pipes using AnsysWorkbench Explicit Dynamics module which is computer aided and based on finite element. SolidWorks program was used for 3 dimensional studies considering elbow pipe design. Water properties and physical conditions were applied to the 3 dimensional solid model in the pipe flow analysis. At the end of the analysis, erosion amounts of liquid fluid formed in pipes with different material properties were obtained and evaluations were made considering the changes in corrosion rate in elbow pipes.

Keywords: 304 stainless steel, Ti6Al4V, polyurethane, erosion corrosion, finite element analysis

ÖZET

Biyomalzemeler, insan vücudundaki canlı dokuların fonksiyonlarını yerine getirmek ya da desteklemek amacıyla kullanılan, belirli aralıklarla veya sürekli olarak vücut akışkanlarıyla (kan vb.) temas eden doğal ya da sentetik malzemelerdir. Biyomalzemeler, akut kalp hastalıkları, artrit, osteoporoz ve diğer eklemlerle komplikasyonlarından muzdarip insanların hayatta kalması için gerekli olduğu gibi biyomalzemelerin korozyonunda oldukça önemlidir.

Bu çalışmada, 304 paslanmaz çelik Ti6Al4V ve poliüretan dirsek borularda sıvı akışkanın erozyon korozyonuna olan etkisi bilgisayar destekli sonlu eleman tabanlı AnsysWorkbench Explicit Dynamics modülü kullanılarak araştırılmıştır. Dirsek boru tasarımı göz önüne alınarak 3 boyutlu çalışmalar için SolidWorks programı kullanılmıştır. Boru içi akış analizlerinde 3 boyutlu katı modele su özellikleri ve fiziki şartlar uygulanmıştır. Analiz sonunda, sıvı akışkanın

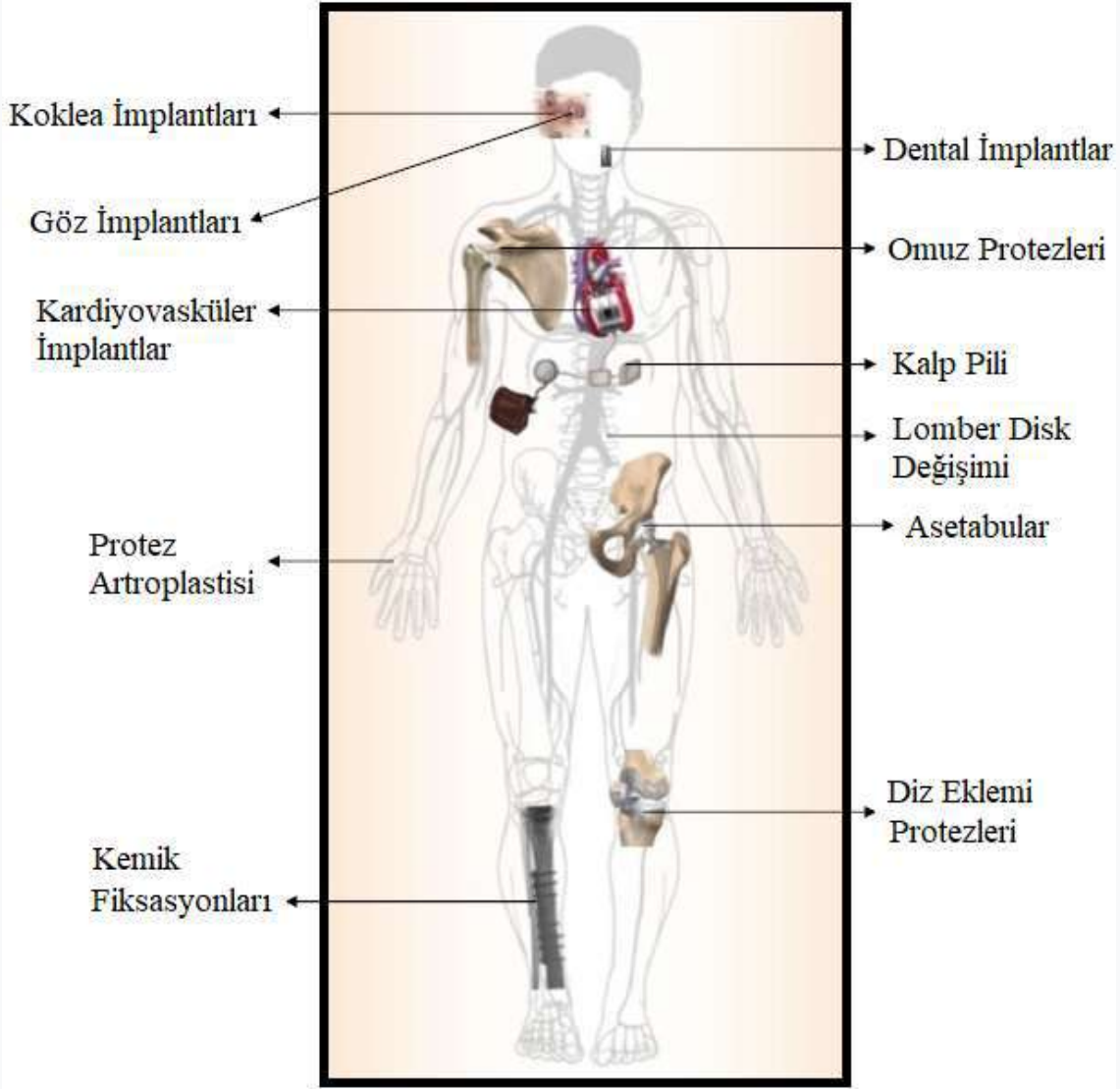
farklı malzeme özelliklerine sahip borularda oluşturduğu erozyon miktarları elde edilmiş ve dirsek borulardaki korozyon oranındaki değişimler gözüne alınarak değerlendirmeler yapılmıştır.

Anahtar Kelimeler: 304 paslanmaz çelik Ti6Al4V ve poliüretan, erozyon korozyonu, sonlu elemanlar analizi

1. GİRİŞ

Tıp alanında malzeme denilince biyolojik sistemler ile temas halinde kullanılan doğal veya sentetik malzemelerin özellikleri ve uygulamaları akla gelmektedir. Bu malzemeler yaygın olarak biyomalzeme olarak adlandırılmaktadır. Biyomalzemeler tıp, kimya, biyoloji ve malzeme bilimlerini kapsayan ve yaklaşık yarım asırdan fazladır gelişimine devam eden bir alandır. Temelini mühendislik prensiplerinden almakta olup hem tanısal hem de terapi amacıyla kullanım yönleri mevcuttur. Biyomalzemeler ilk başta sadece medikal uygulamalarda kullanılmasına rağmen sonraları kültürde hücre büyütmek, klinik laboratuvarında kan proteinlerinin analizini yapmak, biyoteknolojik uygulamalar için biyomoleküllerin işlenmesi için ekipmanlarda ve benzeri uygulamalarda kullanılmaya başlanmıştır. Farklı alanlarda kullanılan bu malzemelerin ortak kullanım alanının oluşturulmasında biyolojik sistemler ile sentetik veya değiştirilmiş doğal malzemeler arasındaki etkileşim sağlanmıştır. Tıbbi uygulamalarda, biyomalzemeler nadiren izole malzemeler olarak kullanılır, ancak daha yaygın olarak cihazlara veya implantlara entegre edilir. Fakat hem malzemelerin alıcı üzerindeki etkisi hem de cihaz üzerindeki etkisi nedeni ile cihaz arızasına yol açabilmektedir. Ayrıca, bir biyomalzeme her zaman nihai fabrikasyon, sterilize edilmiş formu bağlamında değerlendirilmelidir [1,2].

Biyomalzemelerin tarihi 4000 yıllara dayanmaktadır. Mısırlılar ve Romalılar dikişler için keten bezi, dişçilik uygulamaları için altın ve demir ve ayak parmağı değişimi için ahşap kullanmışlardır. Ancak bunların korozyon sorunu hakkında çok az bilgiye sahiptiler. 2. Dünya Savaşı'ndan sonra kullanılmaya başlanana naylon, teflon, silikon, paslanmaz çelik ve titanyum diğer malzemelerden bazılarıydı. Halihazırda, daha iyi tanı araçlarının mevcudiyeti ve cerrahi prosedürler kadar materyaller hakkındaki bilgilerdeki gelişmeler ile implantoloji daha büyük bir önem kazanmıştır. Biyoimplantlar, diş hekimliği, ortopedi, plastik ve rekonstrüktif cerrahi, oftalmoloji, kardiyovasküler cerrahi, beyin cerrahisi, immünoloji, histopatoloji, deneysel cerrahi ve veteriner hekimliğinde yaygın olarak kullanılmaktadır (Şekil 1) [3].



Şekil 1. İnsan uygulaması için biyomalzemeler [3]

Günümüzde metal tornalama, kemik delme, kemik vidalama, su jeti işlemi, implant malzemelerinin yorulma davranışı, COVID-19 ve diğer enfeksiyonların simülasyonlarının yanısıra implant malzemelerinin optimal konfigürasyonu gibi süreçleri çözmek için bilgisayar destekli sonlu elemanlar analizi (FEA) kullanılmıştır [4-17].

Bu tür uygulamalarda bilgisayar destekli simülasyon araçları kullanarak akışkanın oluşturacağı korozyon tahribatı önceden tahmin edilerek farklı çözüm yöntemleri bulunabilir. Genel olarak, dirsek boruda oluşan erozyon korozyon davranışı ticari hesaplamalı akışkanlar dinamiği kodu FLUENT kullanılarak incelenmiştir. Bu çalışmada,

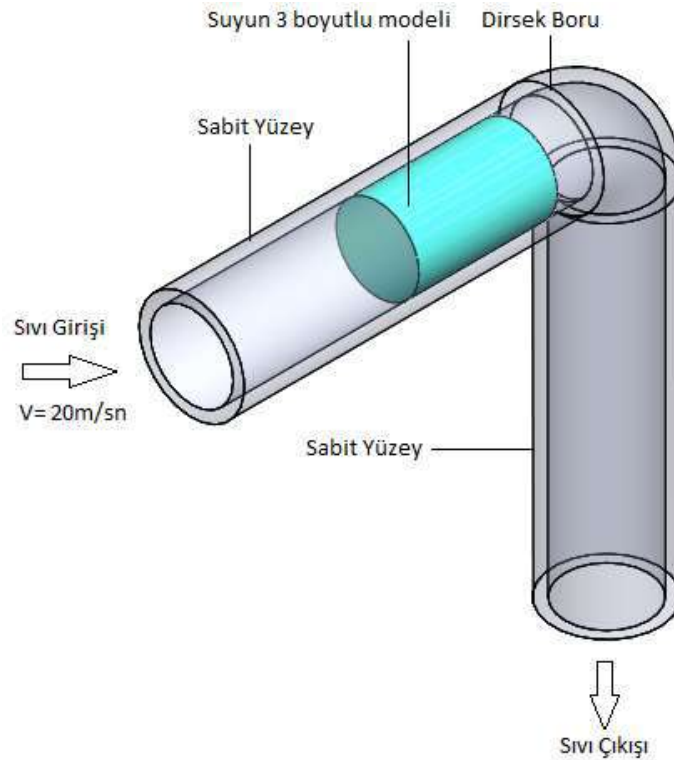
304 paslanmaz çelik Ti6Al4V ve poliüretan gibi biyomalzemelerin seçildiği dirsek borularda sıvı akışkanın erozyon korozyonu olan etkisinin bilgisayar destekli sonlu eleman tabanlı AnsysWorkbench Explicit Dynamics modülü kullanılarak araştırılmıştır. Dirsek boru tasarımı göz önüne alınarak 3 boyutlu çalışmalar için SolidWorks programı kullanılmıştır. Boru içi akış analizlerinde 3 boyutlu katı modele su özellikleri ve fiziki şartlar uygulanmıştır. Analiz sonunda, sıvı akışkanın farklı biyomalzeme özelliklerine sahip borularda oluşturduğu erozyon miktarları elde edilmiş ve dirsek borulardaki korozyon oranındaki değişimler gözüne alınarak değerlendirmeler yapılmıştır.

2. ÜÇ BOYUTLU MODELLEME VE DİNAMİK ANALİZ

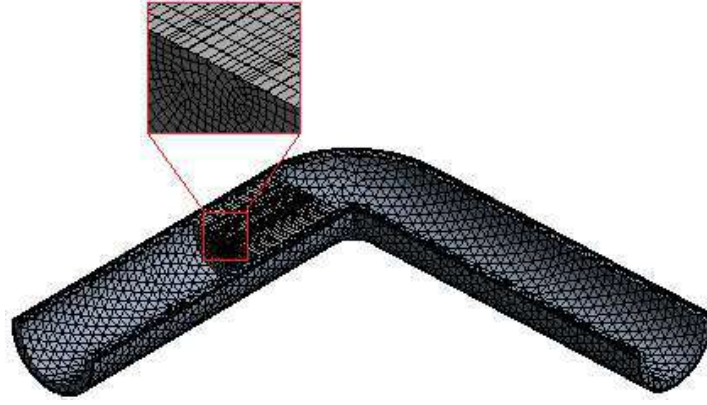
Bu çalışmada, dirsek borunun 3 boyutlu modeli, Şekil 2’de görüldüğü gibi, SolidWorks programı kullanılarak oluşturulmuştur. Bilgisayar destekli analizler AnsysWorkbench yazılımı kullanılarak gerçekleştirildi. 3D CAD modelleri, sonlu eleman modelini hazırlamak için AnsysWorkbench Explicit Dynamics modülü aktarıldı. AnsysWorkbench’de yük, sınır koşulları ve malzeme modelleri tanımlanmıştır. Sonlu elemanlar analizi (SEA) özellikle makine ve cihazların optimum tasarımlarının geliştirilmesi için çok önemlidir. Deneysel veya analitik sonuçların doğrulanması için güvenilir bir teknik olarak da kullanılır.

2.1. Yükleme ve Sınır Şartları

Şekil 3’ de görüldüğü gibi, SEA’ de dirsek boru için üçgen eleman, su modeli için dörtgen eleman türü kullanılarak ağ işlemi gerçekleştirilmiştir. SEA modelinde 22393 düğüm, 37200 eleman bulunmaktadır. Dirsek boru için eleman boyutu 2 mm olarak seçilirken, su modeli için 1mm olarak seçilmiştir. Dirsek boru dış yüzeyinden sabitlenirken, su girişi kısmından 20 m/sn hızlı gönderilmektedir. Dirsek borusu olarak kullanılan 304 paslanmaz çelik Ti6Al4V ve poliüretan malzemelerine ait özellikler Tablo 1’de verilmiştir. Dirsek borusu ile su modeli arasındaki temas türü sürtünmesiz olarak seçilmiştir. Explicit Dynamics analiz için gerekli olan Steinberg guinan strength ve Shock EOS Linear modelleri, AnsysWorkbench malzeme kütüphanesindeki her bir malzemenin default değerlerinden elde edilmiştir. Dinamik analizleri çözmek için çok fazla zaman gerektiğinden analiz süresi 0.0015 sn olarak seçilmiştir.



Şekil 2. Dirsek borunun 3 boyutlu modeli



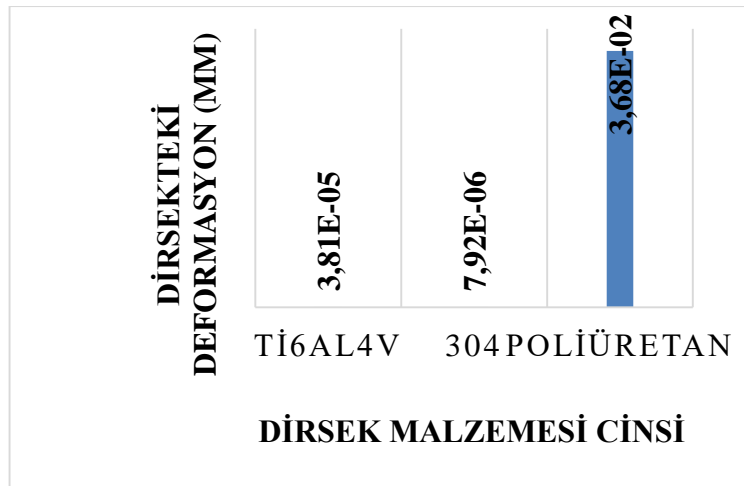
Şekil 3. Dirsek boru ve su modelinin ağ yapısı

Tablo 1. SEA’de kullanılan malzemelerin mekanik özellikleri [18]

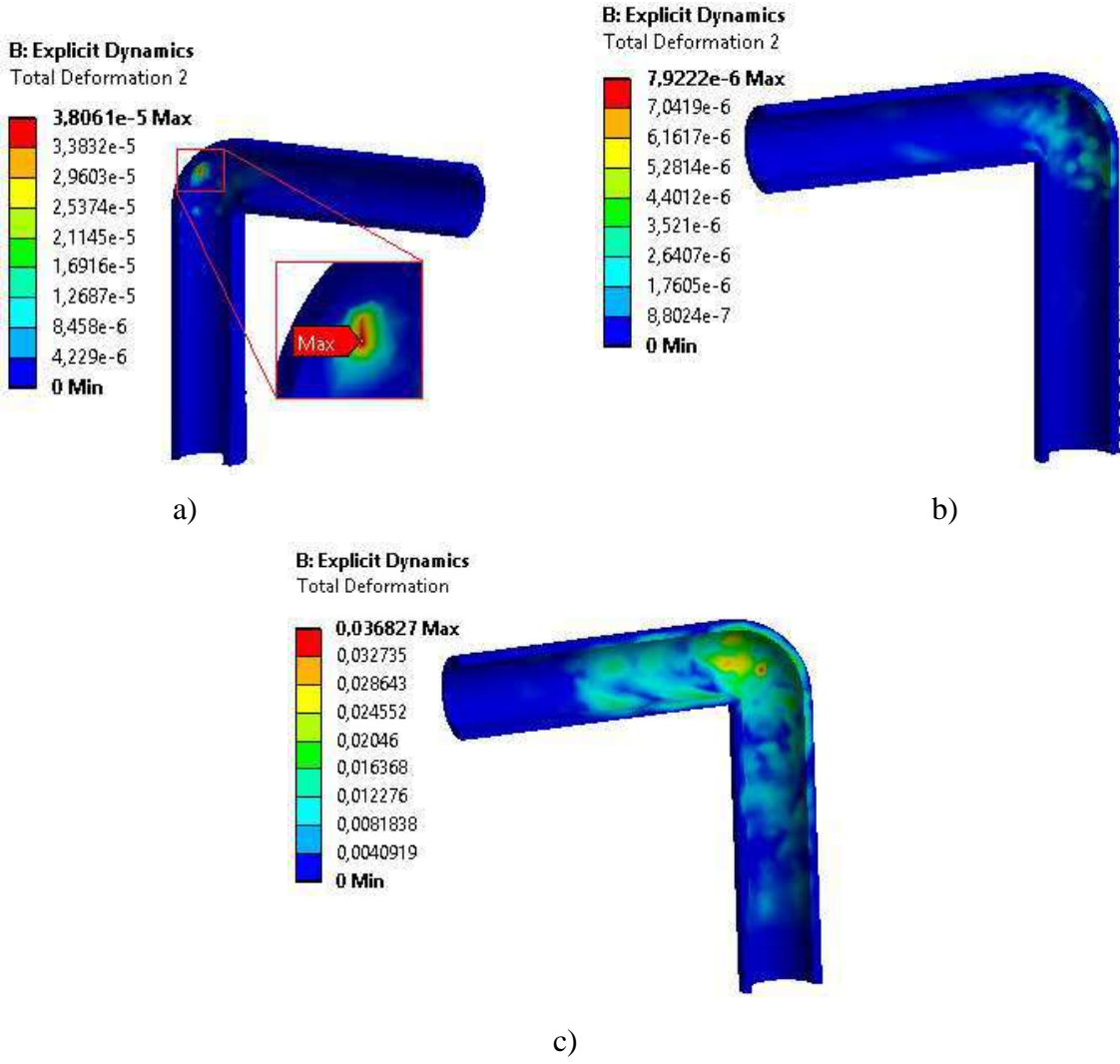
Parametreler	Ti6Al4V	304 paslanmaz çelik	Poliüretan	Water
Yoğunluk (kg/m ³)	4419	7900	1265	998
Kayma Modülü (Pa)	4,19e10	7,7e10	5e6	1e-06

3. SONUÇLAR

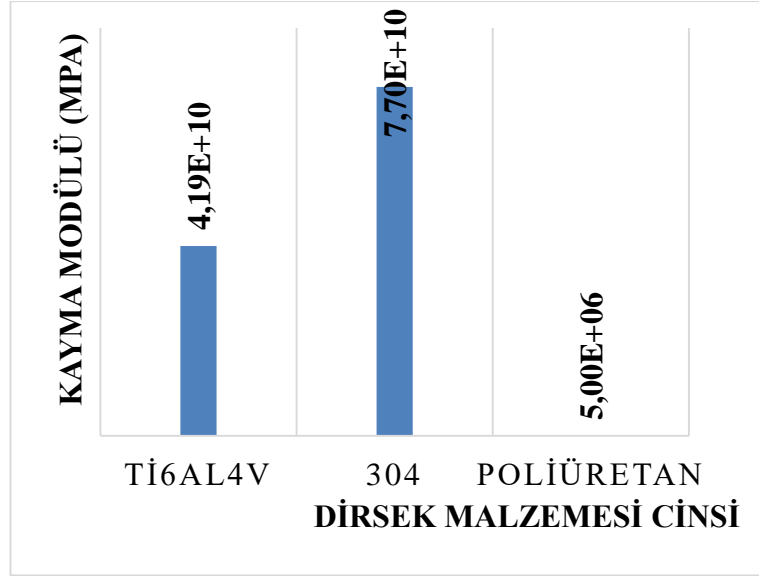
Analiz sonucunda farklı malzemelere ait dirsek borularda oluşan deformasyon (erozyon) değerleri Şekil 4’ de ve bunların şekilsel olarak görünüşleri ise Şekil 5’de verilmiştir. Ti6Al4V malzemesine ait dirsek boruda oluşan deformasyon, $3,81e-5$ mm, 304 paslanmaz çelik malzemesine ait dirsek boruda oluşan deformasyon, $7,92e-6$ mm ve poliüretan malzemesine ait dirsek boruda oluşan deformasyon ise $3,68e-02$ olarak hesaplanmıştır. Bu durum Eşitlik (1)’deki gibi malzemelerin kayma modülleri ile ilişkilendirilebilir ve Kayma modülü, elastikiyet modülü ve poisson oranı arasında eşitlikteki gibi bir bağıntı vardır. Kayma modülü, elastikiyet modülü gibi malzemenin dayanımı ile ilgilidir. Elastikiyet modülü dolayısıyla kayma modülü arttıkça malzemenin şekil değiştirmesi yani deformasyona uğraması daha geç gerçekleşecektir. Şekil 6’da görüldüğü gibi en yüksek kayma modülüne sahip 304 paslanmaz çelik, Şekil 4’de en düşük deformasyona uğrayan malzemedir.



Şekil 4. Dirsek borularda oluşan deformasyon (erozyon) değerleri



Şekil 5. Dirsek borularda oluşan deformasyon değerleri, a) Ti6Al4V, b) 304 paslanmaz çelik, c) poliüretan



Şekil 6. Farklı malzemelerin kayma modülleri

$$E = 2\sigma(1 + \nu) \quad (1)$$

Burada;

E = Elastikiyet Modülü (Pa)

σ = Kayma Modülü (Pa)

4. DEĞERLENDİRME

Bilgisayar destekli sonlu eleman tabanlı gerçekleştirilen bu çalışmada, farklı malzemelere sahip dirsek borularda meydana gelen erozyon korozyonu sıvı akışkanın dirsek boru üzerinde oluşturduğu deformasyon miktarı hesaba katılarak çözülmüştür. Sonuçlar irdelendiğinde, malzemelerin kayma modüllerinin erozyon korozyonu üzerinde etkili olduğu anlaşılmıştır. Bu çalışmada kullanılan malzemelerden 304 paslanmaz çelik dirsek borusunun daha yüksek kayma modülüne sahip olması onun daha az deformasyon ve dolayısıyla daha az erozyon korozyonuna uğradığı saptanmıştır. Poliüretan malzemesine sahip dirsek borunun daha düşük kayma modülüne sahip olması daha yüksek erozyon korozyonuna uğramasına sebep olmaktadır. Bu çalışmada gelecekte yapılması planlanan damar içi stentlerde erozyon korozyonu çalışmalarına temel oluşturacaktır.

5. KAYNAKÇA

1. Ratner BD, Allan S. Hoffman BDRFJSJEL, Hoffman AS, Knovel, Biomaterials Sf, Schoen FJ, Lemons JE (2004) Biomaterials Science: An Introduction to Materials in Medicine. Elsevier Science,
2. Akil Birkan Selçuk, Arif Gök, Sermet İnal, Gök K (2021) Biyomekanik. Seçkin Yayıncılık, Ankara



3. Manivasagam G, Dhinasekaran D, Rajamanickam A (2010) Biomedical Implants: Corrosion and its Prevention -A Review. *Recent Patents on Corrosion Science* 2:40-54. doi:10.2174/1877610801002010040
4. Gok A, Gok K, Bilgin MB (2015) Three-dimensional finite element model of the drilling process used for fixation of Salter–Harris type-3 fractures by using a K-wire. *Mech Sci* 6 (2):147-154. doi:10.5194/ms-6-147-2015
5. Gok K (2015) Development of three-dimensional finite element model to calculate the turning processing parameters in turning operations. *Measurement* 75:57-68. doi:https://doi.org/10.1016/j.measurement.2015.07.034
6. Gok K, Inal S (2015) Biomechanical comparison using finite element analysis of different screw configurations in the fixation of femoral neck fractures. *Mech Sci* 6 (2):173-179. doi:10.5194/ms-6-173-2015
7. ERDEM M, GOK K, GOKCE B, GOK A (2017) NUMERICAL ANALYSIS OF TEMPERATURE, SCREWING MOMENT AND THRUST FORCE USING FINITE ELEMENT METHOD IN BONE SCREWING PROCESS. *Journal of Mechanics in Medicine and Biology* 17 (01):1750016. doi:10.1142/s0219519417500166
8. Gok K, Inal S, Gok A, Pinar AM (2017) Biomechanical effects of three different configurations in Salter Harris type 3 distal femoral epiphyseal fractures. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* 39 (4):1069-1077. doi:10.1007/s40430-016-0666-8
9. Inal S, Gok K, Gok A, Uzumcugil AO, Kuyubasi SN (2018) Should we really compress the fracture line in the treatment of Salter–Harris type 4 distal femoral fractures? A biomechanical study. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* 40 (11):528. doi:10.1007/s40430-018-1448-2
10. Gok K, Inal S, Urtekin L, Gok A (2019) Biomechanical performance using finite element analysis of different screw materials in the parallel screw fixation of Salter–Harris Type 4 fractures. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* 41 (3):143. doi:10.1007/s40430-019-1640-z
11. Pirhan Y, Gök K, Gök A (2020) Comparison of two different bowel anastomosis types using finite volume method. *Computer Methods in Biomechanics and Biomedical Engineering* 23 (8):323-331. doi:10.1080/10255842.2020.1722809
12. Türkes E, Erdem M, Gok K, Gok A (2020) Development of a new model for determine of cutting parameters in metal drilling processes. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* 42 (4):169. doi:10.1007/s40430-020-2257-y
13. ADA HD, ERDEM M, GOK K (2021) COMPUTATIONAL FLUID DYNAMICS SIMULATION OF EROSION-CORROSION IN ABRASIVE WATER JET MACHINING. *Surface Review and Letters* 28 (05):2150031. doi:10.1142/s0218625x21500311
14. Gök K, Selçuk AB, Gök A (2021) Computer-Aided Simulation Using Finite Element Analysis of Protect Against to Coronavirus (COVID-19) of Custom-Made New Mask Design. *Transactions of the Indian Institute of Metals*. doi:10.1007/s12666-021-02227-4
15. GOK K INVESTIGATION USING FINITE ELEMENT ANALYSIS OF EFFECT ON CRATER GEOMETRY OF DIFFERENT ABRASIVE TYPES IN ABRASIVE



- WATER JET MACHINING. *Surface Review and Letters* 0 (0):2150060. doi:10.1142/s0218625x21500608
16. Gok K Investigation of the use of silicone pads to reduce the effects on the human face of classical face masks used to prevent from COVID-19 and other infections. *Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering* 0 (0):09544089211019581. doi:10.1177/09544089211019581
 17. Gok K, Erdem M, Kisioglu Y, Gok A, Tumsek M (2021) Development of bone chip-vacuum system in orthopedic drilling process. *Journal of the Brazilian Society of Mechanical Sciences and Engineering* 43 (4):224. doi:10.1007/s40430-021-02959-w
 18. AnsysWorkbench Material Library.

MICROSTRUCTURE ANALYSIS AND CHARACTERIZATION OF AZ91 BIOMATERIALS PRODUCED BY DIE CASTING

BASINÇLI DÖKÜM İLE ÜRETİLEN AZ91 BIYOMALZEMELERİN MİKROYAPI ANALIZİ VE KARAKTERİZASYONU

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ABSTRACT

AZ91 is a magnesium-based alloy and has recently been preferred as a biomaterial. The main reason for its preference is that it is biodegradable. Other reasons are; Magnesium exhibits good biocompatibility and is an essential element for the body. It has superior mechanical properties compared to recently developed polymer and ceramic-based biodegradable implant materials, and its elasticity is close to bone tissue. In the study, microstructure and hardness analyzes of the samples produced by pressure casting in different parameters were made. The change in grain structure was determined by changing the parameters of pressure, temperature and nozzle inlet velocity. The most suitable production process was selected in terms of optimum process parameters and mechanical properties.

Keywords: AZ91, biomaterials, microstructure, mechanical properties

ÖZET

AZ91, magnezyum bazlı bir alaşımdır ve son zamanlarda biyomalzeme olarak tercih edilmektedir. Tercih edilmesinin temel nedeni biyolojik olarak bozunabilir olmasıdır. Diğer sebepler ise; magnezyumun iyi biyo uyumluluk sergilemesi ve vücut için gerekli bir element olmasıdır. Son zamanda geliştirilen polimer ve seramik bazlı biyobozunur implant malzemelerine göre üstün mekanik özelliklere sahip olması, elastikiyeti kemik dokusuna yakın malzeme olmasıdır. Çalışmada, farklı parametrelerde basınçlı döküm üretilen numunelerin mikroyapı ve sertlik analizleri yapılmıştır. Tane yapısındaki değişim, basınç, sıcaklık ve meme giriş hızı parametreleri değiştirilerek belirlenmiştir. Optimum proses parametreleri ve mekanik özellikler açısından en uygun üretim prosesi seçilmiştir.

Anahtar Kelimeler: AZ91, biyomalzemeler, mikroyapı, mekanik özellikler

1. GİRİŞ

Engin (2013) , bu çalışmada; AZ91 magnezyum alaşımının dayanımı ve şekillendirilebilirlik özelliklerinin düşük olması sebebiyle bu özellikleri iyileştirmek için alaşıma belirli oranlarda Bi, Sb, Sr ve Sn elementler ilave edilmiştir. 420°C'de homojenleştirme ve 8, 16, 32 saat çökeltme sertleşmesi ısıl işlemi uygulayarak alaşımın sertlik ve mikro-yapı özellikleri incelenmiştir. Vanlı (2007), Yapı malzemesi olarak kullanılan metaller içerisinde en hafif olanı magnezyumdur. Birçok endüstri kollarında (otomotiv, havacılık gibi) plastik kadar hafif olması

ve metal kadar dayanıklı olması sebebiyle tercih edilmektedir. Bu malzemenin döküm kabiliyetinin iyi olması sebebiyle Mg alaşımlarının basınçlı döküm yöntemi ile üretimi, hızla büyüyen universal olarak kendine yer bulmuştur. Otomasyona uygunluğu yönüyle, magnezyum alaşımlarının basınçlı dökümü, büyük hacimli malzemelerin üretimi için kullanılan uygun bir yöntemdir. Hatalı parça veya kalıp tasarımı, alaşım içindeki segregasyonun kötü etkileri hata etkenlerini meydana getirmektedir. mekanik özellikleri iyi, düşük poroziteli ve hatasız parçalar üretmek için; yüksek enjeksiyon basınçlarında, düşük döküm sıcaklıklarında, uygun kalıp sıcaklıklarında ve optimum akış hızları ile döküm işleminin yapılması gerekmektedir. Ünal (2008) Bu çalışmada, AZ91 magnezyum alaşımının döküm özelliklerinin iyileştirilmesi amacıyla, alaşıma yüzey aktif (Sn, Pb), yüzey aktif olmayan (Si, Fe, Cu) ve aşılama elemanları (Zr, Ti) eklenmiştir. Argon ve CO₂+SF₆ gazları alaşımın döküm pratiğine etkisi ile birlikte ilave edilen elementlerin kalıp sıcaklığı, akıcılık, sıcak yırtılma ve mekanik özelliklere etkileri araştırılmıştır. Düşük miktarda eklenen Sn, Pb, Si, Fe, Cu, Zr ve Ti elementlerinin hepsi çekme dayanımına olumlu etki yapmışken bu elementlerin miktarının artması ile Si hariç çekme dayanımına olumlu etkileri de azalmıştır. Si oranının artması ile alaşımın çekme dayanımı artmıştır. Düşük miktarda Pb ilavesi % uzamayı artırırken Sn, Fe ve Ti % uzamayı düşürmüştür. AZ91 alaşımına Sn, Pb, Fe, Cu, Zr ve Ti ilavesi sertlik ve uzamayı düşürmüştür. Yüksek miktarda (%2) Si hem sertliği hem de uzamayı artırmıştır. Serçe (2015), basınçlı döküm metodunda, enjeksiyon hızı, döküm sıcaklığı kalıp sıcaklığı ve kalıp yüzey pürüzlülüğü gibi parametrelerdeki değişiklik ürünün kalitesine doğrudan etki ettiği bilinmektedir. Bu sebepten dolayı döküm simülasyon programları kullanılarak, döküm işlemini gerçekleştirmeden önce farklı parametrelerle simülasyon işlemleri yapılarak en uygun dizayn belirlenmiş olacaktır. Bu çalışmada, dişli kutusu parçası modellenerek simülasyon işlemleri tamamlanmıştır. Böylece en uygun döküm dinamik ve termal parametrelerinin belirlenmesi işlemi gerçekleştirilmiştir. Simülasyon programında farklı Enjeksiyon hızı, kalıp sıcaklığı, döküm sıcaklığı ve pürüzlü ve pürüzsüz değerleri seçilerek simülasyon işlemleri gerçekleştirilmiştir. Bu simülasyon programında elde edilen sonuçlar neticesinde en uygun döküm parametreleri belirlenmiştir. Bu çalışmada belirlenen uygun parametreler, Enjeksiyon hızı 2 m/s, döküm sıcaklığı 1053 K ve kalıp sıcaklığı 573 K şeklinde belirlenmiştir. Karaahmet (2013), günümüzde Magnezyum alaşımlarının hafif olmasından dolayı otomotiv, havacılık gibi birçok endüstri kollarında kullanımı artarak birçok sektörün ilgisini çekmektedir. Magnezyum alaşımları içerisinde en çok kullanılan alaşım AZ91 alaşımıdır. Fakat Mg alaşımlarının üretimi sadece döküm metoduyla yapılmakta, dövme yöntemiyle üretimi yapılmamaktadır. AZ91 alaşımının son yıllarda sıcak dövme yöntemleri üzerine çalışmalar yapılmıştır. Bu çalışmada, AZ91 Mg alaşımının farklı sıcaklıklarda deformasyon yeteneği incelenmektedir. Deformasyon yeteneğinin belirlenmesi için Çekme testi kullanılmaktadır. AZ91 alaşımının döküm, homojenizasyon ve T6 ısıl işlemi uygulanmış üç farklı yapısına, farklı sıcaklıklarda çekme testi yapılmıştır. T6 işlemi ilk önce 420 °C'de 12 saat bekletilmekte ve su verilerek soğutulmaktadır. Ardından 215 °C'de 4 saat bekletilerek yapay yaşlandırılmaktadır. Homojenizasyon işlemi 415 °C'de 12 saat bekletilerek uygulanmaktadır. 25 °C, 250 °C, 350 °C ve 400 °C sıcaklıklarda Çekme testi yapılmaktadır. Bu sıcaklıklarda elde edilen veriler sonucunda, en yüksek mukavemet değerine 25 °C'de yapılan deneylerde ulaşılmış olup, ancak çekme testi sıcaklığı arttıkça mukavemet değerleri sürekli düşmüştür. 250, °C 350 °C ve 400 °C sıcaklıkta gerinim değerlerinin arttığı yani deformasyon yeteneğinin arttığı görülmüş olup 25 °C sıcaklıkta ise gerinim değerleri çok düşük seviyeye ulaşmıştır. Gerinim değerinin Döküm numunelerin ve T6 numunelerin yüksek sıcaklıkta arttığı ve en yüksek gerinim değeri 400 °C'de 0,51 ile T6 numuneden elde edilmektedir. Fakat homojenize numunelerin 250 °C'de en yüksek gerinim değerine elde edilmiştir. Döküm numunelerin gerinim değerleri, intermetalik gevrek bir mikro yapıya sahip olmasına rağmen sıcaklıkla arttığı fakat T6 numuneler kadar yüksek değerlere çıkamadığı görülmektedir. Numunelerin gerinim değerlerine göre deformasyon yeteneği

yapılan deneyler sonucunda incelenmektedir. En yüksek gerinim değeri T6 numunelerinden elde edilmektedir. Döküm ve T6 numunelerinin gerinim değeri homojenize numunelerin gerinim değerlerine göre çok daha yüksek değerlerdedir.

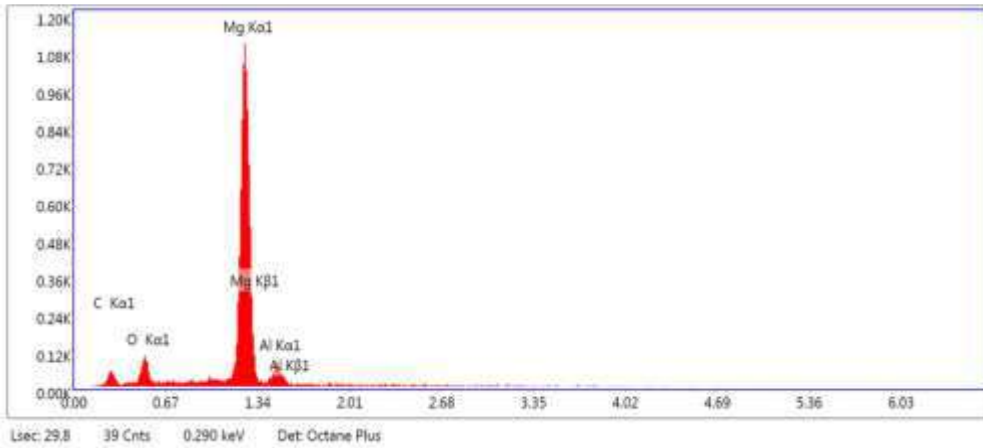
Bu çalışmada ise, farklı parametreler kullanılarak soğuk basınçlı döküm yöntemi ile AZ91 biyomalzemesi üretilmiştir. Tane yapısındaki değişim ve sertlik ölçümü yapılarak tane yapısının mekanik özelliklere etkisi araştırılmıştır.

2. MALZEME VE YÖNTEM

Bu çalışmada, AZ91 Magnezyum alaşımının; soğuk hazneli Magnezyum enjeksiyon makinası ile standartlara uygun kalıplara çeşitli işlem parametrelerinin (döküm sıcaklığı, kalıp içi basınç ve yolluk giriş hızı) değiştirilerek üretilmiştir. Farklı işlem parametrelerinde dökümü yapılmış üç farklı numuneye ve geleneksel döküm yöntemi ile dökümü yapılmış numunelere uygulanan, çekme testi, sertlik testi, aşınma testi ve mikro yapı incelenmesiyle basınçlı döküm yöntemi ve geleneksel döküm yöntemi ile üretilmiş numunelerin mekanik özellikleri ve tane boyutları bakımından kıyaslanmasını içermektedir. Bu sebeple farklı döküm parametrelerinde AZ91 alaşımların üretimi ve üretilen alaşımların mikro yapı ve mekanik testleri çalışmanın ana başlıklarını oluşturmuştur.

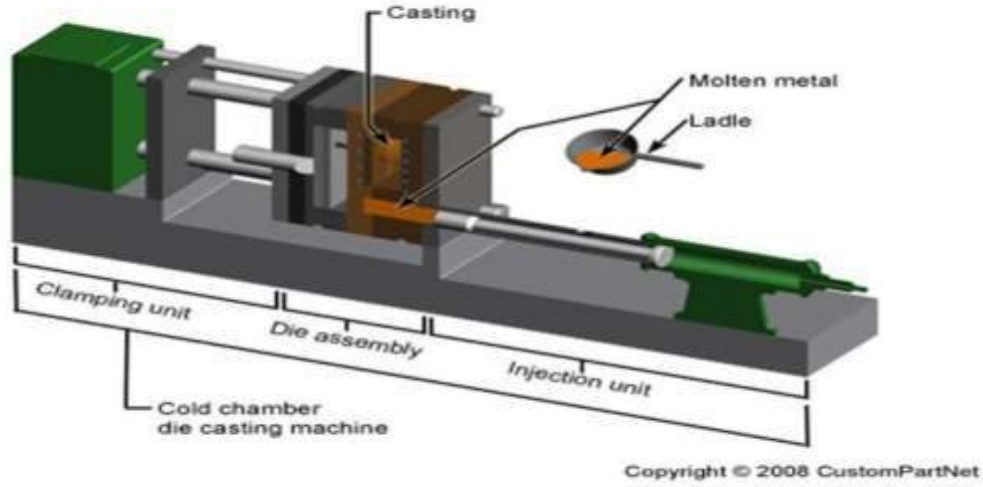
Çizelge 1. AZ91 Malzemesinin Kimyasal İçeriği

Mg	Al	Cu	Ca	Zn	Mn
88	8.50	Max. 0.025	Max. 0.010	0.45	0.17



Şekil 1. AZ91 XRD Analizi

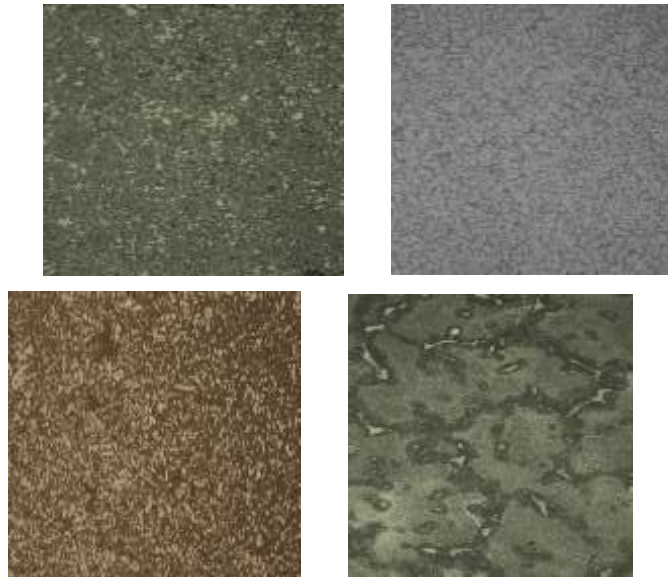
AZ91 Magnezyum alaşımlarının presleme işlemi Yıldız Teknik Üniversitesi'nin makine bölümü basınçlı döküm laboratuvarında yapılmıştır. Farklı döküm parametrelerinde üretilen AZ91 alaşımından elde edilen numunelerin ve geleneksel döküm yöntemi ile üretilen numunelerin çekme testi, sertlik testi ve metalografik analizleri Çemaş Döküm A.Ş. laboratuvarlarında gerçekleştirilmiştir. Basınçlı döküm yöntemi ile AZ91 Magnezyum alaşımına, farklı döküm parametreleri (döküm sıcaklığı, kalıp içi basınç ve yolluk giriş hızı) uygulanarak üretilen parçalara, sertlik testi ve mikro yapı analizi uygulanarak alaşımların mekanik ve metalografik özellikleri tespit edilmiştir. Şekil 2'de soğuk kameralı basınçlı döküm yöntemi şematik resmi verilmiştir.



Şekil 2. Soğuk kameralı basınçlı döküm yöntemi şematik gösterimi

3. DENEYSEL SONUÇLAR

Basınçlı döküm yönteminde döküm işlem parametreleri doğru seçildiğinde soğuma hızının geleneksel döküm yöntemlerine göre hızlı olmasından dolayı ince taneli yapılı ürün elde edilmektedir. Geleneksel döküm yöntemlerinde soğuma hızı basınçlı döküme göre daha yavaş olduğundan iri taneli yapı elde edilmektedir. (34). Numunelerin mikro yapıların görüntülenmesi Çemaş Döküm Sanayi A.Ş. kalite kontrol laboratuvarında Nikon Eclipse MA100 optik mikroskobu kullanılmıştır. Tane boyutu ölçümünde Metalim görüntü analiz programı kullanılmış olup, ASTM E112 standardına göre çizgi kesişme yöntemi ile ölçümler gerçekleştirilmiştir. Metalografik numune hazırlama süreçleri gerçekleştirilmiş olup yüzey parlatma ve dağlama işlemi sonrası optik mikroskop yardımı ile görüntü alınmıştır. SEM cihazından elde edilen sonuçlar Şekil 3’de verilmiştir.



Şekil 3. AZ91 Malzemelerinin Mikroyapı Analizi (X200)

Sertlik testi uygulaması, numuneye 5 mm bilye çapı ile 75 kg kuvvet uygulanarak,30 saniye sürede numunelerin üç farklı noktasından alınan sertlik değerlerinin ortalaması alınarak, her numunenin sertlik değerleri belirlenmiştir. Çizelge 2’de elde edilen sertlik değerleri verilmiştir.

Çizelge 2. Numunelerin Sertlik Testi Sonuçları

Numune Numarası	Basınçlı Döküm İşlem Parametreleri			Ölçülen Sertlik Değeri (HB)
	Döküm Sıcaklığı(°C)	Kalıp İçi Basınç (Bar)	Yolluk Giriş hızı(m/s)	
1	650	1000	30	69,72
2	650	1000	60	73,30
3	670	1000	45	80,90
4	Geleneksel Döküm Yöntemi ile Elde Edilmiş Numune			64

Soğuk basınçlı döküm parametrelerinden sıcaklık, kalıp iç basıncı ve yolluk giriş hızı değiştirilerek elde edilen ASTM standartlarındaki numunelerine çekme testi uygulanmıştır. Sıcaklık değişimi 650-670 °C aralığında değişirken basınç 1000 bar da sabit tutulmuştur. Yolluk giriş hızı ise 30-45-60 m/s aralığında farklı denemeler yapılmıştır. Sonuçlar incelendiğinde giriş hızının artmasıyla AZ91 alaşımındaki sertlik ve uzama değerlerinin arttığı gözlenmektedir. Bu durum yüksek yolluk giriş hızına sahip dökümlerde daha ince taneciklerinin yapı içinde yer alması ile açıklanabilir.

Döküm sıcaklığı parametresinin incelenen parametreler içerisinde en güçlü etkiye sahip olduğu görülmektedir. Yüksek sıcaklıklarda yalnızca gözenek miktarı azalmamakta, aynı zamanda yapının tamamı ve mikro yapısal ölçekte mekanik özelliklerin belirgin şekilde iyileştiği gözlenmektedir.

4. SONUÇLAR

- Uygun basınçlı işlem parametreleri seçildiğinde tane yapısı kontrol edilerek istenilen mekanik özellikler elde edilebilir.
- Geleneksel döküm yöntemlerinde soğuma hızı, basınçlı döküm yöntemine göre daha yavaş olduğundan, basınçlı döküm yönteminde ince taneli yapı oluşmasından dolayı yüksek mekanik özellikler elde edilmiştir.
- Tane sınırları deformasyon sırasında dislokasyon hareketlerine engel olduğundan ince taneli malzemenin mukavemeti kaba taneli malzemeye göre artmaktadır.
- Magnezyum alaşımlarının basınçlı döküm yöntemi ile üretilen numunelerin sertlik değerlerindeki artış gözlenmiştir.

TEŞEKKÜR

Çalışmaya MMF.A3.17.003 numaralı BAP projesi kapsamında gerçekleştirilmiş olup Kırşehir Ahi Evran Üniversitesi BAP birimine teşekkür ederiz.



KAYNAKÇA

- ASM Specialty Handbook, Magnesium and Magnesium Alloys, 1999.
- Engin, A, 2013, AZ91 magnezyum alaşımına farklı oranlarda alaşım elementlerinin ilavesi ile uygulanan ısıtıl işlemin mikroyapı ve sertlik üzerine etkilerinin incelenmesi, Yüksek Lisans Tezi, Karabük Üniversitesi Fen Bilimleri Enstitüsü.
- Vanlı, A.S., (2007). Magnezyum Alaşımının Basınçlı Dökümde İşlem Faktörlerinin Araştırılması, Yüksek lisans Tezi, YTÜ Fen Bilimleri Enstitüsü, İstanbul.
- Akdoğan,A, 2008, Magnezyum ve Alaşımaları Ders Notları, Yıldız Teknik Üniversitesi,İstanbul.
- Vanlı, A.S., (2013). Magnezyum Alaşımının Basınçlı Dökümünde Ürün Kalitesine Etki Eden Proses Parametrelerinin Optimizasyonu, Doktora Tezi, YTÜ Fen Bilimleri Enstitüsü, İstanbul.
- ASM Handbook Volume 2, 1996, Properties and Selection: Nonferrous Alloys and Special Purpose Materials, ASM International Handbook Committee, United States of America.
- Gutman, E.M., Unigovski, Y., Levkovich, M., Koren, Z., Aghion, E. ve Dangur, M., 1997, Influence of Technological Parameters of Permanent Mold Casting and Die Casting on Creep and Strength of Mg Alloy AZ91D, Materials Science and Engineering, 234-236: 880.
- Aarstad K., 2004. Protective Films on Molten Magnesium, PhD. Thesis, Norwegian University of Science and Technology, Department of Materials Technology, Trondheim.
- Li, N., 2004 ,Automotive Magnesium Applications and Life Cycle EnvironmentalAssesment, 3rd International Conference on SF6 and the Environment 1-26, Scottsdale, Arizona

SÜRDÜRÜLEBİLİR GİRİŞİMCİLİK ÖRNEĞİ: GÜNEY ADANA GİRİŞİMCİ KADINLAR TARIMSAL KALKINMA KOOPERATİFİ

A CASE STUDY ON SUSTAINABLE ENTREPRENEURSHIP: SOUTH ADANA
WOMEN ENTREPRENEURS AGRICULTURAL DEVELOPMENT COOPERATIVE

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ÖZET

Sürdürülebilir enerji kaynakları tüm dünyada olduğu gibi Türkiye’de de daha fazla tartışılmaya ve araştırılmaya başlanmıştır. Sürdürülebilir girişimcilik, sürdürülebilir kalkınma ve inovasyon ile girişimciliğin bağlantı noktasındadır. Girişimcilik tarihi açısından sürdürülebilir girişimcilik, yeni bir yöntem, yeni bir pazar ya da örgütlenme nedeniyle yaratıcı yıkımın günümüzdeki yansıması olarak kabul görmektedir. Ekonomik ve sosyal kalkınma açısından büyük önem taşıyan sürdürülebilir girişimciliği açıklamaya yönelik pek çok model bulunmaktadır. Ancak sürdürülebilir girişimciliğin başarısının örgüte, paydaşlara, topluma, yerel yönetimlere ve merkezi yönetime bağlı olması nedeniyle bu çalışmada sürdürülebilir girişimcilikte kültürün önemine dikkat çeken ve O’Neill Jr, Hershauer, and Golden (2009) tarafından geliştirilen bütüncül değer önermesi temel alınmıştır. Bütüncül değer önermesinin çalışmanın temelini oluşturmasıyla, girişimin yarattığı parasal ve parasal olmayan değerlerin yanı sıra yerel kültürün sürdürülebilir girişimcilikteki yerinin ortaya konulması hedeflenmiştir. Bu hedef doğrultusunda çalışmada dezavantajlı kadınların ev ekonomilerine katkı sağlamak amacıyla 2019’da kurdukları Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi incelenmektedir. Kooperatif, güneş enerjisi ile kurutma tesisini kurarak bin metrekaarelik bir üretim tesisi haline gelmiştir. Söz konusu kooperatif, sürdürülebilir enerji kaynağı ile daha etkili ve verimli üretim yapmakla kalmamış aynı zamanda dezavantajlı kadınlara da istihdam olanağı sağlamıştır. Nitel araştırma yöntemiyle gerçekleştirilen bu çalışmanın, özellikle sürdürülebilir girişimciliğin artırılması ve dezavantajlı kadınların girişimciliğe yönlendirilmesine dair politikalara ve uygulamalara faydalı olması umulmaktadır.

Anahtar kelimeler: Sürdürülebilir girişimcilik, güneş enerjisi ile kurutma tesisi, dezavantajlı kadınlar

ABSTRACT

Sustainable energy sources have been started to be discussed and researched more in Turkey as well as all over the world. Sustainable entrepreneurship is at the cross-section of sustainable development, innovation, and entrepreneurship. In terms of entrepreneurship history, sustainable entrepreneurship is accepted as the current reflection of creative

destruction due to the creation of a new method, a new market, or an organization. There are many models to explain sustainable entrepreneurship, which is of great importance in terms of economic and social development. However, since the success of sustainable entrepreneurship depends on the organization, stakeholders, society, local governments, and central government, this study is based on the holistic value proposition developed by O'Neill, Hershauer, and Golden (2009), which draws attention to the importance of culture in sustainable entrepreneurship. With the holistic value proposition as the basis of the study, it is aimed to reveal the monetary and non-monetary values created by the initiative as well as the importance of local culture in sustainable entrepreneurship. In line with this goal, the South Adana Entrepreneurial Women's Agricultural Development Cooperative, which was established in 2019 to contribute to the home economy of disadvantaged women, is examined in this study. The cooperative has become a production facility of one thousand square meters by establishing a drying facility with solar energy. The cooperative in question not only made more effective and efficient production with its sustainable energy source but also provided employment opportunities for disadvantaged women. It is hoped that this study, which is carried out with a qualitative research method, will be beneficial for policies and practices especially for increasing sustainable entrepreneurship and directing disadvantaged women to entrepreneurship.

Keywords: Sustainable entrepreneurship, solar drying facility, disadvantaged women

GİRİŞ

1987 yılında Birleşmiş Milletler alt komisyonu tarafından yayınlanan “Bizim Ortak Geleceğimiz” adlı raporda sürdürülebilir kalkınma, “bugünün ihtiyaçlarını, gelecek nesillerin kendi ihtiyaçlarını karşılama kabiliyetinden ödün vermeden karşılama yeteneği” olarak tanımlanmıştır (World Commission on Environment and Development, 1987). Tanımda iki anahtar kavram bulunmaktadır. Bunlar ihtiyaçlar ve sınırlılıklardır. İhtiyaçlar ile kastedilen bilhassa önceliklenmesi gereken dezavantajlı grupların ihtiyaçlarıdır. Sınırlılıklar ise çevrenin sadece şu anki değil aynı zamanda gelecek nesillerin de ihtiyaçlarını karşılayacak şekilde ele alınmasıdır. Bu yönüyle sürdürülebilir kalkınma salt ekonomik çıkar yerine, doğal güzelliklerin, suyun ve havanın tüketilmek için birer araç değil, korunması gereken değerler olduğunu savunur.

İnsanların çevre üzerindeki baskısını azaltmak için sürdürülebilirlik temelli yeni yaklaşımlara ihtiyaç duyulmaktadır (Ay Türkmen ve Kılıç, 2020: 2521). Sürdürülebilir kalkınma, sürdürülebilir inovasyonu ile çevresel ve sosyal hedeflere ulaşabilmek için başarılı girişimcileri gerektirir. Sürdürülebilir kalkınmayı sağlayan inovasyon tesadüfen değil, etkili aktörler ve örgütler tarafından gerçekleştirilir. Ana faaliyet alanlarında çevresel ilerleme kaydeden aktörler ve şirketler ise sürdürülebilir girişimciler olarak adlandırılabilir (Schaltegger & Wagner, 2011). Sürdürülebilir girişimciler sürdürülebilir kalkınmanın uygulanmasını teşvik eden yenilikçi aktörlerdir. Dolayısıyla geniş anlamda sürdürülebilir girişimcilik, resmi ve sivil toplum kuruluşlarından, kâr amacı güden ve kâr amacı gütmeyen kuruluşlar da dahil olmak üzere sürdürülebilirlik bağlamında aktörlerin yenilikçi davranışlarını ifade etmektedir. Dar anlamda sürdürülebilir girişimcilik, özel sektörde faaliyet gösteren kişilerin ve örgütlerin çevresel ve toplumsal sorunları önceleyerek ve onları rekabet avantajı olarak tanımlayan yenilikçi davranışlardır (Gerlach, 2003, p. 31). Sürdürülebilir girişimcilik özünde, kitle pazarına yönelik ve toplumun daha büyük bir bölümüne fayda sağlayan sürdürülebilir yeniliklerinin gerçekleştirilmesidir (Schaltegger & Wagner, 2011, p. 225).

Sürdürülebilir kalkınma için sürdürülebilir girişimciliğin varlığı gereklidir. Bu noktada Tilley and Young (2009) sürdürülebilir girişimciliğin özelliklerini şu şekilde özetlemişlerdir:

- Hali hazırdaki ekonomik ve yasal düzenlemeler içinde bir işletmenin var olabilmesi ve varlığını devam ettirebilmesi için öncelikle işletmenin finansal açıdan sürdürülebilir olması gerekir. Sadece çevresel amaçları gözeten ve karlılığı tamamen göz ardı eden bir işletme varlığını sürdürülemez.
- Faaliyet gösterdiği bölgedeki insanları göz ardı eden ve tamamen doğal çevreyi önceleyen bir bakış açısı da sürdürülebilir değildir.
- Tamamen sosyal değerlere odaklanarak çevreyi ve finansal yapıyı göz ardı eden bir bakış açısı da sürdürülebilirlikten uzaktır.

Belirtilen hususlar nedeniyle sürdürülebilir girişimcilik eko-girişimcilik, sosyal girişimcilik ve klasik anlamda karı önceleyen girişimciliğin bir karması olarak yorumlanabilir (Tilley & Young, 2009). Ancak diğer girişimcilik türlerinden farklı olarak sürdürülebilir girişimciliğin altında yatan temel motivasyon çevresel ve toplumsal sorunların çözümüne başarılı bir girişimle katkıda bulunmaktır (Schaltegger & Wagner, 2011). Sürdürülebilir girişimcilik, çevre kirliliğini önlemek, sosyal adaletsizliği ve eşitsizliği düzeltmek için pazar odaklı çözümler sunar. Bu süreçte menfaatleri birbirleriyle çatışan tarafların bulunması ve bunlar arasında uzlaşa sağlayacak çözüm üretme kapasitesine sahip olma, böyle girişimlerin özelliklerindedir. Sadece kar amacından ve işletme sürekliliğinden ziyade gelecek nesilleri gözeterek çözüm önerilerinin geliştirilmesi gerekmektedir.

Kapsamlı bir şekilde sosyo-ekonomik, doğal çevreyi gözeten ve yenilikçi çözümler sunan aktörlerin genellikle bilgi, sermaye, sosyal ağlar itibarıyla bolca kaynağa sahip büyük işletmeler olabileceği düşünülebilir. Ancak alanyazında da belirtildiği üzere (Ashby et al., 2009; Kibler, Fink, Lang, & Muñoz, 2015; Kiselitsa, Shilova, Liman, & Naumenko, 2018) özellikle kırsal ve az gelişmiş alanlarda sürdürülebilir girişimcilik faaliyetleri görece küçük işletmeler tarafından da gerçekleştirilebilmektedir.

Sürdürülebilir girişimciliğin tanımında da yer aldığı üzere doğal kaynakların gelecek nesillere aktarılması motivasyonu, işletme faaliyetlerinde sürdürülebilir enerji kaynaklarının kullanımını gerektirmektedir. Güneş, tabiatın birincil enerji kaynağı iken, halen fosil yakıtlar insanların birincil enerji kaynağını oluşturmaktadır. Sürdürülebilir enerji kaynaklarının başında güneş enerjisi gelmektedir. Sürdürülebilir girişimcilik ile sürdürülebilir enerji kaynaklarını bir arada ele alan çalışmaların genellikle sürdürülebilir enerji kaynaklarına yatırım yapan işletmelere odaklandığı görülmektedir (Stenzel & Frenzel, 2008; Wüstenhagen, Markard, & Truffer, 2003).

1969 yılında kabul edilen Kooperatifler Kanunu'nda kooperatif; "tüzel kişiliği haiz olmak üzere ortaklarının belirli ekonomik menfaatlerini ve özellikle meslek veya geçimlerine ait ihtiyaçlarını işgücü ve parasal katkılarıyla karşılıklı yardım, dayanışma ve kefalet suretiyle sağlayıp korumak amacıyla gerçek ve tüzel kişiler tarafından kurulan değişir ortaklı ve değişir sermayeli ortaklıklar" şeklinde tanımlanmıştır. En az 7 ortak tarafından kurulan kooperatiflerin özellikleri Ticaret Bakanlığı tarafından şu özelliklerle karakterize edilmektedir (Türkiye Cumhuriyeti Ticaret Bakanlığı, 2019):

1. *Gönüllü ve açık üyelik*
2. *Ortakların demokratik kontrolü*
3. *Ortakların ekonomik katılımı*
4. *Özerklik ve bağımsızlık*

5. Eğitim, öğretim ve bilgilendirme

6. Kooperatifler arası işbirliği

7. Toplumla karşı sorumluluk

1895 yılında kurulan, 112 ülkeden 318 örgütteki bir milyardan fazla kooperatif üyesini kapsayan Uluslararası Kooperatifler Birliği'nin (ICA) tanımına göre kooperatif “*ortak ekonomik, sosyal ve kültürel ihtiyaç ve isteklerini gerçekleştirmek için üyeleri tarafından ortaklaşa sahip olunan ve demokratik olarak kontrol edilen insan merkezli işletmelerdir. Değerlere ve ilkelere dayalı işletmeler olarak, insanların uzun vadeli işler ve refah yaratan sürdürülebilir işletmeler yaratmalarına izin veren adalet ve eşitliği ilk sırada ele alırlar. Üreticiler, kullanıcılar veya işçiler tarafından yönetilen kooperatifler, 'bir üye, bir oy' kuralına göre yönetilir*” (ICA, 2021).

Kooperatiflerin tanımları incelendiğinde ortakların eşit bir şekilde oy hakkına sahip olması, sosyal ve kültürel ihtiyaçların göz önünde bulundurulması ve insan merkezli olmaları nedeniyle sürdürülebilir girişimcilikle örtüştüğü görülmektedir. Nitekim sürdürülebilir girişimcilikte de altı çizilen hususlar, eşitlikçi bir şekilde gelecek nesilleri ve bütün olarak dünyayı gözetmedir. Sürdürülebilir girişimcilikte kısa vadede kar getirebilecek faaliyetlerden ziyade paydaşları kapsayan, uzun vadede içinde bulunulan toplumun ve yaşanan ekosistemin refahı göz önünde bulundurulur.

Özellikle tarım kooperatiflerinin pazar payındaki konumları incelendiğinde sektöre göre değişmekle beraber Avrupa Birliği'nde gıda tedarik zincirinin %40'ının tarım kooperatiflerinin oluşturduğu görülmektedir. Amerika'da ise üretilen sütün %75'i kooperatiflerce karşılanmaktadır (Candemir, Duvalaix, & Latruffe, 2021). Türkiye'deki tarımsal kooperatiflerin, çeşitli tarım ürünleri alımları içerisindeki paylarının ortalaması yaklaşık %10'dur. AB'de ise tarımsal kooperatiflerin tarım ürünleri alım payları %50 civarındadır (Karşo, Mevlüt, & Kadakoğlu, 2018). Dolayısıyla, Türkiye'de kooperatif ve üretici birliklerinin arzulan düzeyde etkin olmamasına rağmen sürdürülebilir girişimcilik adına önemli bir potansiyel taşıdığı söylenebilir. Nitekim 800 binden fazla ortağı ile Türkiye'nin en büyük çiftçi kuruluşu olan Türkiye Tarım Kredi Kooperatiflerinin 1 merkez birliği, 17 bölge birliği, 1615 kooperatif, çok sayıda hizmet bürosu ve iştirakleri bulunmaktadır (Türkiye Tarım Kredi Kooperatifleri, 2021).

Küresel Raporlama Girişimi veri tabanında bulunan 168 kooperatifin sürdürülebilirlik beyanlarını inceleyen Yakar Pritchard ve Çalıyurt (2021) sürdürülebilirlik raporlarını sunan kooperatiflerin genellikle bankacılık hizmetleri alanında faaliyet gösterenler ile büyük kooperatifler (%69) olduğunu bulgulamıştır. Küçük işletme grubuna giren kooperatiflerin ise sosyal sorumluluk raporunu sunanlar ise %14,3'tür.

Çanakkale ilinde kooperatif yöneticilerinin yenilenebilir enerji kaynaklarına dair farkındalıklarının incelendiği bir çalışmada en çok bilinen kaynağın güneş enerjisi olduğu belirlenmiştir. Güneş enerjisini, rüzgar, biyogaz takip etmekte, en az bilinen yenilenebilir enerji kaynağı ise dalga, akıntı, gelgittir (Yıldırım & Everest, 2020).

Yenilenebilir enerji ve kooperatifçilik alanında yapılan çalışmalarda model önerisi sunulmuş (Kanlı & Kaplan, 2018), çiftçilerin yenilenebilir enerjiye dair farkındalık düzeyleri (Everest, 2021) incelenmiştir. Türkiye'de tarım kooperatifleri ve yenilenebilir enerji kaynaklarını bir arada ele alan çalışmaların genellikle teorik düzeyde olduğu (Şensöz, 2019) görülmüştür. Kemaliye ilçesinde kooperatif aracılığıyla kurulabilecek bir güneş enerjisi santralının fizibilite etüdünün yapıldığı bir başka çalışmada 200 üyenin yaptığı 1950 dolar ile yaptığı yatırımı 6-9 ay gibi bir sürede geri kazanacağı tespit edilmiştir.

2020 yılı itibariyle SCOPUS veri tabanında bibliyometrik analiz yöntemiyle sürdürülebilir girişimcilik konusunu ele alan 216 makale arasında Türkiye’den herhangi bir çalışma raporlanmamıştır (Terán-Yépez, Marín-Carrillo, del Pilar Casado-Belmonte, & de las Mercedes Capobianco-Uriarte, 2020).

Sürdürülebilir girişimcilik alanında Türkiye’de yapılacak çalışmalar bu yönüyle alanyazına katkı sağlayacaktır. Pratik düzeyde ise özellikle bölgeler arasında kalkınma farkının bulunduğu göz önüne alındığında, başarılı sürdürülebilir girişimcilik örneklerinin yaygınlaştırılmasıyla kalkınma farklarının azaltılırken, sosyal refahın artırılması bunun da çevreyi dikkate alacak şekilde yapılması pek çok farklı paydaş açısından faydalı olacaktır.

Bu nedenle bu çalışmanın amacı bir sürdürülebilir girişimcilik örneği olarak Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi’nin nitel analiz yöntemiyle incelenmesidir. Bu amaç doğrultusunda öncelikle kooperatifle ilgili basında çıkan haberler değerlendirilmiştir. Çalışmanın sonraki aşamasında kooperatifle telefon üzerinden iletişime geçilecektir. Yarı yapılandırılmış mülakat tekniği ile sürdürülebilir girişimcilik sürecinde kooperatif üyelerinin motivasyonları, sürdürülebilirliğe ilişkin algılamaları değerlendirilecektir. Araştırmanın bu aşamasında öncelikle internet üzerinden “Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi” anahtar kelimesiyle tarama yapılmıştır. Yapılan tarama sonucunda 18/11/2021 itibariyle 46 sonuca ulaşılmıştır.

Yapılan inceleme neticesinde Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifinin gerek yerel gerek ulusal basında bilgilendirici ve olumlu örnek şeklinde haber yapıldığı tespit edilmiştir. İlgili haberler incelendiğinde aşağıda belirtilen hususların ön plana çıktığı görülmüştür:

- Kadınların kooperatif aracılığıyla el emeği ürünler üreterek girişimcilik faaliyetinde bulunduğu
- Pandemi döneminde turunçgil reçeline olan talebin artmasına paralel kumkat-kamkat gibi farklı adlarla anılan bir turunçgil reçelinin kooperatifçe üretilerek pazara sunulması
- Erişte üretimi
- Güneş enerji sistemini kullanan bir kooperatif olması
- Ulusal bir televizyon kanalındaki yemek programında kooperatif başkanı olan Suna Çetin’in jüri olarak yer alması
- Kooperatifin ürettiği çeşitli ürünlerin reklamları

SONUÇ VE BULGULAR

Ekonomik kalkınma ile beraber gelecek nesilleri de göz önüne alan aynı zamanda yerel ve yereldeki insanı önceleyen girişimcilik türü sürdürülebilir girişimcilik olarak adlandırılmaktadır. Sürdürülebilir girişimcilikte finansal açıdan sürdürülebilirlik, faaliyet gösterdiği bölgedeki bölge insanı ile beraber doğayı dikkate alma, sosyal değerlere yer verme kriterlerine bakılmaktadır.

Belirtilen kriterler dahilinde pek çok sürdürülebilir girişimcilik örneği bulmak mümkündür. Ancak bu çalışmada “Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi” sürdürülebilir girişimcilik örneği olarak ele alınmıştır. 2019’da kurdukları Güney Adana Girişimci Kadınlar Tarımsal Kalkınma Kooperatifi incelenmektedir. Kooperatif, güneş enerjisi ile kurutma tesisini kurarak bin metrekarelik bir üretim tesisi haline gelmiştir. Söz

konusu kooperatif, sürdürülebilir enerji kaynağı ile daha etkili ve verimli üretim yapmakla kalmamış aynı zamanda dezavantajlı kadınlara da istihdam olanağı sağlamıştır.

Yapılan ön incelemeler neticesinde güneş enerjisinden faydalanarak kurulan meyve-sebze kurutma tesisinin bulunması dikkat çekici bulunmuştur. Adana valiliği tarafından desteklenen bir proje kapsamında kurulan kooperatifin kadınlara iş imkanı sunduğu görülmüştür. Ayrıca internet üzerinden yapılan incelemeler neticesinde kooperatifin olumlu bir algısının olduğu görülmüştür. Pandemi dönemiyle beraber bir turunçgilin reçeline olan artan talep basında en fazla vurgulanan haberdır. Kooperatifin sürdürülebilir enerji kaynağı kullanıyor olmasına ilişkin olarak ise iki haber tespit edilmiştir. Bu yönüyle basında girişimcilik faaliyetinde sürdürülebilir enerji kaynaklarının kullanılıyor olmasından ziyade girişimin kazanç noktasına odaklandığı, vurgunun eko-girişimcilikten ziyade klasik anlamda karı önceleyen girişimcilik çerçevesinde olduğu söylenebilir

Çalışmanın sürdürülebilir girişimcilikte yerel dinamikleri dikkate alan ve sürdürülebilir enerji kaynaklarına yer veren işletmelere faydalı olması umulmaktadır. Nitel araştırma yöntemiyle gerçekleştirilen bu çalışmanın, özellikle sürdürülebilir girişimciliğin artırılması ve dezavantajlı kadınların girişimciliğe yönlendirilmesine dair politikalara ve uygulamalara faydalı olması hedeflenmektedir.

KAYNAKÇA

- Ashby, J., Heinrich, G., Burpee, G., Remington, T., Wilson, K., Quiros, C. A., . . . Ferris, S. (2009). What farmers want: collective capacity for sustainable entrepreneurship. *International Journal of Agricultural Sustainability*, 7(2), 130-146.
- Ay Türkmen, M. & Kılıç, F. (2020). Sürdürülebilir Kalkınma Anlayışına Yönelik Döngüsel Ekonomi Modeli. *Third Sector Social Economic Review*, 55(4), 2538-2556.
- Candemir, A., Duvaleix, S., & Latruffe, L. (2021). Agricultural cooperatives and farm sustainability—A literature review. *Journal of Economic Surveys*, 35(4), 1118–1144.
- Everest, B. (2021). Willingness of farmers to establish a renewable energy (solar and wind) cooperative in NW Turkey. *Arabian Journal of Geosciences*, 14(6), 1-10.
- Gerlach, A. (2003). Sustainable entrepreneurship and innovation. *Corporate Social Responsibility and Environmental Management*, 29-30.
- ICA. (2021). What is a cooperative? Retrieved from <https://www.ica.coop/en/cooperatives/what-is-a-cooperative>
- Kanlı, İ. B., & Kaplan, B. (2018). Yenilenebilir enerji kaynaklarının etkin kullanımı için bir model önerisi: şehir enerji kooperatifleri. *Siyaset, Ekonomi ve Yönetim Araştırmaları Dergisi*, 6(4), 31-42.
- Karşo, B., Mevlüt, G., & Kadakoğlu, B. (2018). Türkiye’de tarımda üretici örgütlenmesinin önemi ve gelişimi. *Akademia Sosyal Bilimler Dergisi*, 1(Özel Sayı), 318-329.
- Kibler, E., Fink, M., Lang, R., & Muñoz, P. (2015). Place attachment and social legitimacy: Revisiting the sustainable entrepreneurship journey. *Journal of Business Venturing Insights*, 3, 24-29.
- Kiselitsa, E. P., Shilova, N. N., Liman, I. A., & Naumenko, E. E. (2018). Impact of spatial development on sustainable entrepreneurship. *Entrepreneurship and Sustainability Issues*, 6(2), 890.



- O'Neill Jr, G. D., Hershauer, J. C., & Golden, J. S. (2009). The cultural context of sustainability entrepreneurship. *Greener Management International*(55).
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business strategy and the environment*, 20(4), 222-237.
- Stenzel, T., & Frenzel, A. (2008). Regulating technological change—The strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity markets. *Energy Policy*, 36(7), 2645-2657. doi:<https://doi.org/10.1016/j.enpol.2008.03.007>
- Şensöz, R. (2019). Yenilenebilir Enerji Kooperatifçiliği Ve Etkileri. *İklim Değişikliği ve Çevre*, 4(2), 10-22.
- Terán-Yépez, E., Marín-Carrillo, G. M., del Pilar Casado-Belmonte, M., & de las Mercedes Capobianco-Uriarte, M. (2020). Sustainable entrepreneurship: Review of its evolution and new trends. *Journal of Cleaner Production*, 252, 119742.
- Tilley, F., & Young, W. (2009). Sustainability Entrepreneurs. *Greener Management International*(55), 79-92.
- Türkiye Cumhuriyeti Ticaret Bakanlığı. (2019). Kooperatif Nedir? Retrieved from <https://ticaret.gov.tr/kooperatifcilik/kooperatifler-hakkinda-bilgiler/kooperatif-nedir>
- Türkiye Tarım Kredi Kooperatifleri. (2021). Köklü Geçmişimiz. Retrieved from <https://www.tarimkredi.org.tr/kurumsal/koklu-gecmisimiz/>
- World Commission on Environment and Development. (1987). *Report of the World Commission on Environment and Development - Our Common Future*. Retrieved from Canada: https://www.un.org/ga/search/view_doc.asp?symbol=A/42/427&Lang=E
- Wüstenhagen, R., Markard, J., & Truffer, B. (2003). Diffusion of green power products in Switzerland. *Energy Policy*, 31(7), 621-632. doi:[https://doi.org/10.1016/S0301-4215\(02\)00147-7](https://doi.org/10.1016/S0301-4215(02)00147-7)
- Yakar Pritchard, G., & Çalıyurt, K. T. (2021). Sustainability Reporting in Cooperatives. *Risks*, 9(6), 117.
- Yıldırım, M., & Everest, B. (2020). Tarımsal Kooperatif Yöneticilerinin İklim Değişikliği ve Yenilenebilir Enerji Farkındalıkları: Çanakkale İli Örneği.

KIRŞEHİR KOŞULLARINDA FARKLI MÜRDÜMÜK (*Lathyrus sativus* L.) VE YULAF (*Avena sativa* L.) KARIŞIM ORANLARININ OT VERİM VE KALİTESİ ÜZERİNE ETKİSİ

EFFECTS ON HAY YIELD AND QUALITY OF DIFFERENT GRASS PEA (*Lathyrus sativus* L.) AND OAT (*Avena sativa* L.) MIXTURES RATIO IN KIRŞEHİR CONDITIONS

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ÖZET

Bu araştırma, Kırşehir ekolojik koşullarında uygun Mürdümük (*Lathyrus sativus* L.) + Yulaf (*Avena sativa* L.) karışım oranlarını belirlemek amacıyla 2021 yılında yürütülmüştür. Araştırma tesadüf blokları deneme desenine göre üç tekrarlamalı olarak kurulmuştur. Denemede her iki türün saf ekimleri ile üç farklı karışım oranının (%25 Mürdümük + %75 Yulaf, %50 Mürdümük + %50 Yulaf, %75 Mürdümük + %25 Yulaf) bazı verim ve kalite özellikleri incelenmiştir. Araştırmada sonuçlarına göre; en yüksek toplam yaş ot verimi %25 M + %75 Y karışımından (2096.8 kg da⁻¹), en yüksek toplam kuru ot verimi yalın yulaftan (653.2 kg da⁻¹), en yüksek toplam ham protein verimi de %50 M + %50 Y (87.8 kg da⁻¹) karışımından elde edilmiştir. Karışımlarda mürdümük oranı arttıkça ham protein oranı artmış, ADF ve NDF oranı azalmıştır. Sonuç olarak, Kırşehir ve benzer ekolojilerde yüksek verim ve kaliteli ot elde etmek için %50 M + %50 Y karışımı önerilebilir.

Anahtar kelimeler: Yulaf, mürdümük, karışım, verim, kalite

ABSTRACT

This study was conducted to determine the proper mixture ratio of grass pea (*Lathyrus sativus* L.) and oat (*Avena sativa* L.) under the ecological conditions of Kırşehir in 2021. This trial was set up according to a randomized block design with three replicates. This study covered some yield and quality measurement of pure sowing of both species and their different mixture ratios

(25% Grass pea + 75% Oat, 50% Grass pea + 50% Oat, 75% Grass pea + 25% Oat). Results showed that the highest total green forage yield was obtained from the mixture of 25% G + 75% O (2096.8 kg da⁻¹), the highest total dry matter yield was obtained from pure oat, the highest crude protein yield was obtained from 50% G + 50% O (87.8 kg da⁻¹). Crude protein ratio increased and ADF and NDF ratio decreased as the grass pea ratio increased in the mixtures. To conclude, the mixture of 50% G + 50% O could be recommended for Kırşehir and similar ecologies to obtain high yield and quality hay.

KEYWORDS: Oat, grasspea, mixture, yield, quality

GİRİŞ

Mürdümük (*Lathyrus sativus* L.) yüksek protein içeriği, toprağa azot kazandırması ve zayıf drenajlı alanlara uyum sağlayabilmesi nedeniyle hem insan gıdası hem de hayvan yemi olarak kullanılmaktadır (Karadağ vd, 2011). Yulafın (*Avena sativa* L.) yumuşak saplı ve bol yapraklı olması, organik ve mineral maddelerce zenginliği hayvan beslenmesinde önemini artırmaktadır (Ay ve Mut, 2017; Tuna ve Orak, 2007). Mürdümük bitkisinin gövdesinin zayıf olması ve destek bitki olmadığı durumlarda ortaya çıkan yatma nedeniyle hem biçimi zorlaşır hem de alt kısımda çürümeler görülür. Baklagil yem bitkilerinde görülen bu sorunun çözümü için tahıllarla karışık ekilmesi önerilmektedir. Tahılların dik gelişme göstermesi, mürdümük gibi baklagillerin tahıllara tutunması sonucunda yatma, çürüme ve yaprak kayıpları azalmaktadır. Karayel (2015), Kırşehir ekolojik koşullarında aralarında Karadağ mürdümük çeşidinin de olduğu mürdümük hatlarının verim ve kalite özelliklerini belirlemek amacıyla yürüttüğü çalışmada yeşil ot verimlerini 419-700 kg da⁻¹, kuru ot verimlerini 137-250 kg da⁻¹ arasında tespit etmiştir. Çetin (2017) Kırşehir ekolojik koşullarında Macar fiğini 11 farklı yulaf çeşidi ile %50 : %50 oranından denediği çalışmada yeşil ot verimini 680.0-1209.7 kg da⁻¹, kuru ot verimini 153.8-291.8 kg da⁻¹, kuru otta Macar fiği oranını 46.25-64.97 kg da⁻¹, ham protein oranını %15.75-17.39, ham protein verimini 25.12-48.22 kg da⁻¹, asit deterjan lif oranını (ADF) %25.19-28.79, asit deterjan lignin oranını (ADL) %4.61-6.74, nötral deterjan lif oranını (NDF) 37.87-41.84 kg da⁻¹ arasında olduğunu, ot ve protein verimleri açısından Seydişehir ve Kırklar çeşitlerinin öne çıktığı belirlemiştir. Topçu vd (2020), Bornova ekolojik koşullarında iki farklı fiğ (Kubilay-82 ve Cumhuriyet), bir arpa (Akhisar-98) ve bir yulaf (Faikbey) çeşidi ile bunların karışımlarına farklı hasat zamanlarının verim ve diğer bazı özellikleri üzerine etkisini belirlemek amacıyla yürüttükleri çalışmada yaş ot verimlerini 2380-4350 kg da⁻¹, kuru ot verimlerini 434-1013 kg da⁻¹, ham protein verimlerini 52-175 kg da⁻¹ arasında tespit etmişlerdir. Araştırmacılar ikinci biçim zamanında hasat edilen fiğ (Kubilay) %50 + arpa (Faikbey) %50 karışımı oranının diğer karışımlar ve karışım oranlarından üstün olduğunu ifade etmişlerdir. Verim ve kaliteyi yakalamak için birlikte ekimi yapılan baklagil ve tahıl karışımlarından maksimum ürün elde edilebilmesi, bölgeye uygun tür ve çeşitlerin yanında uygun baklagil+tahıl kombinasyon oranlarının belirlenmesi gerekmektedir. Kırşehir ilinin kaba yem ihtiyacının karşılanmasında tek yıllık baklagil + tahıl karışımlarının önemi çok büyüktür. Mürdümük ve

yulaf karışımları bu amaçla kullanılabilir önemli yem bitkilerindedir. Bu çalışma ile, Kırşehir hayvancılığının en büyük problemi olan kaliteli kaba yem açığının kapatılmasına yönelik olarak, verim ve kalite bakımından uygun, bölgede ekilebilecek Mürdümük ve yulaf karışım oranının belirlenmesi hedeflenmektedir.

MATERYAL VE METOT

Araştırma, 2021 yılı yaz vejetasyon dönemlerinde Kırşehir Ticaret Borsası'nda bulunan uygulama alanlarında yürütülmüştür. Araştırmada Karadağ Mürdümük (*Lathyrus sativus* L.) ve Albatros yazlık yulaf (*Avena sativa* L.) çeşidi deneme materyali olarak kullanılmıştır. Araştırma alanından ekim zamanında alınan örnekler Kırşehir Ahi Evran Üniversitesi Merkezi Araştırma ve Uygulama Laboratuvarında analiz edilmiştir. Analiz sonuçlarına göre arazi toprakları killi-tınlı, tuzsuz, hafif alkali, bitkiler tarafından alınabilir fosfor ve potasyum yönünden zengin, yüksek kireç içeriğine sahip, organik madde miktarı ise düşük düzeydedir (Karaman, 2012). Araştırmanın yürütüldüğü 2021 yılı Nisan, Mayıs, Haziran, Temmuz ayları (18.6°C) ortalama sıcaklığı uzun yılların (17.3°C) üzerinde gerçekleşirken, toplam yağış miktarı (64.6 mm) ise uzun yılların altında (133.4 mm) gözlenmiştir. Deneminin yürütüldüğü üç aylık dönemde nispi nem % 49.3 uzun yıllar ortalaması ise % 57.3'dir.

Tablo 1. Kırşehir ilinin iklim verileri*

AYLAR	Sıcaklık (°C)		Yağış (mm)		Nispi Nem (%)	
	2021	UYO	2021	UYO	2021	UYO
Nisan	12.0	10.9	19.4	42.4	56.5	63.3
Mayıs	18.2	15.4	9.2	45.6	45.3	61.3
Haziran	19.3	19.7	35.1	36.4	55.1	55.5
Temmuz	24.9	23.3	0.9	8.9	40.4	48.9
Ortalama	18.6	17.3	64.6	133.4	49.3	57.3

UYO: Uzun yıllar ortalaması, *T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı Meteoroloji Genel Müdürlüğü.

Ekim 01.04.2021 tarihinde yapılmıştır. Ekim işlemleri yalnız ekimde mürdümük 220 tohum/m² (Karadağ vd, 2012), yulaf ise 500 tohum/m² (Mut vd, 2006) olacak şekilde yapılmıştır. Karışımlarda kullanılan tohumluk miktarı, yalnız ekimde kullanılan tohumluk miktarı ile karışım oranı dikkate alınarak hesaplanmıştır (Önal ve Eğritaş, 2017). Araştırma alanına ekim yapılmadan önce 6 kg da⁻¹ P₂O₅ ve 4 kg da⁻¹ N, kardeşlenme-sapa kalkma döneminde ise 4 kg da⁻¹ N gübre uygulanmıştır (Aydın, 2009). Araştırma, tesadüf blokları deneme desenine göre üç tekrarlamalı olarak kurulmuştur. Araştırmada ikisi yalnız dördü karışım olmak üzere toplam altı konu (Yalnız mürdümük (%100 M), yalnız yulaf (100 Y), %75 mürdümük (M) + %25 yulaf (Y), %50 mürdümük (M) + %50 yulaf (Y) ve %25 mürdümük (M) + %75 yulaf (Y)) incelenmiştir. Her parselde sıralar 20 cm sıra aralığında, 6 sıra olacak şekilde markörle açılarak türler ve karışımlar aynı sıraya elle ekilmiştir. Araştırma konularının biçim zamanları tahıllara

göre belirlenerek; tahıllar çiçeklenme dönemindeyken mürdümük tam çiçeklenme dönemine geldiğinde biçim yapılmıştır. Biçim işlemleri sırasında her parselin kenarlarından birer sıra, parsellerin baş ve sonundan 50 cm'lik kısımları kenar tesiri olarak atılmıştır (Göçmen ve Parlak, 2017). Geriye kalan alandan bitkiler tırpanla biçilmiştir. Tartıldıktan sonra dekara yaş ot verimleri (YOV) hesaplanmıştır. Her parselde biçilen biokütleden alınan 500 gramlık yaş örnekler 60 °C'de sabit ağırlığa gelinceye kadar kurutulmuş, elde edilen değerlerden faydalanılarak kuru ot verimleri (KOV) hesaplanmıştır (Sleugh vd, 2000). Tür ve karışımların azot içerikleri Kjeldahl yöntemiyle belirlenmiş ve bu değerler 6.25 katsayısıyla çarpılarak ham protein oranları (HPO) elde edilmiştir (AOAC, 2005). Kuru ot verimleri ile ham protein oranının çarpılması ile ham protein verimleri (HPV) belirlenmiştir. Asit deterjan lif (ADF) ve nötral deterjan lif (NDF) değerleri ANKOM200 Fiber analiz cihazında belirlenmiştir (Anonim, 2017). Araştırma sonucunda elde edilen veriler, MSTAT-C istatistikî paket programında varyans analizine tabi tutulmuş ve ikili karşılaştırmalar için LSD testi kullanılmıştır (Petersen, 1994).

BULGULAR VE TARTIŞMA

Araştırmada tür ve karışımların yaş ot verimi, kuru madde oranı, kuru ot verimi, ham protein verimi, ADF ve NDF oranı üzerine etkileri istatistikî açıdan ($P<0.01$) çok önemli bulunmuştur (Tablo 2).

Tablo 2. Tür ve karışımların bazı verim ve kalite özellikleri

Tür ve Karışımlar	YOV (kg da ⁻¹)	KMO (%)	KOV (kg da ⁻¹)	HPO (%)	HPV (kg da ⁻¹)	ADF (%)	NDF (%)
%100 M	973.5 c	22.9 e	223.1 c	20.0 a	44.8 c	34.4 d	39.7 e
%75 M + %25 Y	1523.3 b	25.2 d	383.7 b	17.7 b	67.9 b	35.7 c	43.2 d
%50 M + %50 Y	2071.4 a	27.5 c	569.8 a	15.4 c	87.8 a	36.3 bc	46.8 c
%25 M + %75 Y	2096.8 a	29.8 b	626.4 a	13.0 d	81.7 ab	36.9 b	50.3 b
%100 Y	2033.2 a	32.1 a	653.2 a	10.7 e	69.6 b	38.5 a	53.8 a
Ortalama	1839.6	27.5	516.6	15.4	74.8	36.4	46.8
CV	%11.77	%2.90	%12.53	%3.45	%13.66	%1.44	%1.70
LSD (0.05)	385.4**	1.50**	115.9**	0.99**	18.09**	0.98**	1.50**

** : Aynı harfle gösterilen ortalamalar arasındaki farklar $P<0.01$ düzeyinde önemsizdir.

En yüksek yaş ot verimi 2096.8 kg da⁻¹ ile %25 M + %75 Y karışımından, en düşük verim ise 973.5 kg da⁻¹ ile yalın mürdümükten elde edilmiştir. Bulgulara göre %50 M + %50Y, %25 M + %75 Y ve %100 Y istatistikî açıdan birbirinden farksız olan yüksek verim grubunu oluşturmuşlardır. Rakeih vd (2010) karışımlarda baklagil oranının artması ile yeşil ot veriminin azaldığını ifade etmişlerdir. Nitekim baklagil oranının artmasına bağlı olarak yaş ot verimi azalmıştır. Tuna ve Orak (2007), Tekirdağ koşullarında en yüksek yaş ot verimini yalın yulaf (2420 kg da⁻¹) ve %25 Macar fiği+%75 yulaf karışımından (2530 kg da⁻¹) elde etmişlerdir.

Sabancı vd (2016), Kırşehir ekolojik koşullarından aralarında Karadağ mürdümük çeşidini bulduğu mürdümük çeşitleri ile yaptıkları bir araştırmadan 303.4-482.8 kg da⁻¹ arasında yaş ot verimi almışlardır. (Sabancı vd, 2016). Araştırmada yulaf verimine deneme kurulmadan önceki mart ayında düşen 95.2 mm yağış (uzun yıllar ortalaması 36.7) nedeniyle vejetasyon döneminin serin ve yağışlı seyretmesi ve sapa kalkma döneminde atılan azotlu gübre olumlu etki yapmıştır.

Kuru madde oranları bakımından bir baklagil bitkisi olan Mürdümükten en düşük (% 22.9), bir buğdaygil bitkisi olan yulaftan (%32.1) en yüksek kuru madde oranı elde edilmiştir. Tahılların yüksek kuru madde içermeleri beklenen bir sonuçtur. Nitekim karışım oranlarında yulafın oranı arttıkça kuru madde oranı artmış veya diğer bir ifade ile karışımlarda mürdümük oranı arttıkça kuru madde oranı azalmıştır. Bingöl vd (2007) kuru madde oranı bakımından türler arasında farklılıkların olabileceğini ifade etmişlerdir. Gibson (2009) göre, kuru madde oranlarının olgunlaşma dönemiyle doğrusal ilişkisi olması yanında özellikle kurak ve yarı kurak iklimlerde yağıştan da etkilendiğini ifade etmişlerdir. Kuru madde oranlarını Ceri ve Acar (2019) yulaf hat ve çeşitleri ile yaptığı çalışmada %21-36 arasında, Sabancı vd (2016) mürdümük çeşitleri ile yaptığı çalışmada % 24.6-27.6 arasında tespit etmişlerdir.

En düşük kuru ot verimi 223.1 kg da⁻¹ ile mürdümükten, en yüksek kuru ot verimi 626.4 kg da⁻¹ ile %25 M + %75 Y karışımından ve 653.2 kg da⁻¹ ile yalın yulaftan elde edilmiştir. Kuru madde ve yaş ot verimleri üzerinden hesaplanan kuru ot verimlerinde yüksek kuru madde oranına sahip yulaf ve yulaf oranının yüksek olduğu %25 M+%75 Y karışımından yüksek kuru ot veriminin alınması doğal bir sonuçtur. Bu durum Gündüz (2010); Hatipoğlu vd (1999) göre tahılların baklagillere oranla daha fazla oranda kuru madde biriktirmesi ve yüksek karbonhidrat içermeleri ile daha güçlü gelişme göstermelerinden kaynaklanmıştır. Droushiotis (1989) karışımlarda baklagil oranı arttıkça kuru ot veriminin azaldığını ifade etmiştir. Nitekim en düşük kuru ot verimi mürdümükten elde edilmiş ve karışımlarda mürdümük oranı arttıkça kuru ot verimi azalmıştır. Kırşehir koşullarında Yavuz (2017) Seydişehir yulaf çeşidinde 390.0 kg da⁻¹, Sabancı vd (2016) 82.4-160.0 kg da⁻¹, Çetin (2017) 11 yulaf çeşidinin Macar fiği ile %50+%50 karışım oranlarında denediği araştırmada 153.8-291.8 kg da⁻¹ arasında belirlemişlerdir. Karadağ ve Büyükburç (2003) kuru ot veriminin Tokat koşullarında arpa + mürdümük karışım oranlarına bağlı olarak 806-929 kg da⁻¹ arasında değiştiğini tespit etmişlerdir.

Ham protein oranları bakımından en yüksek ham protein oranı yalın ekimi yapılan mürdümükten (%20.0) elde edilirken, en düşük ham protein oranı yalın yulaftan (%10.7) elde edilmiştir. Nitekim baklagillerin ham protein oranları buğdaygillerden daha yüksektir. Mürdümügüm ham protein oranı yüksekliğine bağlı olarak karışımlarda mürdümük oranı arttıkça ham protein oranı da artmıştır. Bu sonuç diğer araştırmacılar tarafından da desteklenmektedir. Nitekim Çağan ve Yılmaz (2015); Yavuz (2017) karışımlarda baklagil oranı arttıkça ham protein oranının arttığını ifade etmişlerdir. Ham protein oranının Tokat ekolojik koşullarında mürdümük çeşitlerinde Karadağ vd (2012) %18.97-26.14, Karadağ ve Büyükburç (2003), % 17.46-22.27, karışık ekimlerde yalın yulaftan Yavuz (2017) Kırşehir koşullarında %

10.27, Göçmen ve Parlak (2017) Çanakkale koşullarında % 11.9 olarak tespit etmişlerdir. Araştırmacıların bulguları arasındaki farklılıklar ekolojik ve iklimsel farklılıklar yanında araştırmalara kullanılan tür ve çeşitlerin karışım oranlarının farklılığından kaynaklanmaktadır.

Ham protein verimi bakımından en düşük ham protein verimi 44.8 kg da⁻¹ ile yalın mürdümükten, en yüksek 87.8 kg da⁻¹ ile %50 M + %50 Y karışımından elde edilirken, %50 M + %50 Y karışımı ile %25 M + %75 Y karışımları birbirinden farksız yüksek istatistiki ham protein verim grubu oluşturmuşlardır. Ham protein veriminin yalın ekimlerde ve karışımlarda farklılık göstermesi ham protein oranı ve kuru ot verimlerinin değişiklik göstermesinden kaynaklanmaktadır. Nitekim ham protein verimi kuru ot verimi ve ham protein oranları üzerinden hesaplanmaktadır. Ham protein verimlerini Karadağ ve Büyükburç (2003) %50 mürdümük ve % 50 arpa karışımından 153 kg da⁻¹. Yavuz (2017) %30 Yem Bezelyesi + %70 Yulaf karışımından 64.2 kg da⁻¹, Ay ve Mut (2017) %30 yulaf + %70 yem bezelyesi karışımından 73.3 kg da⁻¹ ve %40 arpa + %60 yaygın fiğ karışımından 72.4 kg da⁻¹, Sabancı vd (2016) mürdümük çeşitlerinde 17.7-31.5 kg da⁻¹, Dilyaver ve Uzun (2021) yulaf genotiplerinin 22.53-33.17 kg da⁻¹ arasında tespit etmişlerdir.

Yalın ekimi yapılan mürdümükten en düşük (%34.4), yalın ekimi yapılan yulaftan en yüksek ADF (%36.4) oranı elde edilmiştir. Karışımlarda mürdümük oranı artıkça ADF oranı azalmış, buna karşın yulaf oranı artıkça da ADF oranı artmıştır. Lithourgidis vd (2006)'da karışımlarda baklagil oranının armasına bağlı olarak ADF oranının azaldığını ifade etmiştir. Buğdaygillerin baklagillere göre yaprak/sap oranlarının düşük olması yanında hızlı olgunlaşmaları ADF içeriklerinin daha yüksek olmasına sebep olmaktadır (Tan ve Mentеше, 2003). Hücre duvarı yapısal bileşenleri olan selüloz ve ligninden oluşan ADF oranlarını Karadağ vd (2011) mürdümük hatlarında % 33.90-39.04, Yavuz (2017) yulafın yem bezelyeli karışımlarında % 30.33-39.69, Ceri ve Acar (2019) yulaf hat ve çeşitlerinde %37.82-41.75 arasında tespit etmişlerdir.

NDF oranları ile ilgili bulgular ADF oranlarına benzerlik göstermiş bir baklagil yem bitkisi olan mürdümüğün yalın ekiminden % 39.7 ile en düşük, bir buğdaygil bitkisi olan yulafın yalın ekiminden % 46.8 ile en yüksek NDF oranı elde edilmiştir (Tablo 2). Karışımlarda yulaf oranına bağlı olarak ADF oranlarında gözleendiği gibi NDF oranının arttığı gözlenmiştir. Carr vd (2004) en düşük NDF oranı yalın baklagillerden, en yüksek ise yalın ekimi yapılan buğdaygillerden elde etmişlerdir. Buğdaygillerin yapısında hücre duvarı bileşiklerinin baklagillere oranla fazla olması ADF ve NDF gibi hücre duvarı bileşiklerinin yüksek çıkmasına sebep olmuştur. Nitekim Kavut vd (2014) NDF içeriğinin mürdümük oranının artmasına bağlı olarak azaldığını ifade etmiştir. Hücre çeperinin yapısını oluşturan selüloz, hemiselüloz ve ligninden oluşan NDF oranını Karadağ vd (2011) mürdümük hatlarında % 42.63-51.20, Yavuz (2017) yulaf yem bezelyesi karışımlarında % 42.27-52.82 Ceri ve Acar (2019), yulaf hat ve çeşitlerinde %52.79-57.80 arasında olduğunu tespit etmişlerdir.

SONUÇ

Mürdümük ve yulafın yalın ve karışım oranlarının belirlenerek, erken ilkbahar döneminde kaba yem açığının kapatılması katkı sunmak amacıyla yapılan çalışmada yulaf oranının artmasına bağlı olarak yaş ot verimi, kuru ot verimi ve ham protein verimi gibi verim değerleri yanında yem kalite göstergelerinden olan ADF ve NDF oranları da artmıştır. Karışımlarda mürdümük oranı artıkça ham protein oranı artmış, ADF ve NDF oranı azalmıştır. Kuru ot açığının kapatılması açısından % 100 Y, %25 M + %75 Y ve %50 M + %50 Y karışımları, verim ve kalite özellikleri birlikte değerlendirildiğinde ise Kırşehir ve benzer ekolojilerde yüksek verim ve kalitede kaba yem elde etmek için %50 M + %50 Y karışımı önerilebilir.

TEŞEKKÜR

Bu çalışma Ahi Evran Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimince Desteklenmiştir. Proje Numarası: **ZRT.A4.21.032**.

KAYNAKLAR

- Anonim (2017). Analytical Methods Fiber Analyzer A200. www.ankom.com/analytical-methods-support/fiber-analyzer-a200. 15.10.2017.
- AOAC 2005. *Official Methods of Analysis*. Association of Official Analytical Chemists. (18th), (18th ed.) Association of Official Analytical Chemists International, Maryland, USA.
- Ay, İ. ve Mut, H. 2017. Yaygın Fiğ ile Yem Bezelyesinin Arpa ve Yulaf ile Karışımlarında Uygun Karışım Oranının Belirlenmesi. *ÇOMÜ Ziraat Fakültesi Dergisi*, 5:2, 55-62.
- Aydın, A. 2009. Diyarbakır kuru koşullarında bazı tescilli tritikale (*X Triticosecale* Wittmack) çeşitlerinin tarımsal özelliklerinin belirlenmesi. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 19:2, 61-70.
- Bingöl, N. T., Karslı, M. A., Yılmaz, I. H. ve Bolat, D. 2007. The effects of planting time and combination on the nutrient composition and digestible dry matter yield of four mixtures of vetch varieties intercropped with barley. *Turkish Journal of Veterinary and Animal Sciences*, 31:5, 297-302.
- Carr, P. M., Horsley, R. D. and Poland, W. W. 2004. Barley, oat, and cereal-pea mixtures as dryland forages in the northern Great Plains. *Agronomy Journal*, 96:3, 677-684.
- Ceri, S. ve Acar, R. 2019. Konya’da Sulu Şartlarda Yetiştirilen Yulaf Hat ve Çeşitlerinin Ot Verimi ve Bazı Yem Kalite Özelliklerinin Araştırılması. *Bahri Dağdaş Bitkisel Araştırma Dergisi*, 8:1, 26-33.

- Çaçan, E. ve Yılmaz, H. Ş. 2015. Bingöl Koşullarında Değişik Macar Fiği (*Vicia pannonica* Crantz) + Buğday (*Triticum aestivum* L.) Karışım Oranlarının Ot Verimi ve Kalitesi Üzerine Etkileri. *Türk Tarım ve Doğa Bilimleri Dergisi*, 2:3, 290-296.
- Çetin, Y. 2017. Kırşehir koşullarında bazı yulaf çeşit ve hatlarının karışım performanslarının belirlenmesi. Yüksek Lisans Tezi, Ahi Evran Üniversitesi, Fen Bilimleri Enstitüsü, Tarla Bitkileri Ana Bilim Dalı, Kırşehir.
- Dilyaver, S., H ve Uzun, A. 2021. Bursa Ekolojik Koşullarında Yetiştirilen Yulaf (*Avena sativa* L.) Genotiplerinin Tane Verimi ve Bazı Kalite Özellikleri, *Bursa Uludağ Üniversitesi Ziraat Fakültesi Dergisi*, 33(2), s. 293-305
- Droushiotis, D. 1989. Mixtures of annual legumes and small-grained cereals for forage production under low rainfall. *The Journal of Agricultural Science*, 113:2, 249-253.
- Gibson, D. J. 2010. *Grasses and grassland ecology*. Oxford University Press, <https://doi.org/10.2989/10220111003703542>.
- Göçmen, N. ve Parlak, A. Ö. 2017. Yem Bezelyesi İle Arpa, Yulaf ve Tritikale Karışım Oranlarının Belirlenmesi. *ÇOMÜ Ziraat Fakültesi Dergisi*, 5:1, 119-124.
- Gündüz, T. E. 2010. Karaman İli Şartlarında Yetiştirilecek Macar Fiği+Arpa Karışımında Uygun Karışım Oranının Saptanması Üzerine Bir Araştırma. Yüksek Lisans Tezi, Çukurova Üniversitesi, Fen Bilimleri Enstitüsü Tarla Bitkileri Anabilim Dalı, Adana.
- Hatipoğlu, R., Çil, A. ve Gül, İ. 1999. Diyarbakır koşullarında karışım oranının fiğ+ tritikale karışımında ot verimi ve ot kalitesine etkileri üzerinde bir araştırma. *GAPİ. Tarım Kong.*, 26-28.
- Karadağ, Y. ve Büyükburç, U. 2003. Tokat ekolojik koşullarında bazı mürdümük (*Lathyrus sativus* L.) hatlarının verim ve kalite özelliklerinin belirlenmesi. *Gaziosmanpaşa Üniversitesi Ziraat Fakültesi Dergisi*, 20:1, 135-141.
- Karadağ, Y. and Büyükburç, U. 2003. Effects of seed rates on forage production, seed yield and hay quality of annual legume-barley mixtures. *Turkish Journal of Agriculture and Forestry*, 27:3, 169-174.
- Karadağ, Y., Özkurt, M., Akbay, S. ve Kır, H. 2012. Tokat-Kazova ekolojik koşullarında bazı mürdümük (*Lathyrus sativus* L.) hatlarının verim ve verim özelliklerinin belirlenmesi. *International Journal of Agricultural and Natural Sciences*, 5:2, 11-13.
- Karadağ, Y., Yavuz, M., Karaalp, M., Akbay, S. ve Kır, H. 2011. Bazı mürdümük (*Lathyrus sativus* L.) hatlarının Tokat-Kazova ekolojik koşullarında verim ve kalite özelliklerinin belirlenmesi. Türkiye IX. Tarla Bitkileri Kongresi Bildirileri, Cilt III. *IX. Tarla Bitkileri Kongresi*, 12-15.



- Karaman, M. 2012. *Bitki Besleme. Gübretaş Rehber Kitaplar Dizisi:2. Editör: Zengin, M., Toprak ve Bitki Analiz Sonuçlarının Yorumlanmasında Temel İlkeler (Bölüm 12), s. 874.,*
- Karayel, A. İ. 2015. Kırşehir koşullarında sıra arası uygulamalarının bazı mürdümük hatlarının verim ve kalitesine etkisinin belirlenmesi. Yüksek Lisans Tezi Ahi Evran Üniversitesi, Fen Bilimleri Enstitüsü, Tarla Bitkileri Ana Bilim Dalı, Kırşehir.
- Kavut, Y., T., Geren, H., Soya, H., Avcioglu, R. ve Kır, B. 2014. Karışım Oranı ve Hasat Zamanlarının Bazı Yıllık Baklagil Yembitkileri ile İtalyan Çimi Karışımlarının Kışlık Ara Ürün Performansına Etkileri. *Ege Üniversitesi Ziraat Fakültesi Dergisi*, 51:3.
- Lithourgidis, A. S., Vasilakoglou, I. B., Dhima, K. V., Dordas, C. A. and Yiakoulaki, M. D. 2006. Forage yield and quality of common vetch mixtures with oat and triticale in two seeding ratios. *Field Crops Research*, 99:2-3, 106-113.
- Mut, Z., Ayan, I. and Mut, H. 2006. Evaluation of forage yield and quality at two phenological stages of triticale genotypes and other cereals grown under rainfed conditions. *Bangladesh Journal of Botany*, 35:1, 45-53.
- Önal, A., Ö ve Eğritaş, Ö. 2017. Yaygın Fiğ-Tahıl Karışımlarında Ot Verimi, Bazı Kalite Özellikleri ve Rekabetin Belirlenmesi *Tarım Bilimleri Dergisi*, 23:2, 242-252.
- Petersen, R., G., 1994. *Agricultural Field Experiments: Design and Analysis*. CRC Press,
- Rakeih, N., Kayyal, H., Larbi, A. and Habib, N. 2010. Forage potential of triticale in mixtures with forage legumes in rainfed regions (Second and third stability zones) in Syria. *Jordan J. of Agricultural Sci*, 6:2, 194-207.
- Sabancı, C. O., Kır, H., Yavuz, T., Karayel, A. İ. ve Başköy, S. 2016. Farklı sıra arası uygulamalarının Mürdümük (*Lathyrus sativus* L.) ot verimi ve kalitesine etkisi. *Anadolu Ege Tarımsal Araştırma Enstitüsü Dergisi*, 26:2, 1-13.
- Sleugh, B., Moore, K. J., George, J. R. and Brummer, E. C. 2000. Binary legume-grass mixtures improve forage yield, quality, and seasonal distribution. *Agronomy Journal*, 92:1, 24-29.
- Tan, M. ve Menteşe, Ö. 2003. Yembitkilerinde anatomik yapı ve kimyasal kompozisyonun besleme değerine etkileri. *Journal of the Faculty of Agriculture*, 34:1.
- Topçu, G. D., Kır, B., Çelen, A. E. ve Kavut, Y. T. 2020. Değişik Fiğ+ Tahıl Karışımları İçin En Uygun Karışım Oranı ve Biçim Zamanının Belirlenmesi. *ISPEC Journal of Agricultural Sciences*, 4:2, 146-156.
- Tuna, C. and Orak, A. 2007. The role of intercropping on yield potential of common vetch (*Vicia sativa* L.)/oat (*Avena sativa* L.) cultivated in pure stand and mixtures. *J. Agric. Biol. Sci*, 2:2, 14-19.



Yavuz, T. 2017. Farklı Biçim Zamanlarının Yem Bezelyesi (*Pisum sativum* L.) ve Yulaf (*Avena sativa* L.) Karışımlarında Ot Verim ve Kalitesi Üzerine Etkileri. *Tarla Bitkileri Merkez Araştırma Enstitüsü Dergisi*, 26:1, 67-67.



**TƏSVİRİ İNCƏSƏNƏTİN MUSİQİLƏ İNTEQRASIYASININ KREATİV TƏŞKİLİ
ZAMANI YUXARI SİNİF ŞAĞIRDLƏRİNİN HƏYATİ BACARIQLARININ
FORMALAŞDIRILMASI**

FORMATION OF SENIOR STUDENTS` VITAL SKILLS IN CREATIVE
ORGANIZATION OF INTEGRATION OF FINE ARTS INTO MUSIC

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XÜLASƏ

Azərbaycanda həyata keçirilən təhsil islahatlarına dair direktiv sənədlərdə fənlərin inteqrasiyasının nümunəvi təşkili şagirdlərin hərtərəfli inkişafını təmin edən müasir təlim metodlarından biri kimi təlqin olunur. Göstərilir ki, fənlərin məqsədyönlü inteqrasiyası şagirdlərdə yeni bacarıqlarının aşkara çıxarılmasına köməklik göstərir. Bu mənada yuxarı siniflərdə təsviri incəsənətin digər fənlərlə, o cümlədən musiqilə inteqrasiyası yuxarı sinif şagirdlərinin həyatı bacarıqlarının formalaşması içində mühüm əhəmiyyət kəsb edir.

Məqalədə, təsviri incəsənət dərslərinin musiqi ilə inteqrasiyası prosesində şagirdlər daha çox həyatı bacarıqlara yiyələndikləri ortaya qoyulmuşdur. Ona görə ki, həm təsviri sənət materiaları, həm də musiqi nümunələri şagirdlərin bədii yaradıcılıq qabiliyyətlərinin formalaşdırılmasına birgə təsiri nəticəsində şagirdlər daha zəngin həyatı bacarıqlara yiyələnirlər.

Tədqiq edilən dərslər vəsaitləri və elmi tədqiqatlardan müəyyən edilmişdir ki, həm təsviri incəsənət dərslərində, həm də musiqi dərslərində inteqrasiya üçün münasib sayılan mövzuların sayı çoxdur. Bütün bunlar deməyə əsas verir ki, təsviri incəsənət mövzularının hər birinin tədrisində musiqi nümunələrindən istifadə etməklə şagirdlərə həm faydalı həyatı bacarıqları aşılamaq olar.

Qeyd etmək lazımdır ki, təsviri sənətlə musiqinin inteqrasiyası üçün seçilən mövzular V-IX sinif şagirdləri üçün bu baxımdan daha əhəmiyyətli hesab olunabilir. Ona görə ki, təsviri incəsənət dərslərində mövzulara uyğun dinlənən musiqi nümunələri şagirdlərin yorulmasına imkan vermir, yorulanların yorğunluqlarını çıxarır, bütövlükdə isə uşaqların mədəni istirahətini təmin edir. İkinci bir tərəfdən təsviri incəsənətin bütün forma və növləri ilə məşğul olan uşaqların musiqi nümunələri sədaları altında işləmələri, əgər bir tərəfdən daha çox səmərəli nəticələr verirsə, digər bir tərəfdən şagirdlərin bir sıra bacarıqlarının aşkara çıxmasına səbəb olur.

Məsələyə digər müstəvidən yanaşsaq deməliyik ki, təsviri incəsənətin musiqi ilə inteqrasiyası prosesində, şagirdlər musiqi əsərlərinin bir çox janrı ilə yaxından tanış olmaq imkanı əldə edirlər. Bu isə onların yaradıcılıq qabiliyyətlərinin formalaşmasına daha güclü təsir göstərir.

Açar sözlər: Təsviri incəsənət, musiqi, həyatı bacarıqlar, pedaqogika, fənlərin inteqrasiyası

ABSTRACT

The exemplary organization of the discipline integration in the directive documents on education reforms carried out in Azerbaijan is proposed as one of the modern teaching methods

that ensure the comprehensive development of students. It is shown that purposeful integration of subjects helps students discover their new skills. In this sense, the integration of Fine Arts with other subjects, including music, is of great importance in the formation of the life skills of senior students.

The article reveals that in the process of integration of Fine Arts lessons with music, students acquire more vital skills. Because both fine art materials and music samples have a joint impact on the formation of students' artistic and creative abilities, students acquire rich life skills.

The study materials and scientific research have found that there are many topics that are considered suitable for integration both in the textbook of Fine Arts and in the textbook of music. All this gives grounds to say that using music samples in teaching each of the subjects of Fine Arts, students can be taught useful vital skills.

It should be noted that the topics selected for the integration of Fine Art and music can be considered more important for students of V-IX grades from this point of view. Because the music samples listened to in the lessons of Fine Arts do not allow the pupils to get tired, remove the fatigue of those who are tired, and in general, provide the cultural rest of children. On the second hand, the work of children engaged in all forms and types of Fine Arts to the accompaniment of musical samples leads to the fact that, on the one hand, it gives more effective results, on the other hand, a number of skills of students are revealed.

If we approach the issue from another perspective, we must say that in the process of integrating fine art with music, students get an opportunity to get acquainted with many genres of musical works. And this has a stronger impact on the formation of their creative abilities.

Keywords: Fine arts, music, vital skills, pedagogy, integration of disciplines

GİRİŞ

V-IX sinif şagirdləri Azərbaycan xalq musiqisi nümunələri ilə yanaşı, simfonik musiqi nümunələri, orkestr musiqisi nümunələri, kamera musiqisi nümunələri, eləcə də muğam simfoniyası nümunələri ilə tanış olurlar. V-IX siniflərdə şagirdlər ayrı-ayrı musiqi alətlərinin yaranması, ifa tərzini, səslənmə xüsusiyyətləri ilə tanış olarkən onların hər birinin rəsmini təsvir etməklə Azərbaycan musiqi mədəniyyəti tarixi, xalq çalğı alətlərinin ifaçılıq tarixi, ifaçılıq manevaraları, onların estetik dəyərləri, Azərbaycan musiqisinin beynəlxalq musiqi mədəniyyəti arenalarındakı yeri, rolu haqqında informasiyalar əldə edir və bu informasiyalar şagirdlərin öz təxəyyüllərinin məhsulu olan təsviri sənət nümunələri yaratmağa sövq edir. Təsviri sənət nümunələri yaratmağa maraq göstərən şagirdlər isə yeni-yeni həyati bacarıqlar qazanırlar. Təsviri incəsənət dərslərində şagirdlərin muğam janrına yaxınlaşdırılması üçün daha geniş imkanlar vardır. Yeri gəlmişkən qeyd etmək vacibdir ki, vaxtilə, yəni sovetlər dönməsinin ilk illərindən başlayaraq təlim-tərbiyə müəssisələrində muğamların ifasına qadağa qoyulmuş və milli koloritimizin bir çox xüsusiyyətlərini özündə ehtiva edən muğamlarımızı məktəblərdən uzaqlaşdırılmasına cəhd göstərilmişdir. Sovet hökumətinin ilk illərində Maarif Komissarı olmuş Mustafa Quliyevin məruzə və çıxışlarındakı “Muğamlar şagirdlərin zövqlərini korlayır” deməsini xatırlatmaq kifayətdir. Əgər bir ölkənin təhsilinə rəhbərlik edən şəxs Azərbaycan muğamlarına qarşı belə xoşagəlməz münasibət bəsləmişsə, həmin münasibətin uzunmüddətli təsirindən xalqın övladlarının ziyan çəkəcəyinə heç bir şübhə ola bilməzdi. Doğrudan da bütün Sovet ittifaqı dövründə Moskvanın təkidi ilə Azərbaycan Muğamlarına ögəy münasibət bəslənilmişdir. Yalnız müstəqillik dövründə muğamlarımız xalqımıza qaytarılmışdır. Xüsusilə Heydər Əliyev Fondunun prezidenti, YUNESKO-nun və İSESKO-nun xoşməramlı səfiri, ölkəmizin Vitse-prezidenti Mehriban xanım Əliyevanın xüsusi səyi, qayğısı nəticəsində Azərbaycan muğamları xalqın özünə qaytarılmış, orta ümumtəhsil məktəblərində tədrisinə

diqqət artırılmışdır. Unutmaq olmaz ki, muğam həm də dünya musiqisinin lad sistemində öz töhfəsini vermişdir. Fərəhli hal ondan ibarətdir ki, eramızdan əvvəl mövcud olan Azərbaycan muğamlarının lad-məqam sistemi dünya musiqisinin ümumlad sisteminin yaradılmasına öz töhfəsini vermişdir.

Cənubi Azərbaycanın (Zaqros silsilə dağlarına aid edilən Şuş dağının ətəyində, qədim Akbatan – Həmədanın cənub-şərqində yerləşən) Çığamış şəhərində arxeoloji qazıntılar zamanı saxsıdan (bişmiş gildən) hazırlanmış qab tapılmışdır. Qədim Cığamış iki çay (Karun və Dez) arasında, 15 km² ərazidə yerləşmiş ilkin şəhərlərdən biridir. Orta əsr mənbələrində - “Sürətul-əra”, “Hüdudülaləm” Cığamış, Akbatan, Həmədan və digər qədim şəhərlər Azərbaycan xəritəsinə daxildir.

Həmin qaba əsasən belə fikir yürütmək olur ki, xalqımız idiofonlu (özənsəsli), aerofonlu (nəfəs), membranofonlu (səs mənbəyi dəridən olan) və xordofonlu (telli) alətlərdən ən azı 7-8 min il bundan əvvəl geniş istifadə etmişdir.

Göründüyü kimi, 7-8 min il əvvəl mövcud olan gil qablarda muğam ifaçılarının şəklinin əks olunması, əlində qaval olan muğənninin muğam ifa etməsi Azərbaycan muğamlarının çox qədim tarixə malik olmasını sübut edən tarixi faktlardandır. Saxsı qabların üstündə əks edilən rəsmlər isə təsviri sənət və muğamın əsrlər və minillər boyu doğmalaşmış maddi-mənəvi dəyərlərimizdən olduğunu sübut edir. Belə maddi-mənəvi dəyərlərimizin elmi əsaslarının, estetik dəyərinin, öyrənilməsi, şagirdlərə çatdırılması onların maddi-mənəvi dəyərlərimizə hörmət hissini artırmış olur. Əslində maddi-mənəvi dəyərlərimizin şagirdlər tərəfindən öyrənilməsi, təsvir edilməsi onların bir sıra bacarıqlarının aşkara çıxarılmasına, inkişaf etdirilərək formalaşdırılmasına öz təsirini göstərmiş olur. Milli-mənəvi dəyərlərimizdən olan muğamların təsviri incəsənətin ədəbiyyat və musiqi ilə inteqrasiyası prosesində səsləndirilməsi şagirdlərdə bir sıra yeni həyati bacarıqların aşkara çıxarılmasına öz təsirini göstərmiş olur. Ayrı-ayrı inteqrasiya məqamlarında “Rast”, “Şur”, “Segah”, “Çahargah” “Bayatı-Şiraz”, “Hümayun”, “Şüştər” kimi muğamlardan seçilmiş parçaların səsləndirilməsi şagirdlərdə lad-məqam xarakterilə bağlı təsəvvürləri genişləndirir. Belə səsləndirmələrdən sonra şagirdlərə simfonik muğamlar barədə məlumatlar verilir. Fikrət Əmirovun “Şur” simfonik poemasından, Mayestro Niyazinin “Rast” simfoniyaq poemasından parçaların səsləndirilməsi şagirdləri simfonik muğamlara yaxınlaşdırır, onları simfonik musiqiyə yaxınlaşdırır. Onlara dinləmə bacarığı aşılayır. Şagirdlərin bir qismi simfonik musiqini təhlil etmək bacarığına yiyələnirlər.

Təsviri incəsənətin musiqilə inteqrasiyasının kreativ təşkili. V-IX siniflərdə şagirdlərlə “Təsviri incəsənətdə musiqi” və “Musiqidə təsviri incəsənət” mövzusu üzrə iş aparmaq bu baxımdan xüsusi əhəmiyyətə malikdir. Belə mövzuların inteqrasiyası şagirdlərdə daha ciddi həyati bacarıqların aşılmasına təsir etmiş olur. Ona görə təsviri incəsənət məşğələlərində “Təsviri incəsənətdə musiqi və musiqidə təsviri incəsənət” mövzularının inteqrativ əsasda tədrisinə rəvac vermək elmi-pedaqoji baxımdan mühüm əhəmiyyət kəsb edir. Ona görə ki, belə inteqrasiya ən dəyərli didaktik əsaslara söykənir. Təsviri incəsənətdə musiqi mövzusunun V-VI siniflərdə müvafiq mövzular üzrə, VII-VIII siniflərdə əksər mövzular üzrə və IX siniflərdə isə bütün mövzuların tədrisi prosesində həyata keçirmək çox faydalıdır. “Təsviri incəsənətdə musiqi” mövzusunun V-VII və VIII-IX siniflərdə müxtəlif variantlarda tədris etmək olar. Bu zaman musiqi dərslərindəki bəzi didaktik nümunələrdən istifadə etmək məqsədəuyğun sayılır. Təsviri incəsənət dərslərində müvafiq mövzuların tədrisində şagirdlərə verilən məlumatlar içərisində təsviri incəsənətdə sülh mövzusunda olan rəsmlərlə musiqi əsərlərindəki sülh mövzusunda olan əsərlərin inteqrasiyasının təşkili zamanı şagirdlər sülhü qorumağa, vətən torpağını müdafiə etməyə, vətən uğrunda şəhid olmağa səsləyən həyati bacarıqlar qazanmış olurlar. Bu zaman müəllim qeyd edir ki, 1949-cu ildə Parisdə və Praqada keçirilən Sülh Tərəfdarlarının I Ümumdünya konfransının emblemini məşhur ispan rəssamı Pablo Pikasso

işləmişdi. Emblemdə dimdiyində zeytun budağı tutmuş ağ göyərçin təsvir edilmişdi. Əsərin adı “Sülh göyərçini”dir. Sülhün simvolu olan ağ göyərçinin ağzında tutduğu zeytun budağı isə halal əməyin, zəhmətin, məhsul toplamağın və halal qida ilə qidalanmağın simvoludur.

Sülh mövzusu Azərbaycan ədəbiyyatının, təsviri incəsənətinin və musiqisinin aparıcı mövzularından olduğu üçün bu mövzudan inteqrasiya mövzusu kimi bəhrələnmək çox faydalıdır.

Görkəmli Azərbaycan Rəssamı Kamil Nəcəfzadənin “Ana və uşaq” əsərində öz uşağını qoruyan qəlbi sülh arzulu ana obrazı təsvir edilmişdir. Dərsləyinizdə təsviri verilən həmin rəsm əsərinə tamaşa etdikdə böyük Azərbaycan bəstəkarı Qara Qarayevin “Məktəblilərin sülh haqqında mahnısı” yada düşür. Çünki bu mövzular biri-birini tamamlayır.

Böyük Azərbaycan bəstəkarı Qara Qarayevin marş tempində, təntənəli səslənən “Məktəblilərin sülh haqqında mahnısı”nı dinləyəndə həmin rəsm əsərindəki sülh motivləri diqqəti cəlb edir. Bu mahnı “Rast” muğamı üzərində yazılmışdır. Ana muğamımız olan “Ana və uşaq” əsərindəki sülh motivlərini duyub qavramağa və dəyərləndirməyə kömək edir. Ümumiyyətlə desək, sülh mövzusu V-IX siniflərdə tədris olunan təsviri incəsənət dərslərinin aparıcı mövzularındandır. Ermənistanın Azərbaycan torpaqlarını işğal etdiyi hazırkı şəraitdə dövlət rəhbərlərinin sülh çağırışlarına rekasiya vermələrini təqdirəlayiq hesab etmək lazımdır. Azərbaycan Respublikasının prezidenti İlham Əliyev cənabları müxtəlif xarakterli çıxışlarında Atətin Minski Qrupunun üzvlərinin sülh çağırışına cavab olaraq dediyi “Biz sülh istəyirik. Bu şərtlə ki, Ermənistanın silahlı qüvvələri işğal etdikləri torpaqlarımızdan geri çəkilsinlər”. Aprel döyüşləri bir daha onu göstərdi ki, erməni faşistləri sülhə gəlmək istəmirlər. Erməni faşistlərinin hücumlarına cavab olaraq sentyabr ayının 27-dən başlayan əks həmlə əməliyyatları ordumuzun cəbhə boyu irəliləməsi və bir neçə rayonu, kəndi və yüksəklikləri azad etməsi Azərbaycanın sülhməramlı ordusunun, müzəffər yürüşü kimi dəyərləndirmək üçün təsviri incəsənət dərslərində bu mövzunun inteqrativ əsaslar üzrə tədrisinə mütəşəkkil olaraq yer ayrılması şagirdləri yəni gələcək əsgərləri, bu gün sinif otağındakı vətən övladlarını mübarizəyə səsləyir, onları vətən torpaqlarını qorumağa çağırır. Ona görə ki, məhz təsviri incəsənətin ədəbiyyatla və musiqi ilə inteqrasiyası zamanı şagirdlərdə bu mövzu daha böyük maraq doğurur. Çünki təsviri incəsənət dərslərində ədəbi-bədii materiallardakı təsviri incəsənətin nümayiş etdirilməsi şagirdlərə bu mövzular əsasında sinif işlərinin və ev tapşırıqlarının verilməsi və həmin sinif işlərinin və ev tapşırıqlarının yerinə yetirilməsi nəticəsində onlar bir sıra həyati bacarıqlar qazanmış olurlar. Bu zaman sülh mövzusunə müraciət olunmasının mühüm əhəmiyyəti vardır. Təsviri incəsənətin ədəbiyyat və musiqi dərsləri ilə inteqrasiyası əsasında sülh mövzularının təsviri ilə bağlı mövzuların verilməsi, şagirdlərə sülh göyərçinlərinin rəngli təsvirlərinin çəkilməsi, əlində üçrəngli Azərbaycan bayrağı olan insanların sülh uğrunda mübarizə əzmini ifadə edən mövzuların təsvir olunması və bu zaman sülh haqqında mahnı və melodiyaaların səsləndirilməsi şagirdlərdə bir sıra bədii yaradıcılıq qabiliyyətlərinin aşkara çıxarılmasına və həmin qabiliyyətlərdən nəşət edən həyati bacarıqların özünü göstərməsinə səbəb olur. Təsviri incəsənət dərslərindəki sülh mövzularının təqdimatı zamanı poetik nümunələrin şagirdlər tərəfindən səsləndirilməsi və bu zaman musiqi əsərlərindən istifadə olunması bu baxımdan mühüm əhəmiyyət kəsb edir. Sülh mövzusunda səsləndirilən musiqi əsərləri içərisində Azərbaycanın görkəmli bəstəkarı Cövdət Hacıyevin “Sülh uğrunda” adlı əsərindən istifadə etmək inteqrasiya prosesində şagirdlərin həyati bacarıqlarının aşkara çıxarılması inkişaf etdirilməsi və formalaşdırılması baxımından mühüm əhəmiyyət kəsb edir.

C.Hacıyev “Sülh uğrunda” əsərində dövrünün mühüm problemlərinə toxunmuşdur. Əsəri dinlədikcə göz önünə xeyir və şər qüvvələrin mübarizəsi gəlir. Əsərin sonunda xeyir şərə qalib gəlir. C.Hacıyev, həmçinin müxtəlif səpkili simfoniya, oratoriya, ballada, sonata, xor üçün bir sıra dəyərli musiqi əsərlərinin müəllifidir. Bu əsərlərin hər biri dinləyicidə estetik bədii zövq

aşılamaqla yanaşı, vətəni sevmək, torpağı qorumaq, şər qüvvələrə qarşı mübarizə aparmaq kimi hislər baş qaldırır. “Sülh uğrunda” əsərinin səsləndirilməsindən sonra şagirdlərə xeyir qüvvələrin təmsalında Azərbaycan əsgərlərinin təsvir edilməsi tapşırığı verilsə, şər qüvvələri təmsalında erməni əsgərlərinin karikatura xarakterli mənfi obrazları yaradılır. Xeyir qüvvələri kimi Azərbaycan əsgərlərinin simasında mübarizə ruhunun, qələbə əzminin, torpağa məhəbbət, sevgi hissənin tərənnüm olunması məqsəd kimi qarşıya qoyulursa, şər qüvvələrinin təmsalında erməni əsgərlərinin obrazlarının yaradılması zamanı onların mənfi personajlarının simasında işğalçılıq, xəyanətkarlıq, qonşulara xəyanət, rəzillik, mənfürlük cizgiləri təsvir olunmalıdır. Təsviri incəsənət müəlliminin belə integrativ yanaşmaları şagirdlərdə ciddi musiqi duymaq, qavramaq, qiymətləndirmək bacarıqları aşılamaqla yanaşı düşmənə nifrət bacarıqları formalaşdırmış olur.

Göründüyü kimi, təsviri incəsənətin ədəbiyyat və musiqi ilə birgə integrasiyası zamanı V-IX sinif şagirdləri üçün xarakterik olan ümumiləşdirilmiş mövzuların tədrisinə məqsədyönlü, planlı, mütəşəkkil olaraq yer ayrılması faydalı hesab olunur. Belə mövzulardan biri Azərbaycanın görkəmli şairlərindən sayılan “Nizami Gəncəvi mövzusu”dur. Ümumiyyətlə desək, Nizami Gəncəvi mövzusu həm təsviri incəsənət, həm ədəbiyyat, həm də musiqi dərsləri üçün integrativ əsaslara söykənən fənlərarası əlaqənin imkanlarına uyğun olan mövzulardandır. Birincisi, ona görə ki, Nizami Gəncəvinin portretləri, əsərlərinə çəkilən minyaturalar çoxluq təşkil edir. İkincisi, Nizami yaradıcılığına həsr olunan elmi-tədqiqat əsərlərinin sayı çoxdur. Üçüncüsü, V-IX siniflərin proqram materiallarında Nizami poeziyasının ən örnək nümunələrindən istifadə olunur. Dördüncüsü, Nizaminin yaradıcılığına, onun əsərlərinə həsr olunan musiqi əsərlərinin sayı kifayət qədərdir. Bütün bunlardan integrativ əsaslara söykənməklə istifadə edilməsi şagirdlərdə bir sıra həyati bacarıqların aşkara çıxarılmasına, inkişaf etdirilərək formalaşdırılmasına öz töhvəsini vermiş olur.

Dahi Azərbaycan şairi Nizami Gəncəvinin ilk təsvirini 1947-ci ildə dahi şairin anadan olmasının 800 illiyi münasibəti ilə Xalq rəssamı Qəzənfər Xalıqov işləmişdir. Bu rəsm əsərindən uzun müddətdir ki, ümumtəhsil məktəblərinin həm təsviri incəsənət, həm Azərbaycan dili, həm ədəbiyyat, həm də musiqi dərslərində istifadə olunur.

Bundan başqa böyük şairin Bakıda və Gəncədə ucalan möhtəşəm abidələrinin müəllifi isə Xalq rəssamı Fuad Əbdürrəhmanovdur. İstər ədəbiyyat müəllimləri, istər Azərbaycan dili müəllimləri, hətta tarix müəllimləri bu heykəllərlə şagirdləri təlim ekskursiyaları zamanı mütəmadi olaraq tanış etmişlər.

Görkəmli Azərbaycan bəstəkarı Fikrət Əmirov isə dahi Nizaminin obrazını simli alətlər orkestri üçün yazdığı “Nizami” simfoniyasında böyük sənətkarlıqla yarada bilmişdir.

F.Əmirov “Nizami” simfoniyasını Nizaminin anadan olmasının 800 illiyinə həsr etmişdir. 1947-ci ildə yazılmış bu əsər sonradan təkcə Azərbaycanda deyil, Rusiyada, Almaniyada, Fransada, ABŞ-da ən görkəmli dirijorlar tərəfindən səsləndirilmişdir. F.Əmirovun “Nizami” simfoniyasını dinlədikcə dahi Nizami Gəncəvinin portreti göz önündə canlanır. Təsviri incəsənət dərslərində Nizami Gəncəvi mövzuların hər birinin tədrisi prosesində ədəbiyyat dərslərindəki mövzuların əlaqəli şəkildə tədrisinə yer verərkən Nizami Gəncəvinin yaradıcılığına həsr olunmuş musiqi əsərlərinin səsləndirilməsi üçqat integrasiyaya səbəb olur. Hansı ki, bu üçqat integrasiyanın təsir imkanları öz genişliyi ilə diqqəti cəlb edir. Çünki şagirdlərin bir qismi Nizami Gəncəvinin portretinə, onun əsərlərinə çəkilmiş illüstrasiyalara diqqət etdikdə illüstrasiyaların altında Nizaminin tərbiyəvi fikirlərini nəzərdən keçirdikcə onları düzlüyə, doğruluğa, dostluğa, yoldaşlığa, qardaşlığa, hümanizmə, əltutmağa, şəfqət verməyə, sədaqətli olmağa, torpağı sevməyə, vətən uğrunda mübarizə aparmağa, düşmən ilə barışmamağa səsləyir. Belə bir prosesdə şagirdlərdə düzgünlüyə, doğruluğa, yoldaşlığa, vətənsəvərliyə, humanizmə meyl etmə bacarıqları baş qaldırır. Təsviri incəsənət dərslərinin

ədəbiyyatla və musiqi ilə inteqrasiyası prosesində Nizami Gəncəvinin mövzuları ilə bağlı rəsm əsərlərinin nümayiş etdirilməsi zamanı səsləndirilən poetik nümunələrin fonunda Nizami operasından parçaların təqdim edilməsi şagirdlərdə simfonik əsərlərə, o cümlədən opera janrına olan maraqların artırılmasına köməklik göstərmiş olur.

Dahi Nizaminin obrazı görkəmli Azərbaycan bəstəkarı, Xalq artisti Əfrasiyab Bədəlbəylinin də yaradıcılığında özünə yer tapmışdır. Onun yaratdığındakı “Nizami” opsındaki librettosunu da Ə.Bədəlbəyli özü yazmışdır. Bu onu bir daha göstərir ki, bəstəkar Nizami Gəncəvinin “Xəmsə”sini dərinlən öyrəndiyindən, şairin məntiqi mühakimələrini, tərbiyəvi fikirlərini melodiyanın imkanları ilə ifadə edə bilmişdir. Operadan parçaları təsviri incəsənət dərslərində səsləndirərkən ədəbiyyat dərslərlərində Nizami Gəncəvinin həyatı ilə bağlı faktları da şagirdlərin diqqətinə çatdırmaq lazım gəlir. Belə məqamda müəllim göstərir ki, “uşaqlar Nizami Gəncəvinin həyatı haqqında qeyd olunan tarixi faktlar böyük şairin yaradıcılığına həsr edilən əsərlərdə bədii şəkildə tərənnüm olunur. Məsələn, Ə.Bədəlbəylinin “Nizami” operasında Nizaminin həyat yoldaşı Rəna adı altında təqdim olunur. Operada Nizami obrazı ilə yanaşı Rəna obrazı aparıcı obrazlar kimi təqdim edilir. Görkəmli bəstəkarımız Ə.Bədəlbəyli Nizami operasında “Rənanın mahnısı” adlı mahnı nümunəsi bu baxımdan çox maraqlıdır. Gəlin həmin mahnını dinləyək. Mahnını dinlədikdən sonra təxəyyülümüzə canlanan Nizami Gəncəvi obrazı, onun həyat yoldaşı Rəna xanım obrazı ilə bağlı ağ-qara formada minyaturaları hazırlayaq”. Təsviri incəsənət dərslərində müəllimin təsviri incəsənətin ədəbiyyat və musiqi ilə inteqrasiyasına belə yanaşması şagirdlərdə təsviri incəsənət nümunələrinin mövzuya uyğun variantlarının yaratmaq bacarıqları baş qaldırır.

Təsviri incəsənət dərslərində Ana obrazına yer ayırmaq da faydalı hesab olunur. Bu zaman ədəbiyyat dərslərindəki Ana obrazlarından və Ana obrazına dair musiqi nümunələrindən inteqrativ əsaslar üzrə istifadə olunması faydalıdır.

Ana obrazı bütün dövrlərdə musiqinin və incəsənətin aparıcı mövzularından olub. İnsan Ana Vətən deyəndə Vətəni bütün varlığı ilə sevdini vurğulayıb, “Ana torpaq” deyəndə doğma yurdun onun üçün necə müqəddəs olduğunu demək istəyib, “Ana dili” deyəndə dilinə hədsiz məhəbbətini etiraf edib. Deməli, sevginin meyarı anaya olan istəkdir. Qədim yazılı abidəmiz olan “Kitabi-Dədə Qorqud”da da anaya – qadına yüksək məhəbbət və hörmət var. Dastanda ana obrazı Vətən rəmzi kimi ümumiləşdirilir, ana haqqı Tanrı haqqı kimi qiymətləndirilir.

Məşhur rəssam Rafael Santinin də yaradıcılığında ana obrazına rast gəlinir. Bunu rəssamın “Florensiya madonnası” əsərinin timsalında söyləmək olar. Ana haqqında yazılmış ən uğurlu mahnılardan biri də böyük bəstəkarımız Cahangir Cahangirovun İslam Səfərlinin sözlərinə bəstələdiyi “Əziz ana” mahnısıdır. Bu mahnının ilk ifaçısı dünya şöhrətli müğənni, Xalq artisti Rəşid Behbudov olmuşdur. Mahnının söz mətnindəki “Gözümün nuru, canım ana”, “Böyütdün sən məni yana-yana”, “Saçının ağına, qarasınma qurbanam” kimi sözlər bütün şagirdlərin hislərinə hakim kəsilir. Onların öz analarına olan hədsiz sevgiləri onların mənəvi dünyasında baş qaldırır. Ona görə təsviri incəsənət dərslərində Ana mövzusunda dair poetik nümunələrin səsləndirilməsi zamanı şagirdlərə Ana obrazının yaradılması ilə bağlı esselərin, poetik nümunələrin və digər bədii təsvirlərin üzərində işləmələri tapşırılır. Onlar öz təxəyyüllərində canlandırdıkları ana obrazına olan münasibətlərini, sevgi və məhəbbətlərini rəngli karandaşların dili ilə təsvir etməyə çalışırlar. Bu zaman “Ana” mahnısı səslənir. Bu səslənmə isə şagirdləri “Ana” mövzusunda daha çox yaxınlaşdırır. Onlar analarına olan hissələrini ürəklərinin dərinliklərində yaşatdıqları sevgisini rəngli təsvirlərə çevirərək müqəddəs Ana obrazı yaratmaq bacarıqlarına yiyələnirlər. Onlar yaratdıqları təsviri incəsənət nümunəsinin altından şeirlər də yazmaq istəyirlər. Şagirdlərin bir qismi yaratdıqları ana obrazının təsvirlərinə uyğun poetik fikirlər yaratmaq qabiliyyətinə yiyələnirlər.

NƏTİCƏ

Bütün bunlar onu göstərir ki, təsviri incəsənət dərslərinin digər fənlərlə inteqrasiyası zamanı şagirdlərdə bir-sıra zəruri həyati bacarıqların aşkara çıxarılmasına, inkişaf etdirilməsinə və formalaşdırılmasına nail olmaq mümkündür.

Məqalədə, təsviri incəsənət dərslərinin musiqi ilə inteqrasiyası prosesində şagirdlər daha çox həyati bacarıqlara yiyələndikləri ortaya qoyulmuşdur. Ona görə ki, həm təsviri sənət materiaları, həm də musiqi nümunələri şagirdlərin bədii yaradıcılıq qabiliyyətlərinin formalaşdırılmasına birgə təsiri nəticəsində şagirdlər daha zəngin həyati bacarıqlara yiyələnirlər.

Tədqiq edilən dərslər vəsaitləri və elmi tədqiqatlardan müəyyən edilmişdir ki, həm təsviri incəsənət dərslərində, həm də musiqi dərslərində inteqrasiya üçün münasib sayılan mövzuların sayı çoxdur. Bütün bunlar deməyə əsas verir ki, təsviri incəsənət mövzularının hər birinin tədrisində musiqi nümunələrindən istifadə etməklə şagirdlərə həm faydalı həyati bacarıqları aşılamaq olar.

İSTİFADƏ EDİLMİŞ ƏDƏBİYYAT

1. Abbasov A.N. Təhsil sisteminin idarə olunmasının pedaqoji-psixoloji problemləri. Bakı: Mütərcim, 2011, 338 s.
2. Cəbrayilov İ.H. Müasir təhsil: problemlər və həlli yolları. Bakı: Mütərcim, 2018, 508 s.
3. Cəfərzadə K.A., Cəlilova Y.E., Məmmədova M., Məlikov T.M. Təsviri incəsənət (ümumtəhsil məktəblərinin 6-cı sinfi üçün dərslik). Bakı: "Bakı" nəşriyyatı, 2017, 79 s.
4. Cəfərzadə K.A., Məmmədova M.N. Təsviri incəsənət (ümumtəhsil məktəblərinin 7-ci sinfi üçün dərslik). Bakı: "Bakı" nəşriyyatı, 2018, 80 s.
5. Cəfərzadə K.A., Məmmədova M.N. Təsviri incəsənət (ümumtəhsil məktəblərinin 8-ci sinfi üçün dərslik). Bakı: "Bakı" nəşriyyatı, 2019, 85 s.
6. Cəfərzadə K.A. Təsviri incəsənət (ümumtəhsil məktəblərinin 9-cü sinfi üçün dərslik). Bakı: Yaz nəşriyyatı, 2016, 102 s.
7. İsmixanov M.A., Vəliyeva S.V., Mollayeva E.Ə. Təhsilin əsasları. Bakı: ADPU-nun nəşr., 2016, 208 s.
8. Məmmədova M.A., Mirzəyeva B.E., Əliyeva N.A. Təsviri incəsənət (ümumtəhsil məktəblərinin 5-ci sinfi üçün dərslik). Bakı: Aspoliqraf, 2018, 170 s.
9. Nəcəfzadə A.İ., Məmmədəliyev V.M. Muğam (dərslər vəsaiti). Bakı: Ecoprint, 2017, 160 s.
10. Rəcəbov O.M. Musiqi (ümumtəhsil məktəblərinin 5-ci sinfi üçün dərslik). Bakı: Təhsil, 2019, 80 s.
11. Sadıqov F.B. Uşaqların bədii yaradıcılıq qabiliyyətlərinin formalaşdırılması işinin elmi-pedaqoji əsasları. Bakı: ADPU-nin nəşriyyatı, 1994, 221 s.



KİMYANIN TƏDRİSİNDƏ İNTERAKTİV TƏLİM METODLARINDAN İSTİFADƏNİN ÜSTÜNLÜKLƏRİ

THE ADVANTAGES OF USING INTERACTIVE METHODS IN CHEMISTRY

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XÜLASƏ

Məqalədə qeyd olunur ki, kimyanın tədrisi prosesində mənimsənilmə keyfiyyəti interaktiv təlim metodun müxtəlif forma, üsul və üsullarından istifadə olunmasından asılıdır. Müəllif qeyd edir ki, interaktiv təlim metodlarından istifadə məntiqi, tənqidi və yaradıcı təfəkkürü inkişaf etdirir, araşdırma qabiliyyətini formalaşdırır.

Problemin elmi yeniliyi: İnteraktiv təlim metodları əldə edilmiş biliklərin təcrübədən keçirilməsi əsasında konkretləşmişdir.

Problemin praktik əhəmiyyəti: İnteraktiv təlim metodlarından istifadə məntiqi, tənqidi və yaradıcı təfəkkürü inkişaf etdirir, elmi tədqiqat vərdişləri formalaşdırır.

Yeni təlim texnologiyalarının tətbiqi ilə əlaqədar ənənəvi təlimin üstün və çatışmazlıqları təhlil edilərək təkmilləşdirilməsinə daha çox ehtiyac vardır.

Problemin praktik əhəmiyyəti. Təlim prosesində ənənəvi təlim metodları ilə fəal metodları arasında müəyyən fərqlər mövcuddur. Şagirdlərin şəxsiyyətyönlü ünsiyyət və fəaliyyətləri əsasında həyati bacarıqlarını inkişaf etdirməklə onda milli və bəşəri dəyərlərin formalaşdırılır.

İnteraktiv təlim metodları biliklərin daha müstəqil və sərbəst qavranılmasında mühüm rol oynayır. Fəal təlim biliyin qrup və cütlərlə iş formalarından müntəzəm şəkildə istifadə etməklə axtarılıb tapılması ön plana çəkilir. Bu cür təlim texnologiyası ilə təşkil olunan dərslərdə əvvəlcə problemə istiqamət verəcək motivasiya yaradılır. Motivasiya problemə çıxaracaq məsələnin qoyulmasıdır.

İnteraktiv təlim prosesində şagirdlərin yaradıcılıq qabiliyyətləri və dünyagörüşləri inkişaf edir. İnteraktiv öyrənmə prosesində şagirdlər müstəqil şəkildə düşünmə qabiliyyətinə yiyələnir, təcrübələr aparır, həll yollarının düzgünlüyünü öyrənir, müqayisə aparmaqla məlumatların daha düzgün mənimsənilməsinə nail olurlar.

Müasir təlim metod və texnologiyalarının öyrədilməsi istiqamətində təşkil olunan seminarlarda, layihələrdə (treninqlər, monitorinqlər) müəllimlərin iştirakı məqsəduyğundur.

Anahtar kelimələr: kimya, interaktiv təlim, aktiv metod, planlaşdırma, dərs

ABSTRACT

In the article, it is noted that in the process of teaching chemistry the quality of acquisition depends on the use of different forms, methods and techniques of interactive method. The author notes that the use of teaching methods develops logical, critical and creative thinking and forms the ability of investigation.

Scientific novelty of the problem: Interactive training methods are specified on the basis of the acquired knowledge through practice.

Practical significance of the problem: The use of interactive teaching methods develops logical, critical and creative thinking, forms scientific research skills.

There is a great need to improve the training by analyzing the advantages and disadvantages of traditional training due to the introduction of new training technologies.

Practical significance of the problem. There are some differences in the learning process between traditional teaching methods and active methods. By developing students' life skills based on personal communication and activities, national and human values are formed in them.

Interactive learning methods play an important role in making knowledge more independent and free. Active learning focuses on finding knowledge through the regular use of forms of group and pair work. Lessons organized with this type of learning technology first create motivation to address the problem. Motivation is to ask a problem.

In the process of interactive learning, students' creative abilities and worldviews develop. In the process of interactive learning, students acquire the ability to think independently, conduct experiments, learn the correctness of solutions, achieve better assimilation of information by comparison.

Teachers' participation in seminars and projects (trainings, monitoring) organized in the direction of teaching modern teaching methods and technologies is expedient.

Keywords: chemistry, interactive training, active method, planning, lessons

GİRİŞ

“Azərbaycan Respublikasında təhsilin inkişafı üzrə Dövlət Strategiyası”nda təhsil sisteminin institusional əsaslarının inkişaf etdirilməsi, innovativ təlim metodları və texnologiyalarının tətbiqinin genişləndirilməsi yolu ilə səriştəyə əsaslanan şəxsiyyət və nəticəyönlü təhsil modelinin yaradılması strateji hədəf kimi qarşıya qoyulmuşdur. Azərbaycanın təhsil sistemində tətbiqinə bağlanmış “Azərbaycan Respublikasında ümumi təhsilin Milli Kurikulumu” sənədində inkişafetdirici təlim şagirdin inkişafının təmin olunmasında mühüm təsir vasitəsi kimi müəyyən edilir. Təfəkkürün inkişafı əqli inkişafın başlıca məqsədidir. Təlimin inkişaf etdirici xarakteri tədris prosesində tətbiq olunan metodlardan çox asılıdır. Bu zaman təfəkkür inkişafının qayğısına qalmalı nəyi nə üçün və necə öyrənmək problemi onların həmişə diqqət mərkəzində olmalıdır. Fəal təlim biliyin qrup və cütlərlə iş formalarından müntəzəm şəkildə istifadə etməklə axtarılıb tapılması ön plana çəkilir. Bu cür təlim texnologiyası ilə təşkil olunan dərslərdə əvvəlcə problemə istiqamət verəcək motivasiya yaradılır (Əliyev, 2009: 57-61).

Motivasiya problemə çıxaracaq məsələnin qoyulmasıdır. Onun nəticəsi tədqiqat sualı olur. Şagirdlər irəli sürülmüş fərziyələrin doğruluğunu isbat etmək üçün mətn üzərində, bilik mənbələrinə nəzər salmaqla tədqiqat işlərinə cəlb olunurlar. Şagirdlər öz tədqiqatlarının yekunları ilə sinfi tanış edirlər. Sonra təqdim olunan bütün işlər arasında rəbitə, əlaqələr yaradılır. Məlumatlar sistemə salınaraq ümumiləşdirilir. Ümumiləşmələrin nəticələri ilkin fərziyələrlə müqayisə olunur. Bundan sonra biliyin tətbiqi mərhələsi gəlir. İşin gedişindən aydın olduğu kimi, fəal-interaktiv təlimdə şagirdlərdə məntiqi, tənqidi və yaradıcı təfəkkürünün inkişafı qayğısına qalınır, təlim prosesinə tədqiqat xarakteri verilir. Təlim

prosesində işgüzar iş mühiti, əməkdaşlıq şəraiti yaradıldığından iştirakçıların yüksək fəallığı təmin olunur.

İNTERAKTİV TƏLİM ÜSULLARINDA KİMYANIN TƏDRİSİNDƏ TƏTBİQİ İMKANLARI

Fəal təlim şagirdlərin yaddaşının təkcə yeni elmi bioloji biliklərlə zənginləşdirilməsinə deyil, həm də təfəkkürün müntəzəm inkişaf etdirilməsi əsasında daha çox biliklərin müstəqil əldə edilməsi və mənimsənilməsi, ən mühüm bacarıq və vərdişlərinin, şəxsi keyfiyyət və qabiliyyətlərin qazanılmasına yönəlir. Bu prosesdə bütün şagirdlərin müxtəlif nöqtəyi nəzərlərini və fikirlərini nəzərə almaqla, bioloji təlim fikir müstəqilliyinə, tədrisin məzmununu daha da zənginləşdirməyə imkan yaradır, nəticə çıxarma prosesinə müsbət təsir edir.

Təlim prosesində müəllim və şagirdin qarşılıqlı münasibətlərinin formalaşmasını əks etdirən müxtəlif üsul və yanaşmaların məcmusu təlim metodlarını müəyyənləşdirir. Təlim prosesi müəllim və şagird arasındakı təsirlərin elə münasibətlərini nəzərdə tutur ki, bunun nəticəsində şagirdlər tələb olunan bilik, bacarıq, vərdiş və dəyər qazansınlar. Müasir dövrdə təhsilin səviyyəsini yüksəltmək qarşıda duran mühüm vəzifələrdəndir. Ona görə də interaktiv təlim texnologiyalarının tədrisdə tətbiqi böyük əhəmiyyətə malikdir (Zeynalov, 2013: 15-17).

Ümumiyyətlə, təlim modelləri passiv, aktiv və interaktiv olmaqla üç əsas qrupa ayrılır. Passiv təlim və ya ekstraktiv təlim modelinin əsas xüsusiyyəti öyrənənlərin deyil, öyrədici mühitin fəallığının üstün olmasından ibarətdir. Bu, o deməkdir ki, şagirdlər təlim materiallarını bir-biri ilə ünsiyyətdə olmadan, heç bir yaradıcı məsələni həll etmədən müəllimin nitqindən və dərslərdəki mətnlərdən öyrənirlər. Belə modelə nümunə olaraq məktəb müəhazirəsi şəklində aparılan ənənəvi dərslər formalarını misal göstərmək. Ənənəvi dərslər modeli uzun illərdir ki, tətbiq olunsa da, dərslər verilən ən yeni tələblər belə onun strukturunda şagirdlərin fəallığını təlim edə bilməmişdir. Aktiv və ya interaktiv metodlar isə bundan fərqli olaraq şagirdlərin müstəqilliyini və idrak fəallığını stimullaşdırmağa imkan yaradır. Bu təlim modeli adətən yaradıcı xarakterli ev tapşırıqlarının yerinə yetirilməsi və şagird-müəllim münasibətləri sistemində ünsiyyətin zəruriliyinin təmin olunması tələbi ilə şərtlənir. Bu modelin əsas çatışmazlığı ondan ibarətdir ki, şagirdlər öyrənmə subyektini kimi yalnız özləri üçün çalışır, onlar müəllimdən başqa prosesin digər iştirakçıları ilə heç bir qarşılıqlı təsirdə ola bilmirlər.

Beləliklə, qeyd etmək olar ki, bu metodlar özünün birtərəfli istiqaməti, xüsusən müstəqil fəaliyyət, özünü təhsil, özünü-tərbiyə, özünü inkişaf texnologiyaları üçün yetərli olsa da, qrupda təcrübə mübadiləsi və qarşılıqlı təsir bacarıqlarının inkişafını təmin edə bilmir. İnteraktiv təlim üsulları o zaman müsbət nəticə verə bilər ki, şagirdlər üçün müasir tələblərə cavab verən öyrədici mühit yaradılsın. Öyrədici mühit üç komponentdən ibarətdir:

- sosial-psixoloji;
- informasiya mühiti;
- əşyavi mühit.

Digər tərəfdən, interaktivlik şagirdlərin özləri arasında da ola bilər. Əsas cəhət odur ki, bu prosesdə əməkdaşlıq edən, öyrənənlər və öyrədən eyni hüquqlu mövqedə dayanırlar. Təbii ki, müəllim öyrədən olaraq təşkilatçılıq, koordinator, məsləhətçi, fasilitator funksiyasını yerinə yetirir. Şagirdlərin işlərinə müdaxilə etmədən problemləri qoyur, istiqamət verir, nəzarət edir, axtarış strategiyasını hazırlamağa kömək edir, amma təlim tapşırıqları üzərində uşaqlar özləri birlikdə öz aralarında mübahisə edərək, diskussiya apararaq işləyirlər. Bununla yanaşı, hər bir şagirdin öz fikri, ideyası olur. Mübadilə nəticəsində fikirlər dəyişir, ideyalar təzələnilir.

Beləliklə, psixoloji abhava dəyişir. Qrupdakı zəif şagirdlər də müzakirədə fəal iştirakə qoşulurlar: məsələlərin müzakirəsi və kollektiv müzakirənin gedişində biribirini dinləməyə alışırlar.. Beləliklə, təlim prosesində şagirdlərarası əlaqə, qarşılıqlı təsir və əməkdaşlıq əsas olur. Təlim nəticəsi təlim prosesi iştirakçılarının qarşılıqlı qüvvəsi ilə əldə edilir, şagirdlər təlim nəticələrinə görə öz üzərinə qarşılıqlı məsuliyyət götürürlər. Bunlar imkan verir ki, şagirdlər

–Biliyi qavrama prosesini daha anlaşıqlı etsinlər;

–Öz fikrini formalaşdırmağı, onu düzgün ifadə etməyi, öz nöqtəyi-nəzəri əsaslandırmağı, müzakirələşdirməyi və sübut etməyi öyrənirlər;

– Digərini eşitməyi, dinləməyi, alternativ fikrə hörmət etməyi öyrənirlər.

İnteraktiv təlim şagirdlərə bilik vermə məsələlərində, həm də onları iradi, əxlaqi, əqli, estetik, mədəni, hüquqi dəyərlər yönündə inkişaf etdirib formalaşdırır. İnteraktiv metodları aktuallaşdıran bir sıra tələblər var:

- İnsanların bazar iqtisadiyyatı cəmiyyətində yaşaması və hər kəsin özünün bu cəmiyyətdə yaşaya bilməsi ucun hazırlanması zərurəti;

- Uşaqların 20-30 il əvvəlki zamana görə dünyagörüşünün, sosial, texniki məlumatlıq səviyyəsinin yüksək olması;

- Deməli, çevik, düşündürücü idrak fəallığını doğurmayan metodlar uşaqların marağını təmin etmir, onları canlandırmır, fəaliyyətə qoşmur.

Eyni zamanda müasir dərsin planlaşdırılmasından sonra, dərsə qədər, dərs prosesi və dərsdən sonrakı mərhələlərin geniş təhlili aparılmalı, dərsin məzmununa keçmədən əvvəl, mövzunun əhəmiyyəti, eləcə də onun öyrənənlər qarşısında qoyduğu məqsəd və vəzifələrə dair suallar formalaşdırılmalıdır (Məmmədova, 2012: 75-77).

Bundan başqa sualların əksəriyyəti və tipləri elə seçilməlidir ki, öyrənənlərdə bilik (informasiyanı eşitdiyi formada təkrar etmək bacarığı), anlama (mövzuya dair hər hansı bir fikri öz sözləri ilə və ya hər hansı başqa bir yolla yenidən söyləmək bacarığı), tətbiq etmə (təzəcə öyrəndiyi üsuldan istifadə etməklə, yeni bir tapşırığı həll etmək bacarığı), analiz (mürəkkəb bir ideyanın səbəblərini, nəticələrini və digər tərkib hissələrini tapmaq bacarığı), sintez (bir neçə ideyanın bir yeni ideya ilə birləşdirilməsi, köhnə ideyanın yeni variantını tapmaq bacarığı) və qiymətləndirmə (konkret ideyanın, yaxud hər hansı bir prosesin izahı üçün tam uyğun gəldiyini qiymətləndirmək bacarığı) kimi bacarıq və qabiliyyətlərin formalaşması təmin olunsun və dərsin düşünmə mərhələsində öyrənənlər özləri üçün müəyyən nəticələr çıxara bilsinlər . İnteraktiv təlim və onun əsasında duran interaktiv texnologiyalar öyrənmə subyektivi olan şagirdin daim öyrədici sistemin fəal avtonom elementi rolunda çıxış etməsini tələb edir. İnteraktiv təlim informasiyanın passiv rejimində deyil, fəal, problemləli situasiya rejimində mənimsənilməsini təmin edir ki, bu da interaktiv dialoji ünsiyyətə, əqli inkişafa yol açır.

NƏTİCƏ

İnteraktiv təlim metodları biliklərin daha müstəqil və sərbəst qavranılmasında mühüm rol oynayır. Fəal təlim biliyin qrup və cütlərlə iş formalarından müntəzəm şəkildə istifadə etməklə axtarılıb tapılması ön plana çəkilir. Bu cür təlim texnologiyası ilə təşkil olunan dərslərdə əvvəlcə problemə istiqamət verəcək motivasiya yaradılır. Motivasiya problemə çıxaracaq məsələnin qoyulmasıdır.



Deyilənlərdən belə bir nəticə çıxır ki, interaktiv təlim prosesində şagirdlərin yaradıcılıq qabiliyyətləri və dünyagörüşləri inkişaf edir. İnteraktiv öyrənmə prosesində şagirdlər müstəqil şəkildə düşünmə qabiliyyətinə yiyələnir, təcrübələr aparır, həll yollarının düzgünlüyünü öyrənir, müqayisə aparmaqla məlumatların daha düzgün mənimsənilməsinə nail olurlar. Müasir təlim metod və texnologiyalarının öyrədilməsi istiqamətində təşkil olunan seminarlarda, layihələrdə (treninqlər, monitorinqlər) müəllimlərin iştirakı məqsədəuyğundur.

ƏDƏBİYYAT

Əliyev, R.Y. (1989). Kimya tədrisi üsulunun nəzəri əsasları. Bakı.

Əliyev, Ş.H. (2009). Fəal/ interaktiv təlim. Bakı.

Qədimova X. (2003). İnteraktiv təlim metodları və onların tətbiqi yolları, Bakı.

Məmmədova A.Z. (2012). Kimyanın tədrisində müasir təlim texnologiyaları, Bakı.

Veysova Z.A. (2004). Məktəb müəllimləri üçün fəal təlim metodlarına giriş kursu, Bakı.

Veysova Z.A. (2007). Fəal/interaktiv təlim (müəllimlər üçün vəsait). Bakı.

Zeynalov S. (2013). Dərsdə problem-situasiya və şagirdlərin idrak fəallığının inkişafı. Azərbaycan məktəbi jurnalı, № 4.

BİOLOGİYA DƏRSLƏRİNDƏ MÜASİR TƏLİM METODLARINDAN İSTİFADƏNİN TƏKMİLLƏŞDİRİLMƏSİ

IMPROVING OF THE USE OF MODERN TEACHING METHODS IN BIOLOGY LESSONS

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XÜLASƏ

Məqalə biologiya dərslərində müasir təlim metodlarından istifadənin elmi-pedaqoji əsaslarının modernləşdirilməsi probleminə həsr olunmuşdur. Məqalənin əvvəlində müasir təlim metodlarının təsnifatı öz əksini tapır. Bu təsnifatda Azərbaycanın pedaqoq-metodist alimləri ilə yanaşı, xarici ölkə pedaqoqlarının və metodistlərinin təqdim etdikləri təsnifatlar müqayisəli şəkildə şərh olunur. Məqalədə biologiya dərslərində istifadə edilən ən aparıcı təlim metodlarının tətbiqi yolları və praktik istiqamətləri öz əksini tapır.

Məqalədə biologiyanın tədrisi prosesində modernləşdirilməsi müasir təlim metodlarından səmərəli şəkildə istifadə etməklə bağlı bir sıra elmi idealar, konseptual fikirlər, nəzəri müddəalar irəli sürülmüşdür ki, bütün bunlar məqalənin elmi yeniliyi kimi qiymətləndirilə bilər.

Məqalənin praktik əhəmiyyəti və tətbiqinə dair isə qeyd etmək olar ki, burada biologiya müəllimlərinin bir sıra praktik fəaliyyət istiqamətləri öz əksini tapır. Bunlardan orta ümumtəhsil məktəblərində biologiyayı tədris edən müəllimlər, habelə zoologiya, botanika müəllimləri də faydalana bilərlər.

Açar sözlər: biologiya dərsləri, təlim metodları, müəllimin kompetensiyaları, praktik metodlar, əyani metodlar

ABSTRACT

The article is devoted to the problem of modernization of scientific and pedagogical bases of use of modern teaching methods in biology lessons. At the beginning of the article is a classification of modern teaching methods. This classification compares the classifications presented by pedagogues and methodologists of Azerbaijan, as well as foreign pedagogues and methodologists. The article reflects the ways and practical directions of application of the most advanced teaching methods used in biology lessons.

The article puts forward a number of scientific ideas, conceptual ideas, theoretical provisions related to the modernization of biology in the teaching process and the effective use of modern teaching methods, all of which can be considered as scientific novelty of the article.

Regarding the practical significance and application of the article, it should be noted that it reflects a number of practical activities of biology teachers. Teachers of biology in secondary schools, as well as teachers of zoology and botany can benefit from them.

Key words: biology lessons, training methods, teacher`s competences, practical methods, visual methods

GİRİŞ

Azərbaycanda müvəffəqiyyətlə həyata keçirilən təhsil islahatlarına dair direktiv sənədlərdə fənlərin tədrisinə dair müasir təlim metodlarından məqsədyönlü şəkildə istifadə edilməsi fənn müəllimləri qarşısında bir sıra tələblər qoyulur. Fənn müəllimləri qarşısında qoyulan tələblərə uyğun olaraq fənlərin tədrisində ən müasir təlim metodlarından istifadə edilməsi zəruri sayılır. Bu zərurətə uyğun olaraq digər fənn müəllimləri kimi biologiya müəllimləri də müasir və ən yeni təlim metodlarından istifadə etməklə şəxsiyyətyönlü təhsilin yeni məzmunun yaradılmasında yaxından iştirak etməlidirlər. Unutmaq olmaz ki, Azərbaycan Respublikası Prezidentinin imzası ilə təsdiqini tapan Azərbaycanda təhsilin inkişafı üzrə Dövlət Strategiyasında şəxsiyyətyönlü təhsilin məzmunun yaradılması əsas istiqamətlərdən biri kimi təsbit olunmuşdur. Strategiyada təsbit olunan bu istiqamətə uyğun olaraq biologiyanın tədrisi prosesində şəxsiyyətyönlü təlimin yeni konsepsiyalarının yaradılması və bu konsepsiyalara uyğun təlim yeni modellərin yaradılmasından ötürü ən müasir təlim metodlarına istinad etmək vacib hesab olunur. Digər fənlərdən fərqli olaraq biologiya dərslərində yeni təlim metodlarından istifadə etməklə şagirdlərdə hidrosferin, biosferin, ekosferin, canlılar aləminin, o cümlədən quşların, heyvanların, suda-quruda yaşayanların, bir sözlə biocanlıların morfologiyası ilə bağlı şagirdlərə biliklərin əsaslarının öyrədilməsi və bu xüsusda onlara bacarıq və vərdişlərin aşılması faydalı hesab olunur.

Müasir təlim metodları və onların biologiya dərslərində tətbiqi. İstər ölkəmizin pedaqoji mühitində, istərsə qabaqcıl dünya təcrübəsində istifadə olunan yeni təlim metodları öz zənginliyi ilə diqqəti cəlb edir. Müstəqillik dövrünə qədərki təlim metodları əyani, şifahi, evristik metodlardan istifadə etməyin ümumi sistemi təqdim olunurdu. Fənn müəllimləri isə belə metodlar sistemindən öz praktik fəaliyyətləri zamanı istifadə etməkdə çətinlik çəkirdilər. Lakin müstəqillik dövründə istər ölkəmizdə, istər beynəlxalq pedaqoji mühitdə görkəmli pedaqoqlar tərəfindən irəli sürülən yeni təlim metodları müvafiq istiqamətlər üzrə quruplaşdırılmış və onların tətbiqi imkanları müəyyənləşdirilmişdir. Onlardan birincisi məlumatverici, inkişafetdirici məqsədlərinə və təlim vəzifələrinə görə metodlar hesab olunur. Hansı ki, bu metodlar M.A. Danilov, B.P. Yesipov, Y.Ş. Kərimov, A.N. Abbasov, F.A. Rüstəmov, F.B. Sadıqov kimi alimlər tərəfindən irəli sürülür. Bu metodlar sırasında müəllimin şərh, nəqlətmə, izah etmə, müsahibə, kitab üzərində iş, illüstrasiya, demonstrasiya, evristik müsahibə, problemləli situasiya, tədqiqatçılıq kimi metodlar nəzərdə tutulur. Əslində biologiyanın tədrisində qeyd olunan metodların hamısından istifadə etmək lazım gəlir. Çünki biologiya dərslərində hər hansı bir mövzunun izahı zamanı müəllimin şərhinə, nəqlətmə bacarığına, izah etmə səviyyəsinə, müsahibə aparmaq qabiliyyətinə malik olması nə qədər vacibdirsə, biologiya dərsləri üzrə metodik ədəbiyyatlar üzərində işləmək, illüstrasiya və demonstrasiya proseslərini tətbiq etmək, yəni bioloji məlumatların kompüter texnologiyaları, pedaqoji innovasiyalar vasitəsilə nümayiş etdirmək, yaxud problem situasiyanın qoyuluşuna nail olmaqla şagirdlərə tədqiqatçılıq bacarıqlarına yiyələndirilməsi sayəsində kompetensiyalara malik olmaları bir o qədər vacib sayılır.

Biologiya dərslərində ikinci qrup təlim metodlarına biliklərin, bacarıq və vərdişlərin möhkəmləndirilməsinə xidmət edən təlim metodları aid edilir. Hansı ki, bu metodları əsasən E.İ. Perovski, E.Y. Qolant, S.Q. Şapovalenko, N.M. Verzilin, Q.İ. Şukina, İ.T. Oqorodnikov, Y.K. Babanski, H.Ə. Əlizadə, A.N. Abbasov., L.N. Qasımova və başqaları irəli sürürlər. Bu metodların sırasında aydınlaşdırma, izah, diskussiya, idraki oyunlar, proqramlaşdırılmış təlim, öyrədici nəzarət, situativ yanaşma, tələb qoyma, yarış, təmrinlər üzərində iş metodları üstünlük təşkil edir. Bu metodların hər birindən biologiya tədrisində istifadə etmək məqsədəuyğun hesab edilir. Məsələn, biologiya dərslərində uşaqlara təmrinlərin hazırlanması üzrə tapşırıqların verilməsi bir neçə istiqamət üzrə həyata keçirilə bilər. Məsələn, balıqlar vəsiləsinə dair şərh edilən təmrinlər, balıqlar vəsiləsinə dair nümunə üzrə təmrinlər, bitkilər mövzusunda dair praktik

təmrinlər hazırlamaq üçün öyrənənlərə tapşırıqlar verilə bilər. Göstərilən təmrinlər üzrə şagirdlərin həyata keçirdikləri praktik işlər əsasən didaktik məqsədlərə xidmət etməlidir. Çünki şagirdlərə tapşırılan işlər üzrə həyata keçirdikləri fəaliyyət növlərinin hər birində didaktik nümunələrə istinad etmək dayanır. Belə olan təqdirdə şagirdlərdə yeni biliklər əldə etmək üzrə yeni bacarıq, vərdişlər yaranmış olur.

Ən yeni elmi pedaqoji ədəbiyyatlarda çoxlu sayda pedaqoji texnologiyanın təhlili verilmişdir. Adları: “Sınıfdə materialın əzbər öyrənilməsi”, “Səhvləri axtarıram”, “konspektmühazirə”, “mühazirə-diskussiya”, “mühazirə-məsləhət”, “əks əlaqəli mühazirə”, “tap, kimin haqqında danışırıq”, “İmtahana hazırlıq”, “beyin hücumu”, “generatorlar – tənqidçilər”, “buraxılış vərəqəsi”, “insanı təhlil edirik”, “özünüqiymətləndirmə”, “mətnlər mübadiləsi”, “fikirlərin sintezi”, “yaradıcı test”, “öz yerində oturmaqla sakit cavab vermək” və s (4, s. 28-29).

Beynəlxalq təcrübədə tətbiq olunan təlim metodları da bir çox hallarda müvafiq sistemlər üzrə qruplaşdırılır. Məsələn, rusiyalı tədqiqatçı, alim T.A.İlina təlim metodlarını belə qruplaşdırır: 1) yeni biliklərin verilməsi metodları; 2) yeni biliklərin əldə edilməsi, onların möhkəmləndirilməsi, bacarıq və vərdişlərin yaranması üçün istifadə olunan metodlar; 3) təlimin texniki vasitələri ilə iş metodları (3, səh. 59). Hər üç metoddan biologiyanın tədrisində istifadə etmək faydalı sayılır. Məsələn, Monohidrid çarpazlaşdırmanın genetik analizi, genetik mahiyyəti, dihibrit çarpazlaşmanın genetik əsasları, Polihidrid çarpazlaşmanın genetik analizi haqqında şagirdlərə lokonik məlumatların verilməsi prosesində hər üç metoda istinad etməklə şagirdlərə verilən yeni biliklərin möhkəmləndirilməsi onlarda bu xüsusda müvafiq bacarıqların formalaşdırılması üçün önəmli hesab edilir. Bu prosesdə modul təlim texnologiyalarından istifadə etməkdə məqsədəuyğun sayılır.

Müasir təlim üsullarının tətbiqinin təkmilləşdirilməsi üsulları. Biologiya dərslərində istifadə edilən təlim üsulları da, digər dərslərdə istifadə edilən təlim üsulları kimi müntəzəm olaraq təkmilləşir. A.K.Qromtseva təlim metodlarını yeni biliklərin əldə edilməsini təmin edən metodlar adı ilə belə təsnif edir:

- İnformasiyalı inkişafetdirici metodlar (müəllimin şifahi şərh, müsahibə, kitab ilə iş);
- Evrestik (axtarıcılıq) metodları (evristik müsahibə, disput, laborator işi, tədqiqatçılıq).

O, bilik, bacarıq və vərdişləri möhkəmləndirən və təkmilləşdirən metodlara aşağıdakıları daxil edir:

- Çalışmalar (nümunə əsasında çalışmalar metodu, kommentarialı çalışmalar metodu,variantiv çalışmalar metodu);
- Praktik işlər.
- Şifahi (müəllimin canlı sözü: nəql, izah, müsahibə, dərslik və kitab üzərində iş);
- əyani (müshahidə, demonstrasiya, illüstrasiya, ekskursiya);
- praktik (şifahi və yazılı çalışmalar, yaradıcılıq işləri, laborator işlər, qrafik işlər) (3, səh. 59).

M.A.Danilov, B.P.Yesipov, Y.K Babanski bilik, bacarıq, vərdişlərin yoxlanılmasına xidmət edən metodları, sözlü, əyani, praktik, reproduktiv, axtarıcılıq, induktiv, deduktiv, tədrisi bilavasitə idarə edən metodları müstəqil metodlar kimi təqdim edirlər.

Fikrimizcə, bu metodların hər biri də biologiyanın tədrisinin keyfiyyətinin yüksəldilməsinə xidmət edən metodlar kimi dəyərləndirilə bilər. Lakin biologiyanın tədrisi prosesində daha önəmli sayılan metodlar sırasında müşahidə, demonstrasiya, illüstrasiya, ekskursiya, praktik çalışmalar, laborator işlər, yaradıcı işlər, təlimin texniki vasitələri ilə iş, videometod, proqramlaşdırılmış təlim, fərdlərlə iş, cütlərlə iş, qruplarla iş metodlarından istifadə edilməsi

çox faydalıdır. Fikrimizi onların bəzilərinin tətbiqi imkanları haqqında elmi-pedaqoji, metodik yanaşmalar məzmununda ideyalar irəli sürməklə aydınlaşdırmağa çalışsaq.

Müşahidə məqsədli fəaliyyət olub, həyatımızın bütün sahələrində mühüm yer tutur. Müşahidə təlimin materialının mənimsənilməsinin ən mühüm metodlarından biridir. Müşahidə bəzilərinin zənn etdikləri kimi, sadəcə seyr deyil, məqsədyönlü fəaliyyətdir. Onun köməyi olmadan müxtəlif əşya və hadisələri dərk etmək mümkün deyil. Müşahidə qabiliyyətinə yiyələnməklə şagirdlərin təsəvvürləri formalaşır, bilikləri dərinləşir. Müşahidəçilik qabiliyyəti şagirdlərin əqli qabiliyyətinin inkişafına güclü təsir göstərir. Müşahidə natural şəraitdə-təbiətdə, cəmiyyətdə, həmçinin sinif dərslərində təşkil oluna bilər. Natural şərait dedikdə, meşədə, çöldə, çəmənlikdə, bağda, parkda, dağda, dərədə, şəhərdə, kənddə, bitkilər və heyvanlar aləmi, nəqliyyat, istehsalat üzərində, həmçinin həmin obyektlərdə insanların əməyi üzərində aparılan müşahidələr nəzərdə tutulur (3, səh. 122). Deməli, biologiya dərslərində hər hansı bir mövzunun öyrədilməsi zamanı məqsədyönlü, planlı, mütəşəkkil olaraq müşahidələrin aparılması şagirdlərin elmi dünyagörüşlərini, intellektual səviyyələrini və şəxsiyyətyönümlü inkişafını təmin etmiş olur. Yaxud demonstrasiya metodu vasitəsilə bütün bioloji mühitin incəliklərini şagirdlərə çatdırmaq mümkündür.

Bir çox mövzuların şüurlu başa düşülməsini təmin etmək məqsədilə dərstdə müxtəlif əşyaların, cihazların, alətlərin, vəsaitlərin, dinamikasının açılması, diafilmlərin, diapozitivlərin, kinofilmlərin, təcrübələrin göstərilməsi lazım gəlir. Demonstrasiya sadəcə nümayiş deyil, canlı prosesdir. Demonstrasiya zamanı ilk növbədə obyektin xarici əlaməti –böyüklüyü, forması, rəngi, hissələri, onların hər birinin görünüşü, sonra xassələri, daxili keyfiyyətləri (cihazın necə işləməsi, buzun necə əriməsi, çəyirtkənin necə atılması və s.) nümayiş etdirilir. Bu zaman fəal idrak prosesi baş verir. Demonstrasiyanın səmərəliliyini təmin etmək üçün aşağıdakı şərtlər gözlənməlidir: nümayiş edilən obyekt (tarla bitkiləri, tərəvəz, yeraltı sərvətlər, əmək alətləri və s.) hamı tərəfindən aydın görünməli, müxtəlif hiss orqanları tərəfindən qavranılmalıdır; əşya və ya təcrübə yalnız lazımı anda nümayiş etdirilməlidir; şəkillər iri, rəngli, cədvəllərin yazıları hamının görə biləcəyi ölçüdə olmalıdır; obyektin sözlə təsviri müşahidəçiliyi inkişaf etdirilməli; şagird əldə ediləcək biliklə əlaqədar cəhətə diqqət yetirməlidir; nümayişin nəticəsi şagirdlərin iştirakı ilə formalaşdırılmalıdır; nümayiş etdirilən obyektin xarici əlamətinə aludəçiliyə yol verilməməlidir (3, səh. 125).

Demonstrasiyadan sonra illüstrasiya metodundan istifadə etməklə biologiya dərslərində şagirdlərə biliklərin əsaslarını mənimsətməklə yanaşı, onlarda bir sıra bacarıqların aşılmasına üçün məntiqi əlaqə yaranmış olur. İllüstrasiya demonstrasiya metoduna çox yaxın olub, əşya və hadisələrin bilavasitə özlərinin təqdim edilməsi ilə deyil, simvolik təsvirlərin köməyi ilə təsviri və qavranılması metodudur. İllüstrasiya və demonstrasiya bir-birini tamamlayır. Əşya və hadisələr, həmçinin demonstrasiyada canlı verilən proseslər illüstrasiya metoduna əsasən plakatların, fotoşəkillərin, sxemlərin, mulyajların, herbarilərin, yastı modellərin, rəsmlərin köməyi ilə verilir. İbtidai siniflər üçün müxtəlif mövzularda (meyvə, tərəvəz, heyvanlar, quşlar, ağaclar və s.) şəkilli kartoçkalar, coğrafiya və tarixə dair xəritələr, albomlar və s. geniş yayılmış illüstrativ materiallardır (3, səh. 125-126). Bir sıra metodist alimlər demonstrasiya və illüstrasiya metodlarının əyani metodlar kimi təqdim edirlər. Əslində, biologiya dərslərində istər demonstrasiya, istər illüstrasiya, istərsə ekskursiya metodları vasitəsilə şagirdləri bioloji aləmin bütün sirləri ilə tanış etmək mümkündür. Xüsusilə gülləri, çiçəkləri, ağacları, quşları, heyvanları suda-quruda yaşayanları və digər canlıları əyani şəkildə müşahidə etmək üçün onların mövcud olduğu mühitə ekskursiya etmək lazım gəlir.

Ekskursiya didaktikada həm təlimin təşkilat forması, həm də təlim metodu kimi təqdim olunur. Ekskursiya çox səmərəli təlim metodudur. Bəzən bu və ya digər əşyanı və ya hadisəni onların mövcud olduğu təbii şəraitdə təqdim etmək zərurəti qarşıya çıxır. Ekskursiya əyani metodların

digər növləri (müşahidə, demonstrasiya, illüstrasiya) ilə sıx əlaqədar olduğundan bəzən müəllimlər tərəfindən metod kimi qəbul edilmir. Axı ekskursiya zamanı obyekt və hadisələr üzərində müşahidə aparılır. Ümumiyyətlə, ekskursiyanın başlanmasından sonunadək hər şey onun ayrılmaz komponenti sayılan müşahidə ilə müşayiət olunur. Ekskursiyada bəzən müəllim nələri isə nümayiş etdirir: meşədə tapdığı qıjını, dimdiyi ilə ağacı döyəclənən ağacdələni, gölməçədə hərəkət edən çömçəquyruğu göstərir. Uşaqlar ağacda sincab görüb, onu dələ hesab edirlər. Müəllim albomdakı dələ şəklini göstərsə deməli, illüstrasiya metodundan istifadə edir. Müəllim zavodda şagirdləri hər hansı mühərrikin fəaliyyəti ilə tanış etmək üçün onların diqqətini həmin aqreqata yönəldir (3, səh. 126-127). Ekskursiyanın xüsusi məqsədlər naminə təşkil etmək lazımdır. Plansız, məramsız, məqsədsiz və şagirdlərin asudə vaxtı hesabına təşkil edilən ekskursiyaların heç bir didaktik mahiyyəti, məzmunu yüksək dəyərləndirilmir. Ekskursiya zamanı şagirdlər biologiya dərslərində aldıkları nəzəri bilikləri praktikada reallaşdıraraq mənimsəmiş olurlar. Məsələn, biologiya dərslərində şagirdlər bitgilərin, ağacların, quşların vaxt meyarları ilə bağlı aldıkları öləri bilikləri ekskursiya zamanı genişləndirə bilirlər. Bu zaman onlar həmin biliklər üzrə praktik vərdişlər və bacarıqlar əldə edə bilirlər. Deməli tətbiq edilən metodun modernləşdirilməsi şagirdlərin hərtərəfli inkişafını və intellektual səviyyəsini yüksəltmiş olur.

Ekskursiya zamanı şagirdlərin əlavə didaktik materiallarla tanış edilməsi, şagirdlərin biologiya sahəsində aparılan yeni tədqiqatlarla tanış edilməsi, yeni pedaqoji innovasiyaların gücündən istifadə edilməsi görülən işlərin modernləşdirilməsi kimi dəyərləndirilməlidir. Ekskursiya zamanı müəllim deyir: Saati bilmək istəyirsən güllərə bax!

İnsanlar çoxdan müşahidə ediblər ki, bir çox canlılar vaxtı, zamanı saatsız da çox dəqiq müəyyən edirlər. Onlar qabarma və çəkilmələri, ay və il dövrlərini yaxşı bilirlər. Quşlar, heyvanlar eyni vaxtda yatıb-dururlar. Bütün bu proseslərə bioloji saatlar böyük köməklik göstərir. Bioloji saat olmasa idi, heyvanlar fəsillərin dəyişməsinə vaxtında hazırlaşma bilməzdilər. XVIII əsrdə İsveç botaniki Karl Linney bu xüsusiyyətləri bildiyinə görə, öz bağçasında xüsusi gül saati tərtib edir. Bu, o qədər də çətin iş deyil, hər biriniz bunun öhdəsindən gələ bilərsiniz. Sadəcə, bilmək lazımdır ki: itburnu çiçəyi səhər saat 4-5 radələrində açıb, axşam 7-8 radələrində yumulur (5, səh, 6). Ekskursiya müddətində şagirdlər bunları müşahidə edərək öz gözləri ilə görür, aldıkları biliklər onların təfəkkür səviyyəsini yüksəldir və idrak fəallığını artırmış olur.

Yaxud biologiya dərslərində arılarla bağlı verilən bir sıra qeyri-adi informasiyalarda, arıların həyat tərzi ilə bağlı qeyri-adi məqamları görmək istəyən şagirdlərə ekskursiya prosesində onlara real mənzərəni nümayiş etdirmək çox faydalıdır. Ekskursiya zamanı sərxoş arıları şagirdlərə göstərən biologiya müəllimi qeyd edir ki, gördüklərini sərxoş arılardır. Onların içərisində dәмət səhləbi nektar ifraz edir. Dәмət səhləbi elə nektar ifraz edir ki, onun yaxınlığından uçan arıları bu nektarın qoxusu dərhal cəlb edir. Bu şirədən azacıq dadanlar isə o qədər məst olurlar ki, çiçəyin maye ilə dolu boşluğuna yığılıb qalırlar. “Özünə gələn” arı bir təhər çiçəyin içindən çıxana qədər onun üstü tozcuqlarla örtülmüş olur (5, səh, 7).

Bir çox tropik güllər tozlanmada yarasaların xidmətindən çox məhsuldar şəkildə istifadə edirlər. Övəzində nektar “təklifdən” güllər yarasaları çiçəyin lap dibində yerləşən ətirli şirəyə cəlb edirlər. Bu zaman başı nektarı yalamağa qarışan yarasalar istər-istəməz tozcuğa bulaşırlar. Növbəti çiçəyə - yeni nektar yalamağa tələsən bu heyvan, heç özü də bilmədən, tozcuq paylayan poçtalyona çevrilir (5, s.7-8). Deməli, biologiya dərslərində şagirdlər aldıkları nəzəri bilikləri ekskursiya zamanı praktik olaraq mənimsəyirlər. Bu zaman onların elmi dünyagörüşləri və şəxsiyyətyönümlülük səviyyələri dinamik şəkildə inkişaf etmiş olur.

Nəticə. Göründüyü kimi, müasir təlim metodları şagirdlərin ətraf mühiti daha adekvat dərk etməsinə və əldə edilən biliklərin onların yaddaşında daha yaxşı qalmasına köməklik göstərir.



Həmçinin daha düzgün və praktika ilə sınaqdan keçirilmiş biliklər onların özlərinə olan inamını gücləndirir, təhsil prosesinə olan meyil və həvəslərini artırır (2, s.29-30).

Göründüyü kimi, təlim metodlarından məqsədyönlü, planlı, mütəşəkkil olaraq modernləşdirilməsi biologiya müəllimləri şəxsiyyətyönlü təhsilin yeni məzmunun yaradılması işində fəal iştirak edə bilirlər.

Qeyd etmək lazımdır ki, biologiyanın tədrisi prosesində müasir təlim metodlarından öz kompetensiya imkanları hesabına istifadə edən müəllimlər şəxsiyyətyönlü təhsilin yeni məzmunun yaradılması işində fərqlənə bilirlər.

İSTİFADƏ EDİLMİŞ ƏDƏBİYYAT

1. Azərbaycan Respublikasının ekologiya qanunvericiliyi (normativ-hüquqi aktlar toplusu), II cild. Bakı-Qanun-2006.
2. Ağayev Ə. Müasir təlim prosesin: nəzəriyyə və təcrübə məsələləri // Azərbaycan məktəbi. Bakı, 2005, № 6
5. Kərimov Y.Ş. Təlim metodları. Bakı, 2009.
4. Nəzərov A. Müasir təlim texnologiyaları (Mühazirə xülasələri). Dərs vəsaiti. ADPU-nəşriyyatı. Bakı-2012. 103 səh.
5. Tahirli S. Təbiət. Bildiklərimiz və bilmədiklərimiz. Ayna Uşaq Ensiklopediyası. Bakı, Ayna mətbu evi, 2004.

ZORUNLU VATANDAŞLIK DAVRANIŞI ÜZERİNE BİR İNCELEME A RESEARCH ON COMPULSORY CITIZENSHIP BEHAVIOR

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ÖZET

Günümüz örgütleri sürekli değişen rekabet ortamına adapte olabilmek ve sürdürülebilir bir örgüt yapısına sahip olma avantajını kaybetmemek için çalışanlarına örgütsel vatandaşlık davranışı gibi ekstra rol davranışlarında bulunmaları konusunda baskı yapmaktadırlar. Zorunlu vatandaşlık davranışı, örgütsel vatandaşlık davranışının olumsuz ve yıkıcı tarafı olarak bu baskı ortamında ortaya çıkmaktadır. Örgütsel vatandaşlık davranışının zamanla değişik zorlayıcı unsurlar ile çalışanların iş tanımları dışında yaptıkları davranışlarının mecburiyete dönüşmesi sonucu oluşan zorunlu vatandaşlık davranışı; kurumların, çalışanları üzerinde belirlenen iş tanımları dışında kalan gönüllü davranışlarını zorunlu hale getirmesinden dolayı örgüt iklimini de zaman içinde bozmaktadır. Gerek örgüt ikliminin bir sonucu gerekse üst düzey yöneticilerin baskıları sonucu ekstra rol davranışları sergileyen çalışanların motivasyon ve verimi de düşmektedir. Dahası üstün astından sürekli olarak örgütsel vatandaşlık davranışı sergilemesini beklemesi, çalışanın baskı hissetmesine ve istenen ekstra rol davranışlarını gönülsüzce yapmasına neden olmaktadır. Buradan hareketle derleme niteliğindeki çalışmada, zorunlu vatandaşlık davranışının olumlu ve olumsuz performans çıktılarına yönelik ilişkisi incelenmiştir. Yakın zamana kadar zorunlu vatandaşlık davranışı ile ilgili araştırmaların istenilen seviyeye ulaşamadığı görülmektedir. Yapılan araştırma ile literatürde başlangıç aşamasında olan söz konusu kavram ve bu kavrama yönelik performans çıktılarının sonuçlarına dikkat çekmek amaçlanmakta; yöneticilerin çalışanlarına ekstra rol davranışında bulunmaları konusunda baskı yapmaları neticesinde, çalışanların performanslarının yapılan baskı oranında düştüğü görülmektedir. Yapılan çalışmanın, uygulayıcılara ve alan çalışmalarına katkı sağlayacağı umulmaktadır.

Anahtar kelimeler: Zorunlu vatandaşlık davranışı, örgütsel vatandaşlık davranışı, ekstra rol davranışı, örgüt iklimi.

ABSTRACT

Today's organizations put pressure on their employees to engage in extra-role behaviors such as organizational citizenship behavior in order to adapt to the ever-changing competitive environment and not lose the advantage of having a sustainable organizational structure. Compulsory citizenship behavior emerges as the dark and destructive aspect of organizational citizenship behavior in this pressure environment. Compulsory citizenship behavior is formed as a result of organizational citizenship behavior turning into an obligation with different coercive factors over time. Compulsory citizenship behavior also disrupts the organizational climate over time, as institutions make voluntary behaviors outside of the job descriptions determined on their employees compulsory. As a result of the organizational climate and the pressure of the senior managers, the motivation and productivity of the employees who exhibit extra role behaviors decrease. Moreover, the superior's constant expectation of OCB from the subordinate causes the employee to feel pressure and reluctantly perform the desired extra-role behaviors. From this point of view, in this compilation study, the relationship of compulsory

citizenship behavior to positive and negative performance outcomes was examined. Until recently, it has been observed that research on compulsory citizenship behavior has not reached the desired level. With the research, it is aimed to contribute to the field with the concept in question, which is at the initial stage in the literature, and the performance outputs for this concept, and it is seen that the performance of the employees decreases at the rate of pressure when the managers pressure their employees to act in an extra role. It is hoped that the research will contribute to practitioners and field studies.

Keywords: Compulsory citizenship behavior, organizational citizenship behavior, extra role behavior, organizational climate.

GİRİŞ

Günümüz örgütleri sürekli değişen rekabet ortamına adapte olabilmek ve sürdürülebilir bir örgüt yapısına sahip olma avantajını kaybetmemek için çalışanlarına örgütsel vatandaşlık davranışı gibi ekstra rol davranışlarında bulunmaları konusunda baskı yapmaktadırlar.

Zorunlu vatandaşlık davranışı (ZVD), örgütsel vatandaşlık davranışının (ÖVD) zamanla değişik zorlayıcı unsurlar ile çalışanların iş tanımları dışında yaptıkları davranışlarının mecburiyete dönüşmesi sonucu oluşmaktadır. Bu yönüyle ÖVD'nin karanlık ve yıkıcı yönü olarak bu baskı ortamında ortaya çıkmaktadır (Vigoda-Gadot, 2006; Zhao vd., 2013; Şeşen vd., 2014).

Ortaya çıkan bu durum, mesai saatleri ötesinde, belirlenmiş bir ücret ödemediği fazladan çalışmanın kabul edilen norm haline geldiği bir sosyal atmosfer yaratmaktadır. Çalışanlara, bu faaliyetleri üstlenmedikleri sürece örgütteki sosyal konumları hatta görev süreleri açısından resmi konumlarının tehlikeye atılacağı duygusu hissettirilebilmektedir (Morrison, 1994). Bu tür taciz edici ve sömürücü davranışlar, çalışanların resmi işlerinin ötesinde karşılıksız ekstra rol davranışları sergilemeleri için gerçekleştirilmektedir. (Vigoda-Gadot, 2006). Bununla birlikte, daha fazla ÖVD sergileme baskısı, yöneticilerin ve yönetimlerin, ekstra rol davranışlarını başka yollarla artırmayı amaçlayan diğer stratejileri benimseme olasılığını da gündeme getirmektedir. ZVD, kurumların, çalışanları üzerinde belirlenen iş tanımları dışında kalan gönüllü davranışları zorunlu hale getirmesinden dolayı çalışanların çalışma ortamlarında olumsuz yönde değişikliğe neden olacağından örgüt iklimi zaman içinde bozulacaktır.

Gerek örgüt ikliminin bir sonucu gerekse üst düzey yöneticilerin baskıları sonucu ekstra rol davranışları sergileyen çalışanların motivasyon ve verimi de düşmektedir. Dahası üstün astından sürekli olarak ÖVD sergilemesini beklemesi, çalışanın baskı hissetmesine ve istenen ekstra rol davranışlarını gönülsüzce yapmasına neden olmaktadır. Buradan hareketle derleme niteliğindeki çalışmada, ZVD'nin davranışının olumlu ve olumsuz performans çıktılarına yönelik ilişkisi incelenmiştir.

Yakın zamana kadar ZVD ile ilgili araştırmaların istenilen seviyeye ulaşamadığı görülmektedir. Yapılan araştırma ile literatürde başlangıç aşamasında olan söz konusu kavram ve bu kavrama yönelik performans çıktılarının sonuçlarına dikkat çekmek amaçlanmakta; yöneticilerin çalışanlarına ekstra rol davranışında bulunmaları konusunda baskı yaptıklarında çalışanların performanslarının yapılan baskı oranında düştüğü görülmektedir. Yapılan araştırmanın, uygulayıcılara ve alan çalışmalarına katkı sağlayacağı umulmaktadır.

1. ÖRGÜTSEL VATANDAŞLIK DAVRANIŞINDAN ZORUNLU VATANDAŞLIK DAVRANIŞINA GEÇİŞ

Artan piyasa koşulları ve rekabet baskıları, modern örgüt yapılarını daha da gelişmeye zorlamaktadır. Sürdürülebilir rekabet avantajı sağlamayı hedefleyen örgütler ellerinde bulunan tüm imkânları, örgütsel etkinlik ve verimliliği artırmaya yönelik kullanmaktadırlar (Vigoda-Gadot, 2006).

Son yıllarda ÖVD'nin örgüt kültürü ve yönetim anlayışına önemli katkıları olduğu bilinmektedir. İşletmeler için önemli bir sürdürülebilir rekabet avantajı (Bolino, Klotz, Turnley ve Harvey, 2013) sağlayan ÖVD'yi önemseyen kuruluşların, böyle bir iklime sahip olmayan diğer kuruluşlara göre daha sağlıklı ve daha başarılı oldukları bilinmektedir (Podsakoff vd., 2000).

İlk kez Organ (1977) tarafından tanımlanan ÖVD kavramı, bir çalışanın örgüt tarafından beklenen zorunlu davranışlar dışında, ekstra rol davranışının bir türü olarak, herhangi bir maddi veya manevi karşılık beklemezsizin gönüllülük esasına dayalı olarak yaptığı bireysel davranışlarıdır. ÖVD ile ilgili ilk deneysel çalışmayı ise Smith, Organ ve Near (1983) gerçekleştirmişlerdir (Moon, Van Dyne ve Wrobel, 2005).

Son yıllarda ÖVD'nin örgüt kültürü ve yönetim anlayışına önemli katkıları olduğu bilinmektedir. Ekstra rol davranışının bir türü olarak, karşılığında bir ücret verilmeyen; ancak işletmeler için önemli bir sürdürülebilir rekabet avantajıdır (Bolino vd., 2013).

Yapılan ilk çalışmalarda ÖVD, isteğe bağlı ve özverili olarak tanımlanabilen olumlu bir davranış olarak kabul edilmektedir (Bolino vd., 2013). Araştırmacılar ÖVD'nin temelde çalışanların gayri resmi davranışları olduğuna dair bir fikir birliğine sahiptir. Bu kapsamda ÖVD'de bulunan çalışanlara herhangi bir ücret ödenmese de veya bu tür davranışlarda bulunmayanlara bir yaptırımda bulunulmasa da yöneticilerin iyi davranışları desteklemesi yönünde bir kanaat söz konusudur. Devam eden süreçte ÖVD'nin farklı sonuçlarının da olabileceği görülmektedir. Örgüt içinde önemli ve güçlü konuma sahip olan çalışanların kendisinden daha düşük mevkide çalışanların iş yükünü artırmak isteyen dış baskılara yanıt olarak ortaya çıkabilmektedir. ÖVD'nin örgütsel performansa ve iklime katkısının yanında, bireyin gerçek kimliğinden uzak "iyi niyete" dayanmayan ekstra rol davranışının bir sonucu olduğu düşünülmektedir. ÖVD'de çalışanlar örgüt içinde mevcut iş tanımlarının dışında kalan görevleri de yapmaktadırlar (Porpora, 1989).

Yöneticiler bazen çalışanların iş tanımını gayri resmi iş alanını ihlal edecek şekilde genişletmekte ve astlarına, tamamlamaları gerekenden daha ağır iş yükü üstlenmeleri için haksız baskı uygulamaktadırlar (Vigoda-Gadot, 2007). Pek çok çalışan gerek kendi deneyimlemiş gerekse etrafındaki bu deneyimlere şahit olmuştur. Ayrıca çoğu çalışanın, bu tür faaliyetler için resmi bir ödül veya tazminat almayacak olmalarına rağmen, bu tür baskılara boyun eğdiği görülmektedir. Bu durumda yönetimin bu yönlü baskısı olmasaydı, bu çalışanların bu tür faaliyetler hiç yapmayacakları veya yapmakta oldukları ÖVD faaliyetlerine son vermeyi seçecekleri düşünülmektedir. Bu nedenle, "gönüllük" söz konusu olmadığından ZVD bu tür faaliyetler için daha iyi bir tanım olduğu düşünülmektedir (Vigoda-Gadot, 2006).

Örgütlerde yaygın bir olgu olan ZVD, bu yönüyle ÖVD'den açıkça ayırt edilebilmekte ve ÖVD'den ve örgütsel performansla tamamen ters bir durum oluşturmaktadır. Çalışanlar, iş tanımlarında belirtilen ve resmi bir ödül almadıkları resmi olmayan iş görevlerine daha fazla enerji harcamaya zorlandıklarında, tepkilerinin olumsuz olması kaçınılmaz olmaktadır. Bu yönüyle ZVD kendiliğinden gelişen bir davranış niteliği taşımaktadır (Vigoda-Gadot, 2006).

Demek oluyor ki ÖVD çalışanın kendi iş tanımı dışında kalan özveri içeren davranışlarken zamanla değişik baskı unsurları sebebiyle iş tanımı dışında yapılan davranışların mecburiyete dönüşmesi ZVD şeklinde ortaya çıkmaktadır. Bu durum örgüt ve çalışanlar üzerinde çeşitli olumsuz etkilere sebep olmaktadır.

Çalışanlar ekstra rol davranışları olarak gördüklerini işleri gerçekleştirmeye zorlandıklarında, ideal iş sonuçlarından daha azını üretebilmektedirler. Bu nedenle, bu sonuçların örgütsel bazı temel hedeflere zarar verebileceği düşünülmektedir (Vigoda-Gadot, 2007).

2. ZORUNLU VATANDAŞLIK DAVRANIŞININ OLUMLU ÖRGÜTSEL

ÇIKTILARLA İLİŞKİSİ

Gerek bozulan örgüt ikliminin bir sonucu gerekse üst düzey yöneticilerin baskıları sonucu, ekstra rol davranışları sergileyen çalışanların motivasyon ve verimi de düşmektedir. ZVD'nin örgütsel bağlılık, örgütsel özdeşleşme, bireysel performans, iş tatmini üzerinde olumsuz etkilerinin olduğu şimdiye kadar yapılmış çalışmalarla doğrulanmıştır.

2.1. Ekstra Rol Davranışları, Örgütsel Bağlılık ve Örgütsel Özdeşleşme

Ekstra rol davranışları çalışanların iş tanımlarında yer almayan; ancak örgütsel amaç ve hedeflerin gerçekleştirilmesine katkı veren isteğe bağlı davranışlar olarak bilinmektedir. Yöneticiler çalışanlarını hep daha fazla ekstra rol davranışında bulunmaları ve görev tanımlarında yer almayan davranışlarda bulunmaları yönünde baskıya maruz bırakabilmektedir.

ÖVD, çalışanın resmi rol ve görevlerinin, *ekstra rol davranışları* gibi resmi olmayan rol ve görevlerden farklılığının net olduğu davranışlar olmalıdır (Vigoda-Gadot, 2006). Aksi durumlarda, ÖVD'nin ZVD'ye dönüşmemesi için çalışanların iş tanımları ile kendilerinden beklenen ekstra rol davranışları tanımlanarak birbirinden ayrılmalıdır (Morrison, 1994).

Şeşen vd., (2014) ÖVD'nin olumsuz etkisini ve olası bir karanlık tarafını ortaya koydukları çalışmada yöneticilerin ekstra rol davranışının olumsuz yönlerine dikkat etmesi gerektiğini doğrulamıştır. Sonuçlar, ÖVD'nin iş arkadaşının *sosyal kaytarması* üzerinde önemli bir etkisi olduğunu ve iş arkadaşının sosyal kaytarmasının bir çalışanın kendi sosyal kaytarması üzerinde olumlu ve *örgütsel bağlılığı* üzerinde olumsuz bir etkisi olduğunu göstermektedir. ZVD'nin, örgütsel bağlılıkta olduğu gibi çalışanların örgütsel özdeşleşme duygularını da bozarak sonraki ekstra rol davranışlarını azalttığı Zhao vd., (2014) araştırma sonuçları ile ortaya konmaktadır. Ayrıca ZVD'nin çalışanların örgütsel özdeşleşmelerini, *yenilikçi davranışlarını* ve ÖVD'lerini azalttıkları Ahmadian vd., (2017) çalışmasında da ortaya koyulmaktadır.

2.2. İş Tatmini ve Bireysel Performans

Kerse vd., (2019), imalat sektöründeki çalışanlar üzerinde yapmış oldukları çalışmada örgütteki vatandaşlık davranışının zorunluluğa dönüşmesi sonucu doğan baskıların çalışanların *iş tatminini* negatif yönde etkilediğini tespit etmiştir. ZVD ve iş tatmini arasındaki ilişkide ÖVD'nin negatif yönü olarak ifade edilmektedir (Vigoda-Gadot, 2006; Şeşen vd., 2014).

ZVD çalışanlar üzerinde baskı ve sömürülme hissi uyandırdığından iş performanslarını olumsuz yönde etkilemektedir. Topçu vd., (2017), çalışma bulguları ZVD'nin *iş performansı* üzerinde negatif, *iş tatmini üzerinde* ise pozitif etkisi olduğunu ortaya koymaktadır.

2.3. İş Becerikliliği

Baş ve Şirin (2021), kamu çalışanları üzerinde gerçekleştirdikleri çalışmalarında çalışanların iş verimliliğinin artırmasına pozitif etki doğurması bakımından ZVD'nin *görev becerikliliği* üzerine pozitif ve anlamlı bir etkisi olduğunu ortaya koymaktadır. ZVD ile karşılaşan çalışan

artan iş yükünün üstesinden gelebilmek adına daha çok iş becerikliliği sergileyecektir. İş becerikliliğinin bir boyutu olarak görev becerikliliği, ZVD gibi olumsuz bir durum karşısında dahi çalışanın iş verimliliğini artırmak için başvurduğu bir yol olabilmektedir.

3. ZORUNLU VATANDAŞLIK DAVRANIŞININ OLUMSUZ ÖRGÜTSEL

ÇIKTILARLA İLİŞKİSİ

Yönetici ve yönetimlerin daha fazla ÖVD sergilenmesine yönelik yaptıkları zorlamalar, görevi kötüye kullanma veya istismar edici faaliyetler şeklinde olabilmektedir (Vigoda-Gadot, 2007). İstismarcı denetimin bir sonucu olarak gelişen ZVD'nin iş gücü verimliliğini olumsuz bir şekilde etkilediği; iş stresi, mobbing, iş-aile çatışması, sosyal kaytarma ve örgütsel muhalefet üzerinde artırıcı etkilerinin olduğu görülmektedir.

3.1. İş Stresi

İş stresi her tür baskı ortamında kendini göstermektedir. Özellikle çalışanın kendisinden beklenenler ve işi ile ilgili sınırların netlik kazanmadığı durumlarda ortaya çıkmaktadır ve çalışmanı gerek fiziksel gerekse psikolojik olarak olumsuz etkilemektedir. ZVD, çalışanın kendisinden beklenen iş tanımı dışında kalan ekstra rol davranışları konusunda zorlayıcı bir etken olması nedeniyle iş stresini artırmakta ve iş verimini olumsuz yönde etkilemektedir.

Benzer şekilde, Ahmadian vd., (2017)'nin konaklama işletmelerinde yaptıkları çalışmada ZVD, çalışanların *işten ayrılma niyetlerini, sosyal kaytarma davranışlarını, iş arkadaşlarıyla çatışmalarını* ve tükenmişlik düzeylerini, iş stresini (Vigoda-Gadot, 2007) artırdığı yönünde bulgular elde etmişlerdir.

Kerse vd., (2019), ZVD ile ÖVD arasındaki negatif yönlü ilişkisinden (Vigoda-Gadot, 2006, 2007) yola çıkarak yapmış oldukları çalışmalarında, ZVD'nin *işteki stres* düzeyini artırdığını ve böylece iş stresini pozitif yönde etkilediğini ortaya koymaktadır. Bu durumda ZVD ile iş stresi arasında pozitif yönlü bir ilişki söz edilebilir. Bu durum benzer çalışmalarla örtüşmektedir. ZVD'nin artması ile çalışanların da iş stresi artacaktır (Vigoda-Gadot, 2006, 2007).

3.2. İstismarcı Denetim

İstismarcı denetçiler çalışanlar üzerinde baskı uyguladıklarında, bazı çalışanlar bu tür baskılara boyun eğebilmekte, ancak diğer çalışanlar bu durumu gayri meşru veya suistimal olarak algılayabilmektedir. Bu baskıları olumsuz yorumlayan çalışanların psikolojik olarak olumsuz tepki vermesi beklenmektedir. Böylece istismara uğrayan çalışanlar, ekstra rol faaliyetlerine gönüllü olarak katılmak istemezler (Vigoda-Gadot, 2007).

Zhao vd., (2013) *istismarcı denetimin*, ÖVD ve ZVD'nin karanlık yüzü üzerindeki etkisini incelemeyi amaçladıkları çalışma sonucunda, istismarcı denetim ve ZVD arasındaki ilişkiyi destekleyen *psikolojik güvenliğin* aracı rolüne ve arabuluculuğu etkilemede Çin gelenekselliğinin düzenleyici rolüne odaklanmaktadır.

İstismarcı denetimin gerçekleştiği örgütlerde, istismara uğrayan çalışanlar, ekstra rol faaliyetlerine katılmayı reddederlerse amirlerinin kendilerine kızacaklarına ya da cezalandıracaklarına inanmaları sebebiyle bu tür baskılara boyun eğmektedirler. Bu durumda bu çalışan davranışının ZVD'ye daha uygun olduğu söylenebilir.

3.3. İş-Aile Çatışması ve Sosyal Kaytarma

Pek çok kuruluş çalışanlarından, daha fazla ÖVD gerçekleştirmesini isteyerek işletmelerinin büyümesine yönelik destek beklemektedir (Vigoda-Gadot, 2006). Ancak, tüm çalışanlar böyle

bir beklentiyi kabul etmeye istekli değildir ve ÖVD'yi gerçekleştirmeleri konusunda kendilerini baskı altında hissedebilmektedirler. ÖVD baskısı yaşayan çalışanlar, iş ve aile sorumluluklarını dengeleme konusunda kendilerini güçsüz hissedebilmekte ve bu da onlar için *iş-aile çatışmasını* artırabilmektedir. Bu durumda ÖVD baskısının ZVD'nı güçlendirerek iş-aile çatışmasına yol açtığı söylenebilir. Liu vd., (2017) ÖVD baskısının iş-aile çatışması üzerindeki etkisine yönelik benzer bulgular sunmaktadır. İşyerinde ÖVD yönelik baskı hisseden çalışanların, aile üyeleri onlardan iyi bir eş veya ebeveyn olmalarını bekledikleri için muhtemelen evde de benzer baskılara sahip oldukları düşünülmektedir.

3.4. Mobbing

ZVD çalışanı gönüllü davranışların dışında mecburiyetlere itmesinden dolayı bir *mobbing* unsuru olduğu söylenebilir. ÖVD sergileyen çalışan, örgüt içinde diğer çalışanlardan daha fazla takdir görecektir ve zamanla örgüt içinde diğer çalışanlar tarafından rakip olarak görülebilecektir. Örgüt içinde ÖVD'de bulunmayan personel üzerinde üstleri tarafından baskıya uğrama ihtimali doğacaktır. Bu da ÖVD'de bulunan kişi üzerindeki mobbingin etkisini artıracaktır. Mobbingin, örgüt içinde en çok dürüst, çalışkan ve kendi iş tanımını dışında işlerle de uğraşarak diğer çalışanlara yardımcı olanlara uygulandığı yapılan araştırmalar sonucunda ispatlanmıştır.

Özcan (2011) çalışmasında literatüre benzer bir şekilde mobbingin, ÖVD'nı olumsuz yönde etkilediğini ortaya koymaktadır. Mobbinge maruz kalan çalışanların göstereceği tepkilerin başında ÖVD'den vazgeçmek veya ertelemek gelmektedir. Mobbing kurbanı çalışan görev ve sorumlulukları çerçevesinde işini yapmaya devam ederken zamanla kendisini örgütünden soyutlayıp fikir ve görüşlerini paylaşmayarak örgütsel sessizlik davranışı gösterecektir. Benzer bir çalışmada Poyraz ve Aksoy (2012), çalışanların mobbing kurbanı olma olasılığı arttıkça, ÖVD gösterme eğilimlerinde azalmalar olacağı yönünde bulgular sunmaktadır. Bu durumda mobbinge uğrama düzeyi ile ÖVD arasında ters yönlü bir ilişkiyi kanıtlar niteliktedir.

3.5. Örgütsel Muhalefet

Çalışanlar üzerinde ZVD'ye karşı olumsuz davranışlar gelişmektedir. ZVD sonucu çalışanların aşırı iş yükünün olması, onları fiziksel ve psikolojik olarak yıpratmakta ve bir takım sağlık problemlerini beraberinde getirmektedir. Çalışanlar, sosyal ve yönetsel baskıdan kaynaklanan iş tanımları dışındaki görevleri yapmak zorunda kaldıklarında, onaylamadıkları örgütsel politika ve uygulamalarla ilgili kendi muhalif fikirlerini daha sık dile getirip diğer örgüt üyelerinden destek almak istemektedirler. *Örgütsel muhalefet* yaşayan çalışanın ZVD hissetmesi doğaldır. Sonuç olarak ZVD ve örgütsel muhalefet arasındaki ilişki pozitif yönlüdür. Bu durumun örgüt ve çalışanlar üzerindeki verimliliğine etkisinin negatif yönde olduğu görülmektedir (Baş ve Şirin, 2021).

SONUÇ

Yakın zamana kadar ZVD ile ilgili araştırmaların istenilen seviyeye ulaşamadığı görülmektedir. Yapılan araştırma ile literatürde başlangıç aşamasında olan söz konusu kavram ve bu kavram ile ilgili performans çıktılarının sonuçlarının ilişkilendirilerek çalışmanın mevcut alana katkı vermesi amaçlanmıştır.

Derleme niteliğindeki çalışma sonucunda ZVD'nin görev becerikliliği dışında, örgütsel bağlılık, örgütsel özdeşleşme, iş tatmini, yenilikçi iş davranışı, bireysel performans gibi olumlu performans çıktıları ile negatif ilişkili olduğu görülmektedir. İş becerikliliğinin bir boyutu olan görev becerikliliği çalışanın iş verimliliğini artırmak adına ZVD'ye karşı başvurduğu bir yol olarak görülmektedir (Baş ve Şirin, 2021). Bu bakımdan ZVD ile görev becerikliliği arasında pozitif bir ilişki söz konusudur. Bununla birlikte alan yazında ZVD'nin; iş stresi, mobbing,

tükenmişlik, sosyal kaytarma davranışı, iş arkadaşları ile çatışma, iş-aile çatışması, örgütsel muhalefet gibi olumsuz performans çıktıları ile pozitif ilişkili olduğu görülmektedir.

Literatürde şimdiye kadar yapılan araştırmalarda ZVD, ÖVD'nin yıkıcı ve karanlık yönü olarak tanımlanmaktadır. Çalışanların kendi iş tanımları dışında kalan ekstra rol davranışları, ÖVD'nin olumlu etkilerinin aksine ZVD, çeşitli baskı unsurları ile gönülsüzce yapılmasından dolayı olumsuz etkiye sahiptir.

Yöneticilerin ekstra rol davranışları ile mevcut iş gerekliliklerinin sınırlarına yönelik net bir anlaşmaya varmaları gerektiğidir. Buna yönelik örgütsel iletişim kanallarının verimli kullanılması, çalışanların fikir, öneri ve şikayetlerini iletebilecekleri adil bir yönetim yaklaşımının olduğu bir örgüt iklimi yardımcı olacaktır.

Esnek çalışma sistemleri ve iş özerkliği gibi ZVD'yi azaltacak stratejiler çalışanların bir taraftan iş-aile çatışmasını azaltırken diğer taraftan ÖVD geliştirmeleri yönünde onları destekleyecektir (Liu vd., 2017). Yeni olan bu kavrama yönelik daha fazla teorik ve ampirik çalışma yapılmasını temenni edilmektedir.

Yöneticiler ÖVD'na yönelik uyguladıkları baskının derecesine dikkat etmelidirler. Zira ÖVD'nin “iki ucu keskin bir kılıç” olduğu unutulmamalıdır (Liu vd., 2017). Yöneticiler çalışanlarına ekstra rol davranışında bulunmaları konusunda baskı yaptıklarında, çalışanların performanslarının yapılan baskı oranında düştüğü görülmektedir. Yapılan çalışmanın, uygulayıcılara ve alan çalışmalarına katkı sağlayacağı umulmaktadır.

KAYNAKÇA

- Ahmadian, S., Sesen, H., & Soran, S. (2017). Expanding the boundaries of compulsory citizenship behavior: Its impact on some organizational outputs. *Business and Economic Horizons*, 13(1), 110-118.
- Baş, M., & Şirin, S. (2021). The Mediating Role of Organizational Dissent and The Moderating Role of Organizational Trust in The Relationship Between Compulsory Citizenship Behavior and Job Crafting. *Sivas Cumhuriyet University Journal of Economics and Administrative Sciences*, 22 (1), 356-378.
- Bolino, M. C., Klotz, A. C., Turnley, W. H., & Harvey, J. (2013). Exploring the dark side of organizational citizenship behavior. *Journal of Organizational Behavior*, 34, 542–559.
- Kerse, G., Koçak, D., & Yücel, İ. (2019). Örgütsel vatandaşlığın zorunlu olması iş tatminini etkiler mi? İş stresi bağlamında bir inceleme. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, 21(2), 547-560.
- Liu, Y., Zhao, H., & Sheard, G. (2017). Organizational citizenship pressure, compulsory citizenship behavior, and work–family conflict. *Social Behavior and Personality: An international journal*, 45(4), 695-704.
- Moon, H., Van Dyne, L., & Wrobel, K. (2005). The circumplex model and the future of organizational citizenship behavior research. *Handbook of organizational citizenship behavior*, 3-23.
- Morrison, E. W. (1994). Role definitions and organizational citizenship behavior: The importance of the employee's perspective. *Academy of management journal*, 37(6), 1543-1567.
- Özcan, N. (2011). *Mobbingin örgütsel vatandaşlık davranışı üzerine etkisi ve örgütsel sessizlik: Karaman il özel idaresinde bir uygulama* (Master's thesis, Sosyal Bilimler Enstitüsü).



- Porpora, D.V. (1989). Four concepts of social structure. *Journal for the Theory of Social Behavior*, 19, 195–211.
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management*, 26(3), 513-563.
- Poyraz, K., & Aksoy, Ş. (2012). Mobbing ile örgütsel vatandaşlık davranışı arasındaki ilişkinin belirlenmesi ve Kütahya il merkezi özel banka işletmelerinde uygulama. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 32(1), 183-201.
- Şeşen, H., Soran, S., & Caymaz, E. (2014). Dark side of organizational citizenship behavior (ocb): Testing a model between ocb, social loafing, and organizational commitment, *International Journal of Business and Social Science*, 5(5): 125-135.
- Topcu, M. K., Beğenirbaş, M., & Turgut, E. (2017). Örgütsel sinizm, zorunlu örgütsel vatandaşlık davranışları ve iş tatmininin bireysel iş performansına etkilerinin belirlenmesine yönelik imalat sanayide bir uygulama. *Yönetim ve Ekonomi: Celal Bayar Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 24(2), 505-522.
- Vigoda-Gadot, E. (2006). Compulsory citizenship behavior: Theorizing some dark sides of the good soldier syndrome in organizations. *Journal for the Theory of Social Behavior*, 36, 77-93.
- Vigoda-Gadot, E. (2007). Redrawing the boundaries of OCB? An empirical examination of compulsory extra-role behavior in the workplace. *Journal of business and psychology*, 21(3), 377-405.
- Zhao, H., Peng, Z., Han, Y., Sheard, G., & Hudson, A. (2013). Psychological mechanism linking abusive supervision and compulsory citizenship behavior: A moderated mediation study. *The Journal of psychology*, 147(2), 177-195.
- Zhao, H., Peng, Z., & Chen, H. K. (2014). Compulsory citizenship behavior and organizational citizenship behavior: The role of organizational identification and perceived interactional justice. *The Journal of psychology*, 148(2), 177-196.

**INVESTIGATION OF THE EFFECTIVENESS OF COURAGE-BASED VALUES
EDUCATION PRACTICES FOR PRESCHOOL CHILDREN AGED 6 YEARS
LIVING IN A SOCIOECONOMICALLY DISADVANTAGED REGION**

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ABSTRACT

Today, structuring in education is necessary to keep up with the developments, meet the needs, and find solutions to the problems. For this, appropriate tools and materials should be used best. It is very important to prepare new education programs in preschool in this context. In this way, it can be ensured that preschool children become self-confident, self-sufficient, happy, successful individuals who are beneficial to themselves and society. This situation may impact children being sensitive individuals who can solve the problems they encounter. Values education has a very important place in children's being healthy individuals and increasing their self-confidence. Recently, there has been an increase in research on values. Cooperation between family and school is necessary for children to learn and internalize values. In addition, it is necessary to determine appropriate goals, use the necessary methods and techniques, arrange the appropriate time, and prepare appropriate training environments and training programs. Preschool values education program is also effective on social-emotional development. It is necessary to pay attention to the content and application periods in values education programs in this context. In this study, the effectiveness of courage-based values education practices developed for preschool children aged six years living in a socioeconomically disadvantaged region on children's courage value acquisition was examined. The study sample consisted of 6-year-old children attending an independent kindergarten located in the Altındağ district of Ankara province. The research was carried out with 44 children, 22 of which were in the experimental group and 22 in the control group. Courage Based Values Education Practices, Courage Value Observation Form, and Personal Information Form developed by the researcher were used in the research. The training practices were prepared in 18 sessions and were applied to the experimental group by the researcher three days a week. The research aimed to contribute to the courage value acquisition of children with courage-based values education practices. An independent sample t-test was used to determine whether there was a significant difference between the pre-test and post-test scores of the experimental and control groups from the Courage Value Observation Form and compare the groups. Research results show that courage-based values education practices effectively affect children's acquisition of courage value. According to the data coming from the courage value observation form, it was observed that the courage value gains increased significantly.

Keywords: Courage-based values education, preschool education, courage.

INTRODUCTION

Change and development have made themselves felt in many areas. The rapid development of science and technology causes changes in the cultural and social structure (Karabacak, 1996; Öztürk, 2015; Akengin, Sağlam & Dilek, 2002). Early years are of great importance in the child's education to develop his talents and skills, reinforce his correct behaviors, and guide him; therefore, a planned and systematic preschool education should be given (Poyraz & Dere, 2003). Children have learned a lot about understanding emotions, talking about their emotions,

and expressing their emotions until the preschool period. It can be said that it is a systematic, family-supported education process that guides the child in line with the cultural values of the society, develops his commitment to national, spiritual, moral, cultural, and human values, and enables him to express himself, to provide self-control and to gain independence (Gülaçtı & Tümkaya, 2012). He developed his research for children aged five to six by applying for the education program. He concluded that the values including responsibility, respect, cooperation, friendship, honesty, and sharing positively affected children. Values education has an important place in helping preschool children be sensitive individuals who can stand on their feet and be useful to themselves and society. This situation has led to an increase in studies on values education recently (Özkan Kılıç & Özbek Ayaz, 2018; Sigurdardottir & Einarsdottir, 2016; Karakaş, 2015; Ülavere & Veisson, 2015; Johansson, Brownlee, Cobb-Moore, Boulton-Lewis, Walker & Ailwood, 2011).

THEORETICAL FRAMEWORK

Preschool education covers cognitive, emotional, psychosocial, physical, in other words, all developmental areas of children aged 0 to 6 years. In addition, preschool children are provided with the opportunity to express themselves, provide self-control and gain autonomy (Gülaçtı & Tümkaya, 2012). In preschool education, cultural, national, moral, moral, cultural, and humanitarian values of their society are also given. Culture is passed down from generation to generation throughout the ages. Culture is a value that sustains society. Culture consists of values based on morality and life as a whole. Keeping the values alive and transferring them is particularly important for Turkish culture. Culture includes all the beliefs, traditions, thoughts, material and spiritual values specific to a nation (Çüçen, 2005). Children's characters should be raised well, and conscientious values should be formed in children (Aydın, 2010). Values provide individuals with a different perspective and improve relations with the social environment (Yeşil & Aydın, 2007). Many studies were carried out on values education in the preschool period, and the studies were dealt with values education from multidimensional and different aspects.

METHOD

In this study, the effectiveness of courage-based values education practices developed for preschool children aged six years living in a socioeconomically disadvantaged region on children's courage value acquisition was examined. The study aimed to determine the contribution of courage-based values education practices to children's courage value acquisition. Courage Based Values Education, Courage Value Observation Form, and Personal Information Form developed by the researcher were used in the research. In the study, courage-based values education activities made in 18 sessions were applied to the students in the experimental group. The students in the control group continued their normal preschool education, and no intervention was made. The study sample consisted of 44 children attending an independent kindergarten in Ankara's Altındağ district. Of the children forming the sample, 22 constitute the researcher's experimental group, and 22 include the control group from the same age group. Statistical analysis of the research was analyzed with Wilcoxon Signed Ranks and Mann-Whitney U tests. The training practices were prepared in 18 sessions and were applied to the experimental group by the researcher three days a week. According to the pre-test results made before the courage-based values education practices, it was seen that the experimental group and the control group were similar before the training.

MODEL OF THE RESEARCH

In this study, a courage-based values education was applied to preschool children attending an independent kindergarten. An experimental design with the experimental-control group, pre-test, and post-test measurement was used to determine this practice's effectiveness. In this study, care was taken to use a control group equivalent to the experimental group. The independent variable of the study is the courage-based values education practice. In this research, Courage Based Values Education, Courage Value Observation Form, and Personal Information Form developed by the researcher were used. The pretest-posttest, experimental-control group (split-plot) pattern used in the research is given in Table 1.

Table 1. Research Pattern

Groups	First Measurement	Application	Final Measurement
Experiment Group	X	18 sessions of courage-based values practice	X
Control Group	X	-	X

In Table 1, 18 sessions of courage-based values education were applied to the experimental group, and no activity was applied to the control group (Karasar, 2005). The group that did not use any activity constitutes the control group in the study.

Participants

Participants in this study consist of 6-year-old children attending an independent kindergarten in Altındağ district of Ankara province in the 2019-2020 academic year. The research was carried out with 44 children, 22 of which were in the experimental group and 22 in the control group.

Data Collection Tools

In this research, Courage-Based Training Practices, Courage Value Observation Form, and Personal Information Form developed by the researcher were used as data collection tools.

Courage-Based Training Applications

Courage-based values education practices aim to support the courage-based value acquisition of preschool children. The researcher examined the books about the value of courage for preschool children and the play and drama activities applied to preschool children. Courage-based values education practices were applied to 6-year-old children attending an independent kindergarten by the researcher. The research was implemented as three sessions per week, a total of 18 sessions. Each session lasted 30 minutes, and the days on which the sessions would be implemented were determined together with the teachers, like Drama, games, etc., in the sessions. Various activities were used. Courage-based values education practices were carried out in the children's classes. The materials to be used before the application were made ready. During the application, children were observed (Yıldırım, 2018).

Courage Value Observation Form

A literature review on values education was first conducted to create a courage observation form. In this context, daily life behaviors related to the value of courage are listed. A list of 45 items was created and presented to the opinion of 10 experts. Opinions were received from Turkish teachers for the correctness of the expressions in the items, guidance and psychological counseling experts in terms of the compatibility of the listed behaviors with the developmental characteristics of their children, faculty members from the fields of preschool teaching, and preschool teachers working in the field. The Courage Value Observation Form was finalized

by evaluating the expert opinions. The Value of Courage Observation Form has 19 items directed to teachers and graded as five to determine children’s acquisition levels of courage value. In the prepared observation form, it was graded on a five-point Likert scale as “always (5), often (4), sometimes (3), rarely (2), never (1)” (Yıldırım, 2018).

Personal Information Form

In the personal information form, the age of the mother and father, the education level of the mother and father, the working status of the mother and father, the income status of the family, the gender of the child, the age of the child, the duration of attending the preschool education institution, the number of siblings and the order of birth questions are included (Yıldırım, 2018).

Data Collection, Evaluation, and Analysis

Permissions for Courage-Based Values Education Practices and Forms used in the study were obtained from people who adapted the scale and conducted validity and reliability studies. With the permissions obtained from the Ankara Provincial Directorate of National Education, the application was carried out in the spring term of the 2020-2021 academic year, and the data were collected. The independent kindergarten where the research will be conducted was visited beforehand, and teachers and institution administrators were interviewed. The researcher introduced himself to the children before the application. The applications and forms used to collect data from children were applied to each child in their class. The data obtained from the study were analyzed with the SPSS 26 package program.

Findings

Demographic Statistics

In this section, the demographic characteristics of children in independent kindergarten and their parents were examined within the scope of the research. In addition, after the courage-based values education practices, statistical analyzes of the data obtained from the courage value observation forms of the children in the experimental and control groups were made, and the findings were presented in tables and interpreted.

Table 2. Frequency and Percentage Distribution of Children’s Demographic Information

Variables	Categories	n	%
1. Gender of Students	Girl	26	59.1
	Boy	18	40.9
2. Number of siblings	Single child	6	13.6
	One sibling	18	40.9
	Two siblings	18	40.9
	Three siblings or more	2	4.5
3. Mother education status	Primary school	7	15.9
	Secondary school	10	22.7
	Highschool	18	40.9
	Licence degree	9	20.5
4. Father education status	Primary school	5	11.4
	Secondary school	5	11.4
	Highschool	23	52.3
	Licence degree	11	25.0

5. Mother working status	Not working	41	93.2
	Worker	2	4.5
	Officer	1	2.3
6. Father working status	Not working	25	56.8
	Worker	13	29.5
	Officer	6	13.6
7. Family Income Level	0-2000tl	7	15.9
	2001-4000tl	24	54.5
	4001- 6000tl	8	18.2
	6001tl or more	5	11.4
8. How many years of education	1 year	22	50
	2 years	17	38.6
	3 years	5	11.4
9. Birth order	First Child	23	52.3
	Second Child	14	31.8
	Third Child	7	15.9

Table 2 shows that the number of girls and boys included in the research is close to each other. Most children have one or two siblings; 93% of the mothers do not work, 57% of the fathers do not work. When the education period of the children is examined, it is seen that 50% of them have attended preschool education for one year, and when the birth order of the children is examined, it is seen that 52% are the first children. The finding indicates that most students' families have a low socioeconomic level.

Experimental vs. Control Group

Table 3. Means and Standard Deviations of Control and Experimental Group by Pre and Post Test Scores

	Control Group		Experimental Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-test	70.09	10.42	49.32	3.64
Post-test	63.32	10.29	86.23	3.57

Table 3 below shows necessary information about both the control and experimental group. The table provides evidence that the control and experimental groups differ in terms of both pre and post-test scores. Besides, the control group's pre-test scores are larger than its post-test scores, and the experimental group's post-test scores are higher than its pre-test scores. In addition to that, the experimental group appears to be quite better than the control group in terms of post-test scores.

Table 4. Experimental and Control Group Compared by Pre and Post Tests

Pair	N	Mean Difference	<i>t</i>	<i>df</i>	Sig (2-tailed)
Pre-test<>Pre-test	44	-20.77	-8.83	26.064	.000
Post-test<>Post-test	44	22.91	9.867	25.989	.000

$p < .001$

An independent sample t-test was used to analyze whether the experimental group is different compared to a control group with respect to pre and post-test scores. Table 4 shows the analysis result. As indicated in the table 3 and table 4, control group's pre-test scores ($M = 70.09$, $SD = 10.42$) are significantly higher than experimental group's pre-test scores, ($M = 49.32$, $SD = 3.64$), $t(26.064) = -8.83$, $p < .001$. However, when it comes to the post-test scores, the experimental group ($M = 86.23$, $SD = 3.57$) is statistically significantly better than the control group ($M = 63.32$, $SD = 10.29$), $t(25.989) = 9.867$, $p < .001$. This result means that taking training as an intervention causes a positive effect on students in building more courage values.

CONCLUSIONS AND DISCUSSIONS

Research results show that courage-based values education practices are effective in helping children acquire courage values. Furthermore, study findings revealed that children's courage value gains increased significantly. In other words, courage-based values education practices applied to the experimental group positively affect children's courage value acquisitions. As a result of the research, there was an increase in children's behaviors of expressing that they find the behavior of others right or wrong when they think that they have been wronged and of taking risks in games.

SUGGESTIONS

In line with the results of this research, the following recommendations have been developed.

1. This research was conducted in Altındağ district of Ankara province. research Comparison can be made by conducting research in different provinces and districts.
2. Comparisons can be made by applying the research in schools with different socio-economic levels.
3. This research was applied to children aged six years. Comparisons can be made by applying it to children in different age groups.
4. The experimental part of the research was implemented in an 8-week period. Comparisons can be made by applying at different times.
5. The value of courage was examined in the practices in this research. Research on different values can be done.
6. In a different study, children who went to preschool and those who did not can be compared.
7. Preschool children should be encouraged, opportunities should be provided and support should be provided when necessary.

REFERENCES

- Akengin, H., Sağlam, D. ve Dilek, A. (2002). İlköğretim 4. ve 5. Sınıf Öğrencilerinin Sosyal Bilgiler Dersi ile İlgili Görüşleri. M.Ü. Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi, 16 (16), 1-12. Erişim adresi: <https://dergipark.org.tr/tr/download/article-file/2160>.
- Aydın, M. Z. (2010). Okulda Değerler Eğitimi. Eğitime Bakış Dergisi, 6 (18), 16-19.
- Çuçen, A. K. (2005). Felsefeye giriş. (4. baskı). Bursa: Asa Kitabevi.



- Gülaçtı, F., & Tümkaya, S. (2012). Erken çocukluk eğitimi. Türkiye’de ve Dünyada Erken Çocukluk ve Okul Öncesi Eğitimi, 2-19.
- Johansson, E., Brownlee, J., Cobb-Moore, C., Boulton-Lewis, G., Walker, S., & Ailwood, J. (2011). Practices for teaching moral values in the early years: a call for a pedagogy of participation. *Education, Citizenship and Social Justice*, 6 (2), 109-124.
- Karabacak, N. (1996). Sosyal bilgiler dersinde eğitsel oyunların öğrencilerin erişim düzeyine etkisi. (Yüksek Lisans Tezi). YÖK Tez Merkezi veri tabanından erişildi. (Tez No: 52769)
- Karakaş, H. (2015). Değerler eğitimi etkinliklerinin okul öncesi öğretmenlerine göre değerlendirilmesi: Nitel Bir Çalışma. *Eğitimde Gelecek Arayışları. Düünden Bugüne Türkiye’de Beceri Ahlak ve Değerler Eğitimi Uluslararası Sempozyumu*, 16-18 Nisan, Bartın.
- Karasar N. (2005). *Bilimsel Araştırma Yöntemi: Kavramlar, İlkeler ve Teknikler*. Ankara: Nobel Yayıncılık.
- Özkan Kılıç, Ö., & Özbek Ayaz, C. (2018). 5-6 yaş grubu çocukların değerlere yönelik farkındalık düzeyini arttırmada değerler eğitimi programının etkisi. *Uluslararası Sosyal Araştırmalar Dergisi*, 11 (59), 818-824.
- Öztürk, T. (2015). Paleolitik, neolitik ve ilkçağda bilim ve teknoloji ve sosyal değişim. B. Ata (Ed.) *Bilim, Teknoloji ve Sosyal Değişim* (ss. 3-11). Ankara: Pegem AYayıncılık
- Poyraz, H., & Dere, H. (2003). *Okulöncesi eğitiminin ilke ve yöntemleri*. Anı yayıncılık.
- Sigurdardottir, I., & Einarsdottir, J. (2016). An action research study in an Icelandic preschool: Developing consensus about values and values education. *International Journal of Early Childhood*, 48 (2), 161-177
- Ülavere, P., & Veisson, M. (2015). Values and values education in Estonian preschool child care institutions. *Journal of Teacher Education for Sustainability*, 17(2), 108-124.
- Yeşil, R., & Aydın, D. (2007). *Demokratik değerlerin eğitiminde yöntem ve zamanlama*.
- Yıldırım, A. (2018). 6 yaş okul öncesi çocuklarına yönelik cesaret temelli değerler eğitimi uygulamalarının etkililiği. (Yüksek Lisans Tezi). İstanbul Sabahattin Zaim Üniversitesi Sosyal Bilimler Enstitüsü.



EFFECT OF BIO STIMULANTS ON THE GROWTH OF EGGPLANT (*SOLANUM MELONGENA* L.) GROWN UNDER NaCl INDUCED SALINITY

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ABSTRACT

Biostimulants have been applied to enhance the growth and yield of various vegetables under saline conditions which hampered the yield potential. A pot (12x30 cm) study was conducted to assess the mitigation response of two different biostimulants (*Quantis* and *Seamax*) on eggplant (Black Diamond) grown under different NaCl induced salinity levels (4 dS m⁻¹, 6 dS m⁻¹ and 8 dS m⁻¹) along with control (1.5 dS m⁻¹) at University of Agriculture, Faisalabad-Pakistan. Four different concentration of each biostimulants (0, 4, 6, 8, and 10 ppm) were used to evaluate its response toward different morpho-physiological parameters of eggplant under saline environment. This experiment was done under completely randomized design (CRD) and data was analyzed statistically to check the significance among treatments with Tukey HSD (P< 0.05) with Statistix 8.1. After 15 days of foliar application of biostimulants, it revealed that at lower salinity levels of 4 dS m⁻¹ and 6 dS m⁻¹ both the biostimulants showed results at par. *Quantis* performed better at plant height and spread at higher concentrations of 8 ppm and 10 ppm than *Seamax*. On overall basis *Seamax* with 6 mm resulted in high yield at control (1.5 dS m⁻¹). At higher salinity level of 8 dS m⁻¹, *Seamax* showed overall better performance than *Quantis* with. Fruit weight was highest when *Quantis* was foliarly applied at control (1.5 dS m⁻¹). Maximum number of fruits per plant were seen in 4 ppm (*Quantis*) at control and 6 ppm (*Seamax*) with 13.80 and 13.73, respectively. It was concluded that biostimulant overall enhances the ability of eggplant to response against salinity.

Keywords; *Solanum melongena*, *Quantis*, *Seamax*, Biostimulants, salinity

INTRODUCTION

Salinity also induces some unnecessary reactive oxygen species these include hydrogen peroxide, superoxide and hydroxyl radical in plants. At high concentration these reactive oxygen species change metabolism and cause damage to membranous lipids, nucleic acid and proteins. To restrict these reactive oxygen species activities, plant tissues produce enzymes which act as antioxidants (Foyer and Noctor 2009). Furthermore, if the large amount of salt enters in the transpiration stream of plant they damage the leaves conducting transpiration and ultimately cause death to plant. Ion imbalance and irregularity in homeostasis are the major outcomes of salinity which leads to the lessen growth and reduce productivity (Parihar *et al.*, 2015).

Salinity may be prevented by good agriculture practices and by the application of plant nutrients. To lessen the effects of salinity there are some strategies which help to get increased yield and good quality product. These strategies include application of bio fertilizers and organic matter, foliar application of both organic and inorganic substances and application of bio stimulants (Lacerda *et al.*, 2010). Therefore, to eliminate the adverse effects of salinity we must use the kind of practice that have ability to eliminate excess amount of soluble salt or

exchangeable sodium from soil solution (Saifullah *et al.*, 2018). A lot of research has already been done to find a way to reclaim the soil effected with salinity. Reclamation of soil from organic products like press mud, compost, poultry and farm yard manure are widely being used in the past to enhance chemical, biological and physical properties of soil effected with salinity to get the maximum output from soil (Lax *et al.*, 1994; Oo *et al.*, 2015; Srivastava *et al.*, 2016; Walker and Bernal, 2008; Yaduvanshi and Swarup, 2005). However, reclamation through these organic matter need continuous reapplications and it also contain large amount of decomposable organic substrate. Repeated application of organic matter is economically impossible and it is also environment unfriendly (Al-Wabel *et al.*, 2019). That's why bio stimulants are now being extensively used to lessen the effects of salinity.

The consumption of bio stimulants, known as the material or the substances other than the pesticides and the nutrients that are currently practiced to control physiological processes of crop to get the good yield, has risen many folds in the past few years, with the estimated global market of 2 billion USD in the year 2018 (Calvo *et al.* 2014). Bio stimulants are very effective throughout the plant life cycle from its seed stage to its maturity. They promote growth and development of plant by increasing its metabolic efficiency which in result increase yield and quality of product and help in translocation and nutrient enrichment and thereby increase crop tolerance against abiotic stresses and helps in recovery from it.

Bio stimulants enhances plant growth, increase uptake of nutrients from soil and lessen the need of fertilizers). When bio stimulants applied exogenously they perform the same role as some of the plant growth hormones do mainly auxins, cytokinins and gibberellins (Yaronskaya *et al.*, 2006). To counter saline stress bio stimulants can be used because they help in maintaining turgor pressure of leave by regulating water absorption (Azevedo *et al.*, 2011). Bio stimulants with algae, bacteria and arbuscular mycorrhizal fungi (AMF) as raw material help in enhancing tolerance against saline stress by promoting germination rate, fresh and dry weight of roots, shoots, quality, yield and productivity (Yakhin *et al.*, 2017; oosten *et al.*, 2017). Algal extracts stimulate so many different pathways in plants that help in developing salt tolerance (Salehi *et al.*, 2016).

Keeping in view, the harmful effects of salinity on physical and physiological parameters of eggplant, this study was planned to evaluate the salinity tolerance of eggplant. To find out the harmful effect of salinity on growth and yield parameters of eggplant. To evaluate the synergistic effect of combine exogenous application of Quantis and Seamax (commercial bio stimulant) under salinity.

MATERIALS AND METHODS

This experiment trial was conducted in the wire house at Institute of horticultural sciences (IHS), University of Agriculture, Faisalabad (UAF). The experiment was conducted in pots under completely randomized design (CRD) with single factor factorial arrangement and three replications. OP variety “Black Diamond” of eggplant was used to assess the potential of bio stimulants on the growth of eggplant grown under different saline conditions. Seeds were sown in the germination trays for production of healthy seedlings. Two seeds were sown in each cell to complete the number of required plants. Germination trays were then placed under polythene to boost the emergence. Germination trays were watered according to requirement. Seedlings were transplanted after 45 days of sowing. Each seedling was transplanted in one pot. After transplanting seedlings were watered heavily to minimize the osmotic stress. Seedlings were established within 15 days.



STATISTICAL ANALYSIS

This experiment was carried out under complete randomized design (CRD). The data was analyzed statistically using LSD test at 5% probability levels for comparing the differences among treatment means (steel *et al.*, 1997).

CONCLUSION

It was concluded from experiment that biostimulant overall enhanced the ability of eggplant to response against salinity. Overall, positive trend was seen in the results of parameters by increasing concentrations in foliar sprays but some of the attributes showed negative trend by increasing concentrations of foliar spray above optimum value. Most of the parameters showed better result at concentration of 8ml and 10ml than the control treatment against salinity.

REFERENCES

- Al-Wabel, M.I., A. R. A. Usman, A. S. Al-Farraj, Y. S. Ok, A. Abdul jabbar, A. I. Al-Faraj, and Sallam, A.S. 2019. Date palm waste biochars alter a soil respiration, microbial biomass carbon, and heavy metal mobility in contaminated mined soil. *Environ. Geochem. Hlth.* 41:1705-1722.
- Lax, A., E. Díaz, V. Castillo and J. Albaladejo. 1994. Reclamation of physical and chemical properties of a salinized soil by organic amendment. *Arid Land Res. Manage.* 8:9-17.
- Foyer, C. H. and G. Noctor. 2009. Redox regulation in photosynthetic organisms: signaling, acclimation, and practical implications. *Antiox. Redox. Design.* 11: 861-905.
- Parihar P., R. Singh, V. P. Singh and S. M. Prasad. 2015. Effect of salinity stress on plants and its tolerance strategies: A review. *Environ. Sci. Pol. Resrch.* 22:4056-4075.
- Lacerda C. F., R. N. T. Costa, M. A. Bezerra and H. R. Gheyi. 2010. Estratégias de manejo para uso de água salina na agricultura. *Fort. Int. Sal.* 43:306-318.
- Saifullah, S. Dahlawi, A. Naeem, Z. Rengel and R. Naidu. 2018. Biochar application for the remediation of salt-affected soils: Challenges and opportunities. *Sci. Environ.* 625:320-335.
- Srivastava, P. K., M. Gupta, N. Singh and S. K. Tewari. 2016. Amelioration of sodic soil for wheat cultivation using bioaugmented organic soil amendment. *Land Degrad. Dev.* 27:1245-1254.
- Walker, D. J. and M. P. Bernal. 2008. The effects of olive mill waste compost and poultry manure on the availability and plant uptake of nutrients in a highly saline soil. *Bioresour. Technol.* 99:396-403.
- Yaduvanshi, N. and A. Swarup. 2005. Effect of continuous use of sodic irrigation water with and without gypsum, farmyard manure, pressmud and fertilizer on soil properties and yields of rice and wheat in a long term experiment *Nutr. Cycl. Agroecosyst.* 73:111-118.
- Calvo, P., L. Nelson and J. W. Kloepper. 2014. Agricultural uses of plant biostimulants. *Plnt. Soi.* 383:3-41.
- Yaronskaya E., I. Vershilovskaya, Y. Poers, A. E. Alawady, N. Averina and B. Grimm. 2006. Cytokinin effects on tetrapyrrole biosynthesis and photosynthetic activity in barley seedlings. *Planta.* 224:700-709



- Yakhin. O. I., A. A. Lubyaynov, I. A. Yakhin and P. H. Brown .2017. Bio stimulants in plant science: A global perspective. *Front. Pl. Sci.* 7(2049):1-32.
- Salehi. S. Y. and H. Bakhshayeshan-Agdam. 2016. Drought stress in plants: Causes, consequences, and tolerance. *Sprin. Intl Pub.* pp. 1-16.
- Oo, A. N., C. B. Iwai and P. Saenjan. 2015. Soil properties and maize growth in saline and nonsaline soils using cassava-industrial waste compost and vermicompost with or without earthworms. *Land Degrad. Dev.* 26:300-310.

AN INTELLIGENT ENVIRONMENTAL BIOSENSOR BASED ON THE FUZZY INFERENCE SYSTEM

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ABSTRACT

During the last two decades, hundreds of analytical biosensors have been introduced to determine the concentration of various analytes in environmental and agricultural samples. However, a significant part of these biosensors has not yet been developed in commercial point-of-care devices. The use of electrochemical biosensors is a challenging task because their electrochemical response is significantly affected by the sample's characteristics, such as pH and mediator concentration. Therefore, the response of these biosensors should be analyzed by an expert. Therefore, a wide range of introduced electrochemical biosensors needs an expert analyst to relate the voltammetry results to the analyte concentration in an unknown sample. To untie this knot, in this study, an artificial intelligence-based program is developed to predict samples' nitrate concentration in an enzyme-based three-electrode biosensor. It uses the fuzzy inference system (FIS) for nitrate concentration determination considering limiting cathodic current from the cyclic voltammetry, sample' pH, and mediator concentration as the input variables. Fuzzy rules were defined based on the nature of the problem. Furthermore, the mean and variance of the Gaussian membership functions were optimized using particle swarm optimization. Three membership functions, namely low, moderate, and high, as well as five membership functions, namely very low, low, moderate, high, and very high, were proposed for input and output variables, respectively. From the database which was prepared during the experiments based on the biosensor's response, 20% of the patterns were used to optimize the fuzzy system, and the rest were used to evaluate the performance of the system. Results of this study indicate that the optimized FIS was able to predict nitrate concentration in the samples with acceptable performance. The values of R^2 and MSE of the prediction for the test patterns were 0.96 and 0.004, respectively. The proposed artificial intelligence model can be used in various environmental, agricultural, and food biosensors.

Keywords: Fuzzy logic, particle swarm optimization, artificial intelligence, biosensor.

1. INTRODUCTION

So far, numerous accurate and reliable chemosensing and biosensing methods have been developed for nitrate concentration determination in drinking water and other liquid samples (Wang et al., 2017). Nitrate concentration determination in plant extracts is a matter of great importance because about 80% of dietary nitrates are derived from vegetable consumption (Hord and Conley, 2017).

Enzymatic electrochemical biosensors which have been developed for nitrate concentration determination have acceptable detection limit and linear concentration range for environmental and human health applications (Madasamy et al., 2013). In these biosensors, nitrate reductase (NR) from plant or bacteria origin as an appropriate enzyme with acceptable specificity (Lambeck et al., 2010) is used in a three electrode system for electrocatalytic reduction of nitrate to nitrite. The obtained limiting cathodic current from the voltammetry is considered as the

output of the sensor. Usually, a mediator is used in the catalytic reduction reaction of nitrate to nitrite for electron transfer from the working electrode to the active site of the enzyme (Kalimuthu et al., 2013).

However, the use of electrochemical biosensors is a challenging task because their current response is significantly affected by sample's characteristics such as pH (Kalimuthu et al., 2015) and mediator concentration. Therefore, the response of these biosensors should be analyzed by an expert chemical analyst. This issue is not just for nitrate biosensors, but a wide range of introduced electrochemical biosensors need an expert analyst to relate the results of voltammetry to the analyte concentration in an unknown sample.

It is desirable to develop an artificial intelligence model to predict nitrate concentration in the samples having their cathodic current response (obtained from a mediated enzyme-based three-electrode system), sample's pH and mediator concentration. Among artificial intelligence methods, fuzzy inference system (FIS) has become a popular method to design robust prediction models because of its ability in transferring the human skills into the linguistic rules. Instead of being black-box, FIS provides membership functions for features and target along with logical fuzzy rules to properly relate the features to the target (Papadopoulos et al., 2011). The objective of this study was to develop a FIS as the decision making unit for electrochemical nitrate biosensors. To do this, a fuzzy model with three inputs and one output in the form of a mobile application is proposed to analyze the response of the biosensor.

2. MATERIAL AND METHODS

An unstirred three-electrode system including a glassy carbon (GC) disk working electrode (0.06 cm^2), a Pt wire counter electrode, and an Ag/AgCl reference electrode (+196 mV vs. NHE) was employed in electrochemistry unit. The electrodes were purchased from Ionode, Australia. *Arabidopsis thaliana* NR was purified from a heterogeneous expression system in *E. coli* (Lambeck et al., 2010). To prepare the GC/NR working electrode, a $30 \mu\text{M}$ droplet of NR in 50 mM assay buffer [50 mM Bis-Tris-acetate (pH 7.0), 50 mM KCl, 5 mM $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$, and 1 mM CaCl_2] was pipetted onto the conducting surface of the freshly polished working electrode. This was allowed to completely dry to a film for about 30 min at 4°C .

NR requires a mediator for electron transfer between the enzyme and the working electrode (Kalimuthu et al., 2013). Anthraquinone-2-sulfonate (AQ) purchased from Sigma-Aldrich was used as the mediator during the experiments.

Cyclic voltammetry was used to provide the electrochemical feature of the samples. The potential was controlled between the working and reference electrodes, whilst the current was measured between the working and counter electrodes. Voltammetric sweep range was $[-100 - 500] \text{ mV vs. NHE}$, whilst the sweep rate was 5 mV s^{-1} in the experiments. Although the Ag/AgCl electrode was used as the reference electrode, all the potentials are converted and reported compared to NHE for convenience in this paper. Limiting cathodic current of each voltammogram was considered as the electrochemical feature of the corresponding sample during the FIS modeling. Since mediator concentration, samples' pH, and nitrate concentration in the samples changed in the ranges of $10\text{-}40 \mu\text{M}$ (4 levels), $6.0\text{-}9.0$ (4 levels), and $0\text{-}1500 \mu\text{M}$ (31 levels), respectively, 496 patterns were obtained during the experiments.

Mediator concentration, samples' pH, and limiting cathodic current obtained for each pattern were considered as the input features. Nitrate concentration in the samples was considered as the target since the aim of this study was to model the response of a nitrate biosensor using the FIS. The difference of samples' pH from 7 results in protonation and deprotonation events at the active site of the immobilized enzyme which lowers the enzyme activity (Kalimuthu et al.,

2015). To simplify the FIS modeling, pH of the patterns was recorded as the absolute value of their difference from 7. We call this feature “pH difference” hereafter.

In this study, three membership functions namely {low}, {moderate}, and {high} and five membership functions namely {very low}, {low}, {moderate}, {high}, and {very high} were proposed for input and output variables, respectively. Gaussian functions were considered for the membership functions knowing that they are fully defined with two parameters: center and variance. The reason why Gaussian functions were chosen for membership functions lies in their smooth variation, small number of parameters, and being in accordance with natural phenomena (Hameed et al., 2011).

Since it was difficult to define the appropriate values of the membership function parameters in the first place, arbitrary initial values were assigned to the parameters. Due to the fact that all the variables were normalized between 0 and 1, for input variables, the centers of {low}, {moderate}, and {high} membership functions were considered 0, 0.5, and 1, respectively. For output variable, the centers of {very low}, {low}, {moderate}, {high}, and {very high} membership functions were considered 0, 0.2, 0.5, 0.8, and 1, respectively. The variance of all membership functions belonging to input and output variables were considered 0.025 and 0.005, respectively.

Next step in FIS modeling is the {if ... then ...} fuzzy rules designing by an expert according to the nature of the problem. In this study, fuzzy rules were designed based on three electrochemical principles:

- 1) According to the Randles-Sevcik equation, with increasing analyte concentration in the sample, the limiting cathodic current in the cyclic voltammetry increases (Aristov and Habekost, 2015).
- 2) Limiting current is a function of pH where the function is a bell-shaped curve (Brimaud et al., 2014) and its center for mediated electrocatalytic reduction of nitrate to nitrite lies on pH approximately equal to 7. Therefore, the more sample’s pH differs from 7, the more limiting cathodic current decreases.
- 3) Higher mediator concentrations result in the saturation of the electrode’s surface with the mediator which increases the limiting cathodic current. This is because of the increment of electron transfer rate from the electrode’s surface to the active site of the enzyme.

According to these principles, 27 fuzzy rules were proposed which are shown in Table 1. Membership functions of the output variable (nitrate concentration) are shown in gray cells. One of the rules, for example, is as follows:

{If the limiting cathodic current is {low} and pH difference is {low} and mediator concentration is {high}, then nitrate concentration in the sample will be {very low}}.

Table 1. Proposed fuzzy rules for nitrate concentration determination (membership functions of the output variable are shown in gray cells)

membership functions of limiting cathodic current	membership functions of mediator concentration	Membership functions of pH difference		
		low	moderate	high
low	low	low	low	moderate
	moderate	very low	low	low
	high	very low	very low	low
moderate	low	moderate	high	high
	moderate	low	moderate	high
	high	low	low	moderate
high	low	high	very high	very high
	moderate	high	high	very high
	high	moderate	moderate	high

The last step in FIS is defuzzification process that maps a fuzzy set which in fact is the output of the fuzzy system into a crisp value. In this study, the centroid method which is conventional in fuzzy expert systems (Pokhrel et al., 2013) was chosen for defuzzification. In this method, all of the activated output membership functions with certain membership degrees are superimposed one upon another, forming a single geometric shape. Then, the centroid of this shape, called the fuzzy centroid, is calculated. The x coordinate of the centroid is the defuzzified value.

After designing the initial FIS model, one-objective particle swarm optimization was used for efficient optimization of the membership function parameters belonging to the input and output variables. From the database created using the results of the electrochemical biosensor, 20% of the patterns (100 patterns) were randomly selected as train patterns to optimize membership function parameters of the FIS model. The objective function was the error in the nitrate concentration prediction in the train patterns. The optimization algorithm was implemented on a computer using a code written in MATLAB R2017a programming environment (The Mathworks Inc.).

3. RESULTS AND DISCUSSION

Table 2 shows the results of the evaluation of the introduced FIS. The method of evaluation in this study was based on the difference between the actual and predicted nitrate concentration in train and test patterns. Train patterns were patterns which were used to optimize the parameters of fuzzy membership functions using the optimization algorithm and test patterns were the rest of the pattern in the database. In Table 2, the system performance is expressed based on two parameters of mean square error (MSE) and coefficient of determination (R^2). Table 2 also shows the performance of the system in predicting nitrate concentration in the samples before and after the optimization of the system. Since the values of the output variable of the fuzzy system were normalized before the evaluation, the values of these parameters can be compared with each other. As shown in the table, the values of the evaluation parameters before the optimization indicate a large error in the fuzzy system. Therefore, the system cannot be used to predict nitrate concentration in the samples before the optimization of the membership function parameters.

Table 2. Performance parameters of the FIS model

Stage	Training patterns		Test patterns	
	MSE	R^2	MSE	R^2
Before optimization	0.045	0.82	0.067	0.78
After optimization	0.003	0.97	0.004	0.96

Table 2 shows that after optimizing the FIS, the evaluation parameters have been significantly improved. In this situation where the performance parameters of the fuzzy model are similar to complex learning methods such as black-box models (Mishra et al., 2015) or kernel-based methods which require complex implementation algorithms, using the FIS will be reasonable. In addition to simplicity, the fuzzy method provides the user with a good understanding of the behavior of the system, whilst other methods of artificial intelligence are not able to provide such understanding.

Furthermore, Table 2 shows that the prediction error of nitrate concentration in the patterns used to optimize the FIS was less than the prediction error of the test patterns. This was predictable since membership functions are optimized based on the train patterns and are completely blind to the test patterns. Nevertheless, the prediction error of the optimized FIS was acceptable for test patterns being competitive with complex machine learning methods.

One of the characteristics of the FIS is that membership functions can be optimized with a small fraction of the patterns in the database. In this study, only 20% of the patterns were used to optimize the system. The reason is that if the expert designs fuzzy rules correctly, the FIS model can converge to a minimum error with a small fraction of the patterns. However, in other learning methods, such as node-based and kernel-based methods, a larger fraction of the patterns is used to train the machine because the machine itself has to identify and understand the relationships between the features of the patterns and their output variable.

In order to compare the experimental results and the results obtained by the FIS, Figure 1 shows the difference between the actual and predicted nitrate concentrations in the test patterns for different values of the input variables. The actual concentrations are shown in blue color whilst the predicted values are illustrated in red color. As can be seen, performance of the FIS is acceptable for most of the patterns. If the actual and predicted values of the concentration were equal, the MSE and R^2 parameters would be 0 and 1, respectively. This situation is rarely achievable in statistical and artificial intelligence modeling.

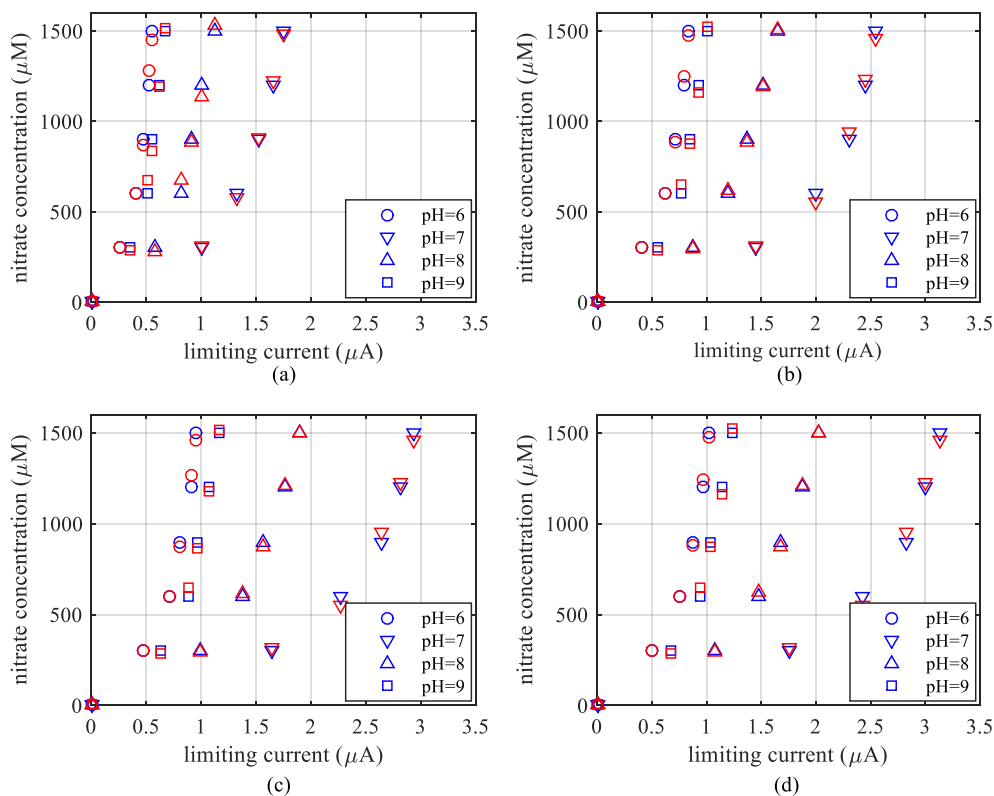


Figure 1. The difference between the actual and predicted nitrate concentrations in the test samples for mediator concentration equal to (a) 10 μM , (b) 20 μM , (c) 30 μM , and (d) 40 μM (actual and predicted concentrations are shown in blue and red colors, respectively).

Figure 1 shows that actual and predicted values are generally close to each other having limiting cathodic current, samples' pH difference and mediator concentration. The role of samples' pH is not usually studied in the biochemical analysis or it is studied individually because sample's pH difference from the neutral state significantly affects the enzyme behavior and results in unpredictable catalyst response of the biosensor. However, in this study, sample's pH difference is considered as an important input variable and its effect on nitrate concentration determination is considered in the fuzzy rules.

Although in this study, to simplify the design of fuzzy rules, only pH difference from 7 is considered as the input variable, the limiting current reaches its maximum value at pHs slightly higher than 7. From the Figure 1, for patterns with the same nitrate concentration and pH values equal to 6 and 8, the sample with pH of 6 lowered the limiting cathodic current to a greater extent. Therefore, the performance of the FIS seems to be slightly better if we assume the center of the bell-shaped curve representing the limiting cathodic current as the function of pH equal to a value higher than 7 during the fuzzy rules designing. However, this value is affected by the operating conditions of the biosensor and an exclusive value should be considered for each operating condition of the biosensor. In this situation, the number of fuzzy rules increases which affects the performance of the optimization algorithm and its convergence to a minimum error.

4. CONCLUSIONS

The values of R^2 and MSE of the prediction for the test patterns were 0.96 and 0.004, respectively. Furthermore, the surface of the optimized FIS model presented in this study provided a proper understanding of the relationships between the input and output parameters. The decision making system introduced in this study can be used in many existing biosensors which are currently carried out only in the laboratory environment because of the difficulties in interpretation of the biosensor's response. As a result, these biosensors can be implemented in portable commercial devices without any requirements to expert operators and analysts, because the decision making process about the analyte concentration is carried out by artificial intelligence instead of human.

REFERENCES

- Aristov, N., and Habekost, A. (2015). Cyclic voltammetry-A versatile electrochemical method investigating electron transfer processes. *World Journal of Chemical Education*, 3(5), 115-119.
- Brimaud, S., Solla-Gullón, J., Weber, I., Feliu, J. M., and Behm, R. J. (2014). Formic Acid Electrooxidation on Noble-Metal Electrodes: Role and Mechanistic Implications of pH, Surface Structure, and Anion Adsorption. *ChemElectroChem*, 1(6), 1075-1083.
- Hameed, I. A. (2011). Using Gaussian membership functions for improving the reliability and robustness of students' evaluation systems. *Expert systems with Applications*, 38(6), 7135-7142.
- Hord, N. G., and Conley, M. N. (2017). Regulation of Dietary Nitrate and Nitrite: Balancing Essential Physiological Roles with Potential Health Risks. In *Nitrite and Nitrate in Human Health and Disease* (pp. 153-162). Springer International Publishing.
- Kalimuthu, P., Fischer-Schrader, K., Schwarz, G., and Bernhardt, P. V. (2013). Mediated electrochemistry of nitrate reductase from *Arabidopsis thaliana*. *The Journal of Physical Chemistry B*, 117(25), 7569-7577.
- Kalimuthu, P., Fischer-Schrader, K., Schwarz, G., and Bernhardt, P. V. (2015). A sensitive and stable amperometric nitrate biosensor employing *Arabidopsis thaliana* nitrate reductase. *JBIC Journal of Biological Inorganic Chemistry*, 20(2), 385-393.
- Lambeck, I., Chi, J. C., Krizowski, S., Mueller, S., Mehlmer, N., Teige, M., Fischer, K., and Schwarz, G. (2010). Kinetic analysis of 14-3-3-inhibited *Arabidopsis thaliana* nitrate reductase. *Biochemistry*, 49(37), 8177-8186.



- Madasamy, T., Pandiaraj, M., Kanugula, A. K., Rajesh, S., Bhargava, K., Sethy, N. K., Kotamraju, S., and Karunakaran, C. (2013). Gold nanoparticles with self-assembled cysteine monolayer coupled to nitrate reductase in polypyrrole matrix enhanced nitrate biosensor. *Advanced Chemistry Letters*, 1(1), 2-9.
- Mishra, R. K., Alonso, G. A., Istamboulie, G., Bhand, S., and Marty, J. L. (2015). Automated flow based biosensor for quantification of binary organophosphates mixture in milk using artificial neural network. *Sensors and Actuators B: Chemical*, 208, 228-237.
- Papadopoulos, A., Kalivas, D., and Hatzichristos, T. (2011). Decision support system for nitrogen fertilization using fuzzy theory. *Computers and electronics in agriculture*, 78(2), 130-139.
- Pokhrel, J., Wehbi, B., Morais, A., Cavalli, A., and Allilaire, E. (2013). Estimation of QoE of video traffic using a fuzzy expert system. In *Consumer Communications and Networking Conference (CCNC), 2013 IEEE* (pp. 224-229). IEEE.
- Wang, Q. H., Yu, L. J., Liu, Y., Lin, L., Lu, R. G., Zhu, J. P., He, L., and Lu, Z. L. (2017). Methods for the detection and determination of nitrite and nitrate: A review. *Talanta*, 165, 709-720.

A COMPARISON OF OPTIMIZATION METHODS IN IMAGE PROCESSING-BASED AGRICULTURAL YIELD ESTIMATION

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ABSTRACT

Crop yield prediction based on the environmental, soil, water, and crop parameters has been a potential research topic in the last decade. Crop yield estimation is an essential task for the decision-makers at national and regional levels (e.g., the EU level) for rapid decision-making. An accurate crop yield prediction model can help farmers to decide on what to grow and when to grow. There are different approaches to crop yield prediction. Machine learning is an important decision support tool for crop yield prediction, including supporting decisions during the growing season of the crops. Machine learning, which is a branch of artificial intelligence focusing on learning, is a practical approach that can provide better yield prediction based on several features. Machine learning can determine patterns and correlations and discover knowledge from datasets. Several machine learning algorithms have been applied to support crop yield prediction research. Deep learning-based models are broadly used to extract significant crop features for prediction. Although these methods could resolve the yield prediction problem, there still exist the following inadequacies: they are unable to create a direct non-linear or linear mapping between the raw data and crop yield values. Moreover, the performance of those models highly relies on the quality of the extracted features. The proposed algorithm constructs a convolutional neural network (CNN) with several learning layers whose parameters, i.e., weight and bias, are optimized using evolutionary optimization methods. The optimization methods included the differential evolution method (DE) and whale optimization algorithm (WOA), called CNN-DE and CNN-WOA methods, to improve the prediction performance. The algorithm was used to detect orange fruits on trees and estimate the crop yield in the field. The error evaluation criteria, including mean squared error (MSE) and R^2 of prediction, were 0.002, 0.003, 0.95, and 0.93, respectively, for the CNN-DE and CNN-WOA methods. The results of this study can help implement precision agriculture and agricultural inputs management properly.

Keywords: Convolutional neural networks, differential evolution method, whale optimization algorithm.

1. INTRODUCTION

So far, much research has been carried out on the machine-vision applications in crop yield estimation without physical contact in mechanized harvesting. Annamalai (2004), in a leading study, used a machine-vision system to detect citrus fruits in images and estimate citrus orchard yield. Arivazhagan et al. (2010) presented a method for detecting the fruits in images using color and textural features. They used the gray-level co-occurrence matrix (GLCM) to determine image textural properties. The results showed that using textural properties resulted in at least 10% better performance than the color properties in fruit detection.

Payne et al. (2013) presented an approach for counting mango fruits from daytime images of individual trees for vision-based estimation of mango crop yield. In their research, pixels were

segmented into fruit and background pixels using color segmentation in the RGB and YCbCr color models and a texture segmentation based on adjacent pixel variability. They showed that the performance of the algorithm decreased as the number of fruits on the tree increased. Maldonado and Barbosa (2016) developed a method for feature extraction from the images from green fruits with the combination of the color model conversion, thresholding, histogram equalization, spatial filtering with Laplace and Sobel operators, and Gaussian blurring. They designed an algorithm to detect and count the fruits in the images, with a false-positives of 3% in images acquired in appropriate light conditions.

The literature review shows that in traditional methods, object recognition in images for agricultural applications is based on combinations of processes such as thresholding, masking, color segmentation, edge detection, and filtering (Liu et al., 2019; Hejazipoor et al., 2021). These approaches result in acceptable performance when the lighting is predictable, the appearance of the objects is suitable in the region of interest, and occlusions in the image are low (Asefpour Vakilian and Massah, 2017; Williams et al., 2019). However, in the field environment with direct sunlight, none of these conditions are usually met. In kiwi orchards, the conditions are even more critical since the plant canopy is often backlit by the sun. Furthermore, kiwifruits grow in different shapes and hang on various angles, and might be obstructed by kiwifruits.

During the last five years, to overcome the shortcomings and present an efficient system for fruit detection in images captured in farmlands, researchers have widely used deep learning algorithms to detect agricultural products in images (Wan and Goudos, 2020). Recent progress in deep learning algorithms has shown the acceptable classification accuracy and robustness of these algorithms in different areas of science and technology (Zhang et al., 2020). Today, the use of deep learning techniques on different platforms, i.e., laptops, GPUs, and Raspberry Pies, has become very popular for the detection of a wide range of fruits and agricultural products in both harvesting and yield estimation applications.

Several efficient deep learning approaches such as FCN-8S (Williams et al., 2019), ZFNet (Fu et al., 2018), AlexNet (Kuang et al., 2019), and GoogleNet (Kuang et al., 2019), with approximate accuracies of 89, 92, 99, and 99%, respectively, have been recently used for the detection of kiwifruits in images captured in natural field conditions. Although AlexNet and GoogleNet have resulted in very promising accuracies, they require very large training datasets (Kuang et al., 2019) to perform well, which limits their applications in agriculture. Moreover, deep learning methods are black-box, and their performance can be remarkably affected by trapping in local minima. Furthermore, since these algorithms usually work based on image matching, their application is limited for use in nighttime conditions, and the light should be controlled using an artificial lighting system (Williams et al., 2019). Besides, deep learning approaches require a trade-off between processing time and object detection rate. The faster the inference time, the lower the detection rate, and therefore, considering a compromise between desired running time and required detection rate is necessary.

It seems that using optimization algorithms can be useful for improving the capability of deep learning in the detection of kiwifruits in images for yield estimation of kiwifruit in orchards where the trellis system is used for growing the trees. Therefore, the objective of this study was to introduce a robust image processing algorithm for fruit detection in the captured images for efficient kiwifruit yield estimation.

2. MATERIAL AND METHODS

A CCD camera (NT.6301/6, NEXT, China) was used for image acquisition. The camera had a sensor (1/3" Sony Digital CCD), video lens with autofocus, and PAL system to receive color images with a resolution of 512×576 pixels. An analog to digital converter (i-Tek USB Movie Editor, Dexatek, Taiwan) was used to transfer analog data of the camera to a laptop (F134FX, Sony, China). All the images were recorded on the computer's memory for image processing. The camera was positioned vertically (upward) to capture images from the kiwifruits hanging on tree clusters during the travel under the kiwi trees.

After collecting all images from the orchard, an algorithm was used for counting the kiwifruits in the images. The algorithm was implemented using the MathWorks MATLAB R2010b programming environment installed on the computer located on the robot. The algorithm consisted of several steps that are described below.

The images were divided into 64×64-pixel sub-images for further analysis. Since the size of the images were 512×576 pixels, 72 sub-images were obtained from each image. A simple segmentation method based on RGB color thresholding was used to reduce the effects of the background. Firstly, image contrast was enhanced to sharpen the colors to make more difference between the objects and the background. In the next step, pixels with R, G, and B values in the range of those for kiwifruit were extracted from the image. The values depend on the geographical location, weather conditions, and the amount of natural light during image acquisition. By an accurate selection of R, G, and B ranges in the image segmentation step, the algorithm can be applicable at the sunset and sunrise without the need for artificial lighting modules. Since in this study, the images were captured in a sunny day from 10 a.m. to 3 p.m. in late October in the north of Iran, the R, G, and B ranges of the kiwifruits in an 8-bit image were selected equal to 80-255, 50-170, and 0-100, respectively. To keep the image segmentation as simple as possible, no morphological operators were performed on the images during the image segmentation.

To compare the performance of the proposed method with deep learning algorithms introduced in previous studies, several open-source convolutional neural networks (CNNs), namely, FCN-8S, ZFNet, AlexNet, GoogleNet, and ResNet, which are freely accessible at GitHub website (www.github.com) were used to the predicted number of kiwifruits in the images. The implementation of these CNNs was performed in MathWorks MATLAB R2010b programming environment installed on the computer located on the robot.

3. RESULTS AND DISCUSSION

Table 1 shows the performance of the CNN enhanced with evolutionary optimization methods in the prediction of the number of kiwifruits in the sub-images. Since 100 images were captured in the kiwi orchard and each image was converted to 72 sub-images to form a database, the values shown in Table 1 were obtained by comparing the number of observed and predicted kiwifruits in 7,200 sub-images. Table 1 shows that the value of R^2 varied in the range of 0.86 to 0.95, which highlights the importance of selecting an appropriate optimization method. The best performance for the machine was obtained for the CNN-DE.

Table 1. Performance evaluation of the CNN enhanced with evolutionary optimization methods in the prediction of number of kiwifruits in the sub-images

Method	Optimization method	MSE	R^2
CNN	-	0.009	0.86
	DE	0.002	0.95
	WOA	0.003	0.93

Figure 1 shows the performance of the CNN-DE in predicting the number of kiwifruits in the sub-images extracted from an arbitrary image. Since the camera was mounted vertically on the robot, the kiwifruit clusters were well visible in the recorded images. Figure 1(b) shows the observed number of kiwifruits by the human eye (which was considered as the label of sub-images), along with the predicted number of kiwifruits in the sub-images (which was the predicted label by the machine). It can be seen that the observed and predicted values are slightly different, and the machine was capable of the proper determination of the kiwifruits in the sub-images.

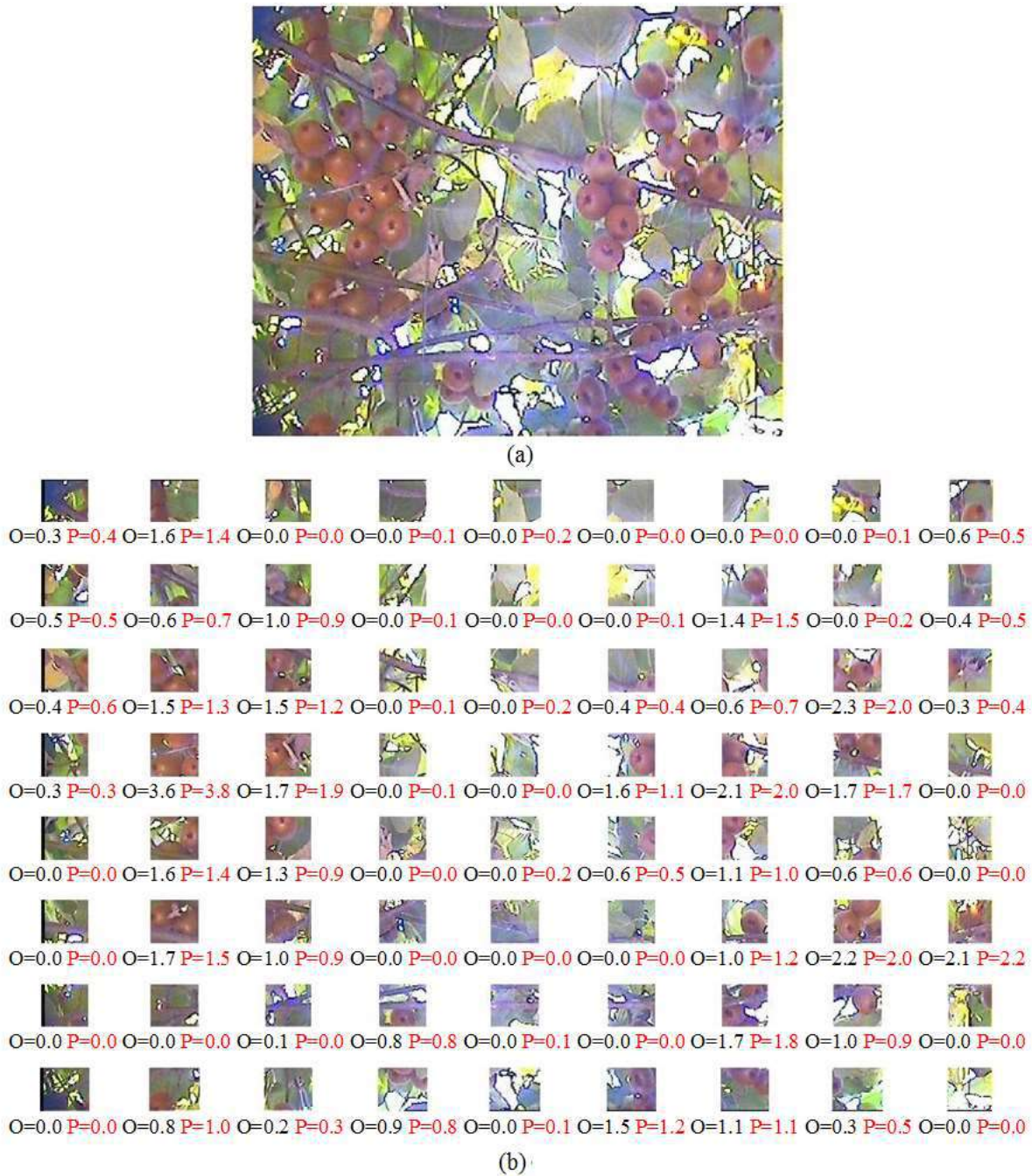


Figure 1. Fruit detection in sub-images using the proposed image processing algorithm, (a) image of interest, (b) the predicted number of kiwifruits in the sub-images.

Performance evaluation of several methods in the prediction of the number of kiwifruits in the 512×576-pixel images are brought in Table 2. The sum of the number of kiwifruits in each sub-image, determined by the proposed method, was calculated to obtain the predicted number of kiwifruits in each image. Table 2 shows that the proposed method was capable of predicting the number of kiwifruits in the images with an R^2 equal to 0.95, which is slightly higher than that of the prediction of kiwifruits in the sub-images (0.94). The reason here is that a part of the biased errors is canceled during the summation of the predicted values for the sub-images to obtain the predicted value for the original image.

Table 2. Performance evaluation of the proposed method compared to the conventional methods in the prediction of the number of kiwifruits in the 512×576-pixel images

Method	R^2
Proposed method	0.95
FCN-8S	0.91
ZFNet	0.73
AlexNet	0.83
GoogleNet	0.90
ResNet	0.63

According to Table 2, conventional methods resulted in lower R^2 values, ranging from 0.63 (obtained for the ResNet) to 0.91 (obtained for the FCN-8S). No modifications have been made to the architecture of the CNN algorithms implemented in this study by the authors. FCN stands for a fully-convolutional network, which was introduced by Long et al. (2015) to perform semantic segmentation in image processing applications. FCN-based algorithms are capable of operating in a range of dynamic environments and lighting conditions. The FCN used in this study is an adapted form of the VGG-net16, presented by Simonyan and Zisserman (2014), called FCN-8S.

4. CONCLUSIONS

A comparison with conventional deep learning algorithms showed that the proposed method resulted in a better detection rate. The findings of this study show that an optimization-based method with parameters optimized by sophisticated evolutionary methods can generally perform better than neuron-based methods.

REFERENCES

- Annamalai P. (2004). Citrus yield mapping system using machine vision, Ms. Thesis, University of Florida, United States.
- Arivazhagan S., Newlin Shebiah R., Selva Nidhyanandhan S., and Ganesan L. (2010). Fruit recognition using color and texture features, *Journal of Emerging Trends in Computing and Information Sciences*, 1(2), 90-94.
- Asefpour Vakilian, K. and Massah, J. (2017). A farmer-assistant robot for nitrogen fertilizing management of greenhouse crops. *Computers and electronics in agriculture*, 139, 153-163.
- Fu, L., Feng, Y., Majeed, Y., Zhang, X., Zhang, J., Karkee, M., and Zhang, Q. (2018). Kiwifruit detection in field images using Faster R-CNN with ZFNet. *IFAC-PapersOnLine*, 51(17), 45-50.



- Hejazipoor, H., Massah, J., Soryani, M., Asefpour Vakilian, K., and Chegini, G. (2021). An intelligent spraying robot based on plant bulk volume. *Computers and Electronics in Agriculture*, 180, 105859.
- Kuang, Y. C., Streeter, L., Cree, M. J., and Ooi, M. P. L. (2019). Evaluation of deep neural network and alternating decision tree for kiwifruit detection. In *2019 IEEE International Instrumentation and Measurement Technology Conference (I2MTC)* (pp. 1-6), 20-23 May 2019, Auckland, New Zealand.
- Liu, T. H., Ehsani, R., Toudeshki, A., Zou, X. J., and Wang, H. J. (2019). Identifying immature and mature pomelo fruits in trees by elliptical model fitting in the Cr–Cb color space. *Precision Agriculture*, 20(1), 138-156.
- Long, J., Shelhamer, E., and Darrell, T. (2015). Fully convolutional networks for semantic segmentation. In *Proceedings of the IEEE conference on computer vision and pattern recognition* (pp. 3431-3440) 7-12 June 2015, Boston, MA.
- Maldonado Jr, W., and Barbosa, J. C. (2016). Automatic green fruit counting in orange trees using digital images. *Computers and electronics in agriculture*, 127, 572-581.
- Payne, A. B., Walsh, K. B., Subedi, P. P., and Jarvis, D. (2013). Estimation of mango crop yield using image analysis–segmentation method. *Computers and electronics in agriculture*, 91, 57-64.
- Rini, D. P., Shamsuddin, S. M., and Yuhaniz, S. S. (2016). Particle swarm optimization for ANFIS interpretability and accuracy. *Soft Computing*, 20(1), 251-262.
- Williams, H. A., Jones, M. H., Nejati, M., Seabright, M. J., Bell, J., Penhall, N. D., Barnett, J. J., Duke, M. D., Scarfe, A. J., Ahn, H. S., Lim, J., and MacDonald, B. A. (2019). Robotic kiwifruit harvesting using machine vision, convolutional neural networks, and robotic arms. *Biosystems Engineering*, 181, 140-156.
- Zhang, Q., Liu, Y., Gong, C., Chen, Y., and Yu, H. (2020). Applications of deep learning for dense scenes analysis in agriculture: A review. *Sensors*, 20(5), 1520.

FERTILITY, HATCHABILITY, AND GROWTH PERFORMANCE OF INDIGENOUS, SASSO AND INDIGENOUS*SASSO CROSS CHICKEN GENOTYPES IN SIDAMA REGION, ETHIOPIA

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ABSTRACT

The aim of this study was to evaluate fertility, hatchability, and growth performance of three chicken genotypes. A total of 1550 (600 of indigenous, 450 of Sasso, 500 of crossbred) eggs were labelled and incubated. Growth performance was recorded on-station and on-farm in week interval of W0-W7 and W7-W20 respectively from the same population. Relatively higher proportion of fertility was observed for the eggs collected from Sasso (89.6%) followed by crossed eggs (72.8%). Bodyweight was increased from 27.9g to 321.7g for indigenous, 36.8g to 431.2g for Sasso, and 32.4g to 353.4g for crossbred from W0-W7. Bodyweight performance of the indigenous and crossbred male chickens were significantly ($p < 0.05$) higher in midland until W15, however male Sasso chickens in W15 was significantly higher in lowland. W20 bodyweight showed significant difference for male Sasso and crossbred chickens in different agro-ecologies. Male crossbred chickens performed significantly lower body weight in lowland (1057g) than both midland (1270g) and highland (1204g) in W20. Higher proportion of indigenous (22%) and Sasso (24%) birds were died in highland in between W7-13, however higher proportion of crossbred birds were lost in lowland for same week interval. Considering the most parameters of chickens, midland agroecology is more promising for their production. This is because, better feed resources, climatic condition, and awareness of farmers how to manage their birds.

Key words: Fertility, hatchability, incubation, growth performance, mortality

INTRODUCTION

Poultry production in Ethiopia plays a crucial role in generating employment opportunities, poverty reduction, improving family nutrition, and in women empowerment. It is a suitable business for resource-poor households due to the small land requirement and low initial investment costs needed (FOA, 2019).

Fertility is an important parameter in chicken and reflects the total actual reproductive capacity of females and males expressed by their ability when mated together to produce offspring. An egg is said to be infertile when it fails to show any evidence of developing embryo (Miazi et al., 2012; Adedeji et al., 2015).

Hatchability is a trait of economic importance in the chicken industry because it has a strong effect on chick output (Wolc et al., 2010; Adedeji et al., 2015). It is influenced by several factors such as egg weight, turning of eggs, storage, humidity, shell strength, egg size and genetic factors within the chickens kept. Good hatchability of eggs is to some extent heritable but is determined by a complicated genetic constitution and the environment.

To increase the genetic potential of chickens, planned breeding program is a demand of time. However, broodiness is one of the major characteristics of Indigenous chicken which causes less egg production. Artificial incubation system can minimize the problem of broodiness and result in incubation of many eggs at a time. As a result of reduced broodiness, egg production would be expected to be increased as well (Hossain, 2014).



Fertility and hatchability are major parameters of reproductive performance which are most sensitive to variation in environment and genetic makeup. Fertility refers to the percentage of incubated eggs that are fertile while hatchability is the percentage of fertile eggs that hatch. Fertility and hatchability are major parameters of reproductive Performance which are most sensitive to environmental and genetic influences (Sapp et al., 2004; Abdurehman and Urge, 2016). So, the study was undertaken to evaluate fertility, hatchability, and growth performance of different chicken genotypes.

MATERIALS AND METHODS

Experiment Site

The study was conducted in poultry farm of Hawassa University, College of Agriculture, Hawassa Zuria District, Wondogenet, and Malga Districts, Sidama Regional State of Ethiopia. Hawassa is situated in the shores of Lake Hawassa in the Great Rift Valley on longitude 38° 28' 34.86 E and latitude 7° 03' 43.38 N.

Sources of eggs and incubation

In this experiment, 600 eggs of indigenous chickens were collected from the selected farmers around Hawassa, 450 eggs from Sasso were collected from Hawassa Poultry farm, and 500 eggs from arranged mating of Sasso female and indigenous males to produce hybrid eggs in poultry farm of college of Agriculture, Hawassa University.

The eggs prepared for incubation from the three genotypes were ready after checking them to avoid unsuitable eggs (cracked, dusty, shapeless, too small, too large). Before incubation, the incubator was sanitized and fumigated (run) for 72 hours without setting the eggs. This was done to ensure that the incubator is maintaining the proper temperature and relative humidity before the eggs were set. Total of 1550 eggs were labelled for their genotypes and placed in PETERSIME (model ST. 7-B) incubator at a temperature of 37-38°C.

The eggs were candled at the 18th day of incubation to check for fertile eggs. Consequently, eggs that showed signs of developing embryos by means of a visible network of blood vessels spreading from the center of the egg's outwards were fertile and shifted to hatchery.

Management of experimental chicks

The brooding house and chicken rearing equipment were cleaned and disinfected prior to one week of the beginning of experiment. On hatching, chicks were weighed, and brooded for 7 weeks in Poultry farm, college of Agriculture, Hawassa University. Chicks were kept in a deep litter housing system with concrete floors covered with wood shavings and pens divided by mesh wire for each genotype. The chicks were vaccinated regularly with Marek's (DOC), HBI (Thermostable) at 7th day, Gumboro (IBD) at 17th day, Lasota (Thermostable) at 42nd day of their age based on the recommendation of manufacturer. All the three genotypes were fed the same standard commercial dual purpose chicken feed as per the recommendation of feeding chemical composition by Alema Feed Plc, Debrezeit, Ethiopia (Table 1).

Table 1. Chemical composition of commercial dual purpose chick feeds used

Nutrient composition	Age	
	W0-W3	W4-W7
Crude protein (%)	20.9	18.5
Crude fiber (%)	4.50	5.80
Crude fat (%)	3.00	5.00
Calcium (%)	1.15	0.90
Phosphorus (%)	0.55	0.49
Energy (kcal/kg)	3035	2950

W0 = weight of day-old chicks, W3 = third week, W4= fourth week, W7 = seventh week

Data Collection

Body weight was recorded from growing chicks starting from hatching to the age of week 7 (W0-W7) while they were managed on station. After W7 age, the chicks were distributed to pre-selected households representing three agro-ecologies (lowland, midland, and highland) where the growth performance data were evaluated under on-farm condition. A total of 450 chicks (50 chick of each of the three genotype) was distributed to the selected farmers in lowland (Hawassa Zuria), midland (Wondogenet) and highland (Malga) districts. The data on mortality and growth rate of the chicks across the three agro-ecologies were recorded until their 20th weeks old at different age interval (9th, 11th, 15th, and 20th weeks) for body weight performance and W7-13 and W13-W20 for mortality rate under the farmers management system.

Fertility was calculated based on total eggs set whereas hatchability and mortality on hatching day were calculated based on total fertile eggs set. Fertility, hatchability, and mortality were calculated using following formulae:

$$\text{Fertility (\%)} = \frac{\text{total number of fertile eggs after candling}}{\text{total number of eggs set}} * 100$$

$$\text{Hatchability (\%)} = \frac{\text{total number of chicks hatched}}{\text{total number of eggs set}} * 100$$

$$\text{Hatchability of fertile eggs (\%)} = \frac{\text{total number of chicks hatched}}{\text{total number of fertile eggs}} * 100$$

$$\text{Mortality (\%)} = \frac{\text{total number of dead chicks}}{\text{total number of fertile eggs}} * 100$$

Data management

Data were checked for consistency and outliers. Then the data were analyzed using descriptive statistics.

RESEARCH AND FINDINGS

Incubation

As shown in Table 2, a total of 1550 eggs were incubated at PETERSIME (model ST. 7-B) incubator. Among the incubated eggs, 1036 eggs were fertile (412 indigenous, 403 Sasso and 291 crosses of Sasso*indigenous). The proportion of fertility was higher for the eggs obtained

from Sasso (89.6%) followed by eggs of indigenous (68.7%). The average fertility, hatchability, and mortality for all the three genotypes were 72.2%, 77.9% and 22.1% respectively.

As reported under the study of Ajayi and Agaviezor, (2016), the hatchability of the pure normal feathered chicken is 86.36%, whereas lower values of 62.09 and 66.90% was recorded for pure frizzle and naked neck strains of Nigeria, respectively. The hatchability percentage of Ajayi and Agaviezor, (2016) revealed higher for pure normal feathered Nigerian chickens and which is comparable for pure frizzle and naked neck while comparing report of current study (Table 2).

Table 2. Incubation, fertility, and hatchability of eggs from different genotypes

Variables	genotype			Total	Mean
	Indigenous	Sasso	Ind.*Sasso		
Eggs incubated	600	450	500	1550	516
Eggs fertile	412	403	291	1036	345
Eggs hatched	266	327	256	849	283
Fertility of eggs (%)	68.7	89.6	58.2		72.2
Hatchability (%)					
Hatchability of fertile eggs (%)	64.6	81.1	88.0		77.9
Mortality (%)	35.4	18.9	12.0		22.1

Bodyweight performance

On-station growth performance of the three genotypes is presents in Table 3. Bodyweight of the day-old chicks was 27.9gram, 36.8gram, and 32.4gram for indigenous, Sasso, and indigenous*Sasso crossbred respectively.

The bodyweight of chicks of the three genotypes were significantly different ($p < 0.05$) for all week limits except W7 where there is no significant difference ($p > 0.05$) for the bodyweight performance of indigenous and crossbred chicks. The bodyweight was increased from 27.9gram to 321.7gm (indigenous), 36.8gram to 431.2gram (Sasso), and 32.4gram to 353.4gram (Indigenous*Sasso) from W0 to W7 of their age.

In the whole period of the time while the chicks were in the farm (on-station) from day one up to W7, only 3 (indigenous), 3 (Sasso) and 2 of the crossbred chicks were died. Proportionally 1.13% from indigenous, 0.92% of Sasso, and 0.78% of crossbred chicks were lost. On-station mortality rate of chicks was very low; due to the better management towards them.

The live bodyweights of all the three studied chicken genotypes reported in this study were higher than those reported for intensively reared Kuchi chicken ecotype in Kenya by Lihare et al. (2020) who reported that 24 gram in W0, 64.6 gram in W2, 145.8gram in W4 and 280.7gram in W6 except for indigenous chickens which is concurrent at W4 (144.3gram) in current study. However, Mulugeta et al. (2020) reported that higher day-old bodyweight of DZ-white (35.0gram) and improved Horro (29.3gram) chicks compared to the live bodyweight of day-old chicks of indigenous chickens in this study. This is an indicator of existing variation for different ecotypes across their various habitats hence possible improvement through selection and climatic conditions.

Table 3. On-station growth performance and mortality of different genotype chickens

Age	genotype			Overall
	Indigenous	Sasso	Ind.*Sasso	
Body weight				
W0	27.9 ^a	36.8 ^c	32.4 ^b	32.4
W2	82.0 ^a	133 ^c	118 ^b	111
W4	144.3 ^a	202 ^c	174 ^b	173
W7	321.7 ^a	431 ^b	353.4 ^a	369
Mortality	n (%)	n (%)	n (%)	n (%)
W0-W7	3 (1.13)	3 (0.92)	2 (0.78)	8 (0.94)

W0 = bodyweight of day-old chicks, W2 = bodyweight at second week, W4 = bodyweight at fourth week, W7 = bodyweight of chicks at seventh week, Ind. = indigenous

On-farm growth performance of the chickens at different week intervals in the three agro-ecologies are reported in Table 4. Bodyweight of the male chickens up to the end of W9 of their age (348gm) was significantly ($p < 0.05$) higher in lowland than midland (307gm) and highland (281gm) agro-ecologies. Male Sasso weighed significantly lower in highland and no significant difference in lowland and midland agroecology. Crossbred did not show significant difference ($p > 0.05$) both for male and female chickens in W9 across the three agro-ecologies.

There is a significant difference ($p < 0.05$) in bodyweight performance of female indigenous chickens, both male and female Sasso, and crossbred chickens at all the three agro-ecologies. Female indigenous chickens were significantly ($p < 0.05$) higher for bodyweight in midland (280gm) compared to lowland (262gm) and highland (249gm) at W11. At the same week interval, both male and female Sasso and crossbred chickens were significantly ($p < 0.05$) higher for their bodyweight in midland.

Bodyweight performance of the indigenous (762gm) and crossbred (847gm) male chickens were significantly ($p < 0.05$) higher in midland until W15 of their age. Male Sasso chickens in W15 was significantly higher in lowland (1100gm) and midland (1218gm) agro-ecologies than highland (973gm).

There was no significant difference for bodyweight performance of female indigenous chickens across the three agro-ecologies and in between lowland and midland for female Sasso.

W20 bodyweight showed significant difference for male Sasso and crossbred chickens in different agro-ecologies. Male crossbred chickens performed significantly lower bodyweight in lowland (1057gm) than both midland (1270gm) and highland (1204gm) in W20.

Table 4. Mean bodyweight of the three chickens breeds across three agro-ecologies

Genotype	Sex	Agroecology	Bodyweight (gm)			
			W9	W11	W15	W20
Indigenous	Male	Lowland	348 ^b	388	759 ^b	1001
		Midland	307 ^a	390	762 ^b	975
		Highland	281 ^a	377	611 ^a	1017
	Female	Lowland	236	262 ^a	569	712
		Midland	233	280 ^b	587	754
		Highland	223	249 ^a	551	743

Sasso	Male	Lowland	591 ^b	657 ^b	1100 ^{ab}	1434 ^a
		Midland	599 ^b	664 ^b	1218 ^b	1859 ^b
		Highland	504 ^a	599 ^a	973 ^a	1526 ^a
	Female	Lowland	479	544 ^b	655 ^{ab}	1007
		Midland	484	534 ^b	680 ^b	1051
		Highland	456	486 ^a	632 ^a	999
Indg*Sasso	Male	Lowland	488	563 ^b	727 ^a	1057 ^a
		Midland	474	594 ^b	847 ^b	1270 ^b
		Highland	455	509 ^a	767 ^a	1204 ^{ab}
	Female	Lowland	425	475 ^{ab}	553 ^a	907
		Midland	412	496 ^b	615 ^b	886
		Highland	417	459 ^a	591 ^b	913

^{a,b,c} Means on the same column with different superscripts within the specified age group are significantly different ($p < 0.05$), W9 = body weight at ninth week, W11 = body weight at eleventh week, W15 = body weight of chickens at fifteenth week, W20 = bodyweight at 20th week

On-farm mortality rate of chickens at the three agro-ecologies is presented in Table 5. Higher proportion of the indigenous (22%) and Sasso (24%) birds were died in highland in between W7-13; whereas high proportion of crossbred birds were lost in lowland for same week interval.

On-farm mortality of chickens was relatively higher in highland agroecology than the remaining agro-ecologies following the influence of environment. This is in line with the study of (Melesse et al., 2013; Tadesse, 2014) who reported that chickens in midland survive better than chickens in other agro-ecological zones of Ethiopia. The higher mortality rate in highland is not agreed with the report of Azoulay et al. (2011) and Mulugeta et al. (2020) who reported that high mortality rate under hot environmental conditions.

Table 5. Mortality rate of three chicken genotypes across the three agro-ecologies

Genotype	Agroecology	W7-W13			W13-W20		
		n	Died	Mortality rate (%)	n	Died	Mortality rate (%)
Indigenous	Lowland	50	2	4.0	48	2	4.17
	Midland	50	4	8.0	46	1	2.17
	Highland	50	11	22.0	39	1	2.56
Sasso	Lowland	50	5	10.0	45	-	-
	Midland	50	1	2.0	49	2	4.08
	Highland	50	12	24.0	38	4	10.5
Indg*Sasso	Lowland	50	6	12.0	44	5	11.4
	Midland	50	4	8.0	46	7	15.2



n = number of chickens, W = week

CONCLUSION

The results of this study have demonstrated that both fertility and hatchability were better for the eggs collected from Sasso, and all the three studied chicken genotypes in midland showed significantly ($p < 0.05$) higher performance than highland and lowland agro-ecologies. On-station chicks' mortality was almost null for the three genotypes with in first seven weeks of their age. Better bodyweight performance was recorded in midland agroecology followed by lowland, for better management and ecological advantage.

ACKNOWLEDGMENT

This study was funded by grants from the African Chickens Genetic Gain project, ILRI for the first author. The authors are grateful to School of Animal and Range Sciences, College of Agriculture, Hawassa University of Ethiopia for the research materials support and provision of poultry farm. We also sincerely thank the poultry rearing farmers for their willingness to participate.

REFERENCES

- Abdurehman, A., & Urge, M. (2016). Evaluation of fertility, hatchability, and egg quality of rural chicken in Gorogutu district, Eastern Hararghe, Ethiopia. *Asian Journal of Poultry Science*; 10: 111-116.
- Adedeji, T.A., Amao, S.R., Popoola, A.D., & Ogundipe, R.I. (2015). Fertility, Hatchability, and Eggs Quality Traits of Nigerian Locally Adapted Chickens in the Derived Savanna Environment of Nigeria. *Journal of Biology, Agriculture and Healthcare*; 5(17); 36-42
- Ajayi, F.O., & Agaviezor, B.O. (2016). Fertility and Hatchability Performance of Pure and Crossbred Indigenous poultry Strains in the High Rainforest Zone of Nigeria. *International Journal of Livestock Production*; 7 (12): 141-144.
- Azoulay, Y., Druyan, S., Yadgary, L., Hadad, Y., & Cahaner, A. (2011). The viability and performance under hot conditions of featherless broilers versus fully feathered broilers. *Poultry Science*; 90(1): 19- 29.
- Hossain, M.H. (2014). Personal communication, Nobo Jibon Project, Save the Children, Barguna, Bangladesh.
- Lihare, G.O., Wasike, C.B., & Kahi, A.K. (2020). Describing Growth Pattern Using Gompertz Growth Function – A Case Study of Kuchi Chicken in Kenya. *Poultry Science Journal*; 8(2): 119-127
- Melesse, A., Worku, Z., & Teklegiorgis, Y. (2013). Assessment of the prevailing handling and quality of eggs from scavenging indigenous chickens reared in different agro-ecological zones of Ethiopia. *Journal of Environmental Occupation Sciences*; 2(1): 1-8.
- Miazi, O.F., Miah, G., Miazi, Md. M., Uddin, M.M., Hassan, M.M., & Faridahsan, Md. (2012). Fertility and Hatchability of Fayoumi and Sonali Chicks. *Scholarly Journal of Agricultural Science*; 2(5). 83-86



- Mulugeta, S., Goshu, G., & Esatu, W. (2020). Growth performance of DZ-white and Improved Horro chicken breeds under different agro-ecological zones of Ethiopia. *Journal of Livestock Science*, 11: 45-53
- Sapp, R.L., Rekaya, R., Misztal, I., & Wing, T. (2004). Male and female fertility and hatchability in chickens: A longitudinal mixed model approach. *Poultry Science*, 83: 1253-1259.
- Tadesse, A. (2014). Production and reproduction performance of rural poultry in lowland and midland agro-ecological zones of Central Tigray, Northern Ethiopia. *British Journal of Poultry Sciences*, 3(1): 6–14.
- Wolc, A., White, I.M.S., Hill, W.G., & Olori, V.E. (2010). Inheritance of hatchability in broiler chickens and its relationship to egg quality traits. *Poultry Science*, 89: 2334-2340.

CHARACTERIZATION OF INDIGENOUS CHICKENS REARED IN THREE AGRO-ECOLOGIES OF HADIYA ZONE OF ETHIOPIA BASED ON THEIR MORPHOMETRIC TRAITS USING A MULTIVARIATE ANALYSIS APPROACH

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ABSTRACT

This study was conducted to differentiate the indigenous chicken populations at different agro-ecologies based on morphometric traits by applying multivariate analysis. Morphometric data were collected from 520 (130 male and 390 female) adult indigenous chickens. Traits scored were live bodyweight (LBW), body length (BL), breast circumference (BC), wingspan (WS), shank length (SL), and shank circumference (SC). The six quantitative traits for both sexes were subjected to stepwise discriminant analysis, of which four (wingspan, live bodyweight, shank circumference and body length) in females and two of them (shank length, and wingspan) in males were identified as the best discriminating variables. Two canonical variables, CAN1 and CAN2 were extracted with 61.5% and 38.6% of the total variation in females, respectively and CAN1 (89.3%) and CAN2 (10.7%) of the total variation in parameters of male chicken populations. The higher classification rates were obtained in lowland agroecology both for female (56.6%) and male (50%) chickens. The longest pairwise Mahalanobis distances were observed between midland and highland in male chickens and between lowland and highland in females, whereas the shortest distance was observed between the lowland and highland in male and female chicken populations. The variations obtained in chickens of different agro-ecologies and sex, considered as opportunities for genetic improvement of indigenous chicken.

Keywords: agroecology; Ethiopia; Hadiya zone; indigenous chicken; morphometric traits; multivariate analysis

INTRODUCTION

In rural Ethiopia, chickens are the most widespread and almost every rural family owns few to large number of chickens. Moreover, recent socio-economic studies have indicated that chicken rearing has potential to improve household nutrition security by increasing animal source food production and consumption of meat and eggs (Hiwot et al., 2020).

Indigenous domestic chickens are often reared under the traditional farming system by small-holder farmers in developing countries. The indigenous chickens are popular in Ethiopia because of their tolerance to common poultry diseases and fluctuations in both feed quality and quantity, hence requiring minimum input (Teketel and Oli, 2012)

Documenting the information of the body weight and linear body parameters through phenotypic characterization is important for further improvement and sustainability of chicken production following their genetic variability (Benitez, 2002), which can be ascertained through characterization studies. Since morphological traits constitute major components of phenotypes in animal genetic resources, knowing the variations of morphological traits is fundamental to characterization of local genetic resources. Many statistical tools are available for assessing the morphological profiles of indigenous chicken populations. Among others, cluster and canonical

discriminant analysis has been reported to be the most suitable statistical tool to describe the relationship between two or more variables through linear combinations (Daikwo et al., 2015; Dahloum et al., 2016; Al-Atiyat et al., 2017).

Though work on the multivariate analysis of morphometric traits of local chicken in Ethiopia has been carried out by researchers covering some parts of Ethiopia (Fassil et al., 2016; Aberra et al., 2021). However, documenting such information through multivariate analysis across agro-ecological zones of the study sites is scanty. Given the high potential for poultry production and the presence of diverse ecotypes, it is imperative to conduct comprehensive studies that can cover the agroecology based morphometric trait evaluation of the indigenous chickens using multivariate analysis in study sites. Hence, this study was undertaken with the aim of differentiation of indigenous chicken populations reared in different agro-ecologies by applying multivariate statistical tools.

MATERIALS AND METHODS

Data collection

The study was conducted at purposively identified three agro-ecologies. A total of 520 live adult chickens were randomly selected from which 30 males and 90 females from lowland, 50 males and 150 females from midland and 50 males and 150 females from highland agro-ecologies. The study sites were identified purposively based on availability of adult indigenous chicken population, distribution of exotic chickens and agro-ecological variation.

Data on ten morphometric traits were scored following the descriptor list of (FAO, 2012) for phenotypic characterizations of chicken. Accordingly, the following traits were measured: live bodyweight (LBW), body length (BL), breast circumference (BC), wingspan (WS), shank length (SL), and shank circumference (SC).

Spring balance was used to measure LBW of individual adult bird. All other linear measurements were measured using textile measuring tape meter in centimeter. Measurements were taken from males aged 24 weeks and above, and females that have already started laying eggs based on information obtained from the owner of each chicken.

Data analysis

Data were subjected to GLM procedures of Statistical Analysis System (SAS 2012, ver. 9.4) by fitting agro-ecology and sex as independent variables.

Different multivariate procedures such STEPDISC and CANDISC of SAS (2012, ver. 9.4) were used to analyze morphometric traits. The following model was used for body weight and nine linear body measurements per individual chicken.

$$Y_{ij} = \mu + S_i + A_j + e_{ij}$$

where: Y_{ij} = individual observation; μ = fixed overall mean; S_i = effect of sex (i = male, female); A_j = effect of agro-ecology (j = lowland, midland, highland); e_{ij} = random residual error

Since the interaction effect on sex and agroecology was not significant, it was dropped from the statistical model.

RESEARCH AND FINDINGS

Quantitative traits

Mean values for live bodyweight and linear body measurements of cocks and hens are presented in Table 1. Agroecology had significant effect ($p < 0.05$) on bodyweight and all the linear measurements. Sex had a significant effect ($p < 0.05$) on all linear body measurement and live bodyweight of chickens. Accordingly, male chickens were better than the females for all linear body measurements and live bodyweight. Sex was the main cause of variation of measurable traits of indigenous chickens of Ethiopia.

The higher values of body measurements for male chickens in this study agreed with the findings of Al-Qamashoui et al. (2014) who reported that males had higher values for live body weight and linear body measurements than female chicken populations in Oman. Likewise, Yakubu (2010), Nigussie (2011), and Guni and Katule (2013) revealed the superiority of male chickens over female chickens for almost all body parameters in Botswana, Nigeria, Ethiopia, and Tanzania, respectively. The differences in bodyweight and other linear body measurements between males and females show the presence of sexual dimorphism (the difference in size in male and female) in chicken populations.

Table 1. Mean values of live bodyweight (kg) and linear body measurements (cm) in indigenous chicken populations as affected by agroecology and sex (N = 520)

Parameters	LBW	BL	BC	WS	SL	SC
Average	1.15	24.2	24.88	37.4	6.95	2.58
R ²	0.15	0.15	0.52	0.19	0.16	0.18
CV (%)	23.3	13.4	15.27	8.91	17.2	22.6
Highland	1.09 ^a	23.7 ^a	24.2 ^a	36.2 ^a	6.70 ^a	2.58 ^{ab}
Midland	1.23 ^b	24.8 ^b	25.7 ^b	38.6 ^c	7.32 ^b	2.64 ^b
Lowland	1.11 ^a	23.8 ^a	24.7 ^a	37.6 ^b	6.75 ^a	2.47 ^a
Male	1.30 ^b	26.1 ^b	26.4 ^b	39.4 ^b	7.66 ^b	3.03 ^b
Female	1.09 ^a	23.5 ^a	24.4 ^a	36.7 ^a	6.71 ^a	2.42 ^a
Sources of variations						
Agroecology	<.0001	0.0007	<.0001	<.0001	<.0001	0.0351
Sex	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

LBW = live body weight; BL = body length; BC = breast circumference; WS = wingspan; SL = shank length; SC = shank circumference

Stepwise discriminant analysis

Six quantitative variables with complete data for both sexes were subjected to the STEPDISC procedure and four of them were identified as the best discriminating variables for female chickens while only two variables for males (Table 2). Wilk's lambda test confirmed that all the selected variables had highly significant ($p < 0.0001$) contribution to discriminate the total population into separate groups.

The variables with the highest discriminating power for females were wingspan, live bodyweight, shank circumference and body length (Table 2). For male chickens, only two variables (shank length, and wingspan) identified with the highest discriminating power. Rosario et al. (2008) reported that body length as discriminating traits for chicken populations

which agrees the current study for female chickens where body length was among the traits with high discriminating power in females.

Table 2. Summary of stepwise discriminant analysis for selection of traits with the highest discriminating power for female and male chicken populations

Step	Variables entered	Partial R ²	F-value	Pr > F	Wilks' Lambda	Pr < Lambda	ASCC	Pr > ASCC
Females								
1	Wingspan	0.079	16.5	<.0001	0.921	<.0001	0.040	<.0001
2	Live weight	0.040	8.03	0.0004	0.884	<.0001	0.059	<.0001
3	Shank circumference	0.025	4.85	0.0083	0.827	<.0001	0.091	<.0001
4	Body length	0.019	3.61	0.0279	0.811	<.0001	0.099	<.0001
Males								
1	Shank length	0.150	11.1	<.0001	0.851	<.0001	0.075	<.0001
2	Wingspan	0.086	5.91	0.0035	0.778	<.0001	0.114	<.0001

ASCC = average squared canonical coefficient (exploring the relationship between two multivariate sets of variables), R² = coefficient of determinant

Canonical discriminant analysis

The identified variables with the highest discriminating power were then subjected to canonical discriminant analysis for male and female populations separately, which performed the multivariate analysis, the Mahalanobis distances, eigen-values of extracted canonical variables, standardized canonical coefficients and canonical structures.

Accordingly, the shortest Mahalanobis distances of the female chickens were observed between lowland and highland agro-ecologies (0.63) followed by lowland and midland agro-ecologies (0.67) and the furthest Mahalanobis distances between those of midland and highland agro-ecologies (0.69). In male chickens, the shortest pairwise Mahalanobis distances were observed between chickens of lowland and highland agro-ecologies (0.306), whereas the longest between those of the midland and highland agroecology chicken populations (1.43).

Table 3. Mahalanobis distances between female and male chicken populations of the three agro-ecologies based on morphometric traits.

Sex group	Female chickens			Male chickens		
	Highland	Midland	Lowland	Highland	Midland	Lowland
Highland	0 1.0000	<.0001	<.0001	0 1.0000	0.136	<.0001
Midland	0.693 <.0001	0 1.0000	<.0001	1.43 0.136	0 1.0000	0.0007
Lowland	0.626 <.0001	0.666 <.0001	0 1.0000	0.306 <.0001	0.985 0.0007	0 1.0000

Summary of canonical correlation and eigen values of male and female chickens were presented in Table 4. Two canonical variables namely CAN1 and CAN2 were extracted, which accounted for 61.5% and 38.6% of the total variation in female chickens, respectively being highly significant (p<0.0001). In male chickens, however, CAN1 and CAN2 accounted for 89.3% and 10.7% of the total variation, respectively, the latter being insignificant (p = 0.1118; Table 4).



As it was reported by (Addis et al., 2013; Fasil et al., 2016) in indigenous chicken of Gonder and Metekel Zones of Ethiopia, respectively, there were significant canonical correlation between the chicken ecotype and the first canonical variable and the second canonical variable, which indicate that the canonical variables explain the differentiation of the chicken populations, though the CAN1 was more in explaining the most of variation than CAN2, like wise to the current study for both sexes except male chickens whereby there was no significant ($p < 0.05$) canonical correlation between CAN2 and agroecology.

Table 4. Summary of canonical correlations and eigen-values in female and male chickens

Functions	Canonical correlations	Eigenvalues			Likelihood Ratio	F-value	Pr>F
		Eigen value	Proportion	Cumulative			
Females							
CAN1	0.344	0.135	0.615	0.615	0.813	8.36	<.0001
CAN2	0.279	0.084	0.386	1.000	0.922	8.10	<.0001
Males							
CAN1	0.479	0.298	0.893	0.893	0.744	6.58	<.0001
CAN2	0.186	0.036	0.107	1.000	0.966	2.23	0.1118

CAN = canonical variables

CONCLUSION

Most of traits showed significant variations across agro-ecologies and between sexes. So, the information raised at this study could provide the direction for developing breeding plan for conservation of indigenous chicken genetic resources, management, and improvement of indigenous chicken populations by based on the variations of their body measurements.

ACKNOWLEDGEMENTS

We are grateful to ILRI (International Livestock Research Institute), ACGG (African Chicken Genetic Gain) project to its provision of fund to accomplish this work for the first author.

REFERENCES

- Aberra, M., Abiyu, T., Hailu, A., Kefala, T., Tesfahun, K., Mestawet, T., & Simret, B. (2021). Assessing the morphological diversity of Ethiopian indigenous chickens using multivariate discriminant analysis of morphometric traits: Implications for sustainable utilization and conservation. *Poultry Science Journal* 9(1): 61- 72. <https://doi:10.22069/psj.2021.18469.1644>.
- Addis, G., Kefyalew, A., & Zewdu, W. (2013). Phenotypic characterization of indigenous chicken ecotypes in the north Gondar zone, Ethiopia. *American-Eurasian Journal of Scientific Research*; 8 (6): 248-255. <https://www.doi.org/10.1017/S2078633614000113>
- Al-Atiyat, R.M., Aljumaah, R.S., Abudabos, A.M., Alotybi, M.N, Harron, R.M., Algawaan, A.S., & Aljoan, H.S. (2017). Differentiation of free ranging chicken using discriminant



- analysis of phenotypic traits. *Revista Brasileira de Zootecnia*, 46(10): 791-799. <http://www.dx.doi.org/10.1590/s1806-92902017001000001>
- Al-Qamashoui, B., Mahgoub, O., Kadim, I., & Schlecht, E. (2014). Towards Conservation of Omani local chicken: Phenotypic characteristics, Management Practices and Performance traits. *Asian-Australian Journal of Animal Sciences*; 27(6): 767-777. <https://www.dx.doi.org/10.5713%2Fajas.2013.13541>
- Benitez, F. (2002). Reasons for the use and conservation of some local genetic resources in poultry. *Proceeding of 7th World Congress on Genetics Applied to Livestock Production, August 19-23, Montpellier, France*, <http://wcalp.org/system/files/proceedings/2002/reasons-use-and-conservation-some-localgenetic-resources-poultry.pdf>
- Daikwo, S.I., Dike, U.A., & Dim, N.I. (2015). Discriminant analysis of morphometric differences in the normal feathered and frizzle feathered chickens of North Central Nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension*; 14(3): 12-15. <http://www.dx.doi.org/10.4314/as.v14i3.3>
- Dahloum, L., Moula, N., Halbouche, M., & Mignon-Grasteau, S. (2016). Phenotypic characterization of the indigenous chickens (*Gallus gallus*) in the northwest of Algeria. *Archives Animal Breeding*, 59, 79–90. <http://www.dx.doi.org/10.5194/aab-59-79-2016>
- Fasil, G., Solomon, A., Abraham, A., Manaye, M., & Yibrehu, E. (2016). Multivariate analyses of morphological traits in indigenous chicken populations of Metekel Zone, Northwestern Ethiopia. *Journal of Animal Genetic Resources*; 59: 15-25. <https://www.dx.doi.org/10.1017/S2078633616000084>
- Food, and Agriculture Organization. (2012). phenotypic characterization of Animal genetic Resource. *Animal Production and Health Guidelines*; 11. Rome 2012. <http://www.fao.org/3/a-i2686e.pdf>
- Guni, F.S., & Katule, A.M. (2013). Characterization of local chickens in selected districts of the Southern Highlands of Tanzania: I. Qualitative characters. *Livestock Research for Rural Development*; 25(9): <http://www.lrrd.org/lrrd25/9/guni25153.htm>
- Hiwot, D., Biruk, A., Wole, K., Annet, A., Anouka, V., & Barbara, W. (2020). Contribution of small ruminants to food security for Ethiopian smallholder farmers. *Journal of Small Ruminant Research*; 184: 1-10. <http://www.dx.doi.org/10.1016/j.smallrumres.2020.106064>
- Nigussie, D. (2011). Breeding programs for indigenous chicken in Ethiopia, analysis of diversity in production systems and chicken populations. Ph.D. Thesis. Agricultural University, Wageningen, The Netherlands. <https://cgspace.cgiar.org/handle/10568/32821>
- Rosario, M.F., Silva, MAN., Coelho, AAD., Savino, VJM., & Dias, CTS. (2008). Canonical discriminant analysis applied to broiler chicken performance. *Animal*; 2(3): 419-424. <http://www.dx.doi.org/10.1017/S1751731107001012>
- Teketel, T.D., & Oli, W. (2012). Uses and flock management practices of scavenging chickens in Wolaita Zone of southern Ethiopia. *Tropical Animal Health and Production*; 44: 537–544. <https://www.dx.doi.org/10.1007/s11250-011-9933-y>
- Yakubu, A. (2010). Indigenous chicken flocks of Nasarawa State, north central Nigeria: Their



characteristics, husbandry, and productivity. *Tropical and Subtropical Agroecosystems*; 12:
69-76: <https://www.revista.ccba.uady.mx/ojs/index.php/TSA/article/view/287/275>

CRYSTAL STRUCTURE, MECHANICAL AND THERMODYNAMICAL PROPERTIES OF Os₂CuAl COMPOUND: A FIRST-PRINCIPLES INVESTIGATION

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ABSTRACT

This work was studied pseudopotential calculations on the structural, electronic, mechanical, and thermodynamic properties of Heusler Os₂CuAl compound by first principles calculations. Based on the results of this study undertaken on electronic properties of this material using GGA-PBE calculation, it was clearly seen that it possessed metallic characteristic due to overlapping between conduction and valance band at the Fermi level. Based on investigation of elastic properties of Os₂CuAl, it can be seen that this compound mechanically stable and is ductile in nature. The phonon dispersion relation of Os₂CuAl was calculated using linear response method. This compound is not dynamically stable due to the absence of imaginary frequency in the calculated full phonon spectra. The specific heat capacity, internal energy, entropy and vibrational energy at a constant volume C_V of Os₂CuAl was calculated.

Keywords: Structural properties, mechanical properties, thermodynamical properties.

INTRODUCTION

Hemi-metallic ferromagnets (HFMs), which have been extensively studied in recent years, are semiconductor materials in which the majority-spin band is metallic and the minority-spin band has an energy gap at the Fermi level. Hemi-metallic ferromagnets function as spin filters, providing current with a high degree of spin polarization and being key materials for spin-dependent phenomena such as tunnelling magnetoresistance (TMR) [1] and spin injection into semiconductors in spintronic [2, 3]. High temperature and high pressure alloys have received great attention in industrial applications. While a lot of research has been investigated on the full-Heusler alloy, Osmium-based Heusler alloys have been the subject of very few studies [4-7]. Osmium-based superhard alloys are receiving widespread attention due to their good high temperature, high pressure and ductile properties.

The aim of this article is to investigate the structural, electronic, phonon, mechanical and thermodynamic properties of Os₂CuAl compound in L2₁ phase using density functional theory within the generalized gradient approach (GGA).

METHOD OF CALCULATION

All calculations in this study were achieved using the plane wave pseudopotential method as implemented in the Quantum-Espresso code. The exchange correlation functional (ECF) was used in the Perdew–Burke–Ernzerhof (PBE) [8] generalized gradient (GGA) approach to examine exchange correlation (EC) effects. The cut-off value of 40 Ryd plane-wave expansions in all calculations were chosen. For Self-consistent solutions of the Kohn–Sham equations, the Monkhorst–Pack scheme [9] with 10x10x10 *k*-points was used. Thermodynamic properties were calculated under at a constant volume using the semi-harmonic Debye model approach [10].

Ab-initio pseudo potential calculations are a method that allows total energy calculations for random crystal structures. In this method, applying a small amount of strain to the equilibrium lattice to find changes in total energy and then using this information helped us derive elastic constants. The elastic constants are identified as a function of the deformation parameter (δ) proportional to the quadratic coefficient in a polynomial fit of the total energy.

Here, the elastic constants have been computed using the stress-strain method [11, 12]. From the elastic constants we calculated, the bulk modulus (B), shear modulus (G), Young's modulus (E) and Poisson's ratio (σ) are derived via the Voigt-Reuss-Hill mean averaging scheme [13-15]. There are three independent elastic constants to describe a cubic crystal: C₁₁, C₁₂ and C₄₄. The bulk modulus of a cubic crystal is similar for the Voigt, Reuss and Hill averages as in Equation 1:

$$B_v = \frac{1}{3}(C_{11} + 2C_{12}) \quad 1$$

The shear modulus in the Voigt average is given by Equation 2:

$$G_v = \frac{(C_{11}-C_{12}+3C_{44})}{5} \quad 2$$

The Reuss average is given by Equation 3:

$$G_R = \frac{(5(C_{11}-C_{12})C_{44})}{4C_{44}+3(C_{11}-C_{12})} \quad 3$$

Arithmetic mean (Hill) $G = (G_v + G_R)/2$ presented as the shear modulus. Young's modulus (E) is obtained as shown in Equation 4:

$$E = \frac{9BG}{3B+G} \quad 4$$

It is obtained by calculating the Poisson's ratio as in Equation 5:

$$\sigma = \frac{3B-2G}{2(3B+G)} \quad 5$$

The anisotropy factor (A) is determined using Equation 6:

$$A = 2C_{44}/(C_{11} - C_{12}) \quad 6$$

RESULTS

The osmium-based Os_2CuAl compound has been investigated in the $L2_1$ phase. Os_2CuAl is crystallized in a cubic structure with the $Fm-3m$ space group as seen in Figure 1. Cubic structure of Os_2CuAl compound with $Fm-3m$ space group (#225), where Os atoms in 8c (0.25, 0.25, 0.25), Cu 4b (0.5, 0.5, 0.5) and Al 4a (0, 0, 0) is positioned in the $L2_1$ non-magnetic phase. The computed structural parameters of the compound Os_2CuAl are presented in **Table 1** compared with the available data [16]. The calculated lattice constant value of this compound is in good agreement with the previous theoretical calculation [16]. We could not find any comparable data in the existing literature on elastic constants and other related parameters. Thus, these data are calculated for the first time for Os_2CuAl in the $L2_1$ phase.

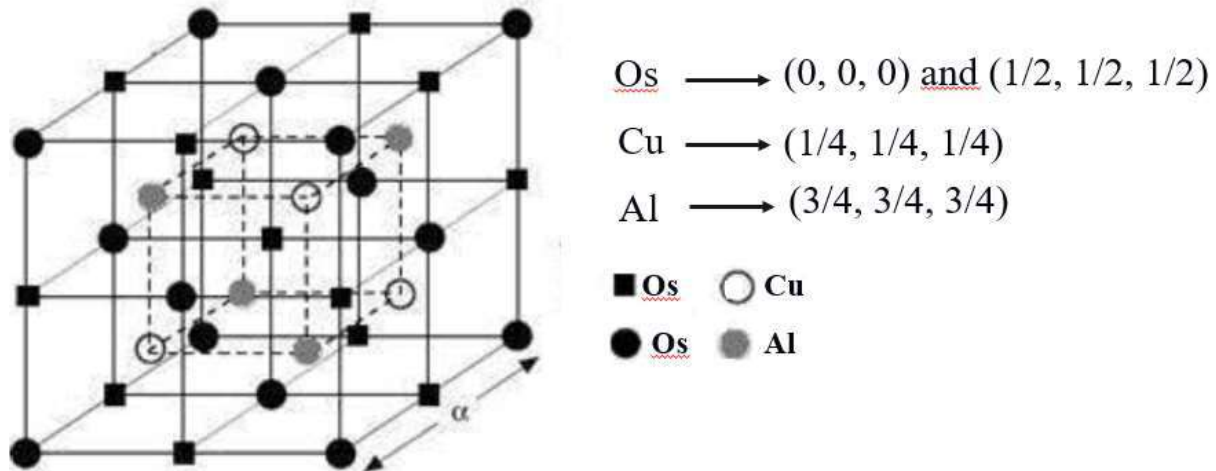


Figure 1. The crystal structure of Os_2CuAl compound in the $L2_1$ Type Heusler phase.

The elastic constants and some of their related parameters (such as Youn's modulus, shear modulus and B/G ratio) of the Os_2CuAl compound are presented in Table 1. Born stability condition [17] of elastic constants for cubic compounds can be expressed as;

$$C_{44} > 0, (C_{11} - C_{12})/2 > 0, B = (C_{11} + 2C_{12})/3 > 0$$

As can be clearly seen from Table 1, this criterion (Born stability criteria) has been validated and thus this compound has found to be mechanically stable at $L2_1$ phase. The mechanical properties (brittleness and ductility) of the Os_2CuAl compound have been investigated using the ratio of bulk modulus to shear modulus (B/G). According to the Pugh [18] criterion, if the B/G ratio is less than 1.75, the material behaves brittle, while if this ratio is greater than 1.75, the material has a ductile nature. The B/G value for the Os_2CuAl compound has been calculated as 2.41. Accordingly, this material has a ductile nature. The osmium contribution in this compound is responsible for the high value of bulk modulus, Young's modulus and shear modulus. The bulk, shear and Young's modulus observed at high value showed that Os_2CuAl is a hard material.

Table 1. Computed lattice constants, bulk modulus, elastic constants, shear modulus, Young's modulus and B/G ratio of Os_2CuAl compound.

Compound	a_0	B	C_{11}	C_{12}	C_{44}	G	E	B/G
Os_2CuAl	6.028	350.35	440.62	305.22	241.58	145.59	382.29	2.41
Ref. [16]	6.004							

The non-spin polarized electronic band structure of the Os_2CuAl compound is presented in Figure 2 along the high symmetry directions. As can be seen from Figure 2, it is seen that there are no electronic band gaps in the Fermi energy level. This shows that it exhibits metallic behaviour according to the electronic band structure.

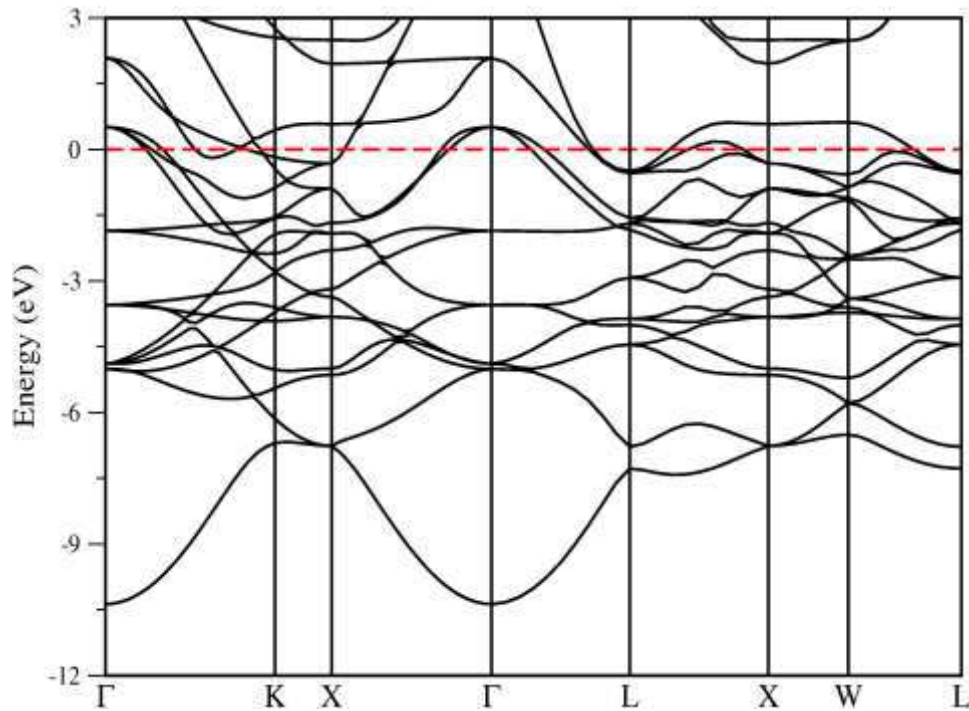


Fig 2. Non-spin polarized electronic band structure along the high symmetry directions for Os_2CuAl .

In order to examine the electronic band structure of the Os_2CuAl compound in detail, it is necessary to investigate the projected density of state curves (DOS). It is clear that this compound is metallic, since the DOS values are non-zero at the Fermi level. The most important contribution to the Fermi level in the DOS curve comes from the Os-5d and Cu-3d states.

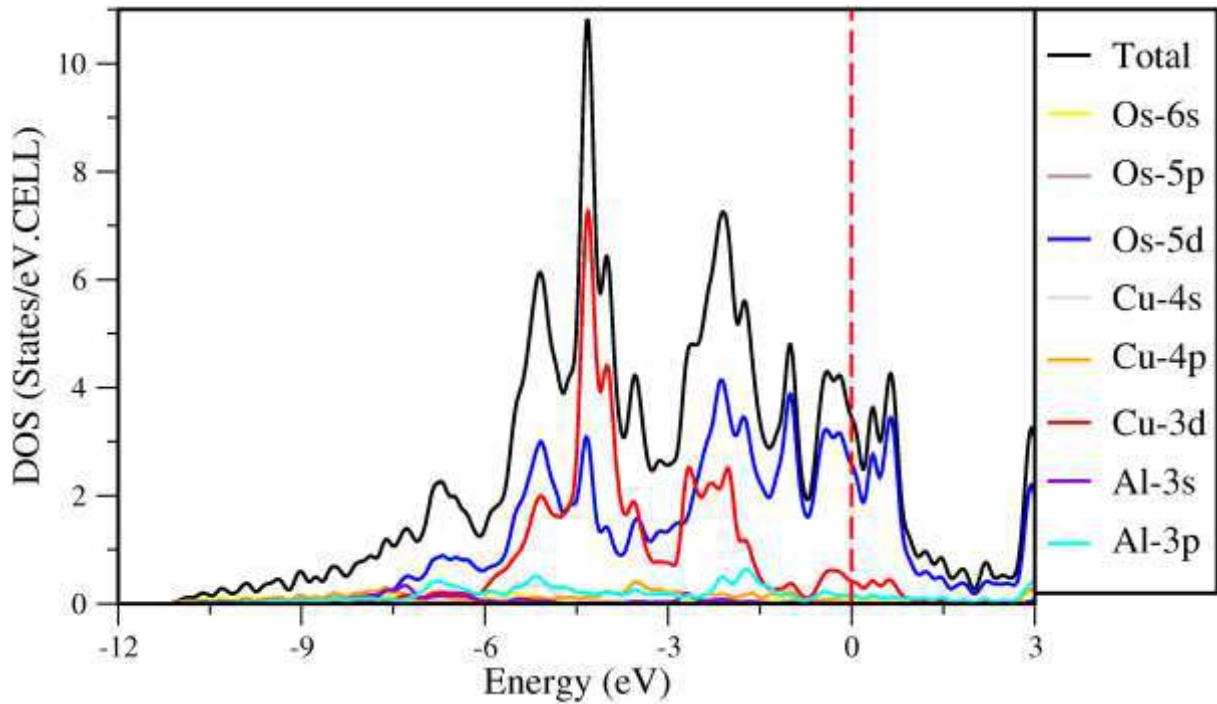


Figure 3. Calculated total and partial density of states for Os_2CuAl .

Figure 8 shows the calculated phonon distribution curves of Os_2CuAl in the full-Heusler phase. As expected for the $L2_1$ type crystal structure with four atoms in the unit cell, the phonon dispersion curves exhibit 12 branches, three acoustics and nine optical branches. As can be understood from all phonon modes, especially acoustic modes contain imaginary phonon branches. Therefore, the compound is not dynamically stable.

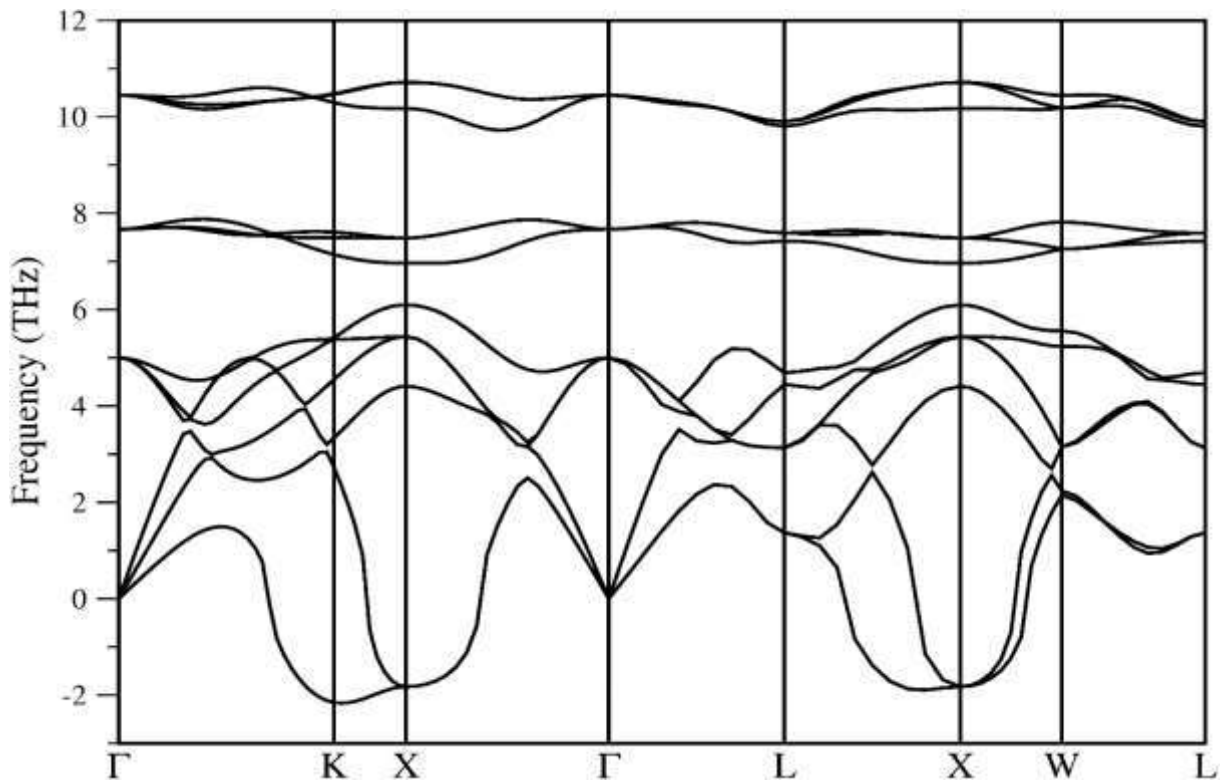


Figure 4. Phonon dispersion curves of Os_2CuAl compound in $L2_1$ phase.

Various thermodynamic properties such as internal energy, vibrational energy, entropy and specific heat capacity were investigated at a temperature between 0 and 800 K using the quasi-harmonic Debye model (Figure 5-8). In Figures 5, 7 and 8, internal energy, entropy, and specific heat capacity increased with rising temperature as a function of temperature for Os_2CuAl compound. On the other hand, it can be seen in Figure 6 that the vibrational energy changes with increasing temperature as an inverse function of temperature.

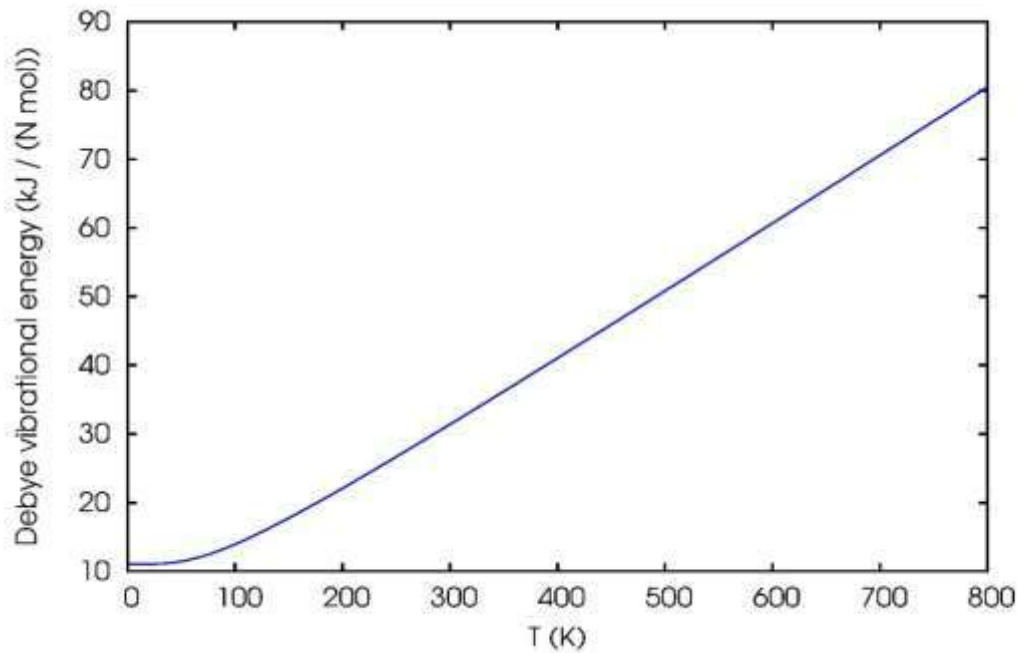


Figure 5. Temperature dependent variation of vibrational energy of Os_2CuAl compound.

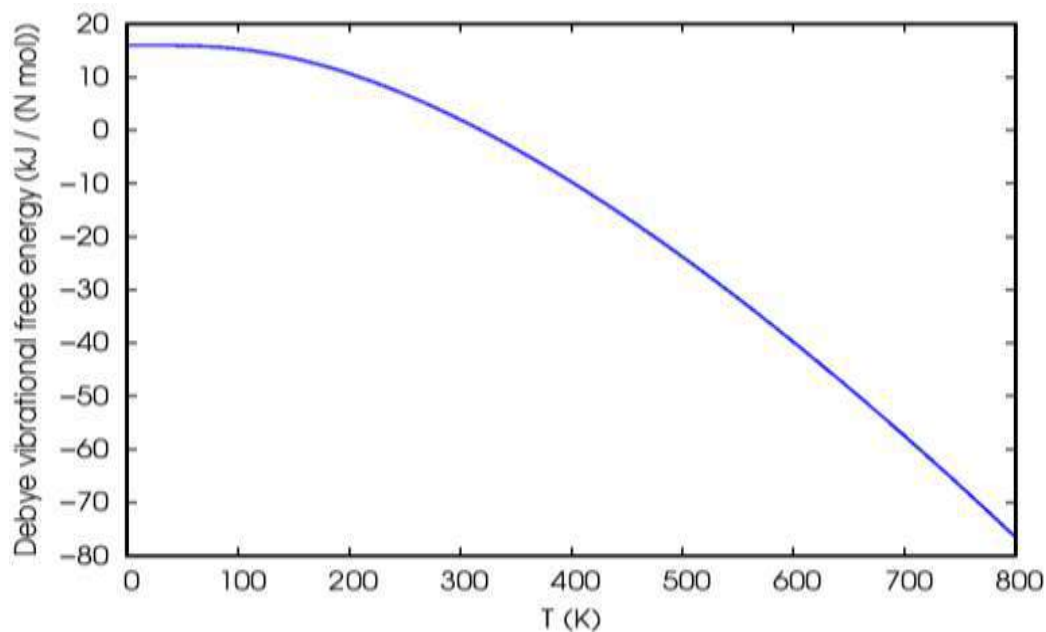


Figure 6. Temperature dependent variation of vibrational free energy of Os_2CuAl compound

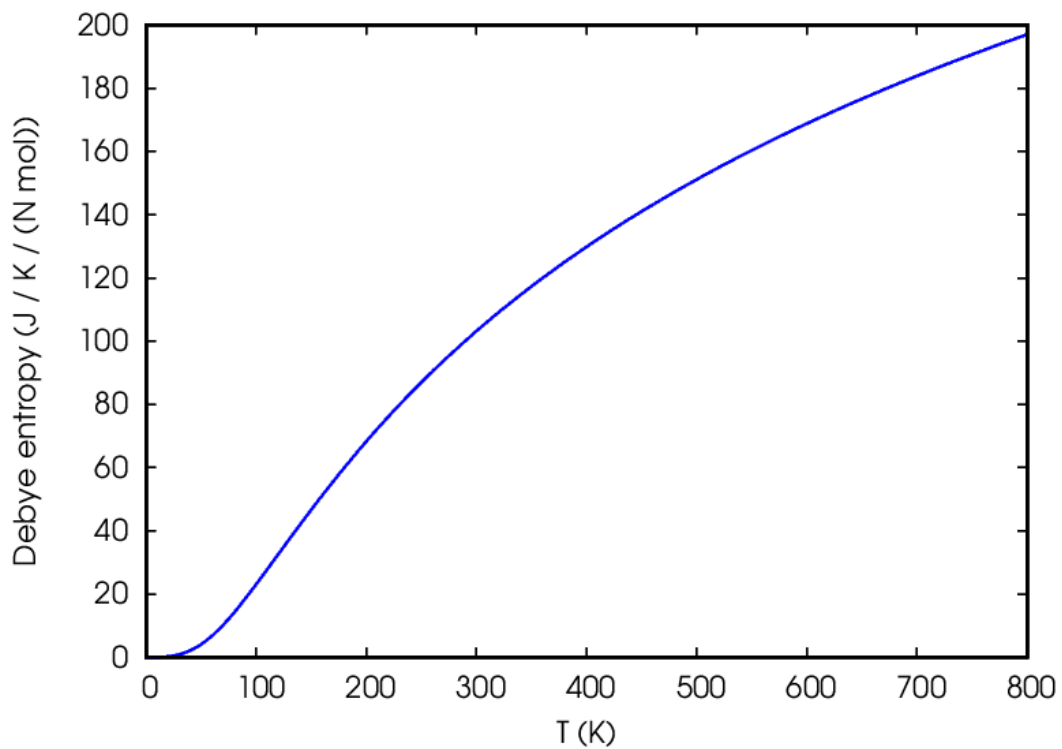


Figure 7. Temperature dependent variation of entropy of Os_2CuAl compound.

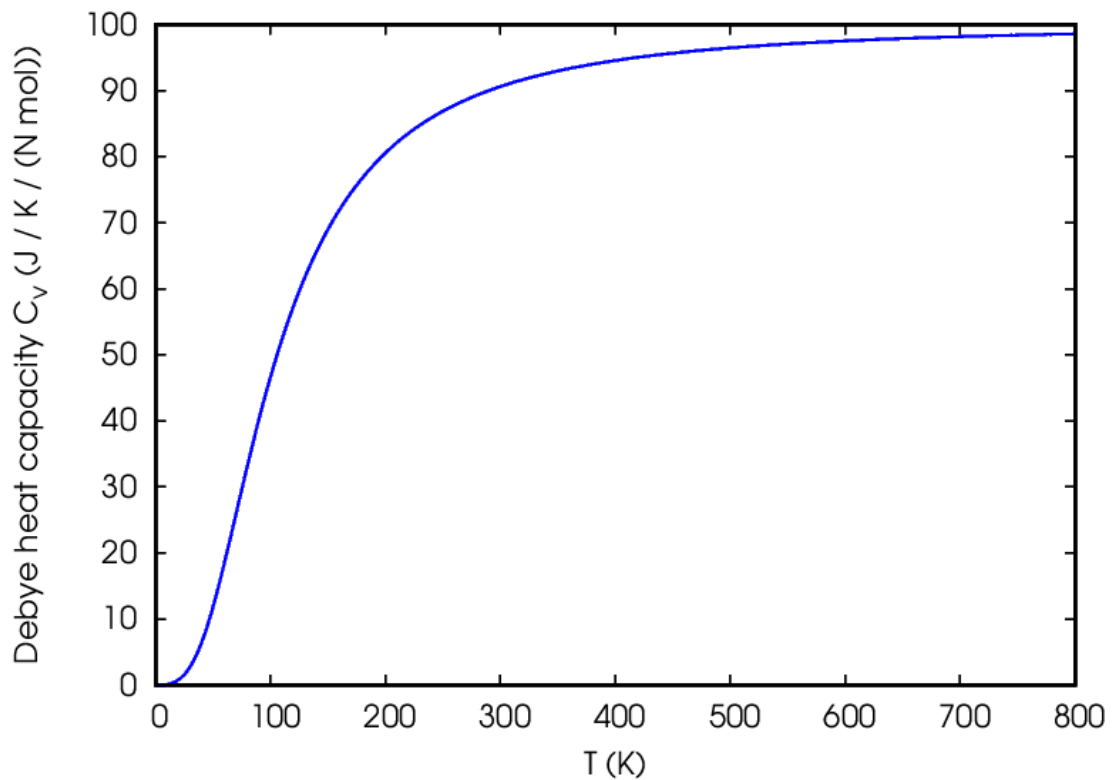


Figure 8. Temperature dependent variation of heat capacity of Os_2CuAl compound.



CONCLUSIONS

In this work, *ab-initio* calculations have been made to examine the structural, elastic, electronic and dynamic properties of Os_2CuAl in $L2_1$ phase. The values obtained for the equilibrium lattice constant is in good agreement with the available theoretical data. The computed high bulk and Young's modulus of the Os_2CuAl compound showed that it is a hard material. The calculated electronic band structures for this compound and their corresponding total and projected density of states curves indicate its metallic nature. Since this compound has a negative phonon frequency, it is not dynamically stable. Finally, various thermodynamic properties such as internal energy, vibrational energy, entropy and specific heat capacity were investigated at a temperature between 0 and 800 K using the quasi-harmonic Debye model.

REFERENCES

- [1] G. Schmidt, D. Ferrand, L. W. Molenkamp, A. T. Filip, and B. J. van Wees, *Phys. Rev. B* 62, R4790 2000.
- [2] R. Fiederling, M. Keim, G. Reuscher, W. Ossau, G. Schmidt, A. Waag, and L. W. Molenkamp, *Nature London* 402, 78 1999.
- [3] Y. Ohno, D. K. Young, B. Beschoten, F. Matsukura, H. Ohno, and D. D. Awschalom, *Nature London* 402, 790 1999.
- [4] Arıkan, N., Örnek, O., Charifi, Z., Baaziz, H., Uğur, Ş., & Uğur, G. (2016). A first-principle study of Os-based compounds: Electronic structure and vibrational properties. *Journal of Physics and Chemistry of Solids*, 96, 121-127.
- [5] Yang, R., Shi, M., Wu, F., Wei, Q., Zhou, Y., & Xue, M. (2021). Study on the physical properties of Pm-3 m-Os 3 X (X= V, Nb and Ta) under high pressure by first principles. *Applied Physics A*, 127(5), 1-12.
- [6] Gilleßen, M., & Dronskowski, R. (2009). A combinatorial study of full Heusler alloys by first-principles computational methods. *Journal of computational chemistry*, 30(8), 1290-1299.
- [7] Ş Uğur, & S. Nazlı, (2015). Pseudo-Potential Calculations of Structural, Electronic, Elastic and Phonon Properties Of Os_2YPb (Y= Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn). *Materials Science. Non-Equilibrium Phase Transformations.*, 1(3), 15-17.
- [8] J. P. Perdew, K. Burke and M. Ernzerhof, *Phys. Rev. Lett.* 77 (1996) 3865.
- [9] M. Methfessel and A. T. Paxton, *Phys. Rev. B* 40 (1989) 3616.
- [10] P Giannozzi, O Andreussi, T Brumme, O Bunau, M Buongiorno Nardelli, M Calandra, R Car, C Cavazzoni, D Ceresoli, M Cococcioni, N Colonna, I Carnimeo, A Dal Corso, S de Gironcoli, P Delugas, R A DiStasio Jr, A Ferretti, A Floris, G Fratesi, G Fugallo, R Gebauer, U Gerstmann, F Giustino, T Gorni, J Jia, M Kawamura, H-Y Ko, A Kokalj, E Küçükbenli, M Lazzeri, M Marsili, N Marzari, F Mauri, N L Nguyen, H-V Nguyen, A Otero-de-la-Roza, L Paulatto, S Poncé, D Rocca, R Sabatini, B Santra, M Schlipf, A P Seitsonen, A Smogunov, I Timrov, T Thonhauser, P Umari, N Vast, X Wu and S Baroni, "Advanced capabilities for materials modelling with Quantum ESPRESSO." *Journal of physics: Condensed matter* 29.46 (2017) p. 465901.
- [11] A. Dal Corso, "Elastic constants of beryllium: a first-principles investigation." *Journal of Physics: Condensed Matter* 28.7 (2016) p. 075401.



- [12] N. Arıkan, G. Dikici Yıldız, Y. G. Yıldız, and A. İyigör, Electronic, Elastic, Vibrational and Thermodynamic Properties of HfIrX (X = As, Sb and Bi) Compounds: Insights from DFT-Based Computer Simulation, *Journal of Electronic Materials* 49 (2020) p. 5.
- [13] G.D. Yıldız, Y.G. Yıldız, S. Al, A. İyigör, N. Arıkan, *Int. J. Mod. Phys. B* 32 (2018) p. 1850214.
- [14] S. Al, N. Arıkan, S. Demir, A. İyigör, *Phys. B Condens. Matter.* 16 (2018) p. 531.
- [15] A. İyigör, M. Özduran, M. Ünsal, O. Örnek, & N. Arıkan, Ab-initio study of the structural, electronic, elastic and vibrational properties of HfX (X= Rh, Ru and Tc). *Philosophical Magazine Letters*, 97(3) (2017) p. 110-117.
- [16] M. Gilleßen, R. Dronskowski, A combinatorial study of full Heusler alloys by first-principles computational methods, *J. Comput. Chem.* 30 (8) (2009) 1290–1299.
- [17] Born, M. and Huang, K., *Theory of Crystal Lattices*, Clarendon, Oxford, (1956).
- [18] Pugh, S.F., XCII. Relations between the elastic moduli and the plastic properties of polycrystalline pure metals, *Philosophical Magazine and Journal of Science*, 45, 823-843, (1954).



AB-INITIO CALCULATIONS OF ELASTIC CONSTANTS, ELECTRONIC, VIBRATIONAL, AND THERMODYNAMIC PROPERTIES OF VO₂Ga HEUSLER COMPOUND

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ABSTRACT

In this work, first-principles approach is used to investigate the elastic, mechanical, phonon and thermodynamic properties of VO₂Ga Heusler compounds, using a plane-wave pseudopotential scheme in density-functional theory (DFT) utilizing the Quantum-ESPRESSO package program. The calculated equilibrium lattice constant and bulk modulus agree well with the available theoretical data. The calculated negative formation energy indicates that the VO₂Ga compound has strong structural stability. According to the calculated second-order elastic constants, this compound met the Born criteria for mechanical stability. It has been determined that they have a ductile structure and show anisotropic behaviour according to Pugh criteria. In addition, the electronic band structures of VO₂Ga compound have calculated, and it has found to have a metallic band structure. To determine the dynamic properties, the phonon dispersion curves, and its corresponding total and projected densities of states have been investigated for the first time by using a linear-response approach. For VO₂Ga compound, internal free energy, entropy, specific heat capacity at constant volume and vibrational free energy changes analysed and discussed between the temperature range of 0–800 K using the quasi-harmonic approximation.

Keywords: Elastic constants, Electronic band, Vibrational properties.

INTRODUCTION

In general, Heusler alloys have received increasing attention in the scientific community since their discovery in 1903 by the German miner Friedrich Heusler [1]. There are three main types of Heusler alloys, these are full-Heusler [2-4], half-Heusler [5-8], and quaternary Heusler [9–12] are given by the general formulas XYZ, X₂YZ, and XYMZ, respectively, where X, Y, M

are transition metal elements and Z is a main group element. Heusler alloys can be used in many industrial applications as they are multifunctional materials with remarkable and specific properties. Although Heusler alloys have been investigated extensively for over 100 years, Os₂-based Heusler alloys have not been investigated sufficiently. The purpose of the present paper is to provide a theoretical description to use density functional theory (DFT) based Quantum-Espresso package program to compute the electronic structures, the structural, elastic, electronic, and mechanical properties of VO_s2Ga compound.

This study is organized as follows. In Section 2 we explain the details of the calculation method and present our calculations as a basis. Results and discussions are presented in Section 3. In Section 4 we summarize and conclude our calculations.

METHOD

All calculations in this study were achieved using the plane wave pseudopotential method as implemented in the Quantum-Espresso code. The exchange correlation functional (ECF) was used in the Perdew–Burke–Ernzerhof (PBE) [13] generalized gradient (GGA) approach to examine exchange correlation (EC) effects. The cut-off value of 40 Ryd plane-wave expansions in all calculations were chosen. For Self-consistent solutions of the Kohn–Sham equations, the Monkhorst–Pack scheme [14] with 10x10x10 *k*-points was used. Thermodynamic properties were calculated under at a constant volume using the semi-harmonic Debye model approach [15].

Ab-initio pseudo potential calculations are a method that allows total energy calculations for random crystal structures. In this method, applying a small amount of strain to the equilibrium lattice to find changes in total energy and then using this information helped us derive elastic constants. The elastic constants are identified as a function of the deformation parameter (δ) proportional to the quadratic coefficient in a polynomial fit of the total energy.

Here, the elastic constants have been computed using the stress-strain method [16, 17]. From the elastic constants we calculated, the bulk modulus (B), shear modulus (G), Young's modulus (E) and Poisson's ratio (σ) are derived via the Voigt-Reuss-Hill mean averaging scheme [18-20]. There are three independent elastic constants to describe a cubic crystal: C₁₁, C₁₂ and C₄₄. The bulk modulus of a cubic crystal is similar for the Voigt, Reuss and Hill averages as in Equation 1:

$$B_v = \frac{1}{3}(C_{11} + 2C_{12}) \quad 1$$

The shear modulus in the Voigt average is given by Equation 2:

$$G_v = \frac{(C_{11}-C_{12}+3C_{44})}{5} \quad 2$$

The Reuss average is given by Equation 3:

$$G_R = \frac{(5(C_{11}-C_{12})C_{44})}{4C_{44}+3(C_{11}-C_{12})} \quad 3$$

Arithmetic mean (Hill) G = (G_V + G_R)/2 presented as the shear modulus. Young's modulus (E) is obtained as shown in Equation 4:

$$E = \frac{9BG}{3B+G} \quad 4$$

It is obtained by calculating the Poisson's ratio as in Equation 5:

$$\sigma = \frac{3B-2G}{2(3B+G)} \quad 5$$

The anisotropy factor (A) is determined using Equation 6:

$$A = 2C_{44}/(C_{11} - C_{12}) \quad 6$$

RESULTS

The ground state of the VOs_2Ga Heusler alloy is found by performing the lattice optimization calculation for $L2_1$ phases (Cu_2MnAl -prototype). The VOs_2Ga Heusler compound crystallizes in conventional $L2_1$ (Cu_2MnAl) structures under space group of $\text{Fm}\bar{3}\text{m}$ (space group number 225). A detailed definition of the $L2_1$ structure can be found in our previous paper [x]. The Os atoms are located on 4a (0, 0, 0) and 4c (1/2, 1/2, 1/2) Wyckoff positions and the V and Ga atoms on 4b (1/4, 1/4, 1/4) and 4b (3/4, 3/4, 3/4) positions, respectively. The crystal structure of VOs_2Ga in the $L2_1$ phase is presented in Figure 1.

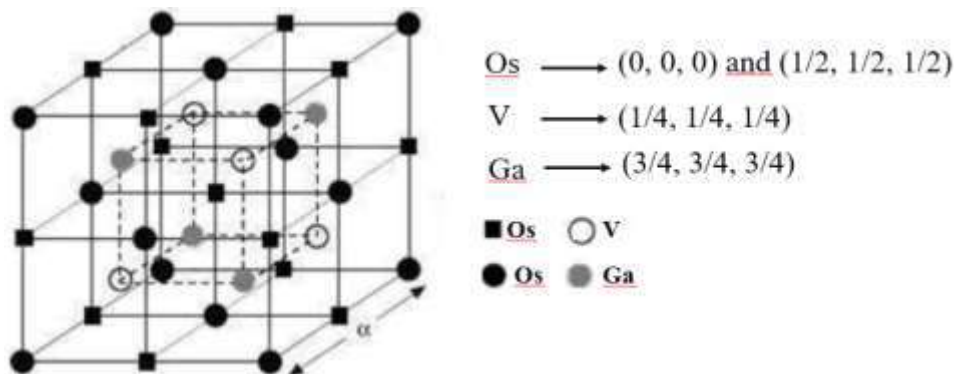


Figure 1. The crystal structure of VOs_2Ga alloy in the $L2_1$ phase.

The lattice constant, bulk modulus and elastic constant values obtained for the VOs_2Ga compound are presented in Table 1 together with the available data. The lattice constant values obtained for this compound are in good agreement with the theoretical result. Bulk modulus value for VOs_2Ga has been calculated as 275.18 GPa (in Table 1). The C_{11} represents the resistance to unidirectional compression (compression along the $\langle 100 \rangle$ cardinal direction), C_{44} represents the resistance to shear deformation along the (100) plane in the [110] direction, and C_{12} simply has no physical meaning, its combination with C_{11} and C_{44} gives additional information about the elastic behaviour of materials. The mechanical stability conditions for cubic crystals are given below, known as Born stability criteria [22]; $C_{44} > 0$, $C_{11} > |C_{12}|$, $C_{11} + 2C_{12} > 0$. It is clearly seen that the VOs_2Ga compound is mechanically stable in accordance with the Born stability criteria.

Table 1. Elastic constants (C_{11} , C_{12} and C_{44} (GPa)), bulk modulus (B ; GPa), shear modulus (G ; GPa), Young's modulus (E ; GPa), Poisson's ratio (ν), B/G ratio, of VOs_2Ga alloy

Material	References	a_0	C_{11}	C_{12}	C_{44}	B	G	B/G	E	σ
VOs2Ga	This work	6.075	418.41	203.57	132.93	275.18	122.06	2.25	319.02	0.30
	Ref. [21]	6.059								

The calculated bulk and Young's modulus values for the VOs_2Ga compound are quite high. This is clearly demonstrated that the VOs_2Ga compound is a hard material. According to Pugh [23] ratio (B/G), the B/G value of VOs_2Ga has been calculated as 2.25 and accordingly this

compound is a ductile material. The calculated Poisson ratio (σ) for this compound has been found to be 0.30. Thus, this compound has ionic bond character.

To obtain detailed information about the VOs_2Ga compound in the $L2_1$ Heusler phase, we have examined their electronic band structure. The electronic band structure of VOs_2Ga along selected lines of high symmetry within the first Brillouin region is shown in Figure 2. It is clearly seen that there is no gap at the Fermi level (E_F). The valence and conduction bands largely overlap. As a result, VOs_2Ga is expected to exhibit metallic properties such as good thermal and electrical conductivities.

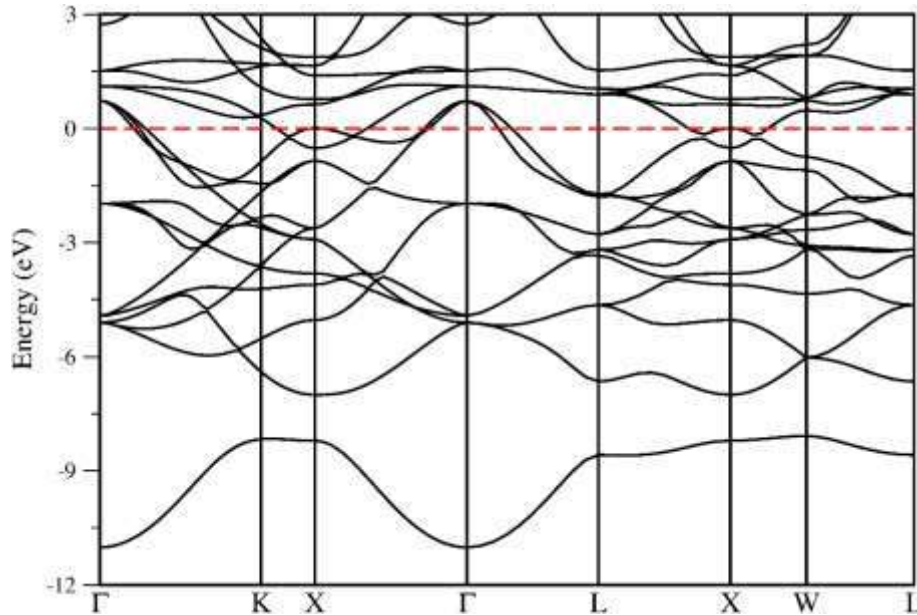


Figure 2. Band structure along the high symmetry directions for VOs_2Ga .

The calculated partial and total density of states (DOS) for detailed examination of the electronic band characteristics of the compound are shown in Figure 3. It is also clear that this compound is metallic, since the DOS values are non-zero at the Fermi level. It can be seen from Figure 3 that the most significant contribution to the Fermi level in the density of states of this compound comes from the Os-5d and V-3d states.

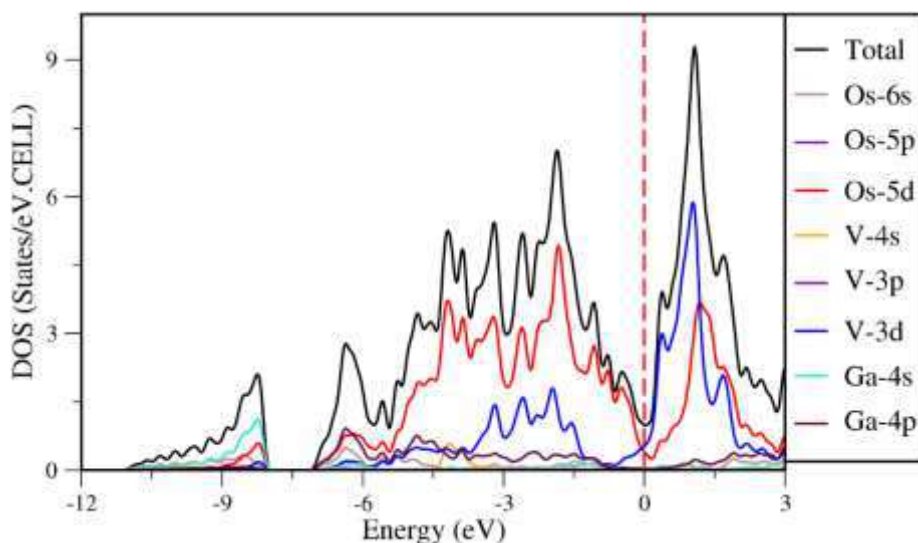


Figure 3. Calculated total and partial density of states for VOs_2Ga .

The calculated phonon distribution curves of the VOs_2Ga compound are presented in Figure 4. As expected for $L2_1$ type crystals with four atoms in the unit cell, the phonon dispersion spectra exhibit 12 branches, three acoustics and nine optical branches. By examining the phonon modes calculated for this compound, it appears to be dynamically stable since there is no negative frequency.

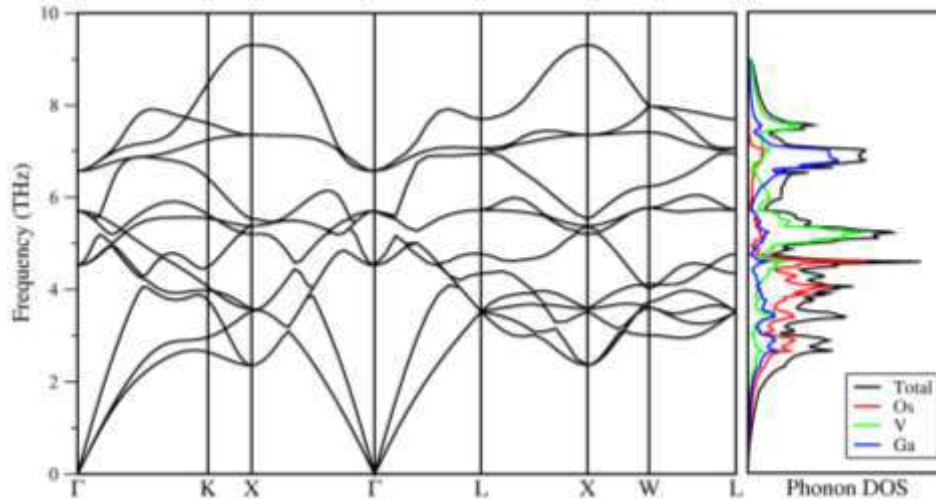


Figure 4. The computed phonon dispersion curves of VOs_2Ga compound in the $L2_1$ phase.

Thermodynamic properties of VOs_2Ga compound such as internal energy, vibrational energy, entropy and specific heat capacity were investigated using the Quasi-Harmonic Debye Approximation and are presented in Figure 5-8. In Figures 5, 7 and 8 for the VOs_2Ga compound, internal energy, entropy and specific heat capacity have raised as a function of increasing temperature. On the other hand, it can be seen in Figure 6 that the vibrational energy changes with increasing temperature as an inverse function of temperature

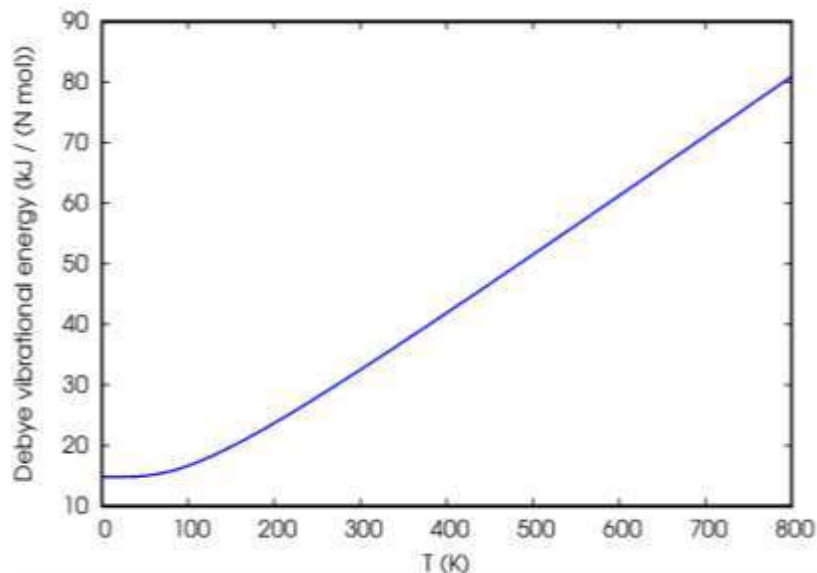


Figure 5. Temperature dependent variation of vibrational energy of VOs_2Ga .

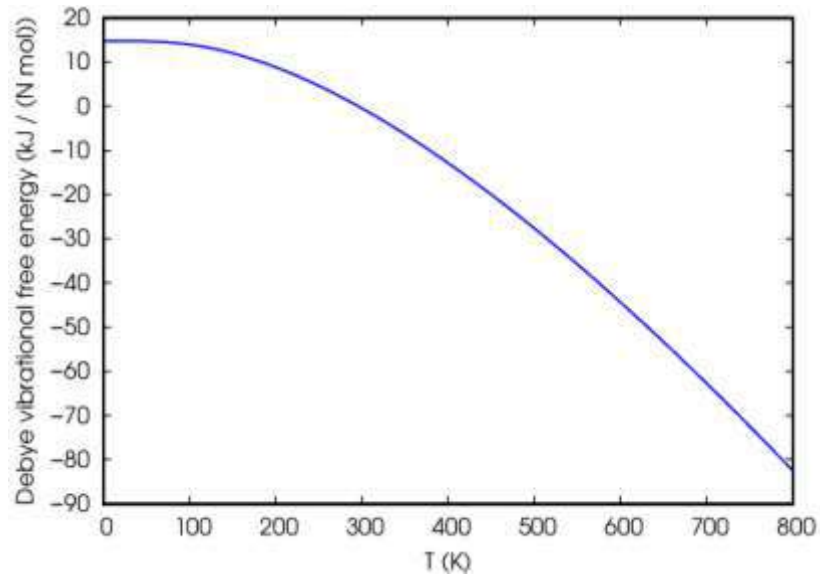


Figure 6. Temperature dependent variation of vibrational free energy of VO₂Ga

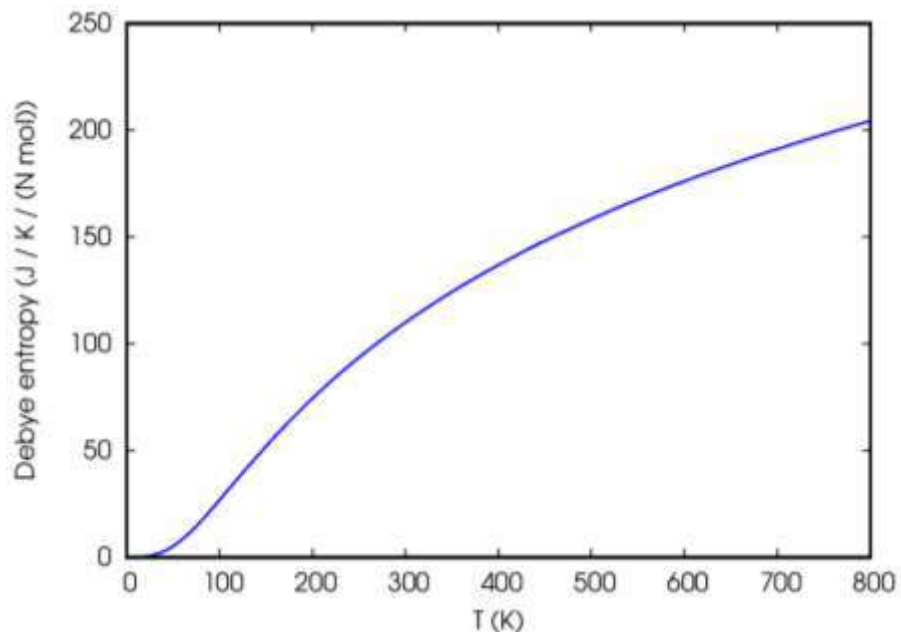


Figure 7. Temperature dependent variation of entropy of VO₂Ga compound

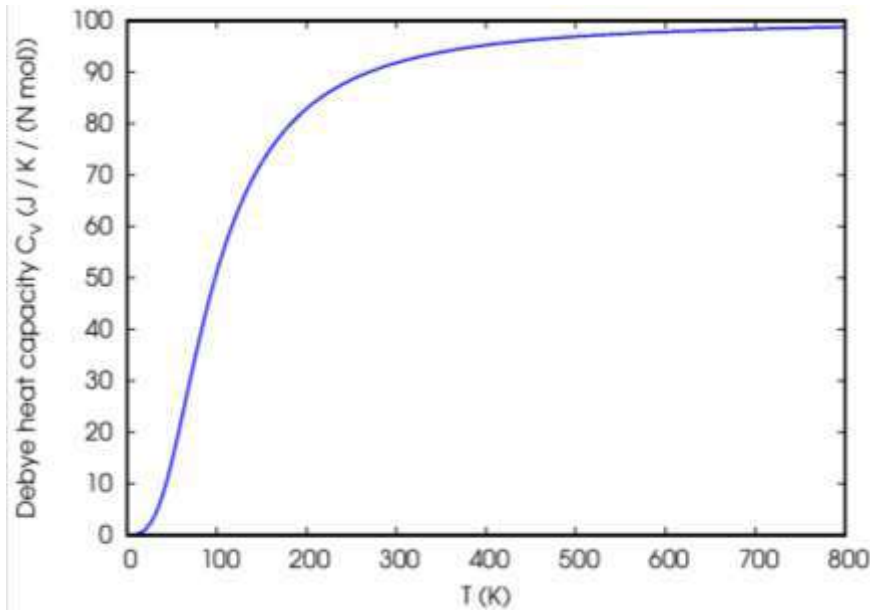


Figure 8. Temperature dependent variation of specific heat capacity at constants volume of VOs_2Ga .

CONCLUSIONS

In this study, first-principle calculations have been done to investigate the mechanical, electronic, dynamic and thermodynamic properties of VOs_2Ga in full-Heusler structure. The computed value of the lattice constant of this compound is in good agreement with the available theoretical data. It can be seen that VOs_2Ga is a hard material due to its high calculated bulk and Young's modulus values. The calculated electronic band structures for this compound and their corresponding density of states curves point out its metallic behaviour. It is concluded that VOs_2Ga is dynamically stable since it does not have an imaginary phonon frequency. Then, we examined here various thermodynamic properties of VOs_2Ga compound such as internal energy, vibrational energy, entropy and specific heat capacity using the Quasi-Harmonic Debye model.

REFERENCES

1. O. Heusler, Ann. Phys. 411, 155 (1934).
2. V. A. Ivanshin, T. Litvinova, A. Sukhanov, D. Sokolov, and M. Aronson, JETP Lett. 90, 116 (2009).
3. A. Akriche, H. Bouafia, S. Hiadsi, B. Abidri, B. Sahli, M. Elchikh, M. Timaoui, and B. Djebour, J. Magn. Magn. Mater. 422, 13 (2017).
4. M. G. Kostenko, A. V. Lukoyanov, and E. I. Shreder, JETP Lett. 107, 126 (2018).
5. X. Wang, Z. Cheng, and G. Liu, Materials 10, 1078 (2017).
6. D. Xiao, Y. Yao, W. Feng, J. Wen, W. Zhu, X. Q. Chen, G. M. Stocks, and Z. Zhang, Phys. Rev. Lett. 105, 096404 (2010).
7. X. Zhang, Z. Hou, Y. Wang, G. Xu, C. Shi, E. Liu, X. Xi, W. Wang, G. Wu, and X. X. Zhang, Sci. Rep. 6, 23172 (2016).



8. S. Chibani, O. Arbouche, M. Zemouli, K. Amara, Y. Benallou, Y. Azzaz, B. Belgoumene, A. Bentayeb, and M. Ameri, *J. Electron. Mater.* 47, 196 (2018).
9. S. Bahramian and F. Ahmadian, *J. Magn. Magn. Mater.* 424, 122 (2017).
10. X. H. Kang and J. M. Zhang, *J. Phys. Chem. Solids* 105, 9 (2017).
11. J. X. Wang, Z. Chen, and Y. Gao, *J. Phys. Chem. Solids* 116, 72 (2018).
12. Y. Feng, X. Xu, W. Cao, and T. Zhou, *Comput. Mater. Sci.* 147, 251 (2018).
- [13] J. P. Perdew, K. Burke and M. Ernzerhof, *Phys. Rev. Lett.* 77 (1996) 3865.
- [14] M. Methfessel and A. T. Paxton, *Phys. Rev. B* 40 (1989) 3616.
- [15] P Giannozzi, O Andreussi, T Brumme, O Bunau, M Buongiorno Nardelli, M Calandra, R Car, C Cavazzoni, D Ceresoli, M Cococcioni, N Colonna, I Carnimeo, A Dal Corso, S de Gironcoli, P Delugas, R A DiStasio Jr, A Ferretti, A Floris, G Fratesi, G Fugallo, R Gebauer, U Gerstmann, F Giustino, T Gorni, J Jia, M Kawamura, H-Y Ko, A Kokalj, E Küçükbenli, M Lazzeri, M Marsili, N Marzari, F Mauri, N L Nguyen, H-V Nguyen, A Otero-de-la-Roza, L Paulatto, S Poncé, D Rocca, R Sabatini, B Santra, M Schlipf, A P Seitsonen, A Smogunov, I Timrov, T Thonhauser, P Umari, N Vast, X Wu and S Baroni, "Advanced capabilities for materials modelling with Quantum ESPRESSO." *Journal of physics: Condensed matter* 29.46 (2017) p. 465901.
- [16] A. Dal Corso, "Elastic constants of beryllium: a first-principles investigation." *Journal of Physics: Condensed Matter* 28.7 (2016) p. 075401.
- [17] N. Arıkan, G. Dikici Yıldız, Y. G. Yıldız, and A. İyigör, Electronic, Elastic, Vibrational and Thermodynamic Properties of HfIrX (X = As, Sb and Bi) Compounds: Insights from DFT-Based Computer Simulation, *Journal of Electronic Materials* 49 (2020) p. 5.
- [18] G.D. Yıldız, Y.G. Yıldız, S. Al, A. İyigör, N. Arıkan, *Int. J. Mod. Phys. B* 32 (2018) p. 1850214.
- [19] S. Al, N. Arıkan, S. Demir, A. İyigör, *Phys. B Condens. Matter.* 16 (2018) p. 531.
- [20] A. İyigör, M. Özduran, M. Ünsal, O. Örnek, & N. Arıkan, Ab-initio study of the structural, electronic, elastic and vibrational properties of HfX (X= Rh, Ru and Tc). *Philosophical Magazine Letters*, 97(3) (2017) p. 110-117.
- [21] M. Gilleßen, R. Dronskowski, A combinatorial study of full Heusler alloys by first-principles computational methods, *J. Comput. Chem.* 30 (8) (2009) 1290–1299.
- [22] Born, M. and Huang, K., *Theory of Crystal Lattices*, Clarendon, Oxford, (1956).
- [23] Pugh, S.F., XCII. Relations between the elastic moduli and the plastic properties of polycrystalline pure metals, *Philosophical Magazine and Journal of Science*, 45, 823-843, (1954).

ŞEMDİNLİ (HAKKARI) YÖRESİNDE YETİŞTİRİLEN ÜZÜM ÇEŞİTLERİNİN AMPELOGRAFİK ÖZELLİKLERİNİN BELİRLENMESİ ÜZERİNE BİR ARAŞTIRMA

A RESEARCH ON THE DETERMINATION OF THE AMPELOGRAPHIC
CHARACTERISTICS OF GRAPE VARIETIES GROWED IN ŞEMDİNLİ (HAKKARI)
REGION

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ÖZET

Ülkemiz bağcılığının geliştirilmesi amacıyla asma gen kaynaklarının toplanması, korunması ve geliştirilmesi yönündeki çalışmalar bağcılığımızın geleceği açısından büyük önem taşımaktadır. Bu çalışma, Şemdinli (Hakkari) yöresinde yetiştirilen Çekirdeksiz, Süleymani, Genotip, Hurist, Reşik, Sadani, Keçimemesi, Veşifir, Zerik, Kırıkire ve Sipiyaşın üzüm çeşitlerinin ampelografik özelliklerinin belirlenmesi amacıyla yapılmıştır. Çeşitlerin ampelografik özellikleri IBPGR (Uluslararası Bitki Genetik Kaynakları Merkezi) tarafından hazırlanan ‘Üzüm Tanımlayıcıları’na (Descriptors for Grape) göre belirlenmiştir. Üzüm çeşitlerinin tanımlanmalarında esas alınan morfolojik ve fenolojik özelliklerin; yetiştirilen yöre, bakım ve besleme koşulları, buldukları yer ve zamana göre değişebileceği belirlenmiştir. Bağcılık konusundaki zengin genetik potansiyelimizin ortaya çıkarılması amacıyla yapılan ampelografik çalışmada belirlenen çeşitlerin tamamının *V. vinifera* L. türüne ait çeşitler oldukları saptanmıştır. Yörede pekmez yapımı, kurutmalık ve sofralık olarak değerlendirilen bu çeşitler, yapılacak çalışmalar ve modern bağcılık teknikleri kullanımıyla daha verimli hale getirilmesi ve ülkemiz bağcılığına kazandırılması gerekliliği ortaya çıkmıştır. Yörenin filoksera ile bulaşık olması kendi kökleri üzerinde yetiştirilen bu çeşitlerin korunmasına yönelik çalışmalara hız verilmesini zorunlu kılmaktadır. Aksi takdirde bu çeşitlerin zaman içerisinde zararlı nedeniyle ortadan kalkması kaçınılmazdır. *V. vinifera* L. türüne ait olan çeşitlerin, erselik çiçek yapısına sahip ve biri hariç diğerlerinin çekirdekli oldukları belirlenmiştir. Çeşitler arasında ortalama yaprak büyüklüğü, ortalama salkım ağırlığı ve ortalama tane ağırlığı yönünden farklılıkların olduğu gözlemlenmiştir.

Anahtar Kelimeler: Ampelografı, Yerli Üzüm Çeşitleri, Şemdinli.

ABSTRACT

In order to develop viticulture in our country, studies on the collection, protection and development of grapevine gene resources are of great importance for the future of our

viticulture. This study was carried out to determine the ampelographic properties of Çekirdeksiz, Suleymani, Genotip, Hurist, Reşık, Sadani, Keçimesi, Veşifir, Zerık, Kırıkire and Sipiyaşın grape varieties grown in Şemdinli (Hakkari) region. The ampelographic characteristics of the cultivars were determined according to the 'Descriptors for Grape' prepared by IBPGR (International Center for Plant Genetic Resources). It has been determined that the morphological and phenological characteristics, which are taken as a basis in the identification process of grape varieties, may change according to the grown region, care and feeding conditions, location and time. In this ampelographic study, which was carried out to reveal our rich genetic potential in viticulture, it was determined that all of the varieties determined were *V. vinifera* L. varieties. These varieties, which are used in making molasses, as drying and as edibles, need to be brought to our country's viticulture by making them more productive with future studies and the use of modern viticulture techniques. The infestation of the region with phylloxera necessitates speeding up the efforts to protect these varieties grown on their own roots. Otherwise, it is inevitable that these varieties will disappear over time. It was determined that the cultivars belonging to the *V. vinifera* L. species had a herbaceous flower structure and all the cultivars except one were nucleated. It was observed that there were differences between cultivars in terms of average leaf size, average cluster weight and average grain weight.

Key words: Ampelographi, Local Grape Varieties, Şemdinli.

GİRİŞ

Anadolu'nun bağcılık bakımından çok özel bir yeri vardır. Yabani asma ile kültür asmasının anavatanlarından biri olan Anadolu, iklim ve toprak özellikleri bakımından asmanın bütün isteklerine cevap verebilmektedir. Bununla ilişkili olarak Anadolu'da kendiliğinden yetişme imkânı bulabilmiş olan asma, çok uzun bir tarih süreci içerisinde, yine Anadolu'dan gelmiş-geçmiş bütün kavimlerin üzerinde hassasiyetle durdukları bir kültür bitkisi olmuş ve hatta bağ yetiştiriciliği için özel kanunlar bile çıkarılmıştır. Arkeolojik buluntulardan da üzüm figürlerinin tarih boyunca birçok devlet tarafından güç, kuvvet ve zenginlik simgesi olarak kullanıldığı anlaşılmaktadır.

Bağcılık yetiştiriciliği için en elverişli bölgelerin 34-49 kuzey ve güney enlem dereceleri içerisinde kalan bölgeler olduğunu kabul etmektedir (Ağaoğlu ve ark., 1995). Ülkemiz ise 36-42 kuzey enlem dereceleri arasında bulunmaktadır. Bu konumu itibariyle Ülkemiz, üzüm yetiştiriciliği için çok elverişli bir yerde bulunmaktadır (Oraman,1970).

Bu nedenle Anadolu bir gen kaynağı kabul edilmiş ve asma bitkisi bakımından büyük bir çeşit zenginliği göstermiştir. Bağcılık kültürünün yapıldığı ilk merkez olmuş Dünyaya buradan yayılmıştır. Yıllık sıcaklık toplamının yetersiz olduğu birkaç yöre dışında ülkemizin genelinde bağcılık yapılmasına elverişli olduğu bildirilmiştir (Barış, 1989).

Ülkemizin bağcılık için bu kadar elverişli iklim ve toprak yapısı olması nedeniyle bağcılığın geliştirilerek ülke ekonomisine katkısı artırılabilir. Bu katkıyı sağlamak için ilk adımda asma gen potansiyelinin tespit edilerek korunması ve değerlendirilmesine yönelik araştırmaların yapılması gerekmektedir (Marasalı, 1986; Söylemezoğlu, 1996).

Bu bağlamda, ülkemiz bağcılığının geliştirilmesi ve milli ekonomiye olan katkısının daha yüksek düzeye ulaştırılması için asma gen kaynaklarının belirlenmesi, toplanması, korunması ve geliştirilmesine yönelik çalışmalar büyük önem arz etmektedir (Çelik ve ark, 2005).

Ülkemizde BGK (Bitki Genetik Kaynakları)'nın korunmasına yönelik çalışmalar 1964 yılında (Şehirali ve Özgen 1987) Ege Bölge Zirai Araştırma Enstitüsü'nde başlatılmıştır. Ayrıca 1978

yılından itibaren BGK Projesi diğer bitki ıslah programları arasında ülke genelinde yapılması için bir koordinasyon kurulmuştur. Bağcılıkta çeşitlerin tanımlanması ve sınıflandırılması için standart bir metot kullanılması amacıyla “Uluslararası Bitki Gen Kaynakları Merkezi” (International Board for Plant Genetic Resources-IBPGR), “Uluslararası Bağcılık ve Şarapçılık Ofisi” (Office International de la Vigne et du Vin-OIV) ve “Uluslararası Yeni Bitki Çeşitlerinin Korunması Birliği” (International Union for the Protection of New Varieties of Plants-UPOV) nin ortaklaşma çalışması sonucunda “üzüm Tanımlayıcıları” (Descriptor for Grape) isimli eser yayımlanmış ve bütün ülkelerde geçerli olabilecek bir metod ortaya konmuştur (Anonim, 1983). Yeni çeşitlerin tanımlanmasında veya elde edilmesinde mevcut genetik varyasyonların kullanılmasında “Üzüm Tanıyıcıları” kolaylıklar sağlayacaktır (Uzun,1986).

Ülkemizde bağcılık potansiyelinin ortaya çıkarılması ve bu zenginliğin muhafaza edilmesi için Ziraat Fakülteleri, Araştırma Enstitüleri ve İstasyonlarınca bazı yerli ve yabancı üzüm çeşitlerini içeren koleksiyon bağları oluşturulmuştur. Yine Ziraat Fakülteleri öğretim elemanlarınca birçok bölgede araştırma yapmak sureti ile buralarda yetiştiriciliği yapılan yerli ve yabancı üzüm çeşitlerinin ampelografilerinin belirlenmesine önemli katkılarda bulunmuşlar. Fakat ülkemizde çeşit sayısının fazla olması sebebiyle yapılan çalışmalar çeşitlerin tümünü kapsayacak şekilde olamamış ve yok olma tehlikesi yaşayan çeşitler olmuştur (Gökçay, 1985).

Ülkemizde son yıllara kadar bağcılık konusunda birçok araştırma yapılmış ve karşılaşılan sorunların çözümüne yönelik olarak önemli adımlar atılmıştır. Ancak bağ bölgelerine ve yörelere göre en uygun üzüm çeşitlerinin özellikleri tüm detaylarıyla ve uluslararası normlarda henüz tanımlanmış değildir. Bağcılık konusundaki zengin genetik potansiyelimizin ortaya çıkarılması amacıyla yapılan ampelografik çalışmalara ve bu çeşitlerden kurulan koleksiyon bağlarına rağmen ülkemizdeki tüm üzüm çeşitleri incelenememiş ve bazı çeşitler kaybolmuştur (Çelik ve Karanis, 1998).

Bu çalışmada; önemli bağcılık potansiyeline sahip olan Şemdinli (Hakkari) yöresinde yetiştirilen üzüm çeşitlerinin uluslararası normlara göre tanımlanması, koruyucu kuruluşlara duyurularak koleksiyon bağlarına alınmaları ve ileride yapılacak çalışmalara ışık tutulması amaçlanmıştır.

MATERYAL ve METOT

Bu araştırma, 2011 yılında yapılan bir ön çalışmadan sonra 2012 yılında Şemdinli (Hakkari) ilçesi Merkez, (Öveç ve Akbal köyleri) üretici bağlarında yürütülmüştür. Şemdinli yöresinde yaygın olarak yetiştirilen 12 üzüm çeşidi değişik veya aynı bağda olmak üzere sağlıklı ve verimli omcalardan 10'ar adet olacak şekilde işaretlenmiştir. Araştırmada Çekirdeksiz, Süleymani, Genotip, Hurist, Mılakı, Reşik, Sadani, Keçimemesi, Veşifir, Zerık, Kırıkıre ve Sipiyaşın üzüm çeşitlerinin ampelografik özellikleri belirlenmiştir.

Üzüm çeşitlerinin ampelografik özelliklerinin belirlenmesinde uluslararası yöntem birliği sağlamak amacıyla “Uluslararası Bitki Gen Kaynakları Merkezi” (International Board for Plant Genetic Resources) adına oluşturulan bir çalışma grubu tarafından “Bağcılık ve Şarapçılık Ofisi” (Office International de la Vigne et du Vin-OIV) ve “Uluslararası Yeni Bitki Çeşitlerinin Korunması Birliği” (International Union for the Protection of New Varieties of Plants- UPOV) ile işbirliği içerisinde yapılan çalışmalar sonucunda geliştirilen normlar “Üzüm Tanımlayıcıları” (Grape Descriptors) adı altında yayınlanmıştır (Anonim. 1983; 1989).

Bu arařtırmada ağırlıklı olarak yöntemin ilk aşamasını oluřturan “Tanımlama ve Ön Deęerlendirme” verilerine ait kriterler esas alınarak üzerinde alıřılan üzüm eřitlerinin ampelografik özellikleri belirlenmiřtir. Alınan verilerin tescile esas olan kriterler olmasına dikkat edilmiřtir. Örneklerin SKM ve asit ierięi analizleri Van Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Bahe Bitkileri Bölümü Laboratuvarında yapılmıřtır.

BULGULAR

Arařtırmada incelenen ekirdeksiz, Süleymani, Genotip, Hurist, Mılake, Reřık, Sadani, Keimemesi, Veřifir, Zerik, Kırkire ve Sipiyařın üzümü eřitlerinin ampelografik özellikleri ve bazı kalite özellikleri ile fenolojik özellikler ařaęıda ayrıntılı olarak tanımlanmıřtır.

Sürgün Özellikleri

Sürgün ucu aıklıęı incelenen eřitlerin tamamında “aık” olarak bulunmuřtur. Sürgün ucunda antosiyanin daęılımı; ekirdeksiz, Reřık, Veřifir ve Zerik eřitlerinde “yok”, Genotip, Hurist, Mılake, Sadani, Keimemesi ve Sipiyařın eřitlerinde “kısmen”, Süleymani ve Kırkire eřitlerinde ise “her tarafta” olarak belirlenmiřtir. Antosiyanin yoğunluęu bakımından eřitlerin daęılımı; ekirdeksiz, Veřifir ve Zerik eřitlerinde “yok”, Reřık ve Keimemesi eřitlerinde “ok zayıf”, Mılake ve Sadani “zayıf”, Genotip ve Sipiyařın eřitlerinde “orta”, Süleymani, Hurist ve Kırkire eřitlerinde ise “kuvvetli” olarak tespit edilmiřlerdir.

Sürgün ucunda yatık tüyler bakımından; Süleymani, Veřifir ve Sipiyařın eřitlerinde “yok”, ekirdeksiz, Hurist, Reřık ve Sipiyařın eřitlerinde “ok seyrek”, Zerik eřidinde “seyrek”, Genotip, Mılake, Sadani ve Kırkire eřitlerinde ise “orta” olarak saptanmıřtır. Sürgün ucundaki dik tüyler bakımından; Genotip eřidi “sık”, Mılake ve Sadani eřitleri “ok seyrek” dięer dokuz eřit ise “yok” olarak tespit edilmiřtir.

Sürgün habitusu bakımından; ekirdeksiz, Reřık, Sadani, Veřifir ve Sipiyařın eřitleri “dik”, Süleymani, Genotip, Hurist, Keimemesi, Zerik ve Sipiyařın eřitleri “yarı dik”, Mılake eřidi ise “yarı sarkık” sınıfına girmiřlerdir.

Boęum aralarının sırt tarafının rengi bakımından; ekirdeksiz, Reřık, Keimemesi, Veřifir ve Zerik eřitleri “yeřil”, Hurist, Mılake, Kırkire ve Sipiyařın eřitleri “kırmızıizgili yeřil”, Süleymani, Genotip ve Sadani eřitleri ise “kırmızı” olarak tespit edilmiřtir. Boęum aralarının karın tarafının rengi ise; ekirdeksiz, Reřık, Hurist Keimemesi, Veřifir ve Zerik eřitleri “yeřil”, Süleymani, Genotip, Mılake, Sadani, Kırkire ve Sipiyařın eřitleri “kırmızıizgili yeřil” olarak tespit edilmiřtir.

Boęumlardaki ve boęum aralarındaki dik tüyler ile yatık tüyler bakımından; dört eřit (ekirdeksiz, Veřifir, Keimemesi ve Sipiyařın) “yok”, altı eřit (Süleymani, Hurist, Mılake, Reřık, Zerik, Kırkire ve Sadani) “ok seyrek”, Genotip eřidi ise “seyrek” sınıfına girmiřlerdir.

Kıřık gözlerde gözlerdeki antosiyanin yoğunluęu bakımından; Veřifir ve Sipiyařın “ yok”, ekirdeksiz, Reřık, Keimemesi ve Zerik “ok zayıf”, Mılake eřidi “zayıf” Süleymani, Hurist ve Kırkire “orta”, Genotip ve Sadani “ kuvvetli” olarak tanımlanmıřtır.

Sürgündeki sülüklerin diziliři tüm eřitlerde “kesikli”dir. Sülük uzunluęu tespitinde; Sadani eřidi “ok kısa”, ekirdeksiz, Hurist, Veřifir, Zerik, Kırkire ve Sipiyařın eřitleri “kısa”, Süleymani Genotip, Mılake, Reřık ve Keimemesi eřitleri ise “orta” sınıfına girmiřlerdir. En kısa sülük $9.12 \pm 1,17$ cm ile Sadani 'de iken, en uzun sülük $20.33 \pm 1,71$ cm ile Süleymani eřidinde bulunmuřtur.

Olgun yaprak özellikleri

Yaprak alanı (büyüklüğü) bakımından; Hurist ve Reşik çeşitleri “küçük”, Keçimemesi, Veşifir, Zerik, Kırkire ve Sipiyaşın çeşitleri “orta”, diğer çeşitler ise “büyük” sınıfına girmişlerdir. Reşik çeşidi 122.7 ± 24.73 cm² ile en küçük, Mılaki 298.48 ± 30.87 cm² ile en büyük yaprak alanı olan çeşit olmuştur.

Yaprak uzunluğu bakımından; Mılaki çeşidi “uzun”, Süleymani, Hurist, Reşik, Zerik ve Sipiyaşın “kısa” diğer altı çeşit ise “orta” sınıfına girmişlerdir. Hurist çeşidi 12.5 ± 1.11 cm ile en kısa, Mılaki 20.7 ± 1.18 cm ile en uzun çeşit olmuştur.

Yaprak ayasının şekli bakımından; Çekirdeksiz, Hurist, Mılaki, Sadani ve Sipiyaşın çeşitleri “kama şeklinde”, Keçimemesi çeşidi “yuvarlak” ve diğer altı çeşit ise “beşgen” sınıfına girmiştir. Yaprığın dilim sayısı tüm çeşitlerde “beş” olarak tespit edilmiştir.

Olgun yaprağın üst yüzünün rengi bakımından; Reşik ve Zerik çeşitlerinde “açık yeşil”, Süleymani, Genotip, Veşifir ve Sipiyaşın çeşitlerinde “yeşil”, diğer altı çeşitte ise “koyu yeşil” olarak tespit edilmiştir. Yaprığın üst yüzündeki ana damarların antosiyanin renklenmesi; Genotip çeşidinde “orta”, Süleymani, Kırkire ve Sipiyaşın çeşitlerinde “çok zayıf”, diğer sekiz çeşitte “yok” bulunmuştur. Yaprığın alt yüzündeki damarlarda antosiyanin renklenmesi ise Çekirdeksiz, Hurist, Mılaki, Reşik ve Zerik çeşitlerinde “yok”, Genotip çeşidinde “kuvvetli”, diğer altı çeşitte “çok zayıf” bulunmuştur. Ayada ikincil ve üçüncül damarlar arasında kıvrılma Sadani çeşidinde “var” diğer on bir çeşitte ise “yok”tur. Birincil ve ikincil damarlar arasında dalgalanma Süleymani çeşidinde “sapa yakın kısmında”, Sadani çeşidinde “genellikle” bulunurken diğer on çeşitte ise “yok” olarak tespit edilmiştir. Ayanın profili; Mılaki, Keçimemesi, Kırkire ve Sipiyaşın “düz”, Süleymani ve Sadani çeşitlerinde “dalgalı” diğer altı çeşitte ise “düze yakın”dır. Yaprığın üst yüzünün kabarıklığı Çekirdeksiz, Keçimemesi, Kırkire ve Sipiyaşın “yok”, Sadani çeşidinde “orta”, Süleymani ve Mılaki çeşitlerinde “zayıf”, diğer çeşitlerde “çok zayıf” olarak tespit edilmişlerdir.

Olgun yaprak dişlerinin şekli; Hurist çeşidi “her iki tarafı iç bükey”, Veşifir, Kırkire ve Sipiyaşın çeşitleri “her iki tarafı dışbükey”, sınıfına girerlerken geriye kalan yedi çeşit ise “her iki tarafı düz” sınıfına girmişlerdir. N2 diş uzunluğu bakımından; Çekirdeksiz çeşidi “orta” sınıfına girerken diğer tüm çeşitler “kısa” sınıfına dahil olmuşlardır. Çekirdeksiz çeşidi 9.37 ± 0.75 mm ile en uzun N2 dişine sahip iken, en kısa çeşitte 6.68 ± 0.99 mm ile Kırkire olmuştur. N4 diş uzunluğu bakımından ise; Çekirdeksiz, Süleymani, Hurist ve Reşik çeşitlerinde “orta” diğer bütün çeşitlerde “kısa” olarak tespit edilmiştir. Hurist çeşidi 10.36 ± 2.21 mm ile en uzun N4 dişine sahip olurken, Keçimemesi 5.55 ± 1.02 mm ile en kısa çeşit olmuştur. N2 diş uzunluğunun genişliğine oranında çeşitlerden dokuzu “orta” sınıfına girerken, ikisi “uzun” ve bir çeşitte “çok uzun” sınıfına girmiştir. En uzun oran 1.59 ± 0.47 mm ile Süleymani çeşidinde görülürken, en kısa oran ise 0.78 ± 0.10 mm ile Keçimemesi çeşidinde gözlenmiştir. N4 diş uzunluğunun genişliğine oranında on çeşit “orta”, bir çeşit “uzun” ve bir çeşitte “çok uzun” sınıfına girmiştir. En uzun oran 1.40 ± 0.29 mm ile Süleymani, en kısa oran ise 0.68 ± 0.09 ile Veşifir çeşidinde gözlenmiştir.

Sap cebinin açıklık derecesi Süleymani ve Keçimemesi çeşitlerinde “kapalı”, Genotip, Mılaki ve Reşik çeşitlerinde “açık”, Hurist çeşidinde “loplar kuvvetli üste üste”, diğer altı çeşitte ise “loplar üste üste binmiş” olarak tespit edilmiştir. Sap cebinin esas şekli Çekirdeksiz, Hurist, Sadani ve Zerik çeşitlerinde “V” diğer sekiz çeşitte “U” şeklindedir. Sap cebinin özelliği on çeşitte “yok” iken, Sadani ve Kırkire çeşitlerinde “kenarında dişler var” olarak tespit edilmiştir.

Üst yan ceplerin genel şekli Keçimemesi çeşidinde “kapalı”, Hurist ve Reşik çeşitlerinde “açık”, diğer dokuz çeşitte ise “dilimler hafif üste üste” olarak tespit edilmişlerdir. Üst yan

ceplerin esas şekli Çekirdeksiz, Hurist, Sadani ve Keçimemesi çeşitlerinde “V”, diğer sekiz çeşitte ise “U” şeklindedir.

Olgun yaprağın alt yüzünde ana damarlar arasında yatık tüyler bakımından; Süleymani, Hurist ve Reşik çeşitleri “yok”, Genotip ve Zerik çeşitleri “seyrek”, diğer yedi çeşit ise “çok seyrek” sınıfına girmişlerdir. Yaprak alt yüzünde ana damarlar arasında dik tüyler bakımından; Çekirdeksiz çeşidi “yok”, Genotip, Keçimemesi ve Sipiyaşın çeşitleri “seyrek”, Süleymani, Hurist, Mılakı ve Veşifir “orta”, diğer altı çeşit ise “çok seyrek” sınıfına dahil olmuşlardır. Alt yüzde ana damarlar üzerinde yatık tüyler bakımından; Mılakı, Keçimemesi, Kırkire ve Sipiyaşın çeşitleri “çok seyrek”, Genotip, Zerik ve Sadani çeşitleri “seyrek”, Veşifir çeşidi “orta”, diğer dört çeşit ise “yok” sınıfına girmişlerdir. Dik tüyler bakımından; Çekirdeksiz, Hurist ve Veşifir çeşitleri “yok”, Reşik çeşidi “çok seyrek”, Genotip, Zerik ve Keçimemesi çeşitleri “seyrek”, Mılakı çeşidi “sık” ve diğer dört çeşit “orta” sınıf olarak tespit edilmiştir. Yaprak üst yüzünde ana damarlar üzerinde yatık ve dik tüyler bakımından; Genotip ve Mılakı çeşitleri “var”, diğer çeşitler ise “yok” sınıfına girmişlerdir.

Olgun yaprak sapında yatık tüy bakımından; Genotip, Mılakı, Sadani ve Sipiyaşın çeşitlerinde “çok seyrek” diğer çeşitlerde ise “yok” olarak bulunmuştur. Dik tüy bakımından ise; Çekirdeksiz, Hurist, Reşik ve Kırkire çeşitlerinde “yok”, diğer çeşitlerde ise “çok seyrek” olarak bulunmuştur

Yaprak sapının uzunluğu bakımından; Hurist, Keçimemesi ve Zerik çeşitlerinde “çok kısa”, diğer dokuz çeşitte ise “kısa” olarak bulunmuştur. En kısa yaprak sapı 6.70 ± 0.95 cm ile Keçimemesi çeşidinde, en uzun yaprak sapı ise 8.50 ± 0.62 cm ile Çekirdeksiz çeşidinde tespit edilmiştir. Yaprak sapının orta damara oranı tüm çeşitlerde “daha kısa” olarak tespit edilmiştir.

Üzüm salkımı özellikleri

Sürgün başına üzüm salkımı sayısı Zerik çeşidinde “0-1 salkım”, Çekirdeksiz çeşidinde “2.1-3 salkım”, diğer çeşitlerde ise “1.1-2 salkım” olarak görülmüştür. Üzüm salkımı büyüklüğü bakımından Hurist ve Kırkire çeşitlerinde “küçük”, Genotip, Mılakı, Reşik ve Sadani çeşitlerinde “orta”, Sipiyaşın çeşidinde “çok büyük”, diğer beş çeşitte ise “büyük” olarak tespit edilmiştir. Kırkire çeşidi 171.7 ± 30.71 cm² ile en küçük, Sipiyaşın ise 356.5 ± 41.96 cm² ile en büyük salkıma sahip çeşit olmuştur.

Salkım uzunluğu bakımından Hurist çeşidi “kısa”, diğer çeşitler ise “orta” sınıfa dahil olmuşlardır. Hurist çeşidi 17.2 ± 1.48 cm ile en kısa, Sipiyaşın ise 22.20 ± 1.81 cm ile en uzun salkıma sahip çeşit olmuştur.

Salkım sıklığı yönünden; Zerik ve Kırkire çeşitleri “çok seyrek”, Genotip, Hurist ve Sadani çeşitleri “seyrek”, Mılakı ve Reşik çeşitleri “orta”, Süleymani, Veşifir ve Sipiyaşın çeşitleri “sık”, Çekirdeksiz ve Keçimemesi çeşitleri “çok sık” sınıfına girmişlerdir.

Salkımdaki tane sayısı bakımından; Çekirdeksiz ve Veşifir çeşitlerinde “fazla”, Süleymani, Keçimemesi ve Sipiyaşın çeşitlerinde “orta”, geriye kalan çeşitlerde ise “az” olarak tespit edilmiştir. En az tane sayısı 64.4 ± 10.09 ile Kırkire çeşidinde, en fazla tane sayısı ise 205.0 ± 29.72 ile Çekirdeksiz çeşidinde tespit edilmiştir.

Salkım sapı uzunluğu bakımından; Kırkire çeşidinde “uzun”, Çekirdeksiz, Sadani ve Veşifir çeşitlerinde “orta”, diğer çeşitlerde ise “kısa” olarak tespit edilmiştir. En kısa salkım sapı 3.79 ± 0.42 cm ile Hurist, en uzun salkım sapı ise 8.21 ± 1.53 cm ile Kırkire çeşidinde bulunmuştur. Salkım sapı odunlaşması bakımından Keçimemesi çeşidi “kuvvetli”, Hurist ve Zerik çeşitleri “zayıf”, diğer çeşitler ise “orta” olarak tespit edilmiştir.

Tane özellikleri

Tane uzunluğu bakımından; Çekirdeksiz ve Zerik çeşitleri “kısa”, Sipiyaşın çeşidi “uzun” diğer çeşitler “orta” sınıfına girmiştir. Çekirdeksiz çeşidi 12.36 ± 1.19 mm ile en kısa, Sipiyaşın çeşidi ise 23.45 ± 1.55 mm ile en uzun taneye sahip olmuştur.

Tane genişliği bakımından; Çekirdeksiz çeşidi “çok dar”, Mılaki, Sadani, Keçimemesi, Sipiyaşın ve Kırkire çeşitleri “orta”, Veşifir çeşidi “enli”, diğer beş çeşit ise “dar” sınıfına girmiştir. Çekirdeksiz çeşidi 9.99 ± 0.97 mm ile en dar, Veşifir çeşidi ise 18.8 ± 1.23 mm ile en geniş taneye sahip çeşit olarak tespit edilmiştir.

Tanede büyüklüğün bir örneği bakımından; Hurist, Reşik ve Zerik çeşitlerinde “birörnek değil”, diğer çeşitler ise “birörnek” olarak tespit edilmiştir.

Tane şekli yönünden Zerik çeşidi “geniş oval” diğer bütün çeşitler “kısa oval” sınıfına girmişlerdir. Tanenin enine kesiti bütün çeşitlerde “yuvarlak”tır.

Tane kabuk rengi bakımından; Genotip çeşidi “kırmızı-siyah”, Süleymani, Hurist, Zerik ve Keçimemesi çeşitleri “koyu kırmızı–mor”, diğer yedi çeşit ise “yeşil-sarı” sınıfına girmiştir.

Kabuk rengi bakımından; Süleymani ve Reşik çeşitlerinde “birörnek değil”, diğer çeşitlerde “birörnek” olarak tespit edilmiştir.

Pus tabakası yönünden; Sadani ve Veşifir çeşitleri “zayıf”, Çekirdeksiz, Hurist ve Zerik çeşitleri “orta”, Keçimemesi çeşidi “çok kuvvetli” diğer altı çeşitte ise “kuvvetli” olarak bulunmuştur.

Tane kabuk kalınlığı bakımından; Kırkire çeşidi “çok ince”, Çekirdeksiz, Genotip ve Mılaki çeşitleri “ince”, Hurist ve Zerik çeşitleri “orta”, diğer çeşitler ise “kalın” sınıfına dahil olmuşlardır. Hilum incelemesi bakımından çeşitlerin hepsi “az belirgin” olarak belirlenmiştir.

Meyve eti rengi bakımından; Reşik ve Keçimemesi çeşitleri “çok hafif renkli” diğer on çeşit ise “renksiz” sınıfına girmişlerdir. Meyve etinin sululuğu; çeşitlerin hepsi “sulu” olarak tespit edilmiştir.

Şıra verimi bakımından; Reşik, Sadani ve Zerik çeşitleri “düşük”, geriye kalan on çeşit ise “orta” sınıfına girmişlerdir. Reşik çeşidi 48.90 ± 2.28 ml ile en düşük çeşit olurken, Çekirdeksiz çeşidi ise 60.80 ± 0.79 ml ile en yüksek şıra verimine sahip çeşit olmuştur.

Tane eti sertliği bakımından; Çekirdeksiz ve Veşifir çeşitleri “çok düşük”, Hurist, Sadani ve Keçimemesi çeşitleri “orta”, Süleymani, Mılaki ve Reşik çeşitleri “yüksek”, diğer çeşitler ise “düşük” sınıfına girmişlerdir. Tat özeliği bakımından bütün çeşitler “yok” sınıfında yer almışlardır.

Tadın sınıflandırılması bakımından; Keçimemesi çeşidi “az aromatik”, Süleymani, Hurist, Mılaki, Reşik ve Sipiyaşın çeşitleri “nötr”, diğer yedi çeşit ise “az tatlı” sınıfına girmişlerdir.

Tane sapı uzunluğu bakımında; Genotip, Hurist ve Reşik çeşitleri “çok kısa”, diğer dokuz çeşit ise “kısa” olarak tespit edilmiştir. Hurist çeşidi 4.80 ± 0.79 mm en kısa, Kırkire çeşidi ise 8.01 ± 1.29 mm ile en uzun sapa sahip çeşit olmuştur.

Tane sapının kopması bakımından; Genotip, Hurist, Keçimemesi, Zerik ve Kırkire çeşitleri “kolay”, diğer çeşitler “orta” sınıfına girmişlerdir. Çekirdeklilik durumu bakımından; Çekirdeksiz çeşidi “yok” diğer çeşitler ise “var” olarak tespit edilmiştir.

Fenolojik özellikler

İncelenen çeşitlerin hepsinde gözler Mayıs ayının ilk iki haftası içinde uyanmaktadır. En erken uyanma 03.05.2012 tarihinde Keçimemesi çeşidinde görülürken, en geç uyanma 14.05.2012 tarihinde Reşik çeşidinde tespit edilmiştir.

Çiçeklenme durumuna göre; Kırkire çeşidi 05.06.2013 tarihinde en erken çiçek açan çeşit olurken, Reşik çeşidi 22.06.2013 tarihinde en geç çiçek açan çeşit olarak tespit edilmiştir.

Ben düşme zamanı olarak; Çeşitlerin hepsine Ağustos ayında ben düştüğü görülmüştür. En erken ben düşme 08.08.2012 tarihinde Veşifir çeşidinde, en geç ise 24.08.2012 tarihinde Reşik ve Mılaki çeşitlerinde tespit edilmiştir.

Olgunlaşma zamanı; Mılaki ve Reşik çeşitleri Ekim ayının ilk haftasında görülürken, diğer on çeşitte ise Eylül ayında oluşmakta olup geççi özellik göstermektedir. En erken olgunlaşma 08.09.2012 tarihinde Veşifir ve Zerik çeşidinde görülürken, en geç olgunlaşma 05.10.2012 tarihinde Reşik çeşidinde tespit edilmiştir.

Büyüme özellikleri

Sürgün büyüme gücü bakımından; Sadani çeşidinde 72.0 ± 9.78 cm ile en düşük büyüme gücü görülürken, Süleymani çeşidi 132.70 ± 18.09 cm ile en yüksek büyüme gücü gösteren çeşit olmuştur. Koltuk sürgünlerinin büyüme gücü; Çeşitlerin hepsi “orta” sınıf olarak tespit edilmiştir.

Boğum aralarının uzunluğu bakımından; Süleymani çeşidi “orta” sınıfına girerken, diğer çeşitler ise “kısa” sınıfına dahil olmuşlardır. En kısa sürgün 71.59 ± 8.21 mm ile Çekirdeksiz çeşidinde görülürken, en uzun sürgün gelişimi 107.50 ± 17.41 mm ile Süleymani çeşidinde tespit edilmiştir.

Boğum aralarını çapı bakımından; Genotip, Hurist, Mılaki, Sadani, Veşifir ve Sipiyaşın çeşitleri “çok ince”, diğerleri çeşitler ise “ince” sınıfına girmişlerdir. En düşük boğum arası çapa 5.21 ± 0.54 mm ile Sadani çeşidi olurken, en yüksek çapa 6.91 ± 0.87 mm ile Kırkire çeşidi sahibi olmuştur.

Verim ve kaliteye ilişkin özellikler

Çeşitlerin salkım ağırlığı bakımından Keçimemesi ve Veşifir çeşitleri “büyük”, Çekirdeksiz, Süleymani, Mılaki, Zerik ve Sipiyaşın çeşitleri “orta” diğer beş çeşit ise “küçük” sınıfına girmişlerdir. Sadani çeşidi 193.5 ± 17.78 g ile en küçük salkım ağırlığına sahip iken, en ağır çeşit 713.4 ± 110.01 g ile Veşifir çeşidi olmuştur.

Tane ağırlığı bakımından; Çekirdeksiz çeşidi “küçük”, diğer on bir çeşit ise “orta” sınıfına dâhil olmuşlardır. En küçük tane ağırlığı 1.60 ± 0.52 g ile Çekirdeksiz çeşidinde görülürken, en büyük tane ağırlığı 4.46 ± 0.93 g ile Mılaki çeşidinde tespit edilmiştir.

Omca verimi bakımından; Kırkire çeşidi 3.49 ± 0.90 kg/omca ile en düşük verime elde edilen çeşit olurken, en yüksek verim 7.12 ± 0.97 kg/omca ile Veşifir çeşidinde tespit edilmiştir.

İncelemeye esas çeşitlerin suda çözünebilir kuru madde (SÇKM) miktarları hasat döneminde yapılarak; Çekirdeksiz çeşidi “yüksek”, Hurist, Mılaki ve Veşifir çeşitleri “düşük”, Reşik, Sadani, Zerik ve Sipiyaşın çeşitleri “çok düşük”, diğer çeşitler ise “orta” sınıf olarak tespit edilmiştir. En yüksek SÇKM miktarı 21.0 değeriyle Çekirdeksiz çeşidinde görülürken, Sadani çeşidi ise 10.0 değeri ile en düşük SÇKM miktarına sahip çeşit olarak tespit edilmiştir.

Şıranın asit içeriği bakımından; Sadani çeşidi “çok yüksek”, Süleymani, Hurist ve Reşik çeşitleri “yüksek”, Genotip, Keçimemesi ve Sipiyaşın çeşitleri “orta”, diğer beş çeşit ise “düşük” olarak tespit edilmiştir. Kırkire çeşidi 4.80 ile en düşük asit içeriğine sahip olurken,

Sadani çeşidi 15.0 değeri ile en yüksek asit içeriğine sahip çeşit olmuştur. Yöre halkı yetiştirdiği üzüm çeşitlerinin hepsini sofralık olarak değerlendirilmektedir.

TARTIŞMA ve SONUÇ

Yörede yetiştirilen üzüm çeşitlerine ait ampelografik özellikler belirlenmiştir. Üzüm çeşitlerinin sürgün, genç yaprak, olgun yaprak, salkım, tane, çekirdek ve fenolojik özellikler bakımından farklılıklar gösterdikleri saptanmıştır.

V. vinifera L. türüne ait çeşitlerde genel bir karakteristik olarak bilinen sürgün ucu şekli, sülüklerin dizilişi gibi özellikler aynen bu çalışma materyallerinde de görülmüş ve incelenen çeşitlerin *V. vinifera* L. türüne ait olduğu belirlenmiştir.

Olgun yaprakta yaprağın üst yüzünün rengi, üst ve alt yüzündeki ana damarlar üzerindeki antosiyanin renklenmesi, sürgünde boğumların ve boğum aralarının karın ve sırt tarafının rengi, bakımından çeşitler farklı gruplarda yer almışlardır. Yine aynı çeşidin yaprak alt ve üst yüzünde antosiyanin renklenmesinin farklı olabileceği tespit edilmiştir. Bağın yetiştiği konun bakım, çevre ve iklim şartlarına bağlı olarak değişebileceği (Anonim, 1983), Kara ve Beyoğlu (1995); Dili (1997) Ünal (2000)'nın görüşleriyle örtüşmektedir. Yapılan araştırmada Genotip çeşidinin üst yüz ana damarlarda renklenmenin “orta” alt ana damarlarda ise “kuvvetli” olduğu tespit edilmiştir. Diğer çeşitlerde ise alt ve üst ana damarlarda zayıf ya da yok olarak tespit edilmiştir.

Üzüm çeşitlerinde tane bağlama sırasında veya ben düşmeden önceki dönemde tanelerin yeşil renkte olması ve bu dönemden itibaren çeşidin kendine has bir şekilde değiştiği bilinen bir husuttur. Yapılan çalışmada incelemeye alınan çeşitlerin biri “kırmızı-siyah”, dördü “koyu kırmızı-mor” ve yedi çeşit ise “yeşil-sarı” olduğu tespit edilmiştir. Kabuk rengi farklılığına karşın çeşitlerin hemen hepsinde (Reşık ve Keçimemesi çok hafif renkli) meyve etinin renksiz olması, “meyve eti renkli olan çeşitlerde meyve etinde kabuktan bağımsız olarak antosiyaninin oluştuğu” tezini doğrular niteliktedir (Marasalı, 1986). Bakım ve besleme tekniği, etkili toplam sıcaklık, topoğrafik yapı, gece gündüz farkı gibi çevresel faktörlerin tane renginin yoğunluk ve bir örnekliliğinin aynı omcada bile farklılık göstermesine neden olabileceği bir gerçektir.

Çeşitlerin yıllık dal ana renkleri (OIV 103) “sarımsı kahverengi”, “koyu kahverengi” grupları arasında dağılmıştır. İncelenen diğer organlarda olduğu gibi renk özelliklerinde ortaya çıkan bu farklılıkların çeşit, çevre ve bakım koşulları interaksyonundan kaynaklandığı düşünülebilir (Kılıç ve ark., 2011).

Ampelografik açıdan incelenecek olgun yaprakların alınacağı kısımlarda farklı yöntemler kullanılmıştır. Oraman'a (1959) göre olgun yaprak 9.-12. boğumlarda iken, Fidan'a (1985) göre salkımların karşısındaki yapraklar veya 8.-10. boğumlardaki yapraklardır. Anonim (1983)'e göre ise olgun yaprak sürgünün 1/3'lük orta kısmındaki yapraklar olduğu bildirilmektedir. Bu çalışmada da Anonim (1983) ileri sürdüğü metod esas alınmıştır.

Kantitatif (ağırlık, en ve boy gibi) ve kalitatif (renk, tüylülük ve şekil) özelliklerin oluşumunda Düzgüneş ve Ekingen'e (1983) göre hem genlerin, hem de çevrenin etkili olduğunu bildirmektedirler.

Üzüm çeşitlerini birbirinden ayırt edilmesi için ölçüme dayalı özellikler de kullanılmaktadır. Bu özelliğin kullanıldığı organlardan biri de yaprak olup alanı “cm²” olarak ölçülmektedir. Bu kapsamda Planimetre veya Alan ölçer kullanımı, yaprak alan katsayılarını kullanma, bilgisayar programlarıyla belirleme gibi değişik yöntemler kullanılmaktadır. Çalışmamızda yaprak alan ölçümleri, Anonim (1983) belirtilen en ve boy çarpımları ile tespit edilmiştir. Bu

kapsamda incelenen çeşitlerde yaprak büyüklüğü bakımından iki çeşidin “küçük”, beş çeşidin “orta” ve beş çeşidin de “büyük” sınıfında yer aldığı görülmüştür.

Olgun yaprakta dilim sayısı tespitinde çeşitlerin “beş dilimli” olduğu görülmüştür. Aktepe (1994), Diri (1995) yaprak şekli ve dilim sayısı çeşit ayrımında kullanılan kesin bir kriter olduğunu bildirmekteler yine Demir (1987) 'de, olgun yaprağın bu özelliğinden bahisle gerek omcanın gelişme gücü ve gerek toprak yapısı ile ilgili olduğu vurgulamakta; Gider (1995) ise, aynı çeşitlerin çevre şartlarından en az etkilenen karakterlerden birisinin dilim sayısı olduğunu ifade etmektedir.

Bilindiği gibi eski çalışmalarda salkım büyüklüğü çeşit tanımlamada önemli bir kriter olarak kabul ediliyordu. Fakat sulama, toprak tipi, topoğrafik yapı, kültürel işlemler (terbiye sistemi, budama şekli, bırakılan göz sayısı), kimyasal madde uygulaması, gübreleme ve iklim koşulları gibi etkenler salkım büyüklüğüne önemli oranda etki etmesi nedeni ile eski önemini kaybetmiştir. Yapılan çalışmalarda artık salkım büyüklüğünün tespiti için IBPGR, en x boy olarak değerlendirmektedir. Üzüm salkımı büyüklüğü bakımından iki çeşit “küçük”, beş çeşit “orta”, beş çeşitte “büyük” ve bir çeşitte “çok büyük” olarak tespit edilmiştir. Bu özelliği ile Sipiyaşın çeşidi artı bir değere sahip olduğu tespit edilmiştir.

Salkım uzunluğu bakımından Hurist çeşidi “kısa”, diğer çeşitler ise “orta” sınıfa dahil olmuşlardır. Sipiyaşın çeşidi en uzun salkıma sahip çeşit olmuştur. Salkım sıklığı iklim şartları, kültürel uygulamalar, çiçek yapısı, çiçeklenme dönemindeki hava koşulları ve çeşit özelliği gibi kriterlerden etkilendiği bilinmektedir. Salkım sıklığı yönünden; iki çeşit “çok seyrek”, üç çeşit “seyrek”, iki çeşit “orta”, üç çeşit “sık” ve iki çeşit “çok sık” sınıfına girmişlerdir. Salkım sapı uzunluğu incelenen çeşitlerde genel itibari ile “kısa” olarak tespit edilmiştir.

Çeşit tanımlamasında tane şeklinin önemli bir kriter olduğu yapılan çalışmalarla tespit edilmiştir. Tane şekli ile ilgili yapılan çalışmalarda; tozlayıcı çeşidin tane boyu ve eni üzerinde etkili olmadığı Özbek (1951) tarafından bildirilirken, Dağlı (1962) ve Fidan (1975), tozlayıcı çeşitlerin tane şekli üzerinde etkili olabileceğini bildirmişlerdir. Bu kapsamda incelenen çeşitlerde tane şekli yönünden Zerik çeşidi “geniş oval” diğer bütün çeşitler “kısa oval” olduğu görülmüştür. İncelenen çeşitlerde saf çeşitlerden oluşan bağların bulunmaması nedeniyle dekara verim belirlenememiştir.

İncelenen çeşitlerde sürgün başına üzüm salkımı sayısı Zerik çeşidinde “0-1 salkım”, Çekirdeksiz çeşidinde “2.1-3 salkım”, diğer çeşitlerde ise “1.1-2 salkım” olarak görülmüştür.

Çeşitlerin hepsinde üzüm salkım uzunluğu ilk çiçek salkım uzunluğundan daha fazla değer aldığı belirlenmiştir.

Çeşitlerin hepsinde meyve eti “sulu” olarak tespit edilmiştir. Tane eti sertliği bakımından; Çekirdeksiz ve Veşifir çeşitleri “çok düşük”, Hurist, Sadani ve Keçimemesi çeşitleri “orta”, Süleymani, Mılaki ve Reşik çeşitleri “yüksek”, diğer çeşitler ise “düşük” sınıfına girmişlerdir. Meyve eti sertliği yüksek olan çeşitlerin “susuz” veya “az sulu” olduğu Gürsöz (1993) tarafından bildirilmektedir.



İncelenen üzümlerin çiçek yapısı Sadani, Kırkire ve Sipiyaşın çeşitleri “ morfolojik erdişi fizyolojik dişi” iken diğer bütün çeşitler “erdişi” olarak tespit edilmiştir. Çalışmaya esas alınan çeşitlerden Çekirdeksiz çeşidi hariç tamamı çekirdekli olarak görülmüştür. Oraman (1959), kurutulmuş halde iken çekirdeğin şekil, renk ve parlaklık bakımından bazı çeşitlerde farklar olduğunu bildirmiştir. Yine çekirdeğin tanelerin gelişmesi ve bileşimi üzerinde etkili olduğu Fidan (1985) tarafından bildirilmektedir.

Çeşitlerin suda çözünebilir kuru madde (SÇKM) miktarları Çekirdeksiz çeşidi “yüksek”, Hurist, Mılakı ve Veşifir çeşitleri “düşük”, Reşık, Sadanı, Zerık ve Sipiyaşın çeşitleri “çok düşük”, diğer çeşitler ise “orta” sınıf olarak tespit edilmiştir. Şırada kuru madde miktarı kalite ve değerlendirme şekli üzerinde önemli bir role sahiptir.

Şıranın asit içeriği bakımından; bir çeşit “ çok yüksek”, üç çeşit “yüksek”, üç çeşit “orta”, diğer beş çeşit ise “düşük” olarak tespit edilmiştir. Bu farklılıkların çeşitlerin genetik özelliklerinden kaynaklandığı gibi, iklim ve bakım şartları nedeni ile her yıl hasadın aynı dönemde yapılmamasında da kaynaklanabileceği Kara (1990) tarafından bildirilmektedir.

Üzüm çeşitlerinin tanımlanmalarında esas alınan morfolojik ve fenolojik özelliklerin; yetiştirilen yöre, bakım ve besleme koşulları, buldukları yer ve zamana göre değişebileceği belirlenmiştir.

Bağcılık konusundaki zengin genetik potansiyelimizin ortaya çıkarılması amacıyla yapılan ampelografik çalışmada çeşitlerin tamamının *V. vinifera* L. türüne ait çeşitler oldukları saptanmış; ayrıntılı olarak incelenmiş çeşitlerde ortak olarak belirlenen özelliklerin bu türe ait çeşitlerde yaygın olarak bulunabileceği kanısına varılmıştır. Yörede pekmez yapımı ile kurutmalık ve sofralık olarak değerlendirilen bu çeşitler, yapılacak çalışmalar ve modern bağcılık teknikleri kullanımıyla daha verimli hale getirilebilir ve ülkemiz bağcılığına kazandırılabilirler. Yörenin filoksera ile bulaşık olarak kabul edilmesi kendi kökleri üzerinde yetiştirilen bu çeşitlerin korunmasına yönelik çalışmalara hız verilmesini zorunlu kılmaktadır. Aksi takdirde bu çeşitlerin zaman içerisinde bu zararlı nedeniyle kaybolması kaçınılmazdır.

			
Çekirdeksiz Üzümü			
Gözlerin uyanması	08.05.2012	Salkım ağırlığı (g)	323.58±38.50
Tam çiçeklenme	21.06.2012	Çekirdek varlığı	Yok
Ben düşme	17.08.2012	Tane ağırlığı (g)	1.60±0.52
Olgunluk	21.09.2012	SÇKM (%)	21
Yaprak Döküm tarihi	29.10.2012	Asit (g l ⁻¹)	6.20



Süleymani Üzümlü



Gözlerin uyanması	12.05.2012	Salkım ağırlığı (g)	527.2±33.12
Tam çiçeklenme	20.06.2012	Çekirdek varlığı	2 Var
Ben düşme	15.08.2012	Tane ağırlığı (g)	4.06±0.31
Olgunluk	28.09.2012	SÇKM (%)	18
Yaprak Döküm tarihi	01.11.2012	Asit (g l ⁻¹)	12.0



Genotip Üzümlü



Gözlerin uyanması	04.05.2012	Salkım ağırlığı (g)	232.1±31.45
Tam çiçeklenme	18.06.2012	Çekirdek varlığı	2 Var
Ben düşme	13.08.2012	Tane ağırlığı (g)	2.93±0.32
Olgunluk	14.09.2012	SÇKM (%)	18
Yaprak Döküm tarihi	27.10.2012	Asit (g l ⁻¹)	9.0



Hurist Üzüümü




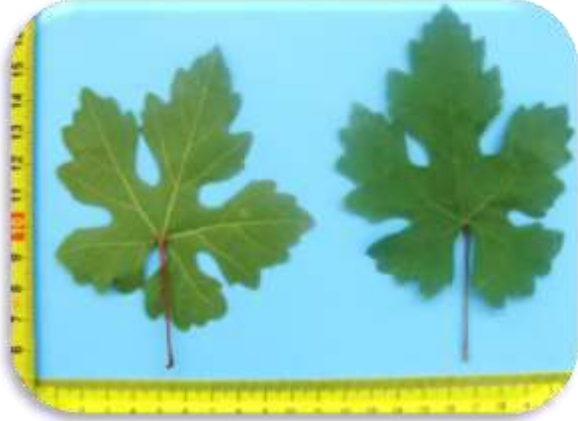
Gözlerin uyanması	11.05.2012	Salkım ağırlığı (g)	250.9±40.47
Tam çiçeklenme	14.06.2012	Çekirdek varlığı	2 Var
Ben düşme	17.08.2012	Tane ağırlığı (g)	3.44±0.37
Olgunluk	27.09.2012	SÇKM (%)	14
Yaprak Döküm tarihi	27.10.2012	Asit (g l ⁻¹)	13.4





Mılaki Üzüümü



Gözlerin uyanması	11.05.2012	Salkım ağırlığı (g)	348.0 ±38.60
Tam çiçeklenme	18.06.2012	Çekirdek varlığı	2 Var
Ben düşme	24.08.2012	Tane ağırlığı (g)	4.46±0.93
Olgunluk	03.10.2012	SÇKM (%)	16
Yaprak Döküm tarihi	09.11.2012	Asit (g l ⁻¹)	5.9

			
Reşik Üzüümü			
Gözlerin uyanması	14.05.2012	Salkım ağırlığı (g)	297.60±44.22
Tam çiçeklenme	22.06.2012	Çekirdek varlığı	2 Var
Ben düşme	24.08.2012	Tane ağırlığı (g)	3.98±0.39
Olgunluk	05.10.2012	SÇKM (%)	11
Yaprak Döküm tarihi	05.11.2012	Asit (g l ⁻¹)	12.2

			
Sadani Üzüümü			
Gözlerin uyanması	11.05.2012	Salkım ağırlığı (g)	193.5±17.78
Tam çiçeklenme	14.06.2012	Çekirdek varlığı	2 Var
Ben düşme	15.08.2012	Tane ağırlığı (g)	3.05±0.65
Olgunluk	23.09.2012	SÇKM (%)	10
Yaprak Döküm tarihi	28.10.2012	Asit (g l ⁻¹)	15



Keçimemesi Üzümlü





Gözlerin uyanması	03.05.2012	Salkım ağırlığı (g)	616.5±85.28
Tam çiçeklenme	13.06.2012	Çekirdek varlığı	2 Var
Ben düşme	06.08.2012	Tane ağırlığı (g)	4.02±0.46
Olgunluk	12.09.2012	SÇKM (%)	18
Yaprak Döküm tarihi	28.10.2012	Asit (g l ⁻¹)	8.0







Veşifir Üzümlü



Gözlerin uyanması	05.05.2012	Salkım ağırlığı (g)	713.40±110.01
Tam çiçeklenme	11.06.2012	Çekirdek varlığı	2 Var
Ben düşme	03.08.2012	Tane ağırlığı (g)	3.80±0.58
Olgunluk	08.09.2012	SÇKM (%)	14
Yaprak Döküm tarihi	30.10.2012	Asit (g l ⁻¹)	5.30

			
Zerik Üzümlüğü			
Gözlerin uyanması	05.05.2012	Salkım ağırlığı (g)	322.1±20.78
Tam çiçeklenme	10.06.2012	Çekirdek varlığı	2 Var
Ben düşme	09.08.2012	Tane ağırlığı (g)	3.90±0.73
Olgunluk	08.09.2012	SÇKM (%)	12
Yaprak Döküm tarihi	01.11.2012	Asit (g l ⁻¹)	6.90

			
Kırkire Üzümlüğü			
Gözlerin uyanması	05.05.2012	Salkım ağırlığı (g)	235.3±40.13
Tam çiçeklenme	05.06.2012	Çekirdek varlığı	2 Var
Ben düşme	10.08.2012	Tane ağırlığı (g)	4.02±0.40
Olgunluk	14.09.2012	SÇKM (%)	17
Yaprak Döküm tarihi	05.11.2012	Asit (g l ⁻¹)	4.80

			
Sipiyaşın Üzüğü			
Gözlerin uyanması	08.05.2012	Salkım ağırlığı (g)	480.90±28.04
Tam çiçeklenme	14.06.2012	Çekirdek varlığı	2 Var
Ben düşme	16.08.2012	Tane ağırlığı (g)	4.42±0.92
Olgunluk	18.09.2012	SÇKM (%)	12
Yaprak Döküm tarihi	02.11.2012	Asit (g l ⁻¹)	7.7

KAYNAKLAR

- Ağaoğlu, Y. S., Çelik, H., Çelik, M., Fidan, Y., Gülşen, Y., Günay, A., Halloran, N., Köksal, İ., Yanmaz, R., 1995. *Genel Bahçe Bitkileri*. AÜ, Ziraat Fakültesi, Eğitim Araştırma ve Geliştirme Vakfı Yayınları, Yayın No: 4, Ankara. 387.
- Aktepe, N., 1994. *Kalecik İlçesi Bağcılığı ve Yörede Yetişen Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerinde Araştırmalar* (yüksek lisans tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.
- Anonim, 1983. *Descriptor for Grape*. IBPGR Secretariat, Roma.
- Anonim, 1989. Minimal descriptor list for grapevine varieties. *5th International Symposium on Grape Breeding*. Geilwerlerhof.
- Barış, C., Gürnil, K., 1991. Üzüm çeşitlerinde (*Vitis vinifera*) çekirdeksizliğin kalıtımı. Tar. ve Köy İşl. Bak., Tar. Araş. Gen. Müd. Atatürk Bahçe Kùltürleri Araş. Enst., Yalova, *Bahçe*, 20 (1-2): 87-100.
- Çelik, H. ve C. Karanis, 1998. Amasya'da Yetiştirilen Bazı Üzüm Çeşitlerinin Ampelografik Özelliklerinin Saptanması Üzerine Bir Araştırma. *4. Bağcılık Sempozyumu*, 357-361, Yalova.
- Çelik, H., Çelik, S., Kunter, B. M., Söylemezoğlu, G., Boz, Y., Özer, C., Atak, A., 2005. Bağcılıkta gelişme ve üretim hedefleri. *VI. Türkiye Ziraat Mühendisliği Teknik Kongresi*. 3-7 Ocak 2005, Ankara.
- Dağlı, S. (1962). Muhtelif Üzüm Çeşitleri Arasında Melezleme Suretiyle Erken Yeni Sofralık Çeşitlerinin Elde Edilmeleri Üzerinde Araştırmalar. Tar. Bak. Zir. İşl. Gen. Müd., Yayınları, İstanbul, C-103, 63.
- Demir, İ., 1987. *Ankara Şartlarında Yetiştirilen Yabancı Kökenli Bazı Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerinde Araştırmalar* (yüksek lisans tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.

- Dilli, Y., 1997. *Harran Ovası Koşullarında Yetiştirilen Bazı Üzüm Çeşitlerinin Ampelografik Nitelikleri İle Verim ve Kalite Unsurlarının Belirlenmesi Üzerinde Bir Araştırma* (yüksek lisans tezi). HÜ, Fen Bilimleri Enstitüsü, Şanlıurfa.
- Diri, A., 1996. *Sungurlu Bağcılığı ve Yörede Yetişen Üzüm Çeşitlerinin Ampelografik Özellikleri* (yüksek lisans tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.
- Düzgüneş, O. & Ekingen, H.R. (1983). *Genetik*, 2. Baskı, A.Ü. Ziraat Fakültesi Yayınları 55, A.Ü. Basımevi, Ankara.
- Fidan, Y., 1975. Karagevrek üzüm çeşidi için uygun dölleyicinin saptanması üzerinde bir araştırma. *AÜ. Ziraat Fakültesi Yayınları*, No: 575, Ankara. 48.
- Fidan, Y., 1985. *Özel Bağcılık*. AÜ, Ziraat Fakültesi, Yayın No: 930, Ankara. 401.
- Gider, S., 1995. *Kalecik Karası Üzüm Çeşidinin Klon Seleksiyonuyla Elde Edilmiş Klonlarının Ankara Koşullarında Ampelografik Özelliklerinin Saptanması Üzerine Bir Araştırma* (doktora tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.
- Gökçay, E., 1985. Bitki gen kaynaklarının önemi, bağcılık alanında bu konuda yapılan çalışmalar ve çeşit standardizasyonu sorunu. *Türkiye I. bağcılık Sempozyumu Bildirileri*. Cilt III: 25–34. Tarım Orman ve Köy işleri Bakanlığı, Teşkilatlanma ve Destekleme Genel Müdürlüğü, Yayın No: 3, Ankara.
- Gürsöz, S., 1993. *GAP Alanına Giren Güneydoğu Anadolu Bölgesi Bağcılığı ve Özellikle Şanlıurfa İlinde Yetiştirilen Üzüm Çeşitlerinin Ampelografik Nitelikleri İle Verim ve Kalite Unsurlarının Belirlenmesi Üzerinde Bir Araştırma* (doktora tezi). ÇÜ, Fen Bilimleri Enstitüsü, Adana.
- Kara, Z., Beyoğlu, N., 1995. Konya ili Beyşehir yöresinde yetiştirilen üzüm çeşitlerinin ampelografik özellikleri üzerinde bir araştırma. *2. Ulusal Bahçe Bitkileri Kongresi*. 3–6 Ekim 1995, Adana. Cilt 2: 519–523.
- Kara, Z., 1990. *Tokat Yöresinde Yetiştirilen Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerinde Araştırmalar* (doktora tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.
- Kılıç, M. F., Doğan, A., Kazankaya, A., & Uyak, C. (2011). Gevaş (Van)'da Yetiştirilen Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerine Bir Araştırma. *Iğdır Üniversitesi. Fen Bilimleri Enstitüsü Dergisi*, 1(1), 23-31.
- Marasalı, B., 1986. *Ankara Koşullarında Yetiştirilen Bazı Yerli Standart Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerinde Araştırmalar* (yüksek lisans tezi). AÜ, Fen Bilimleri Enstitüsü, Ankara.
- Oraman, M. N., 1959. *Ampelografi*. A.Ü. Zir. Fak. Yayınları, Ankara, No: 154, 128s.
- Oraman, M.N., 1970. *Bağcılık Tekniği I*. AÜ, Ziraat Fak., Yayın No: 415, Ankara. 283.
- Özbek, S., 1951. Baba Çeşitlerin Çavuş Üzümünün Meyve Vasıfları Üzerine Doğrudan Doğruya Tesiri (Metaxenie). A.Ü. Zir. Fak., 1951 Yıllığı Ayırbaşım Ankara. s.142-165
- Söylemezoğlu, G., 1996. Türkiye'de Yetiştirilen Sofralık ve Şaraplık Üzüm Çeşitlerinin İzoenzimlerden Yararlanılarak Page Tekniği İle Teşhisleri Üzerinde Çalışmalar. TUBİTAK, Proje No: TOTAG-1321, 26 S, Ankara
- Şehirli, S., & Özgen, M. (1987). *Bitki genetik kaynakları*. Ankara Üniv. Ziraat Fak. Yayınları, (1020), 294.



- Uzun, H.İ., 1986. *Bazı Üzüm Çeşitlerinin Ampelografik Özellikleri, Kateşol Oksidaz İzoenzim Bantlarından Teşhisleri ve Sıcaklık Toplamları Üzerinde Araştırmalar* (doktora tezi). EÜ, Fen Bilimleri Enstitüsü, İzmir.
- Ünal, M.S., 2000. *Malatya ve Elazığ İlleri Bağcılığı İle Malatya İlinde Yetiştirilen Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerine Araştırmalar* (doktora tezi). ÇÜ, Fen Bilimleri Enstitüsü, Adana.
- Yağcı, A. (2013). Gemerek (Sivas) Yöresinde Yetiştirilen Üzüm Çeşitlerinin Ampelografik Özelliklerinin Belirlenmesi Üzerine Bir Araştırma. *Selcuk Journal of Agriculture and Food Sciences*, 27.

SEVEN PHASES OF FREEZING AND REOPENING, AND MECHANISMS OF STATE AID TOWARDS THE AUDITORIUM CULTURE SECTOR DURING THE FIRST YEAR OF THE COVID-19 PANDEMIC IN THE REPUBLIC OF POLAND

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ABSTRACT

The article describes the phases of the *anti-pandemic policy* and the mechanisms of the *anti-crisis policy* introduced by the Government of the Republic of Poland in the first year of the COVID-19 pandemic in the area of the *auditorium culture sector*. The research conducted by the authors of the article allowed the distinguishing of seven phases of the policy towards this sector as an element of the *anti-pandemic policy* of the Republic of Poland. First, this sector was the object of lockdowns, operation restrictions and reopening. The *anti-pandemic policy* brought adverse effects for the entities and workers in it. Consequently, the Polish Government arranged public aid mechanisms for them as a part of its *anti-crisis policy*. The article characterises these phases and the wide range of public instruments dedicated to supporting the sector.

Keywords: anti-pandemic policy, anti-crisis policy, auditorium culture sector, culture, art, COVID-19 pandemic, state aid, subsidies, European Union, Poland, economic crisis

JEL classification codes: J48, H11, H12, H20, H23, H24, H25, H71, H80, H81, H84, O52, P11, Z11, Z18

INTRODUCTION

The *auditorium culture sector* denotes that part of the cultural sector associated with the direct participation in a cultural experience of many people at the same time, in the same physical space. In the Republic of Poland, this sector is comprised of cultural institutions (state and local government), non-governmental organisations (including social economy entities) and enterprises, and within them by people (creators, artists, animators, organisers). It includes the operation of theatres, cultural centres, cinemas, museums, art galleries, libraries, archives, historical places, creators and audiences in this sector.

Entities operating in the *auditorium culture sector in Poland* are included in the Polish Classification of Activities (PCA) in the subclasses such as: Activities related to film screening (cinemas) (59.14.Z), Activities related to staging artistic performances (90.01.Z), Activities supporting the staging of artistic performances (90.02.Z), Cultural object operation (90.04.Z), Library operation (91.01.A), Archives operation (91.01.B), Museums operation (91.02.Z), Operation of historic sites and buildings and similar tourist attractions (91.03.Z), commercial art galleries (part of the subclass 47.78.Z), antiques retail sales and auction houses (in the field of works of art and cultural heritage facilities and exhibition activities) (part of the subclass 47.79.Z). All these entities produce and disseminate cultural goods related to the direct and

simultaneous participation in their reception and the experience of the bigger and smaller groups of people in the same physical space.

In the Republic of Poland, the first legal act directly related to the COVID-19 pandemic was the *Act of 2 March 2020, on special solutions related to the prevention, counteraction and combating of COVID-19, other infectious diseases and crises caused by them* (Journal of Laws of 2020, item 374). On 14 March 2020, an epidemic emergency state was introduced in the entire territory of the Republic of Poland, and an epidemic state was announced on 20 March. In addition, numerous restrictions have been imposed on society and economic activity. During the first year of the COVID-19 pandemic, the Polish Council of Ministers, as a ruling tool in its *anti-pandemic policy*, used the regulations on imposing certain restrictions, orders and bans in connection with the outbreak of an epidemic, as implementing acts to the *Act of 5 December 2008, on preventing and combating human infections and infectious diseases in humans* (Journal of Laws of 2008, No. 234, item 1570). There were fifteen of them in the period from early March 2020 to early March 2021.

At the beginning of the COVID-19 pandemic, the activity of the *auditorium culture sector* was adjudged to be a potential source of threats and disease outbreaks by the Polish Government. Therefore, it was included in the spectrum of activities potentially threatening public health, thus creating the risk of a negative impact on achieving goals and expected results identified in the *anti-pandemic policy*. Accordingly, during the first year of the COVID-19 pandemic, the operation of entities in this sector was the object of lockdowns, restrictions and reopening by Polish Government decisions. These decisions were based on the number of cases of COVID-19 in the Polish population. Therefore, the *anti-pandemic policy* was negatively affecting the entities and workers in the *auditorium culture sector*. In consequence, the Polish Government arranged public aid for them.

The authors of the paper conducted research using juridical exegesis, desk research, sociological and economic analysis, and observation during the pandemic period. The study period covers the first year of the COVID-19 pandemic, i.e. from early March 2020 to early March 2021. As a result, seven phases of the Polish Government policy towards the *auditorium culture sector* as an element of its *anti-pandemic policy* during the first year of the COVID-19 pandemic were distinguished. In addition, a wide range of public instruments, which was dedicated to supporting this sector, were identified as a part of the *anti-crisis policy*. The article presents these phases and instruments.

1. FINDINGS OF THE RESEARCH ABOUT PHASES OF FREEZING AND REOPENING THE AUDITORIUM CULTURE SECTOR

From the beginning of March 2020 to the beginning of March 2021, in the Republic of Poland, seven phases of the Polish Government policy towards the *auditorium culture sector* as an element of its *anti-pandemic policy* can be distinguished. It had essential consequences for the activity of entities and workers in this sector. These phases were:

1. The starting point for the anti-pandemic policy - the fundamental law, the legal basis for the anti-pandemic policy: *Act of 5 December 2008, on preventing and combating human infections and infectious diseases in humans* (Journal of Laws of 2008, No. 234, item 1570)
2. Preparation for the legal freezing of the economy, including the *auditorium culture sector*. *The Act of 2 March 2020, on special solutions related to the prevention, counteraction and combating of COVID-19, other infectious diseases and the emergencies caused by them*, introduced changes to the *Act of 5 December 2008 on preventing and combating infections and infectious diseases in people* (Journal of Laws of 2020, item 374). Provisions have been added

allowing for the establishment of temporary limitation of specific scopes of business activity, temporary restriction of the use of premises or land and the obligation to secure them, and an order or prohibition to stay in specific places, areas and facilities.

3. Complete freezing of the *auditorium culture sector* (from 13 March to 3 May 2020). A complete ban on performing activities in the field of performing arts and all forms of collective culture and entertainment, including philharmonics, operas, operettas, theatres, cinemas, libraries, archives, museums and historical places, community centres, art galleries, was instituted. (PCA: 90.0, 91.0, 59.14.Z).

4. Partial unfreezing of the *auditorium culture sector* in pandemic rigours (from 4 May 2020 to 5 June). A complete ban on performing spectacle arts and film screenings (PCA: 90.01 and 59.14.Z). Libraries, archives, museums and historical places (PCA: 91.0) could resume their activity by fulfilling the obligation to cover the mouth and nose with clothing or parts thereof, masks, a visor or a protective helmet.

5. Reopening in pandemic rigours of the *auditorium culture sector* (from 6 June to 27 November 2020). Permission to conduct creative activity related to all collective forms of culture and entertainment (PCA: 90.0) and cinema activities (PCA: 59.14.Z), provided that the viewers comply with the obligation to cover their mouths and nose and make no more than half (from October 10, 25%) of the number of seats available to viewers or listeners (or from 10 October, to keep the distance in the audience between the spectators/listeners 1.5 m), and in the open air from 19 June, provided it is ensured that at the same time the number of spectators, listeners, visitors or participants is not more than one person per 5 m², keep a distance of at least 2 m (from 8 August 1.5 m) from other people by marking with horizontal signs places for the public, taking into account a distance of 2 m (from 8 August 1.5 m), to ensure that viewers, listeners, visitors or participants comply with the obligation to cover the mouth and nose unless a distance of not less than 2 m from other people is kept. This restricted form of activities could also be conducted by libraries, archives, museums and historical sites (PCA 91.0).

6. Closing the *auditorium culture sector* to direct audience experience (28 November 2020, to 29 January 2021). The performing arts sector (PCA: 90.0) and museums (PCA: 91.02.Z) could operate without the audience's participation. It was allowed to carry out activities necessary to prepare artistic events, such as rehearsals and exercises, phonographic and audiovisual recordings, and events transmitted using direct remote communication. Museums were forbidden to make their collections available to the public inside cubature interiors and to organise public events. However, they could carry out activities through direct remote communication, make the collections available in a non-contact form, comply with appropriate sanitary requirements, and provide access to outdoor collections and historic forests, parks and gardens. Prohibition of cinema operation (PCA: 59.14.Z), except for activities that could be carried out using direct remote communication. Libraries could make collections available, provided that no more than one person per 15 m² of the area of such a room is present in the space accessible to the people who use them, except for librarians.

7. Reopening in pandemic rigours of the *auditorium culture sector* (from 30 January to 14 March 2021). From 30 January, allowing activities of galleries and cultural institutions could conduct exhibition activities (museums). Libraries operated under the rigours of the previous period. From 12 February, theatres and cinemas were allowed to operate under certain restrictions and regimes. Indoor activities related to all collective forms of culture and entertainment (PCA: 90.0) were allowed in the scope related to the preparation and implementation of artistic events, exhibitions and activities related to the projection of films or video recordings in cultural centres, cinemas or other places and activities film clubs (PCA: 59.14), provided that 1) viewers or listeners are made available every second seat in the

audience, however not more than 50% of the number of seats, in the absence of designated seats in the audience, while maintaining a distance of 1.5 m between viewers or listeners; 2) ensuring that viewers or listeners comply with the order to cover the mouth and nose; 3) ensuring that viewers or listeners do not eat or drink.

At the end of February 2021, Deputy Prime Minister and Minister of Culture and National Heritage Professor Piotr Gliński indicated that the sanitary regime is respected in cultural institutions, and the ongoing monitoring carried out by the ministry confirmed that no pandemic outbreaks had been recorded in them. He also noticed that after unfreezing in rigours of the *auditorium culture sector* (phase 7), Poles were eager for contact with culture. This was manifested by queues in front of cultural institutions (P. Gliński for wPolityce.pl, 2021).

2. FINDINGS OF THE RESEARCH ABOUT THE MECHANISM OF STATE AID TOWARDS THE AUDITORIUM CULTURE SECTOR

As an answer for the *anti-pandemic policy* of the Republic of Poland, the *anti-crisis policy* was based on two pillars: the Anti-Crisis Shields in versions 1.0-7.0 and the Financial Shields in versions PFR 1.0-2.0. During the first year of the pandemic period, the shape and scope of public intervention underwent significant modifications, from a broad mechanism addressed to all market participants - the so-called model of universal distribution of public funds, to directing support to selected sectors and industries (based on identification in the PCA), the so-called selective model. In its assumptions, the aid system had to consider the proportionality of the distribution of benefits to market participants, as the mechanisms addressed to entrepreneurs had to take into account the principles of state aid resulting from Art. 107 of the *Treaty on the Functioning of the European Union* (TFEU). The European Commission (EC) was notified of the planned aid programmes, based on the EC Notice: *Temporary framework of state aid measures to support the economy in the context of the ongoing COVID-19 epidemic*.

The regulations referred to as the Anti-Crisis Shields were introduced in specially dedicated acts on counteracting the economic effects of the COVID-19 pandemic. The authors of the acts were the Ministry of Development, the Ministry of Finance and the Ministry of Family, Labour and Social Policy. The works were carried out under the supervision of the Chancellery of the Prime Minister in cooperation with other ministries and public agencies. In *cultural policy*, including support for the *auditorium culture sector*, the activities were conducted by the Ministry of Culture and National Heritage. As a result, entities in this sector could benefit from two waves of support, i.e., universal support instruments (from March 2020) and selective support instruments (from May 2020).

Based on the seven Anti-Crisis Shields and two Financial Shields, the Polish Government notified the European Commission and implemented a wide range of solutions aimed at entities from the *auditorium culture sector*. In the first period of the COVID-19 pandemic (from 31 March 2020), these were multi-sector instruments supplemented by a program dedicated to the *cultural sector*, i.e., *Culture in the web* (for activities from May 2021). On 14 August 2020, the legal basis for the intervention and the use of public funds from the state budget by the Minister of Culture and National Heritage for financial support in the form of social aid for authors and artists, as well as the use of public funds from *The COVID-19 Counteracting Fund* to support local government artistic institutions, non-governmental organisations and entrepreneurs operating in the field of theatre, music or dance was adopted. From October 2020 (Anti-Crisis Shield 5.0), specific solutions targeted at the *auditorium culture sector* were launched in response to demands of the cultural profession and the scale of pandemic degradation.

The intervention applied to entities from the *auditorium culture sector*, including the *Anti-Crisis Shield for Culture*¹, consisted of:

- *Support for enterprises, non-governmental organisations and self-employed persons* in the form of: exemption from social security contributions, subsidies for micro and small entrepreneurs, co-financing from the Labor Fund of part of the costs of employee salaries and social security contributions due from these salaries, 3-month salary subsidy for employees and payment of social security contributions, working capital loan financing the payment of wages in the SME sector, cancellation of tax arrears, the possibility of deducting the loss from the current year from the income for the previous year, low-interest loan from the Labor Fund for micro-entrepreneurs up to the amount of PLN 5,000, triple downtime benefit for persons running a business in the amount of PLN 2,080 or PLN 1,300, a one-off additional industry standstill benefit for employees of auditorium culture (from 15 October, 2020) (solutions included in individual versions of the anti-crisis shields from Shield 1.0, i.e. from 31 March, 2020).
- *Compensation for persons under civil law contracts* - in a situation where the contract has not been concluded, or there has been a limitation in its implementation due to downtime in business as a result of COVID-19. The payment source was the Social Security Institution (ZUS) (Anti-crisis Shield 1.0, i.e. from 31 March 2020).
- *Vouchers for culture* - law determining the operation of institutions and enterprises, among other things, in the area of culture, to replace unrealised services with vouchers of a corresponding value (Anti-crisis Shield 1.0, i.e. from 31 March 2020).
- *Support for the keepers of UNESCO Historical Monuments and World Heritage sites* - the possibility of applying for co-financing of salaries of persons employed by the entity managing the Historical Monument or World Heritage site from the resources of the Guaranteed Employee Benefits Fund (FGŚP) (Anti-crisis Shield 3.0, i.e. from 16 May 2020).
- *Subsidies to remuneration in cultural institutions* - support from the FGŚP for co-financing the remuneration of employees affected by economic downtime or reduced working hours due to a pandemic in cultural institutions, both state-run and local government (Anti-crisis Shield 4.0, i.e. from 24 June 2020.).
- *Working capital loans with reduced interest rates* - with support in the form of an interest rate subsidy from the state budget (Anti-crisis Shield 4.0, i.e. from 24 June 2020).
- *Aid in the form of subsidies for micro-enterprises and subsidies to uncovered fixed costs* for small and medium-sized enterprises from selected industries (Financial Shield 2.0, i.e. from 18 April 2020).
- *Compensation of lost income* - financial aid of PLN 400 million directed to the cultural sector from the Culture Support Fund. In its assumptions, the mechanism's purpose was to ensure the institution's stable functioning and maintain the current employment in the cultural sector. Payments from the fund took the form of compensations for income lost due to the epidemic from 12 March to 31 December 2020. The tool was addressed to local government artistic institutions, non-governmental organisations and entrepreneurs conducting cultural activities in theatre, music and dance (Anti-crisis Shield 5.0, i.e. from 8 October 2020).

¹ This name was used by the Ministry of Culture and National Heritage to define the package of all anti-crisis tools, both implemented for the entire economy and specific to the industry, which could be used by cultural sector entities (MCNH, 2021a).

– *Legislative support for the film industry* - change of the definition of film work (change of the provision, indicating that a film is also a work that has not been shown in the cinema), suspension of data reporting by cinemas, changes to the act on the financial support of audiovisual production - from 31 March 2020.

– *Direct support for the film industry* - transfer by the Minister of Culture and National Heritage to the Polish Film Institute at the request of its director of funds of PLN 120 million to finance or co-finance the costs incurred by entities operating in the field of cinematography from 1 November 2020 to 30 April 2021, as a result of COVID-19 and which have not been financed or co-financed from other funds, including public funds. Possibility of granting funds by PIFS to entities operating in the field of cinematography, regardless of the organisational and legal form and ownership structure, in the form of a grant, loan or surety, and in the form of a scholarship to a natural person (Anti-crisis Shield 6.0, i.e. from 26 January 2021) (MCNH, 2021a).

In addition to the mechanisms resulting from individual types and versions of Anti-crisis and Financial shields (e.g. from *The COVID-19 Countermeasure Fund*), during the first year of the pandemic, support mechanisms were offered from the state budget funds at the disposal of the Minister of Culture and National Heritage, i.e.:

– *Culture in the web* - a program of the Minister of Culture and National Heritage (MCNH) announced on 3 April 2020, and managed by the National Center for Culture (NCC), worth PLN 80 million, for activities related to the presentation of cultural events and online access to cultural resources. The program consisted of two elements: a scholarship program (worth PLN 20 million) and a grant program (worth PLN 60 million). The scholarship program was targeted at natural persons, creators and artists. Applicants could be awarded scholarships from 3 to 6 months for a project from 01/05/20 to 31/10/20 (the amount of the scholarship: PLN 3,000 per month²). The following entities could apply for a subsidy: local government cultural institutions, non-governmental organisations, foundations, churches and religious associations as well as entities conducting economic activity (the amount of subsidy being PLN 5 - 150 thousand; subsidy up to 100% of the cost of the task)³. Call for grant applications and scholarships from 6/04/20 to 21/04/20; implementation of tasks from 01/05/20 to 30/10/20; (NCC, 2020a; NCC, 2020b; MCNH, 2020b).

– Authors and artists could obtain social assistance from the Culture Promotion Fund in a difficult financial situation, i.e. approx. 80% of the minimum wage.

– Modification of the Minister's 2020 Programs in terms of implementing projects that have already received a subsidy allowing for the flexible introduction of changes in projects and their adaptation to a pandemic situation.

– Increasing the pool of scholarships from PLN 1.5 to 6.5 million as part of *The Competition of the Minister of Culture and National Heritage for creative scholarships and scholarships in the field of promoting culture aimed at supporting the individual development of creators, artists, animators and educators, as well as researchers of the broadly understood sphere of culture and national heritage*.

² 9,000 scholarships each The Minister of Culture and National Heritage (MKiDN) granted 2,223 artists and creators. The number of scholarships awarded in specific industries was as follows: music (743), visual arts (499), animation and cultural education (419), literature (160), film (110), theater (101), folk art (86), dance (57), cultural management and support for the development of cultural personnel (48). The number of applicants was 4,370 formally correct applications (MCNH, 2020b).

³ Grants were received by 1,182 beneficiaries. The competition was adjudicated on May 15, 2020 (MCNH, 2020b).

- Increasing the budget of the *Film Production* program by approximately PLN 40 million from the Ministry of Culture and National Heritage funds. The Polish Film Institute implemented the program.
- Additional subsidies, the so-called COVID payments for the activities of cultural institutions in connection with reducing the adverse economic and social effects of the pandemic, with a worth of PLN 140 million.
- *Shield for writers* - a program organised by the Institute of Literature, under which PLN 2.3 million was allocated to support authors by purchasing licenses for previously published or premiere texts: poems and short stories and critical sketches and translations (MCNH, 2020b).

Additionally, the Ministry of Culture and National Heritage has undertaken several initiatives in the existing sectoral mechanisms. In July 2020, the Ministry of Culture and National Heritage informed that the total value of the multidimensional state support for the *cultural sector* in Poland provided after the announcement of the epidemic threat and restrictions on the activities of cultural institutions amounted to over PLN 5 billion (MCNH, 2020a). In February 2021, the Minister of Culture and National Heritage indicated that in the first year of the COVID-19 pandemic (from March 2020 to February 2021), the *Anti-Crisis Shield for Culture* amounted to PLN 6 billion. He emphasised that most of the aid under it were implemented for the entire Polish economy. The Minister said that none of the cultural sector workers was left alone because everyone could get social assistance⁴ (P. Gliński for wPolityce.pl, 2021).

Moreover, industry and professional institutions offered aid instruments aimed at artists and creators and cultural organisers. These were implemented by: Adam Mickiewicz Institute (*The Polish Culture in the World*), Institute of Music and Dance (psychological support; *Professional Dancers Retraining Program*), Zbigniew Raszewski Theater Institute (*Public Theater Day on the Internet*), National Institute of Museology and Collection Protection (review of grant competitions), Polish Radio National Symphony Orchestra (support for local artists, musicians, performers; fees for concerts in the open air), Polish Music Foundation, Polish Music Publishers and many professional organisations. Although with much lower values than from the state budget and Anti-crisis and Financial Shields, support was also offered by local governments, both at the level of communes, poviats and voivodships. The city of Gdańsk, the city of Gdynia, the city of Katowice, the City of Krakow, the City of Łódź, the City of Poznań, the City of Sopot, the City of Warsaw, the City of Wrocław, Pomorskie Voivodeship, among others, developed their support mechanisms.

The above aid mechanisms were supported by the EU offer under the *Creatives Unite Platform* with loan guarantees for the creative sector offered by Bank Gospodarstwa Krajowego (a Polish state development bank) and liquidity loans for entrepreneurs from the European Regional Development Fund (MCNH, 2021f). In addition, on 27 April 2020, the Council of Ministers adopted the *Ad hoc Support Program for NGOs in the field of counteracting the effects of COVID-19*, worth PLN 10 million, as a mechanism to support the institutional existence of civil society organisations and their activities related to countering COVID-19. The program manager was the *National Institute of Freedom - Centre for Civil Society Development* (MCNH, 2021h; NNF, 2021). Furthermore, art colleges have also taken action in response to the pandemic. They targeted help, in various forms, at students, doctoral students and academic staff (MCNH, 2021i).

⁴ In the first year of the pandemic, the Ministry of Culture and National Heritage awarded 13807 social benefits, PLN 1 thousand. Some people received this help several times, even six times. The cost of social benefits was almost PLN 25 million (P. Gliński for wPolityce.pl, 2021).



CONCLUSION AND REFERENCES

The COVID-19 pandemic is a spectacular event in modern world history. It affects entire societies and economics. It has had a decisive influence on public policies pursued since March 2020 by governments, including the Government of the Republic of Poland. The Polish Government has implemented both the *anti-pandemic policy* and the *anti-crisis policy*. This first policy was destructive for the *auditorium culture sector*, and the second one supported this sector. At the beginning of the COVID-19 pandemic, the Polish Government included the activities of the entities in the *auditorium culture sector* in the spectrum of dangerous activities that could potentially threaten public health. The Ministry of Culture and National Heritage monitoring confirmed that auditorium culture institutions operating under the sanitary regime were not sources of COVID-19 outbreaks during the defrosting and reopening periods in the first year of the pandemic. On the one hand, there were seven phases of freezing and reopening (unfreezing) the *auditorium culture sector* during the first year of the pandemic in Poland. And on the other, there were seven Anti-Crisis Shields, two Financial Shields, and many mechanisms supporting entities and workers in this sector. There are a lot of questions about the future. One very important is how, after the pandemic years, a society without or with remote participation in the cultural experiences provided by the *auditorium culture sector* will be shaped.

From the policy analysis side, the authors recommend:

- Improving public statistics in the field of culture, taking into account the specificity of its various industries and the need to collect data necessary and adequate for making public decisions.
- Improving the mechanisms of coordinating public decisions taken at all levels of implementation of policies towards the sector.
- Designing scenarios of responses to various types of threats, fitted with reaction instruments, institutions' roles, and individual state services.
- Developing guidelines addressed to all participants of the process of providing services in the *auditorium culture*, guaranteeing the safety of providing such services also during the disclosure of a threat comparable in its socio-economic effects to the COVID-19 pandemic.
- Improving the law-making process and communication of ruling decisions towards the sector reduces the legal mess and a multitude of incomprehensible regulations to recipients. The legal basis and the resulting support mechanisms must be legible, unambiguous, transparent, and easy to understand for the cultural sector workers, artists, creators, and performers.
- Improving the process of communication with the public in emergencies to protect the *cultural sector* against inappropriate behaviour, leading to the intensification of restrictions imposed on the activity of the sector (developing social responsibility).
- Implementation of social programs and innovative solutions directed to rebuilding social trust towards participation in cultural events organised in cubature facilities.
- Implementation of modern technical solutions building the resilience of the *auditorium culture sector* to various crises, including epidemic ones.

BIBLIOGRAPHY

1. Act of 27 July 2005 Law on Higher Education (Journal of Laws No. 164, item 1365, as amended);



2. Act of 5 December 2008, on preventing and combating human infections and infectious diseases in humans (Journal of Laws of 2008, No. 234, item 1570)
3. Act of 4 July 2019, on the system of development institutions (Journal of Laws of 2019, item 1572);
4. Act of 31 March 2020, amending the Act on special solutions related to the prevention, prevention and combating of COVID-19, other infectious diseases and crises caused by them, and some other acts (Journal of Laws 2020, No. 2020 item 568);
5. Act of 31 March 2020, amending the Act on the system of development institutions (Journal U. of 2020, item 569);
6. Act of 3 April 2020, on special solutions supporting the implementation of operational programs in connection with the occurrence of COVID-19 in 2020 (Journal of Laws No. 2020, item 694);
7. Act of 16 April 2020 on specific support instruments in connection with the spread of SARS-CoV-2 virus (Journal of Laws of 2020, no. 2020, item 695);
8. Act of 14 May 2020, amending certain acts in the field of protective measures in connection with the spread of SARS-CoV-2 virus (Journal of Laws of 2020, no. 2020 item 875);
9. Act of 28 May 2020, amending the Corporate Income Tax Act, the Goods and Services Tax Act, the Act on the Exchange of Tax Information with Other Countries and Certain Other Acts, Journal of Laws No. 2020 item 1106;
10. Act of 19 June 2020 on interest subsidies for bank loans granted to entrepreneurs suffering from the effects of COVID-19 and on simplified proceedings for approval of an arrangement in connection with the occurrence of COVID-19 (Journal of Laws of 2020, item 1086);
11. Act of 14 August 2020, amending the Act on special solutions related to the prevention, prevention and combating of COVID-19, other infectious diseases and emergencies caused by them, and the Act amending the Act on special solutions related to the prevention, prevention and combating of COVID 19, other infectious diseases and crises caused by them and certain other acts, (Journal of Laws No. 2020, item 1478. Effective 4 September 2020);
12. Act of 17 September 2020 amending the Act on special solutions related to the prevention, prevention and combating of COVID-19, other infectious diseases and crises caused by them. And some other acts (Journal of Laws No. 2020 item 1639);
13. Act of 9 December 2020 amending the Act on special solutions related to the prevention, prevention and combating of COVID-19, other infectious diseases and crises caused by them and some other acts (Journal of Laws. 2020 item 2255);
14. Act of 28 November 2020, amending the act on personal income tax, the act on corporate income tax, the act on flat-rate income tax on certain revenues earned by natural persons and some other acts (Journal of 2020 item 2123);
15. Act of 21 January 2021 amending the act on special solutions related to the prevention, prevention and combating of COVID-19, other infectious diseases and crises caused by them, and some other acts (Journal of Laws No. 2021 item 159).
16. Act of 16 April 2020, on special support instruments connected with the spread of SARS-CoV-2 virus, Journal of Laws of 2020, item 695.

17. BIP Kraków (2020). „Kultura odporna” <https://www.bip.krakow.pl/?dok_id=124316> [20.02.2021];
18. Biznes.gov.pl (2021). *Lista kodów PKD*, <<https://www.biznes.gov.pl/pl/tabela-pkd>> [15.05.2021];
19. Commission Notice (2020): Temporary framework for state aid measures to support the economy in the context of the ongoing COVID-19 epidemic (consolidated version). Authentic versions of the temporary framework for State aid measures adopted on 19 March 2020 (C (2020) 1863) and their revisions: C (2020) 2215 of 3 April 2020, C (2020) 3156 of 8 May 2020, C (2020) 4509 of 29 June 2020, C (2020) 7127 of 13 October 2020 and C (2021) 564 of 28 January 2021 have been published in the Journal of the European Union. https://ec.europa.eu/competition/state_aid/what_is_new/covid_19.html [Access: 20.02.2021];
20. Culture Zone Wrocław (2021). *Dokumenty*. <http://https://strefakultury.pl/programy/wroclawski-program-wydawniczy/dokumenty/> [20.02.2021];
21. Gdynia.pl (2020). *Falochron dla kultury*. <https://www.gdynia.pl/koronawirus,8402/falochron-dla-kultury,548797> [20.02.2021].
22. Katowice.eu, 2020. *Katowicki Pakiet dla Kultury*. Data publikacji: 23.04.2020. <<https://www.katowice.eu/dla-mieszka%C5%84ca/aktualnosci?ItemID=4096&ListID={75169DCB-89EF-46CD-A876-165C1E838909}>> [20.02.2021];
23. MCNH (2020a) / Ministry of Culture and National Heritage (2020a). *Ponad 5 mld zł na wsparcie kultury w Polsce. Trwa stopniowe odmrażanie sektora*. Data publikacji: 07.07.2020. <<https://www.gov.pl/web/kulturaisport/ponad-5-mld-zl-na-wsparcie-kultury-w-polsce-trwa-stopniowe-odmrazanie-sektora>> [22.05.2021];
24. MCNH (2020b) / Ministry of Culture and National Heritage (2020a). *20 mln zł na stypendia dla artystów! Rozstrzygnęliśmy II część programu Kultura w sieci*. Data publikacji: 22.05.2020 <<https://www.gov.pl/web/kulturaisport/20-mln-zl-na-stypendia-dla-artystow-rozstrzygnelismy-ii-czesc-programu-kultura-w-sieci2>> [20.05.2021];
25. MCNH (2021a) / Ministry of Culture and National Heritage (2021a). *Tarcza antykryzysowa dla kultury*. <<https://www.gov.pl/web/kultura/tarcza-antykryzysowa-dla-kultury2>> [20.02.2021 and 20.05.2021];
26. MCNH (2021b) / Ministry of Culture and National Heritage (2021b). *Wsparcie Ministra Kultury i Dziedzictwa Narodowego*. <<https://www.gov.pl/web/kulturaisport/wsparcie-ministra-kultury-i-dziedzictwa-narodowego>> [20.02.2021 and 20.05.2021];
27. MCNH (2021c) / Ministry of Culture and National Heritage (2021c). *Dodatkowe działania MKiDN*. <<https://www.gov.pl/web/kulturaisport/dodatkowe-dzialania-mkidn>> [20.02.2021 i 20.05.2021];
28. MCNH (2021d) / Ministry of Culture and National Heritage (2021d). *Wsparcie Branżowe i Środowiskowe*. <<https://www.gov.pl/web/kulturaisport/wsparcie-branzowe-i-srodowiskowe>> [20.02.2021 and 20.05.2021];
29. MCNH (2021e) / Ministry of Culture and National Heritage (2021e). *Samorzędy* <<https://www.gov.pl/web/kulturaisport/samorzady>> [20.02.2021 and 20.05.2021];



30. MCNH (2021f)/ Ministry of Culture and National Heritage (2021f), *UE* < <https://www.gov.pl/web/kulturasport/ue>> [20.02.2021 and 20.05.2021];
31. MCNH (2021g)/ Ministry of Culture and National Heritage (2021g). *Banki, Fundacje* <<https://www.gov.pl/web/kulturasport/banki-fundacje-ngo>> [20.02.2021 i 20.05.2021]
32. MCNH (2021h)/ Ministry of Culture and National Heritage (2021h). *Program wsparcia dla NGO* < <https://www.gov.pl/web/kulturasport/program-wsparcia-dla-ngo>> [20.02.2021 and 20.05.2021];
33. MCNH (2021i)/ Ministry of Culture and National Heritage (2021i), *Uczelnie Artystyczne* < <https://www.gov.pl/web/kulturasport/uczelnie-artystyczne3>> [20.02.2021 and 20.05.2021];
34. NCC (2020a) / National Cultural Centre (2020a). *Kultura w sieci – nowy program dotacyjny!* < <https://nck.pl/dotacje-i-stypendia/dotacje/programy-dotacyjne-nck/kultura-w-sieci/aktualnosci/kultura-w-sieci-nowy-program-dotacyjny>> [10.04.2020];
35. NCC (2020b) / National Cultural Centre (2020b). *Program dotacyjny „Kultura w sieci”. NABÓR WNIOSKÓW.* <<https://nck.pl/dotacje-i-stypendia/dotacje/programy-dotacyjne-nck/kultura-w-sieci/aktualnosci/nabor-wnioskow-2020>> [10.04.2020];
36. NNF (2021) / National Institute of Freedom (2021). *Program COVID-19.* <<https://niw.gov.pl/nasze-programy/program-covid-19/>> [20.02.2021];
37. Notice from the Commission on the notion of state aid within the meaning of Art. 107 paragraph. 1 of the Treaty on the Functioning of the European Union (C/2016/2946, OJ C262, 19.7.2016, p. 1–50) <https://eur-lex.europa.eu/legal-content/PL/TXT/?uri=CELEX%3A52016XC0719%2805%29> [Access: 20.02.2021];
38. Ordinance of the Minister of Science and Higher Education of 16 August 2006, detailing the conditions and procedure for granting and paying the Minister's scholarship for academic achievements and the Minister's scholarship for outstanding sports achievements (Journal of Laws No. 153, item 1093);
39. Pomorskie.eu (2020) / Pomeranian Voivodeship Portal (2020). *Uwaga artyści! Samorząd województwa ma dla was stypendia. Można dostać nawet 5 tys. zł.* Data publikacji: 03.07.2020 < <https://pomorskie.eu/uwaga-artysci-samorzad-wojewodztwa-ma-dla-was-stypendia-mozna-dostac-nawet-5-tys-zl/>> [20.02.2021];
40. Portal the city of Gdańsk (2020). *Stypendium Kulturalne Miasta Gdańska.* Data publikacji: 30.04.2020. <<https://www.gdansk.pl/urząd-miejski/biuro-prezydenta-ds-kultury/stypendium-kulturalne-miasta-gdanska,a,170012>> [20.02.2021];
41. Poznan.pl (2020). *Poznań Wspiera - pakiet działań w trosce o ludzi kultury.* Data publikacji: 30.04.2020. < <https://www.poznan.pl/mim/info/news/poznan-wspiera-pakiet-dzialan-w-trosce-o-ludzi-kultury,146625.html>> [20.02.2021];
42. Regulation of the Council of Ministers of 31 March 2020, on the establishment of certain restrictions, orders and bans in connection with an epidemic (Journal of Laws 2020, No. 2020 item 566);
43. Regulation of the Council of Ministers of 10 April 2020, on the establishment of certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws No. 2020 item 658);



44. Regulation of the Council of Ministers of 19 April 2020, on the establishment of certain restrictions, orders and bans in connection with an epidemic (Journal Of Laws 2020, item 697).
45. Regulation of the Council of Ministers of 2 May 2020 on the establishment of certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws No. 2020, item 792);
46. Regulation of the Council of Ministers of 16 May 2020 on establishing certain restrictions, orders and bans in connection with an epidemic (Journal of Laws No. 2020, item 878).
47. Regulation of the Council of Ministers of 29 May 2020 on establishing certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws No. 2020, item 964);
48. Regulation of the Council of Ministers of 19 June 2020 on the establishment of certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws 2020, No. 2020 item 1066);
49. Regulation of the Council of Ministers of 7 August 2020, on the establishment of certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws 2020, No. 2020 item 1356);
50. Regulation of the Council of Ministers of 30 September 2020 on financial support for entities conducting cultural activity in the field of theatre, music or dance (Journal of Laws 2020, item 1729);
51. Regulation of the Council of Ministers of 1 December 2020 on establishing certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws No. 2020 item 2132);
52. Regulation of the Council of Ministers of 21 December 2020, on the establishment of certain restrictions, orders and bans in connection with an epidemic (Journal of Laws 2020, No. 2020 item 2316);
53. Regulation of the Council of Ministers of 19 January 2021 on support for participants in economic transactions affected by the COVID-19 pandemic (Journal of Laws No. 2021 item 152);
54. Regulation of the Council of Ministers of 29 January 2021 amending the regulation on the establishment of certain restrictions, orders and bans in connection with the occurrence of an epidemic (Journal of Laws No. 2021 item 207);
55. Regulation of the Council of Ministers of 11 February 2021 amending the regulation on the establishment of certain restrictions, orders and bans in connection with an epidemic (Journal of Laws No. 2021 item 267);
56. Regulation of the Council of Ministers of 26 February 2021 on the establishment of certain restrictions, orders and bans in connection with an epidemic (Journal of Laws 2021, 2021 item 367);
57. Regulation of the Council of Ministers of 26 February 2021, on support for participants in economic transactions affected by the COVID-19 pandemic (Journal of Laws of 2021, No. 2021, item 371);
58. Regulation of the Minister of Culture and Cultural Heritage of 24 May 2012 on the detailed rules and procedure for granting scholarships to persons involved in artistic



- creation, promotion of culture and care of monuments, and the amount of these scholarships (Journal of Laws of 2012, item 612);
59. Regulation of the Minister of Culture and National Heritage of 2 April 2020, on financial support for natural persons, legal persons or organisational units without legal personality to change the form of disseminating creative or artistic activity during the period of an epidemic threat or state of an epidemic (Journal of Laws of 2020, item 583).
 60. Regulation of the Minister of Culture, National Heritage and Sport of 30 October 2020 on financial support for authors and artists in the form of social assistance (Journal of Laws No. 2020 item 1938);
 61. Regulation of the Minister of Health of 13 March 2020 on the declaration of an epidemic threat in the territory of the Republic of Poland (Journal Of Laws 2020, item 433);
 62. Regulation of the Minister of Health of 20 March 2020 on the announcement of an epidemic in the territory of the Republic of Poland (Journal of Laws No. 2020 item 491);
 63. Sopot.pl (2020a). *Sopocka kultura – wsparcie dla artystów, funkcjonowanie instytucji w nowej rzeczywistości*. Data publikacji: 29.04.2020. <<https://www.sopot.pl/aktualnosc/8210/sopocka-kultura-wsparcie-dla-artystow-funkcjonowanie-instytucji-w-nowej-rzeczywistosci>> [20.02.2021];
 64. Sopot.pl (2020b). *Sopot wspiera lokalne księgarnie*. Data publikacji: 06.04.2020. <<https://www.sopot.pl/aktualnosc/8167/sopot-wspiera-lokalne-ksiegarnie>> [20.02.2021];
 65. uml.pl (2020). *"Zdrowa kultura". Wsparcie w czasie epidemii*. Data publikacji: 20.04.2020, <<https://uml.lodz.pl/aktualnosci/artykul/zdrowa-kultura-wsparcie-w-czasie-epidemii-id34097/2020/4/20/>> [20.02.2021];
 66. wPolityce.pl (2021). *Kultura w czasie pandemii. Wicepremier Gliński o wsparciu sektora: Nikt nie został sam, ponieważ każdy mógł dostać pomoc*. Data publikacji: 24.02.2021. <<https://wpolityce.pl/kultura/540616-kultura-w-czasie-pandemii-glinski-nikt-nie-zostal-sam>> [30.04.2021];
 67. Wrocław.pl (2020). *Wrocławski Program Interwencji Społecznej. 1% stawki czynszu za pracownie artystów*. Data publikacji: 2020-04-30 <<https://www.wroclaw.pl/wroclawski-program-interwencji-spoecznej-1-procent-stawki-czynszu-za-pracownie-artystow>> [20.02.2021].



**SUPPORTING ENTREPRENEURSHIP AND INNOVATION IN HIGHER
EDUCATION INSTITUTIONS FROM THE REPUBLIC OF MOLDOVA**

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ABSTRACT

Education is a fundamental component that contributes to the formation of human personality. The nation's ability to prosper and to thrive in an increasingly knowledge-based global society and economy depends on our having a progressively well-educated population. In the current period, taking into account the varied educational offers from universities, in order to be competitive on the market of higher educational services, it is necessary to be innovative and open to entrepreneurship. The purpose of this article is to explain the innovative and entrepreneurial approach of universities in the context of the knowledge economy, to describe the main specific activities, to emphasize the importance of the link between the educational environment and the professional environment. Higher education institutions from the Republic of Moldova offer excellent examples of what it means to be innovative and entrepreneurial, and promote entrepreneurial mindsets, entrepreneurship and knowledge exchange. The strategies of higher education institutions are based on creating value by offering innovative services and products, developing modern teaching-learning processes and applying business models that respond to economic, social and environmental needs. The major challenge for Higher Education Institutions from the Republic of Moldova is to strengthen the anchorage of value creation processes in education and research. This can be achieved by stimulating interdisciplinarity, developing entrepreneurship in all areas, actively engaging researchers and students worldwide, and providing growth-oriented support for startups. In this context, we must also mention the importance of public-private partnerships between universities and the business environment in the context of facilitating the transition on the labor market of young specialists with higher education. According to preventive results, in comparison with other countries, the Republic of Moldova still has much to learn in terms of innovative and entrepreneurial orientation of universities. However, the results that are today recorded at the national and organizational level indicate a high degree of flexibility and quality of the study programs, as well as the tendency to correlate the educational supply with the demand for the labor force. To exemplify these approaches, the authors of the paper present data on the projects implemented by moldovan universities, as well as the number of enterprises created by students and alumni.

Keywords: innovation, entrepreneurship, higher education institution, knowledge economy, education, economic development

1. INTRODUCTION

In recent years, the theory of knowledge economy and Information Society has been actively developing. In these conditions, the need for the transformation of universities arises in the framework of these trends, the problem of transformation and improvement of universities. Their function is not only to provide new knowledge and achieve the link between teaching staff and students, but it becomes a complex one, namely participation in the system of innovation and technological transfer.

The development of the global economy forces the university to adapt to this unstable and ever-changing environment. The university is forced to rebuild to meet the challenges of the external environment in order to ensure competitiveness in the international educational market. The globalization of the economy and the internationalization of education create prerequisites for the university to think about its internal restructuring, change of strategic objectives, increase the efficiency of its activities both to provide better educational services and to influence the economy with current challenges.

The improvement of higher education institutions implies the adoption of entrepreneurial characteristics, combined with a lot of creativity and spirit of innovation.

2. LITERATURE REVIEW

In the literature there are many approaches to the entrepreneurial universities phenomenon, as can be seen in Table 1.

Table 1. Referential frame of Entrepreneurial University

Author/Year	Definition
Etzkowitz (1983)	Universities that are considering new sources of resources such as patents, research by contract and partnerships with private companies.
Chrisman et al. (1995)	The Entrepreneurial University involves the creation of new enterprises by university professors, technicians or students.
Kirby (2002)	Entrepreneurial Universities have the capacity to innovate, recognize and create opportunities, work as a team, take risks and respond to challenges.
Etzkowitz (2003)	The Entrepreneurial University is a natural incubator, providing support structures for professors and students to begin new intellectual and commercial enterprises.
Jacob, Lundqvist, & Hellsmark (2003)	An Entrepreneurial University is based both on the commercialization of personalized education courses, consultancy services and extension activities and on commoditization (patents or startups).
Salamzadeh et al. (2011)	A dynamic system that includes special contributions (resources, culture, rules and regulations, structure, mission, business capacities and expectations from society, industry, government and the market); processes (teaching, research, management processes, logistical processes, commercialization, selection, financing and financial processes, networking, multilateral interaction and innovation, research and development activities; outputs (entrepreneurial human resources, effective research according to the needs of the market, innovations and inventions, entrepreneurial networks and entrepreneurial centers) and aims to mobilize all its resources, skills and capacities to fulfill its "third mission".

As we can see from the analysis of the definitions summarized in Table 1, many characteristics of Entrepreneurial University are attested. The first characteristic deals with the entrepreneurial activities of community members (academics and professors) and is found in the definitions that contemplate the entrepreneurial actions of the university's members towards the environment in which these ones are or will be inserted.

Other features of entrepreneurial universities refer to the following:

- *Interaction*: the entrepreneurial university interacts closely with the industry and government;
- *Independence*: the entrepreneurial university is a relatively independent institution; it is not a dependent creature of another institutional sphere;
- *Hybridization*: the resolution of the tensions between the principles of interaction and independence allows to create hybrid organisational forms to realize both objectives simultaneously;
- *Reciprocity*: there is a continuing renovation of the internal structure of the university as its relation to industry and government changes.

Closely related to the notion of an entrepreneurial university is the notion of a triple Helix model. This model consists of three components: Academia (i.e. educational institutions of higher learning - colleges and universities), government (national, provincial and municipal), and industry (e.g. private corporations, partnerships, or sole proprietorships). Triple helix of innovation is a process by which academia, government, and industry collaborate, i.e. engage in a process of mutually beneficial leveraging of resources, to create or discover new knowledge, technology, or products and services.

According to Etzkowitz (2008), the triple helix is “a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalization”. The first dimension of the triple helix model is internal transformation in each of the helices, the second is the influence of one helix upon another and the third dimension is the creation of a new overlay trilateral networks and organizations from the interaction among the three helices, formed for the purpose of coming up with new ideas and formats for high-tech development.

In the literature can be identified several triple helix models - static model, laissezfaire model, interaction model and circulation model. Individual models differ in the character of relationships.

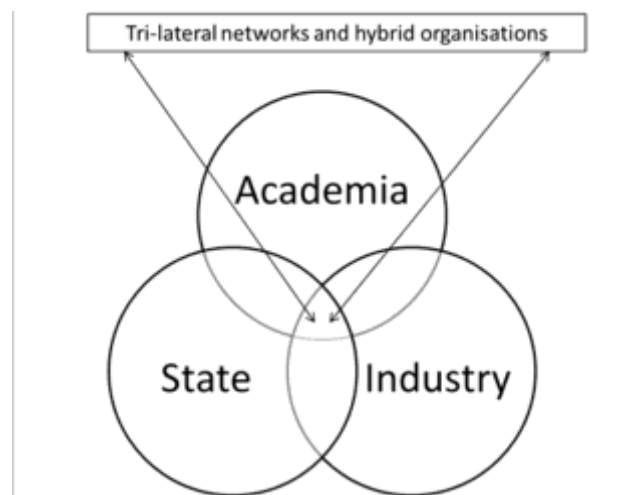


Figure 1. Triple Helix model (Etzkowitz: 2003)

According to this model, the characteristics of an entrepreneurial university are:

1. Capitalizing on knowledge that is created and disseminated for use in practice and for disciplinary development. Knowledge is the basis of social and economic development, which means the growing importance of all functions of the University in society.
2. The university works closely with business and the state.
3. Entrepreneurial university is a relatively independent institution, not a structure generated and dependent on other institutional spheres.
4. The conflict between the principles of independence and interdependence leads to the emergence of hybrid forms corresponding to the realities of society in a specific place and at a specific time.
5. Reflexivity, characteristic of an entrepreneurial university, leads to internal renovation and revision of the University's relationship with business and the state.

This model describes the dynamics of the development of the university by stages and formulates the principles of building a modern entrepreneurial university:

1. The ability of academic leadership to define strategic objectives and achieve them;
2. Legal control over academic resources, including real estate and intellectual property;
3. Organizational capacity for technology transfer through patenting, licensing and incubators;
4. Corporate entrepreneurial ethics among representatives of the administration, faculty, students (Etzkowitz: 2008).

Entrepreneurial ecosystems are made up of individuals and legal entities that have tangent with entrepreneurship. The main components and main actors of entrepreneurial ecosystems are illustrated in Figure 2.

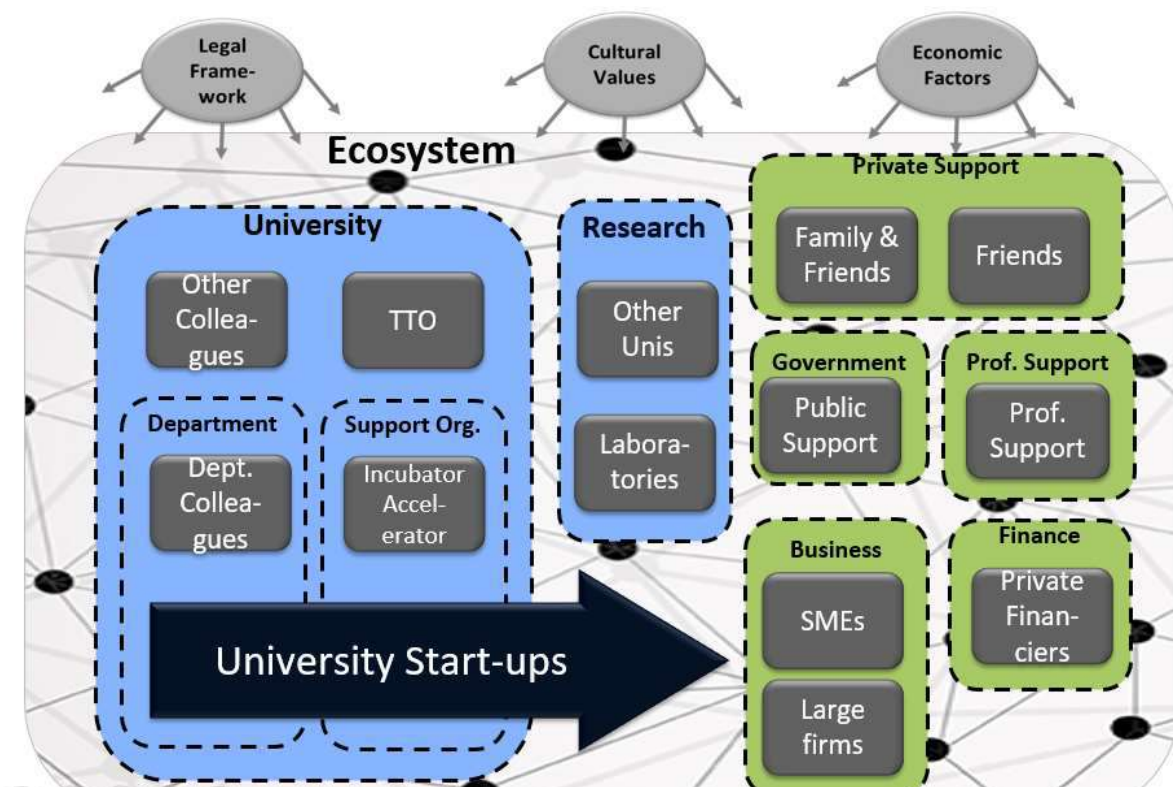


Figura 2. Start-up supporting actors in the ecosystem (Etzkowitz: 2003)

At the center is the entrepreneur who founds a startup or spinoff and wants to grow it successfully in the market.

The blue ellipses are environmental factors (macro level) that differ in each region and determine the conditions in which entrepreneurial activities take place

The gray boxes are actors who directly support - to varying degrees - the entrepreneurs and his new venture. These actors are divided into various fields (green).

Ecosystems therefore differ in each region according to:

- a) degree of support received from these different actors;
- b) different characteristics of the environmental factors influencing the activities.

Following this model, each start-up ecosystem is unique in a way of exhibiting different characteristics in terms of a) the contextual factors providing the conditions in which entrepreneurial activities take place, b) the degree of support the entrepreneur receives from the different actors/institutions, and c) the degree and nature of interrelations among the support actors in the ecosystem.

3. EXAMPLES OF ENTREPRENEURIAL UNIVERSITIES AT INTERNATIONAL LEVEL

In Germany there are some examples of universities that want to develop entrepreneurial skills among both students and existing and potential entrepreneurs outside the University.

In Munich, UnternehmerTUM promotes skill development and supports the development of new firms.

The University of Jena, Germany, also recognizes the value of developing entrepreneurial skills among students and academic staff. The university established the Center for Entrepreneurship (CpA). It is an interdisciplinary center with the aim of promoting entrepreneurship and is an integral part of the University's technology transfer office, not being an academic department. CpA organizes entrepreneurial education activities, provides support for start-ups and facilitates interaction between the large entrepreneurial community and the University.

Its main activities include:

- planning and organizing courses and workshops relevant to entrepreneurship;
- organization of activities promoting self-employment as a viable professional choice;
- providing consulting and coaching services for future entrepreneurs;
- facilitating contacts with third parties such as business support providers, financiers and firms;
- organization of mentors for future entrepreneurs;
- building and maintaining regional networks to promote links between universities and industry.

The "Support for Entrepreneurship" Program at Aalborg University (SEA) also tries to present students with entrepreneurial options by providing training, guidance, coaching and, above all, assisting access to networks. SEA operates an incubator program that puts the entrepreneur in touch with people with specific knowledge. This can help the entrepreneur to further develop his business idea. In addition, the entrepreneur can be put in touch with other students with different professional skills to challenge their expectations and thinking patterns in relation to their business idea.



Students of many universities are taught how to launch their own business and how to manage it effectively. Finding a suitable space in which to grow their company can be a challenge for many entrepreneurs, especially when they are individual entrepreneurs. Numerous initiatives have been developed to meet this challenge either by developing new facilities or by renovating existing properties, which can also contribute to the regeneration of operating facilities. An example of a successful approach in this area is IndyCube in Wales, a common space for offices and collaborative communities. Individuals and companies can book an office or meeting room, get business support or financial advice and take advantage of free Wi-Fi, tea and coffee. Like many other similar service providers, Indycube also currently offers access to several specialized spaces, such as workshops equipped for woodworking and light engineering, photo studios and "fab labs" equipped with 3D printers, laser cutting machines and other production tools. Services are booked daily or hourly and therefore provide local businesses with access to resources when needed, reducing the overall costs of the firm. Businesses can also join the Indycube community which offers free access to many facilities, a schedule of events and the opportunity to connect with other local businesses.

4. ENTREPRENEURIAL INITIATIVES OF UNIVERSITIES FROM THE REPUBLIC OF MOLDOVA

The integration of universities in the Republic of Moldova into entrepreneurial ecosystems is an image factor, but also an element of responsibility towards society. Aware of the importance of the development of entrepreneurial ecosystems at university level, but also the role of universities in the development of local ecosystems, the International Consortium of the SMART Project, co-financed by the European Union, through the ERASMUS+ program, has proposed the development of institutional capacities, in this area, of 7 universities from the Republic of Moldova, Armenia, Belarus. With the support of the SMART Project, teachers were trained in order to increase the quality of teaching entrepreneurship disciplines, training materials were developed, the university curriculum was modified. At the same time, the international network of SMART cafes was created, located in the 7 universities, through which universities are committed to giving impetus to innovations by supporting startups, but also by strengthening connections with the real sector and involving academic potential in innovative processes at the company level. SMART cafes are both physical spaces and entrepreneurial skills development programs, which include training, mentoring, consulting, coworking activities. Through the activities organized within the project, conditions have been created for the development of models of recovery by universities of the position of center, around which local entrepreneurial ecosystems develop (Bucos: 2021).

The talent, potential, and aspirations of young people in the Republic of Moldova are premises that allow the development of dynamic and profitable sectors of national economy. Tekwill Center, created by the Technical University of Moldova, focuses its efforts on encouraging entrepreneurship among the new generations. In the 2021-2022 school year, with the support of the project in 4 universities in Chisinau, Balti, Comrat, and Cahul that teach IT or related fields, entrepreneurship will be taught – one of the investment directions of the project, with the support of USAID development partners and Sweden.

Promoting of entrepreneurship culture in the Republic of Moldova will generate positive results if it is correlated with the education of young people and the development of related skills. The integration of a dedicated course in the field is more than a necessity for future specialists, as Moldovan universities face various challenges related to change or performance. It is necessary for students to learn more about entrepreneurship, to change the views, knowledge and skills of the younger generation. Now, future professionals need



to acquire new skills in order to be more competitive on the labour market and generate innovative and useful products for society.

CONCLUSIONS

It is currently widely accepted that it is not possible to simply copy successful practices from elsewhere. Efforts to promote entrepreneurship must be adapted to the specific needs, conditions and cultures of each area. This article highlighted examples that have been successfully adopted by universities in different countries to promote entrepreneurial culture and build an integrated entrepreneurial support system.

So that the idea of the entrepreneurial university can be successfully implemented in higher education in the Republic of Moldova, we can mention the following factors that characterize the success of these initiatives, namely:

- meeting a recognized need in its own area of action;
- providing the means to bring together students, firms and suppliers;
- providing services that recognize the practical requirements of customers;
- adapting the offer to meet the interests and needs of companies, students and potential entrepreneurs;
- knowledge of our own customer base and the necessary efforts to provide customized solutions within global programs;
- a long-term approach that provides long learning opportunities and allows the institutions involved to build a positive reputation and sustainability.

BIBLIOGRAPHY

- Bucos, T. (2021). A conceptual approach to the role of universities in the entrepreneurial ecosystem. *Journal „ECONOMICA”* nr.3 (117).
- Chrisman, J. J., Hynes, T., & Fraser, S. (1995). Faculty entrepreneurship and economic development: The case of the University of Calgary. *Journal of business venturing*, 10(4), 267-281.
- Etzkowitz, H. (1983). Entrepreneurial scientists and entrepreneurial universities in American academic science. *Minerva*, 21(2), 198-233.
- Etzkowitz, H. (2003). Research groups as ‘quasi-firms’: the invention of the entrepreneurial university. *Research policy*, 32(1), 109-121.
- Etzkowitz, H. (2008) *Triple Helix. University – Industry – Government. Innovation in Action*. New York: Routledge.
- Jacob, M., Lundqvist, M., & Hellsmark, H. (2003). Entrepreneurial transformations in the Swedish university system: The case of Chalmers University of Technology. *Research Policy*, 32(9), 1555-1569.
- Kirby, D. A. (2002). Entrepreneurship education: can business schools meet the challenge?, *International Council for Small Business – the 47th World Conference*. San Juan, 16-19 June.
- Klein, S. (2020) Entrepreneurial university: conceptions and evolution of theoretical models. *Revista Pensamento Contemporâneo em Administração*, vol. 14, núm. 4, pp. 20-35.



Salamzadeh, A., Salamzadeh, Y., & Daraei, M. (2014). Toward a systematic framework for an entrepreneurial university: a study in Iranian context with an IPOO model. *Global Business and Management Research: An International Journal*, Vol. 3; No.1.



NIETZSCHE'S IMAGE OF THE SUPERMAN AND THE IDEA OF MAN OF THE NOOSPHERE REALITY OF V. VERNADSKY

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ABSTRACT

Theses reveal the Nietzschean image of the superman, who by vocation of destiny, must be in constant motion on the path of self-improvement not only body but also spirit and mind, what, according to Nietzsche, can be achieved through the will to power over themselves.

For F. Nietzsche, the superman is the result of cultural and spiritual improvement of man, a type that far exceeds modern man in its intellectual and moral qualities. F. Nietzsche thought the emergence of the superman as a long process of self-determination, as a celebration of the spiritual nature of man.

He connection between F. Nietzsche's idea of the superman and W. Vernadsky's doctrine of the noosphere man is determined.

It is concluded that F. Nietzsche's idea of the superman does not contradict the scientific views of modern thinkers about the ways and directions of evolution of intelligent man. That is why modern man feels the need to master the creative heritage of F. Nietzsche to improve their qualities.

Key words: biological evolution, V. Vernadsky, man of the future, man of noosphere reality, naturalism, Nietzschean image of the superman, F. Nietzsche.

INTRODUCTION

F. Nietzsche's idea of the superman is set forth in his most famous work, «Thus Spoke Zarathustra». This book has a deep subtext, which is contained in its subtitle: «For all and for no one».

It is necessary to take into account the preconditions for the appearance of this work. In the early 1880's, F. Nietzsche was in a prolonged depression caused by his serious illness. Hence the form of presenting the material in the form of a philosophical confession for oneself, behind which physical pain and moral suffering were hidden. All this inspired him to think about the need for a person to achieve inner harmony: with the help of his own willpower, to be able to realize his true «I», working on himself, to actually discover it in himself. According to F. Nietzsche, this can be achieved through the will to power over themselves.

This fundamental leitmotif of Nietzsche's book has not lost its theoretical relevance and practical significance both in the last century and at the present stage of globalization in the transition from fifth-wave information and communication technologies to sixth-wave cognitive-cybernetic technologies.

We are talking, in particular, about the spread in the scientific literature of the transhumanist (posthumanistic) image of man from the machine, which appears as a futurology, tangent to the semi-realistic, semi-mythological prospects of understanding the technological singularity.

In view of this, to understand how transhumanist views correspond to human nature, it is appropriate to turn to V. Vernadsky's doctrine of noosphere man, based on naturalism, biological evolution and geological process, which determines almost all human parameters: its anatomy, physiology, nervous system, physical data, mental and labor. In other words, we are talking about the intelligent man as a kind specie of animal world and part of living matter.

RESEARCH AND FINDINGS

The preface to Nietzsche's book contains the following sentence: «Man is a rope stretched between an animal and a superman. Rope over the abyss. It is dangerous to pass, it is dangerous to be on the road, dangerous to look back, dangerous to fear and stopping ...» (*Nietzsche*) (fig. 1).

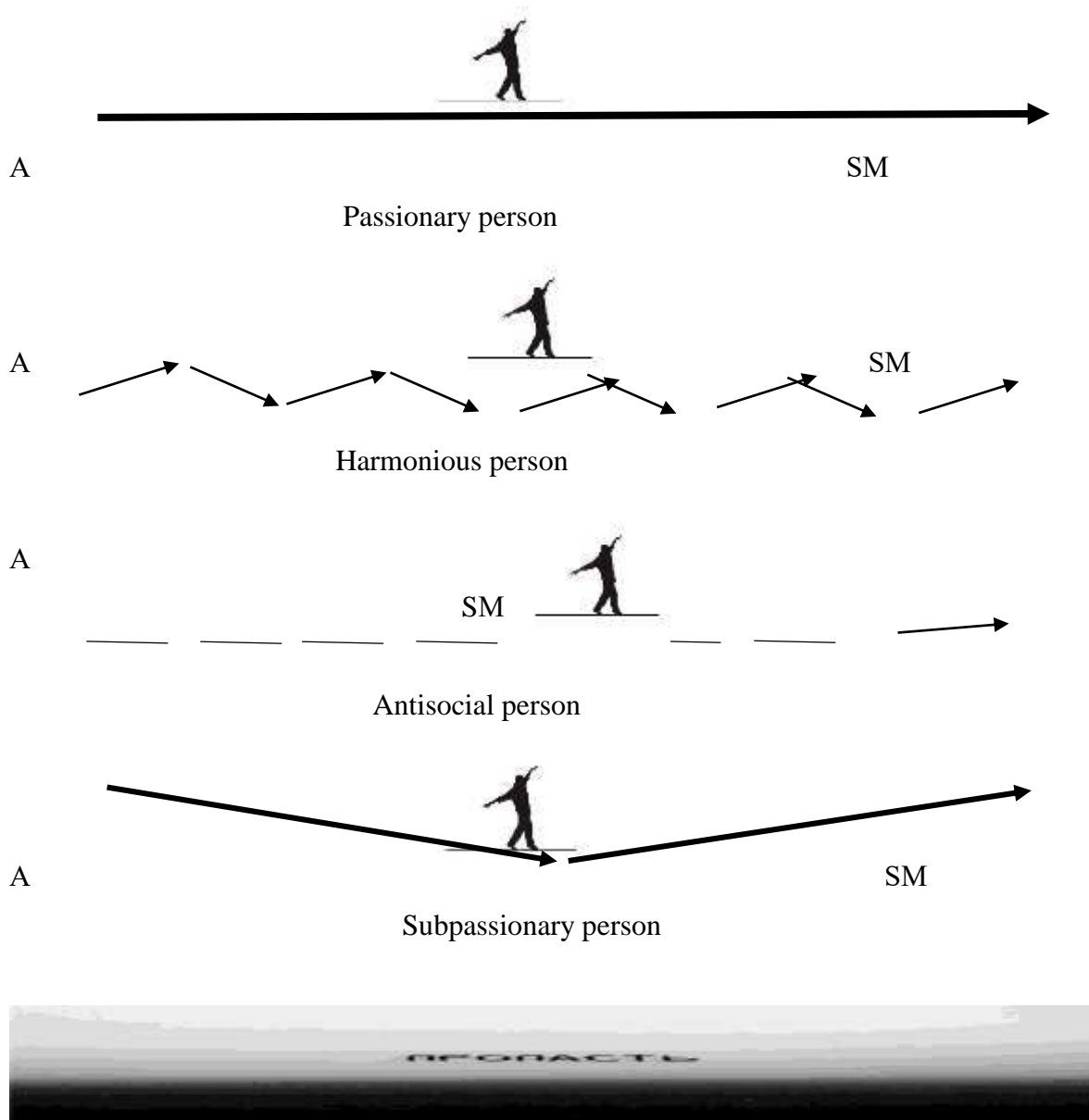


Fig. 1. «Transition» of man from animal (A) to superman (SM)
 Source: compiled using: (*Nietzsche; Gumilev, p. 265*).

Having embarked on this path, man, according to Nietzsche, must go through three stages of spiritual development: of «camel», «lion», «child» (tab. 1).

Table 1

Degrees of spiritual development of the man*

Degree of spiritual development	Sign of classification (degree of humanization)	Essential characteristics of the degree of spiritual development
«Camel»,	Low	A man burdened with traditions and attitudes of culture
«Lion»	Average	A man who denies himself as a camel, that is, gives up everything on which he depends
«Child»	High	Man, open to everything new, a blank sheet, makes his own laws and governs his will

* Source: compiled and supplemented on the basis of: (*Nietzsche*).

But what can a child do that not even a lion could do? Why should a predatory lion become a child? The child is innocence and oblivion, a new beginning, a game, the very rolling wheel, the initial movement, the sacred word of affirmation. Yes, for the game of creation, you need the holy word of affirmation: now the spirit wants its will, its world finds the lost world. I called you three transformations of the spirit: how the spirit became a camel, a lion a camel and, finally, a lion a child – notes Nietzsche.

Only the spiritual attitude of man depends on the degree of development he will reach. As you know, the spiritual qualities of man are the result of education, historical and personal experience and are not inherited in contrast to physiological and psychological properties, so they are quite mobile and changeable. No wonder K. Jaspers compared the spiritual system of man with a thin shell over the crater of a volcano. It may happen, he noted, that this shell will be dropped, which threatens the human community to turn back to the people of the Stone Age (*Jaspers, p. 56*).

Man, according to Nietzsche, is something that must surpass. What did you do to surpass her? All beings have so far created something above themselves, and you want to be an ebb of this wave and return to the state of the beast rather than defeat man? (*Nietzsche*) (fig. 2).

1.	To break the shackles of non-freedom and superstition, to rise above oneself higher and higher on the steps of the spirit, experiencing life with the ultimate force of the tension of passion (kinship with the concept of ethnogenesis L. Gumilev)
2.	The highest type of personality is a superman, freed from erroneous values, free in spirit and heart, full of will (power of energy) to life, tireless in moving upwards, to his true «I»
3.	Superman – a category not social, national, but spiritual – is a prototype of the limit, which is available to the development of personality (connection with the ideas of E. Fromm and A. Schopenhauer)
4.	The human desire to surpass myself contributes to the birth of a new aristocracy, the opponent of all that is the crowd and all despotism, which on the new tablets will write the word «noble» (aristocrat of spirit, not titled)

Fig. 2. Which means, according to F. Nietzsche, «to surpass man»

Source: compiled and supplemented on the basis of: (*Nietzsche*).

To the doctrine of progressive development, which prevailed in the minds of Europeans with the advent of the Enlightenment, F. Nietzsche contrasted the doctrine of eternal return, the cyclical nature of any development. Only the superman is able to readily accept the endless return of the once experienced, including the most bitter moments.

In the most general sense, a superman is one who lives according to the requirements of his nature. A superman is a person who has managed to overcome the fragmentation of his existence, who has regained the world and looked up over its horizon. The superman, according to F. Nietzsche, is the essence of the Earth, in which nature finds its ontological justification. In contrast, the last man represents the degeneration of the human race, living in complete oblivion of its essence, preferring animal existence in comfortable conditions.

As man surpasses the ape, so the superman surpasses man. The «higher man» or «best man» is, on the one hand, the forerunner of the superman, his ancestor, on the other hand, like the silkworm cocoon, the higher man must likewise be destroyed in order for the superman was born.

Nietzsche tried to discover a new state of the human spirit – the superman, which has certain features (fig. 3).

1.	This is a person who manages his own experience, creates his own destiny
2.	He is an «aristocrat» of spirit. The man of the crowd will never become a superman
3.	She does not depend on God, on social and historical constraints
4.	The main value is «noble», that which stands «on the other side of good and evil». Nietzsche protests against the instincts of ordinary life. He must overcome all the trivial and shameful, make a breakthrough to the top of the human spirit. And this ascent is the way «towards one's highest suffering and one's highest hope»
5.	Life is a constant struggle. We must be free to meet life and courageously look into the face of death
6.	The purpose of life – in creative work, the search for truth, in overcoming oneself. But not everyone is capable of this, but only those who are endowed with the «will to power». In essence, this is Nietzsche's call for self-destruction of the «creature» in man for self-creation in him «creator»

Fig. 3. Manifestations of the superman as a new state of the human spirit

Source: compiled and supplemented on the basis of: (Nietzsche).

For Nietzsche, the superman is the result of cultural and spiritual improvement of man, a type that far exceeds modern man in its intellectual and moral qualities.

F. Nietzsche thought the emergence of the superman as a long process of self-determination, as a triumph of the spiritual nature of man.

In the light of Nietzsche's doctrine of the superman, the latter is an image-metaphor, author's heuristics. Therefore, to look for a finished portrait, as well as to guess it, instead of the author, does not make sense. The idea of the superman is an open project that gives space for the flight of thoughts, which do not give any ready-made thoughts. Everyone is free to fill the «vessel» of the superman with his own content

V. Vernadsky approached the assessment of the essential characteristics of the man of the future from other positions. At the heart of his doctrine of the man of the noosphere is naturalism, biological evolution and geological process, which determines almost all the parameters of man: his anatomy, physiology, nervous system, physical data, mental and labor. In other words, it is about the intelligent man as a species of wildlife and part of living matter.

In the midst, in the intensity and complexity of modern life, V. Vernadsky noted, a person practically forgets that he himself and all of humanity, from which he cannot be separated, are inextricably linked with the biosphere – with a certain part of the planet on which they live. They are geologically naturally related to her material and energy structure (Vernadsky).

He noted that a person is usually spoken of as an individual living and moving freely on our planet, who freely builds his story. Until now, historians, scientists in the humanities in general, and to a certain extent biologists, deliberately do not take into account the laws of the nature of the biosphere – that earthly shell where life can only exist. Man cannot be separated from her spontaneously. And this indissolubility is only now beginning to become clear to us for sure. In fact, not a single living organism is in a free state on Earth. All these organisms are inextricably and continuously connected – primarily by nutrition and respiration – with the material and energy environment surrounding them. Outside it, in natural conditions, they cannot exist.

At the same time, V. Vernadsky noted that in the twentieth century «the biosphere acquires a completely new understanding. It manifests itself as a planetary phenomenon of a cosmic nature. In biogeochemistry, we have to take into account that life (living organisms) really exists not only on one of our planets, not only in the terrestrial biosphere. This is established now, in my opinion, without a doubt so far for all the so-called «terrestrial planets», ie for Venus, Earth and Mars» (*Vernadsky*).

Deep and consonant with F. Nietzsche's idea of the superman is the conclusion of V. Vernadsky that «in the geological history of the biosphere before man opens a huge future if he understands this and does not use his mind and his work to self-destruction» (*Vernadsky*).

Against this background, techno-determined images of man and society, relevant to the epoch of the new industrialism, appear quite understandable. Modern technology, it seems, according to K. Schwab, will have the effect of increasing the impact of machine technology on the primordial human essence and beyond recognition will change (and possibly replace, as warn alarmists) the biological nature of the human body. Thus, technique and technology will not only be a continuation and complement of human nature from the outside, but also penetrate into the human body and human «soul» (*Schwab*).

Comparing the scientific ideas about the perfect man F. Nietzsche with the ideas of modern thinkers, it should be noted that they do not contradict each other, as well as do not exhaust the full characteristics of the man of the future.

CONCLUSION

Assessing the significance of Nietzsche's image of the superman for modernity, we must understand that Nietzsche was an untimely man for his time. The epoch lived belief in progress, he regarded his present as the past, sought support in the ideal world, which for the man of his time was a deception, and what Nietzsche's contemporaries perceived as the norm, for him was hypocrisy.

He saw the hypocrisy of the era as a challenge, so he did not want to mislead himself and the people around him. For this reason, one can fully trust the characterization he gave to European society in the late nineteenth century.

That is why modern man feels the need to comprehend the creative heritage of F. Nietzsche, and especially the part of it that relates to the idea of improving human qualities.

As the idea of comprehensive improvement of modern man has acquired universal significance, its systematic study requires the focus of scientists on an interdisciplinary approach, which is actually one of the most promising areas for further research.

Taking into account the social experience that humanity has accumulated, it can be argued that the one who has freedom of thought and independence of action really lives. Man has a purpose



within himself, his goal is life, that is, his unrealized life program, his personal, individual, unique in the universe and not repeated.

REFERENCES

- Gumilev, L N. (1989). *Ethnogenesis and the Earth's Biosphere biosphere*. Moskva: Ayris-Petri.
- Jaspers, K. (1991). *The Origin and Goal of History*. Translated from german. Moskva: Politizdat.
- Nietzsche, Friedrich (2006). *Thus Spoke Zarathustra A Book for All and None*. Edited by Adrian del Caro University of Colorado at Boulder Robert B. PIPPIN University of Chicago. Translated by Adrian del Caro. Cambridge University Press. URL: <http://users.clas.ufl.edu/burt/LoserLit/zarathustra.pdf/> Accessed September 16, 2021.
- Vernadsky, V. I. (2005). *Some Words About The Noosphere*. 21st CENTURY. URL: https://21sci-tech.com/translations/The_Noosphere.pdf. Accessed September 29, 2021.
- Schwab, Klaus (2016). *The Fourth Industrial Revolution: what it means, how to respond* URL: <https://www.weforum.org/agenda/2016/01/thefourth-industrial-revolution-what-it-means-and-how-to-respond/>. Accessed October 29, 2021.



EVALUATION OF CHEMICAL COMPOSITION OF TURKEY'S BREAST MUSCLE FED BY DIFFERENT DIETARY CONCEPTS

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ABSTRACT

Turkey meat has a high nutritional value, primarily due to its high protein content and low fat content, especially present in the chest muscle. The aim of this paper is to investigate the effect of different diet concepts with two different mixtures regarding the origin of proteins on the chemical composition of the large pectoral muscle of turkeys (*Musculus pectoralis superficialis* [MPS]). A total of 30 heads (white and black breed) of domestic turkey offspring in the first 21 days were all fed together with a turkey starter, then from 22 days they were divided into two groups of 15 heads each, where one group in the mixture was fed with a certain percentage of whey powder, and the other with a certain percentage of fish meal (feeding interval up to 100 days). To examine the quality of the meat, the MPS was singled out from randomly selected slaughtered carcasses from both groups of turkeys (6 samples in total). Chemical analyses (dry matter, proteins, ash and fats) were performed in accordance with the regulations of the (AOAC, 1990). From the examinations of the chemical composition of the large pectoral muscle, the analyses showed a higher value for the proteins and fats in the meat of the turkeys fed with whey powder. There are no significant differences in the chemical parameters of ash and moisture between the two groups of turkeys. At the same time, protein and fats differed significantly in turkeys fed fishmeal and whey powder.

Keywords: Domestic Turkey, fish meal, whey powder, MPS

INTRODUCTION

Different types of poultry meat have a similar average chemical composition (USDA, 2006). Chicken and turkey are richer in protein and contain a lower percentage of fat than other types of poultry. Quality is an expensive feature and characteristic of a product or service, which refers to its ability to meet identified needs (JUS ISO 5492/2000). One of the steps to assess the quality of poultry meat is to determine its chemical (moisture, total fat, protein, ash, fatty acid composition, cholesterol, oxidation, amino acids, collagen, pigments) and physical (pH and R - value, colour, ability to bind water) characteristics (Petraacci & Baeza, 2009). Meat quality characteristics depend on a number of factors, including biological factors including genotype, sex, and age (Lewis et al., 1997; Hellmeister et al., 2003). Of the many paragenetic factors that can affect the quality and characteristics of meat, breeding systems are of particular importance (Ristic, 2003; Holcman et al., 2003; Fanatico et al., 2005; Dou et al., 2009). Poultry diet not only determines the basic characteristics of producing results and nutritional values, but also significantly shapes the taste and aroma of meat. Fish meal is a well-known source of protein with high biological value in the diet of monogastric animals. Apart from having a high content of essential amino acids, this food also has a good balance of unsaturated fatty acids, high content of certain minerals (available phosphorus) and vitamins (A, D and B - complex). Whey is a by-product of cheese production and is characterized by a high water content, nutritional

value and high concentrations of lactose and sodium. The practical use of whey in poultry feed can be compromised due to its high content of water, lactose and sodium. (Abasiekong., 1989). Turkey meat is extremely soft due to the higher fat content in the muscles and the soft consistency when chewing. It has a moderate and pleasant smell and taste characteristic of heat-treated meat without undesirable side impurities (Janječić, 2002).

In this research the main goal was to ascertain the effect of whey powder as a protein supplement in the mixture for turkeys on the chemical composition of the pectoral muscle (Karapetkovska – Hristova et al., 2021).

MATERIALS AND METHODS

A total of 30 heads (15 heads in R - group containing a mixture of fish meal and 15 heads C - group containing a mixture of whey powder) juvenile turkeys were bred according to the so-called closed breeding system. In our research, the turkey offspring nutrition mix consisted of the following components: corn, soy sauce, wheat, sunflower husk, fishmeal / whey powder, fodder yeast, lard, chalk, salt as well as dicacium phosphate and mineral supplement in order to meet the requirements of poultry nutrition (NRC, 1994). At the age of 100 days, after 12 hours of starvation and physical stunning, the birds were slaughtered and the skinning and cutting process was performed manually in a specialized workshop for slaughter of domestic animals and birds near the breeding facility. To examine the quality of the meat, a large pectoralis major sternum muscle was selected using a scalpel from randomly selected slaughtered carcasses from both groups of turkeys (6 samples in total). The samples were taken in a mobile refrigerator to the Center for Public Health - Bitola, observing the rules prescribed by law. The frozen samples were cut into small pieces and blended into a homogeneous mixture at -10 ° C. Chemical analyzes (dry matter, crude protein, ash and fat) were performed in accordance with the regulations of the Association of Official Analytical Chemists (AOAC, 1990). The chemical parameters were examined in the laboratories of the Center for Public Health, according to the following methods: Moisture - ISO 712/2009, Ash - ISO 3539/1981, Fat - SOXLET (internal method), Protein - KELDAHL (internal method). The ANOVA group test was used to examine the significant differences between the groups in different periods. Significant differences were found at a significance level of 5%. The statistical analysis of the obtained results was done with the statistical package STATISTICA 6.0 and Excel 2003.

RESULTS AND DISCUSSIO

The results for the chemical composition of the breast muscle in turkeys (*Musculus pectoralis superficialis*) in both groups are shown in Tables 1, 2 and Figure 1. Thereby, the average value of moisture expressed in % in the samples from groups R and S is 27.9 / 28.83 respectively. The mean value of proteins in the group R is 22.7% while in group S proteins in the breast muscle are present with 25%. In both groups R and S, fat has an average value of 6.50 / 8.67 %. The value of ash at group R has an average value of 1.28%, while at the turkeys of group S, the average value of ash is 1.19%.

Table 1. Composition of the Breast muscle in turkeys (Musculus pectoralis superficialis) - group R

Parameters %	max permissible values %	R1	R2	R3	\bar{x}
Moisture	75	28.40	28.20	27.10	27.9
Proteins	28	22.30	22.90	21.60	22.27
Fats	25	6.40	6.50	6.60	6.5
Ash	2	1.33	1.20	1.31	1.28

Table 2. Composition of the Breast muscle in turkeys (Musculus pectoralis superficialis) - group S

Parameters %	max permissible values %	S1	S2	S3	\bar{x}
Moisture	75	28.60	28.10	29.80	28.83
Proteins	28	26.00	24.00	25.00	25
Fats	25	8.90	8.50	8.60	8.67
Ash	2	1.16	1.33	1.09	1.19

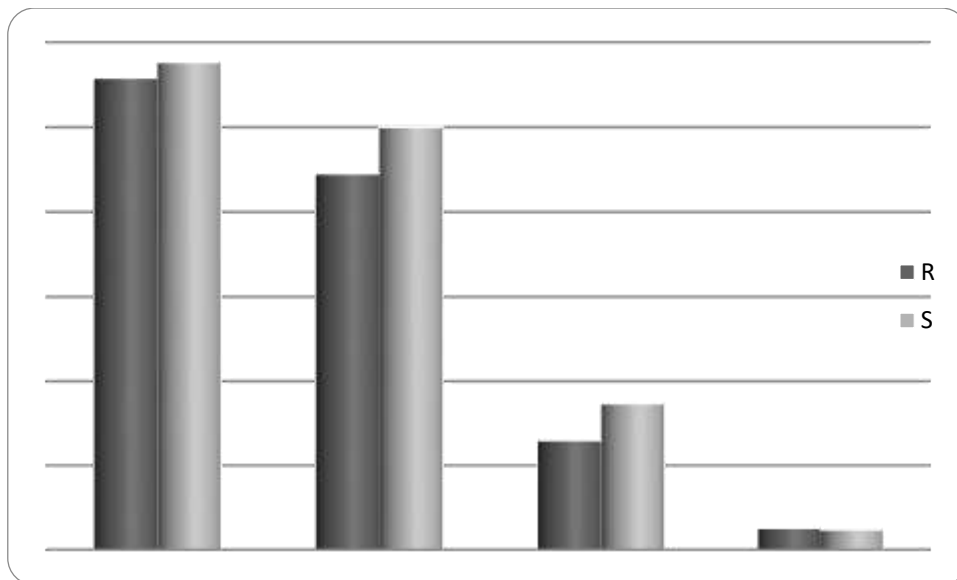


Figure 1. Average chemical composition of the Breast muscle in turkeys - group S and group R

Turkey meat has a high nutritional value, primarily due to its high protein content and low fat content (especially in the breast muscle) (Roberson et al., 2003). According to research by Bogosavljevic - Boskovic et al. (2010) showed that the protein content in the pectoral muscle varies from 22.57 to 23.72%, which was significantly higher ($p < 0.01$) in broilers raised outdoors, applicable to both sexes. The fat content in the breast muscle varied from 1.96 (male broilers in open space) to 2.78% (female broilers in closed spaces). According to research by Kokak (1984), the average protein content in the breast muscle is 24.50% and the average fat content in the breast muscle of bronze turkeys is 1.3%.

Table 3. Chemical composition of the pectoralis muscle (*Musculus pectoralis superficialis*) in groups S and R (ANOVA).

Parameters		Sum squares	Df of (degree of freedom)	F	Sig.
Moisture	Between groups	.000	1	2.085	.222
	In groups	.000	4		
	Total	.000	5		
Proteins	Between groups	.001	1	15.747	.017
	In groups	.000	4		
	Total	.001	5		
Fats	Between groups	.001	1	264.063	.000
	In groups	.000	4		
	Total	.001	5		
Ash	Between groups	.000	1	1.159	.342
	In groups	.000	4		
	Total	.000	5		

Table 3 shows that there are no significant differences in the chemical parameters of ash and moisture between the two groups of turkeys ($p > 0.05$). At the same time, proteins and fats differed significantly ($p < 0.05$) in turkeys fed fish meal and whey powder. The yield of breast meat (as a percentage of carcass weight) of the studied species was similar. With the exception of a significantly ($p < 0.05$) higher protein concentration in (*Musculus pectoralis superficialis*) in slow-growing species, this muscle had almost similar fat and ash components (Werner et al., 2008).

CONCLUSION

From the analysis of the chemical composition of the large pectoral muscle (*Musculus pectoralis superficialis*) in turkeys from both groups, it can be concluded that there are no statistically significant differences in the chemical parameters of ash and water between the two groups of turkeys, while proteins and fats differ significantly between the groups R and S. It is important to note that from the examinations of the chemical composition of the large chest muscle, the analyses showed a higher value for protein and fat in the meat of turkeys fed with whey powder compared to the values in turkeys fed with fish meal. In this scientific paper, one of the intended goals was to ascertain the effect of whey powder as a protein supplement in the mixture for turkeys on the chemical composition of the pectoral muscle. Further surveys are needed in order to reach a firm conclusion and give some practical recommendations regarding poultry nutrition and better meat quality.

REFERENCES

1. Abasiekong, S.F. (1989). Seasonal effect of wet rations on performance of broiler poultry in the tropics. *Archives of Animal Nutrition*, 39, 507-514.
2. Association of Official Analytical Chemists (AOAC) (1990). *Official Methods of Analysis* (15th ed.), Association of Official Analytical Chemists, Washington, DC.



3. Bogosavljevic-Boškovic, S., Kurcubic, V., Petrovic, M. (2006). The Effect of Sex and the Rearing System on the Carcass Composition and Cut Yields of Broiler Chickens. *Czech J. Anim. Sci*, 51, 31-38.
4. Dou. T.C, Shi, S.R., Sun, H.J., Wang, K.H. (2009). Growth rate, carcass traits and meat quality of slow-growing chicken grown according to three raising systems. *Anim. Sci. Papers Rep*, 27(4), 361-369.
5. Fanatico, A.C., Pillai, P.B., Cavitt, L.C., Owens, C.M., Emmert, J.L. (2005). Evaluation of slow-growing broiler genotypes grown with and without outdoor access: growth performance and carcass yield. *Poult. Sci*, 84, 1321-1327.
6. Hellmeister, F., Machadomenten, J.F., Neves Da Silva, M.A., Coelho, A.A.D., Savino, V.J.M. (2003). Efeito de Genótipo e do Sistema de Criação sobre o Desempenho de frangos Tipo Caipira. *Rev. Bras. Zootech*, 32(6), 1883-1889.
7. Holcman, A., Vadnjal, R., Žledner, B., Stibilj, V. (2003). Chemical composition of chicken meat from free range and extensive indoor rearing. *Arch. Geflügelkd*, 67(3),120-124.
8. Janječić, Z. (2002). Fenotipske i genotipske odlike zagorskog purana, Disertacija. Zagreb: Sveučilište u Zagrebu Agronomski fakultet, str.5-8.
9. JUS ISO 5492 (2000). Senzorske analize – recnik. Savezni zavod za statistiku, Beograd.
10. Karapetkovska – Hristova, V., Krsteska, M., Joshevska, E., El Sayed, A. (2021). Effects of different protein sources on growth and carcass performances of domestic turkeys raised in Pelagoni region R.N.Macedonia. V. International Congress on Domestic Animal Breeding, Genetics and Husbandry - 2021 (ICABGEH-21), September 27 - 30, 2021, Book of Proceedings, 59-64.
11. Kokak, C. Turkey husbandry. The Ministry of Agriculture and Forest press 48, Ankara,Turkey, 1984.
12. Lewis, P.D., Perry, C., Farmer, L.J., Patterson, R.L.S. (1997). Responses of two genotypes of chicken to the diets and stocking densities typical of UK and Label Rouge production systems: 1. Performance, behavior and carcass compisition. *Meat Sci*, 45, 501-216.
13. NRC, Nutrient Requirments of Poultry.(1994). 9th rev. ed. Natl. Acad. Press, Washington, DC.
14. Petracci, M., Baeza, E. (2009). Harmonization of methodology of assessment of poultry meat quality feature. *Procesings XVIII European Symposium on the Quality of Poultry Meat*. Prague 175 – 80.
15. Ristic, M. (2003). Fleischqualität von broiler aus der ökologischen produktion. *Biotechnol. Anim. Husbandry*, 19(5-6), 335-343.
16. Roberson, K. D., Rahn, P. A., Balander, J.R., Orth,W.M., Smith, M.D., Booren, L.B., Booren, M.A., Osburn, N.W., Fulton, M. R. (2003). Evaluation of the growth potential, carcass compounds and meat quality characteristics of three commercial strains of tom turkeys. *J. Appl. Poult. Res*, 12 (2), 229-236.
17. USDA. 2006. National Nutrient Database for Standard Reference, release 19.
18. Werner, C., Riegel, J., Wicke, M. (2008). Slaughter performance of four different turkey strains, with special focus on the muscle fiber structure and the meat quality of the breast muscle. *Poult. Sci*. 87(9), 1849-1859.

KIRŞEHİR YÖRESİNDE DOĞAL OLARAK YETİŞEN KUŞBURNU MEYVELERİNİN POMOLOJİK ÖZELLİKLERİNİN BELİRLENMESİ

DETERMINATION OF POMOLOGICAL PROPERTIES OF NATURALLY GROWING ROSEHIP (*Rosa Canina* L.) FRUITS IN KIRŞEHİR REGION

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ÖZET

Bu çalışma Kırşehir yöresinde farklı lokasyonlarda doğal olarak kendiliğinden yetişen kuşburnu meyvelerinin pomolojik özelliklerini saptamak amacıyla yapılmıştır. Kuşburnu meyvelerinde C, P, A, B1, B2, E ve K vitaminleri bulunmaktadır. Kuşburnu meyvelerinin içerdiği mineral maddeler (potasyum ve fosfor elementleri), vitaminler ile gıda sanayinde meyve ve sebze sularının zenginleştirilmesinde kullanılmaktadır. Kuşburnu düşük sıcaklıklara ve kuraklığa dayanıklılığı sebebiyle oldukça geniş bir yayılış alanı bulmuştur. Merkez, ilçeler ve köylerde üstün özelliklere sahip kendi kendine yetişen 50 kuşburnu genotipi belirlenmiştir. Her bir genotipten coğrafi koordinatları belirlendikten sonra 50 adet meyve örneği toplanmıştır. Genotiplerin meyve ağırlığı; 0.50-2.56 gr, meyve eni; 6.81-15.77 mm, meyve boyu; 8.45-25.99 mm, meyve eti oranı %31.85- 83.33, toplam çekirdek ağırlığı; 0.18-1.19 gr, çekirdek sayısı 4-38 adet, çekirdek boyu 2.4-6.91 mm, çekirdek eni; 1.18-3.53 mm ve suda çözünür kuru madde oranı; %9.30-25,80 arasında değiştiği saptanmıştır. Ayrıca genotiplerin renk değerlerinin L değeri 57.29-80.94, a değeri 6.55-17.68, b değeri 2.37-6.31 arasında olduğu belirlenmiştir. Çalışmadaki meyve renkleri turuncu ile açık kırmızı arasında olduğu belirlenmiştir. Kırşehir bölgesindeki kuşburnu bitkisinin çok geniş bir varyasyonun gösterdiği saptanmıştır.

Anahtar Kelimeler: Genotip, Kırşehir, Kuşburnu, Pomolojik özellikler

ABSTRACT

This study was carried out to determine the pomological characteristics of naturally grown rosehip fruits in different locations in Kırşehir region. Rosehip fruits contain vitamins C, P, A, B1, B2, E and K. The mineral substances (potassium and phosphorus elements) contained in rosehip fruits are used to enrich fruit and vegetable juices in the food industry with vitamins. Rosehip has found a wide distribution area due to its resistance to low temperatures and drought. 50 self-grown rosehip genotypes with superior characteristics were determined in the center, districts and villages. After determining the geographical coordinates from each genotype, 50 fruit samples were collected. Fruit weight of genotypes; 0.50-2.56 g, fruit width; 6.81-15.77 mm, fruit length; 8.45-25.99 mm, fruit pulp ratio of 31.85%- 83.33%, total seed weight; 0.18-1.19 gr, seed numbers 4-38, seed length 2.4-6.91 mm, seed width; 1.18-3.53 mm and water soluble dry matter ratio; It was determined that it varies between 9.30-25.80%. In addition, it was determined that the color values of the genotypes were between 57.29-80.94 L, a value of 6.55-17.68, and b value between 2.37-6.31. Fruit colors in the study were determined to be

between orange and light red. It has been determined that the rosehip plant in the Kırşehir region shows a very wide variation.

Keywords: Genotype, Kırşehir, Rosehip, Pomological features

GİRİŞ

Kuşburnu, Rosaceae familyasından Rosa cinsine ait bir bitki türüdür. Anavatanı Batı Asya, Anadolu, Kuzey ve Orta Avrupa olan kuşburnu çalı formunda, kışın yaprağını döken bir bitkidir. 1.5-3.5 m uzunluğunda çalı formu bir bitkidir (Kutbay ve Kılınç, 1996). Derin kök yapıları nedeniyle erozyonu önlemede yaygın olarak kullanılır. Kırsal kesimlerde odunu ise yakacak olarak kullanılırken sürgün, yaprak ve tohumları hayvan yemi olarak da kullanılmaktadır (Şen ve Güneş, 1996).

Kuşburnu meyvesi (*Rosa canina L.*) Türkiye'de olduğu gibi birçok Avrupa ülkesinde de yaygın bir şekilde doğal olarak yetişmektedir (Erentürk ve ark., 2005). Türkiye'de Kuşburnu (Rosacanina) geniş bir yayılış alanına sahiptir. Aynı zamanda zorunlu ve ekstrem iklim şartlarına karşı oldukça dayanıklıdır. Bu bitkinin çok geniş yayılış alanına sahip olmasının en önemli nedeni Mayıs-Haziran aylarında çiçek açması ve geç çiçek açtığı için donlardan zarar görmemesidir. Yükseklere çıkıldıkça çiçeklenme zamanının geç olması nedeniyle meyve kalitesi artmaktadır (Ercişli, 2004). Kuşburnu meyveleri ve çiçeklerinin görsel ve estetik özellikleri nedeniyle peyzaj planlama çalışmalarında, bitkisel tasarımlarda yer almaktadır (Koçan, 2010). Kuşburnu meyveleri lezzetli, hafif tatlı ve mayhoştur. Tatlılığını veren şekerler özellikle glikoz, ekşiliğini veren sitrik asit ve malik asit, kokusunu veren asetik asit, rengini veren karotenoid maddelerdir (Şen ve Güneş, 1996).

Kuşburnu, insan sağlığı üzerinde olumlu etkileri ile aynı zamanda meyve ve sebzeler arasında en yüksek C vitamini içeren (300-4000 mg/100 g) meyvelere sahip türlerden biridir (Ercişli, 2007). Ayrıca kuşburnu meyvelerin, B1, B2, E, K, vitaminleri ve karoten içerdiği mineral madde yönünden zengin olduğunu yapısında potasyum, sodyum, kalsiyum, magnezyum, fosfor, demir, mangan, bakır, çinko gibi katyonlar ve sülfat, klorür, nitrat gibi anyonların da bulunduğunu belirtilmiştir (Yıldız ve Nergiz, 1996). Kuşburnu meyvelerinin önemli bir besin kaynağı, ayrıca vitamin, mineral ve fitokimyasal maddelerce zengin olduğu bildirilmiştir (Chai ve Ding 1995; Ugglu, 2004). Meyve çekirdeklerinin yağ asitlerinden omega-3 içerdiği tespit edilmiştir. Omega-3 gibi yağ asitlerinin insan sağlığı için birçok faydası olmakla birlikte yaşlanma karşıtı etkisinden dolayı kuşburnu meyve çekirdekleri kozmetik sanayiinde kullanılmaktadır (Kazaz ve ark., 2009). Kuşburnu meyvelerinde meyve etinin çekirdeğe oranla düşük olması, çekirdeğinin sert ve tüylü oluşu sebebiyle taze olarak tüketimi sınırlıdır. Besin değeri ve insan sağlığı açısından faydaları öğrenildikçe günümüzde kullanımını artmaktadır. Geleneksel işleme yöntemleriyle endüstriyel olarak üretilmiş pek çok kuşburnu ürünü görülebilmektedir (Çınar ve Çolakoğlu, 2005).

MATERYAL VE METOT

Bu çalışma; Kırşehir yöresinde farklı lokasyonlarda doğal olarak yetişen kuşburnu meyvelerinin pomolojik özelliklerini belirlemek amacıyla yapılmıştır. Merkez, ilçe ve köylerde seleksiyon kriterleri göz önüne alınarak üstün özelliklere sahip kendiliğinden yetişen kuşburnu genotipleri saptanmış bunların içerisinde 50 genotipten meyve örnekleri alınarak pomolojik özellikleri belirlenmiştir. Genotiplerin coğrafi koordinatları belirlenerek her bir genotipten 50 adet meyve örneği alınmıştır. Tüm değerler için her genotipten rastgele seçilmiş 10 meyve örneği kullanılmıştır. Bu örneklerde meyve eni, meyve boyu, çekirdek eni, çekirdek boyu 0.01

mm duyarlı dijital kumpas kullanılarak belirlenmiştir. Meyve ağırlığı, çekirdek ağırlığı 0.01 gr duyarlı hassas terazi kullanılarak belirlenmiştir. Suda çözünür kuru madde miktarı el refraktometresiyle (Brix) tespit edilmiştir. L, a ve b değerleri Minolta marka CR300 model renk ölçer ile yapılmıştır. (Şen ve Güneş 1996, Kazankaya ve ark., 2001)

BULGULAR

Genotiplerin meyve ağırlığı, meyve eni, meyve boyu, meyve eti oranı, toplam çekirdek ağırlığı çekirdek sayısı adet, çekirdek boyu, çekirdek eni ve suda çözünür kuru madde oranı Tablo 1’de verilmiştir.

Tablo 1. Kuşburnu Genotiplerine Ait Bazı Pomolojik Özellikler

	Minimum	Maksimum
Meyve ağırlığı (gr)	0.50	2.56
Meyve boyu (mm)	8.45	25.99
Meyve eni (mm)	6.81	15.77
Meyve eti oranı (%)	31.85	83.33
Çekirdek boyu (mm)	2.4	6.91
Çekirdek eni (mm)	1.18	3.53
Çekirdek sayısı (adet)	4	38
Toplam çekirdek ağırlığı (gr)	0.18	1.19
Suda çözünür kuru madde miktarı (%)	9.30	25.80

Ayrıca genotiplerin renk değerlerinin L değeri 57.29-80.94, a değeri 6.55-17.68, b değeri 2.37-6.31 arasında olduğu belirlenmiştir. Araştırmada meyve renklerinin turuncu ile açık kırmızı arasında olduğu tespit edilmiştir. Kırşehir bölgesindeki kuşburnu bitkisinin oldukça geniş bir çeşitlilik gösterdiği saptanmıştır.

TARTIŞMA VE SONUÇ

Genotiplerin meyve ağırlığı; 0.50-2.56 gr, meyve eni; 6.81-15.77 mm, meyve boyu; 8.45-25.99 mm, meyve eti oranı %31.85- 83.33, toplam çekirdek ağırlığı; 0.18-1.19 gr, çekirdek sayısı 4-38 adet, çekirdek boyu 2.4-6.91 mm, çekirdek eni; 1.18-3.53 mm ve suda çözünür kuru madde oranı; %9.30-25,80 arasında değiştiği saptanmıştır. Ayrıca genotiplerin renk değerlerinin L değeri 57.29-80.94, a değeri 6.55-17.68, b değeri 2.37-6.31 arasında olduğu belirlenmiştir. Kazankaya ve ark. (2001), yapmış olduğu bir çalışmada Adilcevaz yöresinde doğal olarak yetişen kuşburnu popülasyonu içerisinde birinci yıl 54, ikinci yıl 80 genotip incelemeye alınmıştır. Birinci yıl alınan 54 genotipte meyve ağırlığı 1.12-3.62 g, meyve eni 10.80- 17.06 mm, meyve boyu 17.86-29.50 mm, meyve eti oranı %42.61-78.88. Toplam çekirdek ağırlığı 0.34-1.36 g, çekirdek sayısı 13-48 adet, SÇKM miktarı %22-42’dir.

Şavir (2008), Erzincan merkez Munzur Dağı eteğinde yaptığı araştırmada doğal olarak yetişen kuşburnu bitkisinden üstün özelliklere sahip genotipler seçmiştir. Genotiplerin ortalama meyve ağırlığı 0.91–2.53 g, meyve eti oranı %42,83–88.87, SÇKM %8,5–25’tir.

Yıldız ve Çelik (2011), Van’ın Muradiye yöresinde doğal olarak yetişen kuşburnu popülasyonu içerisinde 80 kuşburnu genotipini değerlendirmeye almışlardır. Genotiplerde meyve ağırlığı 1.82-4.09 gr, meyve boyu 20.68-27.34 mm, meyve eni 12.97-15.74 mm, meyve eti oranı %55.22-85.01, SÇKM oranı %15.00-26.20’dir.

Karakuş ve Bostanın (2017), yapmış oldukları çalışmada 55 kuşburnu genotipinden meyve örneği alınmış ve seleksiyon kriterleri doğrultusunda 9 genotipi ümit var olarak seçmişlerdir.

İkinci yıl seçilen 9 genotipin fenolojik, morfolojik ve pomolojik özellikleri belirlenmiştir. Seçilen genotiplerde meyve eti oranı %63.89- %75.01, meyve ağırlığı 1.65-2.78 gr, suda çözünebilir kuru madde oranı %23.24- %34.10 arasında olduğu bildirilmiştir.

Güneş ve ark. (2017), yapmış oldukları çalışmada tescil edilmiş ilk çeşit olan “Yıldız” kuşburnunun bazı pomolojik özellikleri (iki yılın ortalaması olarak) Tokat Merkez ve Başçiftlik lokasyonlarında sırasıyla verilmiştir.

Meyve ağırlığı 2.15-2.90 gr, meyve eti oranı %58.15- 69.93, suda çözünebilir kuru madde %19.52-21.65. Çeşitlerin vejetatif gelişiminin ve morfolojik özelliklerinin çevre şartlarından etkilendiğini bildirmişlerdir.

Çalışmamızda belirlenen meyve eni, meyve boyu, ile karşılaştırıldığında yapılmış olan çalışmalarla benzer değerlerde olduğu tespit edilmiştir. Meyve ağırlıkları, diğer araştırmalardaki meyve ağırlıkları ile benzer olmasına rağmen daha geniş bir aralıkta olduğu gözlenmiştir. Bunun nedeni olarak bölgede yetişen kuşburnu bitkisinin geniş bir varyete gösterdiğini söyleyebiliriz. Ayrıca toplam çekirdek ağırlığı, çekirdek eni, çekirdek boyunun diğer çalışmalarla benzer değerlerde olduğu tespit edilmiştir. SÇKM oranının yapılmış olan çalışmalarla benzer olduğu gözlenmiştir. Meyve ağırlığı üzerinde tür ve çeşit özelliği dışında birçok yetiştiricilik ve ekolojik faktör de etkili olabilmektedir. İnsan popülasyonunun yoğun olduğu merkeze yakın bölgelerdeki genotiplerin meyve ağırlıklarının merkezden uzak bölgelere göre daha yüksek olduğu tespit edilmiştir. Çalışmamızda Kırşehir bölgesindeki kuşburnu bitkisinin çok geniş bir varyasyonun gösterdiği bu çalışma ile ortaya konulmuştur. Bölgenin kuşburnu genetik kaynakları bakımından zengin olduğu ve genetik kaynaklar içerisinden seçilecek üstün vasıflara sahip genotiplerin yapılabilecek seleksiyon ve ıslah çalışmaları ile kuşburnu genotipleri çeşitli özellikler bakımından geliştirilebilir.

KAYNAKLAR

1. Chai, J.T., Ding. Z.H. (1995). Nutrients Composition of Rosa laevigata Fruits. Science Technology in Food Industry, 3: 26–29.
2. Çınar, İ., Çolakoğlu, A.S. (2005). Potential Health Benefits of Rose Hip Products. Proceedings of the First International Rose Hip Conference. Acta Hort. 690, 253–257.
3. Ercişli, S. (2004). A Short review of the fruit germplasm resources of Turkey. Genetic Resources and Crop Evolution, 51: 419-434
4. Ercişli, S. (2007). Chemical Composition of Fruits in Some Rose (Rosa ssp.) Species. Food Chem., 104:1379–1384. İlisulu, K. (1992). İlaç ve Baharat Bitkileri. A.Ü. Ziraat Fak. 1256/360, Ankara
5. Erentürk, S., Gülaboğlu, M.Ş., Gültekin, S. (2005). Experimental Determination of effective moisture diffusivities of whole- and cut-rosehips in convective drying. Food and Bioproducts Processing, 88, 99- 104.
6. Güneş, M, Güneş, S, Dölek, Ü. (2017). “Yıldız” Kuşburnu (Rosa canina) Çeşidinin Bazı Fenolojik, Pomolojik ve Morfolojik Özellikleri. Gaziosmanpaşa Üniversitesi Ziraat Fakültesi Dergisi. JAFAG (2017) 34 (1), 170-178.
7. Karakuş S., Bostan S.Z. (2017). Akıncılar (Sivas) Yöresinde Doğal Olarak Yetişen Kuşburnu Genotiplerinin (Rosa spp.) Seleksiyon Yoluyla Islahı. Nevşehir Bilim ve Teknoloji Dergisi Cilt 6(ICAFOF 2017 Özel Sayı) 215-225.



8. Kazankaya, A., Yılmaz, H., Yılmaz, M. (2001). Adilcevaz Yöresinde Doğal Olarak Yetişen Kuşburnuların (*Rosa spp.*) Seleksiyonu. Yüzüncü Yıl Üniversitesi Ziraat Fakültesi, Tarım Bilimleri Dergisi, 11(2): 29-34.
9. Kazaz, S., Baydar, H., Erbaş, S. (2009). Variations in Chemical Compositions of *Rosa damascena* Mill. and *Rosa canina* L. fruits. Czech. J. Food. Sci, 27 (3), 178-184
10. Kutbay, H. G., Kılınç, M. (1996). Kuşburnu türlerinin (*Rosa L.*) taksonomik özellikleri ve Türkiye'deki yayılışı. Kuşburnu Sempozyumu. 5-6 Eylül 1996. Gümüşhane.75-83.
11. Koçan, N. (2010). Peyzaj Planlama ve Tasarım Çalışmalarında Kuşburnu (*Rosa canina L.*) Bitkisinin Değerlendirilmesi. H.R.Ü.Z.F. Dergisi, 14(4), 33-34.
12. Şen, S.M, Güneş, M. (1996). Kuşburnu Beslenme Değeri, Kullanım Alanları ve Tokat Yöresi Açısından Önemi. Kuşburnu Sempozyumu, 5-6 Eylül 1996, Gümüşhane, 41-46.
13. Şavir, Z. (2008). Munzur Dağı (Erzincan) Kuşburnu (*Rosa spp.*) Genetik Kaynakları. Yüzüncü Yıl Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 50s, Van.
14. Uggla, M. (2004). Domestication of wild roses for fruit production. Swedish University of Agricultural Science, Ph.D Thesis
15. Yıldız, H., Nergiz, C. (1996). Bir Gıda Maddesi Olarak Kuşburnu. Kuşburnu Sempozyumu, s.309, Gümüşhane.
16. Yıldız, Ü., Çelik, F. (2011). Muradiye (Van) Yöresinde Doğal Olarak Yetişen Kuşburnu (*Rosa Spp.*) Genetik Kaynaklarının Bazı Fiziko-Kimyasal Özellikleri. Yüzüncü Yıl Üniversitesi Fen Bilimleri Enstitüsü Dergisi/ Journal of The Institute of Natural & Applied Sciences 16 (2):45-53.

VERGİLEME SINIRININ AŞILMASI: VERGİLEMEDE AŞIRI YÜK PROBLEMLERİ PERSPEKTİFİNDEN BİR DEĞERLENDİRME

**EXCEEDING THE TAX LIMIT: AN ASSESSMENT FROM THE PERSPECTIVE OF
OVERBURDEN PROBLEMS IN TAXATION**

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ÖZET

Vergiler devlet tarafından kamu giderlerinin finansmanı amacıyla veya iktisadi ve sosyal amaçlı olarak birey ve kurumlardan alınmaktadır. Vergi ödeyen bireyler, vergi ödeme dolayısıyla oluşan rahatsızlıktan kurtulmak için vergiyi bir başkasına aktarma eğilimine girmektedir. Vergiler bir bireyden diğer bir bireye, sınırlı ya da sınırsız bir biçimde; tüketiciden üreticiye ya da üreticiden tüketiciye doğru aktarılabilmektedir. Verginin yansımaları etkileyen birçok faktör yer almaktadır. Bunlar içerisinde vergilendirilen malın türü, talep ve arz esneklikleri, piyasa yapısı, vergi tabanı ve yüksekliği gibi mikro faktörler yer aldığı gibi, konjonktürel durum, mükelleflerin vergileri finansman biçimi ve vergilerin devlet tarafından hemen hizmete döndürülmesi gibi makro faktörler de yer almaktadır. Hükümetler kendi maliye politikalarını uygulayabilmek için bu faktörlerden yararlanma ve istedikleri şekilde kullanmak gereksinimi duymaktadır.

Vergi ödeme dolayısıyla mükelleflerin refahlarında meydana gelen azalmanın tespit edilmesi, vergi yükünün bireyler arasında adaletli dağıtılması açısından bir fikir vermektedir. Üretici ve tüketiciler üzerinde kalan vergi yüklerinin hesaplanması dolayısıyla vergi yükünün bir taraf aleyhine bozulmasının önüne geçilebilecektir.

Bu çalışmada vergi yükünün tüketici ve üretici üzerinde ne şekilde dağıldığı uygulamalı örneklerden yararlanılarak açıklanmaktadır. Çalışmada sayısal problemlerden yola çıkılarak özellikle malın talep ve arz esnekliğine bağlı olarak vergi yükünün nasıl dağıldığı, toplam vergi hasılatının nasıl etkilendiği, net vergi yükünün ne olduğu ve tüketici ve üretici rantlarındaki değişimlerin neler olduğu, problemin sonunda vergi kamasının nasıl etkilendiği gibi hususlar analiz edilmiştir. Elde edilen bulgulara göre devletin bir malı vergilendirmesi sonucu malın fiyatının artması, talep esnekliğine bağlı olarak malın tüketimini azaltmaktadır. Yani tüketici faydası da(rantı) bu durumda belirgin bir biçimde azalmaktadır. Fakat tüketici rantındaki azalmanın tamamı, toplum refahı açısından kayıp değildir. Elde edilen bulgulara göre malın talep esnekliği arttıkça net vergi yükü de buna bağlı artmaktadır. Ayrıca advalorem vergi alınması durumunda vergi oranındaki bir artış kendisinden daha fazla net vergi yükünde artışa sebep olmaktadır.

Vergilemede ortaya çıkan aşırı yükün minimize edilebilmesi için ramsey vergileri tavsiye edilmektedir. Bu vergi türünde malın talep esnekliği yüksek ise düşük oranda, malın talep esnekliği düşük ise yüksek oranda vergilendirilmesi gerekmektedir. Fakat bu durumda vergilemede adalet sorunu ortaya çıkmaktadır. Ramsey vergileri bu olumsuzluğa rağmen

vergi hasılatını artırması dolayısıyla verimli sayılır ve aynı zamanda mükelleflerde davranış değişikliğine yol açmadığından ötürü etkin de sayılmaktadır.

Anahtar Kelimeler: Vergi yükü, Vergi, Refah Kaybı, Verginin Yansıması

ABSTRACT

Taxes are collected by the state from individuals and institutions for the purpose of financing public expenditures or for economic and social purposes. Individuals who pay taxes tend to transfer the tax to someone else in order to avoid the inconvenience caused by paying taxes. Taxes from one individual to another, in a limited or unlimited way; It can be transferred from consumer to producer or from producer to consumer. There are many factors that affect the reflection of the tax. These include micro factors such as the type of goods taxed, demand and supply elasticities, market structure, tax base and height, as well as macro factors such as the cyclical situation, the form of financing of taxes and the immediate return of taxes to service by the state. Governments need to benefit from these factors and use them as they wish in order to implement their own fiscal policies.

The determination of the decrease in the welfare of the taxpayers due to tax payment gives an idea in terms of the fair distribution of the tax burden among individuals. Due to the calculation of the remaining tax burdens on the producers and consumers, it will be possible to prevent the tax burden from deteriorating against one party.

In this study, how the tax burden is distributed on the consumer and producer is explained by using practical examples. In the study, starting from numerical problems, especially how the tax burden is distributed depending on the demand and supply elasticity of the goods, how the total tax revenue is affected, what the net tax burden is, what the changes in consumer and producer surpluses are, and how the tax wedge is affected at the end of the problem are analyzed. According to the findings, the increase in the price of a good as a result of the state's taxation of a good reduces the consumption of the good depending on the elasticity of demand. In other words, consumer utility also decreases significantly in this case. But not all of the reduction in consumer surplus is not a loss to society's welfare. According to the findings, as the demand elasticity of the good increases, the net tax burden increases accordingly. In addition, an increase in the tax rate in case of advalorem taxation causes an increase in the net tax burden more than itself.

Ramsey taxes are recommended in order to minimize the overburden in taxation. In this type of tax, if the demand elasticity of the good is high, it should be taxed at a low rate, and if the demand elasticity of the good is low, it should be taxed at a high rate. But in this case, the problem of fairness in taxation arises. Despite this negativity, Ramsey taxes are considered efficient as they increase tax revenues and are also considered effective because they do not cause behavioral changes in taxpayers.

Keywords: Tax Burden, Tax, Welfare Loss, Tax Incidence

INTRODUCTION

Taxation authority is the legal and de facto power of the state to collect taxes based on its sovereignty over its country. This authority is one of the most important powers of the sovereignty of the state in the financial field (Öncel vd, 2007:33). The fact that the tax is taken free of charge and under a legal obligation based on the sovereign right of the state does not indicate that this right will always be used within the desired and fair extent. In almost

every country, there is an open or covert resistance to taxation. The severity and form of this resistance varies according to the development level, social and cultural conditions of the countries. In order to keep this resistance to taxation at the lowest level, the issue of whether taxation should be limited and what the limit should be has been preoccupying economists and financiers for a long time (Aksoy, 1998:72). The Physiocrats put forward the first suggestion regarding the limit of taxation and stated that the tax to be collected should definitely not exceed 20% of the personal income of the taxpayer. French economist Paul Leroy Beaulieu argued that this rate should remain between 12-15%. However, the rationale for both views was not disclosed (Nadaroğlu, 1992:296). Contemporary economists, unlike the previous ones, tried to find the limit of taxation by associating the total tax income with the national income, instead of determining the taxpayer's personal income. For example, the American economist Colin Clark has calculated that this limit should be 25% of the national income. According to Clark, when this limit is exceeded, enterprise power will decrease, producers will begin to make claims, and debtors and entrepreneurs will have an advantage due to inflation (Nadaroğlu, 1992:296). (Öncel, 2001:18). Although taxes are collected based on the sovereignty of the state, there are some legal, economic, financial, political, psychological, etc. limits in the use of taxation authority. In our study, the factors that determine the limits of taxation and the effects of exceeding the limits on the economy will be explained.

ECONOMIC CONSEQUENCES OF EXCEEDING THE TAXATION LIMIT

While using the taxation authority, the tax type and rates should be determined without causing negative effects on the economy. In this respect, it is of great importance that taxes do not impose an excessive burden on taxpayers. As is known, all taxes affect behavior in the economy. Some goods may become more expensive than others, or taxes may cause consumption preferences to change. It can affect people's willingness to take risks, save, and work, as well as the total supply of resources available in the economy. The private goods of obligors reduce their purchasing power and when a new tax is imposed, consumers, employees and firms may have to adjust themselves to it (Musgrave, Musgrave, 1989:443). Macro variables such as total consumption and savings, resource use, and total investments have determinative effects on the taxation limit.

Formation of Overburden in Taxation Due to Exceeding the Taxation Limit

Excessive tax burden can be considered as a loss of efficiency. Efficiency in public finance can be achieved by increasing the income of the state by keeping the efficiency loss of the private sector at a minimum (Hyman, 1999:383). But economists point out that the cost to society of paying taxes is in some cases greater than the increase in revenue the government actually gets. This difference is defined as loss of efficiency or overburden (Susam, 2001:59).

Overburden, in general, is a measure of the deviations caused by taxes in the decisions made by economic units. The reduction in benefit is taken into account against the amount transferred to the public with taxation. The total burden of tax is the sum of the amount actually paid by the consumer (tax burden) and the loss of benefit (overburden) faced by the consumer. When a new tax is imposed, the overburden increases as the change in the behavior of economic agents increases (Rutherford ve Paltsev, 1999:4).

Depending on the elasticity of supply and demand functions, there is a decrease above the amount transferred to the government by taxation. This decrease in consumer and producer surplus remains above the amount transferred to the state as tax (Önder, 1982:97).

EXAMPLES OF CALCULATING OVERBURDEN IN TAXATION

Example Application (1)

Demand Equation $Q_d=10-2P$

The Supply Equation $Q_s=-2+P$ is given. Let's assume that the government takes a specific tax of 0.6 TL per unit of production. In this case, what is required:

- 1) What happens to the Consumer and Producer Tax Burdens?
- 2) Calculate Total Tax Revenues
- 3) What happens to Net Welfare Loss?
- 4) Calculate the Tax wedge?
- 5) What happens to the change in consumer and producer surplus?

Solution:

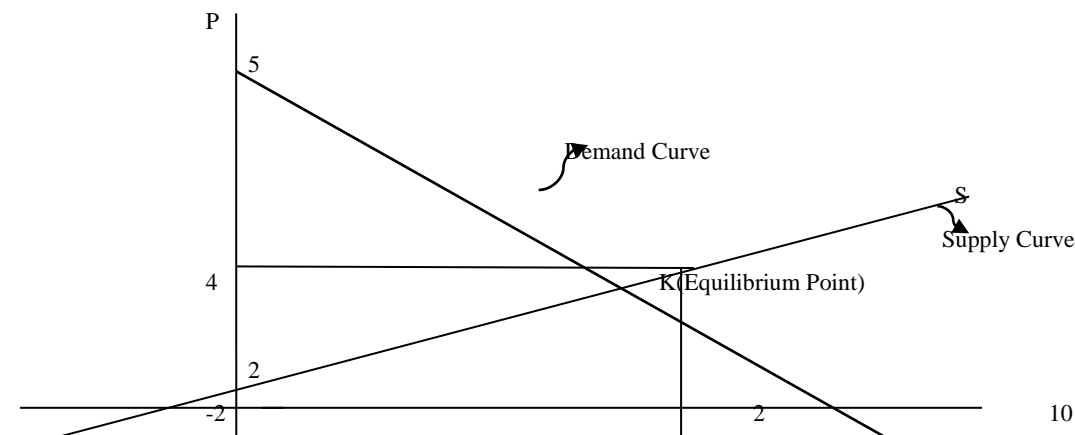
First, we rewrite the equations by writing the demand and supply equations given to us in terms of Q in terms of P.

Demand equation $P_d=5-Q/2$; If the equation of supply is $P_s=Q+2$

Then, by equating the demand and supply equations, we find the equilibrium price and quantity

$5-Q/2=Q+2 \rightarrow 3=3Q/2 \rightarrow Q=2$; If we substitute Q in any equation, $P=2+2=4$

So let's plot our graph for $Q=2$ and $P=4$.



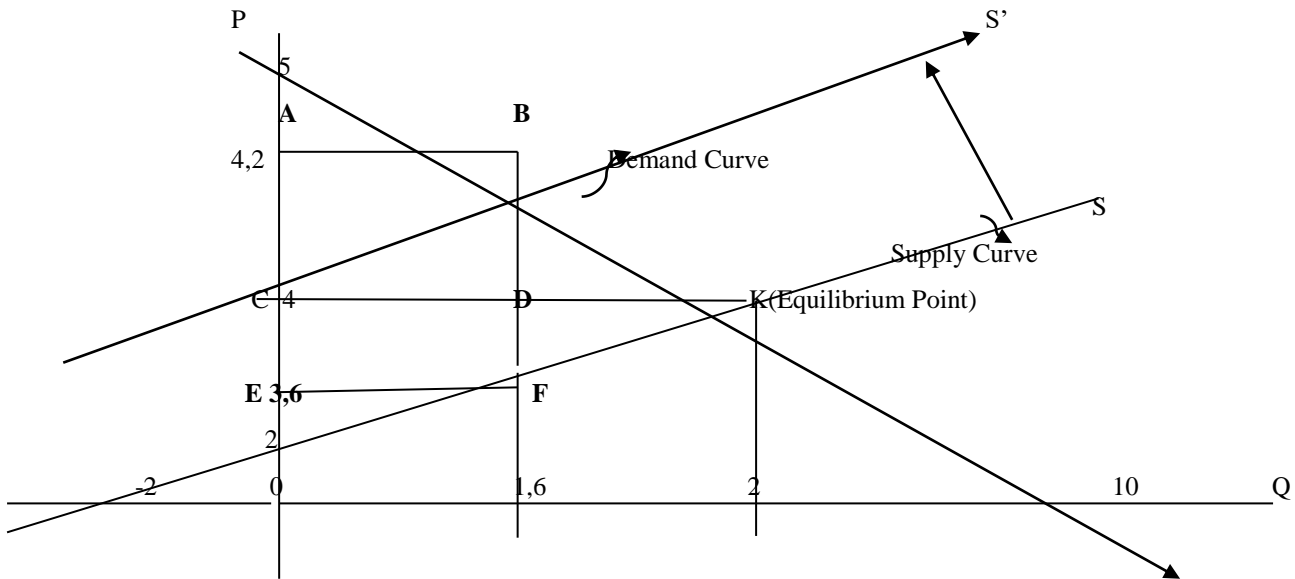
Now let's add 0.6 units of tax to the supply.

New supply equation $P_s=Q+2+0.6=Q+2.6$ → Let's determine a new equilibrium point Q and P by equating the new supply equation with the demand equation

$Q+2.6=5-Q/2 \rightarrow 2.4=3Q/2 \rightarrow Q=1.6$ and if we substitute Q in any equation, we get $P=4.2$. Now let's redraw the shape

Let's also find the price equilibrium that it cuts in the old supply curve when $Q = 1.6$

For this, $Q=1.6$ is substituted in the old supply equation, the old supply equation becomes $P=Q+2 \rightarrow P=1.6+2=3.6$.



Now, after drawing the shape, let's verify it and see if we are on the right way.

It is $4.2 - 3.6 = 0.6$, that is, the tax we applied was also that, so we are on the right way. The calculations are correct....

Now the calculations are easier after plotting the graph. Let's find what you want.

$$\text{Consumer tax burden} = A(ABCD) = 0.2 \times 1.6 = 0.32$$

$$\text{Producer Tax Burden} = A(CEDF) = 0.4 \times 1.6 = 0.64$$

$$\text{Total Tax Revenues} = A(ABEF) = \text{CTB} + \text{PTB} = 0.64 + 0.32 = 0.96$$

$$\text{Net tax burden} = A(BFK) = 0.6 \times 0.4 / 2 = 0.12$$

$$\text{Tax Wedge} = A(ABKFE) = \text{Total Tax Revenues} + \text{Net tax burden} = 0.96 + 0.12 = 1.08.$$

Example Application (2)

The Demand Equation $Q_d = 200 - P$

The Supply Equation $Q_s = P - 50$ is given. Let's assume that the government takes a specific tax of 0.6 TL per unit of production. In this case, what is required:

- 1) What happens to the Consumer and Producer Tax Burdens?
- 2) Calculate Total Tax Revenues
- 3) What happens to Net Welfare Loss?
- 4) Calculate the Tax wedge?
- 5) What happens to the change in consumer and producer surplus?

Solution:

$$Q + 50 = 200 - Q$$

$2Q = 150$ AND $Q = 75$, and P is 125 when written instead in the demand equation, $P = 125$.

When we add the tax to the supply:

$$Q + 50.6 = 200 - Q$$

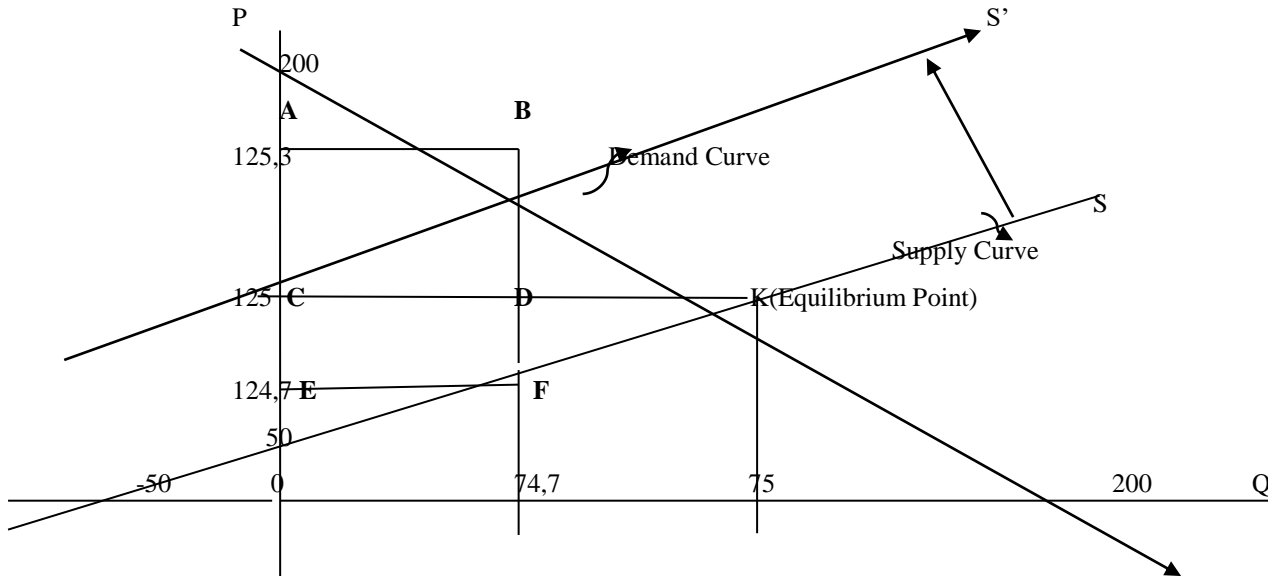
$$2Q = 200 - 50.6$$

$$2Q=149.4$$

$$Q=74.7$$

$$P=200-74,7=125.3$$

To find the cutting point on the old supply curve, $P=74.7+50=124.7$



$$\text{Consumer tax burden} = A(ABCD) = 22.41$$

$$\text{Producer Tax Burden} = A(CEDF) = 22.41$$

$$\text{Total Tax Revenues} = A(ABEF) = \text{CTB} + \text{PTB} = 44.82$$

$$\text{Net tax burden} = A(BFK) = 0.045$$

$$\text{Tax wedge} = A(ABKFE) = \text{Total Tax Revenues} + \text{Net tax burden} = 44.865.$$

In this example, the price elasticity of demand is -1.6. In the example application 1, where the same specific tax is applied, the price elasticity of demand is -4. The conclusion to be drawn from this is that when the price elasticity of demand increases, the net tax burden also increases (in example 1, the tax burden is 0.12, and in example 4, the net tax burden is 0.045).

Example Application 3

In a market where the reverse demand equation is $P=60-0.6Q$ and the reverse supply equation is $P=30+0.4Q$, in case the government applies 80% ad valorem tax on the goods sold in the market;

- What is the consumer and producer tax burden? What is the change in consumer and producer surplus?
- What is the total tax revenue?
- What is the net welfare loss?
- What is the tax wedge?

First, the equilibrium price and equilibrium quantity are found by equating the given demand and supply equations.

$$60-0.6Q = 30+0.4Q$$

$$60-30=0.4Q+0.6Q$$



$$Q=30$$

Secondly, the equilibrium price is found by substituting the equilibrium quantity in the demand or supply equation.

$$P=60-0.6.30$$

$$P=60-18$$

$$P=42$$

In order to draw the appropriate graph, it is found by giving zero to the price and quantity separately in both the supply and demand equations to determine the location of the supply and demand lines coming out of the price axis.

In the demand equation; In the supply equation;

when $P=0$, $Q=60$ when $P=0$, $Q=-75$

when $Q=0$, $P=60$ when $Q=0$, $P=30$

The tax is a cost to the producer, so the tax is added to the price of the supply. For the taxed supply equation;

$$P=30+0.4 Q(1+0.80)$$

$$P=30+0.4Q.1.80$$

$$P=30+0.72Q \text{ Taxed Supply Equation}$$

For the new equilibrium point, the taxed equilibrium point is found by equating the old demand equation with the taxed supply equation.

$$60-0.6Q=30+0.72Q$$

$$30=1.32Q$$

$$Q=22.72$$

$$P=46.35$$

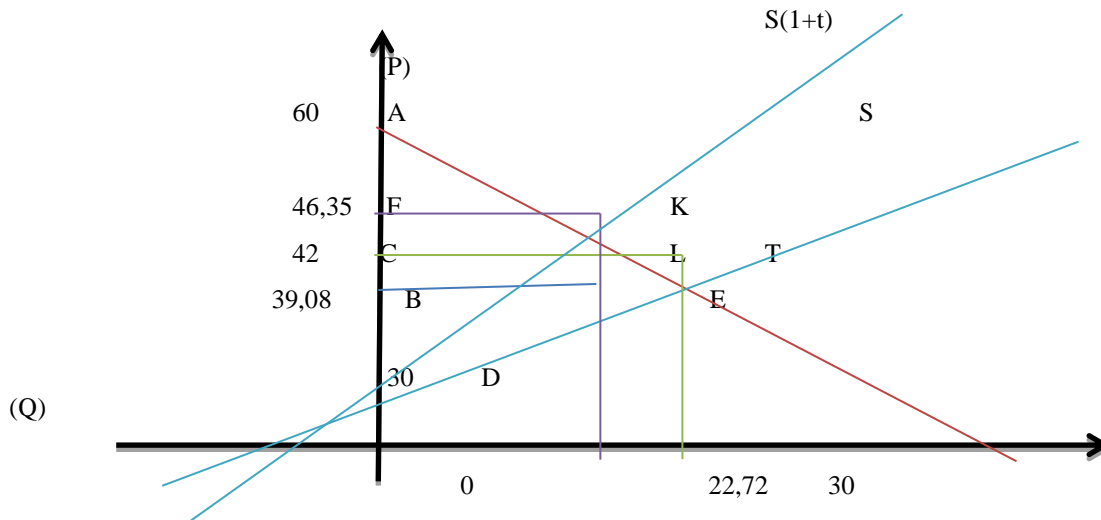
In order to draw the appropriate graph, it is found by giving zero to the price and quantity separately in both the taxed supply equation and the demand equation to determine the location of the supply and demand lines coming out of the price axis.

In the demand equation; In the taxed supply equation;

when $P=0$, $Q=60$ when $P=0$, $Q=41,66$

when $Q=0$, $P=60$ when $Q=0$, $P=30$

By substituting the taxed supply in the tax-free demand equation, we find the point that cuts the price axis.



Source: Erbaykal, 2020:51.

Since this part is negative, it is not economically valid.

- Advalorem tax makes the supply curve steeper than before.
- Equilibrium price and equilibrium quantity have changed with the tax.
- While the old balance point was the T point, the new balance point became the K point with the tax.

a) Change in Consumer Burden: While the tax-free consumer burden is Area (ATC) = 270, the taxed consumer burden is Area (AKF) = 155,064. The change in consumer surplus is 114,936.

Change in Producer Burden: While the tax-free producer burden is Area(CTB)=180, the taxed producer's burden is Area(FKB)= 174,376. The change in producer surplus is 5,624.

b) Total Tax Revenues: Area(BFKE)=165,174.

c) Net Welfare Loss: Area (KET)=26.46.

d) Tax wedge: Area (FKTEB)=191,634.

Example Application 4

In a market where the reverse demand equation is $P=60-0.6Q$ and the reverse supply equation is $P=30+0.4Q$, if the government imposes an 85% advalorem tax on the goods sold in the market

- What is the consumer and producer tax burden? What is the change in consumer and producer surplus?
- What is the total tax revenue?
- What is the net welfare loss?
- What is the tax wedge?

First, the equilibrium price and equilibrium quantity are found by equating the given demand and supply equations.

$$60-0.6Q = 30+0.4Q$$

$$60-30=0.4Q+0.6Q$$

$$Q=30$$

Secondly, the equilibrium price is found by substituting the equilibrium quantity in the demand or supply equation.

$$P=60-0.6.30$$

$$P=60-18$$

$$P=42$$

The tax is a cost to the producer, so the tax is added to the price of the supply. For the taxed supply equation;

$$P=30+0.4 Q(1+0.85)$$

$$P=30+0.4Q.1.80$$

$$P=30+0.74Q \text{ Taxed Supply Equation}$$

For the new equilibrium point, the taxed equilibrium point is found by equating the old demand equation with the taxed supply equation.

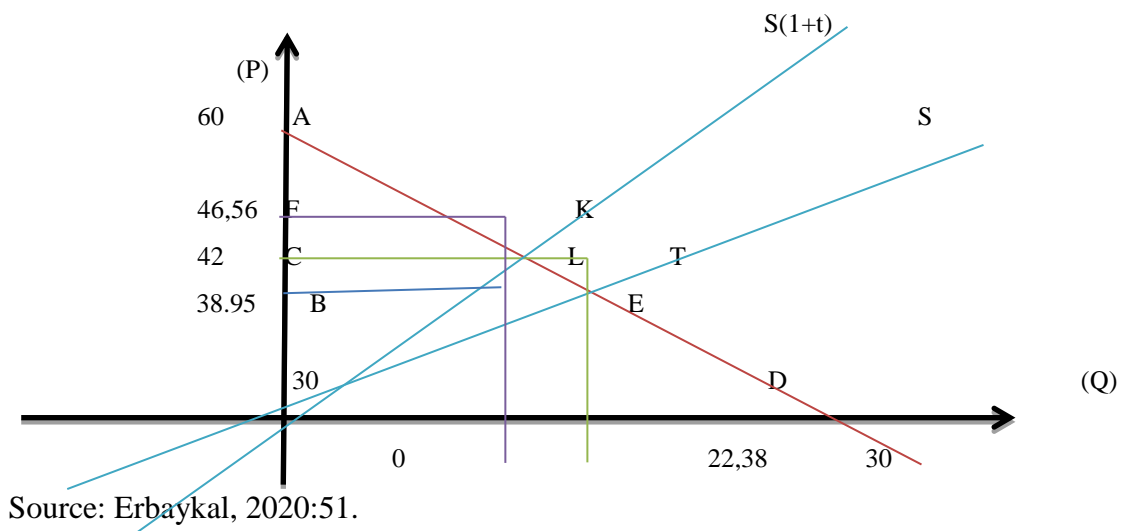
$$60-0.6Q=30+0.72Q$$

$$30=1.32Q$$

$$Q=22.38(\text{Approximate value})$$

$$P=46.56$$

By substituting the taxed supply in the tax-free demand equation, we find the point that cuts the price axis.



- Advalorem tax makes the supply curve steeper than before.
- Equilibrium price and equilibrium quantity have changed with the tax.
- While the old balance point was the T point, the new balance point became the K point with the tax.
- Consumer Tax Burden: $4.56 \times 22.38=102.05$
- Producer Tax Burden: $3.05 \times 22.38=68.25$
- Total Tax Revenues: $\text{Area}(\text{BFKE})=7,608 \times 22.38=170,267$.

e) Net Loss of Welfare: Area (KET)=28.9.

f) Tax wedge: Area(FKTEB)=199,167.

Compared to the previous example, when the tax rate increases by 6.25%, the net tax burden increases by 9.22%. In other words, there has been a change in the net tax burden at a rate greater than the tax rate increase.

EVALUATION OF RAMSEY TAX PROPOSAL IN SOLVING THE PROBLEM OF OVERBURDEN IN TAXATION

What would be a tax structure that would increase government revenues and minimize welfare loss? Goods taxes that will minimize the loss of welfare are called Ramsey Taxes. Under certain conditions, Ramsey taxes are proportional to the sum of the inverses of the demand and supply elasticities. If the elasticity of supply is infinite, the tax should be the inverse of the compensated elasticity of demand. Here, Ramsey's conclusion is not surprising. It proved to be a loss of welfare due to an increased tax with the elasticity of demand compensated. Ramsey rules also set out the conditions for the consumption taxes to be optimal in terms of resource allocation. Because high income groups can choose between marginal income and leisure time, it would be unfair to apply low taxes to these groups. However, if tax is levied on luxury goods, these goods may have leisure substitutability (Yılmazcan,1992:97).

CONCLUSION AND FINDINGS

In the study, using practical examples of how the tax burden is distributed on the consumer and the producer, starting from numerical problems, how the tax burden is distributed depending on the demand and supply elasticity of the goods, how the total tax revenue is affected, what the net tax burden is and what are the changes in consumer and producer surpluses. Issues such as how the tax wedge is affected at the end of the problem are analyzed. According to the findings, the increase in the price of a good as a result of the state's taxation of a good reduces the consumption of the good depending on the elasticity of demand. In other words, consumer utility also decreases significantly in this case. But not all of the reduction in consumer surplus is a loss to society's welfare. According to the findings, as the demand elasticity of the good increases, the net tax burden increases accordingly. In addition, an increase in the tax rate in case of advalorem taxation causes an increase in the net tax burden more than itself.

Ramsey taxes are recommended in order to minimize the excessive burden of taxation. In this type of tax, if the demand elasticity of the good is high, it should be taxed at a low rate, and if the demand elasticity of the good is low, it should be taxed at a high rate. But in this case, the problem of fairness in taxation arises. Despite this negativity, Ramsey taxes are considered efficient as they increase tax revenues and are also considered effective because they do not cause behavioral changes in taxpayers.

REFERENCES

- Erbaykal, E. (2020) Mikro İktisat, A Kadro Yayınları, 3.Baskı s.51
- Musgrave, Richard A., Musgrave Peggy b. (1989), Public Finance in Theory and Praticce, Fifth Edition, Mc Graw- Hill Book Company



- Nadarođlu, Halil. (1992), Kamu Maliyesi Teorisi, Gzden Geirilmiş ve Dzeltilmiş 8. Baskı, İstanbul.
- ncel, Mualla, Kumrulu, Ahmet, ađan, Nami. (2007), Vergi Hukuku, Ankara.
- nder, İ. (1981). Dışsal maliyetler ve dolaylı vergilerde aşırı yük. Maliye Araştırma Merkezi Konferansları, (28), 97-102.
- Rutherford, T., & Paltsev, S. (1999). From an input-output table to a general equilibrium model: assessing the excess burden of indirect taxes in Russia. Department of Economics, University of Colorado.
- Susam, N. (2000). Aşırı Vergi Yk Kavramı ve Aşırı Vergi Yk Hesaplamalarında Telafi Edilmiş Talep Eđrilerinin Kullanılması. Maliye Araştırma Merkezi Konferansları, (39).
- Tavşancı, . . A., & Gltekin, . G. D. R. (2019). Vergilendirme Sınırının Aşılması ve Ekonomik Sonuları. Cataloging-In-Publication Data, 114.
- Yılmazcan, H. D. (1992). Optimal vergileme. Marmara niversitesi İİBF Dergisi. (I-II), s. 90-100

**GELENEKSEL YAPI MALZEMELERİNDEN AHŞABIN DIŞ CEPHEDE
KULLANIM STRATEJİLERİ(KAYSERİ /TALAS/TABLAKAYA, KİÇİKÖY
MAHALLELERİ ÖRNEKLEMİ)**

STRATEGIES FOR USE OF WOOD FROM TRADITIONAL BUILDING MATERIALS
ON THE EXTERIOR (KAYSERİ / TALAS/TABLAKAYA, KICIKOY
NEIGHBORHOODS SAMPLE)

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ÖZET

Kayseri ili ikisi merkez olmak üzere on altı ilçesi bulunan ve İç Anadolu Bölgesi'nde yer alan bir şehirdir. Kentte geleneksel konut oranı oldukça yüksektir. Bu konutların çoğu merkez ve merkeze yakın ilçelerde yer almaktadır. Kayseri ilçelerinden biri olan Talas, geleneksel konutlarını günümüze kadar taşımış ve konut dokusu ile Kayseri'nin mimarlık tarihi için önemli bir ilçe konumuna gelmiştir. İlçede geleneksel konutların oldukça fazladır.

Geleneksel konutların yapı kabuğu buldukları kültürün kente yansımaları sağlayan ayna görevi üstlenmektedir. Cephe mimarisinde sadece sosyokültürel özellikler değil aynı zamanda yaşantı, ekonomik düzey ve gelenekler-görenekler de rahatlıkla okunabilmektedir. Bununla birlikte inşa edildikleri dönemin taşıyıcı sistem ve kullanılan yapı malzemesi özelliklerinin algılanmasını sağlamaktadır. Tüm bunlar geleneksel konutları geçmişten günümüze taşıyan kimlik unsurlarıdır.

Türkiye'de geleneksel yapı malzemelerinden ahşabın kullanımı çok eski tarihlere dayanmaktadır. Eski çağlardan beri doğal bir ihtiyaç olan barınma; insanları kolay ulaşılabilen ahşap malzemesini kullanmaya yöneltmiştir. Ahşap, taşıma gücü yüksek, birleşim detayları basit, ağırlığı az ve mimari etkisi olumlu bir malzemedir. Ahşap malzemesinin depreme dayanımı oldukça yüksektir. Olumsuz hava koşullarından kimyasal faktörlere kadar birçok etkilere maruz kaldığında mukavemetinde azalmanın yavaş olması ahşabı yapı elemanı olarak kullanımında önemli hale getirebilmektedir.

Bu çalışmada Kayseri ili, Talas ilçesi, Tablakaya ve Kçüköy mahallelerinde bulunan geleneksel konutlarda kullanılan ahşabın irdelenmesi hedeflenmiştir. Bu hedef doğrultusunda mahallelerde saha araştırması yapılmış her bir mahalleden ikişer adet geleneksel konut seçilmiş ve bu konutların dış cepheleri incelenmesi amaçlanmıştır. Çalışmada yöntem olarak;

belirlenen mahallelerde seçilen konutlar yerinde incelenmiş, yapıda kullanılan ahşap malzemeler belirlenmiş ve her bir konut fotoğraflama yöntemiyle tek tek belgelendirilmiştir. Sonuç olarak; insan hayatında önemli bir yere sahip olan konutların dış cephesinde ahşap malzeme kullanımı oldukça fazla olduğu görülmüştür. Özellikle yapıyı güçlendirmek için kullanılan payandanın o yapılar için önemli bir parça olduğu farkedilmiştir. Bu yapılar payandalar ve doğal yapı malzemeleri sayesinde ayakta kalmayı başarmışlardır. Ayrıca bu çalışmanın gündün güne yok olan geleneksel konutların geleceğe aktarılmasında bir belge niteliği taşıması önem arz etmektedir.

Anahtar Kelimeler: Ahşap, geleneksel konut, payanda, Kayseri

ABSTRACT

Kayseri is a city located in the Central Anatolia Region and has sixteen districts, two of which are the center. The rate of traditional housing in the city is quite high. Most of these residences are located in the center and districts close to the center. Talas, one of the districts of Kayseri, has carried its traditional houses to the present day and has become an important district for the architectural history of Kayseri with its housing texture. There are a lot of traditional houses in the district.

The building envelope of traditional houses acts as a mirror that reflects their culture to the city. In the facade architecture, not only socio-cultural features, but also life, economic level and traditions-customs can be read easily. In addition, it provides the perception of the carrier system and the building material used in the period in which they were built. All these are elements of identity that carry traditional houses from the past to the present.

The use of wood, one of the traditional building materials, in Turkey dates back to ancient times. Shelter, which has been a natural need since ancient times; has led people to use easily accessible wood material. Wood is a material with high bearing capacity, simple joint details, low weight and a positive architectural effect. The earthquake resistance of wood material is quite high. The slow decrease in strength when exposed to many effects from adverse weather conditions to chemical factors can make wood important in its use as a building element.

In this study, it is aimed to examine the wood used in traditional houses in Kayseri province, Talas district, Tablakaya and Kiçiköy neighborhoods. In line with this goal, field research was carried out in the neighborhoods, and two traditional houses were selected from each neighborhood and it was aimed to examine the exteriors of these houses. As a method in the study; The selected houses in the determined neighborhoods were examined on site, the wooden materials used in the building were determined and each house was documented one by one by photographing method. As a result; It has been observed that the use of wooden materials on the exterior of the houses, which have an important place in human life, is quite high. It has been noticed that the buttress used to strengthen the structure is an important part for those structures. These structures have managed to survive thanks to buttresses and natural building materials. In addition, it is important that this study is a document in the transfer of traditional houses, which are disappearing day by day, to the future.

Keywords: Wooden, traditional house, buttress, Kayseri

1. GİRİŞ

Kentler tarih boyunca katmanlar halinde oluşmuştur. Bu katmanlar, kentlerin geçirdiği değişimler, dönüşümler, eski izler, yeni oluşumlar, toplumsal, sosyal, kültürel etkilerden

oluşur. Tüm bu durumlar kent içinde sürekli meydana gelmekte ve bugünün durumları da kentin yeni katmanlarını oluşturmaktadır (Eren, 2020). Bu katmanlaşmanın bariz bir şekilde görüldüğü illerden biride Kayseri'dir.

Kayseri, İç Anadolu Bölgesinde yer alan ikisi merkez olmak üzere on altı ilçesi bulunan bir şehirdir (Şekil 1). İl geleneksel konutları bakımından önemli kentler arasında yer almaktadır.



Şekil 1. Kayseri siyasi harita (URL-1)

Tarihi ve kültürel donanımı ile Anadolu'nun önemli şehirlerinden olan Kayseri, birçok medeniyeti içerisinde barındırdığı için katmanlaşması ve yerel malzeme, yapım tekniği ve topografyanın da etkisiyle yöreye özgü mimari özelliklerini oluşturan önemli bir bölgede yer almaktadır. Kültürel sürekliliğin önemli parçası olan tarihi miras niteliğindeki geleneksel konutlardır. Geleneksel konutlar, kendine özgü cepheleriyle halkın kültürünü şehre yansıtan bir ayna niteliğindedir (Çağlar vd., 2018).

Kültürel miras olan bu geleneksel konular, Talas ilçesinde günümüze kadar gelmeyi başarmıştır. Talas geleneksel konutların en baskın özelliklerinden biri kullanılan yapı malzemesinin taş olmasıdır. Doğal taş ile birlikte ön plana çıkan diğer bir yapı malzemesi ahşaptır. 19. yüzyılın sonlarında aşağı ve yukarı Talas'ta sivil mimari örnekleri yoğun olarak bulunmaktadır (Şekil 2).



Şekil 2: 1896 tarihli R.Oberhummer'in arşivinden Ali Dağı'ndan çekilmiş olmalıdır.

(Talas B. Arş.)

2. GELENEKSEL TALAS EVLERİNİN DIŞ CEPHE ÖZELLİKLERİNİN İRDELENMESİ

Geleneksel Talas evleri (Şekil 3-4) doğal taş malzemesinden oluşmaktadır. Bu malzeme ile birlikte kullanılan diğer bir malzeme ise ahşaptır. Ahşap yapı malzemesini geleneksel konutların pencerelerinde ve kapılarında karşımıza çıkmaktadır. Kimi zamanda giriş veya payanda olarak yapılarda görülmektedir (Aytemiz, 2021; Yaman, 2007).



Şekil 3:Geleneksel Talas konutlarından biri (Tablakaya mahallesinde)



Şekil 4:Geleneksel Talas konutlarından biri (Kiciköy mahallesinde)

3. GELENEKSEL TALAS EVLERİNDE AHŞABIN YERİ

Geleneksel konutlarda ahşap birçok alanda kullanılmaktadır. Kimi zaman bir taşın arasına sızıp kiriş görevi görmekte, kimi zaman evin ışığını ve havasını içeri alan pencerelerde, kimi zaman ise davetsiz misafire ilk adımı atmasını sağlayan kapılarda çokça kullanılmıştır (Şenkal, 1996; Duman vd., 1988). Ahşabın yüksek taşıma gücü, basit birleşim detayı ve mimari etkisinin olumlu olması tercih sebebi olmuştur (Erkoç, 2004). Ayrıca ahşap depreme dayanımı, hafif bir malzeme olması ve ısı iletkenliğide ahşabın olumlu yönleri olarak sıralanabilmektedir (Çalışkan vd., 2019).

Geçmişte yaşanan doğal afetler sonucunda insanlar tarafından ahşabın kolay yanabilmesi ve dayanıklı olmaması algısı, artan nüfusa yetebilecek kadar yüksek ahşap yapıların yapılamayacağı düşüncesi ile ahşap malzemesi doğal taş, betonarme gibi diğer yapı malzemeleri ile bir arada kullanılmaya başlanmıştır (Batur, 2004). Bunun yanı sıra ahşap malzemesi sürdürülebilir bir malzeme olması ve doğaya zarar vermemesi sebebi ile mimari yapılarda tercih sebebi olmuştur (Oğuz, 2017; Tarım, 2016).

İncelenen geleneksel konutta bahçeye açılan kapıda, üst katta caddeye bakan pencerelerde ve yapının ayakta kalmasını sağlayan kirişlerde kullanılmıştır. Aynı zamanda camları bölmeye yarayan elemanda da ahşap tercih edilmiştir. Bu sayede yapı bütünlüğü sağlanmış ve yapının kendine özgü karakteri oluşmuştur. Bu yapıda en dikkatimizi çeken durum taş payanlar ve zemen katta pencere bulunmamasıdır. Bunun sebebi de o zaman ki mahremiyetten kaynaklandığı düşünülmektedir (Şekil 5).



Şekil 5: Geleneksel Talas konutlarından biri (Tablakaya mahallesinde)

İncelenen yapının dış cephesinde farklı yapı malzemeleri bir arada kullanılmıştır. Yapının cephesin de yonu taşı kullanılmıştır. İkinci katında sokağa doğru taşan odanın alt kısmına ahşaptan payandalar yapılarak desteklenmiştir. Aynı zamanda ahşap kirişlerle taş yapının ağırlığı azaltılmaya çalışılmıştır. Cephede hissedilen ahşap pencereler ve panjurlar yapı bütünlüğünü tamamlamıştır. Bu yapının bütünlüğünü tamamlayan diğer bir parçada ahşap kapıdır. Kapının ve panjurların aynı geometrik durumu yapı bütünlüğünü sağlamıştır (Şekil 6).



Şekil 6:Geleneksel Talas konutlarından biri (Kıçıköy mahallesinde)

4. SONUÇLAR

Talas ilçesi mahallelerinde ahşap doğal taş ile bir arada kullanılıp bir bütünlük sağlamışlardır. Ahşap malzemesi pencerelerde, kapılarda, payandalarda ve panjurlarda sıklıkla kullanılmıştır. Ağırlıklı olarak konut cephesinin pencerelerinde ve girişlerde tercih edilmiştir.

Eski yaşamda sokakların dar olmasından dolayı zemin katları sokakla aynı doğrultuda olduğundan pencere seçimi daha küçük olmuştur. Bazı durumlarda ise mahremiyetten dolayı o katta, sokak cephesinde pencere tercih edilmemiştir. İkinci katta ise sokağa taşan yapı çoğu zaman ahşap payandalar ile desteklenmiş ve yapının yük dağılımını eşitlemeye çalışmışlardır. Mahallelerdeki geleneksel konutlarda çoğu zaman ahşap giriş kullanılmıştır.

Ahşabın yapı malzemesi olarak kullanılması diğer yapı malzemelerine nazaran çok daha eskilere dayanmaktadır. Ahşabın olumsuz yönleri onun tek başına kullanılmak yerine taş malzemeyle birlikte kullanılmıştır. Ahşabın doğaya zarar vermemesi mimari yapılarda kullanılma sebebi olmuştur.

KAYNAKÇA

- Eren, E. (2020). Palimpsest Kentte Psikocoğrafya Okuması: Kayseri Hunad Hatun Külliyesi Ve Kayseri Kalesi, Yüksek Lisans Tezi, Erciyes Üniversitesi Fen Bilimleri Enstitüsü, Kayseri.
- Çağlar, A., Çağlar, H. (2018). Geleneksel Konutların Dış Cephelelerinde Meydana Gelen Hasarların Tespiti Üzerine Bir Araştırma; Kastamonu Örneği, Dicle Üniversitesi, I. Uluslararası Mimarlık Sempozyumu.
- URL- 1. <https://s.milimaj.com/others/image/harita/kayseri-ili-haritasi.png>, Erişim Tarihi: 28.11.2021.
- Yaman, F.Z. (2007).Geleneksel ahşap yapılarda kullanılan ahşap yapı elemanlarının uzun dönem performansı Giresun zeytinlik mahallesinde örnek yapı incelemesi
- Aytemiz, Ö. (2021). Kahramanmaraş yapılarında ahşap kullanımı
- Duru, M.O. (2017).Sürdürülebilirlik ve enerji korunumu bağlamında ülkemiz konut üretiminde ahşap malzemenin önemi
- Tarım, A. (2016). Ekolojik mimaride ahşap malzeme kullanımının sürdürülebilirlik açısından irdelenmesi
- Çalışkan, Ö., Meriç, E. ve Yümcüler, M. (2019). Ahşap ve Ahşap Yapıların Dünyü, Bugünü ve Yarını
- Batur, A. (2004). Gelişmiş Ahşap Yapım Sistemleri ve Türkiye Koşulları Yönünden Değerlendirilmesi. Yüksek Lisans Tezi, Gebze Yüksek Teknoloji Enstitüsü, Mühendislik ve Fen Bilimleri Enstitüsü, Gebze.
- Duman, N. ve Ökten, S. (1988). Ahşap Yapı Dersleri.1 2. baskı. Yapı Endüstri Merkezi Yayın Bölümü, İstanbul, 272.
- Erkoç, E. (2004). Günümüz Teknolojileriyle Üretilen Ahşap Konutların Tasarım-Uygulama-Kullanım Üçgeninde Değerlendirilmesi. Yüksek Lisans Tezi, Yıldız Teknik Üniversitesi, Fen Bilimleri Enstitüsü, İstanbul.
- Şenkal, F. (1996). Konutlarda Dünyüden Bugüne Ahşap Kullanımı Üzerine Bir Araştırma. Yüksek Lisans Tezi, Trakya Üniversitesi, Fen Bilimleri Enstitüsü, Edirne.

**KAYSERİ TALAS ‘TAKİ GELENEKSEL YAPI MALZEMELERİNDEN DOĞAL
TAŞIN ZAMAN İÇERİSİNDEKİ KONUT MİMARİSİNE ETKİSİ**
THE EFFECT OF NATURAL STONE FROM TRADITIONAL BUILDING MATERIALS
IN KAYSERİ TALAS ON HOUSING ARCHITECTURE IN TIME

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ÖZET

Çok eski tarihe dayanan Talas ilçesi farklı medeniyetlere ev sahipliği yapmıştır. Bu medeniyetlerin yaşayış şartları, kültürleri, bulunduğu coğrafi özellikleri ve iklim şartları sebebiyle konut mimarisinde farklı yapı malzemeleri kullanmalarına sebep olmuştur. Bunların başında geleneksel yapı malzemelerinden olan doğal taş gelmektedir. Doğal taşlar konut mimarisinde insan yaşamını kolaylaştırıcı bir yöne sahiptir. İklim koşullarından dolayı taş yapı iyi bir ısı dengesi sunmaktadır. Yaz mevsiminde yapının içi daha serin olurken kış mevsiminde ise daha sıcak tutarak insanlara iyi bir yaşam sunmaktadır. Her türlü etkene karşı çok dayanıklı olması, iyi bir taşıyıcı özellikte olması, uzun ömürlü ve ekonomik olması, en önemlisi de sürdürülebilir olması taşın tercih sebepleri olarak sıralanabilmektedir. Yapılarda birçok alanda kullanılan doğal taşlar daha çok duvar yapımında tercih edilmektedir.

Bu çalışmada, Kayseri ili Talas ilçesi sınırları içerisinde bulunan Han, Harman ve Kçüköy mahallelerinde bulunan geleneksel konut inşasında kullanılan taşların incelenmesi hedeflenmiştir. Bu kapsamda Han, Harman ve Kçüköy mahallelerinden birer örnek seçilerek toplamda üç adet geleneksel konutun incelenmesi amaçlanmıştır. Saha çalışması şeklinde planlanan bu çalışmada yöntem olarak, belirlenen mahallelerden seçilen geleneksel konutlar incelenmesi, yapılarda kullanılan taş malzemelerin belirlenmesi ve her bir konut fotoğrafı ile belgelendirilmesi şeklinde bir yol izlenmiştir. Sonuç olarak; Talas ilçesinin Han, Harman ve Kçüköy mahallelerinde taş kullanımına çokça rastlandığı görülmüştür. Mahallelerdeki konutların birçoğunda doğal taş kullanıldığı görülmüştür. Zaten mahallelere farklı perspektiflerle bakıldığında da ilk göze çarpan konutların doğal taşlarla inşaa edilmiş olmasıdır. Birçok yapının bu durumda olması o bölgede yürürken insanı farklı zamanlara götürmekte ve her bir konutun kendine özgü bir durumu olduğu algısını yaratmaktadır. Zaman içerisinde de teknolojinin gelişimi ile bu taşlar farklı yapıya bürünmüş ve işlevleri artmıştır. Konut mimarisinde de karşımıza çıkan bu işlevler insan hayatını birçok yönde

etkilemiştir. Faydalı bir şekilde etki ettiği görülse de tarihi dokunun kaybolmasına da sebep olmuştur. Ayrıca insan hayatında önemli bir yere sahip olan konutların doğal taş ile inşa edilmesi bölge halkı için oldukça önemli bir değere sahip olduğu gözlenmiştir.

Anahtar Kelimeler: Taş, geleneksel konut, Kayseri, Talas

ABSTRACT

The town of Talas, which dates back to ancient times, has hosted different civilizations. The living conditions, cultures, geographical features and climatic conditions of these civilizations have led to the use of different building materials in residential architecture. Natural stone, which is one of the traditional building materials, comes first. Natural stones have a facilitating aspect of human life in residential architecture. Due to the climatic conditions, the stone structure offers a good heat balance. While the interior of the building is cooler in summer, it keeps warmer in winter and offers a good life to people. The reasons for preference of the stone can be listed as being very resistant to all kinds of factors, being a good carrier, being long-lasting and economical, and most importantly, being sustainable. Natural stones, which are used in many areas in buildings, are mostly preferred in wall construction.

In this study, it is aimed to examine the stones used in the construction of traditional houses in the Han, Harman and K ı ık oy neighborhoods within the borders of Talas district of Kayseri province. In this context, it is aimed to examine three traditional houses in total by selecting one sample from Han, Harman and K ı ık oy neighborhoods. In this study, which was planned as a field study, a method was followed by examining the traditional houses selected from the determined neighborhoods, determining the stone materials used in the buildings and documenting each house one by one by photographing method. As a result; It has been observed that stone use is common in the Han, Harman and K ı ık oy neighborhoods of Talas district. It has been observed that natural stone is used in most of the residences in the neighborhoods. When we look at the neighborhoods from different perspectives, the first thing that catches the eye is that the houses were built with natural stones. The fact that many buildings are in this situation takes people to different times while walking in that area and creates the perception that each house has a unique situation. Over time, with the development of technology, these stones have taken on a different structure and their functions have increased. These functions, which are also encountered in residential architecture, have affected human life in many ways. Although it seems to have a beneficial effect, it also caused the loss of historical texture. In addition, it has been observed that the construction of the houses, which have an important place in human life, with natural stone has a very important value for the people of the region.

Keywords: Stone, residence, Kayseri, Talas

1. GİRİŞ

Kayseri, T urkiye'nin  z Anadolu B lgesinde yer alan ve k lt rel eserler a ısından oldukça  nemli bir merkezdir (Ulvi vd., 2020).

Tarihi ve k lt rel donanımı ile Anadolu'nun  nemli Őehirlerinden olan Kayseri, bir ok medeniyeti i erisinde barındırdıđı i in katmanlaŐması ve yerel malzeme, yapım tekniđi ve topografyanın da etkisiyle y reye  zg  mimari  zelliklerini oluŐturan  nemli bir b lgede yer almaktadır. K lt rel s rekliliđin  nemli par ası olan tarihi miras niteliđindeki geleneksel konutlar, Talas il esinde g n m ze kadar gelmeyi baŐarmıŐtır. Talas geleneksel konutların en

baskın özelliklerinden biri kullanılan yapı malzemesinin taş olmasıdır. Konutlarda kullanılan taş, zaman içerisinde form ve biçim değişikliğine uğramıştır (Büyükmihçi vd., 2007).



Şekil 1: 1896 tarihli R.Oberhummer'in arşivinden Ali Dağı'ndan çekilmiş olmalıdır (Talas B. Arş.).

19. yüzyılın sonlarında aşağı ve yukarı Talas'ta sivil mimari örnekleri yoğun olarak bulunmaktadır (Şekil 1).

Bu bölgede geçmişten günümüze kadar değişen insan popülasyonu ve malzeme form değişikliği farklı taş malzemeler kullanılmaya sebep olmuştur (İmamoğlu, 2006).

Kullanıldığı ilk dönemlerde insanlar, kayaların içlerini oyarak kendilerine yaşam alanı oluşturmuşlardır. Zamanla maden ocaklarından çıkartılarak elde edilen taşlar kullanılmaya başlanmıştır (Url-1).

Doğal taşlar zaman geçtikçe kendine özgü görünüm kazanır ve dayanıklılığı artar. Ayrıca kolay temizlenebilir. Depreme ve yangına dayanıklı olması yönünden en çok tercih edilen yapı malzemelerinden olmuştur. Doğal taşın sürdürülebilirliği de kullanımı açısından çok önemlidir (Korkmaz, 2001).

Geleneksel konutlar birbirlerine benzer formlarda inşa edilmektedirler. Her bir konut ne kadar birbirine benzese de konutların kendine has kimliği ve farklı bir dili bulunmaktadır. Bunun sebebi ise o yapıyı kendine özgü hale getiren insan faktörü olmuştur (İncesakal, 1991; Atamer, 2011).

2. TALAS'TAKİ DOĞAL TAŞ ÇEŞİTLERİ VE ÖRNEKLERİ

Talas ilçesinde genellikle moloz taş, yonu taş ve kesme taş tercih edilmiştir. *Moloz taş*; Taş ocaklarından çıkartılan taşların hiçbir işlem uygulanmadan direk olarak kullanılmasıdır. *Yonu taş*; Yapı yapmada kullanılan ve yontulması kolay iri taştır. Yüzeyleri dikdörtgen biçimli taştır. *Kesme taş*; Gereken boyutlara uygun olarak kesilen taşlardır (Url-2 ; Mutlu, 2005).

Moloz Taş duvar



Yonu Taş duvar



Kesme Taş duvar



Şekil 2: Taş çeşitleri

Bu bakış açısı ile bakıldığında zaman sokaklardaki geleneksel taş malzeme bütünlüğü fark ediliyor. Bu taşları Han, Harman ve Kışıköy mahallelerinin sokaklarında birçok farklı bakış açısından görmekteyiz.

Sokak dokusunu oluşturan bu taşlar bu bölgenin baskın karakteri haline gelmiştir. Sokağın çizgiselliği ve doğrultusunu oluşturan doğal taşlar olmuştur. Geleneksel konutların duvarları ve bahçe duvarları sokak kimliğini desteklemiştir (Asatekin, 2011; Aksoy, 2020).



Şekil 2: Han mahallesi sokak görüntüsü



Şekil 3: Harman mahallesi sokak görüntüsü



Şekil 4:Kiçiköy Mahallesi sokak görüntüleri

3.KONUT MİMARİSİNDE İNCELENMESİ

İncelenen yapının dış cephesinde farklı yapı malzemeleri bir arada kullanılmıştır. Yapının alt katının bir bölümün duvarlarında moloz taş kullanılmıştır. Diğer cephe duvarlarında ise kesme taş kullanılmıştır. İkinci katında sokağa doğru taşan odanın alt kısmına ahşaptan payandalar yapılarak desteklenmiştir. Bu payandalar yapımın yükünü azaltmakla en büyük rolü üstlenmiştir. Bu role yardımcı olan diğer bir elemanda ahşap kirişlerlerdir. Yapıdaki ana eleman olan doğal taşla bir arada kullanılan ahşap pemcereler ve panjurlar yapının bütünlüğümü tamamlamıştır. Aynı zamanda payandayı destekleyen ahşap kiriş de insan işçiliği gözümüze çarpmaktadır.

Aynı zamanda bu yapıyı incelediğimizde birçok detaylar o zaman ki yaşayışa atıfta bulunmaktadır. O dönemde ki yaşayış da insanlar hem iklimsel koşullardan dolayı hem de mahremiyete önem verdiklerinden dolayı ahşap panjurlara ihtiyaç duymuşlardır (Şekil 5).



Şekil 5:Harman Mahallesiindeki geneksel konutlardan biri

İncelenen yapının dış cephesinde farklı yapı malzemeleri bir arada kullanılmıştır. Giriş kısmında uygulanan taş işçiliği ve geriye çekilme bu yapıya karakteristik özellik katmıştır. Cephe duvarlarında ise kesme taş kullanılmıştır. Cephede hissedilen ahşap pencereler ve kapılar yapının bütünlüğünü tamamlamıştır.

Yapının alt katında üst katına göre daha az pencere kullanılmıştır. Bunun sebebi sokağın direk olarak o yapıyla olan ilişkisinin olmasıdır. Kapının üst kısmında konumlandırılan pencere ise içerdeki yaşam alanına gün ışığını ulaştırır.(Şekil 6)



Şekil 6:Han Mahallesiindeki geneksell konutlardan biri

İncelenen yapının dış cephesinde yonu taşı kullanılmıştır. Yapıda doğal taş ile bir arada kullanılan ahşap pencereler ve payandalar bütünlüğü sağlamıştır. Aynı zamanda bu yapı da suyun dışa aktarımına yardımcı olan taşdan su olukları yapılmıştır.

Bu yapı zemin ve birinci kat olmak üzere iki kattan oluşmaktadır. Zemin kat da çoğu yapı da olduğu gibi sadece küçük pencere tercih edilmiştir. Yapının bir bölümü sokağa taşmıştır. Taşan kısımda pencerenin üstünde ahşap hatıl dikkatimizi çekmektedir (Şekil 7).

Bazı iklimsel sebeplerden dolayı yonu taşı zemin katta yapısını değiştirerek farklı bir görünüme bürünmüştür. Bu görünüm bu yapının kimliğini oluşturan diğer bir faktör olmuştur.



Şekil 7: Kicikoy Mahallesi'ndeki geneksel konutlardan biri

4. SONUÇ VE ÖNERİLER

Kayseri Talas'ta bulunan Han, Harman ve Kicikoy mahallelerinde yapı birliđi malzeme bütünü bu yere özgü hale gelmiştir. Her bir konut ne kadar birbirine benzese de her bir konutun kendine has kimliđi ve farklı bir dili olduđu ortaya çıkmıştır.

Mahallelerdeki konutların cephesindeki taş duvarlar, farklı yapı malzemeleri ile birleşerek karakteristik özellik taşımaktadır. Sokakların farklı bir dili olduđu hissedilerek eski dönemdeki yaşayışa da atıf yapmaktadır. Geleneksel konutların en belirgin özelliğinin doğal taş olduğunu görmekteyiz. Bu doğal taşın destekleyen ve yapının bir bütün halinde görülmesini sağlayan ahşap pencereler, panjurlar ve kapılar bu bölgede fazlasıyla mevcuttur. Doğal afetlere karşıda dayanıklı bir yapı malzemesi olduđu anlaşılmıştır.

Talas taki geleneksel konutlar, genellikle dikdörtgen veya kare prizmaların bir araya gelmesi ile oluşmuşlardır. Sokak dokusunu oluşturan konutlar, çođu kez bitişik nizamada oluşturulurken kimi zamanda konutun bahçe duvarı ile çizgiselliđi devam ettirmiştir. Bütüncül bir tasarım yaklaşımı ile inşa edilen geleneksel konutlar bir arada özgün mekânlar ve çevrenin oluşmasına sebep olmuştur. Alanda yer alan konutlar genellikle iki katlı ve sokađa taşan çıkmalarla dikkat çekmektedir. Bunun sebebi o yapıların yığma yapım sistemi ile yapıldıkları için insanlar daha fazla kat çıkmak istememeleridir. Doğal taş ile inşa edilen cephelerde kaplama malzemesi kullanılmamıştır. Yapım tekniğinin açık bırakıldıđı cephelerde taş ve ahşap malzeme bir arada kullanılmıştır. İklim koşulları ve mahremiyet temel alınarak, yapıların zemin katlarında özellikle sokak cephelerinde sağır duvarlar veya küçük pencere açıklıkları bulunmaktadır. Üst katlarda ise pencere oranları alt katlara göre daha büyük ve orantılıdır.

O alanda ön plana çıkan cephe elemanı hiç kuşkusuz çıkmalardır. Genel olarak taş konsollar ve ahşap konsollar tarafından taşınan yapılan çıkmalar, alanın cephe karakteristiğini

oluşturan en önemli öğelerden biridir. Cephede taş ile beraber ahşap payandalar, pencereler ve kapılar ile belli bir ritim yakalamıştır.

Bazı yapılarda ise bahçeye açılan kapılardır. Böylelikle evlerin hemen sokağa açılmaması korunaklı bir giriş oluşturmaktadır. Ayrıca ilk olarak misafiri bahçede karşılamak, eve girmeden açık havada yarı açık mekânlarda oturmak faydalı duruma gelmiştir. Bahçeyle ilişki halinde olan bu evlerdeki insanların zemin katta sokak ile olan ilişkileri kapalıdır. Bu ilişki sadece birinci kattaki pencereler tarafından olmuştur. Aynı zamanda birçok sebepten dolayı tercih edilen panjurlarda ahşap yapı malzemesinden tercih edilmiştir.

Aynı zamanda bu yapıların aynı doğrultuda bir araya gelmesi ve aynı yapı malzemelerinin bir arada kullanılması sokak dokusunu oluşturmuştur. Bu sokak dokusunun bu durumundan dolayı zemin katta ki pencereler oran olarak daha küçük ve yüksekte yapılmaya çalışılmıştır.

Geleneksel konut dokusunun ağırlıkta olduğu yerleşim yerlerinde yeni yapı ihtiyacı doğması halinde dokunun bozulmasına izin verilmemelidir. Yeni yapıların gereksiniminde yerel ve kültürel kimlik yorumlanmalı ve tasarım aşamasında bu konu göz önünde bulundurulmalıdır.

KAYNAKÇA

- Ulvi, A., Yiğit, Y., (2020). 3D study of modelling and animation of Kayseri Güllük Mosque. Mersin Photogrammetry Journal – 2020; 2(2); 33-37.
- Korkmaz, B. (2001). [Naturadergi.com/anasayfa/geleneksel-yerlesimler-uzerinden-mimaride-dogal-tas-kullanimi/](http://www.naturadergi.com/anasayfa/geleneksel-yerlesimler-uzerinden-mimaride-dogal-tas-kullanimi/)
- Url-1, (<https://www.naturadergi.com/anasayfa/geleneksel-yerlesimler-uzerinden-mimaride-dogal-tas-kullanimi>)
- Url-2, (<https://www.slideshare.net/irfanmeric/yap-malzemeleri-doal-talar>)
- Büyükmihçı, G., Bakır, N., Eldek, H. (2007). Talas Kayseri Kentsel Kültür Varlıkları Envanteri
- İncesakal, M. (1991) “Kayseri Evleri”, Türk Halk Mimarisi Sempozyumu, (Konya, 05-07.03.1990). Ankara: Kültür Bakanlığı Yayınları. s. 97-113.
- Aksoy, A. (2020). Natural dergi, sürdürülebilir bir bakış açısı ile doğal taşın kullanımı
- Asatekin, G.N. (2011), Gelenekselden Günümüze Kent Mimarlığında Taş: Süreklilik ve Aykırılık. V. Uluslararası Mimarlık ve Taş Sempozyumu, Mimarlar Odası Antalya Şubesi, Antalya.
- Atamer, M. (2011). Talas'ta Zaman. İstanbul: Yeni İnsan Yayınevi
- İmamoğlu, V. (2001). Kayseri Bağ Evleri. İstanbul: Türkiye İş Bankası Kültür Yayınları.
- Mutlu, S. (2005). Türkiye'nin doğal taşlarının yörelerine göre dağılımı. Stone Yapı Endüstri Merkezi, Yapı Yayın 1, 43-63.

**TAGETES PATULA L. (ASTERALES: ASTERACEAE)'NİN GÜMÜŞ VE ALTIN
NANOPARTİKÜLLÜ SU EKSTRAKTININ *SITOPHILUS GRANARIUS* (L.)
(COLEOPTERA: CURCULIONIDAE) KARŞI LABORATUVAR KOŞULLARINDA
ETKİNLİĞİNİN BELİRLENMESİ**

DETERMINATION OF THE EFFICACY OF *TAGETES PATULA* L. (ASTERALES:
ASTERACEAE) SILVER AND GOLD NANOPARTICLES WATER EXTRACT
AGAINST *SITOPHILUS GRANARIUS* (L.) (COLEOPTERA: CURCULIONIDAE) IN
LABORATORY CONDITIONS

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ÖZET

Depo zararlılarından biri olan *Sitophilus* türleri tüm dünyada tahıllarda önemli zararlara neden olmaktadır. *Sitophilus* türleri içerisinde önemli bir tür olan *Sitophilus granarius* L. (Col.: Curculionidae) ülkemizin hemen hemen her bölgesinde yaygın olarak görülür ve bütün hububat çeşitlerinde zarar meydana getirebilmektedir. Hububat danelerini yiyerek oluşturdukları zarar sonucunda danelerin çimlenme oranlarında %80-90 azalma meydana gelmektedir.

Bu zararlılarla mücadelede yoğun olarak sentetik kimyasallar kullanılmaktadır. Sentetik kimyasallar hem direnç oluşumuna neden olmakta hem de insan ve çevre sağlığına zarar vermektedir. Bu etkileri en aza indirmek için alternatif mücadele yöntemleri araştırılmaktadır. Bu yöntemlerden biri de biyopestisit uygulamalarıdır. Özellikle bitkilerden elde edilen biyopestisitler zararlıları baskı altına alırken çevre ve insan sağlığına daha az zararlıdır.

Bu çalışma ile *Tagetes patula* L. (Asterales: Asteraceae)'nin gümüş ve altın nanopartiküllü su ekstraktları *Sitophilus granarius* L. (Coleoptera: Curculionidae)'a karşı kontak ve davranış (beslenmeyi engelleyici) etkileri bakımından laboratuvar koşullarında araştırılmıştır. Çalışmada, *T.patula*, 'nın gümüş nanopartiküllü su ekstraktı *S.granarius* üzerinde kontak etki denemesinde toksik etki göstermiştir. %100 dozunda 4. gün sonunda %61,25±2.95'lik bir ölüm oranı tespit edilmiştir. Altın nanopartikülün etkinliği ise düşük düzeyde bulunmuştur. Davranışa etkisi seçenek testi ile değerlendirilmiştir. Hem altın nanopartikül hem de gümüş nano partikülün ele alınan tüm dozlarında farklı oranlarda da olsa beslenmeyi durdurduğu belirlenmiştir. En düşük ağırlık kaybı %28,43±8.31 ile altın nanopartikül ekstraktı'nın %100 konsantrasyonunda bulunmuştur. Beslenme sonucunda ise en yüksek ölüm oranı gümüş nanopartikülün %100 konsantrasyonunda (%61,01±7.89) tespit edilmiştir. Sonuç olarak, *T.patula*'nın gümüş ve altın nanopartiküllü su ekstraktının *S.granarius* mücadelesinde kullanılma potansiyeline sahip biyopestisit olabileceği bu çalışma ile belirlenmiştir.

Anahtar Kelimeler: *Sitophilus granarius*, *Tagetes patula*, Gümüş Nanopartikül, Altın Nanopartikül, Buğday.

ABSTRACT

Sitophilus species, one of the storage pests, cause significant damage to cereals all over the world. *Sitophilus granarius* L. (Col.: Curculionidae), which is an important species among the

Sitophilus species, is common in almost every region of our country and can cause damage to all cereal varieties.

By eating cereal grains, they produce an 80-90% reduction in the germination rate of grains. Synthetic chemicals are used extensively to control these pests. Synthetic chemicals cause both resistance and damage human and environmental health. Alternative control methods are being investigated to minimize these effects. One of these methods is the application of biopesticides. Biopesticides, especially from plants, are less harmful to the environment and human health while suppressing pests. In this study, silver and gold nanoparticle water extracts of *Tagetes patula* L. (Asterales: Asteraceae) were investigated their contact and behavioural (feeding inhibitory) effects against *Sitophilus granarius* L. (Coleoptera: Curculionidae) in laboratory conditions.

In the study, silver nanoparticle extract of *T.patula* showed toxic effect on *S.granarius* in the contact effect experiment. A mortality rate of $61.25 \pm 2.95\%$ was determined at the end of the 4th day at the 100% dose. The effectiveness of the gold nanoparticle was found to be at a low level. The effect of behavior was evaluated by the option test. It was determined that both the gold nanoparticle and the silver nanoparticle stopped feeding at different rates at all the doses considered. The lowest weight loss was found at 100% concentration of gold nanoparticle extract with $28.43 \pm 8.31\%$. The highest mortality rate ($61.01 \pm 7.89\%$) as a result of feeding was determined at 100% concentration of silver nanoparticles. As a result, it was determined by this study that the silver and gold nanoparticle water extract of *T.patula* could be a biopesticide with the potential to be used in the control of *S.granarius*.

Keywords: *Sitophilus granarius*, *Tagetes patula*, Silver Nanoparticles, Gold Nanoparticles, Wheat

1.GİRİŞ

Tahıllar, insan beslenmesinde temel besin kaynaklarından biri olması bakımından önemlidir. Dünya da tahıl üretimi 2019 yılında 2.2 milyar ton iken ülkemizde 2019 yılında, 35 milyon ton olmuştur (Anonim, 2020).

Dünyada ve ülkemizde stratejik bir ürün olan tahıldan birim alandan maksimum verimi almak ve kaliteli üretim yapmak için yoğun çalışmalar yürütülmektedir. Bu çalışmaların başında da biyotik ve abiyotik faktörlere yönelik yapılan çalışmalar gelir. Tarla koşullarında biyotik faktörlerden ciddi ürün kayıpları (süne, kıvımlı zabrus, bambul, buğday biti, pas hastalıkları, sürme, rastık, fare vs.) meydana gelmektedir. Tarla koşullarında meydana gelen zararın yanında hasat edilen ürünlerin depolanması esnasında da böceklerin önemli zararlara neden olduğu ve depolanmış tahıllarda böceklerin meydana getirdiği zarar, modern depolama tekniklerinin kullanıldığı ülkelerde %10- 40 civarında olduğu belirtilmiştir (Shaaya ve diğ., 1997). Ülkemizde ise iyi depolama şartlarının olmadığı yerlerde bu oranın %100'e varan oranda olduğu bildirilmektedir (Yıldırım ve diğ. 2001). Depo zararlıları, özellikle buğday depolanan alanlarda buğdayın kalite kayıplarına neden olmaktadır (Özer ve diğ. 1989).

Depoların en önemli zararlılarından biri de *Sitophilus* türleridir. Tüm dünyada ciddi maddi zararlara neden olmaktadır (Asmanizar ve diğ. 2008). *Sitophilus* türleri içerisinde önemli bir tür olan *Sitophilus granarius* L. (Col.: Curculionidae) yurdumuzun hemen hemen her bölgesinde yaygın olarak görülür ve bütün hububat çeşitlerinde zarar meydana getirebilmektedir. Hububat danelerini yiyerek oluşturdukları zarar sonucunda danelerin çimlenme oranlarında %80-90 azalma meydana getirmektedirler (Anonim, 2008).

Diğer zararlılarda olduğu gibi bu zararlıya karşı da yaygın kullanılan mücadele yöntemi kimyasal mücadeledir. Bu zararlıyla pestisit kullanılmadan yapılan üretimlerde %60-100 kayıplar oluşmaktadır. Pestisitlerin etkisinin kısa sürede görülmesi ve uygulamasının kolay olması gibi nedenlerden dolayı pestisit çiftçilerimize cazip gelmektedir (Tiryaki ve diğ. 2010). Fakat kimyasal mücadelenin bu kadar yoğun kullanılması birçok soruna da sebep olmaktadır. Yoğun kullanılan insektisitler böcekler üzerinde baskı oluşturmakta ve ilaçlara karşı direnç kazanmalarına sebep olmaktadır. Ayrıca kazanılan bu direnç genetik kökenli olması sebebiyle nesilden nesile aktarım sağlanabilmektedir (Çakır ve Yamanel 2005). Oluşan bu direnç nedeniyle birim alanda kullanılan ilaç miktarı artmakta ve aşırı insektisit kullanımı insan sağlığına zarar verirken çevre kirliliğini tetiklemektedir.

Tarım alanlarında kullanılan bu yoğun kimyasallar ürün kaybına neden olan zararlı popülasyonlarını azaltırken hedef alınmayan polinatörler, predatörler ve parazitoitlerin de zarar görmesine de neden olmaktadır (Stapel ve diğ. 2000, Xu ve diğ. 2004). Kimyasal pestisitlerin çevreye verdikleri bu zararlar da dikkate alındığında, dengeyi bozmayacak yeni alternatif mücadele yöntemlerine ihtiyaç duyulmuştur. Son yıllarda hastalık, zararlı ve yabancıot mücadelesinde biyopestisitler üzerine çalışmalar hız kazanmıştır (Öncüer, 2000; Kim ve diğ. 2003; Gökçe ve diğ. 2006, Gökçe ve diğ. 2010).

Bitkiler, hayvanlar, bakteriler ve çeşitli mineraller gibi birçok doğal maddeden elde edilen ve zararlılar ile mücadelede kullanılan ürünlere “*biyopestisit*” denmektedir (Tangtrakulwanich ve Reddy 2014). Bitkilerin pestisit olarak kullanımı ile ilgili yapılan çalışmalar ortalama 2000 yıl öncesine dayanmaktadır (Thacher, 2002). Günümüzde 6000 bitki türünün böcek kaçırmacı, böcek öldürücü veya gelişim engelleyici gibi etkinlerinin olduğu belirlenmiştir (Ho ve diğ. 1997, Huang ve diğ. 1997, Obeng-Ofori ve Reichmuth 1997, Huang ve Ho 1998, Gökçe ve diğ. 2010).

Meliaceae, Rutaceae, Malvaceae, Brassicaceae, Asteraceae ve Canellaceae gibi familyalarında içerisinde bulunduğu 235 familyaya ait 2500 türün ise aktif olarak pestisit özelliği gösterdiği bulunmuştur (Saxena, 1998). Bu bitkilerin içermiş oldukları sekonder bileşikler sayesinde bu etkiler görülmektedir. Genel olarak bitkilerin içerdiği çeşitli metabolitlerin (sekonder metabolitler, alkaloitler, terpenler vb.) miktarının 350 üzerinde olduğu tespit edilmiştir (Dimetry, 2014). Bunlarda birçok zararlının kontrolünde başarılı bir şekilde kullanılmaktadır (Erlar ve Çetin 2007, Pavela, 2009). Asteraceae familyası içerisinde yer alan *Tagetes* türlerinin nematisidal etkinlik gösterdiği birçok araştırmacı tarafından bildirilmiştir (Govindaiah ve diğ. 1990; Siyanand 1995). Ancak böcekler üzerine uygulamalar (Cestari ve diğ. 2004) ve özellikle bitkisel kökenli pestisitlerin nanopartikül şeklinde uygulamaları ile ilgili çalışmalar çok sınırlıdır (Athanasios ve diğ. 2018, Şahin, 2019).

Bu çalışma ile *Tagetes patula* L. (Asterales: Asteraceae) su ekstraktının gümüş ve altın nanopartiküllerinin depolarda önemli bir zararlı olan *Sitophilus granarius* L. (Coleoptera: Curculionidae)’a karşı laboratuvar koşullarında etkinlikleri araştırılmıştır.

2. MATERYAL VE YÖNTEM

2.1. *Tagetes patula* L. (Asterales: Asteraceae) Bitkisinin Yetiştirilmesi

Tagetes patula L. tohumu Vilmorin Tohumculuk tarafından temin edilmiş. Kırşehir Ahi Evran Üniversitesi Ziraat Fakültesine ait seralarda yetiştirilmiştir. Yaklaşık 50 gün sonra bitkilerin toprak üstü aksamaları hasat edilerek oda sıcaklığında gölgede kurumaya bırakılmış ve kuruduktan sonra bitkiler öğütülerek kavanozlara konulmuştur. Denemelerde kullanılıncaya kadar güneş almayan serin bir ortamda saklanmıştır.

2.2. *Sitophilus granarius* (L.) (Coleoptera: Curculionidae) Kültürünün Yapılması

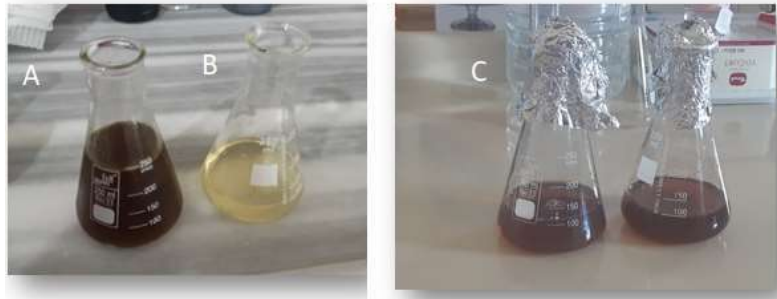
Denemede kullanılacak *S. granarius* erginleri Kırşehir Ahi Evran Üniversitesi, Ziraat Fakültesi Bitki Koruma Bölümü'ne ait stok kültürlerinden elde edilmiştir. *S. granarius* erginlerinin yetiştirilmesinde, içinde temiz buğday bulunan 1 litrelik cam kavanozlarda ergin dişi ve erkekler 48 saat boyunca yumurtlamaya bırakılmıştır. 48 saat sonunda ergin bireyler kavanozlardan uzaklaştırılıp sadece yumurtaların kalması sağlanmıştır. $27\pm 2^{\circ}\text{C}$ sıcaklıkta inkübatörde muhafaza edilmiştir. 45 gün içerisinde yeni nesil ergin bireylerin çıkışı oluşmuş ve *S. granarius* kültürü rutin olarak Bitki Koruma Laboratuvarında üretimi devam ettirilmiştir. Tüm denemelerde yeni çıkan en geç 1 haftalık ergin bireyler kullanılmıştır.

2.3. *Tagetes patula* L. (Asterales: Asteraceae) Bitkisinden Su Ekstraktının Elde Edilmesi

Tagetes patula L. bitkisinin kurutulmuş üst kısmından elde edilen bitkisel tozunun 5 g'ı 100 ml distile su içerisine konularak 250ml'lik erlen içerisinde de 80°C 'lik su banyosunda bir saat bekletilmiştir. Elde edilen *T.patula* sulu ekstraktı kaba filtre kâğıdından süzülerek stok olarak kullanılmak üzere koyu renkli cam şişe içerisinde buzdolabında $+4^{\circ}\text{C}$ 'de muhafaza edilmiştir (Nartop, 2017)

2.4. *Tagetes patula* L. (Asterales: Asteraceae) Su Ekstraktından Gümüş Nanopartiküllerin Elde Edilmesi

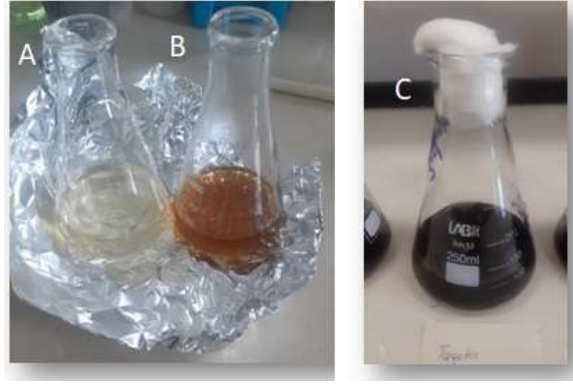
95 ml 1 mM gümüş nitrat çözeltisine 5 ml stok olarak elde edilen *T.patula* ekstraktı ilave edilmiştir. Erlen içerisinde karıştırıldıktan sonra oda sıcaklığında 24 saat bekletilerek nanopartikül oluşumunun bir göstergesi olan renk değişimi takip edilmiştir (Nartop 2017) (Şekil 2.1).



Şekil 2.1. *Tagetes patula* L. su ekstraktından elde edilen gümüş nanopartiküllü ekstrakt. A- *T.patula* stok solüsyonu; B- Gümüş nitratlı solüsyona eklenmiş *T.patula* ekstraksiyonu; C- 24 saat sonunda gümüş nanopartiküllü ekstrakt

2.5. *Tagetes patula* L. (Asterales: Asteraceae) Su Ekstraktından Altın Nanopartiküllerin Elde Edilmesi

95 ml 1 mM altın klor hidrat çözeltisine 5 ml stok olarak elde edilen *T.patula* ekstraktı ilave edilmiştir. Erlen içerisinde karıştırıldıktan sonra oda sıcaklığında 24 saat bekletilerek nanopartikül oluşumunun bir göstergesi olan renk değişimi takip edilmiştir (Nartop 2017). (Şekil 2.2).



Şekil 2.2. *Tagetes patula* L. su ekstraktından elde edilen altın nanopartiküllü solüsyon. A- Altın klor hidrat solüsyonuna eklenmiş *T.patula* ekstraksiyonu; B- *T.patula* stok ekstraktı; C- 24 saat sonunda altın nanopartiküllü ekstraktı

2.6. UV-VIS Spektrofotometrik Analiz

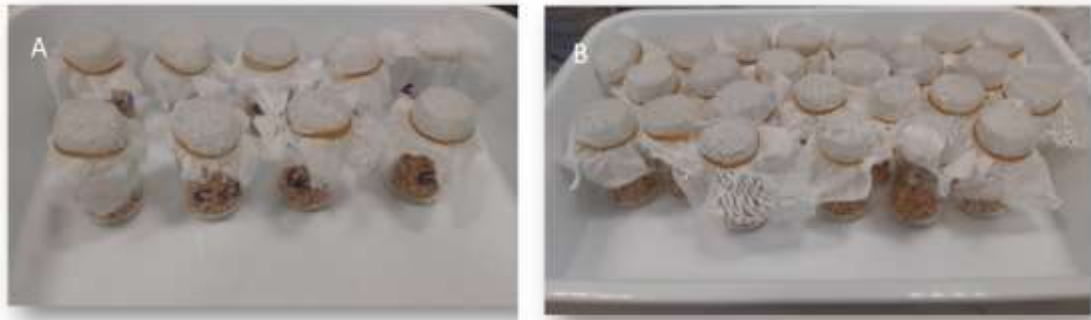
Elde edilen gümüş ve altın nanopartikül çözeltilerinden 24 saatin sonunda 5 ml'lik örnek alınarak UV-VIS spektrofotometrik ölçümü yapılmıştır. Gümüş nanopartikül çözeltisi ölçümü sonucunda 387'de pik vermiş, altın nanopartikül çözeltisi ise 550'de pik vermiştir.

2.7. Gümüş ve Altın Nanopartiküllerin pH Analizi

Gümüş ve altın nanopartiküllerin oluşumu sırasında çözelti içerisinde pH değişimi gözlenmektedir. Bu sebeple *T.patula* su ekstraktının pH değeri 5.15 olarak belirlenmiştir. Nanopartikül elde edilmeden önce Gümüş nitratın pH değeri 3.01 ve Altın Klor Hidratın ise pH değeri 5.21 olarak belirlenmiştir. Denemelerde kullanılan saf suyun değeri ise 7 olarak tespit edilmiştir. Nanopartikül oluşumu sonunda Altın nanopartikülün pH'ı 3.54 ve Gümüş nanopartikülün ise pH değeri ise 4.92 olarak bulunmuştur.

2.8. Kontak Etki Doz Denemesi

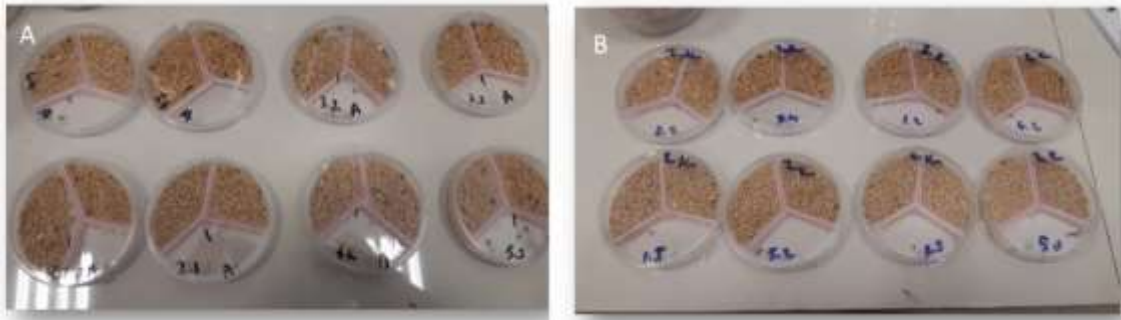
S. granarius için yapılan kontak etki doz denemesi çalışmasında *T.patula*'nın gümüş ve altın nanopartiküllü su ekstraktının stok solüsyonu %100 kabul edilmiştir ve buradan seyretme yapılarak dozlar belirlenmiştir. Buna göre %100, %50, %25, %12,5 ve %6,25'lik konsantrasyonlar denemede kullanılarak etkinliği tespit edilmiştir. Her böcek için 1 µl/böcek olacak şekilde mikropipet yardımıyla konsantrasyonlar böceğin abdomen ventralinden uygulanmıştır. Deneme tesadüf parselleri deneme desenine göre yürütülmüştür. Böcekler kontrolde 1 µl/böcek olacak şekilde distile su ile muamele edilmiştir. Deneme $27 \pm 2^\circ\text{C}$ sıcaklıkta, 4 tekerrürlü ve 2 tekrarlı olarak kurulmuştur. Uygulamadan 24., 48. ve 72. saat sonra sayımlar yapılarak ölü bireyler kayıt altına alınmıştır (Şekil 2.3).



Şekil 2.3. Kontak etki denemesi. A- Gümüş nanopartikül denemesi; B- Altın nanopartikül denemesi

2.9. Davranışsal Etki Denemesi

Seçenek (choice) testine göre kurulan deneme, 9 cm çapında olan petri kapları üç kısma ayrılarak, kısımlardan bir tanesinde %100, %50, %25, %12,5 ve %6,25'lik konsantrasyonlardaki bitki ekstraktları ile muamele edilen yaklaşık 5 gr ağırlığında olan buğday tanelerine 1 ml ekstraktan uygulanmış ve kurutulmuş, diğer kısımda ise kontrol olarak aynı miktarda saf su ile muamele edilmiş ve kurutulmuş buğday taneleri yerleştirilmiştir. Buğdaya ekstraktlar el pülverizatörü ile uygulanıp, buğdaylar bir spatula yardımı ile iyice karıştırılmıştır. Boş olan üçüncü kısma ise aç bırakılan 10'ar adet *S.granarius* erginleri bırakılmıştır. Deneme tesadüf parselleri deneme desenine göre 4 tekerrürlü ve 2 tekrarlı olarak kurulmuştur. Denemeler $27\pm 2^{\circ}\text{C}$ sıcaklıkta muhafaza edilmiş ve ergin böceklerin 7 gün sonundaki beslenmesinden kaynaklanan ağırlık kayıpları ve ölüm sayıları kaydedilmiştir (Şekil 2.4).



Şekil 2.4. Davranış etki denemesi. A- Altın nanopartikül denemesi; B- Gümüş nanopartikül denemesi

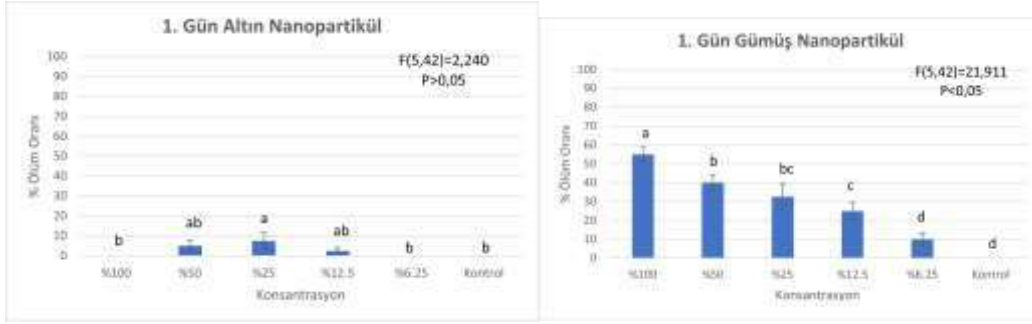
2.10. İstatistik Analiz

Denemeler sonucunda LD₅₀ ve LD₉₀ değerleri POLO-PC (LEORA software, 1994) paket programı kullanılarak hesaplanmıştır. Denemede böceklerin % ölüm oranları Abbott formülüne göre hesaplanıp varyans analizi yapılarak Duncan çoklu karşılaştırma testi uygulanarak değerlendirilmiştir (SPSS1999).

3. BULGULAR

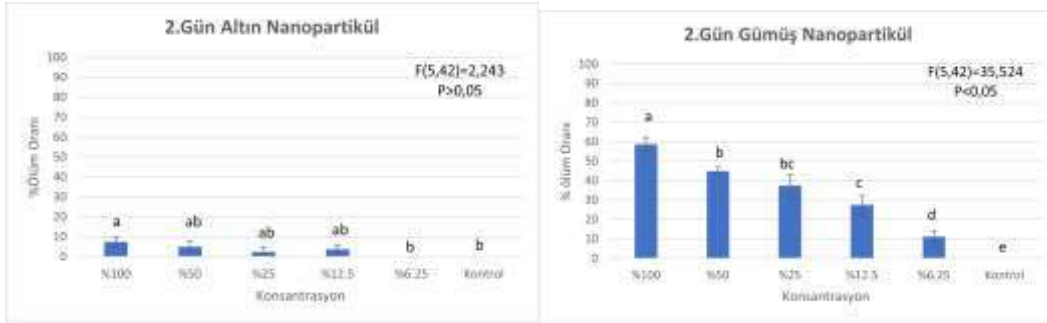
3.1. *Tagetes patula*'nın Gümüş ve Altın Nanopartiküllü Su Ekstraktlarının *Sitophilus granarius* L. 'a Karşı Kontak Etki Doz Denemesi

Tagetes patula'nın gümüş ve altın nanopartiküllü su ekstraktının *S.granarius*'a karşı kontak etki denemesinden elde edilen sonuçlara göre 1. gün sonunda altın nanopartikül ekstraktı uygulanan bireylerde ölüm oranı çok düşük seviyede gözlenmiştir. Arada farklılıklar görünse de bu farklar istatistiki olarak önemli bulunmamıştır ($F(5,42)=2,240$ $P>0,05$). Gümüş nanopartikül uygulamasında 1. gün itibari ile ölümler görülmeye başlamış ve en yüksek ölüm oranı $55\pm 3,77$ ile %100 konsantrasyonunda belirlenmiştir. 1. gün sonunda gümüş nanopartikül uygulaması sonucunda elde edilen veriler arasındaki fark istatistiki olarak önemli bulunmuştur ($F(5,42)=21,911$ $P<0,05$) (Şekil 3.1).



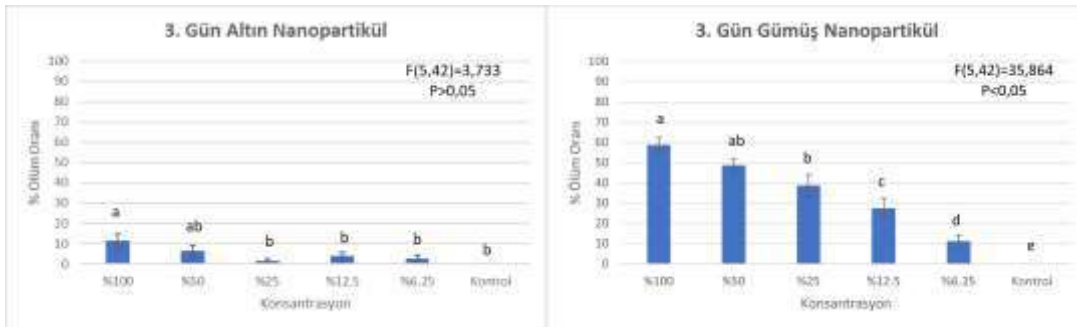
Şekil 3.1. *Tagetes patula* L. gümüş ve altın nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 1. gün kontak etki doz denemesi sonuçları

2.gün sonunda yapılan sayımlarda altın nanopartikül'un *S. granarius*' a karşı etkinliği düşük seviyede olduğu tespit edilmiştir. Arada farklar olmasına rağmen bu fark istatistiki olarak önemli bulunmamıştır ($F(5,42) = 2,243$ $P>0,05$). Gümüş nanopartikül uygulamasında ise yine yüksek konsantrasyonda ölüm oranlarının yüksek konsantrasyonun düşmesi ile oranında düştüğü gözlenmiştir (Şekil 3.2). En yüksek ölüm oranı %100 konsantrasyonda 58.75 ± 3.50 tespit edilmiştir. Ölümler arasındaki fark istatistiki olarak önemli bulunmuştur ($F(5,42) = 35,524$ $P<0,05$).



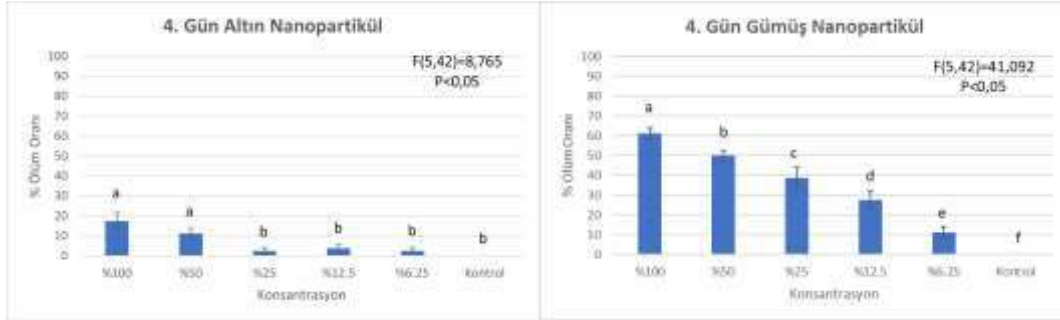
Şekil 3.2. *Tagetes patula* L. gümüş ve altın nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 2. gün kontak etki doz denemesi sonuçları

3.gün sonunda gümüş ve altın nanopartikülün *S.granarius* karşı etkinliğine bakıldığında altın nanopartikül uygulamasının *S.granarius*'un ölüm oranına etkisinin az olduğu belirlenmiştir. Konsantrasyonlara göre ölüm oranları arasında fark belirlenmiş olsa da bu farkın istatistiki olarak önemli olmadığı tespit edilmiştir ($F(5,42)=3,733$ $P>0,05$). Gümüş nanopartiküllü ekstratlarda ölüm oranının yüksek konsantrasyonlarda daha yüksek düzeyde olduğu belirlenmiştir. Konsantrasyonlar arasındaki ölüm oranları arasındaki farklar istatistiki olarak önemli bulunmuştur ($F(5,42)= 35,864$ $P=0,01$) (Şekil 3.3).



Şekil 3.3. *Tagetes patula* L. gümüş ve altın nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 3. gün kontak etki doz denemesi sonuçları

4.gün sonundaki ölüm oranlarına bakıldığında altın nanopartiküllü *T.patula* su ekstraktında en yüksek ölüm oranı 17.5 ± 4.11 ile % 100 'lük konsantrasyonda tespit edilmiştir. Bunu sırasıyla 11.25 ± 2.26 ile %50 lik konsantrasyon ve %12.5'lik konsantrasyon 3.75 ± 1.82 izlemiştir. Konsantrasyonlar arasındaki farklar istatistiki olarak önemli bulunmuştur ($F(5,42)=8,765$ $P<0,05$) (Şekil 3.4). Gümüş nanopartiküllü *T.patula* su ekstraktının *S.granarius*' a etkinliğine bakıldığında ise 4.gün sonunda etkinliğinin yine yüksek konsantrasyonlarda en yüksek olduğu konsantrasyon düştükçe etkinliğinin de azaldığı tespit edilmiştir. En yüksek ölüm oranı 61.25 ± 2.95 ile %100'lük konsantrasyonda tespit edilmiştir. Bunu sırasıyla $50 \pm 2,67$ ile % 50'lik konsantrasyon ve %25lik konsantrasyonla $38.75 \pm 5,48$ ölüm oranı izlemiştir ($F(5,42)=41,092$ $P<0,05$).

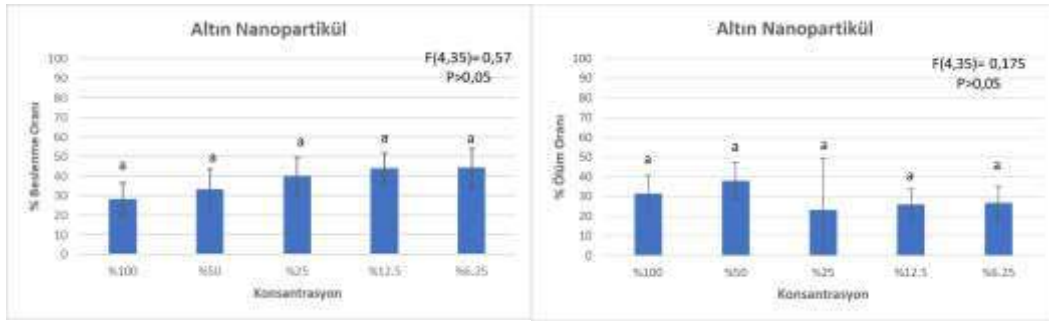


Şekil 3.4. *Tagetes patula* L. gümüş ve altın nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 4. gün kontak etki doz denemesi sonuçları.

Kontak etki doz denemesi sonucunda, Altın nanopartikül solüsyonunda ölüm oranları çok az olduğu için LD₅₀ ve LD₉₀ değerleri hesaplanamamıştır. 1. gün sonunda Gümüş nanopartikül solüsyonunda ise LD₅₀ değeri 74,197 µl/böcek ve LD₉₀ değeri ise 1183,176 µl/böcek olarak hesaplanmıştır. 2.gün sonunda LD₅₀ değeri 58,100 µl/böcek ve LD₉₀ değeri 848,450 µl/böcek, 3 gün sonunda LD₅₀ değeri 53,955µl/böcek ve LD₉₀ değeri732,623 µl/böcek ve 4.gün sonunda ise LD₅₀ değeri 50,215µl/böcek ve LD₉₀ 604,429 µl/böcek değeri hesaplamıştır.

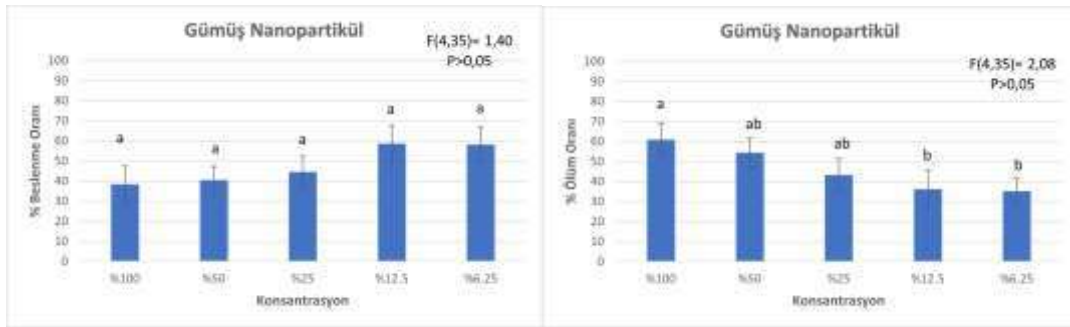
3.2. *Tagetes patula* L. Gümüş ve Altın Nanopartiküllü Su Ekstraktının *Sitophilus granarius* L.'a Karşı Davranışsal Etki Denemesi

S.granarius'un *T.patula*'nın gümüş ve altın nanopartiküllü su ekstraktlarına karşı davranışsal etkisini gözlemlemek amacıyla seçenek testi kullanılmıştır. Deneme sonuçlarına göre altın nanopartikülle muamele edilen buğdaylarda en yüksek beslenme oranı düşük konsantrasyonlarda belirlenmiştir(Şekil 3.5). Buna göre konsantrasyon arttıkça beslenme oranı düşmüştür. En yüksek konsantrasyon olan %100'de böceklerin beslenme oranı 28 ± 8.31 olarak belirlenmiştir. Ancak beslenme oranları arasında farklar olsada bu farklar istatistiki olarak önemli bulunmamıştır ($F(4,35)= 0,57$ $P>0,05$). *Sitophilus granarius* 'un 7. gün sonunda ölüm oranlarına bakıldığında %50'lik konsantrasyonda 38.09 ± 9.30 olarak tespit edilmiştir. Bunu sırasıyla %100'de 31.51 ± 9.13 ve %6.25 'de 26.78 ± 8.58 izlemiştir (Şekil 3.5).



Şekil 3.5. *Tagetes patula* L. altın nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 7. gün sonunda beslenme ve ölüm oranı sonuçları

Gümüş nanopartiküllü *T.patula* su ekstraktının *S.granarius*'un beslenmesine etkisine bakıldığında. Uygulamanın 7.gün sonunda en yüksek beslenme 58.20 ± 8.47 ile en düşük konsantrasyon olan % 6.25 'de tespit edilmiştir. En yüksek konsantrasyonda ise beslenme oranı 38.46 ± 8.89 olarak belirlenmiştir. Bu verilere göre konsantrasyonlar arasında fark olmasına rağmen bu fark istatistiki olarak önemli bulunmamıştır ($F(4,35)= 1,40$ $P>0,05$). Beslenme sonucu ölüm oranlarına bakıldığında %6.25 lik konsantrasyonda en fazla beslenme gösteren bireylerin ölüm oranları 35.12 ± 6.29 bulunurken, % 100 konsantrasyonda beslenme oranı az iken yine de ölüm oranı en yüksek 61.01 ± 7.89 ile burada tespit edilmiştir (Şekil 3.6). Ölüm oranları arasında fark bulunmuş olsa da bu fark istatistiki olarak önemli bulunmamıştır ($F(4,35)=2,08$ $P>0,05$)



Şekil 3.6. *Tagetes patula* L. gümüş nanopartiküllü su ekstraktının *Sitophilus granarius* L.'a karşı 7. gün sonunda beslenme ve ölüm oranı sonuçları

T. patula gümüş ve altın nanopartiküllü su ekstraktının *S.granarius*'a karşı davranışsal etki denemesi sonucunda, altın nanopartikül solüsyonunda LD_{50} değeri $693,212 \mu\text{l}/\text{böcek}$ belirlenmiş ancak LD_{90} değeri hesaplanamamıştır. Gümüş nanopartikül solüsyonun uygulanmasında ise LD_{50} değeri $13.919 \mu\text{l}/\text{böcek}$ ve LD_{90} $643.045 \mu\text{l}/\text{böcek}$ değeri hesaplanmıştır.

4. TARTIŞMA VE SONUÇ

Bitkisel üretimde hastalık, zararlı ve yabancı otlardan dolayı yaklaşık %35'lik bir verim kaybı meydana gelmektedir. Bunun yanında hasat sonrası depolanmış ürünlerde de %14'lük bir verim kaybı da depolarda zararlı böcekler, mikroorganizmalar, kemirgenler ve kuşlardan dolayı meydana gelmektedir (Burçak ve diğ. 2015). Bu zararlıların zararını en aza indirmek için arazi koşullarında ve depolarda yoğun kimyasal ilaçlamalar yapılmaktadır. Kimyasal ilaçların yoğun kullanımı sonucunda zararlılar üzerinde direnç meydana gelmekte bunun yanında hedef alınmayan organizmalara karşıda olumsuz etkiler meydana getirmektedir. Kimyasal ilaçların bu etkilerini en aza indirmek amacıyla alternatif mücadele yöntemleri

üzerine arařtırmalar son yıllarda artış göstermiştir. Bu alternatif mücadelelerin başında bitkisel kökenli pestisitler yer almaktadır. Bitkisel kökenli pestisitlerin etkinliğinin artırılması içinde farklı formülasyon tiplerinin geliştirilmesi üzerine çalışmaların hız kazandığını görmekteyiz (Sabbour 2012, Ziaee ve diğ. 2014).

Yapılan bu çalışma ile *T. patula* gümüş ve altın nanopartiküllü su ekstraktının *S. granarius* üzerinde kontak toksisite ve davranışsal etkileri değerlendirilmiştir. Kontak etki doz denemelerine bakıldığında hem gümüş hem de altın nanopartiküllün %6.25, %12.5, %25, %50 ve %100 dozları *S.granarius* üzerinde denenmiştir. Elde edilen sonuçlara göre *T.patula*'nın altın nanopartikül solüsyonun tüm dozlarında *S.granarius*'un erginlerine karşı düşük düzeyde etkinlik gösterdiği belirlenmiştir. Buna karşın gümüş nanopartikül ekstraktının doz artışı ile ölüm oranında da artışlar gözlenmiştir. En yüksek ölüm %100 doz uygulamasında 4. gün sonunda %61,25 ile tespit edilmiştir. Şahin (2019) yapmış olduğu çalışmada *T.patula*'nın gümüş nanopartiküllü su ekstraktının *S.granarius* üzerinde kontak etkisini 3. gün sonunda % 62,92 olarak belirlemiştir. Yapılan bu çalışmada elde edilen sonuçlar benzerlik göstermektedir. Arannilewa ve diğ. (2006), *A.ringens*, *A.sativum*, *F.exasperata* ve *G. kola* bitkilerinden elde ettikleri petrol eter ekstraktları *S. zeamais*'e karşı laboratuvar koşullarında farklı konsantrasyonlarda denemişlerdir ve *A. ringens*' in *S. zeamais*'e karşı bioinsektisit olarak kullanılabilceğini belirtmişlerdir. Ali ve diğ (2012) yapmış oldukları çalışmada *Datura alba* yaprak ekstraktının *T.granarium* ve *S.oryzae* 'ye karşı etkinliğini test etmişler ve elde edilen sonuçlara göre 7.günün sonunda %2,5'lik konsantrasyonda *T. granarium*'da %33,5 ve *S. oryzae* 'da ise %45 oranında ölüm meydana geldiğini belirtmişlerdir. Ukeh ve diğ. (2012) yapmış oldukları çalışmada *X.aethiopica* ve *D.tripetala* bitkilerinden elde ettikleri meyve ekstraktlarının *S. oryzae*'a karşı insektisidal ve repellent etkinliğini arařtırmışlar ve bitkilerin esansiyel yağlarının 2mg cm⁻² de *S.oryzae*' ye karşı % 100 ölüm gösterdiği ve ayrıca repellent etkili olduğunu belirlemişlerdir. Yapılan bu çalışmada kontak etki doz denemesi sonuçlarına göre *T.patula*'nın gümüş nanopartiküllü ekstraktının yüksek dozlarının *S.granarium*'a karşı etkili olduğu ancak altın nanopartikül ekstraktının ise kontak etki ölüm etkinliğinin düşük seviyede olduğu belirlenmiştir.

Kontak etki doz denemesi sonucunda, altın nanopartikül ekstraktında ölüm oranları çok az olduğu için LD₅₀ ve LD₉₀ değerleri hesaplanamamıştır. 4.gün sonunda gümüş nanopartikül ekstraktının LD₅₀ değeri 50,215µl/böcek ve LD₉₀ 604,429 µl/böcek değeri hesaplanmıştır. Ayrıca *T. patula* gümüş ve altın nanopartiküllü su ekstraktının *S.granarius*'a karşı davranışsal etki denemesi sonucunda, altın nanopartikül ekstraktının LD₅₀ değeri 693,212 µl/böcek belirlenmiş ancak LD₉₀ değeri hesaplanamamıştır gümüş nanopartikül ekstraktının uygulanmasında ise LD₅₀ değeri 13.919 µl/böcek ve LD₉₀ 643.045 µl/böcek değeri hesaplanmıştır. Taghizadeh ve diğ. (2010) yapmış oldukları çalışmada *T.castaneum* ve *S.oryzae*'e karşı *T. persicus*'un esansiyel yağının fümigant etkinliğine bakmışlar ve uygulamadan 24 saat sonra ki ölüm oranlarına göre hesaplanan LC₅₀ değerine *T. castaneum*'da 236.9 (186.27–292.81) ve *S. oryzae* ise de 3.34 (2.62–4.28) µl/l hava olarak hesaplandığını bildirmişlerdir. Ribeiro ve diğ. (2013) yapmış oldukları çalışmada ise *A.mucosa* bitkisinin (yaprak, dal ve tohumları) hekzan ve diklormetan ekstratlarını *S.zeamais*'e karşı denemişler ve elde ettikleri sonuçlara göre tohumdan elde edilen hekzan'ın LC₉₀ değerini 259.31 mg kg⁻¹ ve diklormetan LC₉₀ değerini ise 425.15 mg kg⁻¹ olarak hesaplamışlardır.

T.patula'nın gümüş nanopartiküllü su ekstraktının *S.granarius*'a karşı beslenmeyi durdurucu etkisine bakıldığında beslenme sonucu ağırlık kaybı en az %100 altın nanopartiküllü ekstrat uygulamasında %28.43±8.31 ile belirlenmiştir. Altın nanopartiküllü ekstrat uygulamasının gümüş nanopartiküllü ekstrat uygulamasına göre daha başarılı baskılayıcı olduğu tespit edilmiştir. Dozlar arasında her iki ekstraktında arasında farklar bulunduğu ancak bu farkların istatistiki olarak önemli olmadığı tespit edilmiştir. Altın nanopartikül uygulaması ile %56-72

arasında, gümüş nanopartiküllü ekstrap uygulamasında ise %42-62 arasında beslenmeyi durdurucu etki gösterdiği belirlenmiştir. Şahin (2019) yapmış olduğu çalışmada *T.patula*'nın nanopartikülünün *S.garanirusa* karşı fark olduğunu ancak bu farkın istatistiki olarak önemli bulunmadığını belirlemiştir. Huang ve Ho (1998), *C.aromaticum*'dan elde ettikleri ekstraktları *T. castaneum* ve *S. zeamais* üzerinde kontak ve beslenmeyi engelleme etkisini test etmişlerdir. Bitkilerden elde edilen ekstraktların *T. castaneum*'un larvalarının beslenme alışkanlığında etkili olduğu fakat erginlerde ise herhangi bir etkisinin bulunmadığı bildirilmiştir. *S. zeamais* erginlerin de ise besin tüketimini ciddi oranda azalttığını ancak büyümeye herhangi bir etkisinin olmadığını belirlemiştir. Elde edilen sonuçlara göre *T.patula*'nın gümüş nanopartiküllü su ekstraktının *S.granarius*'a karşı belli oranda beslenmeyi dururucu etkisinin olduğu belirlenmiştir.

Asteraceae familyaları bireyleri biyopestisit özellik gösteren önemli bitkileri içermektedir. *T.patula* üzerine yapılan çalışmalarda önemli nematisit etkinliği belirlenmiş olmasına rağmen insektisidal etkinliği üzerine çok az çalışma bulunmaktadır. Ayrıca depo zararlılarından *Sitophilus* türleri içerisinde dünyadaki *S.zeamais* ve *S. oryzae* üzerinde daha çok çalışma yapıldığı görülmüştür (Kim ve diğ. 2003, Ali ve diğ. 2012). Bu çalışma ile *T.patula* bitkisinin *S.granarius* üzerinde de etkinliğinin belirlenmesi ile birlikte hem *T.patula* bitkisinin depo zararlılarına karşı insektisidal ve beslenmeyi dururucu etkinliği hem de *S.granarius* mücadelesine yönelik çalışmalara önemli veriler sağlanmıştır.

Yapılan bu çalışmanın sonuçları ümit var olup depo zararlıları ile yürütülecek olan diğer çalışmalara ışık tutacağı düşünülmektedir. Bitki ekstraktları ile ilgili çok fazla çalışma olmasına rağmen zararlılar ile mücadelede sınırlı sayıda nanopartiküllü ekstrap çalışmaları bulunmaktadır. Bu çalışma yapılacak olan diğer çalışmalara ışık tutacaktır. Bu formülasyonun diğer depo zararlıları ile mücadelede de denenmesi ve elde edilecek sonuçların bu formülasyonun pratiğe aktarılmasına katkı sağlayacağı şüphesizdir.

TEŞEKKÜR

Bu çalışma Ahi Evran Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimince Desteklenmiştir (Proje Numarası: ZRT.A4.19.022). Gümüş nanopartikül ve altın nanopartikül solüsyonlarının hazırlanmasında bana yardımcı olan Kırşehir Ahi Evran Üniversitesi Ziraat Fakültesi Tarla Bitkileri Bölümünden Dr. Öğr. Üyesi Çiğdem ER ÇALIŞKAN'a, UV- VIS Spektrometre okumalarını ve analizini yapan Kırşehir Ahi Evran Üniversitesi Mühendislik ve Mimarlık Fakültesi Gıda Mühendisliği Bölümünden Dr. Öğr. Üyesi Özlem AYDIN'a, pH ölçümleri ve denemelerimin yürütülmesinde yardımları olan Kırşehir Ahi Evran Üniversitesi Ziraat Fakültesi Toprak Bilimi ve Bitki Besleme Bölümünden Dr. Öğr. Üyesi Fevziye Şüheda HEPŞEN TÜRKAY'a teşekkür ederim.

5. KAYNAKLAR

- Ali, A, Ahmad, F., Biondi, A., Wang, Y. & Desneu, N., (2012). Potential for using *Datura alba* leaf extracts against two major stored grain pests, the khapra beetle *Trogoderma granarium* and the rice weevil *Sitophilus oryzae*. J Pest Sci 85:359–366
- Anonim, (2008). Zirai Mücadele Teknik Talimatları Cilt:1 Tarım ve Köy işleri Bakanlığı Tarımsal Araştırmalar Genel Müdürlüğü Bitki Sağlığı Araştırmaları Daire Başkanlığı, Ankara 283s.
- Anonim, (2020). 2019 yılı hububat sektör raporu. Toprak Mahsülleri Ofisi Genel Müdürlüğü 43s. Ankara.



- Arannilewa, S.T., Ekkrakene, T. & Akinneye, J.O., (2006). Laboratory evaluation of four medicinal plants as protectants against the maize weevil, *Sitophilus zeamais* (Mots). African Journal of Biotechnology, 5 (21), 2032-2036.
- Asmanizar, A. Djamin. A., & Idris, A. B. (2008). Effect of selected plant extract on mortality of adult *Sitophilus zeamais* Motschulsky (Coleoptera: Curculionidae), pest of stored rice grains. Malaysian Appl. Biol, 37(2), 41-46.
- Athanassiou, C. G., Kavallieratos, N. G., Benelli, G., Losic, D., Rani, P. U. & Desneux, N. (2018). Nanoparticles for pest control: current status and future perspectives. Journal of Pest Science, 91(1), 1-15.
- Burçak, A.A., Duru, A.U. & Örneç, H. (2015). Bitki koruma ürünleri ve pestisit kalıntıları, TC. Gıda Tarım ve Hayvancılık Bakanlığı, Ankara 187 s.
- Cestari, I. M., Sarti, S. J., Waib, C. M. & Branco Jr, A. C. (2004). Evaluation of the potential insecticide activity of *Tagetes minuta* (Asteraceae) essential oil against the head lice *Pediculus humanus capitis* (Phthiraptera: Pediculidae). Neotropical Entomology, 33(6), 805-807.
- Çakır, Ş. & Yamanel, Ş. (2005). Böceklerde İnsektisidlere Direnç. Gazi Üniversitesi Kırşehir Eğitim Fakültesi, 6(1), 21-29
- Dimetry, N. Z. (2014). Different plant families as bioresource for pesticides. In Advances in plant biopesticides (pp. 1-20). Springer, New Delhi.
- Erler, F. & Çetin H. (2007). Mortality of brown-tail moth, *Euproctis chrysorrhoea* (L.), larvae in response to neem-based products. Journal of Entomological Science, 42 (4), 593-595.
- Govindaiah S.B., Dandin T.P. & Datia R.K. (1990). Effect of marigold (*Tagetes patula*) intercropping against *Meloidogyne incognita* infecting mulberry. Indian J Nematol 20(1):96 99
- Gökçe, A., Stelinski, L. L., Isaacs, R. & Whalon, M. E., (2006). Behavioural and electrophysiological responses of grape berry moth (Lep., Tortricidae) to selected plant extracts. Journal of Applied Entomology, 40(6), 441-450.
- Gökçe, A., Stelinski, L. L., Whalon M. E. & Gut, L., (2010). Toxicity and antifeedant activity of selected plant extracts against larval obliquebanded leafroller, *Choristoneura rosaceana* (Harris). The Open Entomology Journal, 4 (1), 18-24.
- Ho, S.H., Ma, Y. & Huang, Y., (1997). Anethole, potential insecticide from *Illicium verum* Hook F., against two stored product insects. International Pest Control, 39: 50–51.
- Huang, Y., Tan, J.M.W.L., Kını, R.M. & Ho, S.H., (1997). Toxic and antifeedant action of nutmeg oil against *Tribolium castaneum* (Herbst) and *Sitophilus zeamais* Motsch. Journal of Stored Products Research, 33 (1), 289-298.
- Huang, Y. & Ho, S. H., (1998). Toxicity and antifeedant activities of cinnamaldehyde against the grain storage insects, *Tribolium castaneum* (Herbst) and *Sitophilus zeamais* Motsch. J. Stored Prod. Res.34 (1), 11-17.
- Kim, S. I.I., Roh, J.Y., Kim, D.H., Lee, H.S. & Ahn, Y.J., (2003). Insecticidal activities of aromatic plant extracts and essential oil against *Sitophilus oryzae* and *Callosobruchus chinensis*. Journal of Stored Products Research, 39, 293-303



- Nartop, P., 2017, Biyosentetik gümüş nanopartiküllerinin *Pyracantha coccinea* bitkisinin gövde eksplantlarının yüzey sterilizasyonunda kullanımı. Pamukkale Üniversitesi Mühendislik Bilimleri Dergisi, 23(6), 759-761.
- Obeng-Ofori, D. & Reichmuth, C.H. (1997). Bioactivity of eugenol, a major component of essential oil *Ocimum suave* (Wild) against four species of stored-product Coleoptera. International Journal of Pest Management, 43, 89–94.
- Öncüler, C. (2000). Tarımsal Zararlılarla Savaş Yöntem ve İlaçları. Adnan Menderes Üniversitesi Yayınları, No:13, Aydın, s 333.
- Özer, M., Toros, S., Çobanoğlu, S., Çınarlı, S. & Ekmekçi, M. (1989). The description, distribution and habitats of Acarina species harmful to stored grains and grain products and dried fruits in Izmir Province. DOĞA, Türk, Tarım ve Ormancılık Dergisi, 13(3b), 1154-1189.
- Pavela, R. (2009). Effectiveness of some botanical insecticides against *Spodoptera littoralis* Boisduval (Lepidoptera: Noctuidae), *Myzus persicae* Sulzer (Hemiptera: Aphididae) and *Tetranychus urticae* Koch (Acari: Tetranychidae). Plant Protection Science, 45 (4), 161–167.
- Ribeiro, do Prado L., Vendramim, J. D., Bicalho, K. U., dos Santos Andrade, M., Fernandes, J. B., de Andrade Moral, R., Demétrio, C. G. B. 2013. *Annona mucosa* Jacq. (Annonaceae): a promising source of bioactive compounds against *Sitophilus zeamais* Mots.(Coleoptera: Curculionidae). Journal of Stored Products Research, 55, 6-14.
- Sabbour, M.M. (2012). Entomotoxicity assay of two nanoparticle materials 1-(Al₂O₃ and TiO₂) against *Sitophilus oryzae* under laboratory and store conditions in Egypt. JNAS Journal-2012-1-4/103-108.
- Saxena R.C. (1998). Botanical pest control. In: Dhaliwal GS, Heinrichs EA (eds) Critical issues in insect pest management. Commonwealth Publishers, New Delhi, pp 155–179
- Shaaya, E., Kostjukovski, M., Eilberg, J. & Sukprakarn, C. (1997). Plant oils as fumigants and contact insecticides for the control of stored-product insects. Journal of Stored Products Research, 33(1), 7-15.
- Siyanand, Meher H.C., Kaushal K.K. & Singh G. (1995). Induction of *Tagetes patula* Linn. As mixed rotation crop-A bubble technology protocol for managing rootknot nematode, *Meloidogyne incognita* in vegetables. National symposium on nematode management with eco-friendly approaches and bio-components, 24–26 Mar 1995, IARI, New Delhi (abstract), p 19
- Stapel, J.O., Cortesero, A.M. & Lewis, W.J. (2000). Disruptive sublethal effects of insecticides on biological control: altered foraging ability and life span of a parasitoid after feeding on extrafloral nectar of cotton treated with systemic insecticides. Biological Control, 17(3), 243-249.
- Şahin, Z. (2019). *Tagetes patula* L. (Asterales: Asteraceae)'nın gümüş nanopartiküllü su ekstraktının *Sitophilus granarius* (L.) (Coleoptera: Curculionidae) Karşı Laboratuvar Koşullarında Etkinliğinin Belirlenmesi. Kırşehir Ahi Evran Üniversitesi Fen Bilimleri Enstitüsü Yüksek Lisans Tezi, 37s.
- Taghizadeh Saroukolai, A., Moharramipour, S. & Meshkatalasadat, M.H., (2010). Insecticidal properties of *Thymus persicus* essential oil against *Tribolium castaneum* and *Sitophilus oryzae*. J Pest Sci 83:3–8



- Tangtrakulwanich, K. & Reddy, G.V. (2014). Development of insect resistance to plant biopesticides: an overview. In *Advances in plant biopesticides* (pp. 47-62). Springer, New Delhi.
- Thacker, J.M.R., (2002). *An introduction to arthropod pest control*, Cambridge University Press, Cambridge, UK.
- Tiryaki, O., Canhilal, R. & Horuz, S. (2010). Tarım İlaçları Kullanımı ve Riskleri. Erciyes Üniversitesi Fen Bilimleri Enstitüsü Fen Bilimleri Dergisi, 26(2), 154-169.
- Ukeh, D. A., Oku, E. E., Udo, I. A., Nta, A. I. & Ukeh, J. A. (2012). Insecticidal effect of fruit extracts from *Xylopia aethiopica* and *Dennettia tripetala* (Annonaceae) against *Sitophilus oryzae* (Coleoptera: Curculionidae). *Chilean Journal of Agricultural Research*, 72(2), 195.
- Xu, Y.Y., Liu, T.X., Leibe, G.L. & Jones, W.A. (2004). Effects of selected insecticides on *Diadegma insulare* (Hymenoptera: Ichneumonidae), a parasitoid of *Plutella xylostella* (Lepidoptera: Plutellidae). *Biocontrol Science and Technology*, 14(7), 713-723.
- Yıldırım, E., Özbek, H. & Aslan, İ. (2001). Depolanmış ürün zararlıları. Atatürk Üniversitesi Ziraat Fakültesi Yayınları, (191), 117.
- Ziaee, M., Moharramipour, S. & Mohsenifar, A. (2014). Toxicity of *Carum copticum* essential oil-loaded nanogel against *Sitophilus granarius* and *Tribolium confusum*. *J Appl Entomol.*138(10), 763-771.



USER ASSISTED MULTIPLE SEGMENTATION OF COLOR IMAGES VIA ROBUST HYPOTHESIS TESTING

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ABSTRACT

We consider multiple segmentation of color images by using tools from robust hypothesis testing. To ease this NP-hard problem, we allow the user to select certain regions over the image whose pixels are regarded as candidates from different labels. This selection process initiates the proposed algorithm, then the empirical histograms of the pixel densities are taken as nominal densities to be used in a robust hypothesis test. Specifically, we use the DGL test, due to Devroye et al., by adapting the test structure to include soft metrics gathered over the multi-dimensional color image. We show that the resulting algorithm is suitable for multi segmenting color images with low computational complexity. The proposed algorithm also provides performance advantages compared to other statistical methods such as K-means. We present simulations from popular segmentation databases that validates the performance improvements of the proposed method.

Keywords: Color Image Segmentation, Multiple Segmentation, Robust Hypothesis Testing, DGL Test

INTRODUCTION

One of the most challenging phase of image processing is to develop and process the information from the given image without affecting the other features of that image (Sharif et al., 2010; Yasmin et al., n.d.). Image segmentation is one of the main branches of image processing where any image is divided into multiple parts. Each part provides information such as color, intensity or texture to the user. Therefore, it is important to isolate the boundaries of any image in the form of segments (Seerha & Kaur, n.d.). The distinction in different parts of the image is made on the basis of three properties of the image, namely its color, intensity and texture (Acharya et al., 2013).

The importance of image segmentation cannot be ignored because it has an important role in almost every field of science, such as medical images, satellite images, machine vision, computer vision, biometry ect (Hameed et al., 2013; Yasmin et al., 2012). Since each image has a different type, it is considered that there is no perfect, foolproof method for image segmentation (Khan, 2013). Therefore, there are many segmentation techniques.

SOME TECHNIQUES OF IMAGE SEGMENTATION

Segmentation is a process that separates an image into regions or objects based on their similar or unique features (Kohli et al., 2013). There are some examples of image segmentation techniques:

Threshold Based Image Segmentation: Segments regions by histogram intensity. There are various techniques and methods for threshold segmentation: Mean technique, Pile technique, Otsu technique ect (A New Approach to Color Image Segmentation - ProQuest, n.d.).

Region Based Image Segmentation: One of the best features of region-based segmentation is that, it is noise resilient. It separates an image into different regions based on predefined criteria i.e color, intensity or object. Region based segmentation methods are divided into three main categories: Region growing, region splitting, region merging. (Kaganami & Beiji, 2009).

Region Growing: Starts with a pixel and continues adding pixels to the region based on similarity, iterating until all pixels belong to a region (Dass & Devi, n.d., p. 1; Ning et al., 2010; Sharma et al., n.d.). It over-segments when the image is noisy or has intensity differences and cannot separate the shadow of the real image (Zaitoun & Aqel, 2015).

Split-Merge: The entire image, originally taken as a single region, is repeatedly split until no more splits are possible. The Quad Tree is a division structure. Then, if the two regions are adjacent and similar, it is repeated until no further merging is possible (Dass & Devi, n.d., p. 1; Ning et al., 2010; Sharma et al., n.d.). The position and direction of the image leads to a block final segmentation, and the regular partition is leading to over segmentation (Sharma et al., n.d.)

Edge Based Image Segmentation: Edge detection is the basic step of image segmentation. Splits an image into foreground and background. The edge detection method performs the splitting process according to the intensity of the image or the change of pixels. Has two main methods. These are gray histogram and gradient (Lakshmi, n.d.; Sharif et al., 2015).

Gradient Based Techniques: Sobel operator, Prewitt operator, Robert operator (Agarwal, 2015).

Guassian Based Techniques: Laplacian of gaussian, Canny edge detection (Agarwal, 2015).

Segmentation Based on Clustering: Hard Clustering, Fuzzy Clustering, K-Means Clustering.

K-Mean Clustering: It is also statistically method for image segmentation. Divide an image into K clusters by adding p points to the cluster where the difference between the point and the mean is minimum (Sharma et al., n.d.; Kasmir et al., n.d.). Assumes sharp boundaries between clusters (Dass & Devi, n.d.). K-Mean Clustering is not effective in continuous areas (Zaitoun & Aqel, 2015).

Normalized Cuts: Aims at the optimum areas by reducing the number of areas. Each pixel is a vertex in a graph. Edges connect adjacent pixels. Edge weights are assigned based on similarity, distance, color, gray level, or textures between two corresponding pixels (Dass & Devi, n.d.; Sharma et al., n.d.; Vicente et al., 2008). Its computation is very complex (Sharma et al., n.d.). Techniques of normalized cuts are lazy snapping and graph-cut.

Lazy Snapping: Image cutout is the technique of removing an object from an image. It is possible to specify the foreground and background at a single pixel level. The task in Image Cutout is to specify which parts of the image are foreground and which are background.

Normally, for cutting, the user has to specify pixel accuracy and each region of the foreground separately. But it will be enough to select a region in Lazy Snapping. But Lazy Snapping consists of two sections: Object marking and Boundary Editing (Li et al., 2004). In other words, even after selecting the objects, the background and foreground are mixed one after the other, and it should be noted that here too, the user has a lot of work.

Graph-Cut: Each pixel connected to foreground and background. For segmentation these grounds should be separated. Graph-cut is another image cutout technique. Threshold and simple algorithms are going to fail when both the foreground and background are pretty complicated in terms of texture or color. A cut is a set of edges that when removed separates foreground and background. This technique has connection between pixel to pixel and pixel to terminal. Terminals are background and foreground. Assign a weight to each edge both connections and find the minimum cut (Boykov & Funka-Lea, 2006; Yi & Moon, 2012). It is not perfect doing more scribbling.

ANN Based Image Segmentation: Artificial Neural Network, every neuron is corresponding to the pixel of an image. Image is mapped to the neural network. Image in the form of neural network is trained using training samples and then connection between neurons. New images are classification from the trained image (Zwaag et al., 2002).

CNN Based Image Segmentation: Convolutional Neural Network used for image classification and recognition because of high accuracy. It is the process of classifying each pixel in the image as belonging to a specific category. It comes to the Domain of Deep Learning: Semantic Segmentation (SowmiyaNarayanan, 2020).

OUR APPROACH

Image segmentation is statistically similar to hypothesis testing. We have M regions and each region has its own distributions. If we divide our image into as many regions as we want, choose the most suitable distribution for it, and determine the best values suitable for those distributions, we will get the image we want. If we don't know the distribution, we can choose a nominal distribution. In this case, it can be attributed to Hypothesis testing. In the robust hypothesis test, the nominal distributions are obtained by regions which are user defined them. Our suggestion is to Image Segmentation using the L. Devroye, L. Györfi and G. A. Lugosi (DGL) method. Lazy Snapping, K-Means and Graph-Cut approaches are close to our method. Three of them use probability methods too. They use variance weighted, Gibbs energy, Likelihood equations ect. Lazy Snapping and Graph-Cut works for just 2 regions. K-Means does not let to user defined regions. It works automatically. We mention that K-Mean Clustering is not effective in continuous areas. Our method is both faster and gives better results. ANN & CNN are computational complexity. Complexity of our method is linear in the number of pixel and quadratic in the number of hypotheses. In section 2 we introduce DGL method for image segmentation and its performance about treat image segmentation. We describe the calculation process and analyze some benefits of DGL method with compare other methods and simulate them. Our method is multi-label and semi-supervised. If we know all the distributions, we can get precise results by going window-by-window if we do not we can determine the regions. It will be useful, because all regions have different intensity.

DGL Method Image Segmentation

In this section, we describe the problem definition in Section 2.1. Afterward, the DGL method

is explained for the defined problem in Section 2.2. Finally, the DGL proposed method for image segmentation is generalized to multiple hypothesis testing case in Section 2.3.

Problem Definition

There are fast working methods in statistics-based image segmentation, for example K- means clustering. But the problem with such methods is that they don't exactly work well. Our method is both faster and gives better results.

DGL Method

DGL is a statistical method and statistics has hypotheses. In the binary hypothesis test, there are two hypothetical probability models (H1 & H2). H1 and H2 hypotheses explain the distribution of the vector observed in the binary hypothesis testing. After observation, one of these two hypotheses are chosen. Observed vectors are independent and identically distributed (i.i.d.). The distribution of the H1 hypothesis is P1 and the distribution of the H2 hypothesis is P2. As always, the decision-making mechanism leads to errors when tested. Since we have two hypotheses, we will have two probabilities of error (P_1^e & P_2^e) (Blahut, 1974; Suratman & Zoubir, 2013; Yates & Goodman, 2014).

$$P_e = r_1 P_r[\mathcal{H}_1] P_1^e + r_2 P_r[\mathcal{H}_2] P_2^e$$

DGL is the most common robust analysis method for multiple Bayesian hypothesis testing with i.i.d. The goal is to create tests that are assigned with a high probability. The i index of the nominal density for the observed sample also determines which H_i hypothesis the determined density belongs to. Real distributions are unknown but the nominal distribution close to the real distribution is assumed to be chosen. \mathcal{H}_i are Hypothesis, P_i are Real distributions, Q_i are Nominal distributions. $i = 1, 2, \dots, M$. X_1, X_2, \dots, X_n are observed vectors. The observed vectors, together with the P_i distributions, decide on one of the H_i hypotheses. In order to perform the test, one seeks a decision rule that partitions X_n into M mutually exclusive and collectively exhaustive acceptance regions Q_i such that \mathcal{H}_i is accepted if $x \in Q_i$. In the Bayesian setup, the error for the M hypothesis sum of probabilities (Devroye et al., 2002; Lehmann & Romano, 2006; Levy, 2008).

$$P(e) = \sum_{i=1}^M P(e|\mathcal{H}_i) P(\mathcal{H}_i)$$

Nominal distributions versus real distributions alternating distance relationship. ϵ_j are the stability parameters.

$$V(P_j, Q_j) \leq \epsilon_j, j = 1, 2, \dots, M$$

DGL method is submitting exponential upper bound to a nonasymptotic uniform distribution for hypothesis testing problem [30]. The basic description of the DGL method is as below

$$A_{i,j} = \{x: f^{(i)}(x) > x: f^{(j)}(x)\}, 1 \leq i < j$$

A is a Borel set and \mathcal{A} denotes the collection of $k(k - 1)/2$ sets of the form. In order to define the DGL test, DGL introduced the empirical measure

$$\mu_n(A) = \frac{1}{n} \sum_{i=1}^n \psi_{x_i \in A}$$

ψ denotes the indicator function. This function compares the experimental observation vector distribution for each hypothesis against the A set. In the next step, the following test rule is applied to these comparisons and hypothesis selection is made.

$$\max_{A \in \mathcal{A}} \left| \int_A f^{(j)} - \mu_n(A) \right| = \min_{i=1, \dots, k} \max_{A \in \mathcal{A}} \left| \int_A f^{(i)} - \mu_n(A) \right|$$

For DGL test, exponential limit of the suggested error probability is (Devroye et al., 2002),

$$P(e) \leq 2k(k - 1)^2 e^{-n\epsilon^2/2}$$

PROPOSED METHOD

In the method, to divide the image into segments, several parts are selected from the image as many regions as the user wants to segment the image into. While sectioning, we apply the method by creating frame on the image and ensuring that the frames go right after the beginning window by window. User specifies the dimensions of the frame. This is hard segmentation with DGL. We have also ensured that the specified frame progresses in smaller steps rather than window by window. We used this method in the images you see. This is the soft DGL method. The frame and the steps are both arbitrarily determined by the user. It means our method is weakly-supervised. Values selected by the user also affect the accuracy in the size of the image.

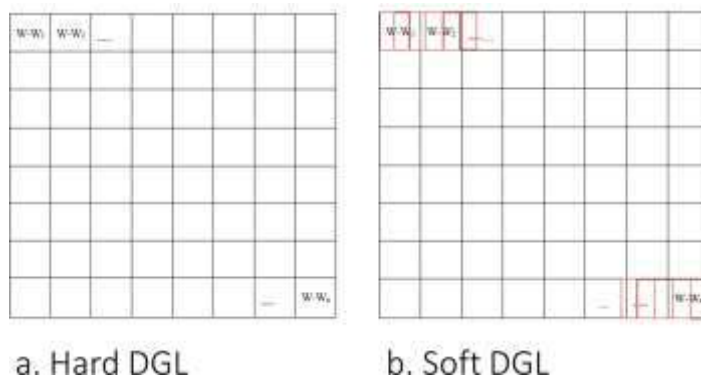


Figure 1: a. Hard DGL method goes by window by window. b. Soft DGL method goes by window by window and same time goes by step by step. Black lines are windows. Red lines are steps. User defined both of them sizes.

Think that this Fig 1. is our image and we want to segment it. First, the user defines the window size n -by- n , After the window sizes are determined, the selected region is taken to the DGL test and a label is assigned the according to the result. DGL calculates the distances of hypothesis during the decision-making phase and choose the value with the minimum distance. It is hard DGL method. But in soft DGL test method, multiple tests are applied by shifting windows, while at the same time the computed distances overlap, that is they add up, and our test choose the minimum sum of the total distance values. Our aim with soft DGL test is to give a little bit better than hard DGL and work more smoothly.

SIMULATION RESULTS

The datasets we used were obtained from the Berkeley Segmentation Data Set and Benchmarks 500 (BSDS500). Below, segmented images were taken from Berkeley's GroundTruth using our proposed method and accuracy was measured. Fig. 2 has a comparison of the soft and hard methods and you can see how the soft method works. Soft DGL method gives a little better result and smoother than Hard DGL method. Fig. 3 shows the comparison of our method with the K-Mean clustering and calculates how well our method outperforms the K-Mean. This is because K-Mean is color-based, messes up some places, and doesn't work well in continuous fields as we mentioned earlier. However, our method gives better results because it is pixel-based. Hard and Soft, both methods work better than K-Mean. Fig. 4 shows some examples from the Berkeley dataset. Sometimes our method does not work as well as we would like. You can see our method mix elephant back with the road in Fig 5.



Figure 2: First result comes from Hard DGL and second comes from Soft DGL. Hard DGL accuracy = 84%, Soft DGL accuracy = 85%.

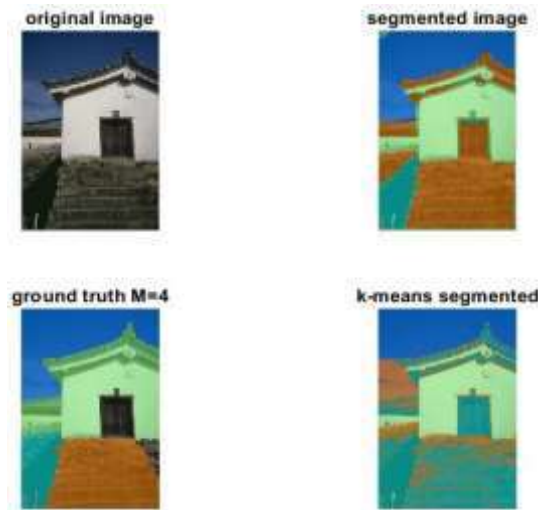


Figure 3: Examples of the segmentation results with the same number of segments. The ground truth from Berkeley database. The segmentation results obtained by the automatic multi-label DGL method with the same number of segments. Accuracy DGL = 85% vs K-Means = 60%.

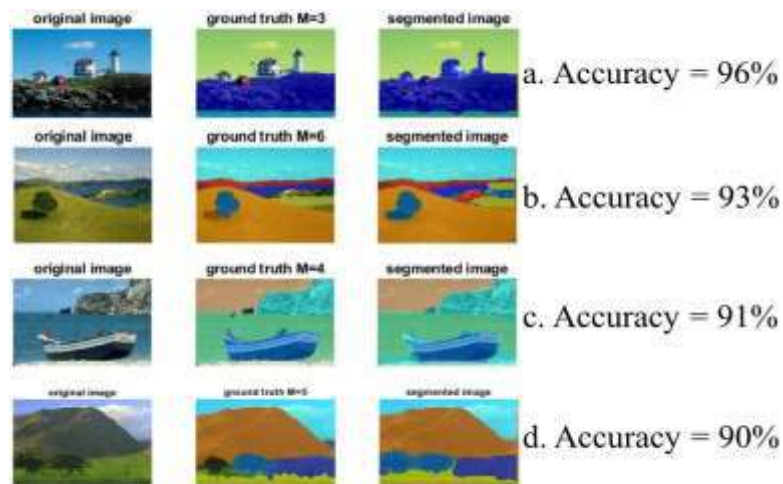


Figure 4: Some proposed method results compared with ground truth in the Berkeley dataset with accuracy.



Figure 5: There accuracy of segmentation is 82%.



CONCLUSION

Pixel-based image segmentation technique is a successful and suitable method for image segmentation. In this study, segmentation with DGL method is proposed for multi-label RGB images. Future studies aim to increase the size of the dataset used with different image features and number of segments to test the stability of the proposed technique. DGL method image segmentation will be user-defined and automatically in future studies.

REFERENCES

- A New Approach to Color Image Segmentation—ProQuest. (n.d.). Retrieved December 3, 2021, from <https://www.proquest.com/openview/085419971938cf052366c1bd6c8189b1/1?pq-origsite=gscholar&cbl=2032130>
- Acharya, J. C., Gadhiya, S. A., & Raviya, K. S. (2013). Objective assesment of different segmentation algorithm for underwater images. 2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT), 1–7. <https://doi.org/10.1109/ICCCNT.2013.6726489>
- Agarwal, D. (2015). A Comparative Analysis of Edge Detection Techniques Used in Flame Image Processing. *International Journal of Advance Research in Science and Engineering*, 4, 1335–1343.
- Blahut, R. (1974). Hypothesis testing and information theory. *IEEE Transactions on Information Theory*, 20(4), 405–417. <https://doi.org/10.1109/TIT.1974.1055254>
- Boykov, Y., & Funka-Lea, G. (2006). Graph Cuts and Efficient N-D Image Segmentation. *International Journal of Computer Vision*, 70(2), 109–131. <https://doi.org/10.1007/s11263-006-7934-5>
- B. J. Zwaag, K. Slump, and L. Spaanenburg, “Analysis of neural networks for edge detection,” 2002.
- Dass, R., & Devi, S. (n.d.). *Image Segmentation Techniques 1*.
- Devroye, L., Györfi, L., & Lugosi, G. (2002). A note on robust hypothesis testing. *IEEE Transactions on Information Theory*, 48(7), 2111–2114. <https://doi.org/10.1109/TIT.2002.1013154>
- Dr.S.V.Kasmir Raja, A.Shaik Abdul Khadir, Dr.S.S.Riaz Ahmed. (2005-2009). ”Moving Toward Region-Based Image Segmentation Techniques: A Study”. *Journal of Theoretical and Applied Information Technology*.
- Hameed, M., Sharif, M., Raza, M., Haider, S., & Iqbal, M. (2013). Framework for the Comparison of Classifiers for Medical Image Segmentation with Transform and Moment based features. *Research Journal of Recent Sciences*, 2, 1–10.



- Kaganami, H. G., & Beiji, Z. (2009). Region-Based Segmentation versus Edge Detection. 2009 Fifth International Conference on Intelligent Information Hiding and Multimedia Signal Processing, 1217–1221. <https://doi.org/10.1109/IIH-MSP.2009.13>
- Khan, W. (2013). Image segmentation techniques: A survey. *Journal of Image and Graphics*, 1(4), 166–170.
- Kohli, P., Osokin, A., & Jegelka, S. (2013). A Principled Deep Random Field Model for Image Segmentation. 1971–1978. https://openaccess.thecvf.com/content_cvpr_2013/html/Kohli_A_Principled_Deep_2013_CVPR_paper.html
- Lakshmi, S. (n.d.). IJCA Special Issue on “Computer Aided Soft Computing Techniques for Imaging and Biomedical Applications” CASCT, 2010. A study of Edge Detection Techniques for Segmentation Computing Approaches.
- Lehmann, E. L., & Romano, J. P. (2006). *Testing Statistical Hypotheses*. Springer Science & Business Media.
- Levy, B. C. (2008). *Principles of Signal Detection and Parameter Estimation*. Springer Science & Business Media.
- Li, Y., Sun, J., Tang, C.-K., & Shum, H.-Y. (2004). Lazy snapping. *ACM Trans. Graph.*, 23, 303–308. <https://doi.org/10.1145/1015706.1015719>
- Ning, J., Zhang, L., Zhang, D., & Wu, C. (2010). Interactive image segmentation by maximal similarity based region merging. *Pattern Recognition*, 43(2), 445–456. <https://doi.org/10.1016/j.patcog.2009.03.004>
- Seerha, G. K., & Kaur, R. (n.d.). Review on Recent Image Segmentation Techniques.
- Sharif, M., Ali, M. A., Raza, M., & Mohsin, S. (2015). FACE RECOGNITION USING EDGE INFORMATION AND DCT. *Sindh University Research Journal - SURJ (Science Series)*, 43(2). <https://sujo-old.usindh.edu.pk/index.php/SURJ/article/view/1371>
- Sharif, M., Mohsin, S., Jamal, M. J., & Raza, M. (2010). Illumination normalization preprocessing for face recognition. 2010 The 2nd Conference on Environmental Science and Information Application Technology, 2, 44–47. <https://doi.org/10.1109/ESIAT.2010.5567274>
- Sharma, N., Mishra, M., & Shrivastava, M. (n.d.). www.ijstr.org COLOUR IMAGE SEGMENTATION TECHNIQUES AND ISSUES: AN APPROACH.
- SowmiyaNarayanan, G. (2020, July 12). Image Segmentation Using Mask R-CNN. Medium. <https://towardsdatascience.com/image-segmentation-using-mask-r-cnn-8067560ed773>
- Suratman, F. Y., & Zoubir, A. M. (2013). Effects of model errors on multiple antenna based spectrum sensing using sequential detection. 2013 1st International Conference on Communications, Signal Processing, and Their Applications (ICCSPA), 1–6. <https://doi.org/10.1109/ICCSPA.2013.6487263>



- Vicente, S., Kolmogorov, V., & Rother, C. (2008). Graph cut based image segmentation with connectivity priors. 2008 IEEE Conference on Computer Vision and Pattern Recognition, 1–8. <https://doi.org/10.1109/CVPR.2008.4587440>
- Yasmin, M., Sharif, M., Masood, S., Raza, M., & Mohsin, S. (n.d.). Brain Image Enhancement- A Survey.
- Yasmin, M., Sharif, M., Masood, S., Raza, M., & Mohsin, S. (2012). Brain Image Reconstruction: A Short Survey. *World Applied Sciences Journal*, 19, 52–62. <https://doi.org/10.5829/idosi.wasj.2012.19.01.486>
- Yates, R. D., & Goodman, D. J. (2014). *Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers*. John Wiley & Sons.
- Yi, F., & Moon, I. (2012). Image segmentation: A survey of graph-cut methods. 2012 International Conference on Systems and Informatics (ICSAI2012), 1936–1941. <https://doi.org/10.1109/ICSAI.2012.6223428>
- Zaitoun, N. M., & Aqel, M. J. (2015). Survey on Image Segmentation Techniques. *Procedia Computer Science*, 65, 797–806. <https://doi.org/10.1016/j.procs.2015.09.027>

BIYOLOJİK GÜBRELER VE SÜRDÜRÜLEBİLİR TARIMDA ÖNEMİ BIOLOGICAL FERTILIZERS AND THEIR IMPORTANCE IN SUSTAINABLE AGRICULTURE

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ÖZET

Biyolojik gübreler canlı materyallerdir. Besin elementi varlığı ve yararlılığını, toprak verimliliğini ve bitki beslenmesini artıran özel mikroorganizma gruplarından oluşturulmaktadır. Modern tarımsal uygulamalar, yüksek verimin sağlanması için yüksek miktarda mineral gübre girdisi ve ürünün patojen ve zararlılara karşı korunması için kimyasal pestisit kullanımı gerektirir. Bu uygulamalar günümüzde yeniden değerlendirilmekte ve aşırı gübre ve pestisit kullanımının sonuçları hakkında daha detaylı çalışmalar yapılmaktadır. Sürdürülebilir tarımda çevreye uyumlu ve toprak ekosisteminin uzun dönemde ekolojik dengesini muhafaza edecek tarımsal uygulamaların ortaya konulmasına gerek duyulmaktadır. Biyolojik gübreleme yöntemi, toprak besin maddesi yönetimi ve ekosistemin devamı için çevre dostu bir yaklaşım sunmaktadır. Günümüzde çevre sorunlarının başında küresel ısınma ve toprak kirliliği gelmektedir. Tarımsal faaliyetlerde kullanılan toplam kimyasal madde miktarı ve bunların ekonomik maliyetleri oldukça yüksektir. Özellikle kimyasal yolla toprağa ulaşan azot hızlıca nitrata dönüşmekte ve yıkanarak akarsu ve deniz ekosistemini olumsuz etkilemektedir. Ayrıca denitrifiye olan azot miktarlarının küresel ısınma üzerine CO₂'ten çok daha etkili olduğu belirlenmiştir. Bitkilerin topraktan en yüksek miktarda kaldırdığı azot, tarımsal faaliyetler için topraklara kimyasal veya doğal yolla ilave edilmek zorundadır. Doğal bir yöntem olan biyolojik gübreleme ise atmosferdeki azotu bitkilerin kullanımına sunmaktadır. Biyogübreler ekolojik, ekonomik ve güvenilir çözümler sunan iyi bir alternatiftir. Bu çalışmada biyolojik gübreler ve sürdürülebilir tarımdaki önemi hakkında farklı kaynaklardan detaylı bilgi sunulacaktır.

Anahtar kelimeler: Biyogübre, kimyasal gübreleme, küresel ısınma, toprak kirliliği, toprak sağlığı

ABSTRACT

Biological fertilizers are living materials. It is made from special groups of microorganisms that increase the presence and availability of nutrients, soil fertility and plant nutrition. Modern agricultural practices require a high input of mineral fertilizers to ensure high yields and the use of chemical pesticides to protect the crop against pathogens and pests. These practices are being reevaluated today and more detailed studies are being carried out on the consequences of excessive use of fertilizers and pesticides. In sustainable agriculture, it is necessary to introduce agricultural practices that are compatible with the environment and will maintain the ecological balance of the soil ecosystem in the long term. The biological fertilization method offers an environmentally friendly approach for soil nutrient management and the continuation of the ecosystem. Today, global warming and soil pollution are the leading environmental problems. The amount of chemicals used in agriculture on a world scale and their economic values are very high. Particularly, nitrogen reaching the soil by chemical means quickly turns into nitrate

and adversely affects the river and marine ecosystems. In addition, it has been determined that the amount of denitrified nitrogen is much more effective on global warming than CO₂. The most removed element from soil by plants is Nitrogen, has to be added to the soil by chemical or natural means for agricultural activities. Biological fertilization is natural and enables nitrogen in the atmosphere for plants. Biofertilizers are good alternatives presenting ecological, reliable and economical solutions. In this study, detailed information about biological fertilizers and their importance in sustainable agriculture will be presented from different sources.

Keywords: Biofertilizer, chemical fertilization, global warming, soil health, soil pollution

1. GİRİŞ

Biyolojik gübre, mikrobiyal gübre, bakteriyel gübre/ biyoinokülant terimlerinin tamamı aynı karşılığı sağlamakta olup bu terimler; bitkisel üretimi artırma yeteneğine sahip olan mikroorganizmalardan yalnız başına birisini ya da birkaçını beraberce içeren preparatları ifade etmektedir. Bu mikroorganizmalar bakteri veya fungus olabilecekleri gibi alg gibi fotosentetik organizmalarda olabilmektedir. Bu mikroorganizmalar bitkisel üretimi, ürün verimini ve toprak verimliliğini 4 şekilde etkiler; (1) Atmosferde dinitrojen (N₂) formunda bulunan azotu fikse ederek toprağa veya doğrudan bitkiye sağlarlar (Biyolojik N fiksasyonu), (2) Toprak ortamında fikse edilmiş durumda bulunan veya çözünemez haldeki besin maddelerinin çözünürlüğünü artırarak besin elementlerinin alınabilir miktarlarını artırır (İnorganik P ve K'un çözünürlüğü), (3) Özellikle rizosfer bölgesinde mikroorganizmalar tarafından sentezlenen kök gelişim hormonları ve bitki gelişim düzenleyicileri ile bitki gelişimini teşvik ederler (Rizosfer mikroorganizmaları), (4) Toprak ortamında gerek doğal olarak gerekse dışarıdan tarımda verimliliği artırmak amacı ile ilave edilen bitkisel ve hayvansal atık ya da artıkları parçalayarak besin maddelerinin açığa çıkmasını sağlarlar ve toprakların diğer fiziko-kimyasal özelliklerini düzeltirler (Mineralizasyon süreçleri) (Arcak ve Güder, 2004).

İntensif tarımda girdilerin, çevre ve insan sağlığında meydana getirdiği olumsuz etkiler gerek ülkemiz koşullarında gerekse diğer gelişmiş ülkelerde yapılan çalışmalarla net bir şekilde ortaya konulmuştur (Anaç ve Okur, 1996). Bu durum karşısında, kimyasal girdilerin kullanılmadığı organik ya da ekolojik tarım kavramları yeni tarımsal yöntemler olmuştur. Ülkemizde ve dünyada intensif tarım yapılan alanlarda kimyasal gübrelemenin neredeyse tamamına yakını azotlu gübrelerden yapılmaktadır. Aynı zamanda üretilen ve satışa sunulan kimyasal gübrelerinde yine tamamına yakını azotlu gübrelerden oluşmaktadır. Genel olarak bilinmektedir ki bitkilerin miktar olarak toprak en yüksek miktarda kaldırdığı bitki besin elementi azottur. Kimyasal gübreler ve gübreleme sıralamasında azottan hemen sonra da fosfor gelmektedir. İntensif tarım ve buna eşlik eden bilinçsiz kimyasal gübreleme önce toprak sağlığını bozmakta bunu takiben toprak kirliliği, yeraltı sularının kirliliği, deniz ve okyanusların kirliliği ve nihayetinde denitrifiye olan azotun atmosfere geri dönüşü ile oluşan sera etkisine olan negatif katkısıyla kompleks bir çevre kirliliğine sebep olmaktadır. Örneğin, indirgen koşullarda denitrifiye olan azotun nitroz oksit (azot prortoksit) formunda atmosfere karışması, CO₂'ten kaynaklanan sera etkisine %10 katkı yapmaktadır. Bunun yanısıra sera etkisi üzerine ise CO₂'ten 300 kat daha etkilidir.

Toprak sağlığı, kimyası ve canlılığındaki bozulma; bitkinin kalite ve verimini düşmesi, satılabilir ürün miktarlarındaki kayıplar ve depolama süresinin kısılması gibi dezavantajları da beraberinde getirmektedir. Kimyasal gübrelemenin sebep olduğu bitki hastalıklarına hassasiyetin artması ise daha çok pestisit kullanımını zorunlu kılmakta bu durum ise "güvenilir gıda"yı tehlikeye sokmaktadır. Günümüzde çevreci bir düşünceyle, insan ve çevre sağlığını ön plana çıkararak, alternatif üretim yöntemlerine bir yöneliş zorunluluk haline gelmiştir. Organik veya ekolojik tarım olarak adlandırılan bu yöntemde, bitkisel ve hayvansal atık ve artıkları

kullanarak gübreleme yapılmaktadır. Ancak bu materyaller, bitkisel üretimde ürün verimini yeterli oranda artıramamakta, ek besin maddesi kaynaklarına ihtiyaç duyulmaktadır. Bu durum, doğal olarak biyolojik yöntemlerle N başta olmak üzere besin elementlerinin toprağa kazandırılma mekanizması, mikroorganizmaların etkin kullanımı ve bu yolla toprakta kazanılan bitki besin maddelerinin korunumu ile olmaktadır (Arcak ve Güler, 2004). Organik tarım ve ekolojik tarım kavramlarından sonra çok daha yakın zamanda “yeşil ekonomi” terimi de tarımsal literatüre girmiş ve tüm dünyada üzerine çalışmalar yapılmaya başlanmıştır. Yeşil ekonomi her ne kadar politik olarak uygulamalı bir odağı olsa da ekolojik ekonomiyi tanımlamaktadır. Biyolojik gübreler kademeli olarak kimyasal gübrelemenin yerini alacak olan doğal ürünlerden birisidir.

Biyolojik gübre kavramı, söz konusu mikroorganizmalardan tarımsal üretim sistemi içerisinde nasıl faydalanılabileceği ve özellikle etki mekanizmalarına göre besin elementlerini bitkiye sağlama noktasında ek bir kaynak olarak nasıl yönlendirilebileceği hususlarını içermektedir. Son yıllarda bu gübrelere önemli miktarda bilimsel yatırımlar yapılmış, yeni inokülantların geliştirilmesi ve mevcut uygulamalarla uyumlu türlerin elde edilmesi için yeni stratejiler geliştirilmiştir (Arcak ve Güler, 2004). Tarımsal üretimde bitkinin ürün verimine sağladığı katkılar ve bitkinin ihtiyaç duyduğu besin maddeleri göz önüne alınarak, biyolojik gübre üretimi ve kullanımı daha çok N ve P üzerinde yoğunlaşmıştır. Bu nedenle N ve P’un mikroorganizmalar kullanılarak bitkisel üretime sağladığı katkılar ve mikroorganizma türlerine göre işlevsel görevleri sırasıyla aşağıda verilmiştir (Hamdi, 1982; Singh ve Saxena, 1999).

1.1. Azot

Tarımda birim alandan alınan ürün miktarını artırmada N’un rolü, topraktaki davranışı ile mobilitesi göz önüne alındığı zaman diğer bitki besin elementlerine göre ayrı bir yere ve öneme sahiptir. Bu nedenle, gerek kimyasal gübre üretimi ve kullanımında gerekse biyolojik gübre materyali olarak mikroorganizmaların kullanılmasında en çok N üzerinde durulmuştur ve durulmaktadır. Aşağıda sırası ile mikroorganizma tür ve etkilerine göre bitkinin ve toprağın N kapsamı üzerine etkileri verilmiştir (Hamdi, 1982; Svetlana ve ark., 2003).

1.1.1. *Rhizobium*

Bunlar, *Eubacteriales* takımının, *Rhizobiaceae* familyasının, *Rhizobium* cinsine aittir. Kısa çubuklar şeklinde, G(-), spor oluşturmeyen, aerob, heterotrof bakterilerdir. Optimum gelişme sıcaklıkları 25-30 °C, gelişme pH’ları 6-7 dir. *Rhizobium* bakterileri yaşam halkaları boyunca, çeşitli formlarda gözlenmiştir. Bu formlar; hareketsiz çubuk, bakteroid-bantlı çubuklar, kokoid, hareketli küme öncesi, küme ve hareketli çubuk olarak adlandırılmaktadır (Walksman, 1952).



Şekil 1. *Rhizobium* spp.

Tarımda *Rhizobium*’lar baklagil bitkilerinin köklerinde nodül oluşturmak suretiyle atmosferdeki N’u fikse ederek bitkinin N (yada protein) kapsamının artmasına çok büyük rol oynamaktadırlar. Bu nedenle mikroorganizmalar içerisinde biyoinokülant üretiminde kullanılan ilk bakteri türü *Rhizobium*’lardır. *Rhizobium*’ların baklagil bitkisinin kökünde nodül oluşturabilme yeteneği, türler ve baklagil bitkileri arasında özel bir seçicilik göstermekte ve bu

durum çapraz aşılama (cross inoculation) olarak adlandırılmaktadır (Tablo 1). Bu bakteriler tarafından gerçekleştirilen N fiksasyonu ancak nodül oluşumu gerçekleştikten sonra olmakta ve bu durumda ise *Rhizobium* bakterisi form değiştirerek bakteroid formuna dönüşmektedir (Walksman, 1952; Hamdi, 1982). *Rhizobium*'lar ancak bakteroid formunda N fikse edebilme yeteneğine sahiptirler. Nodül içerisinde bulunan *Rhizobium*'un N fikse etme yeteneği ise nodülün leghemoglobinden kaynaklanan tipik pembemsi ve kırmızımsı rengi ile ayırt edilmektedir (Walksman, 1952; Alexander, 1977; Burton, 1965; Sutton ve ark., 1981). Her baklagil bitkisinin kökünde nodül oluşturan *Rhizobium* cinsi farklı olduğu gibi ve bunların fikse ettikleri N miktarları da birbirlerinden oldukça farklıdır (Tablo 1).

Tablo 1. *Rhizobium* bakterileri ile Baklagil bitkileri arasındaki çapraz aşılama grupları.

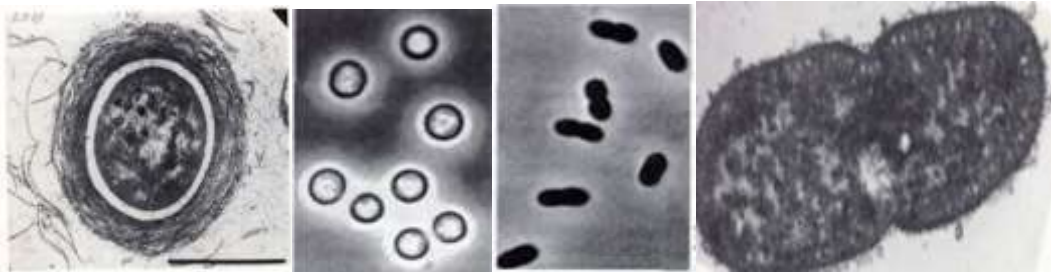
Rhizobium Türleri	Baklagil
<i>Rhizobium japonicum</i>	Soya, börülce, yer fıstığı
<i>Rhizobium leguminosarum</i>	Bezelye, fiğ, mercimek
<i>Rhizobium meliloti</i>	Yonca ve diğer türleri
<i>Rhizobium phaseoli</i>	Fasulye
<i>Rhizobium lupini</i>	Bakla
<i>Rhizobium trifolii</i>	Üçgül ve çeşitleri
<i>Rhizobium cicer</i>	Nohut

Tablo 2. *Rhizobium*-Baklagil simbiyozu sonucunda tarla koşullarında fikse edilen N miktarları.

Yemelik Baklagiller	N Fiksasyonu (Kg N/ha/yıl)	Yemlik Baklagiller	N Fiksasyonu (Kg N/ha/yıl)
Bakla	45 – 552	Sesbania	542
Soya	60 – 168	Yonca	229 – 290
Nohut	103	Yer altı üçgülü	207
Mercimek	88 – 114	Ladino üçgülü	165 – 189

1.1.2. *Azotobacter*

Azotobacter bakterileri, *Eubacteriales* takımının *Azotobacteraceae* familyasının *Azotobacter* cinsine aittir. *Azotobacter*'ler aerob, hücreleri 2,4 x 5 µm büyüklüğünde, genellikle G(-), oval yada küresel şekilli, heterotrofik mikroorganizmalardır. *Azotobacter*'lerin hücre şekli, pigment oluşturma ve hareket kabiliyeti gibi özelliklerine göre 10 önemli türü vardır. Bunlar; *A.agilis*, *A.armeniacus* *A. beijerinckii* *A. chroococcum* *A. macrocytogenes* *A.nigricans* *A. paspali* *A.salinestris*. *A.vinalendii* ve *A. insignis*'dir.



Şekil 2. *Azotobacter* spp.

Azotobacter türleri içerisinde *A. agilis* ve *A. insignis* suda yaşayan türleri oluşturmakta, diğer türler ise topraklarda bulunmaktadır. Toprakta yaşayan *Azotobacter* türleri içerisinde *A. chroococcum* en yaygın olanı olup, *Azotobacterin* olarak da adlandırılmaktadır. Bu bakteri ortam koşullarına göre, her 1 gr toprakta birkaç yüz ile birkaç bin adet bulunabilir. Yıllık azot

fiksasyon düzeyleri 2-3 kg N/ da düzeylerindedir. *Azotobacter* lerin gelişim gösterebilmesi için toprak reaksiyonunun pH > 6 olması gereklidir (optimum pH 7,3). Yalnızca *A. beijerinckii* asit koşullarda (pH 3'e değin) bile azot fikse edebilmektedir. *Azotobacter* 'ler 10 °C ile 40 °C arasında yaşayabilmelerine karşın optimum sıcaklık 30 °C'dir. Heterotrofik nitelikte olan *Azotobacter* 'ler ihtiyaç duydukları karbonu organik karbonlu bileşiklerden karşılamaktadırlar. Topraklara C:N oranı geniş (> 33:1) organik materyallerin ilavesi *Azotobacter* populasyonunu ve azot fiksasyonunu artırmaktadır. *Azotobacter*lerin gelişebilmesi için beslenme ortamlarında P, K ve Ca'un mutlaka bulunması gerekmektedir. *Azotobacter*'lerin bitki beslenmesi üzerine olan etkileri daha çok eski Doğu Bloku ülkeleri ile gelişmiş, Avrupa ülkelerinde yoğunlaşmış ve elde edilen sonuçların çok değişken olduğu görülmüştür. Tablo 3'de eski S.S.C.B.'de *A.chroococcum* ile aşılamanın ürün üzerine etkileri verilmiştir (Rubenchick, 1960).

Tablo 3. S.S.C.B.'de *Azotobacter chroococcum* ile aşılamanın ürün üzerine etkisini belirlemek amacıyla yapılan deneme sonuçlarından bazıları.

Bitki	Deneme Sayısı	Pozitif denemeler (%)	Kontrol ürün (kg/ha)	Artış (kg/ha)
Yazlık buğday	38	89	540	90
Kışlık buğday	5	100	1040	180
Mısır	8	100	1260	220
Şeker pancarı	10	100	11520	1145
Patates	35	86	6015	1220

Bununla beraber eski Çekoslovakya Tarım Bilimleri Akademisinde yapılan araştırmalar ile şeker pancarı, mısır, havuç ve lahanaya bitkisine bulaştırılan *Azotobacter*'in ürün üzerinde önemli artışlara sebep olduğu, bu artışların ise sırasıyla %39, %15,4, %19,2 ve % 2,9 düzeylerinde bulunduğu belirlenmiştir. Sovyetler Birliği'nde *Azotobacter* ile aşılamanın ürün verimi üzerine olan etkisi, 1933 yılından başlayan çalışmalarla araştırılmıştır. Bu konuda yürütülen 1095 denemenin 890'ında *Azotobacter* ile aşılama sonucu hububat, sebze ve endüstri bitkilerindeki artışın ortalama %10'un üzerinde olduğu saptanmıştır (Rubenchick, 1960). Yine Sovyetler Birliği'nde 1937 yılında Azotogen ismi altında bir *Azotobacter* kültürü ile çok fazla sayıda tarla denemeleri kurulmuş, daha sonraları bu kültür şekli *Azotobacter*in olarak adlandırılmıştır. 1950'li yıllardan sonra bu ülkede *Azotobacter* üreten laboratuvarlar ve fabrikalar kurulmuş olup, bu fabrikaların üretim kapasitesi 1960'lı yıllarda yılda birkaç milyon hektar araziye gübreleyecek düzeye ulaşmıştır. Benzer şekilde, Sovyetler Birliği'nde yapılan *Azotobacter* üretimi ile ilgili bilgi açığını kapatarak, ürün verimi ve kalite üzerine önemli etkilerinin saptandığı *Azotobacter* aşılması, ilerleyen yıllarda çeşitli Avrupa ülkeleri ile ABD'de yapılmıştır. Bu ülkelerde elde edilen sonuçların ise çok değişkenlik gösterdiği saptanmıştır. Bu değişkenliğin sebebinin ise, sanayileşmenin ve konvansiyonel tarımın toprak kirlenmesine sebep olması, mevcut *Azotobacter*'lerin atmosferik N'i fikse etme yerine toprak ortamındaki N'i kullanması (tembelleşmesi), etkisi ve *Azotobacter*'in gelişip yaşayabilmesi için mevcut ekolojinin uygun olmayışından kaynaklandığı belirlenmiştir. Ülkemizde ise, İsmailçelebioğlu (1973, 1990) tarafından yapılan çalışmalarla değişik kökenli *Azotobacter chroococcum* kültürleri ile aşılamanın Buğday, Patates, Şekerpancarı ve Domates bitkisinde, bitkilerin verim ve N kapsamı üzerine etkilerinin araştırıldığı çalışmalarda, aşılamanın bitkilerin veriminde önemli artışların meydana getirdiği belirlenmiştir. Ülkemizde *Azotobacter*'lerin mikrobiyal gübre olarak kullanılabilmesine ait bu 2 çalışmanın devamı getirilememiştir. *Azotobacter*'ler atmosferdeki N'u fikse etmesinin yanı sıra bitki gelişiminde önemli rol oynayan giberellin, sitokinin, İndol Asetik Asit gibi gelişim düzenleyicilerini de sentezlemektedir. (Vancura, 1961; Brown ve ark., 1968).

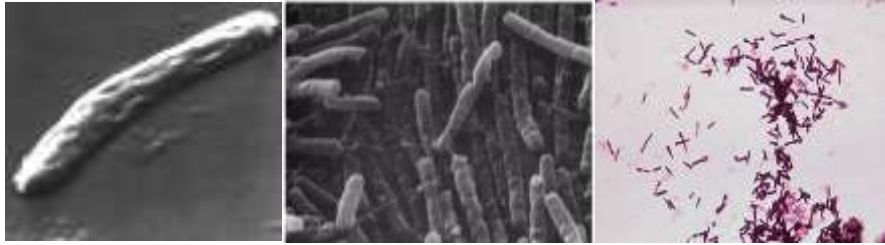
1.1.3. *Azospirillum* (veya *Spirillum*)

Azospirillum veya *Spirillum*, aerob, heterotrof nitelikli ve atmosferik azotu serbest olarak fikse eden mikroorganizmalardır. *Azospirillum*lar, çubuk şeklinde, çevresi yağ damlacıkları ile

çevrilidir ve çok aktif spiral hareketler yapmaktadırlar. Bunlar içerisinde toprakta en fazla *Spirillum lipoferum* türleri bulunmaktadır. Bunlar tropik bölgelerde yetişen şeker kamışı gibi birçok bitkinin hem kök bölgesinde hem de kök yüzeyi ile korteks hücreleri arasında bulunmaktadır. Gelişme ortamlarında karbon kaynağı olarak malate bileşimini, kısmen sakkaroz, mannitol ve sodyum laktatı kullanabilmektedir. Bunlar azot fiksasyonunun yanısıra, bitki gelişmesini teşvik edici indol asetik asit ve auxin gibi bileşikler de üretebilmektedir. *Azospirillum* pH 5.5 – 9.0 arasında yaşayabilmesine karşın optimum pH 6.8 – 7.8 arasındadır. Optimum sıcaklık 32 – 40 °C arasında olup 24 °C'nin altında gelişme azalmakta, 18 °C'nin altında ise tamamen durmaktadır. 42 °C'nin üzerinde ise nitrojenaz aktivitesi inaktive olmakta ve gelişme durmaktadır (Hamdi, 1982).

1.1.4. *Clostridium*

Clostridium bakterileri, *Eubacteriales* takımının *Bacillaceae* familyasının *Clostridium* cinsine aittir. *Clostridium* bakterileri, anaerob, spor oluşturan, G(+), çubuk şekilli ve heterotrofik mikroorganizmalardır. Bunlar bitkileri solunumları sonucu oluşan anaerobik etkiden dolayı bitki kök bölgesinde bulunmaktadır. *Clostridium*ların 3 önemli türü vardır (Alexander, 1977). Bunlar; *C. pasterianum*, *C. butyricum* ve *C. acetobutyricum*'dur.



Şekil 3. *Clostridium* spp.

Clostridium türleri içerisinde toprakta en yaygın olanı *C. pasterianum*'dur. Bunlar anaerob olmalarına karşın topraklarda en fazla sayıda (100 – 100.000 adet / 1 gr toprak) bulunabilirler. Yıllık azot fiksasyon düzeyleri 0.5 – 3.0 kg N / da' dır. *Clostridium*lar toprak reaksiyonuna karşı oldukça dayanıklı olup, pH 4.7 – 8.5 arasında olan topraklarda yaşayabilmektedirler. Fakat düşük pH'larda bu bakterilerin gerçekleştirdiği azot fiksasyonu önemli oranda azalmaktadır.

*Clostridium*lar için optimum sıcaklık 25 – 30 °C'dir. Buna karşın bu bakterilerin sporları sıcaklığa karşı oldukça dayanıklıdır. Sporlar 75 °C'de 5 saat, 80 °C'de 1 saat sıcaklığa toleranslıdır.

1.1.5. *Beijerinckia*

Beijerinckia, aerob koşullarda heterotrofik olarak yaşamaktadır. Aşırı asit ve alkali reaksiyonlu ortamlara karşı toleranslı olan bu cinsler pH, 3.0-10,0 arasında gelişebilmelerine karşın optimum pH istekleri 4.5'tir. *Beijerinckia* türlerinin en önemli özellikleri coğrafi dağılımları ile ilgilidir. Bunlar genellikle tropikal topraklarda bulunmakta olup, çok az sayıda ise subtropikal topraklarda da bulunabilirler. *Beijerinckia* 'ların 4 önemli türü vardır (Hamdi, 1982). Bunlar; *B. indica*, *B. mobilis*, *B. fluminensis* ve *B. derxii*'dir. Bunların yıllık azot fiksasyon düzeyleri işlenmiş topraklarda ortalama 0.2-0.38 gr N/da/gün, işlenmemiş topraklarda ise 0.44-23.8 gr N/da/gün düzeyindedir.

1.1.6. Mavi-Yeşil Algler (*Cyanophyta*)

Karbon kaynağı olarak CO₂'i ve enerji kaynağı olarak güneş ışığını kullanan, fotoototrofik canlılardır. N fiksasyonu yapabilen cinsleri; *Anabaena*, *Calothrix*, *Chroococcus*, *Schizotrhrix*, *Cylindrospermum*, *Nostoc*, *Plectonema*, *Rivularia* ve *Tolypothrix*. Dünyada her toprakta, tatlı sularda ve okyanuslarda geniş bir dağılım gösterirler. Fakat belli şartlar altında nemli tropikal

bölgelerde bol miktarda bulunurlar ve özellikle çeltik tarlalarında bitkilerin N ihtiyacını büyük ölçüde karşılamaktadır. Biyolojik N fiksasyonu için en uygun ortamlardır çünkü suda yaşayan bitkilerin doğal ortamları algler içinde uygun ortam hazırlamakta ve su altındaki anaerobik şartlar ise heterotrofik N fiksasyonunu teşvik etmektedir. Ilıman ve tropikal bölgelerde ek bir azotlu gübreleme yapılmayan çeltik tarlalarında bu organizmalar yaklaşık hektara 50 kg N fikse etmektedir. Nötr veya alkalemi reaksiyonlu topraklarda optimum gelişme gösterirler (Hamdi, 1982).



Anabaena circinalis



Nostoc



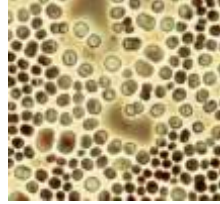
Tolypothrix



Trichodesmium



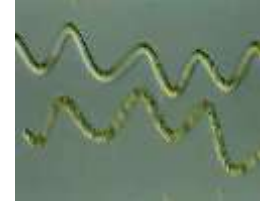
Nodularia spumigena



Microcystis aerogenosa



Calothrix



Spirulina

Şekil 4. Bazı mavi – yeşil alglerin morfolojik yapıları.

1.1.7. *Frankia*

Frankia baklagil olmayan bitkilerin çoğunda kök-nodül simbiyontları olan aktinomisetlerdir. Sporangia ve vesiküllerin taşıdığı dallı ve bölmeli hişlerle filamentli gram (+) aktinomisetlerdir. Oluşan nodüller kortikal hücrelerinde gelişen, konukçu bitkinin kök kılları ile çevrilidir. Nirogenaz aktivitesi keselerle ilişkilidir. Keseler ölümcül formda veya yana doğru taşınmış olabilir. Vesiküller N fiksasyonu olmayan yerlerde gelişebilir. Bu spolar ısıya dayanıklı değillerdir. Hücre duvarları meso-diaminopimelik asit, glutamik asit, alanin, muramik asit ve glukozamin içerir. *Frankia*'lar yoğun dallarla kaplı vejetatif hişlere sahiptir. Lateral sporangialar sporangiosporlarda oluşur; bazen sapsız olabilir.



Şekil 5. *Frankia* spp.

İnfeksiyon ipliği geliştirmeyenler, her zaman hücre duvarı materyalleri ile çevrilidir, keselerden oluşur, hücreleri gram (+)'tir, sporangiosporları hareketsizdir, azot fikse edebilirler, havai miselleri yoktur, spor benzeri küçük bir oluşumu vardır, baklagil olmayan bitki köklerinde nodül oluşturabilirler, kök nodül simbiyozları N fikse edebilmekte ve katalaz(+), kemoorganotrof, mezofilik, aerobik ve microaerofiliktirler (Balows ve ark., 1988, Halt ve ark., 1994).

1.2. Fosfor

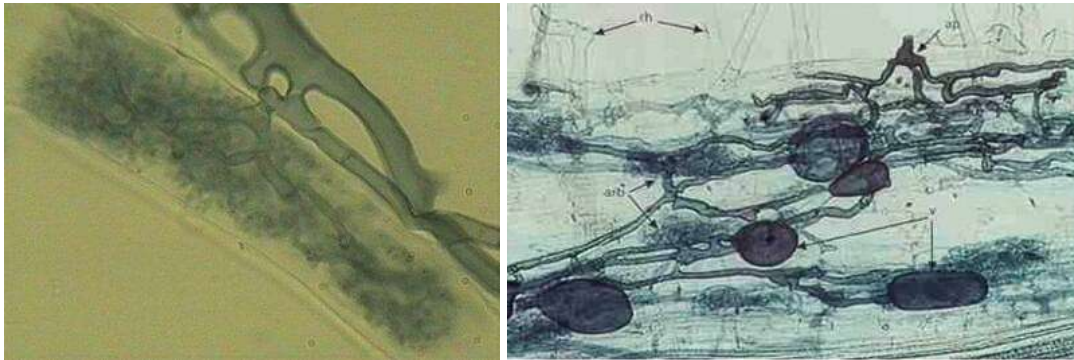
Toprakta bulunan fosforun başlıca kaynağı primer minerallerdir. Primer minerallerin aşınma ve parçalanmasıyla serbest hale geçen fosforun bitkiler tarafından alınması ve asimilasyonu ile fosfor organik maddeye bağlanır. Çözünabilir ve bitki tarafından alınabilir haldeki fosforun çeşitli reaksiyonlarla çözünemez veya güç çözünür bileşikler oluşturarak, bitkilerin alamayacağı formlara dönüşmesi oranına fosfor fiksasyonu denilmekte olup, toprak ortamında fosfor değişik mekanizmalar ile fikse olmaktadır. Biyolojik gübre inokülanı olarak kullanılan mikroorganizmalar genellikle;

1. Mikorizal simbiyozlar ile başta P olmak üzere bitkiye besin maddesi sağlayarak
2. İnorganik fosfor bileşiklerinin çözünür forma geçmesini sağlayarak etki etmektedir (Illmer ve ark., 1995; Singh ve Kapoor, 1998).

1.2.1. Mikoriza

Bazı bitki kökleri ile topraktaki bazı mantarlar arasında oluşturulan mutualistik simbiyoz mikoriza denir. Mikorizal mantarlar, toprakta sporlar ya da kökte hif parçacıkları halinde bulunmaktadır. Kök salgıları tarafından uyarılan mantar hifleri gelişerek epidermis hücrelerini enfekte etmektedir. Mikoriza türüne göre köklerde bir takım morfolojik değişiklikler meydana gelebilmektedir. Mikorizal yaşam bu özelliklerine göre endomikoriza ve ektomikoriza olarak sınıflandırılmaktadır (Sieverding, 1991; Bagyaraj, 1991).

Endomikoriza, ekzomikorizanın aksine kortekste hem hücreler arası boşlukta hem de hücre içi boşluklarda oluşmaktadır (Sieverding, 1991; Smith ve Read, 1997). Fungus kortekste geliştiği için ortamda lipitçe zengin oval görünümlü yapılar oluşturmakta ki bunlara vesikül denilmektedir. Vesiküllerin dışardan alınan besin elementlerini depo ettiği ve gereksinime göre içeriye saldığı tahmin edilmektedir (Bagyaraj ve Manjuanth, 1981; Marschner, 1995). Ayrıca hücre içinde köklerin dallanmasına benzeyen arbüskül yapılar oluşturur. (Marschner, 1995; Mosse, 1998). Mikorizanın arbüsküller sayesinde dışarıdan aldığı besin elementini bitki dokularına aktardığı düşünülmektedir. Endomikorizanın birçok türü olmasına rağmen en yaygın olanları vesiküller ve arbüsküller oluşturduğundan bu grup artık vesiküler-arbüsküler mikoriza (VAM) olarak adlandırılmaktadır (Simpson ve Darf, 1990; Ortaş, 1996; Ortaş ve ark., 1996).



Şekil 6. Toprak içinde Vesiküler ve Arbüsküler Mikorizal mantar hiflerinin görünüşü.

VAM ile enfekte olmuş hücrelerde dallanmış bir kompleks hif sistemi, vesikülerde ise besin deposu görülür. Vesiküler spor formuna dönüşerek mantarın üremesini de sağlamaktadır. VAM, bölmesiz hifler sahiptir.

1.2.1.1. Mikrozanın Bitkisel Ürün Verimi ve Bitkilerin Besin maddesi Kapsamına Etkileri

Mikorizal yaşamda, mikorizal mantar bitkinin kök hücre suyundan yararlanmasına karşılık başta fosfor olmak üzere bir çok besin elementlerini (P, Ca, Mg, K, Cu, Zn,..) elverişli hale getirerek konukçu bitkinin kullanılmasına sunmaktadır. Mikorizal yaşamın bitki beslenmesi üzerine olan etkilerinin yanısıra, strese ve patojenlere karşı olan etkileri de önemlidir (Allen, 1991; Malik ve ark., 1995; Dashti ve ark., 1997; Kozyrowska ve ark., 1997).

A. Mikoriza, konukçu bitki köklerinin başta fosfor olmak üzere Ca, Mg, K, Cu ve Zn' nin topraktan alımını artırmaktadır. Bu etki besin maddelerinin bitkilerce daha hızlı ve kolay alınmasına yöneliktir. Mikorizanın bitki beslenmesi üzerine olan bu önemli etkisi genel olarak birkaç şekilde olmaktadır. Bunlar;

1. Besin elementlerinin bitkiye alınması için gerekli olan difüzyon uzaklığı kırılmaktadır.



Şekil 7. Mikorizal yaşam sonucunda bitki kökünün etki alanının mantar hifleri vasıtasıyla artışının görünüşü ve bitki kökleri arasında hif köprülerinin görünüşü.

2. Mikorizal enfeksiyon içeren köklerin katyon değişim kapasitesi normal yalın köklere oranla daha fazladır. Bu nedenle bitkilerin kökleri vasıtasıyla topraktan aldıkları besin elementleri daha fazla olmaktadır.

3. Mikorizal mantarların hifleri kök çevresindeki besin elementi yarayırlılığını artırmaktadır. Bu mikroorganizmalar çözünemez formdaki Apatit $[Ca_3(PO_4)_2]$ veya demir veya alüminyum fosfatların çözünürlüğünü artırmakta ya da bu çözünemez maddeleri ana fosfat kaynağı olarak kullanılmaktadırlar. Apatit mikroorganizmalarca üretilen organik ve inorganik asitler tarafından dikalsiyum fosfat şekline dönüştürülerek yarayırlı halde fosfor sağlamakta ve bitkiler tarafından kullanılmaktadır. Salgılanan bu asitler vasıtasıyla değer elementlerin (Cu, Zn ..)'de çözünürlüğü artmaktadır.

4. Mikorizal mantar miselleri köklerin toprakla temas yüzeyini artırmakta, bitkilerin köklerini birbirlerine bir ağ gibi bağlamaktadır. Enfekte olmuş köklerin toprakla olan temas yüzeyinin artması, bitkilerin daha fazla alandan beslenme olanağını sağlamaktadır. Bununla beraber mikorizal simbiyoz sonucunda birbirlerine yakın olan bitki köklerinin birbirlerine bir ağ benzeri bağlanması sonucunda, mikorizal mantarın hem karbon alımını artırmakta hem de bir bitkiden diğerine besin elementi transferini sağlamaktadır.

B. Bitkinin yüksek tuz oranı ve ağır metal toksisitesine karşı hassasiyetlerini azaltmaktadır. Mikorizal simbiyoz sonucunda bitkinin yeterli ve düzenli beslenmesinin bir sonucu olarak bitkinin tuz ve ağır metal streslerine karşı olan dayanıklılıkları artmaktadır.

C. Mikorizal yaşam sonucu bitki gelişim düzenleyicilerinin miktarları artmaktadır. Mikorizal mantar ile bitki köklerinde meydana gelen fizyolojik etkileşimler sonucunda, kökte meydana gelebilecek koloni oluşumunun yoğunluğuna bağlı olarak bitki gelişim düzenleyicilerinin miktarları artmaktadır.

D. Mikorizal yaşam sonucu toprakların fiziksel özelliklerinde iyileşme olmaktadır. Mikorizal yaşamın ana bileşeni olan mantarların toprakta salgıladığı bazı çimentolayıcı salgılar ile miselleri toprak parçacıklarını birbirlerine bağlayarak strüktür stabilitesini artırmaktadır.

E. Bitkinin topraktaki bazı patojen mantar ve nematodlara karşı dayanıklılığını artırmaktadır. Mikorizal simbiyozun bitkilere patojen olan canlıların oluşturduğu zararlanmalar üzerine etkisi genel olarak 2 şekilde olmaktadır.

Bunlardan birincisi, mikorizal yaşam sonucunda bitkinin başta P olmak üzere diğer besin elementlerince de düzenli beslenmesinin bir sonucu olarak zararlanmalara karşı dayanıklılığı artmaktadır. Ayrıca mikorizal mantarlar köklerdeki karbonhidratları kullanarak, patojenler için teşvik edici besin maddesi miktarını azaltmaktadır.

İkincisi ise doğrudan bitkinin organlarındaki zararlı etkiyi önlemeye yöneliktir. Nematod ve bitki patojeni olan mantarlar kökteki mikorizal mantar ile etkileşim halindedir. Bitki kökünün korteks hücrelerinin mikorizal mantar ile kaplanması sonucunda bu bölgeye patojenlerin yerleşmesi engellenmektedir. Bununla beraber mikorizal mantarın koloni oluşturduğu kökler nematod zararına karşı daha fazla dayanıklılık göstermektedir.

1.2.2. *Bacillus (B. megaterium var. phosphaticum)*

Çözünemez inorganik fosfor bileşikleri bitkilere büyük ölçüde yararlıdır. Fakat *Pseudomonas*, *Mycobacterium*, *Micrococcus*, *Bacillus*, *Flavobacterium*, *Penicillium*, *Sclerotium*, *Fusarium*, *Aspergillus* gibi birçok mikroorganizma türü fosfatları çözerek yararlılığını arttırabilmektedir. Bunlar içerisinde P'un çözünürlüğünü arttırmadaki katkısından dolayı *Bacillus megaterium var. phosphaticum* cinsi bakterilerin biyoinokülanı biyolojik gübre preparatı olarak kullanılmakta ve bunlara fosfobakterin adı verilmektedir (Cooper,1959;Menkina,1963). *B.megaterium var. phosphaticum*'un preparatları eski Sovyetler Birliği ülkeleri ve Doğu Bloku ülkelerinde, Hindistan'da ise *B.megaterium var. phosphaticum*'a ilaveten *Pseudomonas striata*, *Bacillus polymyxa* ve *Aspergillus awamori*'de benzer etkiyi göstermesinden dolayı biyolojik gübre olarak kullanılmaktadır.

B. megaterium var. phosphaticum özellikle kalsiyum fosfatı çözebilme yeteneğindedirler. Bu tür, Apatit [$Ca_3(PO_4)_2$] veya çözünemez maddeleri ana fosfat kaynağı olarak kullanırlar. Apatit bu canlılara üretilen asitler tarafından dikalsiyum fosfat şekline dönüştürülerek elverişli halde fosfor sağlamaktadır. Bu canlılar, sitrik, glutamik asit, succinic asit, maleik asit, fumerik asit, tartarik asit, alfa-ketobutyric asit, laktik asit, daha az miktarda ise malik, glukonik ve asetik asit gibi asitleri üretebilmektedirler. (Taha ve ark., 1969; Alexander ve ark.,1977; Bardia ve Gaur,1972; Mishustin ve Naumova,1956; Pareek ve Gaur,1973; Saber,1997; Schilling ve ark.1998). *B. megaterium var. phosphaticum* (fosfobakterin) aşılama ile yapılan çalışmalarda patates (Kundu ve ark., 1980; Gouzou ve ark.,1993) ve buğday (Rodriguez ve ark.,1996) da dikkat çekici ürün artışı olmuştur. Fosfobakterin kullanılan bir çalışmada, şeker pancarında %7,5 ve arpada %58,5 artış görülmüştür (Çakmakçı ve ark.,1999).

2. BİYOLOJİK GÜBRELEME

Mikroorganizmaları kullanarak gerek toprağın ve gerekse bitkinin besin element kapsamı ile ürün verimini artırma işlemlerine "Biyolojik Gübreleme" denilmekte olup, bu işlem çoğu zaman uygulanan yöntemlere göre aşılama olarak anılmaktadır. Dünyada mikroorganizmaları

kullanılarak yapılan gübreler ve gübreleme uygulamaları çok çeşitli şekillerde ve çok fazla sayıda olmasına karşın, Ülkemizde bu durum oldukça sınırlıdır. Buna karşın Yurt dışından ithal edilerek ülkemize sokulan çok fazla sayıda mikrobiyal gübre özellikle son yıllarda organik tarımın gelişmesine bağlı olarak kullanılır duruma gelmiştir. Mikroorganizma kültürlerini içeren biyolojik gübreler, aşılama işlemlerinde kullanılan kültür çeşitlerine göre, agar kültürü, sıvı kültür ve peat kültürü olarak 3 şekildedir. Bu kültürler içerisinde üreticilerin kullanma ve depolama durumları göz önüne alınarak yapılan üretim işlemlerinden dolayı daha çok peat kültürleri sıklıkla kullanılmaktadır (Haktanır ve Arcak., 1997).

3. SONUÇ

Bu çalışma kapsamında, biyolojik gübre olarak kullanılabilir mikroorganizmaların ekolojileri, bitkisel üretim üzerine olan etkileri konusunda çok genel bilgiler verilmiştir. Bu bilgilerden hareketle, mikroorganizmalar gerek konvensiyonel tarımda ve gerekse organik tarımda bitkisel üretim üzerine çok büyük katkılar sağlamaktadır. Bu katkılar, topraklara herhangi bir mikroorganizma aşılması yapılmadan doğal koşullarda olmaktadır. Buna ilave olarak besin maddelerini fikse eden veya toprakta bulunan besin maddelerinin çözünürlüğünü artırma yeteneğine sahip olan populasyonun besin ortamına aşılması sonucu artan populasyonla besleyici ortamın alınabilir formdaki besin maddesi kapsamı da artmaktadır. Bu durum artan bitkisel üretimi de beraberinde getirmektedir. Mikroorganizmaların bu faydalı etkilerinin yanı sıra, biyolojik gübre preparatlarının ülkemizde üretimi ve kullanımı oldukça sınırlıdır. Ülkemizde Toprak-Gübre Araştırma Enstitüsü (TGAE) tarafından üretilen baklagil bitkileri için *Rhizobium* kültürlerini içeren ve Azotek olarak piyasaya arz edilen mikrobiyal gübre bulunmaktadır. Buna karşın, birçok ticari firma yurt dışından ithal edilen mikrobiyal gübreleri organik tarımda kullanılması amacı ile üreticilere ve araştırmacıların hizmetine sunmaktadır. Bu durumun ise, birtakım sakıncalara sebep olduğu kaçınılmaz bir gerçektir. Bu gerçeklerin 2 temel başlık altında toplanması mümkündür:

1. Mikrobiyal gübre olarak kullanılacak organizmaların genetik yapısının değiştirilebilme ihtimalinin bulunması,
2. Bu organizmaların ülkemiz ekolojik koşullarında etkenliğinin bulunmamasıdır.

Örneğin; *Azospirillum* kültürlerini içeren mikrobiyal gübreler yurtdışında sıklıkla üretilmekte ve ülkemizdeki bazı firmalar tarafından ithal edilmektedir. *Azospirillum*'ların gelişmeleri için optimum pH düzeyi 6.8-7,8 arasında olup, optimum sıcaklık 32-40 °C arasındadır. Bu canlıların aktiviteleri ortam sıcaklığı 24 °C'nin altına düştüğünde önemli oranda azalmakta, 18 °C'nin altında ise tamamen durmaktadır. Bir başka ifadeyle, bu canlılar tropikal bölge topraklarında bulunan ve bu ortamlarda mikrobiyal gübre olarak değerlendirilebilecek canlılar olup, ülkemiz topraklarında yaşama ve mikrobiyal gübre materyali olarak kullanılma ihtimali bulunmayan canlılardır.

Bu nedenle, biyolojik gübre materyali olarak kullanılabilir canlıların ekolojisini bilmek, bunların bitkisel üretim üzerine olan etkilerini anlayabilmek için gereklidir. Bu durum aynı zamanda, ülkemize ithal yollarla giren biyolojik gübrelerin ülkemiz ekolojisinde kullanılabilme olanaklarını tartışılmasına ve tıpkı TGAE yaptığı gibi ülkemiz işletmeleri tarafından tamamen yerli mikrobiyal gübrelerin üretilmesi amacıyla gerekli bilgi alt yapısının sağlanmasına sebep olacaktır.



4. KAYNAKLAR

- Alexander, M., 1977. Introduction to Soil Microbiology. Second edition. John & Wiley, New York. USA.
- Allen, M.F., 1991. The Ecology of Mycorrhizae Cambridge University Press. Cambridge. UK.
- Anaç, D., Okur, B., 1996. Toprak Verimliliğinin Doğal Yollar ile Artırılması. Ekolojik (Organik, Biyolojik) Tarım. ETO Bornava, İzmir.
- Arcak, S., Güder, N., 2004. Biyolojik Gübrelemenin Sürdürülebilir Ekosistemdeki Önemi. Türkiye 3. Ulusal Gübre Kongresi (Tarım, Sanayi ve Çevre), 11-13 Ekim 2004. Tokat.
- Bagyaraj, D.J., Manjanth, A., 1981. A influence of soil inoculation with vesicular-arbuscular mycorrhizal fungi and phosphate- dissolving bacterium (*Bacillus Circulans*) on plant growth and ³² P- uptake. Soil Biology and Biochemistry 13, 105-108.
- Bagyaraj, D.J., 1991. Ecology of vesicular-arbuscular mycorrhizae. In: D.K. Arora et al. (Ed.) Handbook of Applied Mycology. Soil and Plants. Vol.1. Marcel Dekker. USA.
- Ballows, A., Dworkin, M., Harder, W., Schleifer, K.H., Truper, H.G., 1988. The Prokaryotes. A Handbook on The Biology of Bacteria: Ecophysiology. isolation, identification, application, Springer-Verlag, London, UK.
- Ballows, A., Truper, H.G., Dworkin, M., Harder, W., Schleifer, K.H., 1992. The Prokaryotes. Second Edition. Vol.1. Springer-Verlag, London, UK.
- Bardia, M.C., Gaur, A.C., 1972. Rock Phosphate Dissolution by Bacteria. Indian Journal of Microbiology 12, 269-271.
- Brown, M., Jackson, R.M., Burlingham, S.K., 1968. Effects Produced on Tomato Plants, *Lycopersicum Esculentum*, by Seed or Root Treatment with Gibberelic Acid. Journal of Experimental Botany 19, 544-552.
- Buchanan, R.E., Gibbons, N.E., 1974. Bergey's Manual of Determinative Bacteriology. Eighth Edition. The Williams & Willinns Company. Baltimore, Maryland, USA.
- Burton, J.C., 1965. The Rhizobium-Legume Association. Microbiology and Soil Fertility. Oregon State Uni. Press. Corvallis, USA.
- Cooper, R.A., 1963. Bacterial Fertilizers And Their Importance for Agricultural Plants. Microbiologia 33, 352-358.
- Çakmakçı, R., Kantar, F., Algur, Ö.F., 1999. Sugar Beet and Barley Yields İn Relation To *Bacillus polymyxa* and *Bacillus megaterium* var. *phosphaticum* inoculation. Journal of Plant Nutrition and Soil Science 162, 437-442.
- Dashti, N., Zhang, F., Haynes, R., Smith, D.H., 1997. Application of plant growth-promoting rhizobacteria to soybean (*Glycine max* [L.] Merr.) increases protein and dry matter yield under short-season conditions. Plant and Soil. 188, 33-41.
- Gouzou, L., Burtin, G., Phippy, R., Batoli, F., Heulin, T., 1983. Effect of İnoculation With *Bacillus polymyxa* on Soil Aggregation in The Wheat Rhizosphere: Preliminary Examination. Geoderma 56, 479-491.
- Haktanır, K., Arcak, S., 1997. Toprak Biyolojisi (Toprak Ekosistemine Giriş) A.Ü. Ziraat Fak. Ankara.



- Halt, J.G., Krieg, N.R., Sneath, P.H.A., Stakey, J.T., Williams, S.T., 1994. *Bergey's Manual of Determinative Bacteriology*. 9th Edition. Williams and Wilkns. Baltimore, Maryland. USA.
- Hamdi, Y.A., 1982. Application of Nitrogen –Fixing Systems in Soil Improvement and Management. *FAO Soils Bulletin*. Food and Agriculture Organization of The United Nations, Rome, Italy.
- Illmer, P., Barbato, A., Schinner, F. 1995. Solubilization of inorganic calcium phosphates— Solubilization mechanisms. *Soil Biology and Biochemistry* 27, 257-263.
- İsmailçelebioğlu, Y.N., 1973. Muhtelif bölgelerden izole edilen *Azotobacter chroococcum* ile aşılamanın, Erzurum Kan siltli kili ve Palandöken çakıllı tınında buğday ve patates bitkilerinin verimi üzerine etkisi. Atatürk Üniversitesi Yayınları No. 274. Erzurum.
- İsmailçelebioğlu, Y.N., 1990. Değişik kökenli *Azotobacter chroococcum* kültürleriyle farklı aşılama işlemlerinin iki ayrı toprakta yetiştirilen şeker pancarı ve domates bitkilerinin ürün verimine etkisi. Atatürk Üniversitesi Yayınları No. 668. Erzurum.
- Kim, K.Y., Jordan, D., Mcdonald, G. A., 1998. Enterobacter agglomerans, phosphate solubilizing bacteria, and microbial activity in soil: effect of carbon sources . *Soil Biology and Biochemistry* 30, 995-1003.
- Kozyrovska, N., Kovtunovych, G., Giomodova, E., Kuharchuck, P., Kordyum, V., 1997. Novel İnoculantsfor An Environmentally- Friendly Crop Production. In:Global Environmental Biotechnology. Proceeding of the third International Symposium of International Society for Biotechnology. Wise D.L. (Ed.) Resources, Conversations And Recycling. Boston, USA.
- Kundu, B.S., Gaur, A.C., 1980. Effect of phosphobacteria on The Yield and Phosphate Uptake of Potato Crop. *Current Science* 49, 159-165.
- Madigan, M.T., Martinko, J.M., Parker, J., 1997. *Brack Biology of Microorganisms*. 8th Edition. Prentice Hall. Uper Saddle River, New Jersey, USA.
- Malik, R.D.S., Gour, A., Kavimandon, S.K., 1995. Growth Promoting Bacteria Associated With Sunflower. *Indian Journal of Experinental Biology* 33, 311.
- Marschener, H.,1995. *Mineral Nutrition of High Plants*. Second Edition. Academic Press London, USA.
- Mishustin, E.N., Naumova, A.N., 1956. The Use of Bacterial Fertilizer on Sowing Vegetable Seeds into Peat Manure Nutrient Cubes . *Microbiologia* 25,41-48.
- Mosse, B., 1981. Vesicular-Arbuscular Mycorrhiza Research for Tropical Agricultural. *Reseach Bulletin*. Hawaii İnstitute of Tropical Agriculture and Human Resources, USA.
- Ortaş, İ., 1996. The influence of Use of Different Rates of İnoculum on Root İnfection Plant Growth And Phosphorus Uptake Communication. *Soil Science and Plant Analyses*. 27, 2935-2946.
- Ortaş, İ., Harris, P.J., Rowell, D.L., 1996. Enhance Uptake of Phosphorus Mycorrhizal Sorghum Plants as İnfluenced by Form Nitrogen. *Plant and Soil*. 184, 255-264.
- Ortaş, İ., Akpınar, Ç., 2004. Mikorizanın Tarımda Kullanımı ve Önemi. Türkiye 3. Ulusal Gübre Kongresi (Tarım, Samayı ve Çevre), 11-13 Ekim 2004. Tokat.
- Pareek, R.P., Gaur, A.C., 1973. Release of Phosphate from Tricalcium Phosphates by Organic Acids. *Current Science* 42, 278-279.



- Rodriguez, C.E.A., Gonzales, A.G., Lopez, J.R., Di Ciaco, C.A., Pacheco, B.J.C., Parada, J.L., 1996. Response of Field Grown Wheat to Inoculation with *Azospirillum brasilense* and *Bacillus polymyxa* In The Semiarid Region of Argentina. *Soils and Fertilizers* 59,800.
- Rubenchick, L.I., 1960. *Azotobacter And Its Use In Agriculture Translated From Russian. Published For The National Science Foundation, Washington D.C. US Dept. Of Commerce, Washington, USA.*
- Saber, M.S.M., 1997. Biofertilized Farming Systems. Proceedings of The Training Course on Bio-Organic Farming Systems for Sustainable Agriculture (November 26 to December 6, 1995, Cairo, Egypt) p.66-73.
- Sahu, S.N., Jana, B.B., 2000. Enhancement of The Fertilizer Value of Rock Phosphate Engineered Through Phosphate-Solubilizing Bacteria. *Ecological Engineering* 15, 27-39.
- Schilling, G., Gransee, A., Deubel, A., Lezovic, G., Ruppel, S., 1998. Phosphorus Availability, Root Exudates, and Microbial Activity In The Rhizosphere *Journal of Plant Nutrition and Soil Science* 161, 465-478.
- Sieverding E., 1991. Vesicular-Arbuscular Mycorrhiza Management in Tropical Agrosystems. Technical Co-operation –Federal Republic of Germany.
- Simpson, D., Draft, M.J., 1990. Spore Production and Mycorrhizal Development in Various Tropical Crop Hosts Indicates with *Glomus clarum*. *Plant and Soil*. 121,171-178.
- Singh, S., Kapoor, K.K., 1998. Effect Of Inoculation Of Phosphate Solubilizing Microorganisms And On Arbuscular Mycorrhizal Fungus On Mungbean Grown Under Natural Soil Conditions. *Mycorrhiza*. 7, 249.
- Singh, K.B., Saxena, M.V., 1999. Chickpeas. The Tropical Agriculturalist Series, Macmillan Education Ltd., London and Basing Taked. UK.
- Smith, S., Read, D.J., 1997. *Mycorrhizal Symbiosis*. 2nd Edition. Academic Press. London. UK.
- Sundara, B., Natarajan, V., Hari, K., 2002. Influence of Phosphorus Solubilizing Bacteria on The Changes In Soil Available Phosphorus and Sugarcane and Sugar Yields. *Field Crops Research* 77,43-49.
- Sutton, W. D., Pankhurst, C.E., Craig, A.S., 1981. The Rhizobium Bacteroid State. *International Review of Cytology Supplement* 13. Academic Press. Inc., Orlando, USA.
- Swetlana, B.J., Mirjana, N.J., 2003. The Effect of Use of Nitrogen-Fixators in Forage Pea Production. *Proc.Nat. Sci. Matica. Sprska Novi Sadç*. 105, 75-80.
- Taha, S.M., Mahmoud, S.A.Z., El-Damaty, A.H., El-Hafea, A.M.A., 1969. Activity of Phosphate- Dissolving Bacterian Egyptian Soils. *Plant and Soil*. 31,149-160.
- Vancura, V., 1961. Detection of Gibberelic Acid in *Azotobacter* Cultures. *Nature*. 192, 88-89.
- Walksman, S.A., 1952. *Soil Microbiyology*. Jhon Wiley & Sons, Inc., New York. USA.

SEZGİDEN İÇGÖRÜYE: YANILGI, ŞÜPHE VE İNANÇ

INTUITION TO INSIGHT: MISCONCEPTION, DOUBT AND BELIEF

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ÖZET

Sezgi, bir bilgi kaynağı veya bir bilme yöntemi olarak kabul edilir. Bağlamsal görev özelliklerine ve zamanın kısıtlılığına duyarlı olan sezgisel kavrayış yanlışları, problem çözmede, karar vermede veya benzer görevlerde tetiklenir. Sezgisel çıktılar, uzmanların problem çözümlerinde olduğu gibi olumlu veya acemilerin problem çözümlerinde olduğu gibi olumsuz olabilir. Sezgisel kavrayış yanlışları, bilişsel dengesizliğe neden olur ve dengeleme için şemaların düzenlenmesi gerekir. Fischbein, sezgisel düşünmenin özelliklerini dolaysız, zorlayıcı, öz-kanıtlayıcı olarak tanımlar. Sezgi, ne olgulara, kurallara, bağlamlara, düzenlemelere ne de rasyonel akıl ve onun fakültelerine uyar. İnceleme için yer bırakmayacak derecede güçlü bir duygudur. Bir sorunu sezgisel yoldan çözdüğümüzde veya bir kararı sezgisel yoldan aldığımızda, onun kesinliğinden o denli eminiz oluruz ki, soruşturmayı bırakırız. Beceri veya bilgi açısından problemi çözebilecek potansiyele sahip insanlar, sezgisel zorlamalar nedeniyle kolay problemleri çözerken bile şaşkırtıcı ve ilginç hatalar yapıyorlar. İkili süreç kuramları, iki farklı sistem (Tip1 ve Tip2) ve iki farklı işlem türü (sezgisel ve analitik akıl yürütme) tanımlamaktadırlar. Tirosch ve Stavy sezgisel yanlışları açıklamak için heuristik kurallar (aynı A aynı B- daha A daha B) önerdiler. Deneysel ve nitel çalışmaların çoğu bilişsel psikoloji ve karar verme alanlarında yürütülmektedir. Ayrıca, içgörü ve sezginin farklılıkları ve benzerlikleri hakkında devam eden bir tartışma vardır.

Bu çalışma için problem çözmede heuristik yanlışları anlamak amacıyla uygun örnekleme yoluyla bir dizi görüşme yapıldı. Katılımcılar, problem çözme deneyimine ve öğrenmeye ilgi duyan gönüllülerden oluşmaktadır. Bu görüşmelerden biri sezgisel hatadan içgörüselleştirme kadar düzenleme (accommodation) sürecini açıklamak için özel olarak seçilmiştir. İnanç, güven, şüphe, duygulanım, yinleme, yardım arama, ısrar, somutlaştırma, doğruluk, soyutlama, işlevselleştirme problem çözme sürecinde ortaya çıkan temalardır. Şüphe hissi soruşturmayı tetiklemektedir ve bir süreç olarak somutlaştırma, soyutlanmış bir doğru inanç kuralının temelidir. İlgili konular, öğretim tasarımı uygulamaları için ayrıntılı olarak tartışılmıştır.

Anahtar Kelimeler: Sezgi içgörü, heuristik, iki süreçler, aynı A aynı B

ABSTRACT

Intuition is considered as a source of knowledge or a method-style of knowing. It is triggered in problem solving, decision-making or similar tasks and sensitive to contextual task features and time constraint. It is fast, immediate, coercive, self-evident. Intuition complies neither with the facts, rules, contexts, regulations nor with rational mind and its' faculties. Fischbein describes the features of intuitive thinking, then shows examples of these features. Incorporating intuition into learning problem solving context is possible and might be useful. However, the product of intuition could be positive as in expert problem solver or negative as in novice problem solver. It is a strong sense to the degree that does not leave any place for

deliberation. When we have intuitively solved a problem or made a decision, we are generally sure of its' certainty that we quit further inquiry. People who are able to solve the problem in terms of ability or knowledge are making surprising and interesting errors even at solving easy problems. Dual processing theories explain the mechanism by two distinct kind of system (Type1 and Type2) and two distinct kind of processing (heuristic and analytic reasoning). Tirosh ve Stavy proposed a heuristic rule (Same A Same B- more A more B) to account for these intuitive errors. Most of the experimental and qualitative studies are conducted in cognitive psychology and decision-making. In addition, there is an ongoing discussion about the differences and similarities of insight, and intuition.

A series of interview with convenience sampling is conducted to understand the phenomenon with a heuristic misconceptions in problem solving. The participants are volunteered with an interest in problem solving experience and learning. The analysis of interview which will be presented here is specifically selected to explicate a process of intuitive error to insightful solution. Belief, confidence, doubt, affect, reiteration, help-seeking, persistence, concretization, accuracy, abstracting, functionalizing are the concepts emerged during problem solving process. Doubt as a sense is a search trigger and concretization as a process is the foundation of an abstracted true belief-rule. Both will be discussed in detail for formal instructional design implications.

Keywords: Intuition, insight, heuristic, dual processing, same A same B

PIAGET: COGNITIVE PROCESSES

Piaget bilişsel gelişim kuramında bilişsel gelişim mekanizmalarını, şema (schema-s), dengeleme (equilibrium), örgütlenme (organization), uyum-uyumsuzluk-uyum sağlama (adaptation), özümleme (assimilation), düzenleme-uyum (accommodation) kavramları ile açıklamıştır (Driscoll, 2005). Piaget'e göre bilişsel gelişim dünyayı öğrenme yolunda, dengeden dengesizliğe ve tekrar dengeye ulaştığımız, aşamalar halinde ilerleyen bir süreçtir.

Bilişsel gelişimde iki temel eğilim vardır (Flavel, 1970): İlki, tutarlı sistemdeki davranış ve düşüncenin birleştirilmesi, ve yeniden düzenlenmesi ile ilgilenen örgütlenme eğilimidir. İkincisi ise çevreye uyumumuzu sağlayan mekanizmalardan oluşur. Dengeleme sürecinin kesintisiz işleyebilmesi için karşılaşılan yeni nesne ve durumlara uyum sağlamamız gerekir. Uyuma dönük her bir davranışımız organize edilmiş bir bütünün parçasıdır. Bu bütün bilişsel yapılarımızı ifade eder.

Çevreyle etkileşimlerimiz sonucu oluşturduğumuz bize özgü bilişsel yapılara şema adı verilir (Senemoğlu, 2015). Yeni durumlarla karşılaştığımızda ilgili şemalar devreye girerek çevremizden anlam çıkarmamızı sağlar. Örneğin, birisi "renkliler ile beyazları ayırdım." dediğinde bunun çamaşır yıkama ile ilgili olduğunu hemen anlarız. Şemalar yeni bilgileri yerleştirileceğimiz bilgi, beceri öbekleri veya çerçeveleridir. Burada bilgiden kasıt sadece kitaplardan elde edilen sözel ifadeler ya da olgular değildir. Davranışa ya da tepkilerimize rehberlik eden anlamlı deneyim ve öğrenme bütünleridir.

Yeni gelen bilgilerin zorlanmadan şemalara eklenmesine özümleme denir (Driscoll, 2005). Denge ve özümleme durumunda konfor bölgemizde hareket ederiz. Konfor bölgesi yaşanan durumun bireye tanıdık geldiği, bireyin kendisini rahat hissettiği, çevresini kontrol altında tutabildiği, kaygı ve stresin düşük düzeyde olduğu psikolojik bir durum olarak tanımlanabilir. Yeni gelen bilgiyi özümlüyorsak halen konfor bölgemizdeyizdir. Ancak özümleme uyum sağlamanın bir yönüdür. Diğer yönünde bilişsel yapıların düzenlenmesi yer almaktadır. Dışsal dünya ile etkileşimimizde bizi konfor bölgemizden çıkmaya zorlayan durumlarla da

karşılaşırız. Örneğin tutarsız olan dışsal uyaran durumlarında, bireylerin tepkilerinin anlamlı olarak farklılaştığı tespit edilmiştir. Tutarsızlık dışsal uyaranlar arasında bile olsa belli bir farkındalığa veya rahatsızlığa neden olmaktadır.

Eğer yeni gelen bilgi önceki şemalarımıza uymuyor ise bilişsel dengesizlik (disequilibrium) oluşur (Flavel,1970). Bilişsel dengesizlikte tutarsızlık dışsal uyaranlar arasında değil bireyin zihinsel şemalarındadır. Dengesizlik çelişkili tutum, çelişkili inanç veya çelişkili davranışlara neden olur. Literatürde bilişsel dengesizlik- disequilibrium (piaget,), bilişsel çelişki-cognitive dissonance (Festinger 1957), bilişsel uyuşmazlık-cognitive conflict, misconceptions, safata-fallacy vb. terimler birbirine çok yakın durumları açıklamak için kimi zamanda birbirleri yerine kullanılmaktadır.

Yeni durumla varolan şemalar arasındaki uyumsuzluk birey tarafından fark edilirse şaşkınlık, huzursuzluk, gerginlik gibi bir dizi farklı duygulanımlar yaratabilir. Şemalarda düzenlemeye gitme zorunluluğunun (accommodation) bireyi rahatlık alanından çıkmaya zorlaması nedeniyle, kaygıyı artıracığı ve görel olarak strese neden olacağı öngörülebilir.

Konfor alanından çıkan birey yeniden konfor alanına dönmek için birtakım eylemlerde bulunur. Yeni gelen bilgiyi anlamlı olarak şemalarına yerleştirme çabasına girebilir. Denge geçici bir andır. Dengesizlik ise gelişimin dinamosu gibidir. Sürekli konfor alanından hareket etmemiz ve özümlememiz yeterli değildir, gelişimin sürekliliği ve dönüştürücülüğü için zaman zaman şemalarımızı değiştirmeye veya düzenlemeye ihtiyaç duyarız.

Flavel (1970)'e göre dengeleme aktif ve dinamik bir süreçtir. Dengeleme bir öz-düzenleme sürecidir ve bilişsel gelişimin temel bir işlevidir. Sezgisel düşünme yanılgıları yanılmanın hissedildiği durumlarda dengesizliğe yol açar. Bu yanılgılar şemaların düzenlenmesini gerektiren önemli öğrenme fırsatları yaratır.

SEZGİSEL-BİLİŞ ÖZELLİKLERİ

Fischbein sezgisel düşüncelerden kaynaklanan yanılgıları açıkladığı bir kitap yazmıştır. Bu kitapta Fischbein sezgisel bilgiyi veya sezgisel kavrayışı 8 sezgisel-biliş özelliği ile tanımlamaktadır (1987, Ch.4, s.43-56; Aldağ yayınlanmamış ders notları, akt. Şen, 2011)

1. Öz-kanıtlayıcılık (self-evidence): Bu özellik ifadenin kendi kanıtını kendi içinde barındırmasına işaret eder.
2. İçsel kesinlik (intrinsic certainty): Bu özelliğe göre sezgisel ifadenin kesinliği, doğruluğu veya güvenilirliğinin belirlenmesinde yine sezginin kendisi kullanılmaktadır. Güvenirliğin kanıtlanması için dışarıdan başka bir kaynağa başvurulmasına gerek kalmamaktadır.
3. Kararlılık (perseverance): İfadenin kararlılığına ve kalıcılığına işaret eder.
4. Zorlayıcılık-baskıcılık (coerciveness): Durum veya ifadenin bireyin algılama eğilimlerini veya seçimlerini belirli bir yön lehine etkilemesini vurgular.
5. Kuramsallık (theory status): Sezgisel durum belli bir savın lehine mini-kuram görünümüne sahiptir.
6. Bilinenlerden bilinmeyenlere ulaşmaya olanak vermesi (extrapolativeness): Analitik, parçalı düşünmenin ötesinde bütünsel bir öteleme, vardama, çıkarım yapma özelliğine işaret eder.
7. Bütünsellik (globality): Gestaltçı algılamadaki etkileşimli bütünselliğe işaret eder.

8. Kavrayışın örtüklüğü (implicitness): Bu özellik ifade edilmeden, ima edilen, açıkça belirlenmeden anlaşılabilen ifadeye işaret etmektedir.

Sezgisel düşünceler ikili veya çiftli düşünme süreç kuramları ile ilişkilendirilebilir. İkili veya çiftli düşünme süreç kuramları hızlı, otomatik, çağrışımsal ve duyuşsal temelli bir akıl yürütme biçimine karşı yavaş, düşünmeyle nitelenen analiz gerektiren ikincil bir süreç önermişlerdir. (Kahneman, 2015). Kısaca sözederek, system 1 (tip 1) hızlı düşünme ile nitelenir. Zahmetsizdir, çağrışımsaldır (associative) ve deneyime dayalıdır. Buna karşılık, system 2 (tip 2) yavaş düşünmeyle nitelenir. Çaba gösterilmesini gerektirir ve önemli ölçüde bilişsel kaynakların kullanılmasını gerektirir. Sembolik ve matematik formüller gibi soyut kural kontrolüne dayanır. Sezgisel düşünme yanılgıları bu bağlamda sistem 1'in çıktısı olarak görülür.

Yanılgı kaynaklarının nedenlerinden biri üst-problem çözme yapıları (heuristic rules) kapsamında Stavy ve Tirosh tarafından açıklanmıştır. Stavy ve Tirosh (2000) öğrencilerin matematik alanında öğrenme görevlerine verdikleri tepkileri tahmin etmek ve açıklamak için sezgisel kurallar teorisini önerdiler. Stavy ve Tirosh'a göre öğrenme görevine verilen tepkiler, görevle ilgili kavramlar tarafından değil, görevlerin alakasız dış özellikleri tarafından belirlenmekteydi (Stavy ve Tirosh, 2000). Araştırmacılar, literatürde alternatif kavrayışlar (conception) olarak tanımlanan birçok yanılgının, birkaç yaygın, sezgisel kuralın evrimleşmiş biçimi olarak yorumlanabileceğini belirterek, üç kural belirlediler: "Daha Fazla A-Daha Fazla B", "Aynı A-Aynı B" ve "Her şey bölünebilir" (2000). Stavy ve Tirosh'un yaklaşımında çözüm üst-kısa yolları olarak heuristic kurallar anlaşılacağı gibi algısal özelliklere dayalı yaygın yanılgıların üst-düzyer problem çözme stratejileri haline gelmiş biçimleri gibi görünmektedir..

Çiftli süreç kuramları ile Stavy ve Tirosh'un heuristic kural açıklamasını şöyle ilişkilendirebiliriz: Verilen problemde heuristic kuralla örtüşen dışsal-uyaranlar var ise problemin sözel veya görsel sunumu öğrenende system 1'i harekete geçirecek, bu da çözümün algısal-yüzeysel-dışsal özelliklere bağlı olmadığı durumlarda sezgisel yanılgılar ile sonuçlanacaktır. Öğretim açısından baktığımızda, sezgisel düşünme yanılgıları system 1 ile karakterize olurken, bu yanılgıların düzeltilmesi iki yolla da (sistem 1 ve sistem 2) gerçekleştirilebilir.. Literatürde sezgisel düşünceleri ilgilendirebilecek bir başka tartışma ise -A!ha buluş anı ile tanımlanan içgörüsöl problem çözümlerinin (insight) sezgisel düşünme ile ayırt edilmesidir. İçgörüsöl problem çözümü aşamaları Wallas (1926) tarafından hazırlık (preparation), kuluçka (incubation), aydınlanma (illumination- A!Ha anı) ve doğrulama (verification) olarak sıralanmıştır (Mayer,1991). İçgörü ile gelen çözümler genellikle doğru, ilkesel veya yapısal dolayısıyla transfer edilebilir çözümlerdir. Oysa sezgisel düşünceler ile gelen çözüm veya alternative kavrayışlar her zaman doğru olmayabilir. Doğanay(2007)'ye göre denencelerin kurulması ve test edilmesi üst-düzyer düşünme becerileri açısından önemli bir alt beceridir. Sezgi ile içgörüsöl çözümlerin benzerlik ve farklılıklarının tanımlanması veya çözüm aşamaları temelinde ilişkilendirmenin netleştirilmesine gereksinim vardır.

ARAŞTIRMA YÖNTEMİ

Sezgisel düşünme yanılgılarının doğasını anlamak, tespitler yapmak için uygun örnekleme yöntemine göre bir dizi görüşme gerçekleştirilmiştir. Katılımcılar, problem çözme deneyimine ve öğrenmeye ilgi duyan gönüllülerdir. Bu görüşmeler arasından problem çözümede heuristic nitelikli sezgisel yanılgıların belirginleştiği bir görüşme seçilmiş ve örnek olay niteliğinde sunulmuştur. Olaylar sezgisel bir hatadan çözüme giden bir süreci ve çözüm stratejilerini tanımlamaktadır. Düşünme süreçleri ve ilgili kuramlar incelemelerde temel alınmıştır. Görüşme sezgisel düşünme yanılgılarının tetikleme ve içgörüsöl öğrenmeyi açığa

çıkarmak amacıyla informal formatta yapılmıştır. İnfomal format ile zaman baskısı ortadan kaldırarak içgörüsül çözümlü buluşuna zemin yaratılmak istenilmiştir. Bu örnekte sunulan görüşme analizinde, öğrenenin ön öğrenmelerinin düzey ve niteliğinin, öğrenenin epistemolojik inançları ve öğrenme davranış eğilimleri ile etkileşerek problem çözme sürecini nasıl belirlediği incelenmiştir. Katılımcı çevresinde çözüm üretici ve herkesin danışabileceği ve yardım alabileceği biri olarak bilinir. Sezgisel düşünme yanılığını ortaya çıkarmak için sorulan matematik sorusu, araştırmacının dönem dönem derslerinde sezgisel düşünme niteliklerinin öğretiminde kullandığı bir sorudur. Soru Fischbein (1987) basımlı kitabından alınmıştır.

Araştırmacı kayıt için gerekli izni aldıktan sonra, katılımcıya görüşmenin informal bir görüşme olduğunu, görüşmeden istediği anda çekilebileceğini, istediği anda ara verebileceğini veya kaydı durdurabileceğini bildirmiştir. Araştırmacı katılımcının görüşmenin koşullarını anladığından ve yeterince rahat olduğundan emin olduktan sonra, beyaz bir A4 kağıdı kullanıp, göstererek, araştırmada için katılımcıdan cevaplamasını istediği soruyu sormuştur.

GÖRÜŞME SÜRECİ:

Araştırmacı: Bu kağıt boyutlarının 5'e 10 cm. olduğunu varsayalım. Bu boyutlar ile (A4 kağıdı göstererek) enlemesine mi daha fazla su alır. Yoksa boylamasına mı?

Örnek olarak süt firmalarının süt kutusu tasarımlarını düşünebiliriz diye soruyu detaylandırdı.

Katılımcı (çok kısa süre içinde A4'ü göstermek için kullanarak): Bu şekilde yaptığımızda dar olur. Yükseltisi fazla olur. Diğer türlü enine katladığımızda boyu kısa olur. Eni geniş olur. Aynı miktarda suyu alır diye düşünüyorum.

Sorudaki yüzeysel-algısal özellikler anında sistem 1'i etkinleştirdi. Araştırmacının bu cevabı ile Stavy ve Tirosh'un belirttiği şekilde heuristik-sezgisel yanılığının varlığına işaret etmektedir. (aynı A-aynı B).

Araştırmacı: Şimdi birazcık daha açalım bunu... 1 den 10'a kadar sayı verdiğimiz de bu cevabından ne kadar eminsin?

Katılımcı: Genişse boyu kısaysa da aynı suyu alır, daha uzunsu da aynı suyu alır diye düşünüyorum. Cevabımın doğru olduğunu düşünüyorum. Yanılma payı 1 diyelim. 9 diyelim.

Cevabın doğruluğuna ilişkin eminlikte tepkinin sezgisel olduğunu desteklemektedir. Yanlış cevabın doğruluğuna inancın yüksekliği ise Kruger tepkisini doğrulamaktadır.

Araştırmacı: Peki bu soruya verdiğin cevabın doğru veya yanlış olduğunu... bana nasıl ispat edersin doğruluğunu...

Katılımcı: Deney yaparım. Kağıtla olmaz da bir kaptan..

Araştırmacı: Peki ne istersin, temin edelim.

Katılımcı: Daha kısa ve geniş bir kap bulalım. Daha uzun ve dar bir kap bulalım. İçine konulan sıvı miktarına bakalım.

Karşılaştırılabilir uygun kaplar olmadığı için, uygun ölçülere göre kağıttan kap yaparak içine su yerine pirinç konulmasına karar veren katılımcıya malzemeler temin edildi.

Katılımcı önce uzun formatta paketi hazırlayarak içine pirinç koydu. Sonra doldurduğu pirinci ayrı bir kaba alarak enlemesine format ile denedi. Katılımcı paketleme esnasında katlama paylarını da incelikte düşünerek, enine format için paketi hazırlarken "kesinlikle aynı çıkacağından eminim." dedi. Uzunlamasına denemesinden çıkan pirinci enlemesine

formattaki pakete doldurduğunda paketin dolmadığını görünce durdu. Pakete baktı. “Acaba alt taraf açıldı ondan da olabilir.” dedi. “Belki kağıdı bükmemde bir şey oldu.” Katlama paylarında hata yaptığını düşündü. “eşit çıkacağından gene eminim.” diyerek pirinç dolu pakete bakıyordu. Gözünün görmekte olduğunu farkında idi ama ilk cevabının doğruluğundan daha da emindi. Araştırmacı çıkan farkın milimlik değil önemli bir fark olduğunu söyledi.

Araştırmacı: Peki cevabının yanlış olduğunu söylersem....

Katılımcı halen nerede yanlış yaptığı konusunda akıl yürütmeye çalışıyordu.

Katılımcı: Acaba diğerini çok mu dar yaptım....

Sorun katlama payına ilişkin bir sorun olmalıydı, bir şeyi yanlış yapmış olmalıydı. Çünkü cevabın doğruluğunun kesinliğine inanmaya devam etmek istiyordu.

Bu süreçte araştırmacı çok müdahale etmeksizin, ara ara araştırmacının söylediğini tekrarlıyor veya özetliyordu.

Katılımcı: “Hata payının bu kadar olmaması gerekiyordu. Şu kadar olsa hata payı belki diyeceğim. Ama diğer düşüncede de.. yanlış olduğunu düşünmüyorum. Öbürünü çok geniş bunu çok mu dar tuttum diye kafa yoruyorum.. Bu kadar da hata payı olmamalı diyorum.”.

İlk sezgilerinin ısrarcılığı ile elindeki paketi incelemeye devam ediyordu.

Katılımcı: Demek ki kısa ve geniş olunca daha fazla alıyor diye düşündüm.

Araştırmacının “Neden böyle düşündün?” sorusunu “Arada çok fark var çünkü. Arada çok fark var.” diye cevaplıyor. “Şaşırdım.” diyor “Ben var ya aynı olmasını bekliyordum.” derken, halen su şişeleriyle denemeyi planlıyordu. Gözleri onu ikna etmemiştii.

Katılımcı: “Bir de litre olarak denesem diyorum... Kaç demiştin inancıma % 99’mu”. Araştırmacı “10 üzerinden 9 demiştin.” diye hatırlattı.

Katılımcı: Şimdi 60'lara kadar düştü.”.

Araştırmacı soruyu farklı bir formatta sormuş olsaydım, acaba daha mı farklı olurdu diyerek, örneği süt firmaları ile yeniden sundu: “Daha az karton masrafı ile daha çok süt paketlemek amaç olduğunda”

Katılımcı: Bu sefer geniş olan cevaba doğru kayardım.

Araştırmacı aynı en ve boyda yine aynı kağıt olduğunu hatırlattı ve açıklama istedi. Araştırmacı kesinlikle kafası karışık bir şekilde tüm bu sanı ve gözlemleri işe yarmadığının farkında olarak açıklamaya çalışıyordu. Deney tasarlanmış ve gözlemin olgusal çıktısı görünür hale gelmişti, ancak sezgisel düşünmenin ısrarcılığı ve öz-kanıtlayıcılığının etkileri devam etmekteydi. Katılımcı deneyden elde ettiğimiz gözlemi, el işareti ile göstererek, ilki ile ikinci yorumu yeniden özetliyordu. Bu an tip 1 ve tip 2 düşünmelerinin sonuçlarının görünür hale geldiği, bilişsel farkındalık anıdır. Uzlaşmazlık fark edilmiştir ancak uzlaştırma çabaları sürdürülmektedir. Gözlemin nasıl yapıldığının birinci el deneyim ve bilgisi, gözlem sonuçlarının yanlış olmadığını bilgisi, somutlaştırmanın, yaptığının ve gördüğünün bilgisi ve farkındalığı katılımcıyı sonuçları kabul etmeye zorluyordu. Ancak gözlemdeki öğelerin ve ilkelerin henüz tutarlı bir anlam oluşturacak şekilde soyutlanmamış ve ilişkilendirilmemiş olması bu aşamada ilk sezgisel düşünmenin zorlayıcı ve baskın özelliğini de ortaya çıkarıyor.

Bu informal bir görüşme ve katılımcı deneyimli ve kararlı bir yetişkin. Sorunun bu aşamasında bireysel çalışan deneyimsiz bir öğrenci olsaydı durum farklı olabilirdi. Bu aşamadaki tehlike öğrenenin bunalarak soruyu çözmeyi bırakmasına neden olabilir. Öz-güven sorunu olan öğrenciler için olumsuz etkiler ile sonuçlanabilir. İşte bu nedenle bu aşamada

öğrenenlerin incelikte ipuçları ve desteklerle somutlaştırma çabalarından elde ettikleri gözlem sonuçlarından soyutlamaya doğru yönlendirilmeleri gerekir.

“Birincide eşit olacağımı söylemişim. İkinci de geniş olanın daha fazla alacağını gördüm.” Araştırmacı soruyu biraz farklılaştırarak katılımcının deneyde cevaba götüreceği öğeleri ayırt etmesini sağlamaya çalışırken, bu ayrıma ulaşamayan ve temel kavram ve öğelere ulaşmakta zorlanan katılımcı ilk cevabını ve deney gözlemindeki sonucu tekrarlamaya devam etti. Bu aşama tek bir çözüme saplanıldığı için diğer alternatiflere geçilemediği aşamadır. Katılımcı bu engeli aşabilmek için, günlük yaşam deneyimlerinden bilgilerini getirdi.

Katılımcı: Ben ablamın pekmezini veriyorum (satıyorum). Bazılarının boyu uzun oluyor ama şişe dar oluyor. Bir buçuk litrelik oluyor. Su şişesini kullanıyorum. Bazıları da daha künt ve geniş oluyor. Ben ölçüyorum mesela 750cc. 1 litre, bir kilo olarak düşünüyorum. İkisine de koyduğumda aynı sıvıyı alıyor pekmez de. Bence yine başa döneceğim ya yine aynı alır diye düşünüyorum. Sıvıyla mı yapsak, şuradaki plastikle denesek. Gene başa dönüyorum. Yine başa dönüyorum. Acaba diyorum bunun ayarını mı yapamadım?... Böyle yaptığımı....

Ama her seferinde aynı yere dönüyor olması, onu strese sokmaya başladı. Katılımcı problemi bırakmak istemiyor. Böylece ikinci deney başladı. Dar-uzun ve geniş-kısa iki kap ile deney tekrarlandı. Tam ölçülü kaplar bulunamadı. “Sana aynı olduğunu ispatlamaya çalışıyorum...” diyen katılımcı ispattan emin çıkamayınca, eşya yerleştirme ile ilgili üçüncü bir bağlam ve deney de sorunun cevabını araştırmaya başladı. Bu deneme de araştırmacının katılımcıyı desteklemek için sunduğu ikinci soru tipindeki formatla düşünmeye başladı. “Süt kutuları yer kaplar. Uzun.. yer kaplar. Hacmi olur..”

Bu aşamada araştırmacı “Tamam şimdi bulacak” diye düşünmesine rağmen katılımcı hacim den sonra listelediği kavramları da fark etmeyerek başa dönüyordu. Bunun üzerine araştırmacı katılımcıdan az önce söz ettiği kavram olan hacmi tanımlamasını istedi.

Katılımcı: Sıvılarda hacim. Sıvılar yer kaplar. Sıvılar içinde bulunduğu kabın şeklini alıyor. İçinde bulunduğu kabın genişliği boyu ne kadarsa o kadar gibi bir şey. Bu da alan dar-uzun... Sen şu süt firması sorusunu yeniden sorar mısın?”

Araştırmacı: Süt firması en az masrafla en çok sütü alacak paket...

Katılımcı: Yaparız ya onu da yaparız.”

Araştırmacı yeni formattaki soruyla akıl yürütmeye devam etmek istese de yorgunlukla sorunun cevabını gerçekten bilip bilmediğini sordu. Soruyla ilgili bir matematik öğretmeni ile yaptığım görüşmeden haberdardı.

Katılımcı: Ne çizdi. Silindir mi çizdi? Tabi matematikle de çözebiliriz. Ama ben yine aynı diyorum. Geniş olunca o genişlik tabana geliyor. Uzun olduğunda da buraya....” . Katılımcı artık eline kalem ve kağıt alarak çizim yapmaya başlamıştı. Araştırmacı katılımcıdan hangi kavramları kullandığını sordu.

Katılımcı: “Hacim, yükseklik, alan..silindir..”.

Elindeki somut silindire bakarak “Yükseklik çarpı alan mı? Baksak mı formüle?” diye sordu. İnternette formülü buldu. Formüle bakarak çözmeyi denedi. Problem çözdü, sonucun anlamını kavrayınca “Aaa” “ ile şaşkınlığını belirtti. Kontrol etmek için çözüm aşamalarını özetledi. Katılımcı: “Silindir hacmi nasıl bulunuyor diye baktık. Hacim silindirin tabanın yarı çapıyla pi^yi çarptık. Yarıçapın karesiyle pi’yi çarptık. Bir de h yükseklikle çarptık. İkisinkinede baktık. Kısa geniş olan daha fazla alıyor. Şaşkınlık içindeyim. Hiç böyle bir deney yapmamışım. Enlemesine çıktı. “Kaçırdığımız kavram ne olabilir?” “Kütle hacim, ağırlık, yükseklik, allahalla..”. “Değişen ne?” “Yine de inanmak istemiyorum yaptığım şeye.

” Katılımcı sadece yorulmamıştı. Ama soruyu çözemediği, veya çözdüğü zaman çıkan sonucu anlamlandıramadığı için bunalmıştı.

Araştırmacı çözümü bırakmayı önerdi, katılımcının yorulduğunu ifade etti. Katılımcı problem çözümünü bırakmakta zorlanıyordu. Problem çözülmüştü ancak henüz anlamlandırılmamıştı yani düzenleme (accomodation) gerçekleşmemişti. Araştırmacının zorlamasıyla ara verildi. Araştırmacı “Bir süre dinlenme ile bir A-ha anı yakalayabiliriz miyiz?” diye düşündü. Sezgisel düşünme yanılgıları bir kez fark edildiğinde bazı öğrenenler problemi düşünmeyi bırakmakta zorlanabilir. Sezgisel düşünme yanılgıları ısrarcıdır. Örnek çalışmamızda katılımcımızda problem çözümlerinde dayanıklı ve ısrarcı bir eğilim gösteriyor. Öğrenme görevinin zorluğu ile katılımcımızın özellikleri eşleşti. Bu durum çözüme ulaşılmasını ve bilişsel düzenlemeyi keskinleştirdi. Ancak problem çözümüne kolay bir içgörü ile ulaşılabilmesi olasılığını nasıl etkilediği kestirmek zor görünüyor. Yanılgı ısrarcı, ancak katılımcı da problem çözümünün de ısrarcı. Katılımcı çözüm anlamsal yapıya yerleşinceye kadar yani şemalarda düzenleme (accommodation) gerçekleşinceye kadar dayanmakta ısrarlı. Bu nedenle kuluçka aşaması ile gelebilme olasılığı olan çözüm yerini analitik çözümlere bırakmış olabilir. Bir başka olasılıkta problemin içgörüsüyle çözülebilecek nitelikte olup olmadığı sorusudur. Öğrenme görevi, öğrenenin ön-öğrenmeleri ve problem çözümünde karakteristik özellikleri ile etkileşmektedir. Bu etkileşim içgörüselsel öğrenmelerin ortaya çıkıp çıkmayacağını belirliyor olabilir.

Bu çalışma da çözüm ilk aşamada Stavy ve Tirosh’un belirttiği gibi problem çözümü ile ilgili görev özellikleri sonucunda değil, problemden algılanan dışsal özelliklere tepki olarak ortaya çıkmıştır. Sezgisel yanılgıyı içeren ilk çözüm problemden gelen algısal örüntülere göre system 1’in etkinleştirdiğini göstermektedir. Yanılgılı çözüme hızla hatta anında ulaşılmıştır. Sezgisel yanılgı zaman baskısından kaynaklanmamaktadır. “Aynı-Aynı-B” heuristic yapısı harekete geçerek alan ve hacim kavramlarını eşleştirilmesine neden olmuştur.

Aradan sonra yenilenen enerji ile katılımcı tüm çözüm sürecini yenilemeye karar verdi. Bu aşama da formüllü çözüm ve somutlaştırılmış deney yan yana idi. Deney sonucu kabul edilmişti. Artık problemin doğru çözümü için gerekli olan ilk tepkide kaçırılan öge neredeyse fark edilmişti. İlk ve yanlış verilen tepkiye karşı deneyde elde edilmiş doğru sonucu anlamlı hale getirmek için düzenleme (accomodation) aşamasına hazırдық. Katılımcı ikinci deney sonucuna inancı güçlendirmek için kanıt arıyordu, kendi ifadesi ile sağlamasını yapıyordu. Boy ve en bu defa cetvelle ölçüldü. Uzun formulla kısanın çapları karşılaştırıldı.

Katılımcı: Çünkü aşağı genişledi. Bir süre bu işlemlerle uğraştıktan sonra. “Tamam, anladım.” dedi. “Özetleyim: Önce soru sordun... Ben fark etmez aynı dedim. Denedik. Enlemesine koyduğumuzda fark oluştu. İnanmadım... ve 4 santimle baktık.. Yani alan genişliyor enlemesine koyduğumuzda. Ben dedim ki bu sefer alanı aynı tutalım uzunluğu değiştirelim dedim. Enlemesin de olan da durum değişiyor. Sonuçta dikdörtgen olan bir şey de enlemesine olan daha fazla alıyor. Çap, yarıçap değişiyor. İnanırım.”. “kaçta kaç” “100 de 100.”

Şemalar yeniden düzenlenmiş alan ve hacim şemasında yeni bir derinliğe ulaşılmıştı. Düzenleme analitik bir akıl yürütme sonucunda, çabayla elde edildi, öğrenme ve dengeleme ile sonuçlandı. Dengeye ulaşma katılımcının kendine olan güvenini yerine getirdi ve problem çözümedeki başarısına olan inancını da artırmış görünüyordu. İnanç-şüphe-inanç, çözüm-çözumsuzlük-çözüm döngülerinde ilgili olanlar ile yüzeysel olanlar ayırt edilerek, eski inanç ve yeni çözüm karşılaştırılarak anlamlı ve uygulamaya yönelik işlevsel bir şema düzenlenmiştir.

Araştırmacı: Bunu uygulayabileceğin yer var mı?” “Ben annemin pekmezini satıyorum.... Düne kadar genişlere koyuyordum. Ben uzunlara koyarım, daha gösterişli olur, daha ...daha

fazla.. ...” derken gülümsüyordu. Bu gülümseme çözüme ulaşmanın, yeniden dengeye (equilibrium) ulaşmış olmanın, hatta çözümlü uygulamaya transfer etmenin getirdiği bir rahatlama hissi olarak algılanabilir.

Araştırmacı “İnancında yüzde yetmişbeşe kadar çıkmıştık sonra yeniden başladık. Burada şüphenin rolü nedir? “ diye sordu.

Katılımcı: Şüphe olmasaydı arayış devam etmezdi. Şimdi artık bir daha yapmam (deneyi) gördüm, inandım artık.

Araştırmacı “Peki neden ilk olarak problemi formüllerle çözmeyi denemedin de deneye başladın?” diye sordu.

Katılımcı: Matematiğe ve formüllere inancım tam. Ama formülle çözsük bile anlamazdım ki. Sana da açıklayamazdım. Böyle daha iyi anladım. Yerleşti.

Burada katılımcının ifadelerinden matematiğe olan tutumunun olumlu olduğunu anlıyoruz. Katılımcı sezgisel olarak hangi stratejinin kendisini çözümde başarıya götüreceğinin farkında olarak hareket etti. Bu noktada üst-bilişsel stratejilerin ilişkin kararlarında kendiliğinden yönlendirici olduğunu ve eğilimler olarak hızlı kararlar vermemizi sağladıklarını görüyoruz. Diğer yandan matematiğe karşı olumlu tutuma rağmen, “problemin formüllerle çözsük dahi anlamazdım” ifadesine vurgu yapmakta yarar var. Formüllerin katılımcı için anlaşılabilirliği matematiği nasıl öğrettiğimizin bir göstergesi olabilir. Aynı soru ile yaptığım diğer görüşme sonuçları da formüllerle yapılan çözüm sonucuna inancın tamlığını gösteriyordu. Ancak formüllerle çözümün anlamlı şekilde açıklanamaması bulgusu dikkat çekici idi. Pi'nin fonksiyonunun açıklanamaması ilköğretim düzeyinden gelen bir boşluğa işaret etmektedir. Merrill'in öğretim tasarımı kuramında işlem içerik yapısı ilkeden önce gelmektedir. Anlamlı hale getirilmeyen durumlarda formülle çözüme ulaşmak mümkün gestalt kuramında B tipi çözümler bu düzeyde yer almaktadır. Ancak sağlam, dayanıklı ve transfer edilebilir problem çözümü şemaları için ilkenin anlamlı olarak öğrenilmesi gerekmektedir. Bloom'un taksonomisi ile düşünecek olursak, matematik problemlerinin çözümünde analiz aşamasına geçmeliyiz. Sorunun çoğunlukla yanlışlığı tetikliyor olması bile bu sorunun analiz düzeyinde olduğunu bir göstergesi olabilir. Aynı zamanda çözüme ulaşılması için etkileşen öğeler somut olarak bir arada olmasına rağmen soru yanlışlığı tetiklemektedir. Bu durumda yanlışlığın bastırılmasını önerenler olabilir.

Sezgisel düşünme yanlışlarının engellenmesi-bastırılmasının (inhibition) uygun olabileceği bağlamlar olabilir. Örneğin karar sonuçlarının önemli etkilere sahip olduğu gerçek hayat kararlarında tıp, ekonomi, mühendislik vb. bağlamlarda sezgisel düşünme yanlışlarını engellemek daha etkili çözümlere ulaşılmasını sağlayabilir. Ancak sezgisel düşünme yanlışları anlamlı öğrenme ve öğretme için düzenleme açısından (Piaget-accomodation) büyük bir potansiyele sahip görünüyor. Eğitim araştırmalarının yönünü sezgisel düşünme yanlışlarından optimum fayda sağlamaya yönlendirmeliyiz. Amacımız yanlışlarla oluşan dengesizlikteki öğrenme potansiyelinin optimum düzeyde öğrenmeye dönüşümünü sağlamak olabilir. Bu nokta da etkili olabilecek spesifik-bağlamsal faktörler ve genel faktörlerin etkileri, etki oranları ve etkileşimleri gerçek uygulamalar da incelenebilir.

Diğer yandan bu görüşme de açığa çıkan bir unsur bir kez yanlışlık fark edildikten sonra gelen şaşkınlık (-A-aa anı) problemi çözmeye doğru itici güç oluşturuyor. Önce ilk verilen yanlış tepki yanlışlık yapıldı düşüncesiyle deney veya formülle çözüm tekrar ediliyor. Ancak deney sonucunun veya çözümün ilk tepkiyi tekrar yanlışlamasından sonraki tepki “gerçeğe bakma” olarak nitelendirilebilir. Henüz anlamın netleşmediği bu aşamada katılımcı/öğrenen rahatlık alanından yeterince uzaklaşmış oluyor. Ne zaman katılımcı soruyla bütünleşti ve soruyu bırakamaz hale geldi? Görüşme tam olarak ne zaman kendi kendini ikna etme sürecine

dönüştü sorusu daha ayrıntılı, daha kapsamlı inceleme gerektiriyor. İnanç bilişsel alanda bile öze dönük görünüyor. Bu informal görüşmede ki katılımcı problem çözümlerinden kaçmayan, deneyimli ve çözüm sürecine dayanıklılığı ile bilinen bir yetişkin. Problem çözmeye farklı yaklaşımlar da, tersi özelliklere sahip olanlarda, deneyime sahip olmayanlarda da bu kadar güçlü bir etkiye sahip olma olasılığımız var mı?

Katılımcı anlamı oluşturmadan (yani accommodation öncesi) dengesizlikte iken yanlış olduğunu bildiği ilk tepkiye olan inancı 100 de 99'dan 60'a düşüğünü ifade etmişti. İkinci deney sonrasında ilk tepkisinin yanlış olduğunu ikinci kez gördüğünde inanç düzeyini ifade etmesi istendiğinde deney sonucunun net olduğunu ilk tepkisinin yanlış olduğunu gösterdiğini ama ilk tepkisine olan inancının % 75 olduğunu, inancının hale devam ettiğini ifade etti. “ Hatta 60 bile değil % 75. İnanamıyorum. Şaşırdım...”. Yanlış olan tepkiye inancın ısrar ediciliği sezgisel düşünme yanlışlarının öz niteliklerinden ısrarcılık (Fischbein: 1987) ile paralel görünüyor. Ancak uzlaşmazlık, çatışma, tutarsızlık veya çelişki sadece çözülmekte olan problem alanı ile kalmayıp duyuşsal alana taşıyor görünüyor. Bu noktada Festinger'in bilişsel uzlaşmazlık terimi ile sezgisel yanlışlardaki tepkilere yeniden incelemek yerinde olacaktır. Yanlışlar bağlamında Festinger'in bilişsel uzlaşmazlık terimi çıkış için faydalı ancak kuramsal kapsayış açısından yeterli olmayabilir. Czikszenmihalyi'nin kuramı inaçtan şüpheye, şüpheden inanca geçişte duygulanım süreci ve duyguların değişim süreci konusunda faydalanılabilir. Bu kuram öğrenme de psikolojik süreci açıklama da faydalı olacaktır. Ancak bağlamsal faktörleri, büyük gruplara öğretimde sosyal-dinamiksel değişimleri de açıklamak gerekecektir.

SONUÇ

Görüşme sürecindeki olayların sırası genel olarak şöyledir: inanç (yanılgılı cevaba), güven (yanılgı), şüphelenme (bilişsel farkındalık), duygulanım, çözüm stratejisi seçimi, somutlaştırma, (doğru çözümün görülmesi), yanlışlık yaptığının inanma, doğruyu reddetme, deneyi yinleme (tekrar yanılgılı çözüme dönüş), duygulanım (şaşkınlık), yardım arama, ilk cevapta ısrar (yanılgılı), somutlaştırma, formülle çözüm (doğru cevabı görme), saplanma, somutlaştırma, karşılaştırma, doğruluk, soyutlama, inanç (doğru çözüm) işlevselleştirme, transfer problem çözüme sürecinde ortaya çıkan kavramlardır.

Şüphe, anlam arama tetikleyicisidir. Bir süreç olarak somutlaştırma, soyutlanmış bir doğru inanç kuralının temeli olabilir. Uygun zamanda somutlaştırma uygun bir strateji iken daha üst problem çözüme düzeyleri için gerileme göstergesi de olabilir.

Matematiğe ve formüllerle çözümün doğruluğuna ilişkin inancın tam olmasına ve tutumun oldukça olumlu olmasına rağmen, önceki öğrenmelerin anlamlı öğrenmeler olmayışı formüllerle çözümün anlaşılacağı endişesi ile öğreneni somut düzeyde problem çözmeye yönelmektedir. Bu seçim katılımcının yüksek düzeyde bilişsel farkındalığa sahip olduğunun bir göstergesi olarak kabul edilebilir. Somutlaştırma stratejisi anlamlı öğrenme için bu düzeyde üretici bir strateji seçimi olmuştur. Ancak somutlaştırma stratejisi günlük hayata çözmek durumunda olduğumuz üst düzey karmaşık matematik problemlerinin çözümünde yetersiz kalabilir. Böyle durumlarda transfer edilmesi güç ve verimsiz bir strateji haline gelir. Ayrıca somutlaştırma okul öğrenmelerinde problem çözümlerinin ilkesel temelde anlamlı öğrenmeler düzeyinde gerçekleşmediğinin bir göstergesi olabilir. Anlamlı, transfer edilebilir öğrenmeler için uygulama düzeyinin ötesine çıkılması gerekmektedir. Sezgisel düşüncelerin bastırılması yerine öğrenme ve öğretmedeki etkililik ve verimliliğin sağlanması için açığa çıkarılması hatta bir öğretim stratejisi olarak yanlışların anlam arayışı stratejisine dönüştürülmesi uygun olabilir.

Stavy ve Tirosh'un ifade ettikleri gibi problemdeki algısal ilgisiz öğeler heuristic sezgisel yanılgıları tetiklemektedir. Ancak basit diyebileceğimiz problemlerde yanılgılı olan çözüme saplanma durumunda formal öğretim ortamlarında öğrenenlere uygun desteklerin verilmesi gerekir. İkili süreç kuramlarına göre bu öğeler sistem 1'i tetiklenmektedir. Yanılgının bertaraf edilmesi için başka bir deyişle yeniden dengeye ulaşılması için Piaget'nin bilişsel gelişim mekanizmalarından düzenlemeye (accomodation) gidilmesi gerekmektedir. Düzenleme bu örnekte somutlaştırma stratejisiyle analitik çözüm çabaları ile aşamalı olarak sağlanmıştır. Sezgisel yanılgılardaki inatçılığın duygulanımlar ile ilişkisi daha ayrıntılı olarak incelenmelidir. Sezgisel yanılgıların anlam arayışı stratejisi olarak kullanıldığı durumlarda Gestaltçı içgörüselle öğrenmelerden yaralanmanın mümkün olup olmadığı incelenmelidir. Bu örnek çalışma informal görüşme üstüne kurulu olması nedeni ile sonuçların formal öğretim ortamlarına genellenebilirliği oldukça sınırlıdır.

Bu çalışma zaman baskısının olmadığı durumlarda da algısal-ilgisiz özelliklerin sistem 1'i harekete geçirdiğini göstermesi açısından katkı sağlamıştır. Ayrıca problem çözümlerinde somutlaştırmanın hangi koşullarla ortaya çıktığını göstermiştir. Ön-öğrenmelerin yüzeysel uygulamalar düzeyinde kaldığı durumlarda, formüllerle çözüm doğru sonucun ne olduğunu tespiti için bir araç haline indirgenirken, somut deneylerle çözüm anlam oluşturmada analiz stratejisi düzeyine yükselmiştir. Bu alanda amaç odaklı, detaylı görüşmelere, durum çalışmalarına ve deneysel araştırmalara gereksinim vardır.

KAYNAKÇA

- Avaroğlu, M.C. (2013) Olasılık öğretiminde sunum biçimlerine ve yanılgı desteğine göre hazırlanmış yazılımların öğrencilerin akademik başarı, sezgisel düşünme ve öğretim süreci deneyimlerine etkisi. Yayınlanmamış Yüksek Lisan Tezi. Çukurova Üniversitesi. Adana
- Doğanay, A. (2007) Öğretim ilke ve yöntemleri. Pegem A. Yayıncılık. Ankara
- Driscoll, M. P. (2005) Psychology of learning for instruction. Pearson Education Inc. U. S. A.
- Festinger, L. (1957) A theory of cognitive dissonance, Evanston, IL: Row & Peterson
- Fischbein, H. (1975) The Intuitive sources of probabilistic thinking in children. D. Reidel Publishing. Boston:U.S.A
- Flavell, J. H. (1970) The developmental psychology of Jean Piaget. Van Nostrand Company, Inc. New York USA
- Kahneman, D. (2011) Thinking fast and slow. Penguin Books Britain.
- (Mayer, R. E. (1992) Thinking, problem solving cognition. W. H. Freeman and Company, New York, U. S. A.
- Senemoğlu, N. (2015) Gelişim öğrenme ve öğretim. Yargı Yayınevi. Ankara
- Stavy, R. and Tirosh, D. (2000) How student misunderstand science and mathematics. Teacher college Press. New York. USA.
- Şen, N. (2010) İlköğretim altıncı sınıf matematik dersinde bilgisayar destekli sezgisel düşünme kontrollü olasılık öğretiminin öğrencilerin akademik başarı ve sezgisel düşünme düzeylerine etkisi. Yayınlanmamış Yüksek Lisan Tezi. Adana.

TOKSİK LİDERLİK ZARARLI BİR LİDERLİK TARZI MIDIR? BİR LİTERATÜR ARAŞTIRMASI

IS TOXIC LEADERSHIP A HARMFUL LEADERSHIP STYLE?: A LITERATURE RESEARCH

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ÖZET

Liderlikle ilgili yapılan araştırmalara bakıldığında genel itibarıyla liderliğin olumlu yönlerine vurgu yapılmaktadır. Dönüştürücü liderlik, karizmatik liderlik, etik liderlik gibi liderlik tarzları bu olumlu yaklaşımlara örnek gösterilebilir. Bu yaklaşımların; çalışanların verimliliği, iş performansları, motivasyonları ve iş tatminleri gibi olumlu iş tutum ve davranışı göstermeleri üzerinde yapıcı etkileri olduğu bilinmektedir. Ancak literatürde bahsedilen diğer bir liderlik tarzı ise çalışanlar ve örgüt üzerinde olumsuz etkileri olan toksik liderliktir. Liderliğin karanlık yüzü olarak da nitelendirilen bu yaklaşım, işletme yönetimi ve örgütsel davranış üzerinde çalışan araştırmacıların dikkatini çekmiş ve araştırmacıları bu konuda araştırma yapmaya yöneltmiştir. Yapılan araştırmalarda toksik liderliğin ego ve hırs kullanarak, totaliter davranış sergileyerek, kayırmacılığı ve yolsuzluğu teşvik ederek örgütsel adalet anlayışını zayıflatan bir liderlik tarzı olduğundan söz edilmiştir. Başka bir ifadeyle toksik lider, kötü niyetli ve uyumsuz davranışlar sergileyerek örgütte çalışanlar arasında hoşnutsuzluğa yol açan lider olarak tanımlanmıştır. Bunun yanında toksik liderliğin çalışanların yaratıcılık göstermesini engelleyen, örgütte güvensizliğin yayılmasına sağlayarak örgüt içi iletişim kanallarını zayıflatan eylemler sergilediği belirtilmiştir. Buna ilaveten toksik liderliğin çalışanlar üzerinde de birtakım olumsuz sonuçları vardır. Bunlar çalışanların motivasyonlarını, performanslarını, işe ve örgüte bağlılığı azaltıcı etkilerdir.

Literatürde toksik liderliğin boyutlarından; otoriterlik, narsistlik, istismarcı yönetim, öngörülemeslik ve kendi reklamını yapma olarak bahsedilmiştir. Bu anlamda bir örgütte toksik liderliğin ortaya koyduğu toksisiteden kurtulmak için en önemli görev liderlere düşmektedir. Bu doğrultuda liderlerin sağlıklı işleyen örgütsel iletişim kanalları oluşturması, örgüt kültürünü destekleyici politikalar üretmesi, örgütün iç dinamiklerini iyi bir şekilde tanımlayabilmesi gerekmektedir. Bu çalışmada toksik liderlikle ilgili literatür araştırması yapmak amaçlanmıştır. Bu doğrultuda, çalışmada toksik liderliğin tanımı, önemi, toksik liderlik davranışlarının çeşitleri, toksik davranışların örgütlerde oluşum nedenleri, liderliğin oluşum süreci ve toksik liderlikle ilişkili teoriler, toksik liderliğin boyutları, özellikleri, etkilediği faktörler, toksik liderlerin davranışlarına karşı geliştirilebilecek öneriler ele alınmıştır. Bu çalışmanın hem literatüre hem ileride bu konu ile ilgili araştırma yapacak araştırmacılara yol gösterme anlamında faydalı olabileceği düşünülmektedir.

Anahtar Kelimeler: Liderlik, Çalışanlar, Toksik liderlik, Örgüt

ABSTRACT

Leadership is the art of influencing followers and guiding them to achieve organizational purposes; and leaders, on the other hand, are people who perform this art in an effective and accurate manner. When the studies conducted on leadership are evaluated, the positive

aspects of leadership were emphasized in them in general. Leadership styles such as transformational leadership, charismatic leadership, and ethical leadership can be given as the examples of these positive approaches. It was mentioned in the literature that these approaches have positive effects on the productivity, job performance, motivation, and job satisfaction of employees. However, another leadership type that was mentioned in the literature is toxic leadership behaviors, which have negative impacts on employees and the organization. This approach, which is also described as the dark side of leadership, attracted the attention of researchers who worked in business management and organizational behavior, and guided them to conduct studies on this subject. It was mentioned in previous studies that toxic leadership weakens the understanding of organizational justice by using the ego and greed showing totalitarian behavior, encouraging nepotism, and corruption. In other words, a toxic leader is defined as the one who causes discontent among employees in the organization by showing malicious and maladaptive behaviors. It was also reported that a toxic leader exhibits leadership model characteristics, which prevent employees from showing creativity, and weaken the intra-organizational communication channels by spreading distrust within the organization. Toxic leadership also has some negative outcomes on employees. These results are the effects, which reduce the motivation, performance, and commitment of employees to their job and organization.

In the literature, authoritarianism, narcissism, abusive management, unpredictability, and self-promotion are mentioned among the dimensions of toxic leadership. In this sense, the most important task falls to the leaders to eliminate the toxicity of toxic leadership within an organization. In this respect, leaders must create a healthy functioning organizational communication channels, produce policies supporting organizational culture, and be able to define the internal dynamics of the organization well. In this study, the purpose was to conduct a literature search on toxic leadership. In this regard, the definition of toxic leadership, its importance, types of toxic leadership behaviors, the reasons for the formation of toxic behaviors in organizations, the formation process of leadership and theories associated with toxic leadership, the dimensions of toxic leadership, its characteristics, the factors it affects, and suggestions that can be developed against the behavior of toxic leaders were discussed in the present study. It is considered that this study may be useful in terms of guiding the literature and researchers who will conduct studies on this subject in the future.

Keywords: Leadership, Employees, Toxic leadership, Organization

1. GİRİŞ

Liderlik, lider ile takipçilerinden oluşan ve lider-üye etkileşiminin olduğu örgütsel bir süreç olarak ifade edilir. Başka bir ifadeyle liderlik, örgütsel amaçlara ulaşabilmek amacıyla çalışanların yaptıkları işleri yapılandırma, kolaylaştırma ve yönlendirme sürecidir. Liderler, yoğun stres altında iken örgütü kriz ve kaos ortamında yönetebilme becerisi gösterebiliyorlarsa başarılı olarak kabul edilmektedir. Ait olduğu örgütlerin genel yönetimlerinden sorumlu olarak faaliyetlerini sürdüren kişilerin, örgütün amacına ulaşması için gerçekleştirdiği eylemlere liderlik denir. Aristo liderliğin sağduyu ile pratik bilgelik, mesleki yeterlilik ile kişisel bütünlük iyi niyet ve gruplara saygı özelliklerine sahip olması ile örgütler için önemli bir kavram olduğundan bahsetmiştir (Powers, Judge ve Makela, 2016: 297; Balwant, 2017: 578; Brandebo, 2020a: 567; Hogan ve Kaiser, 2005: 171; Ryan, Odhiambo ve Wilson, 2021: 59). Özetle liderlik, takipçilerini etkileyebilme sanatıdır.

Birçok akademik çalışmada hem örgütsel hem de çalışanlara olan olumlu etkilerinden dolayı liderlik kavramının faydalı olduğu belirtilmiştir. Ancak liderliğin karanlık yüzü olarak nitelendirilen, istismarcı, toksik, yıkıcı, narsist birtakım özelliklere sahip liderliğin hem

örgütler hem de çalışanlar açısından istenmeyen davranışların oluşumuna zemin hazırladığı literatürde belirtilmiştir. Toksik liderlik, liderin otoritesinden kaynaklı olarak merkezde bulunduğu bir liderlik tarzı olarak tanımlanmıştır. Toksik liderler, sahip oldukları karar verme mekanizmasının etkisiyle hem örgütleri hem de çalışanların örgüt kültürünü, verimliliklerini, örgütün marka değerini olumsuz olarak etkileyebilecek kişilerdir (Kılıç, 2019: 14; Mackey vd., 2021: 706; Vreja, Balan ve Bosca, 2016: 545). Başka bir deyişle bu tip liderler, zararlı davranışlar sergileyerek hem örgüte hem de çalışanlara olumsuz etkileri olan kişilerdir.

Bu çalışmada toksik liderlikle ilgili literatür araştırması yapmak amaçlanmıştır. Bir diğer ifadeyle toksik liderliğin zararlı bir liderlik tarzı olup olmadığı incelenmiştir. Bu bağlamda toksik liderlik davranışlarının çeşitleri, toksik davranışların örgütlerde oluşum nedenleri, liderliğin oluşum süreci ve toksik liderlikle ilişkili teoriler, toksik liderliğin boyutları, toksik liderliğin özellikleri, toksik liderliğin etkilediği faktörler, toksik liderlerin davranışlarına karşı geliştirilebilecek önerilerden ele alınmıştır. Bu çalışmanın ele aldığı konu, konunun araştırma biçimi ile sınırlıdır. Buradan hareketle bu çalışmanın literatüre katkı sunabileceği düşünülmektedir.

2. LİTERATÜR ARAŞTIRMASI

Toksik liderlik çalışmalarının kökeni, liderlik davranışlarının olumsuz etkileri olarak da bilinen Conger'in 1990 yılında ortaya attığı Liderliğin Karanlık Yüzü terimine dayanmaktadır. Literatürde liderliğin amacından sapması, karanlık liderlik tarafı, yıkıcı liderlik ve istismar edici liderlik olarak da bilinmektedir. Toksik liderler; çalışanlar ve örgütler üzerinde birtakım olumsuz, zarar verici davranışlar gösteren kişiler olarak adlandırılır. Bir toksik liderin örgüt iklimi içinde düşmanca ve zararlı birtakım davranışlar göstermesi kaçınılmazdır. Bu kavram aslında çalışanların enerjilerini pozitif olarak işe vermelerini sağlayarak örgütsel verimliliği artırıcı bir liderlik tarzı olan destekleyici liderliğin tersi olarak da düşünülebilir. Bu davranışlar karşısında çalışanların gösterdiği tepkiler ise öğrenilmiş çaresizlik, tükenmişlik, performans düşüşü, depresyon ve motivasyon azalması şeklinde olabilmektedir (Okroy ve Şimşek, 2019: 73; Scheffler ve Brunzel, 2020: 757; Heppell, 2011: 243; Saleem, Malik ve Malik, 2021: 3-4; McGurk vd., 2014: 244; Smith ve Fredricks-Lowman, 2020: 539). Kısaca toksik liderlik, örgütsel amaçlara ulaşmayı engelleyen bir liderlik tarzıdır. Buna göre aşağıda toksik liderlik davranışlarının çeşitleri, toksik davranışların örgütlerde oluşum nedenleri, liderliğin oluşum süreci ve toksik liderlikle ilişkili teoriler, toksik liderliğin boyutları, toksik liderliğin özellikleri, toksik liderliğin etkilediği faktörler, toksik liderlerin davranışlarına karşı geliştirilebilecek önerilerden söz edilmiştir:

2.1. Toksik Liderlik Davranışının Çeşitleri

Literatürde Toksik liderliğin aktif ve pasif olarak iki çeşit davranışının varlığından bahsedilmektedir. Adaletsizlik, ceza, kibir ve tehdidin toksik liderin aktif davranışlarını oluşturduğu; planlamayı düzensiz ve özensiz yapma, kimseyle yüz göz olmama gibi davranışların da fazla göz önünde olmak istemeyen ve toksik liderlerce sergilenen pasif davranışlar olduğu belirtilmiştir. Diğer yandan toksik liderlikle ilgili literatürde akademik veya duygusal zekâdan yoksun, pratik, dikkati dağılmış, tembel, iletişim kuramayan özelliklere sahip beceriksiz liderler olarak adlandırılmıştır (Brandebo, 2021b: 221; Kellerman, 2004: 40). Bu liderlik davranışlarının çalışanlar tarafından pek istenmeyen ve hoş karşılanmayan davranışlar olduğu belirtilmiştir.

2.2. Toksik Davranışların Örgütlerde Oluşum Nedenleri

Toksik liderlik davranışlarının görülmesinin ardında iki etken vardır: Birincisi kişiler arasındaki yüz yüze ilişkilerin göreceli olarak küçük iş gruplarında olmasıdır. İkincisi ise ahlaki ve bilişsel yönden gelişmemiş yöneticilerin varlığıdır. Buna ilaveten liderliği, liderler, takipçiler ve bağlamlar arasındaki karmaşık bir ilişki olarak tanımlayan toksik üçgen teorisi toksik liderlik oluşum nedenleri arasında gösterilebilir. Bir diğer ifadeyle toksik liderlik davranışlarının oluşma ortamı liderler, takipçiler ve bağlamlar arasındaki etkileşimin gücüne bağlıdır. Bu teoriye göre, liderin özelliğine bağlı olarak çalışanların ihbarcılık ve tikslenme niyeti algılarının değiştiği belirtilmiştir. Bir bakıma yıkıcı liderler, buldukları çevreyle etkisiz liderlik davranışları göstererek takipçileriyle ilişki kurarlar. Bu noktada liderin özellikleriyle takipçilerin ihbarcılık ve tikslenme algılarının doğru orantılı olarak değişebileceği söylenmiştir (Appelbaum, Iaconi ve Matousek, 2007: 591; Padilla, Hogan ve Kaiser, 2007: 190; Powers vd., 2016: 298; Thoroughgood, Hunter ve Sawyer, 2011: 648). Kısaca toksik liderlik teorisi bu liderlik davranışlarının oluşumunu açıklayan, kanıtlayıcı bir yaklaşımdır.

2.3. Liderliğin Oluşum Süreci ve Toksik Liderlikle İlişkili Teoriler

Liderliğin oluşum süreciyle ilgili olarak birinci varsayım, liderliğin kişilerin doğuştan gelen özelliklerine bağlı olduğu, ikincisi liderin doğuştan sahip olduğu özelliklerinden ziyade takipçilerine gösterdiği davranışlarına bağlı olduğu, üçüncüsü ise liderin özelliklerinin ve davranışlarının içinde bulunduğu durumla ilişkili olduğu şeklinde (Horner, 1997: 271). Genel anlamda klasik liderlik teorileri, üçe ayrılarak incelenebilir.

Genel olarak lider üye etkileşimi teorisi, sosyal öğrenme teorisi, eşitlik teorisi, sosyal mübadele teorisi ve bağlamsal liderlik teorisi toksik liderlikle ilişkili teorilerdir. Bu teoriler; lider üye değişimi teorisi, sosyal öğrenme teorisi, eşitlik teorisi ve sosyal mübadele teorisi olarak aşağıda bahsedilmiştir.

Lider Üye Değişimi Teorisi: Lider üye değişimi teorisi, takipçilerle liderlerin örgüt içinde etkileşimli olarak iş ilişkileri geliştirmelerini savunmaktadır. Bir diğer ifadeyle, bu kuram liderler ile takipçileri arasındaki sorumluluk ve beklentilerden doğan göreceli ilişkilerin kalitesine odaklanmaktadır. Bir bakıma liderlerle takipçileri arasındaki düşük lider üye etkileşiminin sebebi takipçilerinin toksik liderlik algısının büyüklüğüne dayandırılmaktadır (Uhl-Bien vd., 2014: 88; Pelletier, 2012: 413). Bu teoride liderlerle üyeler arasındaki ilişkinin etkileşim gücü azaldıkça toksik liderlik davranışlarının oluşma ihtimali de artmaktadır.

Sosyal Öğrenme Teorisi: Bu teori çalışanların örgüt içinde gösterdiği, kendilerinden beklenmeyen davranışlarının belli süre sonra tekrarlanabileceğini varsaymıştır. Sosyal öğrenme teorisi, bir örgüt içindeki çalışanların gösterdiği istenmeyen davranışların, takipçilerin rol model olarak gördükleri liderlerinin davranışlarının bir sonucu olduğunu belirtmiştir (Manz ve Sims, 1980: 361; Appelbaum vd., 2007: 591). Liderin bu tarz davranışları, örgütsel sapmaya yol açarak çalışanların istenmeyen davranışlar sergilemesine zemin hazırlamaktadır.

Eşitlik Teorisi: Eşitlik teorisi liyakat ve örgütsel adalet çerçevesinde örgütteki çalışanların elde ettiği kazanımların, çalışanların girdileriyle orantılı olduğunu varsaymıştır. Bu teori çalışanların bir örgütte elde ettikleri kazanımlarının girdilerinden az olduğunu algıladıklarında, bunu eşitsizlik olarak tanımladıklarını ifade etmektedir. Bu eşitsizliğin de çalışanların, liderlerinden kaynaklı olarak, istenmeyen davranışlar göstermesine yol açtığı belirtilmiştir (Leventhal, 1980: 1; Appelbaum vd., 2007: 595). Bu teori, çalışanların algıladığı örgütsel adalet anlayışını yansıtmaktadır.

Sosyal Mübadele Teorisi: Bu teoride çalışanların iş hayatında yöneticilerinden takdir edilme, saygı görme gibi birtakım beklentileri olduğu; eğer bu beklentiler yöneticilerce yeterince karşılanmazsa örgütsel amaçlara ulaşmada sapma görülebileceği belirtilmiştir. Çalışanların işle ilgili olarak elde ettiği kazanımların alt yapısı sosyal öğrenme teorisinde kurulmuştur. Bu teoride örgüt üyeleri arasında esnek ilişkilerin var olduğu belirtilmiş olup toksik liderlik davranışlarının boyutlarından biri olan narsizm ile çalışanların performansı arasında ters orantı olduğuna vurgu yapılmıştır (Şengüllendi, Şehitoğlu ve Kurt, 2020: 749; O'Boyle vd., 2012: 559-560). Kısaca bu teori, çalışanlara duyulan saygının yöneticiler tarafından yeterince gösterilmesi gerektiğine işaret etmiştir.

2.4. Toksik Liderliğin Boyutları

Toksik liderliğin boyutları otoriterlik, narsistlik, istismarcı yönetim, öngörülemezlik ve kendi reklamını yapma olmak üzere beşe ayrılmış olup, bu boyutlardan aşağıda bahsedilmiştir:

Otoriterlik: Liderin takipçileri üzerindeki mutlak ve tartışılmaz yetkisinden ve otoritesinden kaynaklanan takipçilerin lidere karşı itaat etme davranışının bir göstergesidir. Bir değer taraftan otoriter liderlik; liderin ortaya koyduğu politika ve stratejilerine astların inisiyatif almadan tam uyumunu bekleyen, katılımcılığı teşvik etmeyen liderlik tarzıdır. Otoriter liderlik; davranışlarını katı bir şekilde uygulayan örgütlerin hiyerarşik yapılarından dolayı kendilerine koşulsuz itaat eden takipçilerden oluşan bir örgüt ikliminin oluşumuna yol açar (Cheng vd., 2004: 91; Schmidt, 2008: 88; Thoroughgood vd., 2012: 911). Bu boyut, astların koşulsuz şartsız lidere biatını yansıtır.

Narsistlik: Narsisizmin kökeni, eski Yunan mitolojisinde bir su birikintisine yansıyan kendi görüntüsüne hayran olan Narcissus'a dayanmaktadır. Buna göre narsist kişiler güçlü ego ile hayal gücüne sahip, kendine güvenen, benmerkezci kişilerdir. Daha sonra psikoloji biliminde Freud'un 1800'lü yıllardaki dönüştürücü etkisiyle birlikte kavram; kendini başkaları karşısında büyük görme, kibir sahibi olma, kendine aşırı hayran olma anlamlarında kullanılmıştır. Buna ilaveten narsist liderlerin geniş bir vizyona sahip olarak takipçilerini güçlü bir şekilde etkileyebildiği belirtilse de bundan narsisizmin, faydalı bir liderlik boyutu olduğu anlamı çıkarılmamalıdır (Deluga, 1997: 50; Higgs, 2009: 170; Biçer, 2020: 303). Özetle narsistlik, kendini aşırı düşünen ve beğenen kişilerin özellikleridir.

İstismarcı Yönetim: Liderlerin sözleşme haricindeki takipçileri üzerindeki, herhangi bir fiziksel temas olmadan sergilediği, sözlü ve sözsüz düşmanca davranışlarıdır. İstismarcı yöneticiler; düşüncelerine katılmayan çalışanlarına karşı bağırır, tehdit eder, gözdağı verir, iş arkadaşları karşısında onları küçük düşürür ve onlarla alay ederler (Tepper, 2000: 178; Zellars, Tepper ve Duffy, 2002: 1068). Netice olarak bu boyut çalışanlara psikolojik şiddet uygulandığına işaret etmektedir.

Öngörülemezlik: Astlar, toksik liderin öngörülemeyen davranışları karşısında sürekli hazır kıta bekleyerek ve daha fazla zaman harcayarak tepki verirler. Bununla birlikte astların öngörülemeyen belirsizlikle başa çıkabilmeleri için motivasyonlarını bozmamaları gerekir. Öngörülemeyen davranışları olan, vizyonu zayıf toksik liderler örgüt iklimini de olumsuz etkilerler (Schmidt, 2014: 19; Reed, 2004: 67). Liderden kaynaklı birtakım öngörülmeleyen durumların varlığı belirtilmiştir.

Kendi Reklamını Yapma: Toksik liderler, astlarına ne kadar yetkin olduklarını göstermek amacıyla geçmişteki başarılarından ve sahip oldukları üstün yeteneklerinden bahsederek kendi reklamlarını yaparlar. Bunun liderin koşulsuz iş memnuniyetini sağlayarak, ekstra kazanımlar ile kredibilite elde etmesine fayda sunduğu ayrıca takım çalışması ve örgütsel güvene olumlu etkisi olduğu literatürde belirtilmiştir (Tal-Or, 2010: 88; Schmidt, 2014: 49).

Kendi reklamını yapma boyutu, liderin egosundan kaynaklı olarak yarattığı suni imaj oluşturma çalışmasıdır.

2.5. Toksik Liderlerin Özellikleri

Toksik liderlerin alaycı, güvenilmez ve ikiyüzlü, aşırı hırslı bir şekilde amaçlarını gerçekleştirme niyeti ile aşırı kibirli ve kararsız bir kişiliğe sahip oldukları; egolarını tatmin etme uğruna kendi kusurlarını örtmeye çalıştıkları; takipçilerin istek ve ihtiyaçlarına karşı duyarsızlık gösteren kişilik özellikleri gösterdikleri belirtilmiştir (Lipman-Blumen, 2011: 337-338). Sonuç olarak, bu liderlerin karakteristik özelliklerinin çalışanlarca pek sevilmediği ve görülme istenmediği söylenebilir.

2.6. Toksik Liderliğin Etkilediği Faktörler

Toksik liderlik; liderle ilişkili değişkenler, işle ilgili değişkenler, örgütle ilişkili değişkenler ve takipçilerle ilgili değişkenler olmak üzere dört faktörü etkilemektedir. Örgütsel bağlılık ve iş gören devri, toksik liderliğin etkilediği örgütle ilgili değişkenlere örnek olarak verilebilir. Stres, iyi oluş ve performans ise izleyiciyle ilişkili değişkenlerdir. Bunun yanında işle ilişkili değişkenlere iş tatmini örnek verilebilir. Takipçilerin lidere karşı direnç göstermesi ve lidere karşı davranışları da liderle ilişkili değişkenlerdendir. Buna ilaveten bu liderlik tarzının, çalışanların morali ile motivasyonu ve işle ilgili çıktılar üzerinde olumsuz etkileri olduğu görülmüştür (Schyns ve Schilling, 2013: 142; Chua ve Murray, 2015: 292). Bu liderlik tarzının çalışan davranışlarını olumsuz biçimde etkilediği literatürde vurgulanmıştır.

2.7. Toksik Liderlerin Davranışlarına Karşı Geliştirilebilecek Öneriler

Toksik liderin iş yerinde çalışanlarına karşı gösterdiği zararlı davranışlarının örgütsel iklim üzerinde olumsuz etkisi olduğu literatürde belirtilmiştir. Bu bağlamda liderlerin örgütsel amaçları gerçekleştirebilmesi, çalışanlarını olumlu yönde motive edebilmesi için kendilerini değerli hissettirecek davranışlar sergilemesi, aksi davranışlardan kaçınması, örgütsel iletişim kanallarını açık tutması, emrindekilerin zor anlarında onların yanında olması, sahiplenmesi gibi öneriler verilebilir. Bunun yanında örgütlerde çalışanların gelişimleri için düzenli aralıklarla hizmet içi eğitim almalarının sağlanması, toksik davranışlardan olumsuz etkilenen çalışanların kollarılması, çalışanların yöneticilerle informel ilişkilere girilmesinin engellenmesi, toksik davranışlara uğrayan çalışanların şikâyetlerinin sağlıklı ve bilimsel bir şekilde tespiti için gerekirse örgüt dışı uzmanlardan destek alınması gerektiği belirtilmiştir. Buna ilaveten toksik davranışlarla ilgili farkındalık yaratmak için stres yönetimi eğitimlerinin verilmesi, toksisitenin oluşumunu engelleyici biçimde iş yerindeki işlerin ve görevlerin yapılandırılması, iş yerinde mola zamanlarında kitap okunması, spor egzersizlerinin yapılması önerilebilir (Çiçek ve Almalı, 2020: 232; Kırca, 2021: 30-31; Gallos, 2008: 360). Bu önerilerin dikkate alınmasının, toksik liderlik davranışlarının oluşmasını engelleyici birtakım etkileri vardır.

3. SONUÇ VE ÖNERİLER

Liderlik, yöneticiliğe kıyasla vizyonu daha geniş bir kavram olarak, örgütsel amaca ulaşma etrafında takipçilerin etkilenecek, sürüklenmesi olarak tanımlanmaktadır. Buna ilaveten takipçilerini etkileyerek örgütsel amaca ulaşma noktasında ilham veren kişiler ise liderdir. Geçmişten günümüze kadar klasik liderlik teorileri arasında gösterilen özellikler, davranışsal ve durumsal ile modern liderlik teorileri genel itibarıyla liderin olumlu davranışlarını incelemiştir. Ancak bazı liderlik tarzlarının hem örgüte hem de çalışanlara olumsuz etkileri vardır. Toksik liderlik hem örgütün örgüt iklimini, örgütsel verimliliğini, kurumsal imajını hem de örgüt içindeki çalışanların moral, motivasyon, çalışma arzusu ile iş tatminini ve iş

performansını olumsuz yönde etkileyen bir liderlik tarzıdır. Bu liderlik tarzının fiziksel müdahale olmaksızın liderin astlarına karşı alaycı, kaba, onları küçük gören, yüksek egolu, kendini aşırı beğenen, kibirli özelliklerinden kaynaklı olduğu literatürde belirtilmiştir. Bu davranışlar karşısında çalışanların gösterdiği tepkiler ise öğrenilmiş çaresizlik, aşırı stres, tükenmişlik, performans düşüşü, depresyon, motivasyon azalması şeklinde olabilmektedir.

Toksik liderlik, zararlı ve istenmeyen bir liderlik tarzı olduğundan öncelikle bu liderlik tarzının oluşumunu örgüt içinde engellemek gereklidir. Bununla ilgili olarak üst yöneticiler gerekli önlemleri alabilmeli, bu davranışların oluşumunu engelleyici proaktif yaklaşımlar sergileyebilmelidir. Üst yöneticiler, oluşumunu engelleyemediği toksik liderlik davranışları karşısında gerekirse dışardan uzman kişilere başvurmalı, toksik liderden olumsuz etkilenen çalışanlarını korumalı, onlara psikolojik destek vermeli, bir daha aynı durumun yaşanmamasını sağlayabilmelidir.

Bu çalışmanın amacı, toksik liderlikle ilgili literatür araştırması yapmaktır. Bu doğrultuda toksik liderlik kavramı ayrıntılı bir şekilde ele alınmıştır. Bu doğrultuda yapılan literatür araştırmasından toksik liderliğin hem örgütler hem de çalışanlar açısından zararlı bir liderlik stili olduğu anlaşılmıştır. Bu çalışmanın ele aldığı konu, araştırma yöntemi ile sınırlıdır. Bundan sonra bu konuyla ilgili araştırma yapacak olanlara, farklı örneklerde karşılaştırmalı uygulamalı çalışmalar yapması önerilebilir. Bu çalışmanın literatürde kavramla ilgili boşluğu doldurması açısından yararlı olabileceği düşünülmektedir.

KAYNAKLAR

- Appelbaum, S. H., Iaconi, G. D., & Matousek, A. (2007). Positive and negative deviant workplace behaviors: causes, impacts, and solutions. *Corporate Governance: The International Journal of Business in Society*, 7(5), 586-598.
- Balwant, P. T. (2017). The dark side of teaching: Destructive instructor leadership and its association with students' affect, behaviour, and cognition. *International Journal of Leadership in Education*, 20(5), 577-604.
- Biçer, C. (2020). Destructive leadership: "Boss from hell", how not to be one?. *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 6(1), 295-308.
- Brandebø, M. F. (2020a). Destructive leadership in crisis management. *Leadership & Organization Development Journal*, 41(4), 567-580.
- Brandebø, M. F. (2020b). How contextual is destructive leadership? A comparison of how destructive leadership is perceived in usual circumstances versus crisis. *International Journal of Organizational Analysis*, 29(1), 220-239.
- Cheng, B. S., Chou, L. F., Wu, T. Y., Huang, M. P., & Farh, J. L. (2004). Paternalistic leadership and subordinate responses: Establishing a leadership model in Chinese organizations. *Asian Journal of Social Psychology*, 7(1), 89-117.
- Chua, S. M. Y., & Murray, D. W. (2015). How toxic leaders are perceived: Gender and information-processing. *Leadership & Organization Development Journal*, 36(3), 292-307.
- Çiçek, B., & Almalı, V. (2020). The effect of toxic leadership on conflict in the workplace. *Journal of Economics Business and Political Studies*, 7(2), 214-235.
- Deluga, R. J. (1997). Relationship among American presidential charismatic leadership, narcissism, and rated performance. *The Leadership Quarterly*, 8(1), 49-65.

- Gallos, J. V. (2008). Learning from the toxic trenches: The winding road to healthier organizations and to healthy everyday leaders. *Journal of Management Inquiry*, 17(4), 354-367.
- Heppell, T. (2011). Toxic leadership: Applying the Lipman-Blumen model to political leadership. *Representation*, 47(3), 241-249.
- Higgs, M. (2009). The good, the bad and the ugly: Leadership and narcissism. *Journal of Change Management*, 9(2), 165-178.
- Hogan, R., & Kaiser, R. B. (2005). What we know about leadership. *Review of General Psychology*, 9(2), 169-180.
- Horner, M. (1997). Leadership theory: past, present and future. *Team Performance Management: An International Journal*, 3(4), 270-287.
- Kellerman, B. (2004). *Bad leadership: What it is, how it happens, why it matters*. Boston, MA: Harvard Business Press, USA.
- Kılıç, M. (2019). *X ve Y kuşaklarındaki toksik liderlik algılarının örgütsel bağlılık, psikolojik iyi oluş ve bireysel performans üzerindeki yansımaları*. Yayınlanmamış doktora tezi. Kocaeli Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim Dalı Yönetim ve Organizasyon Bilim Dalı, Haziran, Kocaeli.
- Kırca, M. Y. (2021). *Çalışanlardaki toksik liderlik algısının örgütsel sessizlik ve iş motivasyonu üzerindeki etkisi: pozitif psikolojik sermayenin düzenleyici rolü*. Yayınlanmamış doktora tezi. İstanbul Sabahattin Zaim Üniversitesi Lisansüstü Eğitim Enstitüsü İşletme Anabilim dalı, Temmuz, İstanbul.
- Leventhal, G. S. (1980). What should be done with equity theory?, K. J. Gergen, M. S. Greenberg, & R. H. Willis (Ed.), *Social Exchange: Advances in Theory and Research*, Plenum, New York, 27-55.
- Lipman-Blumen, J. (2011). Toxic leadership: A rejoinder. *Representation*, 47(3), 331-342.
- Mackey, J. D., Ellen III, B. P., McAllister, C. P., & Alexander, K. C. (2021). The dark side of leadership: A systematic literature review and meta-analysis of destructive leadership research. *Journal of Business Research*, 132, 705-718.
- Manz, C. C., & Sims Jr, H. P. (1980). Self-management as a substitute for leadership: A social learning theory perspective. *Academy of Management Review*, 5(3), 361-367.
- McGurk, D., Sinclair, R. R., Thomas, J. L., Merrill, J. C., Bliese, P. D., & Castro, C. A. (2014). Destructive and supportive leadership in extremis: Relationships with post-traumatic stress during combat deployments. *Military Behavioral Health*, 2(3), 240-256.
- O'Boyle, E. H., Forsyth, D. R., Banks, G. C., & McDaniel, M. A. (2012). A meta-analysis of the Dark Triad and work behavior: a social exchange perspective. *Journal of Applied Psychology*, 97(3), 557-579.
- Okray, Z., & Şimşek, A. H. (2019). Toxic leadership: Systematic review based on studies Made in Turkey. *Istanbul Management Journal*, (89), 73-96.
- Padilla, A., Hogan, R., & Kaiser, R. B. (2007). The toxic triangle: Destructive leaders, susceptible followers, and conducive environments. *The Leadership Quarterly*, 18(3), 176-194.



- Pelletier, K. L. (2012). Perceptions of and reactions to leader toxicity: Do leader–follower relationships and identification with victim matter?. *The Leadership Quarterly*, 23(3), 412-424.
- Powers, S., Judge, L. W., & Makela, C. (2016). An investigation of destructive leadership in a Division I intercollegiate athletic department: Follower perceptions and reactions. *International Journal of Sports Science & Coaching*, 11(3), 297-311.
- Reed, G. E. (2004). Toxic leadership. *Military Review*, 84(4), 67-71.
- Ryan, P., Odhiambo, G., & Wilson, R. (2021). Destructive leadership in education: a transdisciplinary critical analysis of contemporary literature. *International Journal of Leadership in Education*, 24(1), 57-83.
- Saleem, F., Malik, M. I., & Malik, M. K. (2021). Toxic leadership and safety Performance: does organizational commitment act as stress moderator?. *Cogent Business & Management*, 8(1), 1960246, 1-16.
- Scheffler, M., & Brunzel, J. (2020). Destructive leadership in organizational research: a bibliometric approach. *Scientometrics*, 125(1), 755-775.
- Schmidt, A. A. (2008). *Development and validation of the toxic leadership scale*. Master dissertation. University of Maryland, College Park, Maryland.
- Schmidt, A. A. (2014). *An examination of toxic leadership, job outcomes, and the impact of military deployment*. Doctoral dissertation. University of Maryland, College Park, Maryland.
- Schyns, B., & Schilling, J. (2013). How bad are the effects of bad leaders? A meta-analysis of destructive leadership and its outcomes. *The Leadership Quarterly*, 24(1), 138-158.
- Smith, N., & Fredricks-Lowman, I. (2020). Conflict in the workplace: a 10-year review of toxic leadership in higher education. *International Journal of Leadership in Education*, 23(5), 538-551.
- Şengüllendi, M. F., Şehitoğlu, Y., & Kurt, E. (2020). Toksik liderlik ve üretkenlik karşıtı iş davranışları ilişkisinde kariyerizmin aracı etkisi. *Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 11(22), 743-765.
- Tal-Or, N. (2010). Direct and indirect self-promotion in the eyes of the perceivers. *Social Influence*, 5(2), 87-100.
- Tepper, B. J. (2000). Consequences of abusive supervision. *Academy of Management Journal*, 43(2), 178-190.
- Thoroughgood, C. N., Hunter, S. T., & Sawyer, K. B. (2011). Bad apples, bad barrels, and broken followers? An empirical examination of contextual influences on follower perceptions and reactions to aversive leadership. *Journal of Business Ethics*, 100(4), 647-672.
- Thoroughgood, C. N., Padilla, A., Hunter, S. T., & Tate, B. W. (2012). The susceptible circle: A taxonomy of followers associated with destructive leadership. *The Leadership Quarterly*, 23(5), 897-917.
- Uhl-Bien, M., Riggio, R. E., Lowe, K. B., & Carsten, M. K. (2014). Followership theory: A review and research agenda. *The Leadership Quarterly*, 25(1), 83-104.
- Vreja, L. O., Balan, S., & Bosca, L. C. (2016). Toxic Leadership. An evolutionary Perspective. in *Proceedings of the International Management Conference*,



"Challenges of Modern Management", November 3rd-4th, 2016, Bucharest, Romania, 10(1), 539-547.

Zellars, K. L., Tepper, B. J., & Duffy, M. K. (2002). Abusive supervision and subordinates' organizational citizenship behavior. *Journal of Applied Psychology*, 87(6), 1068-1076.

TÜRKİYE’DE MERA KANUNU KAPSAMINDA YÜRÜTÜLEN MERA ISLAHI VE AMENAJMAN PROJELERİNİN GENEL BİR DEĞERLENDİRİLMESİ
EVALUATION OF RANGELAND IMPROVEMENT AND MANAGEMENT PROJECTS CARRIED OUT WITHIN THE SCOPE OF RANGELAND LAW IN TURKEY

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ÖZET

Çayır ve mera alanları hayvanların ihtiyaç duyduğu kaba yemin sağlandığı en önemli yem kaynaklarıdır. Türkiye’de 14.6 mil.ha çayır mera alanı ve 2.1 mil.ha yem bitkisi üretim alanlarından üretilen toplam kaba yem, 73.7 milyon büyük ve küçükbaş hayvan varlığının kaba yem ihtiyacını karşılayamamaktadır. Türkiye’de mevcut çayır mera alanlarının büyük çoğunluğunun ot verimi ve kalitesinin artırılması ve sürdürülebilirliğinin sağlanması için ıslahı gereklidir.

Mevcut mera alanının 1/3’ü zayıf, ½’si orta, 1/10’u ise iyi ve çok iyi mera durumundadır. Mera kanununun yürürlüğe girdiği 1998 yılından beri Tarım ve Orman Bakanlığı 12 630 592 da alanda, 1916 adet Mera Islahı ve Amenajmanı Projesi yürütmüştür. Yürütülen projelerin değerlendirildiğinde, ıslah projelerinden beklenen faydanın ve başarının sağlanmadığı, söylenebilir.

4342 sayılı Mera Kanunu ile birlikte başlatılan Mera Islah ve Amenajman Projeleri ile bugüne kadar ıslah edilen mera alanları oldukça yetersizdir. Mevcut durumu ile projelerin sürdürülebilirliği Ayrıca, ıslah edilen mera alanlarının otlatılmasında mera idaresinin teknik kurallarına uyulmamasından dolayı yapılan ıslah işlemi sürdürülebilir olmamaktadır. Bundan dolayı mera alanlarının kullanımında mevcut uygulamaları değiştirip farklı bir politika uygulamak gerekmektedir. Özellikle bu alanların kullanımında özel sektöre kiralanana mera alanların artırılması bu alanlardan elde edilen ot verimi ve kalitesini artıracaktır.

Anahtar Kelimeler: Türkiye, Mera Kanunu, Islah ve Amenajman Projeleri

ABSTRACT

Meadows and rangelands are the most important feed sources that provide the roughage needed by the animals. Total roughage produced from 14.6 miles of meadow rangeland and 2.1 miles of forage crop production areas in Turkey cannot meet the roughage needs of 73.7 million cattle and sheep. The majority of the existing meadow rangeland areas in Turkey need to be improved in order to increase the grass yield and quality and to ensure its sustainability.

In Turkey, 1/3 of the rangeland area is poor, ½ is medium, 1/10 is in good and very good condition. Since 1998, 1916 Rangeland Improvement and Management Projects have been carried out in an area of 12 630 592 decars within the scope of the Rangeland Law.

When the projects carried out are evaluated, it can be said that the expected benefit and success from the improvement projects has not been achieved.

The rangeland lands that have been rehabilitated with the Rangeland Improvement and Management Projects initiated with the Rangeland Law No. 4342 are quite insufficient. Sustainability of the projects with their current status In addition, the improvement process is

not sustainable due to non-compliance with the technical rules of the rangeland management in the grazing of the reclaimed rangelands. Therefore, it is necessary to change the existing practices and apply a different policy in the use of rangeland areas. Increasing the rangeland areas leased to the private sector, especially in the use of these areas, will increase the yield and quality of grass obtained from these areas.

Keywords: Turkey, Rangeland Law, Rangeland Improvement and Management Projects

GİRİŞ

Hayvansal ürünler, insanlığın sağlıklı bir yaşam sürdürebilmesi için mutlak gereksinim duyduğu gıdalardır. Bu nedenle, günümüzde ulusların gelişmişlik düzeylerinin belirlenmesinde kullanılan ölçütlerden birisi de söz konusu ülkede kişi başına tüketilen günlük protein miktarı ve bu protein içindeki hayvansal proteinin oranıdır. Türkiye’de kişi başına ortalama 104.8 g protein tüketimi ile kişi başına 80.3 g olan dünya ortalamasının üzerinde günlük protein tüketimi olmasına karşılık, söz konusu proteinin ancak % 31.3’ü hayvansal proteindir (FAO, 2016). Kişi başına günlük protein tüketimi içerisinde hayvansal protein oranının dünya ortalaması ise % 39.5’dir. Bu durum, Türkiye’de insanların satın alma güçlerine uygun yeterli hayvansal üretim yapılmadığını ortaya koymaktadır. 18.6 milyon büyükbaş, 55.1 milyon küçükbaş olmak üzere toplamda 73.7 milyon başı bulan hayvan varlığı (BÜGEM, 2020) ile, hayvan varlığı açısından dünyada ön sıralarda yer alan Türkiye’de yeterli ve ucuz hayvansal üretim yapılamaması, Türkiye hayvancılığının içinde bulunduğu sorunlardan kaynaklanmaktadır. Türk Hayvancılığı ile ilgili birçok sorun olmakla birlikte bunlardan en önemlisini hayvanların yeterli beslenememesi oluşturmaktadır. Nitekim, hayvanların yaşama payı gereksinimlerinin karşılanması için gerekli olan kaliteli kaba yem tamamı karşılanamamakta ve 26 milyon ton kaliteli kaba yem açığı bulunmaktadır (Özkurt ve Çınar, 2020). Türkiye hayvancılığının gereksinim duyduğu kaliteli kaba yem açığının kapatılarak yeterli ve ucuz hayvansal ürün üretilebilmesi için ülkedeki doğal çayır-meraların ıslah edilerek kaliteli kaba yem üretim potansiyellerinin artırılması ve tarla tarımı içerisinde yem bitkisi ekim alanlarının artırılması gerekmektedir.

ÇAYIR MERA VARLIĞI

Türkiye’de 14.6 milyon ha doğal çayır-mera alanının 13.168 milyon ha’ı doğal mera, 1.449 milyon ha’ı ise doğal çayırdır (BUGEM, 2021). Söz konusu çayır-mera arazilerinin bölgelere göre dağılımı Çizelge 1’deki görülmektedir.

Çizelge 1. Türkiye’de Doğal Çayır-Mera Alanlarının Bölgelere Göre Dağılımı

Bölge	Mera		Çayır	
	Alan (mil. ha)	%	Alan (mil. ha)	%
Doğu Anadolu	4.861	36.9	0.831	57.3
Orta Anadolu	4.704	35.7	0.198	13.7
Karadeniz	1.269	9.6	0.248	17.1
G.Doğu Anadolu	0.749	5.7	0.040	2.8
Akdeniz	0.631	4.8	0.045	3.1
Marmara	0.519	4.0	0.051	3.5
Ege	0.435	3.3	0.036	2.5
Toplam	13.168	100	1.449	100

Kaynak: Altın ve ark., 2011

Çizelge 1’de izlendiği gibi, Türkiye’deki 13.168 milyon ha’lık doğal mera alanının % 36.9’u, 1.449 milyon ha’lık çayır arazisinin ise % 57.3’ü Doğu Anadolu bölgesinde bulunmaktadır. Doğu Anadolu’dan sonra en fazla mera alanı Orta Anadolu bölgesinde bulunmasına karşılık, çayır alanı açısından ikinci sırayı Karadeniz bölgesi almaktadır. En az mera ve çayır alanı ise Ege bölgesinde bulunmaktadır.

Hayvanlar için en ucuz kaba yem kaynağı olan meraların hayvansal ürün üretim potansiyelleri bu doğal kaynakların ürettiği kaba yemin miktar ve kalitesiyle ilgilidir. Bir meranın ürettiği yemin miktar ve kalitesi söz konusu meranın sağlık durumunu da ifade eden mera durumu ile yakından ilişkilidir. Çok iyiden zayıfa kadar sınıflandırılan merada, mera durumu kötüleştikçe, söz konusu meranın ürettiği yemin kantite ve kalitesinde de azalma görülür.

YÜRÜTÜLEN MERA ISLAHI VE AMENAJMAN PROJELERİ

Türkiye’de 1998-2020 yılları arasında Tarım ve Orman Bakanlığı taşra teşkilatlarının Üniversite ve Tarımsal Araştırma Enstitüleri işbirliği ile yürüttükleri Mera Islah Ve Amenajman Projelerinin bölgelere göre dağılımı Çizelge 2’de görülmektedir.

Çizelge 2. Türkiye’de Yürütülen Mera Islah Projeleri (1998-2020)

Bölge	Proje Sayısı (adet)	Proje Alanı (da)
Karadeniz	454	2.786.696
Marmara	277	597.164
Akdeniz	177	766.162
Ege	207	437.541
Güneydoğu Anadolu	155	665.465
İç Anadolu	357	3.731.948
Doğu Anadolu	289	3.645.616
Toplam	1.916	12.630.592

BÜGEM, 2021

Çizelge 2’de verilen 22 yılda ıslah edilen mera alanı dikkate alındığında ülkemizdeki meraların mevcut uygulamalarla ve mevcut uygulama hızıyla ancak 227 yılda ıslah edebileceği ortaya çıkmaktadır.

Halen sürdürülmekte olan mera ıslah çalışmalarında ortaya çıkan en önemli sorun ise uygulanan amenajman ve ıslah projelerinin sürdürülebilir olmamasıdır. Yüzyıllardır hiçbir sınırlama olmaksızın her türlü teknikten uzak bir şekilde yararlanmaların ortaklaşa olarak kullandığı meraların ıslahı ile ilgili en önemli problemi mera üzerinde mera idaresi kurallarına uygun bir otlatma yapılmasının sağlanamaması oluşturmaktadır. Türkiye’deki meraların bugün içinde buldukları kötü durumun en önemli nedeni de yüzyıllardır uygulanmakta olan mera idaresi kurallarına uygun olmayan otlatmadır. Bu nedenle, meralarda sürdürülebilir ıslah yapabilmek için öncelikle meraların, mera idaresi kurallarına uygun otlatma yapılmasının sağlanması gerekmektedir. Nitekim, 3 farklı bölgede bulunan 11 ilde yürütülmüş toplam 173 mera ıslah ve amenajman projesinin sürdürülebilirliği konusunda yapılan bir araştırmada; araştırma alanında yapılan mera ıslah çalışmalarında istenen başarının sağlanamadığı, başarı

sağlanan meralarda sürdürülebilirliğin devam ettirilemediği, mera ıslah çalışmalarının benimsenmediği, ıslah çalışmalarına çiftçi katılımının yeterli olmadığı ve mevcut mera ıslah çalışmaları ile sürdürülebilir mera kullanımının olamayacağı sonucuna varılmıştır (Cevher ve ark., 2015).

TÜRKİYE’DE YÜRÜTÜLMEKTE OLAN MERA ISLAHI VE AMENAJMAN PROJELERİ İLE İLGİLİ SORUNLAR VE ÖNERİLER

1998 yılından beri sürdürülmekte olan mera Amenajman ve Islah projelerinde karşılaşılan sorunlar ve bu sorunların çözümüne yönelik öneriler aşağıdaki gibi sıralanabilir

- 1) Türkiye’de meralarla ilgili en önemli problem otlatmanın düzenlenmesidir.
- 2) Otlatmanın düzenlenemediği meralarda mera ıslahına başlanılmamalıdır.
- 3) Mera ıslahında meradan yararlananların işbirliği mutlaka sağlanmalıdır.
- 4) Mera ıslahı mutlaka konu uzmanı kişilerce planlanmalıdır. Bakanlığın taşra teşkilatlarında mera Islahı konusunda yeterli uzman bulunmamaktadır.
- 5) İhtiyaç fazlası meralar özel sektöre kiralanmalıdır
- 6) Meradan yararlananların işbirliğinin sağlanamadığı ve köy yerleşim yerine çok yakın olmayan meralar özel sektöre kiraya verilmelidir.
- 7) Mera olarak tahsis edilmekle beraber mera niteliği taşımayan, tamamen taş ve kayalardan oluşan mera arazilerinde tahsis değişikliği yapılarak hazineye devredilmelidir.

SONUÇ

Kaba yem açığının kapatılabilmesi için mera alanlarının ıslahı ve yem bitkisi üretim alanlarının artırılması gerekmektedir. Mera alanlarının ıslahı mevcut bütçe imkanları ile çok uzun yıllar alacaktır. Diğer taraftan Mera kanunu kapsamında Bakanlık taşra teşkilatı üniversite ve araştırma enstitüleri işbirliğinde yürütülen Mera Islahı ve Amenajman projelerinde 22 yıllık süreçte ıslah edilen alan miktarı oldukça sınırlıdır. Diğer taraftan ıslah edilen mera alanlarında sürdürülebilirlikte başarı oldukça düşüktür. Bundan dolayı mera ıslahında sürdürülebilirliğin sağlanması, bu alanlardan kısa zaman içerisinde yüksek ot verimi ve ot kalitesi elde edebilmek için yeni bir yaklaşıma ihtiyaç vardır. Bu çalışmada mera ıslahında mera alanlarının kiralanmasına yönelik öneriler yapılmıştır. Buna göre 1000 da kıraç, 500 da taban meradan daha büyük alanların özel sektöre kiralanarak “ıslah et-işlet” sistemiyle ıslah etmesi, kullanması ve ıslah ettiği alanın ¼’ünü meranın tahsisli bulunduğu köylülere kullandırılması ön görülmüştür. 1000 da kıraç, 500 da taban meralardan daha küçük alana sahip mera alanlarının ise tahsisli buldukları yerleşim yerindeki Mera Yönetim Birliklerine kiralanarak ıslahı ve sürdürülebilirliğinin sağlanması önerilmiştir. Mera Yönetim Birliklerinin ıslah amaçlı kiralamaı kabul etmediği meraların büyüklüğüne bakılmaksızın özel sektöre kiralanması önerilmiştir.

KAYNAKLAR

BÜGEM, 2020. Tarım Orman Bakanlığı, Bitkisel Üretim Genel Müdürlüğü, Bitkisel Üretim verileri. www.tarim.gov.tr/BUGEM

BÜGEM, 2021. Tarım Orman Bakanlığı, Bitkisel Üretim Genel Müdürlüğü, <https://www.tarimorman.gov.tr/Konular/Bitkisel-Uretim/Cayir-Mera-ve-Yem-Bitkileri> (11.05.2021)



Cevher C, Altunkaynak B, Ataseven Y, Köksal Ö, Yavuz GG, Gül U, ve Ataseven ZY. 2015. Türkiye’de ıslah edilmiş meraların sürdürülebilirliği üzerine bir araştırma: Edirne, Afyonkarahisar, Aksaray, Niğde ve Uşak, Ardahan, Artvin, Çorum, Erzurum ve Kars illeri örneği. Tarımsal Ekonomi ve Politika Geliştirme Enstitüsü, Yayın no: 252

FAO, 2016. Food Balance Sheets. [www. faostat.fao.org](http://www.faostat.fao.org)

Özkurt M, Çınar S. 2020. Türkiye, Doğu Anadolu bölgesi ve muş ilinde çayır mera yem bitkileri ve hayvancılığın bugünkü durumu Turjaf, 8(10): 2191-2201, 2020 DOI: <https://doi.org/10.24925/turjaf.v8i10.2191-2201.3656>

KIRGIZİSTAN ÇÜY BÖLGESİNDEKİ BAZI MERALARIN VEJETASYON YAPISI ÜZERİNE BİR ARAŞTIRMA

DETERMINATION OF BOTANICAL COMPOSITION, HAY YIELD AND FORAGE QUALITY OF SOME NATURAL RANGELANDS IN KYRGYZSTAN'S CHUY REGION

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ÖZET

Bu araştırma, Kırgızistan'ın Çüy Bölgesinde farklı rakımlarda (810-2680 m.) bulunan 6 farklı doğal merada, vejetasyon yapısının belirlenmesi amacıyla 2018-2019 yıllarında yürütülmüştür. Araştırmada, her merada toplam 12 lup hattındaki 1200 noktada ölçüm yapılarak meralardaki bitkilerin tür, cins ve familyaları, olatmaya karşı tepkileri (azalıcı, çoğalıcı, İstilacı), ömür uzunlukları belirlenmiştir. Yapılan vejetasyon etütlerinde, meralarda ortalama familya cins ve tür sayısının sırasıyla 11.3, 22.0, 23.7, kaplama oranının % 97.1, botanik kompozisyon oranının buğdaygil, baklagil ve diğer familya bitkilerinde sırasıyla % 36.4, % 15.8 ve % 47.8, tek yıllık ve çok yıllık bitkilerin botanik kompozisyondaki oranlarının sırasıyla % 4.2, % 95.2, azalıcı, çoğalıcı ve istilacı türlerin oranlarının sırasıyla % 36.2, % 6.8 ve % 57.0, olduğu belirlenmiştir.

Araştırma sonuçlarına göre, incelenen meralarda kaplama alanının yüksek, bitkilerin büyük bir kısmının çok yıllık, istilacı türlerin oranının çoğalıcı ve azalıcılardan yüksek olduğu belirlenmiştir. Bu ve benzer ekolojik koşullardaki meralarda, olatmanın düzenlenmesi, toprak ve topoğrafik koşullarına bağlı olarak üstten tohumlama veya doğal tohumlama yöntemlerinin tek başlarına veya diğer ıslah yöntemleri ile kombine edilerek ıslah edilebilme imkanlarının araştırılması ve uygulanması gerekmektedir.

Anahtar Kelimeler: Kırgızistan, Mera, vejetasyon,

ABSTRACT

This research was carried out in 2018-2019 years in order to determine the hay yields, forage qualities, botanical compositions and range conditions of 6 different natural rangelands located in different altitudes (810-2680 m.) in Chuy Region, Kyrgyzstan. In the research, plant species in rangelands were determined at 1200 points in 12 loop lines in each rangeland.

In this research, species, genus and families of plants in rangelands, their responses to grazing (decreaser, increaser, invader), plant life span, plant coverage of rangelands, botanical compositions of each area were determined. In the vegetation research, mean numbers of species, genera and families were 23.7, 22 and 11.3, respectively. In the rangelands, the mean of plant coverage was 97.1%, the mean of grasses in the plant covered area was 36.4%, the mean of legumes was 15.8%, and the mean of other family ranged from was 47.8%. In the rangelands, the mean of decreaser species was 36.2%, the mean of increaser species was 6.8% and the mean of invader species was 57.0%.

According to research results, the grazing control in the rangelands analyzed and rangelands with the similar ecological conditions is recommended. Extensive research targeting appropriate range improvement strategies for each individual rangeland with unique soil and

topographic conditions is recommended in order to select among the top seeding, seeding or natural seeding methods alone or combined with other range improvement strategies.

Keywords: Kyrgyzstan, rangeland, vegetation

1. GİRİŞ

Meralar, hayvanların ihtiyaç duyduğu kaba yemin en ucuz sağlandığı kaynakların başında gelmektedir. Meralar, sürdürülebilir hayvansal üretimin temelini oluşturmaları yanında, toprağı yerinde tutarak, yaşanabilir bir çevre oluştururlar.

Mera bitki toplulukları; toprak, topografya ve iklim faktörlerinin etkileri ile uzun bir süreçte meydana gelmektedirler. Bu nedenle her bir meranın bitki örtüsü kendine özgüdür. Bütün bitki toplulukları konumları ne olursa olsun zaman içerisinde çevre koşullarında ortaya çıkan değişikliklere bağlı olarak değişim göstermektedir. Bitki süksesyonu olarak adlandırılan bu süreçte değişim; vejetasyonu oluşturan türlerin sayısında, her bir türün botanik kompozisyon içerisindeki oranında veya bitki örtüsünün toprağı kaplama oranında olabilir. Bu değişimin yönü, daha istenilen veya daha üretken bir yönde olabileceği gibi, istenilmeyen veya daha az üretken bir yöne doğru da olabilir (Blanchet ve ark., 2003). Bitki toplulukları diğer canlı topluluklarında olduğu gibi süreklilik arz eden bir dinamizm içerisindeyler.

Orta Asya ülkelerinden Kırgızistan, Kazakistan, Tacikistan, Türkmenistan ve Özbekistan'da bulunan meralar, dünyanın en geniş göçebe hayvancılığının yapıldığı mera alanlarıdır. Bu 5 Orta Asya ülkesinin toplam yüzölçümünün % 65'ini meralar oluşturmaktadır. Bu meralar düşük gelire sahip göçebe hayvancılık yapan insanlar için en önemli yem kaynağıdır (Blench ve Sommer, 1999).

Kırgızistan dağlık bir ülke olup, insanlar geçimini daha ziyade tarım ve hayvancılıktan karşılamaktadırlar. Toplam tarımsal alanların % 86'sı dağlık meralardan oluşmakta ve hayvancılık meraya dayalı olarak yapılmaktadır. Kırgızistan meralarının 6.8 mil. ha'nının bozulma sürecinde olduğu, yine mera varlığının 3.0 mil. ha'nın yabancı ot işgali altında ve 1.7 mil. ha'nın ise aşırı otlatmadan dolayı bozulduğu bildirilmiştir (Nishanov, 2015).

Son 25 yılda Kırgızistan meralarında aşırı otlatmadan dolayı büyük bozulmalar meydana geldiği, ancak bu konuda yapılan araştırmaların yeterli olmadığı, sürdürülebilir bir meracılık için meralarda bulunan türlerin belirlenmesi ve buna göre ıslah çalışmalarının yapılması gerektiği (Eddy, 2016) belirtilmiştir.

Liu ve Watanabe (2016), Kırgızistan'da farklı tip meralarda vejetasyon değişimini 1990-2013 yılları arasında incelemişler ve 23 yıllık süreçte meralarda vejetasyonun aşırı otlatmadan dolayı % 29.5- 53.8 oranında değiştiğini, aşırı otlatmanın mera kalitesinde bozulmaya neden olduğunu belirtmişlerdir.

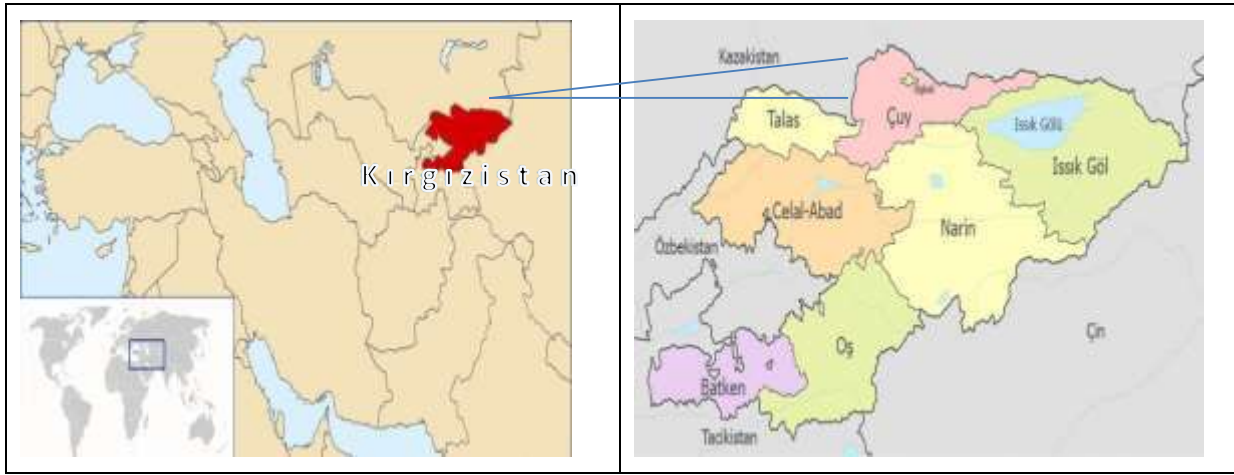
Kırgızistan topraklarının 9.3 mil. ha'nını oluşturan çayır meralar, uygun olmayan kullanım sonucu bitki örtüsü ve verim potansiyeli ile ot kalitesi düşmüştür. Bu durum ülke hayvancılığı ve ekonomisini olumsuz etkilediği gibi, toprak ve su kaynaklarının da tahrip olmasına yol açmaktadır (Mirzabayev ve ark., 2016). Bu sorunların çözülebilmesi için ot verimi ve kalitesi düşmüş olan meraların ıslah edilerek yeniden yüksek verime sahip kaliteli yem üretir duruma getirilmeleri gerekir. Ancak, mera ıslahında başarılı olabilmek için, öncelikle ıslah edilecek meranın vejetasyon yapısının iyi bilinmesi önemlidir. Türkiye'nin farklı bölgelerinde yapılan mera araştırmalarında, buldukları bölgelere göre değişmek üzere meralarda bitki ile kaplı alanı Çınar (2001) % 78.5, Uslu (2005) % 82.0, Şen (2010) % 71.9 - % 95.0, İnal ve ark. (2011) % 68.9-95.9, Çınar ve ark. (2014) % 84.4-99.0, İspirli ve ark. (2016) % 83.3, Uzun ve ark. (2016) % 93.6 arasında değiştiğini, meraların verimlerini oluşturan bitkilerin

çoğunluğunu hayvanların yararlanamadığı, dikenli türler ve yabancı otların oluşturduğunu bildirmişlerdir (Çınar ve ark., 2015).

Bu araştırma Kırgızistan'ın mera varlığının 1/10'unun yer aldığı Çüy bölgesindeki farklı rakıma sahip 6 doğal merada, meraların vejetasyon özelliklerinin, ot verimi ve ot kalitesinin belirlenerek, meraların ıslahında temel teşkil edebilecek bilgilerin elde edilmesi amacıyla 2017, 2018 yıllarında yürütülmüştür.

2. MATERYAL VE YÖNTEM

Araştırmada vejetasyon etüdüleri, Kırgızistan Çüy Bölgesinde (Şekil 1.) farklı rakımlarda bulunan Tokbay (810 m), Kaşkasu (1540 m.), Ala-arça (1750 m.), Tamır (1910 m), Çunkurçak (2210 m.) ve Suusamır (2230-2680 m.) meralarında 1 Haziran 2017- 8 Ağustos 2018 tarihleri arasında yürütülmüştür.



Şekil 1. Proje Çalışma Alanı

Araştırmanın yürütüldüğü mera alanlarına en yakın meteoroloji istasyonu Bişkek'te dir. Bişkek'te uzun yıllar ortalamasına göre toplam yağış 427 mm, ortalama sıcaklık 10.4 °C olup en yüksek sıcaklıklar Temmuz ayında, en düşük sıcaklıklar ise Ocak ayında tespit edilmiştir (Anonim 2019).

Araştırmada vejetasyon ölçümleri nokta quadrat yönteminin değişik bir şekli olan lup yöntemi kullanılmıştır (Anonim, 1962). Lup ölçümleri; her bir merada vejetasyon ve toprak açısından oldukça homojen olan 3 farklı kesimde (blokta) ve her blokta merkez olarak kabul edilen bir noktadan itibaren 4 ana yöneye doğru uzanan 20 m'lik 4 hat boyunca yapılmıştır. Her 20 m'lik hat üzerinde toplam 100 ve her blokta 400 olmak üzere her bir merada toplam 1200 lup ölçümü yapılmıştır. İncelenen meralarla ilgili olarak; bitki ile kaplı alan oranı (%), alana göre botanik kompozisyon oranları (%), Gökkuş ve ark. (2000) tarafından açıklanan yöntemlere göre saptanmıştır.

Bitki türlerinin lezzetlilik ve otlatmaya karşı verdikleri tepkiyi ifade eden azalıcı, çoğalcı ve İstilacı türler Anonim (2008)'e göre belirlenmiştir.

Türlerin ömür uzunlukları, familyaları ve etkilerinin belirlenmesi Anonim (2008) ve Anonim (2015)'e göre yapılmıştır.

Araştırmadan elde edilen verilerden bitki ile kaplı alan, botanik kompozisyon verilerine MSTAT-C istatistik paket programı yardımıyla tesadüf blokları deneme desenine uygun olarak varyans analizi uygulanmıştır (Steel and Torrie, 1960). Bitki ile kaplı alan ve botanik kompozisyon verilerine varyans analizi uygulanmadan önce açı transformasyonu uygulanmıştır (Tekindal, 1998). Çoklu karşılaştırma testlerinde Duncan testi kullanılmıştır (Yurtsever, 1984).

3. BULGULAR VE TARTIŞMA

3.1. Meraların Familya, Cins, Tür Sayıları, Kaplama Oranları

Araştırmada incelenen 6 doğal merada tespit edilen türler, türlerin familya, cins, tür, kaplama oranları Çizelge 1’de görülmektedir.

Çizelge 1. İncelenen Meraların Familya, Cins, Tür Sayıları, Kaplama Oranları

Mera	Familya (Ad.)	Cins (Ad.)	Tür (Ad.)	Kaplama Oranı (%)
Tokbay	10	22	24	97.0
Kaşkasu	9	20	21	96.0
Ala-arça	11	16	18	96.7
Tamır	13	22	23	98.0
Çunkurçak	9	17	19	97.3
Suusamır	16	35	37	97.3
Ortalama	11.3	22	23.7	97.1

Çizelge 1’de görüldüğü üzere; Tokbay merasında 10 familyanın 22 cinsine ait 24 tür, Ala-arça merasında 11 familyanın 16 cinsine ait 18 tür, Kaşkasu merasında 9 familyanın 20 cinsine ait 21 tür, Tamır merasında ise 13 familyanın 22 cinsine ait 23 tür, Çunkurçak merasında 9 familyanın 17 cinsine ait 19 tür, Suusamır merasında 16 familyanın 35 cinsine ait 37 tür, 6 merada ortalama 11.3 familyanın, 22 cinsine ait 23.7 tür tesbit edilmiştir (Çizelge 2). En yüksek ve en düşük tür sayısı sırasıyla Tokbay ve Ala-arça meralarında tespit edilmiştir. İncelenen meralarda bitki ile kaplama oranları % 96.0 ile % 98.0 arasında değişmiş ve bu değişim istatistiki olarak bir fark yaratmamıştır.

3.3. Botanik Kompozisyon Oranları

İncelenen meralarda tespit edilen familyaların bitki ile kaplı alandaki oranları Çizelge 2’de görülmektedir.

Çizelge 2. Meraların Bitki İle Kaplı Alanda Familyaların Oranları

Mera	Bitki ile Kaplı Alanda		
	Buğdaygıl (%)	Baklagil (%)	Diğer Familya Bitkileri (%)
Tokbay	41.2 b*	22.0 a	36.8 c
Kaşkasu	30.5 c	24.0 a	45.5 b
Ala-arça	24.5 d	11.7 c	63.8 a
Tamır	33.3 c	4.7 d	62.0 a
Çunkurçak	48.1 a	15.7 b	36.2 c
Suusamır	40.8 b	16.6 b	42.6 b
Ortalama	36.4	15.8	47.8

*) Aynı sütun içerisinde benzer harf ile gösterilen ortalamalar Duncan testine göre $P \leq 0.05$ hata sınırları içerisinde birbirinden istatistiksel olarak farksızdır.

İncelenen meralarda bitki ile kaplı alanda buğdaygiller oranı % 24.5 ile % 48.1 arasında değişmiş ve bu değişim istatistiki olarak önemli bulunmuştur. Buğdaygillerin en yüksek

oranda olduğu (% 48.1) meranın Çunkurçak, en düşük olduğu (% 24.5) meranın ise Ala-arça olduğu belirlenmiştir. Baklagillerin oranı % 4.7-24.0 arasında değişmiş ve bu değişimin istatistiki olarak önemli olduğu saptanmıştır. Baklagillerin en yüksek olduğu mera (% 24.0) Kaşkasu, en düşük olduğu mera (% 4.7) ise Tamır merası olarak belirlenmiştir. Bitki ile kaplı alanda diğer familya türlerinin oranı % 36.2-63.8 arasında değişmiş ve bu değişimin istatistiki olarak önemli olduğu belirlenmiştir. Diğer familya bitkilerinin en yüksek olduğu meranın ise (% 63.8) Ala-arça merası olduğu tespit edilmiştir.

Doğal meralarda yapılan benzer çalışmalarda bitki ile kaplı alanda buğdaygillerin oranını, Erkun (1972) % 56.0, Gökkuş (1984) % 57.0 Çınar ve ark. (2014) % 54.0, Çınar ve ark. (2019) % 54.0, Seydoşoglu ve ark. (2019) % 25.4 olarak bildirmişlerdir. Bu çalışmada saptanan buğdaygil oranı yukarıda belirtilen araştırmalardan Seydosoglu ve ark. (2019) dışındaki diğer çalışmalarda belirtilen değerlerden daha düşüktür. Bunun nedeni araştırmaların yapıldığı mera alanlarının buldukları ekolojik koşulların ve maruz kaldıkları otlama baskılarının farklı olması olabilir.

Meralarda yürütülen çeşitli araştırmalarda botanik kompozisyonda baklagillerin oranını, Erkun (1972) % 8.0, Gökkuş (1984) % 7.8, Uslu (2005) % 17.8, Şen (2010) % 15.0, Çınar ve ark. (2014) % 15.5, Çınar ve ark. (2019) % 22.0, Seydoşoglu ve ark. (2019) % 36.8 olarak bildirmişlerdir. Bu çalışmada baklagil oranı Şen (2010), Çınar ve ark. (2014), Çınar ve ark. (2019) ile uyumlu diğer bulgular ile uyumlu değildir. Farklılığın nedeni meralar arasındaki iklim, toprak, yağış ve otlama baskısı gösterilebilir.

Araştırmada incelenen meralarda botanik kompozisyonda diğer familya bitkilerinin oranı ortalaması, Erkun (1972) ve Şen (2010)'in bulguları ile uyumlu, Çınar (2001), Uslu (2005) ve Çınar ve ark. (2014)'nin belirttiği değerlerden daha yüksektir. Bunun nedeninin meralar arasındaki ekolojik koşullar ve otlama baskısı farklılığı olduğu söylenebilir.

3.4. Türlerin Ömür Uzunlukları

İncelenen meralarda yer alan bitkilerin ömür uzunluklarına göre tür sayısı ve oranları Çizelge 3'de görülmektedir.

Çizelge 3. Meralardaki Türlerin Ömür Uzunluklarına Göre Sayı Ve Oranları (%)

Mera	Tek Yıllık		Çok Yıllık	
	Tür (Ad.)	Botanik Kompozisyondaki Oranı (%)	Tür (Ad.)	Botanik Kompozisyondaki Oranı (%)
Tokbay	9	49.4	15	50.6
Kaşkasu	1	0.3	20	99.7
Ala-arça	2	12.7	16	87.3
Tamır	2	2.3	21	97.7
Çunkurçak	-	-	19	100.0
Suusamır	6	4.2	31	95.8

Tokbay merası dışındaki meralarda bulunan türlerin büyük bir kısmının çok yıllık (% 87.3-100.0) olduğu, Tokbay merasındaki tek yıllık türlerin sayısının ve botanik kompozisyondaki oranlarının sırasıyla 9 ve % 49.4 olduğu belirlenmiştir (Çizelge 4). Tokbay merası yerleşim yerinin hemen yanında yer almakta iken Tokbay dışındaki meraların yerleşim yerine uzaklığı 3-10 km arasında değişmektedir. Tokbay merasındaki tek yıllık tür sayısının çokluğu ve oranının yüksek oluşu yerleşim yerine yakın mesafede bulunmasından dolayı ağır ve kontrolsüz otlama olarak açıklanabilir.

3.5. Türlerin Otlatmaya Tepkisi

Merada otlanılan türler, otlatmaya karşı gösterdikleri tepkiye göre azalıcı, çoğalıcı ve istilacı olmak üzere sınıflandırılırlar (Altın ve ark. 2011). Türlerin otlatmaya karşı gösterdikleri tepkiye göre azalıcı, çoğalıcı ve istilacı türlerin oranları Çizelge 4’de görülmektedir.

Çizelge 4. Meralarda Türlerin Etki Derecelerine Göre BKO (%)

Mera	Azalıcı	Çoğalıcı	İstilacı
Tokbay	29.4	1.0	69.6
Kaşkasu	40.5	15.7	44.8
Ala-arça	32.7	2.2	65.1
Tamır	32.1	6.1	61.8
Çunkurçak	37.0	13.5	49.5
Suusamır	45.6	2.5	51.9
Ortalama	36.2	6.8	57.0

İncelenen meralarda otlatmaya karşı en hassas olan ve kaliteli türlerden oluşan azalıcı türlerin oranları % 29.4-45.6, azalıcı türlerden kalite olarak daha düşük olan çoğalıcı türlerin oranı % 1.0-15.7, azalıcı ve çoğalıcı türlerin ortamdaki çekilmesiyle ortaya çıkan, İstilacı türlerin oranı ise % 44.8-69.6 arasında değişmiştir (Çizelge 5). İncelenen altı meranın ortalaması olarak, azalıcı türlerin oranı % 36.2, çoğalıcı türlerin oranı % 6.8, İstilacı türlerin oranı ise % 57.0 olarak hesaplanmıştır. Bitki ile kaplı alanda İstilacı türlerin oranının yüksekliği meraların uzun yıllar erken, ağır ve otlatma kapasitesinin üzerinde otlatıldığını, meraların otlatma tekniğine uygun kullanılmadığını göstermektedir (Altın ve ark., 2011).

Araştırmada saptanan azalıcı ve çoğalıcı türlerin ortalama kaplama oranları, Çınar ve ark. (2014)’nın Hatay Kırıkhan meralarında Çınar ve ark. (2019)’nın Adana’nın yüksek kesimlerinde yapmış olduğu araştırmalardan elde edilen değerlerden yüksek, Gür ve Altın (2015)’in Tekirdağ’da, Seydoşoğlu ve ark. (2019) nin Batman’da yapmış oldukları araştırmalarda saptadıkları değerlerden daha düşüktür. İstilacı türlerin oranları ise Seydoşoğlu ve ark. (2019)’nin bildirdiği oranlardan düşük, Çınar ve ark. (2019), Gür ve Altın (2015)’in bildirdiği oranlardan daha yüksektir. Bu farklılığın ekoloji koşulları ve otlatma baskısı farklılığından kaynaklandığı söylenebilir.

İstilacı türlerin oranlarının fazlalığı meraların tekniğine uygun kullanılmadığının göstergesidir (Holeček ve ark., 2004). Azalıcı türler hayvanların birinci derecede tercih ettikleri en lezzetli türlerdir. Meralarda erken ve ağır otlatma sonucunda öncelikle azalıcı türler ortamdaki uzaklaşır, otlatma baskısı devam ederse çoğalıcı türler de ortamdaki uzaklaşır ve İstilacı türler mera alanını işgal ederler (Gökkuş, 1991; Altın ve ark., 2011). Hayvan besleme açısından düşük kaliteli tek yıllık buğdaygil ve baklagiller, İstilacı tür olarak sınıflandırılmaktadır (Gökkuş, 1991). İncelenen mera alanlarında bitki ile kaplı alanın ortalama % 58.1’i İstilacı türlerden oluşmaktadır. Bu da erken ve ağır otlatmanın bir göstergesidir (Çınar ve ark. 2019).

4. SONUÇ VE ÖNERİLER

Kırgızistan Çüy Bölgesinde rakımı 810-2680 m arasında değişen 6 farklı doğal merada yapılan vejetasyon etütlerine göre; meralarda ortalama familya cins ve tür sayısının sırasıyla 11.3, 22.0, 23.7, kaplama oranının % 97.1, botanik kompozisyon oranının buğdaygil, baklagil ve diğer familya bitkilerinde sırasıyla % 36.4, % 15.8 ve % 47.8, tek yıllık ve çok yıllık bitkilerin botanik kompozisyondaki oranlarının sırasıyla % 4.2, % 95.2, azalıcı, çoğalıcı ve istilacı türlerin oranlarının sırasıyla % 36.2, % 6.8 ve % 57.0, olduğu belirlenmiştir.

Araştırma yapılan meralarda kaplama oranının, yüksel olduğu, ancak erken, ağır otlatılmadan dolayı istilacı türlerin oranının yüksek olduğu belirlenmiştir.

İncelenen meralarda ve benzer meraların iklim, toprak ve topoğrafik koşulları dikkate alınarak otlatmanın düzenlenmesinin yanısıra istilacı türler ile mücadele edilmesi, üstten tohumlama, yeniden ekim veya doğal tohumlama yöntemleri ile diğer bazı ıslah yöntemlerinin birlikte kullanılarak meraların ıslah edilmesi gerekir.

KAYNAKLAR

- Altın M, Gökkuş A, Koç A 2011. Çayır Mera Yönetimi 2.cilt. Tarım ve Köyişleri Bakanlığı TÜGEM Yayınları Ankara
- Anonim 2008. Türkiye'nin Çayır ve Mera Bitkileri. Tarım ve Köyişleri Bakanlığı Tarımsal Üretim ve Geliştirme Genel Müdürlüğü. Çayır, Mera, Yem Bitkileri ve Havza Geliştirme Daire Başkanlığı. Ankara
- Anonim 2015. Kırgızistan Mera Bitkileri Kataloğu, Flermoneca
- Anonim 2019. <https://tr.climate-data.org/asya/k%C4%B1rg%C4%B1zistan/chui-province/biskek-484/#climate-graph> (02.05.2019)
- Blanchet K, Moechnig H, DeJong-Hughes J 2003. Grazing systems planning guide. University of Minnesota Extension Service, BU-07606-S, <http://www.extension.umn.edu/agriculture/beef/components/docs/grazingsystemsplaning.guide.pdf> (Erişim tarihi: 01.11.2018).
- Blench R, Sommer F 1999. Understanding Rangeland Biodiversity, In: Working Paper 121. Overseas Development Institute. London: Chameleon Press, 51
- Çınar S 2001. Adana İli Tufanbeyli İlçesi Hanyeri Köyü Merasında Verim ve Botanik Kompozisyonun Saptanması Üzerine Bir Araştırma, Ç.Ü. Fen Bilimleri Enstitüsü, Tarla Bitkileri Ana Bilim Dalı Yüksek Lisans Tezi, 70 s. Adana
- Çınar S, Hatipoğlu R, Avcı M, Yucel C, İnal İ, Avağ A 2014. Hatay İli Kırıkhan İlçesi Taban Meralarının Vejetasyon Yapısı Üzerine Bir Araştırma. Gaziosmanpaşa Üniv. Ziraat Fakültesi Dergisi JAFAG, 31(2): 52-60
- Çınar S, Hatipoğlu R, Avcı M 2015. Bazı Yabancı Ot Mücadele Yöntemlerinin Akdeniz Bölgesi Meralarında Ot Verimi Botanik Kompozisyon Ve Ot Kalitesi Üzerine Etkisi. Tarım Bilimleri Dergisi, 21 (1), 39-49
- Çınar S, Hatipoğlu R, Avcı M, Yucel C, İnal İ, 2019. Adana İli Tufanbeyli İlçesi Meralarının Vejetasyon Yapısı Üzerine Bir Araştırma. KSU J.Agric Nat 22 (1): 143-152
- Edgecombe W 1964. Weeds of Lebanon. Faculty of Agriculture Sciences, American University of Beirut, Lebanon, Publication No:24.
- Eddy I 2016. Land degradation in Central Asia, The Faculty of Graduate and Postdoctoral Studies Master of Science, The University of British Columbia
- Erkun V 1972. Bala İlçesi Mer'aları Üzerinde Araştırmalar. Tarım Bakanlığı Hayvancılığı Geliştirme Gn. Müd. Yayınları Ankara



- Gökkuş A 1984. Değişik Islah Yöntemleri Uygulanan Erzurum Tabii Meralarının Kuru Ot ve Ham Protein Verimleri ile Botanik Kompozisyonları Üzerinde Araştırmalar. A.Ü Fen Bilimleri Enstitüsü, Tarla Bitkileri Ana Bilim Dalı, 145 sayfa, Erzurum.
- Gökkuş A 1991. Doğu ve Güney Doğu Anadolu Bölgeleri Çayır Mera ve Yem Bitkileri ve Hayvancılığı Geliştirme Projesi Eğitim Semineri. 20-22 Şubat 1991, Erzurum.
- Gökkuş A, Koç A ve Çomaklı B 2000. Çayır-Mera Uygulama Kılavuzu. Geliştirilmiş 3. Baskı. A.Ü. Ziraat Fakültesi Yayınları, Yayın No:142, Ankara
- Gür M, Altın M 2015. Trakya yöresinde farklı kullanım geçmişine sahip meraların florastik kompozisyonlarının bazı özellikleri, Anadolu Tarım Bilimleri Dergisi, 30: 60-67
- Holecek JL, Pieper RD, Herbel CH. 2004. Range management: Principles and practices. Prentice Hall, New Jersey 607 p.
- İnal İ, Avcı M, Çınar S, Yücel C, Hatipoğlu R 2011. Çukurova Bölgesi Sahil Meralarının Vejetasyon Yapısı Üzerine Bir Araştırma. IX. Tarla Bitkileri Kongresi Sunulu Bildiri, 3. Cilt. s. 1664-1667. 12-15 Eylül Bursa.
- İspirli K, Alay F, Uzun F, Çankaya N 2016. Doğal meralardaki vejetasyon örtüsü ve yapısı üzerine otlatma ve topoğrafyanın etkisi. Türkiye Tarımsal Araştırmalar Dergisi, 3(1): 14-22.
- Mirzabaev A, Ahmed M, Werner J, Pender J, Louhaichi M 2016. Rangelands of Central Asia: Challenges and Opportunies. J.Arid Land 8 (1): 93-108
- Nishanov N 2015. Sustianable livestock management under changing climate in Cenral Asia https://www.iamo.de/fileadmin/user_upload/Bilder_und_Dokumente/06-veranstaltungen/recca/C1_2_Nariman_Nishanov.pdf (16.01.2018)
- Seydoşoğlu S, Cacan E, Sevilmiş U 2019. Determination of Botanical composition, yield and pasture quality ratings of intertile pastures in Kozluk district of Batman province of Turkey. Fresenius Environmental Bulletin 28 (4A) 3388-3394
- Steel RGD ve Torrie JH 1960. Principles and Procedures of Statistics With Special Reference to the Biological Sciences. Mc Graw-Hill Book Co., Inc., London.
- Şen Ç 2010. Kilis İli Bazı Köylerindeki Meralarda Vejetasyon Yapısı Üzerine Bir Araştırma. Ç.Ü. Fen Bilimleri Enstitüsü, Tarla Bitkileri Ana Bilim Dalı Yüksek Lisans Tezi, 96 s.
- Tekindal B 1998. Varyans Analizinin Önşartları Ve Transformasyonlar, A.Ü Ziraat Fak. Fen Bilimleri Enstitüsü, Zootekni Ana Bilim Dalı Doktora tezi, 70 s.
- Uslu ÖS 2005. Kahramanmaraş İli Türkoğlu İlçesi Araplar Köyü Yeniyanan Merasında Botanik Kompozisyonun Tespiti ve Farklı Gübre Uygulamalarının Meranın Verim ve Botanik Kompozisyonuna Etkileri Üzerinde Araştırmalar, Ç.Ü. Fen Bilimleri Enstitüsü Tarla Bitkileri Ana Bilim Dalı Doktora Tezi, 162 sayfa, Adana
- Uzun F, Alay F, İspirli K 2016. Bartın ili meralarının bazı özellikleri. Türkiye Tarımsal Araştırmalar Dergisi, 3(2): 174-183.
- Yurtsever N 1984. Deneysel İstatistik Metotları. Köy Hizmetleri Genel Müdürlüğü Yayınları, Genel Yayın No: 121, Ankara

BİLİŞİM ÇAĞINDA FELSEFE VE ETİĞİ YENİDEN DÜŞÜNMENİN GEREKLİLİĞİ THE NEED TO RETHINK PHILOSOPHY AND ETHICS IN THE INFORMATION AGE

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ÖZET

Her çağda insanlık, içinde bulunduğu varlık dünyasını kendi zamanının ve kadim olanın kendisine getirdikleri ışığında tanımak ve anlamak; dahası ihtiyaçlarını gidermek amacıyla daha iyi ve gelişmiş bir yaşamın imkânı için tahlillerde bulunmuştur. Bunun için tespitler yapmış, bu terkip ve uygulamalar doğrultusunda ise nitelikli edinimlere yönelmek adına ‘bilme’nin ve ‘bilgi’nin peşine düşmüştür. Bu durum genellikle çağın teknik ve felsefi imkanları doğrultusunda şekillenmiş ve gerçekleşmiştir. Bilgiye nitelikli bir şekilde ulaşarak onu bir bilim ve disiplin haline getiren insanoğlu, ya içinde yaşadığı çağı kendi değerleri doğrultusunda yorumlayarak gelişmiş; ya da sadece kendi çıkarları için var olana maruz kalarak salt ontolojik statülerini koruma yolunu seçmişlerdir.

M.Ö. yüzyıllarda Tekhnê, M.S. yüzyıllarda ise otomat/mekaniğin şekillendirdiği fiziki dünyada varlığını devam ettiren insanlık, araç ve keşiflerin ışığında sahip olduğu değerleri yeniden tahlil etmiş ve içinde bulunduğu fiziksel varlık alanını ona mündemiç değerleri yeni durumuna uyum sağlama ve ilerleme adına yeniden düşünme durumunda kalmıştır. Nihayetinde Endüstrileşme sonrasında otomasyonun insan yaşamına getirdiği farklılıklar; bireysel, toplumsal yaşamımızı etkilemiş ve günlük alışkanlıkları değiştirmeye hatta yeni alışkanlıklar edinmeye zorladığından düşünce, değer dünyamızı da etkilemiştir.

1940 ve sonrasında yaşanan siberetik bilim ve teknoloji alanında yaşanan gelişmeler sonucunda Bilişimin/malumat/information hesaplamalı makinalar bilgisayarlar aracılığı ile işlenmesi bu sayede makine ve insanlarda dahil olmak üzere canlılarda otomatik kontrol ve iletişim sistemini mümkün kılan bilişim teknoloji meydana getirdiği etki ile çağımıza adını vermenin yanı sıra felsefi ve etik tartışmalara zemin hazırlamıştır.

Malumatın/information'ın bilişim teknolojileri aracılığı ile işlenerek (girdi-işlem-çıkıtı) tasarlanması, simule edilmesi veyahut yeniden üretilebilmesi; dahası bu verilerin hayvanlarda dahil olmak üzere canlı-cansız, cansız-cansız, canlı-canlı sistemler arasında eşzamanlı ve karşılıklı iletilebilmesine ve kontrol edilmesine imkân sağlaması bu çağın “ bilişim çağı “ olarak adlandırılmasına neden olmuştur. Bilişim dünyasına ait gelişmeler ve ürettiği yeni terminoloji ekonomik ve sosyal yaşama olduğu kadar düşünce dünyasında da etkisi gösterdiğinden “devrim” olarak nitelendirilmiştir. Bilişim devrimi ve devrimin gelişmelerinden nitelikli bir şekilde istifade etmek; sosyal, felsefi, etik mesele ve problemlerini anlamak ve çözüm önerilerinde bulunabilmek için bilişim çağını felsefenin epistemolojik, ontolojik ve aksiyolojik bağlamında yeniden ele almak hemen hemen her gün güncellenen teknolojinin tanımının dahi yenilenmeye ihtiyaç duyduğu bir çağda bir tercih değil adeta bir zorunluluk halini almıştır.

Söz konusu ihtiyacın gerekliliğine dikkatleri çekmek amacıyla bu çalışma, bilişim devrimiyle şekillenen çağımızın felsefi ve etik meselelerinin yeniden düşünülmesi; bu devrimin olumsuz etkilerinin azaltılması yahut giderilmesi adına birey ve tüm insanlığın geleceğinde gelişim ve ilerlemesini etkileyecek olan konu ve kavramların geleneksel felsefe ve etik yöntemlerin yanı sıra bilişim felsefesi ve etiği bağlamında da ele alınarak değerlendirilmesinin gerekliliğine vurgu yapma amacını taşımaktadır.

Anahtar Kelimeler: Bilişim Felsefesi, Bilişim Etiği, Etik, Teknoloji Etiği



ABSTRACT

In every age, humanity made analyzes for the possibility of a better and developed life in order to know and understand moreover to fulfill their needs at the world of existence in the light of what own time and the ancient brought to it. They made determinations for this, and in line with these compositions and practices, they pursued 'knowing' and 'knowledge' in order to tend towards qualified achievements. This situation has generally been shaped and realized in line with the technical and philosophical possibilities of the age. Human beings, who access knowledge in a qualified way and turn it into a science and discipline, have either developed by interpreting the age in which they lived in line with their own values; or they just chose the path of protecting their pure ontological status by being exposed to the existing one for their own benefit or not.

B.C. Centuries Tekhnê, M.S. In the centuries, humanity, which continued its existence in the physical world shaped by automaton / mechanics, re-analyzed the values it had in the light of tools and discoveries, and had to rethink its physical existence area in order to adapt to its new situation and to progress. Ultimately, the differences that automation brought to human life after industrialization; It has affected our individual and social life and has also affected our world of thought and value, as it forces us to change daily habits and even to acquire new habits.

As a result of the developments in the field of cybernetic science and technology experienced in 1940 and after, the processing of information by means of computational machines and computers, and thus, the information technology, which enables automatic control and communication system in living things, including machines and humans, has given its name to our age. It also laid the groundwork for philosophical and ethical debates.

Designing, simulating or reproducing information by processing (input-process-output) through information technologies; moreover, the fact that these data can be transmitted and controlled simultaneously and mutually between living- nonliving, nonliving - nonliving, living-living systems, including animals, has caused this age to be called the "information age". The developments in the world of information and the new terminology it has produced have been described as a "revolution" since it had an impact on the world of thought as well as on the economic and social life. To benefit from the information revolution and its developments in a qualified way; In order to understand social, philosophical, ethical issues and problems and to be able to propose solutions, reconsidering the information age in the epistemological, ontological and axiological context of philosophy has become a necessity, not a choice, in an age where even the definition of technology, which is updated almost every day, needs to be renewed.

In order to draw attention to the necessity of this need, this study aims to rethink the philosophical and ethical issues of our age shaped by the informatics revolution; In order to reduce or eliminate the negative effects of this revolution, it aims to emphasize the necessity of evaluating the subjects and concepts that will affect the development and progress of the individual and the whole humanity in the future, in the context of philosophy of information and ethics, as well as traditional philosophy and ethical methods.

Keywords: Philosophy of Information, Information Ethics, Ethics, Technology Ethics

BİLİŞİM DEVRİMİ ÖNCESİ HAKİKAT ARAYIŞINDAN BİLİŞİM DEVRİMİNE DOĞRU GENEL BAKIŞ

Aristoteles'e göre 'Her insan doğal olarak bilmek ister'¹, bilmenin amacı ise onu anlamak ve nihai iyiye sahip olmak ile ilişkilidir. Bu eylemin konusu numenal ve fenomenal meseleler olabileceği gibi insanın bireyselliğinde ontolojik meseleleri ve toplum içinde yaşaması nedeniyle sosyal konuları da barındırabilmektedir.

Pratik ve teorik akıldan müteşekkil insanın şüphesiz değişik formlarda sayısız ihtiyacı vardır. Aristoteles'e gör bu ihtiyacı doğasına uygun erdemler doğrultusunda karşılamak ve gidermek ise başlı başına erdemler etiğinin bir parçası olarak görülmektedir². İnsan doğasında var olan bilmeye eğilim ve edinim uçsuz bucaksız bir kolektif bilince dayalı ilim, bilim ve düşünce mirasını oluşturmaktadır. Veriden malumata, malumattan bilgiye, bilgiden ise hikmet ve bilgeliğe erişerek ulaştığı noktada beslendiği değerler doğrultusunda kendi medeniyet ve günlük yaşamını keşfetmiş, bu keşif ile birlikte ona fayda ve imkân sunan yahut sunacak olan şeyi inşa ederek bilmeye olan eğilim ve yönelimi ile yaşamını sürdürmüştür. 'Gerçeğe hâkim olma' adına ileri sürülen paradigmlar inşa etmenin/edebilmenin iştahasında mevcut düşünce ve medeniyet anlayışının temellerini oluşturmuşlardır.

Örneğin; Orta çağ öncesinde *arkhe* üzerinden insanı ve evreni tanımaya, anlamaya ve anlamlandırmaya ve kendine bu düzen içinde anlamı bir yer bulmaya çalışan düşünce dünyası, ortaçağ sonrasında kendisini yenileyerek eskisinden daha yeni ve başka bir form anlamına gelen düşüncede dönüşüm ve değişimin peşine düşerek Rönesansı³ yani eskiden kopuşu ve eskiden farklı temellerden beslenerek dünyayı anlamının ötesinde insan müdahalesinin var olanda hakimiyet kurması teşebbüslerinin ilk nüvelerini bu dönemde verdiği görülmektedir. Akılcı düşüncenin etkisinde insanı ve mevcut sistemi anlama, anlamlandırma düşünceleri insanın mekanik bir sonuca varmasına neden olmuş⁴ ve 20. yy sonrasında yaşanan teknik gelişmeler sonrasında keşfedilen mekanik anlayışı ile mücessem bir inşa etme eğiliminde olarak; bilgi artık keşfedilen bir nesne, eşyanın hakikati olmaktan öte tasarlanan, modifiye edilen, formlaştırılan kurucu bir özne-nesne haline gelmiştir. Teknik ve mekanik merkezli ilgi ve çalışmalar bilim dünyasında olduğu gibi düşünce dünyasında da etkisi göstermiş varlığa dair mikro ve makro meseleler, klasik tanım ve kavram bilişim dünyasının gölgesinde tartışılır olmuştur.

SANAYİ DEVRİMİ SONRASI BİLİŞİM DEVRİMİ İLE DİJİTAL DÜNYADA HAKİKAT ARAYIŞINA DOĞRU

Bilişim devrimi Sanayi devriminin mekanik düşünce dünyasının bir ürünü olarak I. ve II. Endüstri devriminden sonraki dönemde ortaya çıkan süreçte teknolojinin bilgiyle tasarlandığı ve aynı zamanda bilginin de teknoloji ile tasarlandığı ve üretildiği dönemi temsil etmektedir.⁵ Diğer bir ifadeyle; Klasik olanın yenrine modernin, bireyselliğin yerine kitleliliğin, manuel

¹ Crane G.R. Perseus Digital Library. Aristotle, Metaphysics, Book 1, section 980a.

<https://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0052%3Abook%3D1%3Asection%3D980a>.

² Reader, S. (2005). Aristotle on Necessities and Needs. Royal Institute of Philosophy Supplement, 57, 113–136. <https://doi.org/10.1017/S1358246105057061>

³ Yaygın kanı olarak Rönesans'ın bir batı düşünce dinamiklerini temsil ettiği söylene de birçok düşünürün göre böylece bir gelişmenin sadece Avrupa'ya hasredilmesi yanlıştır. Rönesans dönemi ressamından Bellini'nin 1504-7 yıllarına ait resimlerinin doğu ve batının karşılıklı etkileşimine örnek gösterildiği görülmektedir.

Bkz. Jerry Brotton. (2006). The Renaissance: A Very Short Introduction. OUP Oxford.s.19-20

⁴ Ross, Jacqueline, Avrupa Düşüncesinin Serüveni, Antik çağlardan günümüze batı düşüncesi çev:Özcan doğan,DoğuBatı yay,2014, 3.baskı, s.153

⁵ Kantar N. (2021) Bilişim Felsefesi Bağlamında Bir Bilişim Etiği Teorisi: Flourishing Ethics / Gelişim Etiği-Doktora Tezi, Ankara Yıldırım Beyazıt Üniversitesi, Felsefe Bölümü s.9

olanın yerine otomatın, doğal olanın yerine sanal olanın gelerek yer değiştirdiği bir endüstri devrimi sonrasında değişim ve dönüşüm sürecinin⁶ ivme kazandığı bir dönemin başlangıcıdır.

Kuşkusuz böyle olmasının nedeni 20.Yy sonu 21. Yy başlarında Norbert Wiener'in Sibernetik bilimi⁷ ve Claude Shannon'un bilişim teorisinden⁸ meydana gelen dijital dünyayı inşa eden bilişim teknolojilerinin önlenemez ilerlemesi ve gelişmesi olmuştur. Dijital dünyanın kitle haberleşme araçları, değerlendirme kriterleri şekil değiştirmiş ve bu değişiklik çok hızlı bir şekilde kalıplaşarak klasik olanın dışında yeni ve daha önce benzeri görülmemiş bireysel ve toplumsal davranışlara dönüşmüştür. Bu değişim ve dönüşüm bilişim devrimini en görülebilir ve değerlendirilebilir sonuçlarını görmemizi mümkün kılmıştır.

Bilişim devrimi ile birlikte analog hesaplara dayalı makinalardan, dijital makinalara geçiş sürecinde bilginin (information) toplanması, işlenmesi, ürüne dönüşerek dünyanın etrafını saran network (sanal ağ) sistemleri ile hızlı bir şekilde dolaşıma çıkması kolay hale gelmiştir. Bu kolaylık Bilişim teknolojilerinin kablo, yonga ve chiplerden oluşan atmosferinde ontolojik, epistemolojik ve aksiyoloji ile şekillenen reel dünyamızda değişim ve dönüşüme neden olan yeni anlamları, kavram ve konuları gündemimize dahil etmiştir.

Bilişim çağında insan çalışma hayatında daha fazla profesyonelleşmesi, dijital dünyada geliştirdiği ulusal-uluslararası ilişkiler neticesinde daha fazla para kazanması bilgi ve becerilerini daha fazla geliştirme imkânı ortalama bir insan ömrü ve finansal şartları göz önüne alındığında hiçbir zaman göremeyeceği yerler ve asla bilgi sahibi olamayacağı şeyler hakkında bilgiye erişim ve daha fazla dünyaya aitlik gibi duygusal tatminlerin yanı sıra teknolojinin sağladığı ekonomik konfor, imkân vb. faydalar nedeniyle yaşamının merkezine yerleştirmeyi zorunlulukla tercih etmek durumunda kalmıştır. Bu faydalar beraberinde pek tabii bir takım psikolojik, sosyolojik, bireysel, ekonomik ve etik problemleri de getirmiştir Söz gelimi Baudrillard düşünürlerin; sanallığın, simülasyonun birey ve toplumda şeyleşme, nesneleşme, yabancılaşma gibi özgürleşme problemlerine neden olduklarından eleştirildiği görülmektedir⁹.

Bilişim dünyasının eski ve yeni arasında bireysel, toplumsal, etik uyumsuzluklar meydana getirdiği için 21. Yy bilişim çağının felsefi problemlerine zemin hazırladığını söylemek mümkündür. Açık bir şekilde görülmektedir ki bilişim teknolojileri iletişim ve etkileşimi hızlandıran ve yaygınlaştıran yazının icadı, matbaanın icadı ve iletişim teknolojilerinin gelişmesinin ötesine geçmiştir. Herhangi bir tekniğin ilerlemesinden çok daha fazla şey olan bilişim dünyası; insanlığı ekonomik, sosyal alanlarda çok büyük ve derin etkisiyle baş etmek durumunda bırakmıştır.

Özellikle, İkinci dünya savaşı sonrasında Shannon'un bilişim teorisi ile teknolojik gelişme önü kesilemez bir hızda ilerlemesi Bilişim devriminin gelişmesi ve ilerlemesine ivme katmış, teknolojinin sosyal ve toplumsal etkileri her geçen dönemde belirgin bir şekilde ortaya çıkmaya başlamıştır. Bu nedenle birçok düşünür ve araştırmacı tarafından bilişimin etik etkileri incelenmeye başlanmıştır. Bilişim ve teknoloji felsefesi bu efektif yapının sadece etik etkilerini araştırmamakta onun felsefi arka planını da sorgulamaktadır. Hem tarihsel boyutu hem de sistematik bir disiplin olarak bilişim felsefesi, eski felsefi sorunlara yeni bir bakış açısı sunarak

⁶ Kesgin A. (2019). Endüstriyel Siyaset ve Ahlak, 1. Baskı. Ankara, Maarif Mektepleri Yay. S:62

⁷ Bynum TW. (2008). Norbert Wiener and the Rise of Information Ethics. In: J. van den Hoven and J. Weckert (eds). Information Technology and Moral Philosophy, 1st ed. New York, Cambridge University Press, 8-25.

⁸ Capurro, R., & Hjorland, B. (2005). The concept of information. Annual Review of Information Science and Technology, 37(1), 343-411 (<https://doi.org/10.1002/aris.1440370109>)

⁹ Veysel, Çetin (2010) Nesneleşme ve Özgürleşme Sorunu Üzerine 2.Baskı, Etik Yayınları, İstanbul

bilim ve beşeri bilimlerde temel bir kategori haline geldiği için bilim ve düşünce dünyasına yeni araştırma alanları da önermektedir.¹⁰

Varlık dünyasını kendi zamanının ve kadim olanın imkân ve şartları içinde değerlendiren insanoğlu için bilişim dünyasının çağımıza getirdiği teknoloji ışığında varlığı ve mahiyetini tanımak ve anlamak daha iyi ve gelişmiş bir yaşamın imkânı için tahlil, tespit ve terkipler oluşturmaya zorladığı görülmektedir. Dijital çağın hakikat arayışı mevcut olanın sorgusundan öte yeniden inşa etme, dizayn, modifiye, tasarım, hesaplama üzerinden ilerlediği görülmektedir.

Günümüzde ontolojik statüsü olanlar dahil hemen hemen her konu, kavramın veri nesnelere olarak düşünüldüğü çağımızda insanın nesne- özne statüsü, insanın özgürlüğü, insanın kendine yabancılaşması gibi meseleler çağın teknik ve düşünce dinamikleri ile bağlantılı olarak tartışılmaya başlanmıştır. İnsanın konfor ve ekonomik faydası adına neredeyse tüm kabulleri ile bağlandığı World Wide Web (www) dünyası etik problemlerine uygun çözüm önerilerinin olması gerektiği düşünülmüştür.¹¹

Bu nedenle hikmet ve bilgelik sevgisi olan felsefe 21. yüzyılda yeni ve farklı bir felsefe geleneğini oluşturmaktadır. Bilişim temelli problemlere bilişim dünyasının ve teknolojinin doğasına uygun olarak etik tekliflerde bulunmak çağın gerekliliği olarak görülmüştür. Bilişim felsefesi ve etiği alanında çalışmalar yapan Bynum, felsefeyi Anka Kuşu'na (phoenix) benzeterek felsefenin düzenli olarak kendini yenilediğini ve Bilişim Devriminin felsefeyi yeni bir yenilenmeye zorladığını ve teşvik ettiğini¹² ifade etmektedir.

Yapay zekâ, yapay bilinç, makine öğrenmesi ve makinaların etik sorumlulukları gibi insana ait terimlerin bilişim dünyasının gelişmeleriyle sıkça kullanılması Klasik felsefe ve etik teorilerin bilişim çağının problemlerine sesiz kaldığı düşünen Bynum bilişim çağında felsefede etik perspektifin genişletilmesini¹³ ifade eder. Bu fikirde olan sadece Bynum değildir, Türk filozoflardan Mübahat Türker Küyel, Bilişim dünyasının temel kavramı olan Bilişim/Information teriminin felsefi zemini üzerinde durularak tahlil edilmesi gerektiğine vurgu yapmaktadır¹⁴. Felsefi düşüncenin medeniyetin bilinci olduğunu ve bu bilincin o medeniyete ait bir kültür oluşturduğu¹⁵ düşüncesinden yola çıkacak olursak; 21 yy medeniyetine ait bilinç ve bu bilincin kodlarını bilişim dünyasının inşa ettiğini rahatlıkla söyleyebiliriz. Bu nedenle bilişim çağında teknik ilerleme kadar felsefi bilgelik ve yüksek düzey ve bilinçte etik donanıma ihtiyacımız olduğu muhakkaktır. Bu nedenle çağımızda yüksek düzeyde gelişmiş bilinç ve insani değerlere yaslanan felsefi ve etik teklifler için yeniden felsefeye ihtiyacımızın olduğu düşünülmektedir.

Her deneyimin ve karşılaşılan her olgunun belirli bir varlık bütünlüğü içinde ortaya çıktığını, insanlığın sahip olduğu şeyleri aklın, bilimin, etik, felsefi, politik yönelimleri içinde şekillendiği düşünülmektedir. İnsan aklın hangi şart ve dönemde olursa olsun daima eksik olanı tamamlama, gelişme, ilerleme hamlesi insanlığın ortak bir tecrübesi olarak bilinmektedir¹⁶. Bu nedenle Bilişim çağının felsefi ve etik problemlerini tespit etme, bu tespitler üzerinde tahlillerde

¹⁰ Adriaans, P. (2019). Information. İçinde E. N. Zalta (Ed.), The Stanford Encyclopedia of Philosophy (Spring 2019). Metaphysics Research Lab, Stanford University. <https://plato.stanford.edu/archives/spr2019/entries/information/>

¹¹ Kantar N, Bynum TW. (2021). Global ethics for the digital age – flourishing ethics. Journal of Information, Communication and Ethics in Society, ahead-of-print (ahead-of-print). <https://doi.org/10.1108/JICES-01-2021-0016>.

¹² Bynum TW. (2010). Philosophy in the information age. *Metaphilosophy*, 41(3): 420-442.

¹³ Bynum TW. (2006). Flourishing ethics. *Ethics and Information Technology*, 8:157-173

¹⁴ Küyel MT. (1999). Bazı Kavramlar Üzerinde Yeniden Bilinçlenme. İçinde: Türk Kültürü Prof. Dr. Mübahat Türker-Küyel Makaleleri-I, (Bs. 2016), Ankara, Atatürk Kültür Merkezi Başkanlığı, 365-375

¹⁵ Bayraktar L. (2016). Medeniyet ve Felsefe, 1. Baskı. İstanbul, Aktif Düşünce Yayınları.s89

¹⁶ Bilgiç, M (2016) Bilim, Felsefe ve Üniversite, s379

bulunarak yeni terkipler ile etik yaşam, sorumlulukları tasarlayabilmek adına bu ortak hamleyle ihtiyacımız bulunmaktadır.

Sanayi Devrimi Sonrası endüstrileşmiş yaşam biçimi ve alışkanlıklarını yaşantımıza getirdiği gibi; Bilişim Devrimi de reelden sanala geçiş sürecinde yabancılaşma sorunsalı, ontolojik temellendirme ve değer tartışmalarıyla Dijital dünyada Hakikat Arayışına zemin hazırlamıştır.

SONUÇ

Kendi kültürel kodlarımızdan müteşekkil medeniyetimiz adına bilişim teknolojileri alanındaki gelişmeler göz ardı edilmeksizin çağımızdaki olumlu ve olumsuz etkilerini yüksek bir insani bilinç ve şuur ile değerlendirebilmek için felsefi ve etik bağlamda kavram ve konular yeniden gözden geçirilmesi gerektiğini, bunun bir tercih değil zorunluluk halini aldığını söylemek mümkündür. Bu hali ile felsefi ve etik meseleleri yeniden değerlendirmek felsefi ve etik çalışmalara daha da fazla derinlik katacağından insanlığın yüksek bilincine katkıda bulunabilmek adına önemli olacağı düşünülmektedir.

Daha önce insanlığın tecrübe ettiği gibi her alet, teknik, bilimsel gelişme bir felsefi zemine dayandığı gibi yeni felsefi gelişmelerinde derinliğini oluşturmaktadır. Bilişim teknolojileri, yapay zekâ, nesne temelli yazılım çalışmaları belirli bir felsefi ve teknik zemine dayanmaktadır. Gelenek felsefede bilim-felsefe perspektifinin yerini teknoloji-felsefe aldığı görülmektedir. Medeniyet kurucu ve geliştirici kodlara sahip olan felsefenin hak ettiği yeri alması, bilim-felsefe-teknoloji dengesinin gerçekleşmesi için bilişim çağı problemlerine felsefi ve etik gelenekten beslenerek insanlığın ilerlemesine ve gelişmesinde gerçek bir katkı sunması beklenmektedir.

Bu katkıyı insanlık düşünce dünyasına kazandırabilmek için; bilişim devrimi ve çağının problemlerine, zorluklarına sırtımızı dönmek yerine, teknolojinin sağladığı konfor ve fırsatlarından vazgeçmek zorunda olmadan; bilişim çağında Felsefenin bilge dünyasında etiğin güvenilir ve emin şemsiyesi altında ontoloji, epistemoloji ve aksiyolojinin metodolojileri ile birlikte problem ve tartışmaları yeniden düşünmenin ihtiyaç olduğu düşünülmektedir.

KAYNAKÇA

- Adriaans, P. (2019). Information. İçinde E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2019). Metaphysics Research Lab, Stanford University. <https://plato.stanford.edu/archives/spr2019/entries/information/>
- Bayraktar L. (2016). *Medeniyet ve Felsefe*, 1. Baskı. İstanbul, Aktif Düşünce Yayınları.
- Bilgiç, M (2016) *Bilim, Felsefe ve Üniversite*, s379
- Brotton, J. (2006). *The Renaissance: A Very Short Introduction*. OUP Oxford.s.19-20
- Bynum TW. (2008). Norbert Wiener and the Rise of Information Ethics. In: J. van den Hoven and J. Weckert (eds). *Information Technology and Moral Philosophy*, 1st ed. New York, Cambridge University Press, 8-25.
- Capurro, R., & Hjørland, B. (2005). The concept of information. *Annual Review of Information Science and Technology*, 37(1), 343-411 (<https://doi.org/10.1002/aris.1440370109>)
- Kantar N. (2021) *Bilişim Felsefesi Bağlamında Bir Bilişim Etiği Teorisi: Flourishing Ethics / Gelişim Etiği-Doktora Tezi*, Ankara Yıldırım Beyazıt Üniversitesi, Felsefe Bölümü s.9



- Kantar, N. and Bynum, T.W. (2021), "Global ethics for the digital age – flourishing ethics", *Journal of Information, Communication and Ethics in Society*, Vol. 19 No. 3, pp. 329-344. <https://doi.org/10.1108/JICES-01-2021-0016>
- Kesgin A. (2019). *Endüstriyel Siyaset ve Ahlâk*, 1. Baskı. Ankara, Maarif Mektepleri Yay. S:62
- Reader, S. (2005). Aristotle on Necessities and Needs. *Royal Institute of Philosophy Supplement*, 57, 113–136. <https://doi.org/10.1017/S1358246105057061>
- Ross, J. (2014) *Avrupa Düşüncesinin Serüveni*, Antik çağlardan günümüze batı düşüncesi çev:Özcan doğan,DoğuBatı yay, 3.baskı, s.153

RESİM SANATINDA LİF, İPLİK VE KUMAŞ ETKİLERİNİN DOKUSAL AKTARIMI

TEXTURE TRANSFER OF FIBER, YARN AND FABRIC EFFECTS IN PAINTING

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ÖZET

Resim ve tekstil etkileşimi ilk defa tapestry dokuma tekniği (resimli dokuma) ile başlamış, süreç Sanayi Devrimi'ne kadar tekstil malzeme ve teknikleri ile çeşitlenerek devam etmiştir. Plastik sanatlar alanında yirminci yüzyılla birlikte tüm sanat dalları arasındaki sınırlar erimiş, disiplinlerarası ortak bir sanat dili oluşturmak adına malzeme, teknik, tema, kompozisyon gibi aktarım elemanları sanatçı ve izleyici açısından yeni anlamlar kazanmıştır. Rauschenberg'in resim ve tekstili ortak bir paydada buluşturması ile başlayan süreç, sonraki kuşak sanatçılara yeni bir estetik dil ve algı ile oluşturulan özgün eserler ortaya çıkarma fırsatı sunmuştur. Bu çalışmada tekstil hammaddelerinin ve tekniğinin resim sanatı içerisinde biçim ve dokusal bağlamda ele alınışı incelenecektir. Konu, farklı resim malzemeleri ile oluşturulan lif, iplik, dokuma kumaş etkilerinin resim yüzeyindeki biçimsel ifadeleri ile sınırlandırılmıştır. Geleneksel tekstil sanatının teknik ve malzeme özelliklerini deneysel arayışlar ile çağdaş olana yükselten çalışmalar örneklem olarak seçilmiştir. Nitel araştırma yönteminin uygulandığı çalışmanın verileri doküman analizi kullanılarak elde edilmiştir. Sınırlandırılan örneklerde lif, iplik ve kumaş etkilerini tuval yüzeyinde malzemeleri kendi hacimleriyle dokusal olarak aktaran sanatçıların eserleri yorumlanmıştır. Bu araştırma ile resim ve tekstil disiplinlerinin birbirinden beslenerek yaratıcı ve özgün yaklaşımlarına ulaşılmıştır. İzleyici ve sanatçı belleğine farklı bakış açıları sağlamayı hedefleyen sanatçıların disiplinler arası yeni çalışmalara kaynaklık ettiği sonucuna varılmıştır.

Anahtar kelimeler: Resim, tekstil malzemeleri, dokusal etkiler, disiplinler arası

ABSTRACT

The interaction of painting and textile started with the tapestry weaving technique (pictorial weaving) for the first time, and the process continued until the Industrial Revolution by diversifying with textile materials and techniques. The boundaries between all branches of art have melted in the field of plastic arts with the twentieth century, and transfer elements such as materials, techniques, themes, and compositions have acquired new meanings for the artist and the audience in order to create a common art language between disciplines. The process, which began with Rauschenberg uniting painting and textile on a common ground, provided the opportunity for the next generation of artists to create original works using a new aesthetic language and perception.

The handling of textile raw materials and techniques in the art of painting in form and textural context will be investigated in this study. The subject is restricted to formal expressions of the effects of fiber, yarn, and woven fabric created with various painting materials on the painting surface. Examples of works to be sampled were chosen that, through their experimental search, elevate the technical and material properties of traditional textile art to the contemporary.

The data for the study, which used the qualitative research method, were obtained through document analysis. The works of artists who convey the effects of fiber, yarn, and fabric on the canvas surface with their volumes are interpreted in limited examples. With this research, the creative and innovative methods of painting and textile disciplines, which are mutually reinforcing, have been achieved. It has been determined that artists who aim to provide different perspectives to the audience's and the artist's memory are the source of new interdisciplinary studies.

Keywords: Painting, textile materials, textural effect, interdisciplinary

GİRİŞ

Resim anlatı yöntemlerinden biri olan tapestry dokumalar, tekstil malzeme ve yöntemleri ile yapılan ve iki disiplini görünür kılan geleneksel bir tekniktir.

Resim-tekstil etkileşimin en eski örneğini oluşturan tapestryler, dokumacı ve ressam işbirliğinin sonucunda ortaya çıkmışlardır. Konularını çağlarına göre tarihten, mitolojik sahnelerden, kırsal hayattan ve sembolik anlatımlardan alan tapestryler, bölgesel ve dönemsel farklılıklarına rağmen, yapıldıkları döneme ait önemli ipuçları vermeleriyle, uygarlığa ışık tutan önemli birer kaynak niteliği taşımaktadırlar (Yetik, 2009:11).

Renkli, süreksiz atkı iplikleriyle resimsel bir anlatıma olanak tanıyan tapestryler, on sekizinci yüzyılda resim sanatının tuvaldeki başarılı çalışmalarını yansıtırken, aynı zamanda dekoratif duvar nesnesine getirilen yeni alternatifler ve sanayi devriminin ilk kıvılcımları nedeniyle daha az tercih edilmeye başlanmıştır. Özellikle sanayi devrimi ile gelen makinalaşma, değişen tasarım düşüncesi ve seri üretim gibi etkenlerden dolayı yok olmaya başlamıştır. On dokuzuncu yüzyılla birlikte William Morris önderliğinde başlayan Arts&Craft hareketi ardından Bauhaus Tasarım Okulu ve 1962'den itibaren aralıklarla yapılan Lozan Bienallerinin etkisi ile zanaat kategorisinde olan tapestrylerde hareketlenmeler yaşanmıştır. Günümüzde de pek çok ressam, tekstil etkileşimleri ile halı resim olarak adlandırdıkları modern tapestryler üretmektedirler.

Resim ve tekstil, Ortaçağ tapestry dokuma sanatı ile başlayıp yirminci yüzyılın ikinci yarısından itibaren yaşanan ekonomik, sosyolojik ve politik değişimler ile sanat platformlarına da taşınarak yeni ifade biçimleri oluşturulmuştur. Geleneksel malzeme ve tekniklerin yerine yenileri eklenerek disiplinler arası değişimler dikkat çekmiştir. Yirminci yüzyıl başı plastik sanatlardaki sınırların erimesi ile malzeme ve teknik açıdan iki disiplin: kolaj, asamblaj gibi yeni tekniklerle birleşerek farklı sunum yöntemleri geliştirmişlerdir. Bu yeni tekniklerin önderleri Picasso ve Braque'dır. Robert Rauschenberg'in 1955 yılında yaptığı "Bed" isimli çalışması ile sıradan bir ev tekstili olan yatak örtüsünün temelinde zaten tekstil ürünü olan resim tuvalinin yerini alması ile iki disiplin ortak bir potada eriyerek tek bir dilde birleşmiştir. Arabalı Koşar (2017) Rauschenberg'in bu çalışmasını "resim sanatı ile tekstil el sanatı tekniklerini birleştirerek, gazete kâğıtlarına, ipek, şifon ve pamuk kumaşların üzerine el baskıları yapmıştır" şeklinde özetlemiştir. 20 yüzyıl çağdaş sanat yaklaşımları ile tekstil malzemeleri ve teknikleri pek çok sanat akımı ile disipline bir şekilde vücut bulmuştur.

Bu çalışmada resim sanatında lif, iplik ve kumaşın dokusal etkilerini, malzemenin kimliğini, ışık ile ortaya çıkardığı görüntüyü sunan çalışmalar sunulmaktadır. Çalışmanın evrenini tekstilin plastik dokusal alanı, örneklemini ise lif, iplik ve kumaş özelindeki yaratımsal tekniklerle ortaya koyan seçilmiş sanatçılar ve çalışmaları oluşturmaktadır. Çalışmanın genel amacı resim sanatı içerisinde tekstile ait malzemelere doku büyütecisi ile bakan sanatçıların, çağdaş resim sanatında bu süreci nasıl ele aldıkları ve tekstil-resim etkileşiminde farklı ve yeni bakış açılarını nasıl sunduklarını ortaya koymaktır.

Resim Sanatında Dokusal Etkiler

Sanatsal yaratımın malzemesi değıştikçe, görme biçimleri, değerler, kavramlar farklılaşmakta ve insanların sanata bakışı değışmektedir (Üner,2013:2). Doku, görme ve dokunma duyularıyla kavranabilen, homojen bir yüzeysel etki ögedir (Sözen ve Tanyeli, 2014:96). Görsel sanatlarda ve tasarımda doku, temel tasarım öğelerinden biridir. Bir yüzeyin görünüşü dokudan ayrılmaz (akt. Gong and Shin,2013:336). Sanatın unsurundan biri olan doku, üç boyutlu bir çalışmanın dokunulduğunda gerçekte nasıl hissettiğini anlatmak için kullanılır. Resim veya çizim gibi iki boyutlu çalışmalarda, bir parçanın görsel duyusuna atıfta bulunabilir. Sanatta doku, görme ve dokunma duyularını uyarır ve sanatın yüzeyinin dokusal kalitesine atıfta bulunur. Boya uygulamasını içeren tuval veya yüzeyin algılanan dokusuna dayanır. Sanat eseri bağlamında 2 tür doku vardır: görsel ve gerçek. Görsel doku, sanatçının çizgi, gölgeleme ve renk gibi çeşitli sanatsal unsurları kullanarak yarattığı örtülü bir doku duygusunu ifade eder. Gerçek doku boya uygulaması veya üç boyutlu sanat gibi bir nesneye dokunarak fark edebileceğimiz fiziksel görüntü veya gerçek yüzey niteliklerini ifade eder. Doku ayrıca bir kumaşın yüzeyde nasıl hissettiğini ve nasıl görüldüğünü ifade eder. İplik, dokuma yapısı ve apreler kumaşın dokusunu belirler. Bu kumaş dokularını kaba, pürüzsüz, mat, parlak, yumuşak, bulanık, narin, kaygan, tüylü vb. kelimelerle tanımlayabiliriz. Bu çalışmada ele alınan yaratım malzemesi olan dokunun lif, iplik ve kumaş bağlamında resim dili ile görselleştirilmesi ele alınmıştır.

Resim Sanatında Dokusal Lif Yaklaşımları

Tekstil endüstrisinin en küçük elemanı olan lifin dokusal alanı işlevsel bir şekilde genellikle bir kumaş oluşturma yöntemi olan dokusuz yüzeylerde birleştirme amaçlı kullanılmaktadır. Çeşitli yapıştırma ve birleştirme yöntemleriyle elde edilen bu yöntem yirminci yüzyıl ile birlikte sanatsal bir ifade yöntemi olmuştur. “Yirminci yüzyılda plastik sanatlarda yeni yaklaşımların ortaya çıkması ve çağdaş sanat akımlarının etkisiyle birlikte, sanatçılar geleneksel malzemeler yanında hazır yapım ürünler, organik ve teknolojik nesnelere, tekstil lifleri ve ürünleri gibi geleneksel sanat için uzak görünen malzemeler kullanmaya başlamıştır” (Usluca, Erim, 2019:264).

İlk örnekleme oluşturan sanatçı Janusz Jurek dijital platformlar düzeninde lif kümelenmesi ile resimler yapmaktadır. Görsel 1’de yer alan resimde Jurek, parçadan bütüne gitme metodunu kullanmıştır, parça olarak ele aldığı eleman lif’dir. Bütün olarak ele aldığı eleman ise portrenin kendisidir. Lifi yoğunluk oranlarına göre dağıtarak gölge, ışık, açık, koyu etkileri sağlamıştır. Lif etkisi ile ortaya çıkan bu çalışmada lifin dijital teknoloji ile sunulan en etkili sunumlarından birisi gerçekleşmiştir.



Görsel 1: Janusz Jurek, lif etkili dijital portre çalışması

Sanatçı Xandy Peters, İtalyanca sfumare "duman gibi buharlaşmak" kelimesinden gelen yumuşak formlar üretmek için ince ve kademeli gölgeleme tekniği olan Sfumato’yu (rönesans

boyama tekniği) kullanarak çalışmasını oluşturmuştur (URL 1). Portrenin açık ve koyu alanları lif etkileri ile sağlanırken ışık alan en açık kısımlarında boşluklar bırakılarak beyazlıklar verilmek istenmiştir. Peters, bu tekniğini bir yazıcı üzerine yerleştirdiği sentetik lifler aracılığıyla gerçekleştirmektedir.



Görsel 2: Xandy Peters, Portre, Sfumato tekniği, Polyester elyaf

Sanatçı, Görsel 3'te görüldüğü gibi çalışma prensibi olarak, doğrudan bir tarayıcı yatağına yerleştirilen polyester lif dolguları kullanarak portreler üretmektedir. Öncelikle portrenin açık ve koyu alanlarına göre lifleri yerleştiren Peters, tıpkı kalem kullanır gibi yerleştirme yapmaktadır. Yerleştirme işlemi bittikten sonra adeta yazıcı içerisine çıktı alacağı bir kağıt negatifini yerleştirmiş gibi çekim işlemi yaratmaktadır. Ardından yazıcıdan aldığı negatif-pozitif etkilerle çalışma tamamlanmaktadır.



Görsel 3: Sfumato tekniğinin uygulama aşamaları

Resim Sanatında Dokusal İplik Etkileri

Çağdaş sanat kavrayışıyla iplik ve sanat ilişkisi üzerine düşündüğümüzde ve mevcut literatürü ya da sanat eserleri gibi verili materyalleri incelediğimizde iplik ya da ipliksi malzemelerin bir sanat materyali olarak kullanılmasının çağdaş sanatın buluşu olmadığını görebiliriz (Keser, 2016:170). İlk insanın giyinme dürtüsünü ve bunun için kumaş oluşturma eylemini gerçekleştirmek üzere çevresinde bulduğu ot ve dallardan yapmış olduğu ilk bükümüz iplik yapıları ile ipliğin oluşma süreci başlamıştır. Ardından gelişen iplik eğirme, büküm süreçleri ve makinalıma ile devam eden süreçler halen gelişerek devam etmektedir. İplik yirminci yüzyıl çağdaş sanat formlarının gelişimine kadar zanaat formunda değerlendirilirken, bu yüzyıl ile birlikte özgürleşerek plastik bir anlam kazanmıştır. Lenore Tawney bu özgürleşmenin mimarı olmuştur.

“Tawney’nin en erken kişisel sergisi 1961 yılında Staten Island Museum tarafından New York’ta düzenlendi. İşte bu sergi, geleneksel ve işlevsel bir alan olan goblenin faydacı olmayan, çağdaş iplik sanatı alanına yerleşmesinin başlangıcı oldu (Heller ve Heller, 2013). Shiner (2004) de Sanat’ın İcadı adlı kitabında, bir zamanlar ‘dokumacılık’ olan şeyin Lenore Tawney, Sheila Hicks ve Claire Zeisler’in soyut üç boyutlu eserleri sayesinde artık iplik sanatı olduğunu yazdı”(aktr.Keser, 2016:196).

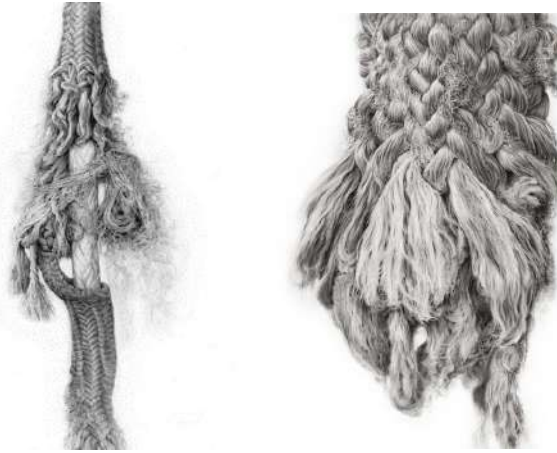
İplik sanatının sanat camiasında kabul görmesinin ardından sanatçılar lif, halat, iplik, bant, kurdele vb. materyalleri sanatçıların oluşturmak istedikleri estetik beğenilerle ve farklı boyutlarla çalışmalarında sunmuşlardır. Geline son noktada ipliğin bir anlatım aracı olarak günümüzde de dokusal alanı ile sanatçılara ilham veren ve plastik dilde anlatımlarına olanak tanıyan bir malzeme olduğu açıktır. Sanatçılar realistik ya da 3 boyutlu çalışmalarında ipliğin dokusallığına, hammaddesine, büküm yönüne, büküm kat sayısına atıfta bulunarak iplik etkilerini vurgulamaktadırlar.

Amanda Fuller, doğal dokuları gerçek nesne ve çizimleri ile alan bir sanatçıdır. Görsel 4’te yer alan çalışmasında bir iplik yapısının sahip olduğu büküm yönü, lif yapısı ve esnek kıvrımlı fiziksel özelliklerini kuru boya tekniği ile yansıtmıştır.



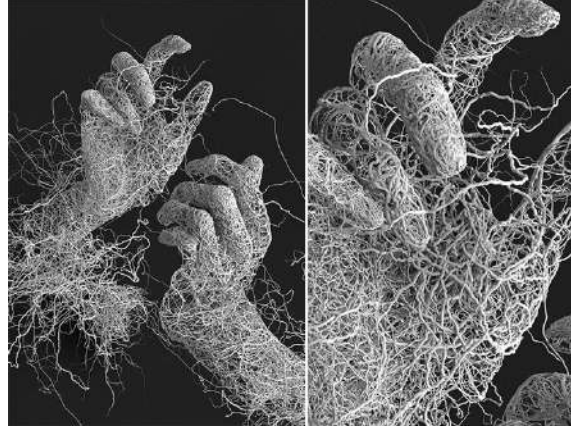
Görsel 4 : Amanda Fuller, kuru boya tekniği

Sanatçı Huguette Despault May, karakalem çizimleri ile realistik görüntülerinde ipliğin sahip olduğu dokusal ve fiziksel özelliklerini bütün gerçekliği ile kopya ederek sunmaktadır. Çalışmaları illüzyon etkisi yaratarak ipliğin bütün dokusal özelliklerini izleyiciye hissettirmektedir.



Görsel 5: Huguette Despault May, “Loose Ends”, kömür ile çizim, The Open Studios Press

Resim Sanatında Dokusal Lif Yaklaşımları başlığı altında ele aldığımız sanatçı Janusz Jurek, iplik etkili çizimlerini dijital sanat tekniği ile ortaya koyuyor: Polonyalı sanatçı, parçadan bütüne oluşturulan eserler tasarlamak için algoritmalarla oynuyor ve onlarla bir silüet yaratarak insan bedenlerine tamamlıyor. Çizimlerinin çoğu, sanatında ölçülü olmadan karıştırdığı çizgilere olan zevkini yansıtıyor. Keşfedilmesi ilginç olduğu kadar tuhaf bir seçim sunmaktadır. Görsel 6’da yer alan çalışmasında ipliğin sahip olduğu boyutsal özelliklerinden yararlanarak yeni bir boyutun oluşmasını sağlamıştır. Sanatçı çalışmalarında genellikle insan bedenini ipliklerden inşa ederek bedeninin en küçük malzemesi olarak sunmaktadır.



Görsel 6: Janusz Jurek, 3D çizim

İplik dokusunu kullanarak resim yapan diğer bir sanatçı Ahmet Yeşil, genellikle yağlı boya ve akrilik malzemeler ile çalışmalarını gerçekleştirmektedir. En küçük birim olarak kullandığı halat iplik dokularını tek tek işlemektedir. Sanatçı çalışmalarındaki halat ipler hakkında yüklediği anlamı şu şekilde ifade etmiştir.

“Halatın ritmik kıvrımları üzerine düşen renk ışık, açık koyu değerlerin bize ait olanın yansımalarıdır. Yaşama ait sosyal, toplumsal, siyasal, ekonomik, ekolojik, kişisel yaşamın her boyutunun halatın nesnel yapısı üzerinden plastik, estetik değerlerini en üst düzeyde sanat yapıtına dönüştürmeye sanat anlayışımı ifade etmeye çalışıyorum” (URL 2).



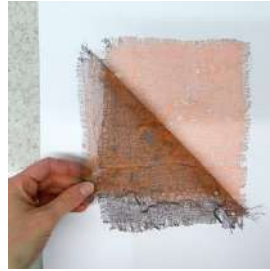
Görsel 7: Ahmet Yeşil, Sol görsel: “Sesler ve İzler”, Sağ görsel: “Tats1905-72”, 2019

Resim sanatında Dokusal Kumaş Etkileri

Resim sanatında kumaşın dokusunun plastik bir dil ile aktarıldığı ilk örneklerini Avrupa resim sanatı içerisinde yer alan kumaş çizimlerinde oldukça sık görmekteyiz. Bu resimlerde kumaşın görsel ve dokusal bağlamda hissini verecek bütün duygular aktarılmaya çalışılmıştır. Yetik (2009) Kıymet Giray ile yaptığı görüşmede aşağıdaki şekilde aktarmıştır.

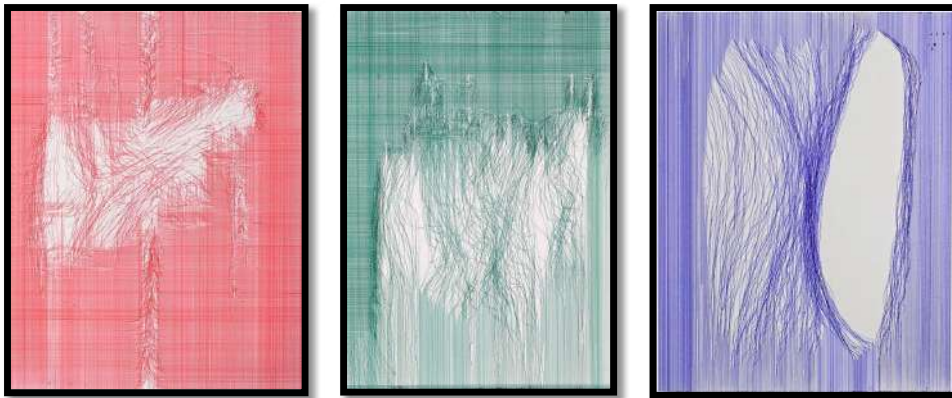
“Resmin kompozisyonu içinde tekstilin ön plana çıkması Hollanda resminde daha fazla gözlenmektedir. Kumaş ve desen olarak tekstil detayları özellikle bazı Holandalı ressamalarda daha da ağırlıktadır. Bu tür resimlerdeki tekstillerde kumaş özelliklerini, renk değerlerini, kaliteyi, kumaşın cinsini belirleyen ayrıntılara rastlanmaktadır. Van Dyck ya da Jacques Luis David’in resimlerinde tekstil tüm detaylarıyla ele alınmıştır.”

Sanat tarihsel bağlamda Modern sanat akımlarında kumaşın dokusal aktarımı pek çok ressam tarafından yapılmıştır. Kumaştaki doku kavramı kalitesi olarak kabul edilir. Bir kumaşın dokusu hacimli, yumuşak, pürüzlü, parlak, mat, ince, şeffaf, pürüzsüz ve kalın olarak tanımlanmaktadır. Yüzyılın son çeyreğinde kumaşın dokusal aktarımında dijital teknoloji görünümüleri kumaştaki dokuyu daha etkili hale getirmiştir. Gelişen 3D, baskı, lazer ve akıllı teknoloji yüzey dokusunu daha görünür kılmaktadır. Bu gelişmeler kumaşın kopyasını yaratma eylemine eşlik etmektedir. Görsel 8 ve 9’da yer alan en basit baskı yöntemi olan su bazlı boyalar ile dokusal baskının yapıldığı mono baskılar bize dokunun aktarımında en kolay çözümdür. Bu baskı ile kumaşın sahip olduğu oluşturulma yöntemi, sıklığı, malzemesi ve diğer fiziksel doku özellikleri kolayca kopya edilmektedir.



Görsel 8: Mono baskı örneği **Görsel 9:** Amanda Fuller, mix media

Bir başka kumaş doku aktarım yöntemi kumaş etüdü ile gerçekleştirilmektedir. Görsel 10’da yer alan Fernando De Brito’nin parçalanmış kumaş etkileri kumaşın fiziksel özellikleri hakkında bilgi vermektedir. Dokusal açıdan gevşek alanlarda kumaşın parçalanması ve alanda yarattığı boşluk kompozisyona derinlik katmaktadır.



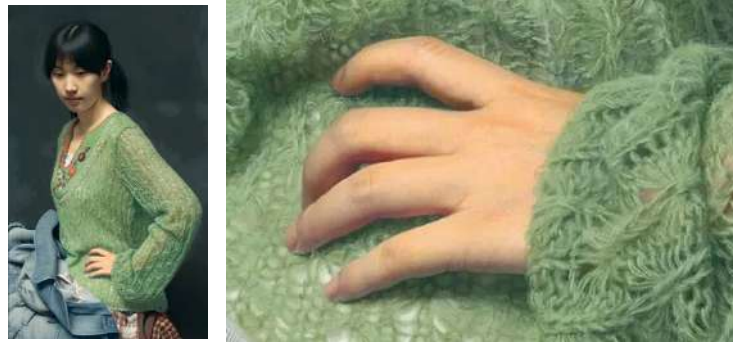
Görsel 10: Fernando De Brito, çizim, 2019

Carol Macdonald monotip baskıyı örme kumaşlarda kullanarak örmenin kendi dinamiğinde var olan gevşek dokularından plastik bir görsel yaratmıştır (Görsel 11).



Görsel 11: Carol Macdonald, Monotip baskı örnekleri, 2019

Görsel 12’de yer alan sanatçı Leng Jun yağlı boya tekniği ile yapmış olduğu resminde hiperrealistik örme detayları ile dikkat çekmektedir. Bir resim unsuruna dönüşen örme kumaşın görseli, malzemesinin dokusal ip uçlarını vermektedir. Görselde yumuşaklığı, rengi gibi hem dokusal hem de görsel dokularını izleyiciye kolayca aktarmaktadır.



Görsel 12: Leng Jun, yağlı boya tekniği, 2004

SONUÇ

Doku, çevremizi saran, doğanın ve insan yapısının tüm yüzeylerini, formlarını karakterize eden önemli bir unsur olarak karşımıza çıkmaktadır. Yapay ya da doğal olsun her nesnenin kendine özgü doğal bir dokusu vardır. Bu dokuların hisleri; Pürüzlülük, düzlük, yumuşaklık, sertlik, girinti ve çıkıntılar ile dokusal ifade ve efektlerdir. Görsel alanda bu dokular yüzey dokusunun özelliklerini resim yoluyla tasarımcının fikir ve tasarım anlayışı ile ifade edilmektedir. Doku temelli tasarımlar, yüzey dokusunu taklit anlayışı ile karşımıza çıkıyor. Tekstil yüzey dokusu tasarımı çağın yenilikleri ile değişmektedir. Yirminci yüzyılın son yıllarından itibaren artan hız ve dijital olanaklar beraberinde kavramsal sorgulamaları da getirmiş, estetik dili etkilemiş ve tekstil tasarımında bir değişime neden olmuştur. Lif, iplik ve kumaş dokuları kullanan sanatçılar, malzeme çeşitliliği, farklı teknikler ve yeni bakış açıları ile tasarım anlayışına önemli katkılarda bulunmuşlardır. Güçlenen resim-tekstil etkileşiminin sonucu olan çalışmalar yenilikçi teknoloji ve malzemelerle oluşturulan dokular üretirken dikkatleri çekmiştir. Sonuç olarak tekstilde doku, estetik nedenlerle artık sadece görünüm ve kalite değildir, tüm yüzey düzenlemesinin dokusal görünümüdür.

KAYNAKÇA

- Yetik, S. (2009). *20. ve 21. Yüzyıllarda Türk Resim Sanatında Tekstil Etkisi*. Yayınlanmamış Yüksek Lisans Tezi, Marmara Üniversitesi, GSF: İstanbul.
- Sözen M. ve Tanyeli U. (2014). *Sanat Kavram ve Terimleri Sözlüğü*. Remzi Yayınevi: İstanbul.
- Arabalı Koşar S. T. (2017) *Çağdaş Sanat Disiplinleri Arası Etkileşimlerde Lif Sanatı, İdil Sanat ve Dil Dergisi*, 6 (35), ss. 2035-2059.
- Lin Gong and Jooyoung Shin. *The Innovative Application of Surface Texture in Fashion and Textile Design Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Hong Kong*
- Üner, Ö. (2013). *Malzemeye Karşı Malzeme, Çağdaş Resim Sanatında Tuvalin Gerçeklik Serüveni*, *Rh Dergisi* https://www.academia.edu/8052353/_MALZEMEYE_KAR%C5%9EI_MALZEME_RH_DERG%C4%B0S%C4%B0 adresinden erişilmiştir. (Erişim tarihi: 16.10.2021)
- Gong, L. ve Shin, J. (2013). *The Innovative Application of Surface texture in Fashion and textile design (suom. kirjoittajan) Fashion and textile research journal*. Jun, 15 (3), ss.336-346
http://kpubs.orgarticle/articleMain.kpubs?articleANo=ORSHBT_2013v15n3_336
- Usluca Erim Ö.(2019). *Sanatsal Bir İfade Aracı Olarak Tekstil, İdil Sanat ve Dil Dergisi* 8 (54), ss.263-273
- Keser, Nimet “İplik Sanatı: Sanat Alanına Kabul Edilme Mücadelesi ve Çağdaş Bir Sanat Dalı Olarak Yükselişi”. *Humanitas*, 4(8-2016):165-179

İnternet Kaynakları

URL 1: <https://www.xandypeters.com/>

URL 2:

<http://www.ahmetyesil.com/pPages/pArtist.aspx?paID=173§ion=550&periodID=&lang=TR&pageNo=7&exhID=0&bhpc=1>

Görsel Kaynakça

Görsel 1: <https://januszjurek.info/> (Erişim tarihi: 12.09.2021)

Görsel 2: <https://www.xandypeters.com/> (Erişim tarihi: 10.09.2021)

Görsel 3: <https://www.xandypeters.com/> (Erişim tarihi: 03.09.2021)

Görsel 4:

https://www.google.com/search?q=amanda+fuller+drawing&rlz=1C5CHFA_enTR858TR858&sxsrf=AOaemvIDTUhyeTP2NFuHQ3NiX4j2BruiNA:1638872509862&tbm=isch&source=iu&ictx=1&fir=z6gnN7wCOxVuiM%252Cs4HIOTBGmy_80M%252C_%253Bqj2gSGuVswLT4M%252CwAtm9nag77Y-6M%252C_%253B0yKJaCLiR7Y- (Erişim tarihi: 15.09.2021)

Görsel 5: <http://huguettemay.com/> (Erişim tarihi: 03.10.2021)

Görsel 6: <http://www.carolmacdonald.com/portfolio/portfolio-knit-structure.html> (Erişim tarihi: 02.09.2021)

Görsel 7:

<http://www.ahmetyesil.com/pPages/pArtist.aspx?paID=173§ion=550&periodID=&lang=TR&pageNo=7&exhID=0&bhcp=1> (Erişim tarihi: 01.09.2021)

Görsel 8: <https://januszjurek.info/> (Erişim tarihi: 19.09.2021)

Görsel 9:

https://www.google.com/search?q=amanda+fuller+drawing&rlz=1C5CHFA_enTR858TR858&sxsrf=AOaemvIDTUhyeTP2NFuHQ3NiX4j2BruiNA:1638872509862&tbm=isch&source=iu&ictx=1&fir=z6gnN7wCOxVuiM%252Cs4HIOTBGmy_80M%252C_%253Bqj2gSGuVswLT4M%252CwAtm9nag77Y-6M%252C_%253B0yKJaCLiR7Y- (Erişim tarihi: 01.10.2021)

Görsel 10: <http://www.vandergrintengalerie.com/fernando-de-brito-texts-259/articles/fernando-de-brito-sunt-lacrimae-rerum-2019-engl.html> (Erişim tarihi: 29.09.2021)

Görsel 11: <https://www.sevendaysvt.com/vermont/art-review-mending-fences-new-works-by-carol-macdonald-rokeby-museum/Content?oid=30852561> (Erişim tarihi: 15.09.2021)

Görsel 12: <https://www.teknolojioku.com/guncel/oyle-bir-tablo-yapti-ki-mercekle-bakiliyor-5a2905e018e54078fb164aae?p=6> (Erişim tarihi: 22.09.2021)

**ADİLCEVAZ (BİTLİS) YÖRESİNDE YETİŞTİRİLEN ÇEVİZLERDE KLOROFİL
MİKTARLARININ, STOMA YOĞUNLUKLARININ VE BESLENME
DURUMLARININ BELİRLENMESİ**

DETERMINATION OF CHLOROPHIL AMOUNT, STOMA DENSITY AND
NUTRITIONAL STATUS IN CHICKENS CULTIVATED IN ADİLCEVAZ (BİTLİS)
REGION

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ÖZET

Bu çalışma, Bitlis ili Adilceviz ilçesinde yetiştirilen 16 farklı ceviz genotipi üzerinde yürütülmüştür. Çalışmada; ceviz genotiplerinin yapraklarında kalıp alma ve saydamlaştırma yöntemleri kullanarak, stoma yoğunluklarını ve büyüklükleri belirlenmiştir. Aynı çeşidin yapraklarının stoma sayıları arasındaki farklılık istatistikî olarak önemli bulunmuştur ($p<0.05$). Saydamlaştırma metodunda 16 ceviz genotipinde stoma sayıları kalıp alma yöntemine göre daha yüksek bulunmuştur. Yapraklarındaki stoma yoğunlukları kalıp alma yönteminde 174.72-353.60 adet/mm², saydamlaştırma yönteminde ise 145.60-312.00 adet/mm² arasında değiştiği belirlenmiştir. Ceviz stomaları böbrek şeklinde olup, uzunlukları kalıp alma yöntemiyle tespit edilenlerde 21.68-32.88 µm arasında, saydamlaştırma yöntemiyle belirlenenlerde ise 23.97-29.31 µm arasında değiştiği belirlenmiştir. İncelenen ceviz tiplerinde stoma yoğunluğu ile stoma büyüklüğü arasında genel olarak ters bir ilişki bulunduğu dikkat çekmektedir. Ceviz genotiplerinin yapraklarından alınan numunelerinin incelenmesi sonucunda, stoma sayısı ceviz genotiplerine göre farklılık gösterdiği ve bunun çeşide özgü olduğu belirlenmiştir

Anahtar Kelimeler: Adilceviz, Ceviz, Klorofil, Stoma Yoğunluğu.

ABSTRACT

This study was carried out on 16 different walnut genotypes grown in Adilceviz district of Bitlis province. In the study; Stomatal densities and sizes were determined by using mold removal and transparency methods in the leaves of walnut genotypes. The difference between the number of stomata of the leaves of the same cultivar was statistically significant ($p<0.05$). In the transparency method, the number of stomata in 16 walnut genotypes was found to be higher than in the mold area method. It was determined that the stomatal densities in the leaves varied between 174.72-353.60 pieces/mm² in the mold removal method and 145.60-312.00 pieces/mm² in the clearing method. Walnut stomas are kidney-shaped and their

lengths were determined to vary between 21.68-32.88 μm in those determined by the molding method, and between 23.97-29.31 μm in those determined by the clearing method. It is noteworthy that there is an inverse relationship between stoma density and stoma size in examined walnut types. As a result of the examination of the samples taken from the leaves of the walnut genotypes, it was determined that the number of stomata differs according to the walnut genotypes and it is specific to the variety.

Key words: Adilcevaz, Walnut, chlorophyll, Stomatal density.

GİRİŞ

Ceviz, bitkiler aleminde, Tohumlu bitkiler (Spermatophyta) bölümünün Kapalı Tohumlular (Angiospermae) alt bölümünün İki Çenekli Bitkiler (Dicotyledoneae) sınıfında yer alır. Juglans cinsinin Dünya'nın ılıman ve subtropik iklim kuşağında yayılmış birçok türü bulunmakla birlikte en önemlisi ve üstün meyve kalitesi ile önde gelen, "Anadolu cevizi", "İran cevizi" ve "İngiliz cevizi" olarak da adlandırılan *J. regia*' dir. Cevizin anavatanı bazı kesimler tarafından İran ve bazı kesimler tarafından da Çin olduğu kabul edilmektedir. Bununla birlikte ceviz Karpat dağlarından Türkiye, Irak, İran, Afganistan, Güney Rusya, Hindistan, Mançurya ve Kore' ye kadar uzanan geniş bir bölgenin doğal bitkisidir. Ceviz Dünya'da büyük bir tabii yayılma alanına sahiptir, savaşlar, göçler ve ticaret yoluyla farklı alanlara götürülmüştür. Cevizlerin bitkisel özelliklerine bakıldığında, hızlı büyüyerek 30-40 metreye kadar boylanabildikleri görülür. Ceviz ağaçları genelde "yayvan" taç şekline sahip olup çok geniş bir "taç" teşekkül edebilirler. Cevizler 3-5 m derinliğe kadar uzayabilen kazık kök yapısına sahiptir (Şen,1986, Şen ve ark., 2006).

Yaprakların arka yüzeylerinde epiderma hücreleri arasında yer alan stomalar bitkiden gaz ve su alışverişinin sağlandığı gözenekler olup, fotosentez ve terleme olaylarında önemli roller oynamaktadır. Stoma hücreleri arasında kalan ve açılıp kapanan aralığa stoma aralığı (ostiol), yanlarında bulunan ince çeperli hücrelere ise komşu hücreleri denilmektedir (Akman, 1985).

Bitkilerde verimli ve kaliteli bir yetiştiricilik için bitki-su ilişkilerinin düzenlenmesi son derece önemlidir. Stomalar bitki yapraklarında bulunan organlar olup bitkinin iç dokularıyla dış ortam arasında gaz alışverişini sağlarlar. Stomalar çeşitli koşullara göre açılıp kapanmak suretiyle transpirasyonu düzenlerler. Stomalar sayesinde bitkiler kontrollü su kaybı yaşarlar. Bu çalışma, Bitlis ili Adilcevaz ilçesinde çiftçi bahçelerinde bulunan 16 farklı ceviz genotipi üzerinde yürütülmüştür. Çalışmada stomaların belirlenmesinde kullanılan farklı iki yöntem olan kalıp alma ve saydamlaştırma yöntemleri incelenmiştir.

MATERYAL ve METOT

Bu çalışma, Bitlis ili Adilcevaz ilçesinde yetiştirilen 16 farklı ceviz genotipi üzerinde 2017 yılında yürütülmüştür. Araştırmada ceviz genotiplerinin yapraklarında kalıp alma ve saydamlaştırma yöntemleri kullanılarak stoma yoğunlukları ve büyüklükleri saptanmıştır. Adilcevaz ilçesi merkez mahallelerinde yetiştirilen 16 farklı ceviz genotipi materyal olarak seçilmiştir. Seçilen ceviz genotiplerinde stoma sayım ve ölçümleri için ceviz tiplerine ait ağaçların 4 yönünden ikişer yıllık sürgünün 3. boğumlarından alınan karşılıklı yapraklar kullanılmıştır. Yaprak örnekleri Temmuz ayının son haftasında alınmıştır. Adilcevaz; 20 mahallesi ve bu mahallelere bağlı toplam 56 mezrası bulunan, etrafı yüksek dağlar ve tepeler ile çevrili olmasından dolayı kısmen mikroklima özelliğine sahip geniş bir alanda ceviz yetiştiriciliği yapılan, Vangölü kenarında bulunan, Bitlise 65 km, uzaklıkta bir ilçedir. Yıllık ortalama sıcaklığın 10.7 °C, aylar itibariyle de Temmuz ayı ortalamasının 23.8 °C ile en

yüksek, Ocak ayı ortalamasının ise $-1.8\text{ }^{\circ}\text{C}$ ile en düşük olduğu, en yüksek sıcaklığın $37.4\text{ }^{\circ}\text{C}$ ile Ağustos ayında ölçüldüğü, en düşük sıcaklığın ise $-21.0\text{ }^{\circ}\text{C}$ ile Ocak ayında ölçüldüğü belirlenmiştir (Anonim, 2014). Bitkilerde yaprakların alt ve üst yüzeylerinde yer alan stomalar bitkiden gaz ve su alışverişinin sağlandığı gözenekler olup, fotosentez ve terleme olaylarında önemli roller oynamaktadır. Bitkilerde yaprakların alt ve üst yüzeylerinde bulunabilen stomalar ceviz bitkisinde yaprakların alt yüzeylerinde bulunmaktadırlar. Çalışma alanları lokasyon haritası Şekil .1’de verilmiştir.

Kalıp alma yönteminde; ceviz yapraklarının alt taraflarından yaprak ana damarlarının dipten uca doğru her ana damarın sağından ve solundan $1.5 \times 3.0\text{ cm}$ ’lik alana fırça ile ince bir tabaka olacak şekilde tırnak cilası uygulanmıştır. Mikroskopta $40x$ büyütmede kareli oküler mikrometrede kalıptaki stoma sayıları belirlenmiştir (Eriş ve Soylu 1992).

Saydamlaştırma yönteminde; yaprak örneklerinin her birinden yaprağın alt tarafında ana damarları boyunca sağından ve solundan çapı 2 cm olan özel bir zımba ile her yapraktan üç adet (dip orta uç kısımlardan) parça alınarak hazırlanan solüsyonun içine üzerine kurşun kalemle yazılabilen muşamba üzerine tel zımba ile zımbalanarak yerleştirilerek $\%2.5$ ’luk sodyum hipokloritin içine konular oda sıcaklığında ($22-23\text{ }^{\circ}\text{C}$) $22-24$ saat bekletilerek istenen düzeyde saydamlaşmanın olması sağlanır.



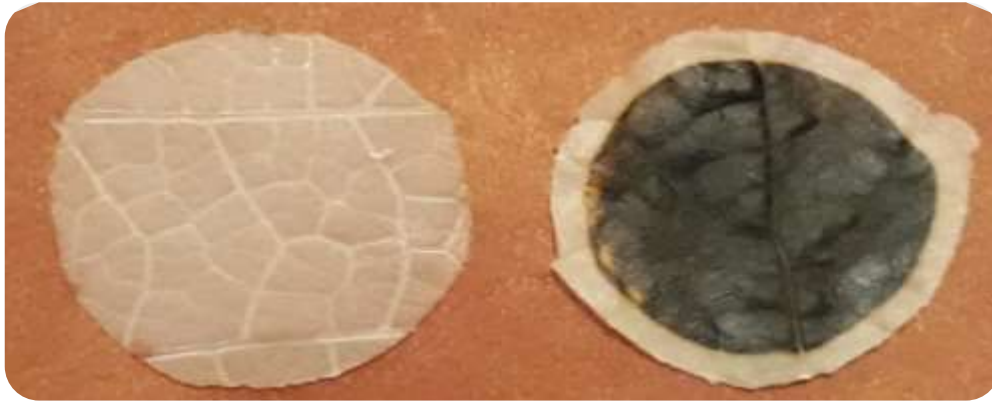
Şekil .1. Çalışma Alanı Lokasyon Haritası.



Şekil 2. Kalıp alma yöntemine ait görüntüler.



Şekil 3. Saydamlaştırma yöntemine ait fotoğraflar.



Şekil 4. Saydamlaştırma yöntemine ait fotoğraflar

BULGULAR

Çalışmada stoma yoğunluğuna ait yapılan analizler sonucunda genotipler arasında ve araştırmada kullanılan metotlara göre (kalıp alma ve saydamlaştırma) yapılan karşılaştırmada stoma sayısı üzerine etkileri yönünden farklılık istatistiki olarak oldukça önemli ($P < 0.001$) bulunmuştur. Çalışmada kullanılan metot açısından yapılan karşılaştırmada kalıp alma ve saydamlaştırma metodunun stoma sayısı üzerine etkisi yönünden farklılık istatistiki olarak oldukça önemli ($P < 0.001$) bulunmuştur. Araştırılan genotipler açısından elde edilen sonuçlar Çizelge 1 de verilmiştir. Yapılan ölçüm sonuçlarına göre, genotiplere göre birim alanda stoma sayıları bakımından farklılık gözlemlenmiştir. Bütün faktörler açısından iki ceviz genotipinde 13 AC 10 (320.32 ± 37.58 adet/mm²) ve 13 AC 15 (324.48 ± 20.88 adet/mm²) stoma yoğunlukları en yüksek değerleri vererek istatistiki anlamda aynı grupta yer aldığı görülmüştür. En düşük stoma yoğunluğuna sahip 13 AC 03 ceviz genotipi 187.20 ± 46.70 adet/mm² olduğu belirlenmiştir (Çizelge 1).

Çalışmada kullanılan metot açısından yapılan karşılaştırmada, kalıp alma ve saydamlaştırma metodunun stoma sayısı üzerine etkisi yönünden farklılık istatistiki olarak oldukça önemli ($P < 0.001$) bulunmuştur. Kalıp alma yöntemi kullanılarak yapılan ölçümlerde stoma yoğunluğu bakımından, saydamlaştırma metoduna göre sayı olarak fazla bulunmuştur. Araştırmada kalıp alma yönteminde 13 AC 10 genotipinde stoma sayısı 353.60 ± 7.21 stoma/mm² bulunurken, saydamlaştırma yönteminde 13 AC 15 genotipinde stoma sayısı 312.00 ± 12.48 stoma/mm² olarak saptanmıştır. İncelenen 16 ceviz tipinin yapraklarındaki stoma yoğunlukları kalıp alma yönteminde $174.72-353.60$ adet/mm² arasında değişmiştir. İncelenen 16 ceviz tipinin yapraklarındaki stoma yoğunlukları saydamlaştırma yönteminde $145.60-312.00$ adet/mm² arasında değişmiştir. Çalışmada stoma boyları için yapılan analizler sonucunda genotipler arasında stoma boyları değişimi yönünden farklılık istatistiki olarak

oldukça önemli ($P<0.001$) bulunmuştur. Yapılmış olan ölçüm sonuçlarına göre, incelenen ceviz genotiplerinin yapraklarında genotiplere göre stoma boyları arasında oldukça önemli farklılık gözlemlenmiştir.

Çizelge 1. Ceviz genotiplerinin yapraklarında saptanan stoma miktarı (adet/mm²)

Genotip No	Stoma Miktarı (adet/mm ²)	Standart Sapma	Farklılık (*)
13 AC 01	245,44	10,19	d
13 AC 02	266,24	50,95	c
13 AC 03	187,20	46,70	j
13 AC 04	241,28	17,05	de
13 AC 05	284,96	21,50	b
13 AC 06	210,08	14,59	hi
13 AC 07	224,64	60,11	fgh
13 AC 08	262,08	23,68	c
13 AC 09	230,88	23,35	def
13 AC 10	320,32	37,58	a
13 AC 11	214,24	14,59	gh
13 AC 12	239,20	9,39	def
13 AC 13	228,80	10,19	efg
13 AC 14	276,64	9,39	bc
13 AC 15	324,48	20,88	a
13 AC 16	197,60	18,37	ij
Ortalama	247,13		
Max	324,48		
Min	187,20		

*: Duncan ($P<0.01$).

Çizelge 2. Uygulanan yöntemlere göre genotiplerde saptanan stoma miktarı

Genotip No	Kalıp Alma			Saydamlaştırma		
	Stoma Miktarı (adet/mm ²)	Standart Sapma	Farklılık (*)	Stoma Miktarı (Adet/mm ²)	Standart Sapma	Farklılık (*)
13 AC 01	253,76	7,21	f	237,12	8,24	gh
13 AC 02	312,00	12,48	c	220,48	7,21	j
13 AC 03	228,80	14,41	h	145,60	7,21	n
13 AC 04	249,60	21,62	fg	232,96	7,21	hi
13 AC 05	303,68	7,21	d	266,24	7,21	e
13 AC 06	220,48	7,21	i	199,68	12,48	l
13 AC 07	174,72	37,44	k	274,56	12,48	c
13 AC 08	282,88	7,21	e	241,28	7,21	g
13 AC 09	212,16	12,48	j	249,60	12,48	f
13 AC 10	353,60	7,21	a	287,04	12,48	b
13 AC 11	224,64	12,48	h	203,84	7,21	k
13 AC 12	245,44	7,21	g	232,96	7,21	hi
13 AC 13	228,80	14,41	h	228,80	7,21	i
13 AC 14	282,88	7,21	e	270,40	7,21	d
13 AC 15	336,96	21,62	b	312,00	12,48	a
13 AC 16	212,16	12,48	j	183,04	7,21	m
Ortalama	257,66		a*	236,60		b
Max	353,60			312,00		
Min	174,72			145,60		

*: Duncan ($P<0.01$)

Genotipler açısından stoma boyları açısından en yüksek olan ve istatistiki olarak aynı grupta yer alan iki genotip olduğu gözlemlenmiştir. 13 AC 09 (29.04 μm) ve 13 AC 16 (29.34 μm) değerleriyle öne çıkan genotipler olduğu belirlenmiştir. Kalıp alma yöntemine göre yaprakların stoma boylarının daha yüksek olduğu söylenebilir

Çizelge 3. Ceviz genotiplerinde yapraklarında saptanan stoma eni (μm)

Genotip No	Stoma Boyu (μm)	Standart Sapma	Farklılık (*)
13 AC 01	28.42	5.96	abc
13 AC 02	25.72	3.51	d
13 AC 03	27.05	3.85	abcd
13 AC 04	25.49	6.23	d
13 AC 05	27.82	5.06	abcd
13 AC 06	27.14	5.27	abcd
13 AC 07	28.84	4.59	ab
13 AC 08	26.89	4.23	abcd
13 AC 09	29.04	5.15	a
13 AC 10	26.46	3.65	bcd
13 AC 11	28.69	4.81	abc
13 AC 12	27.64	4.66	abcd
13 AC 13	27.14	5.67	abcd
13 AC 14	26.29	4.06	cd
13 AC 15	28.28	5.46	abc
13 AC 16	29.34	5.06	a
Ortalama	27.52		
Max	29.34		
Min	25.49		

*: Duncan ($P < 0.01$).

Çizelge 4. Uygulanan yöntemlere göre genotiplerdeki saptanan stoma boyları (μm)

Genotip No	Kalıp Alma			Saydamlaştırma		
	Stoma Boyu (μm)	Standart Sapma	Farklılık (*)	Stoma Boyu (μm)	Standart Sapma	Farklılık (*)
13 AC 01	32.88	4.26	a	23.97	3.59	f
13 AC 02	24.60	3.66	h	26.83	3.08	cd
13 AC 03	27.79	4.44	fg	26.32	3.14	d
13 AC 04	21.68	4.49	i	29.31	5.39	a
13 AC 05	31.14	3.23	bc	24.50	4.36	f
13 AC 06	29.90	3.71	d	24.37	5.23	f
13 AC 07	31.07	4.09	bc	26.62	4.03	cd
13 AC 08	28.31	3.32	f	25.46	4.65	e
13 AC 09	31.81	3.24	ab	26.28	5.30	d
13 AC 10	26.86	3.62	g	26.06	3.76	d
13 AC 11	30.31	4.66	d	27.08	4.53	c
13 AC 12	28.47	4.35	ef	26.82	4.95	cd
13 AC 13	29.05	5.31	e	25.22	5.52	e
13 AC 14	28.32	4.13	f	24.26	2.87	f
13 AC 15	31.51	4.13	ab	25.06	4.74	ef
13 AC 16	30.61	6.08	cd	28.07	3.56	b
Ortalama	29.02		a*	26.01		b
Max	32.88			29.31		
Min	21.68			23.97		

*: Duncan ($P < 0.01$)

Ceviz stomaları böbrek şeklinde olup, uzunlukları kalıp alma yöntemiyle tespit edilenlerde 21.68-32.88 µm arasında, saydamlaştırma yöntemiyle belirlenenlerde ise 23.97-29.31 µm arasında değişmiştir.

TARTIŞMA ve SONUÇ

Stomalar (gözenekler) ceviz yaprağının alt tarafında yer alır ve birim alandaki (mm²) yoğunluğu çeşide ve uygulanan kültürel işleme ve tür ve çeşitlere göre değişmektedir (Düring 1980; Çağlar ve Tekin, 1999). Yapraklardaki stoma yoğunluğu tür ve çeşitlere, yaprağın güneşte ve gölgede olmasına, havanın sıcaklığına, rakıma, havadaki neme ve topraktaki suyun yayırlılığına göre değiştiği belirtilmektedir (Young ve ark. 2004).

Araştırmada kalıp alma yöntemindeki yaprakların, saydamlaştırma yöntemine göre birim alanda daha fazla stoma ihtiva ettiği belirlenmiştir. Aynı ceviz genotipi içerisinde Kalıp alma ve saydamlaştırma yönteminde yapraklarda bulunan stoma sayısı yönünden tespit edilen farklılık istatistiki olarak oldukça önemli ($p < 0.001$) bulunmuştur. Kalıp alma metodunda 13 ceviz genotipinde saydamlaştırma metoduna göre stoma yoğunluğunun daha yüksek bulunurken, saydamlaştırma metodunda 3 ceviz genotipinde stoma yoğunluğunun daha yüksek olduğu belirlenmiştir.

Stoma sayısının yoğunluğu çeşitlere has bir özellik olduğu; şiddetli su stresi altındaki koşullar söz konusu olmadıkça aynı çeşidin sulanan ve sulanmayan asma bitkilerinde stoma sayılarının değişimi itibariyle kesin bir farklılıktan söz etmenin mümkün olmadığı belirtilmektedir (Marasalı ve Aytekin 2003).

Yaptığımız araştırmada Adilceviz (Bitlis) yetişen 16 ceviz tipinin yapraklarındaki stoma yoğunlukları kalıp alma yönteminde 174.72-353.60 adet/mm² arasında değişmiştir. İncelenen 16 ceviz tipinin yapraklarındaki stoma yoğunlukları saydamlaştırma yönteminde 145.60-312.00 adet/mm² arasında değişmiştir. Daha önceki yapılan çalışmalarda tespit edilen stoma yoğunlukları, elde ettiğimiz stoma yoğunlukları açısından bir uyumun olduğu görülmektedir. Çalışmamızda araştırılan ceviz genotiplerinin yapraklarından alınan numunelerinin incelenmesi sonucunda, stoma sayısı ceviz genotiplerine göre farklılık göstermiştir. Stoma sayısı bakımından çeşitler arasındaki farklılığın oldukça önemli bulunması belirli koşullar altında stoma sayısının çeşide özgü olduğunu açıkça ortaya koymaktadır.

Çağlar ve ark., (2004) bildirdiğine göre; incelenen 10 ceviz tipinin yapraklarındaki stoma yoğunlukları 120-217 adet/mm² arasında değiştiğini, bitkilerin stoma büyüklüğü ve yoğunlukları üzerine ekolojik faktörler de etkili olduğunu kaydetmiştir. Yapılan araştırmada kalıp alma metodunda 13 ceviz tipinde saydamlaştırma metoduna göre stoma sayıları daha yüksek bulunurken saydamlaştırma metodunda 3 ceviz tipinin stoma sayısının daha yüksek olduğu belirlenmiştir. Saydamlaştırma yöntemiyle yapılan ölçümlerin sonucunda elde edilen stoma sayılarının, kalıp alma yöntemine göre daha az olduğu tespit edilmiştir. Stomalar ceviz yaprağının alt yüzeyinde (abaxial) yer alır. Ceviz yaprakları diğer bitkilere nazaran yaprakları kalındır. Yaprak yüzeyinde yoğun bir tüylülük bulunmamaktadır. Bu nedenle daha sonraki yapılacak olan çalışmalarda kalıp alma yönteminin yeterli olacağı kanısına varılmıştır. Saydamlaştırma yönteminin hem zaman aldığı hem de yapraktaki kalınlığın mikroskop altında incelenmesi sırasında netlik ayarının verilmesinde zorlanılmıştır. Sonuç olarak, stoma sayısının çeşide has bir nitelik olduğu kanısına varılmıştır. Elde edilen bulgulara dayanarak, saydamlaştırma yönteminde yaprakların tam olarak saydamlaşmasının 28-36 saat aldığı kullanılan piyasada satılan hipoların %17-20 saflıkta bulunduğu unutulmamalıdır. Hiponun kalitesinin önemli olduğu tespitlerimiz arasında bulunmaktadır. Yaprak yüzeyinin dip orta, üst



kısımlarından alınan örneklerde ceviz genotipleri arasındaki fark önemli bulunmamıştır. Ceviz stomaları böbrek şeklinde olup, uzunlukları kalıp alma yöntemiyle tespit edilenlerde 21.68-32.88 µm arasında, saydamlaştırma yöntemiyle belirlenenlerde ise 23.97-29.31 µm arasında değişmiştir. İncelenen ceviz tiplerinde stoma yoğunluğu ile stoma büyüklüğü arasında genel olarak ters bir ilişki bulunduğu dikkat çekmektedir.

KAYNAKLAR

- Akman, Y., 1985. *Botanik* (Hücre, Doku ve Organlar). 2. Baskı. Ankara Üniv. Fen *Fakültesi*. Okan Yayım Dağıtım. 276 s.
- Anonim, 2014. www. Bitlis.gov.tr
- Çağlar, S., Tekin H., 1999. Farklı Pistacia Anaçlarına Aşılı Antepfıstığı Çeşitlerinin Stoma Yoğunlukları Tr. J. of Agriculture and Forestry 23 (1999) Ek Sayı 5, 1029-1032
- Çağlar, S., Sütyemez, M., Bayazıt, S., 2004. Seçilmiş bazı ceviz (Juglans Regia) tiplerinin stoma yoğunlukları. Akdeniz Üniversitesi Ziraat Fakültesi Dergisi. 17 (2): 169–174.
- Çelik, H., Çelik, S., Kunter, B. M., Söylemezoğlu, G., Boz, Y., Özer, C., Atak, A., (2005). Bağcılıkta gelişme ve üretim hedefleri. *VI. Türkiye Ziraat Mühendisliği Teknik Kongresi*, 3-7.
- Düring, H., 1980. Stomata frenquenz Bei Blattern Von Vitis–Arten Und–Sorten. *Vitis*, 19: 91–98.
- Eriş, A., Soylu, A., (1992). Stomatal Density in Various Turkish Grape Cultivars. *Vitis - Special Issue* 382-389.
- Marasalı, B., AYTEKİN, A., (2003). Sulanan ve Sulanmayan Bağ Koşullarında Yetiştirilen Üzüm Çeşitlerinde Stoma Sayısının Karşılaştırılması. *Tarım Bilimleri Dergisi*, 9 (3): 370- 372.
- Şen, S.M., Kazankaya A, Yarılgaç T, Doğan A (2006). Bahçeden Mutfağa Ceviz. Maji Yayınları, 233s, Ankara
- Şen S.M., (1986). Ceviz Yetiştiriciliği. Eser Matbaası, 229, Samsun.
- Young T, Turner S, Torau S, Stanley B, Murphy K, Lee E, Kenny K, Hoffmaster R, Foster K, Cavanaugh B, Brunot R, Bradford K (2004). How Environmental Factors Affect Stomatal Density and Chlorophyll in Trees. Frostburg State University, <http://www.frostburg.edu/fsu/assets/File/clife/mscenter/FinalPapers/2004/Stoma%202004.pdf> (erişim tarihi, 26.06.2018).

İÇ ANADOLU BÖLGESİ'NDE NOHUT ÜRETİM PROFİLİNİN BULANIK KÜMELEME YAKLAŞIMIYLA ANALİZİ

ANALYSIS OF CHICKPEA PRODUCTION PROFILE IN CENTRAL ANATOLIA REGION BY FUZZY CLUSTERING APPROACH

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ÖZET

Tarımsal araştırmalarda veri yapılarının etkin bir şekilde kullanılabilmesi amacıyla kümeleme ve sınıflandırma çalışmalarında yapay zekâ tabanlı alternatif yöntemler araştırmacılar tarafından tercih edilmektedir. Danışmansız örüntü tanımlama tekniklerinden birisi olan Bulanık C-ortalamalar, bulanık mantık teorisinden yola çıkılarak geliştirilmiş bir kümeleme tekniğidir. Bu yöntemde, veri setinde yer alan gözlem değerleri üyelik dereceleri ile ifade edilmektedir ve üyelik derecelerine göre ait oldukları kümeler yerleşmektedirler. Bu çalışmada, çiftlik tipolojisinin belirlenmesi ve nohut üreticilerinin profilinin ortaya koyulması amacıyla temel bileşen tabanlı Bulanık C-ortalamalar algoritması önerilmeye ve değerlendirilmeye çalışılmıştır. Geçerlilik ölçütleri kullanılarak optimum küme sayısı elde edilmiştir. Araştırma bulguları, bulanık kümeleme analizinin nohut üretim profilini objektif bir şekilde yansıttığını ve alternatif çiftçilik tipolojisi belirleme yöntemlerinden birisi olabileceğini göstermektedir.

Anahtar Kelimeler: Bulanık kümeleme, Bulanık C-Ortalamalar, Nohut, Çiftlik Tipolojisi.

ABSTRACT

To use data structures effectively in agricultural research, artificial intelligence-based alternative methods are preferred by researchers in clustering and classification studies. Fuzzy c-means, one of the unsupervised pattern identification techniques, is a clustering technique developed based on fuzzy logic theory. In this method, the observation values in the data set

are expressed with membership degrees, and they are placed in the clusters they belong to according to their membership degrees. In this study, a principal component-based fuzzy c-means algorithm was tried to be proposed and evaluated to determine the farm typology and reveal the profile of chickpea producers. The optimum number of clusters was obtained by using the validity criteria. Results show that fuzzy cluster analysis reflects the chickpea production profile objectively and can be one of the alternative farming typology determination methods.

Keywords: Fuzzy clustering, Fuzzy C-Means, Chickpea, Farm Typology.

GİRİŞ

Yaklaşık olarak 7400 yıl önce ilk yetiştiriciliği bugünkü Türkiye sınırları içerisinde yapılmış nohut 43 tür ile temsil edilmektedir ve bunların 42 tanesi yabancı türler iken yalnızca bir tanesi kültüre alınmış ve tarımı yapılmaktadır (Ladizinsky ve Adler 1976). Nohut dünyada fasulyeden sonra en çok yetiştirilen ikinci baklagil ürünüken, Türkiye’de en çok yetiştirilen baklagil ürünü konumundadır. Türkiye dünyada önemli nohut üreticisi ülkelerden birisidir. Hindistan, Avustralya ve Pakistan’ın ardından en çok nohut üretimi yapan dördüncü ülke konumundadır (Çevik ve Değer, 2019). Nohut insan tüketimi için yetiştirilen en önemli baklagillerden biridir. Dünyanın farklı yerlerinde yaygın olarak üretilip ve tüketilmektedir. Küresel yemeklik tane baklagil üretiminde nohutun payı yaklaşık yüzde 17 dir. Kolayca sindirilebilen proteinlerin çok zengin bir kaynağıdır ve ayrıca magnezyum, çinko, kalsiyum, fosfor ve demir gibi mineraller açısından da zengindir.

Yaklaşık otuz yıllık bir durgunluk döneminden sonra, son yirmi yıl içinde küresel nohut üretiminde büyük bir dönüşüm yaşanmıştır. Küresel nohut üretimi ve verimi bu yıllarda çok önemli bir artış görmekle kalmamış, nohut üretim alanı hem büyük nohut yetiştiricisi ülkelerde hem de ihracat için nohut yetiştirilmeye başlanan ülkelerde yeni alanlara doğru genişlemiştir (Rawal and Navarro, 2019). Nohutun yemeklik tane baklagiller ekim alanı ve üretimi içindeki payı 1990’lı yıllardan bu yana istikrarlı bir şekilde artmıştır. Ortalama küresel verim 1989–91’de hektar başına yaklaşık 706 kilogramdan 2015-17’te hektar başına yaklaşık 943 kilograma yükselmiştir. Asya ülkelerinin çoğunda nispeten daha düşük verime karşı, ABD’de hektar başına 1706 kilogramdan Kanada’da hektar başına 2077 kilograma kadar önemli ölçüde yüksek nohut verimi elde edilebilmektedir (FAOSTAT, 2019).

Nohut üretiminin büyük bölümü tüketim için yetiştirildiği ülkelerde yoğunlaşmaya devam etmektedir. Küresel nohut üretiminin yaklaşık yüzde 12’si uluslararası ticarete konu olmaktadır (Rawal and Navarro, 2019). Hindistan, küresel üretimde yaklaşık yüzde 64’lük payı ile dünyanın en büyük nohut üreticisidir. Türkiye nohut ekim alanında %2,8 ile ilk 6 ülke, üretimde ise %3,8’lik pay ile ilk 5 ülke arasındadır (2015-2017 Ortalaması) (FAOSTAT, 2019). Birçok nohut üreten ülkede nohutun potansiyel ve gerçek verimleri arasında büyük boşluklar vardır. Çeşitli biyotik ve abiyotik stresler bu verim açıklarından sorumludur. Kuraklık ve ısı gibi meteorolojik etmenler potansiyel olarak daha az nohut verimi elde edilmesinde en önemli nedenler arasındadır (Rawal and Navarro, 2019).

FAO’nun dünya nohut ticaretine yönelik 2017 yılı verilerine göre, nohut ihracatında Avustralya birinci sırada yer alırken ABD ikinci, Arjantin ise üçüncü sırada yer almaktadır. Türkiye’nin ihracattaki payı ise %0,77 oranla 12. sıradadır. Nohut ticareti, Dünya’da üretilen nohudun yaklaşık %15’ine konu olmaktadır. Kalan kısım ise, üretici ülkelerin iç tüketiminde değerlendirilmektedir. Dünyada nohut ağırlıklı olarak Asya, Afrika ve Amerika kıtalarında üretilmektedir. Nohut üretiminde birinci sırada yer alan Hindistan, 2017 yılı dünya nohut

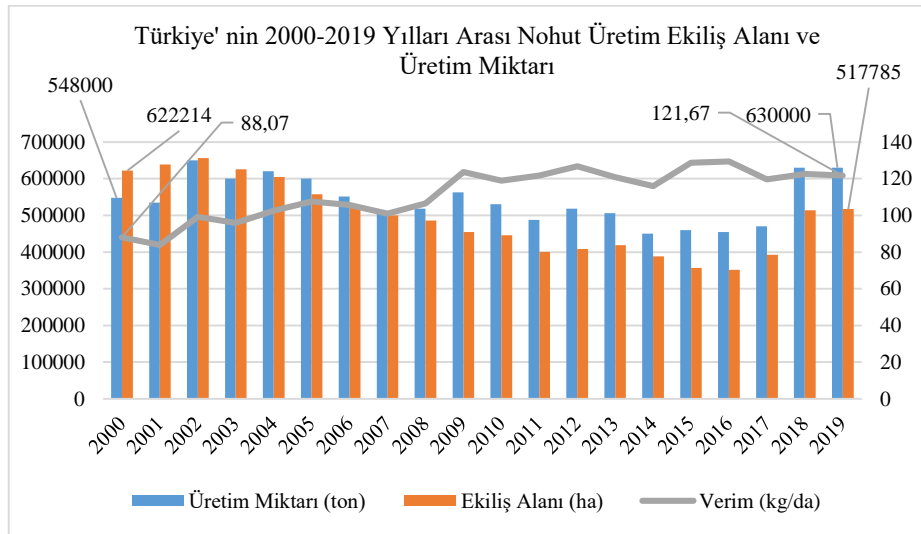
ithalatının yaklaşık %46,63'ünü yapmıştır. Türkiye ise önceki yıla oranla ithalatı 3 katına çıkararak 90 bin tonla, dünya sıralamasında 6. sırada yer almaktadır.

Çizelge 1. Dünya Nohut İhracat ve İthalatının Önemli Ülkeler Bazında Dağılımı (2017)

Ülkeler	İthalat Miktarı (Ton)	%	Ülkeler	İthalat Miktarı (Ton)	%
Avustralya	1785580	59,28	Hindistan	1553069	46,63
ABD	188847	6,27	Pakistan	495992	14,89
Arjantin	166645	5,53	Bangladeş	190322	5,71
Kanada	154671	5,14	BAE	145287	4,36
Rusya	147444	4,90	İran	121217	3,64
Meksika	142861	4,74	Türkiye	90241	2,71
Türkiye (12. sıra)	23273	0,77	Cezayir	78850	2,37
Dünya	3012021	100,00	Dünya	3330518	100,00

Kaynak: FAOSTAT, 2020

Türkiye' de, 2000 yılında nohut ekiliş alanı 622.214 ha, üretim miktarı 548.000 ton ve dekara ortalama verim 88,07 kg/ da olarak görülmüştür. 2019 yılında ise, ekiliş alanı 517.785 ha, üretim miktarı 630.000 ton ve dekara ortalama verim 121,67 kg/ da olarak belirlenmiştir (Şekil 1). Buradan hareketle, ekiliş alanının %16,78 azalış, üretim miktarının %14,96 artış ve dekara verimin %38,15 oranında artış gösterdiği ifade edilebilir.



Şekil 1: Türkiye' de 2000-2019 Yılları Arası Nohut Üretim Ekiliş Alanı, Üretim Miktarı ve Verimi (FAO, 2021)

Araştırma kapsamında il' de üretilen nohudun son 10 yıldaki ekiliş alanı, üretim ve verim parametrelerindeki değişim Çizelge 2' de verilmiştir (TUİK, 2019). Söz konusu illerden ekiliş alanı bakımından sadece Çorum negatif ayrışırken diğer illerin tamamında artış söz konusu olmuştur. Ancak verim için aynı şeyi söylemek mümkün değildir. Kırşehir, Çorum ve Yozgat illeri haricindeki diğer illerde verimde önemli azalışlar söz konusudur. Üretim miktarında ise tüm illerde artışlar olduğu belirlenmiştir.

Çizelge 2. Araştırma Alanında Yıllara Göre Nohut Ekiliş alanı, üretim miktarı ve verim

Nohut			
İller	Ekilen Alan (Da)	Verim (Kg/Da)	Toplam Üretim (Ton)
2009			
Karaman	99304	128	12688
Konya	244640	142	34807
Kırşehir	191024	110	20960
Çorum	237500	117	27816
Yozgat	261286	120	31324
Nevşehir	39950	110	4175
Türkiye	4559344	124	562564
2019			
Karaman	208377	126	26342
Konya	336196	139	46858
Kırşehir	606715	117	70813
Çorum	189045	152	28701
Yozgat	600985	144	68614
Nevşehir	93624	88	8251
Türkiye	5205951	122	630000
Fark (%)			
Karaman	109,84	-1,56	107,61
Konya	37,42	-2,11	34,62
Kırşehir	217,61	6,36	237,85
Çorum	-20,4	29,91	3,18
Yozgat	130,01	20	119,05
Nevşehir	57,33	-25,00	49,40
Türkiye	14,18	-1,61	11,99

Kaynak: TÜİK, 2019.

Bu araştırmada, Karaman, Konya, Kırşehir, Çorum, Yozgat ve Nevşehir illerinde nohut üretim profilinin bulanık kümeleme yöntemiyle ortaya koyulması amaçlanmıştır. Söz konusu iller Türkiye nohut üretiminin yaklaşık %40' ını oluşturmaktadır. Elde edilen sonuçlar üretim tipolojisinin, üretici profilinin ve bunlara bağlı olarak ülkesel ve bölgesel politikaların oluşmasında önemli görülmektedir.

MATERYAL VE YÖNTEM

Çalışmanın materyali, Türkiye'de Orta Anadolu Bölgesi'nde Çorum, Karaman, Kırşehir, Konya, Nevşehir ve Yozgat illerinde nohut üretimi yapan 644 çiftçiyi kapsayan bölgesel düzeyde gerçekleştirilen kapsamlı bir anket çalışmasıyla elde edilmiştir. Anket çalışmasının gerçekleştirildiği üretim bölgeleri, Türkiye'nin İç Anadolu bölgesinde nohut üretiminin yaklaşık %40' ını oluşturan iller arasından seçilmiştir. Çalışmanın analizleri SPSS 21 istatistiksel paket program ile gerçekleştirilmiştir.

Çizelge 2. İç Anadolu Bölgesi nohut üreticileri anketlerinin illere göre dağılımı.

İller	Üretici Sayısı	%	Verim Ortalaması	Std. Sapma
Çorum	80	12.4	10123.85	18669.13
Karaman	68	10.6	4713.514	4760.906
Kırşehir	178	27.6	14364.62	21030.41
Konya	94	14.6	8598.611	18036.09
Nevşehir	42	6.5	2589.881	2418.444
Yozgat	182	28.3	7133.049	10332.93
Total	644	100	9165.512	16066.79

KÜMELEME VE BULANIK C-ORTALAMALAR

Tarımsal veri yapılarının kümeleneşmesi, çeşitli yapısal farklılıklar nedeniyle heterojenlik sergileyen popülasyonların karakterizasyonunda karar alıcı birimlere oldukça faydalı bilgiler sağlamaktadır. Kümeleme analizlerinin temel amacı, bir sistem davranışının temsilini üretmek için büyük bir veri setinden doğal veri gruplarını tanımlamaktır. Bu amaç doğrultusunda, veri yapısındaki homojen grupları belirlemek için çeşitli modelleme algoritmaları kullanılmaktadır. Ham verilerde doğal olarak birbirinden farklı olarak şekillenen gruplar kendi içlerinde homojen, kendi aralarında ise heterojen olmaktadır.

Bulanık kümeleme analizi başta tarım bilimleri olmak üzere çeşitli uygulamalı bilim dallarında başarılı çalışmalara konu olmuştur. Bulanık kümelemenin kökeni, Zadeh (1965)'in bulanık mantık hakkında fikirlerine dayanmaktadır. Bulanık mantık teorisi ilk kez Zadeh'in bulanık küme teorisi hakkında yapmış olduğu araştırma ile bilim dünyasında tanınmıştır. Klasik mantıkta “0” ve “1” gibi kesin ayrımların yanında ara değerlerin de dikkate alınması gerektiğini belirten Zadeh, olayların [0,1] aralığında belli bir derece ile gösterildiğini ifade etmiştir (Zadeh, 1965). Bulanık kümeleme yöntemi Bellman ve ark., (1966) ve Ruspini'nin [8] çalışmalarıyla literatüre kazandırılmıştır. Bulanık C-Ortalamlar algoritmasını Dunn [3] tarafından formüle edilmiştir ve ilerleyen süreçlerde Bezdek (1980) tarafından geliştirilmiştir. Bulanık C-Ortalamlar, her veri noktasının bir üyelik derecesi ile belirtildiği ve belirli bir dereceye kadar bir kümeye ait olduğu veri kümeleme tekniğidir. Literatürde yer alan diğer kümeleme tekniklerine alternatif olarak geliştirilen bu yöntemde, bazı çok boyutlu uzayları belirli sayıda farklı kümeye yerleştiren veri noktalarının gruplandırılması anlatılmaktadır (Soto ve ark., 2007).

Bulanık C-Ortalamlar, her bir veri noktasının farklı üyelik derecelerine sahip birden çok kümeye ait olmasına izin veren bir kümeleme yöntemidir. Bulanık C-Ortalamlar yönteminde Eşitlik 1'de tanımlanan amaç fonksiyonunun minimizasyonu gerçekleştirilmektedir.

$$J_m = \sum_{i=1}^D \sum_{j=1}^N \mu_{ij}^m \|x_i - c_j\|^2 \quad [1]$$

Eşitlik 1'de yer alan amaç fonksiyonunun bileşenleri şu şekilde özetlenmiştir: D , veri noktalarının sayısı; N , küme sayısı; x_i i^{th} veri noktası; c_j , j^{th} küme merkezi; μ_{ij} , x_i j^{th} kümede üyelik derecesidir. Belirli bir veri noktası için (x_i) tüm kümeler için üyelik değerlerinin toplamı birdir.

Bulanık C-Ortalamlar kümeleme analizinde aşağıdaki adımlar izlenmektedir:

1. Küme üyelik değerlerini rastgele başlatılır, μ_{ij} .
2. Küme merkezlerini hesaplanır (Eşitlik 2):

$$c_j = \frac{\sum_{i=1}^D \mu_{ij}^m x_i}{\sum_{i=1}^D \mu_{ij}^m} \quad [2]$$

3. Küme üyelik değerleri μ_{ij} güncellenir:

$$\mu_{ij}^m = \frac{1}{\sum_{k=1}^N \left(\frac{\|x_i - c_j\|}{\|x_i - c_k\|} \right)^{\frac{2}{m-1}}} \quad [3]$$

4. Amaç fonksiyonu hesaplanır, J_m .

5. Amaç fonksiyonu belirtilen minimum eşikten daha az iyileşene kadar veya belirtilen maksimum yineleme sayısından sonraya kadar 2-4 arasındaki adımları tekrarlanır.

BULGULAR

Araştırma bulgularının ilk bölümü temel bileşenler tabanlı bulanık kümeleme analizi sonuçlarından oluşmaktadır. Bulguların diğer bölümünde ise bulanık kümeleme ile elde edilen kümelerin Mann-Whitney U testi ile karşılaştırılma sonuçlarına yer verilmiştir.

Bulanık kümeleme analizinde nesnelere kümeleme başarısı Silhouette katsayısı $s(i)$ ile belirlenir ve Silhouette katsayısı $-1 < s(i) < 1$ arasında bir değer alır (Görgülü, 2008).

Çizelge 3: Kümeler için $s(\bar{i})$ ve $s(\bar{i})$ değerleri

Küme Sayısı	$s(\bar{i})$					$s(\bar{i})$
	1	2	3	4	5	
2	0,4982	0,5017				0,5071
3	0,3387	0,3388	0,3224			0,3613
4	0,2739	0,2739	0,2739	0,1782		0,3468
5	0,1983	0,2011	0,1984	0,2007	0,2013	0,2060

Çizelge 3'te yer alan bulgularda, küme sayısının 2 olduğu durumda gözlem değerlerinin birinci kümeye göre daha kararlı ve homojen olduğu gözlenmiştir. Veri setini oluşturan nohut üreticilerinin kümeleme başarısı incelendiğinde, küme sayısının 2 olduğu durumun diğerlerine göre daha yüksek $s(\bar{i})$ değerine sahip olduğu görülmektedir. Çizelge 4'te Dunn katsayısı sonuçları yer almaktadır. Bulanıklık derecesini ifade eden Dunn katsayısı bulgularında en uygun küme sayısının 2 olduğu görülmektedir. Bu sonuç Silhouette katsayısı bulguları ile benzerlik göstermektedir. Bulanık kümelemenin klasik kümelemeye olan uzaklığı Dunn ayrıştırma katsayısı ile değerlendirilmektedir ve elde edilen kümenin ne kadar bulanık olduğu hakkında fikir verir.

Çizelge 4: Küme sayısına göre ayrıştırma katsayıları

	2	3	4	5
Dunn	0.5001	0.3365	0.3097	0.2001

Çizelge 5: Bulanık C- Ortalama Kümeleme ile belirlenen üretici kümelerinin özellikleri

Değişkenler	Küme1	Küme2	MeanRank1	MeanRank2	Sig.
<i>Kişisel Özellikler</i>					
Çiftçi Yaşı	45,7159±0,7433	50,8684±0,5897	278,46	353,1	0,000**
Öğrenim Durumu	4,0152±0,07796	3,9816±0,06629	325,4	320,49	0,733
Ana Gelir	1,2311±0,02599	1,4421±0,02551	282,4	350,36	0,000**
Tecrübe	24,3523±0,67867	28,2868±0,6839	287,93	346,52	0,000**
İş Gücü	3,0095±0,07954	2,9901±0,06701	323,28	321,96	0,929
<i>Üretim Deseni</i>					
Parsel Büyüklüğü	30,1739±2,28047	26,1805±1,22347	324,05	321,42	0,86
Verim	109,9634±3,38237	91,1391±2,62871	363,73	293,86	0,000**
Baklagil Oranı	31,2385±0,96328	33,8554±0,66323	306,83	333,38	0,074
<i>Maliyet Unsurları</i>					
Sürüm Maliyeti	41,6742±2,34776	39,4868±1,1846	307,94	332,62	0,097

Ekim Maliyeti	129,238±4,64949	131,6038±3,61416	333,68	314,73	0,204
H. Gübre Uygulaması	1,7963±0,34625	0,7919±0,15301	339,15	310,93	0,003*
Taban Gübre	29,7094±1,82076	20,9386±1,24956	354,97	299,94	0,000*
Üst Gübre	14,2601±1,2288	1,0734±0,3217	391,64	274,47	0,733
Hastalık Zararlı Maliyeti	29,7066±1,34329	31,8389±0,89155	307,54	332,89	0,089
Sulama	30,3523±2,99302	11,5395±3,04753	375,05	285,99	0,000*
Hasat Maliyeti	22,2462±0,31867	21,3342±0,22595	354,49	300,28	0,000**
Taşıma Maliyeti	11,4432±0,66511	7,7474±0,70262	402,93	266,63	0,000*
Satış Fiyatı	3,5521±0,09717	3,2718±0,02494	271,65	357,83	0,000**

*İstatistiksel açıdan önemli- Mann-Whitney U Test, *P<0.05, **P<0.01, SE=Standard error*

Çizelge 5 ve Çizelge 6’da Bulanık C- Ortalama kümeleme tekniği sonucu elde edilen kümelerin Mann-Whitney U testi ile karşılaştırma sonuçları yer almaktadır. Analiz sonuçları iki küme arasında kişisel özellikler bakımından incelendiğinde yaş, tecrübe ve ana gelir durumunun istatistiksel açıdan önemli olduğu görülmüştür ($p<0.05$). Toplam verim değişkeni ile çeşitli maliyet unsurlarının da küme grupları arasında önemliliğe sahip olduğu belirlenmiştir ($p<0.05$). Tohum temini, risk algısı, kurum üyeliği ve pazara uzaklık değişkenleri dışındaki unsurların istatistiksel açıdan önemli bir farklılığa sahip olduğunu göstermektedir.

Çizelge 6: Bulanık C- Ortalama Kümeleme ile belirlenen üretici kümelerinin özellikleri (devam).

Değişkenler	Küme1	Küme2	MeanRank1	MeanRank2	Sig.
Tohum Temini					
Tohum Miktarı	1,4697±0,0347	1,4026±0,03588	343,84	307,68	0,003**
Tohum Çeşidi	1,3144±0,0305	1,2263±0,02535	341,46	309,33	0,004**
Karlılık Paylaşımı	22,2159±1,217	30,25±1,02123	277,46	353,79	0,000**
Üretici Tutumu					
Tarımsal Risk Algısı	2,0606±0,05327	1,5684±0,04275	380,2	282,41	0,000**
Teknoloji	1,4811±0,03638	1,4132±0,03355	338,99	311,04	0,027
Ekipman	1,5±0,0364	1,4237±0,03193	338,36	311,48	0,036
Gelir	2,072±0,02779	2,0316±0,02199	329,54	317,61	0,245
Genel Bilgiler					
Kooperatif, Oda, Üretici Birliği Üyeliği	1,3295±0,02898	1,4184±0,02534	305,61	334,23	0,023
Bilgi Kaynağı	0,4091±0,03032	0,1421±0,01794	373,23	287,26	0,000**
Pazara uzaklık	19,9011±0,9133	19,0068±0,62024	321,71	323,05	0,928
Üretimi Riskli Bulma	7,5189±0,1332	6,4711±0,09378	382,76	280,64	0,000**
Son 5 Yılda Değişim	2,5417±0,08135	3,5816±0,06436	241,05	379,09	0,000**

*İstatistiksel açıdan önemli- Mann-Whitney U Test, *P<0.05, **P<0.01, SE=Standard error*

Çizelge 7: Kümelerin bölgelere göre dağılımı

		İller						
		Çorum	Karaman	Kırşehir	Konya	Nevşehir	Yozgat	Toplam
Küme1	n	3	68	3	39	0	151	264
	%	3,80%	100,00%	1,70%	41,50%	0,00%	83,00%	41,00%
Küme2	n	77	0	175	55	42	31	380
	%	96,30%	0,00%	98,30%	58,50%	100,00%	17,00%	59,00%
Toplam	n	80	68	178	94	42	182	644
	%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%

$$\chi^2 = 419.203, p < 0.05.$$

Çizelge 7’de elde edilen bulgular incelendiğinde Bulanık C-Ortalamalar kümeleme tekniği ile elde edilen kümelerin araştırmaya konu olan illere göre dağılımı görülmektedir. Buna göre Yozgat ve Karaman illeri ile Çorum, Kırşehir, Nevşehir ve kısmen Konya illerinin benzer profil yapılarına sahip olabileceği şeklinde yorumlamalar yapılabilmektedir.

SONUÇ

Tarım işletmeleri ile ilgili kümeleme ve tipoloji çalışmaları işletmelerin güçlü ve zayıf yönlerinin ortaya çıkarılması, teknolojik çözümler üretilmesi ve uygun tarım politikalarının oluşturulmasında oldukça önemlidir. Son yıllarda klasik yöntemlerin yanı sıra yapay zeka temelli özellikle de danışmansız örüntü analizine dayalı yöntemler tarımsal alanda oldukça başarı bir şekilde kullanılmakta ve başarılı sonuçlar ortaya koymaktadır.

Bu çalışmada, üretici örüntülerini karakterize etmek ve nohut üreticilerinin karakterizasyonunu belirlemek için Bulanık C-Ortalamalar analizi kullanılmıştır. Araştırma sonuçları, kullanılan PCA tabanlı Bulanık C-Ortalamalar yönteminin sosyo-ekonomik, üretim, maliyetler ve çiftçi tutumları değişkenlerine dayalı olarak nohut yetiştiricileri incelemek ve üretici profilini belirlemek için uygun bir araç olduğu düşünülmektedir. Kullanılan parametreler yönüyle, üretici profili bakımından Çizelge 7’ de elde edilen sonuçlar ışığında Yozgat ve Karaman illerinin benzer profilde, Çorum, Kırşehir, Konya ve Nevşehir’ inde aynı profilde üreticiye sahip olduğu ifade edilebilir. Ürün bazlı politikalar, bölgesel politikalar, yöresel politikalar vb, nispeten daha spesifik oluşturulacak politikalarda bu durumun göz önünde bulundurulması yöre üreticisi açısından daha yararlı olacağı gibi, politika yapıcılar açısından da daha etkili sonuçların alınabileceği bir durumu ortaya koyabilecektir.

KAYNAKLAR

- Bellman, R., Kalaba, R., & Zadeh, L. (1966). Abstraction and pattern classification. *Journal of Mathematical Analysis and Applications*, 13(1), 1-7.
- Ruspini, E. H. (1969). A new approach to clustering. *Information and control*, 15(1), 22-32.
- Soto, J., Aguiar, M. I. V., & Flores-Sintas, A. (2007). A fuzzy clustering application to precise orbit determination. *Journal of computational and applied mathematics*, 204(1), 137-143.



- Görgülü, Ö. (2008). Hayvancılık Bakımından Türkiye'de Bulunan İllerin Benzerlikleri Bulanık Kümeleme Analizi İle Belirlenmesi. TÜİK, 17. İstatistik Araştırma Sempozyumu Bildiriler Kitabı, 2008.
- Zadeh, L. (1965). Fuzzy sets, Inform. and Control (1965) 338–353.
- Ladizinsky, G. ve Adler, A. (1976) Genetic relationships among the annual species of Cicer L. Theor. Appl. Genet, 48: 197-203.
- Çevik, S. & Değer, A. G. (2019). Mersin’de Nohut Üretimi ve Kuraklığın Nohut Gelişimi Üzerine Etkileri . Dünya Multidisipliner Araştırmalar Dergisi , 2019 (1) , 25-34 . Retrieved from <https://dergipark.org.tr/en/pub/dumad/issue/52640/693318>
- Rawal, V. and Navarro, D. K., eds. 2019. The Global Economy of Pulses. Rome, FAO.
- FAOSTAT, 2020. Crop Statistics. <http://www.fao.org/faostat/en/#data/QC>
- FAOSTAT, 2021. Crop Statistics. <http://www.fao.org/faostat/en/#data/QC>
- TUİK, 2019. www.tuik.gov.tr

NOHUT ÜRETİCİLERİNDE RİSK GRUPLARININ BELİRLEYİCİLERİ: İÇ ANADOLU BÖLGESİ ÖRNEĞİ

CHARACTERISTICS OF RISK GROUPS IN CHICKPEA PRODUCERS: CASE STUDY FOR CENTRAL ANATOLIA REGION

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ÖZET

Bu çalışmada, İç Anadolu Bölgesi'nde nohut üretimi gerçekleştiren çiftçilerin riske karşı tutumlarını etkileyen faktörlerin belirlenmesi amaçlanmıştır. Faktörlerin belirlenmesinde Multinomial Logit model kullanılmıştır. Multinomial logit model, bağımlı değişkenin iki değerli olduğu durumlarda değişkenler arasındaki ilişkinin araştırılmasında tarımsal alanda oldukça yaygın şekilde kullanılan yöntemlerden birisidir. Multinomial Logit regresyon modeli, iki durumlu Logit modelin ikiden fazla kategorisi için genişlemiş bir versiyonudur ve bu yöntemde bağımsız değişkenlerin sıralama içermeyen bağımlı değişken kategorisi üzerindeki etkisi bir bütün olarak aynı anda incelenmektedir. Analizlerde bağımlı değişken “risk almayı seven”, “riske duyarlı” ve “riskten kaçınan” olmak üzere üç kategori halinde ele alınmıştır. Referans grup riske karşı nötr olan çiftçi grubu alınmıştır. Buna göre, çiftçilerin riske karşı tutumları modelde yer alan bağımsız değişkenlerin etkisi açısından incelenmiştir. Analiz bulguları, modelin istatistiksel olarak kullanılabilir olduğunu ve istatistiksel açıdan anlamlı çıkan değişkenlerin satış fiyatı, maliyet unsurları, çiftçilerin eğitim seviyesi, pazara uzaklık, tarımsal konularda başvurulan bilgi kaynakları, verim miktarı ve kooperatif üyeliği olduğunu göstermektedir.

Anahtar Kelimeler Multinomial Logit, Nohut Üretimi, Risk, Tarım.

ABSTRACT

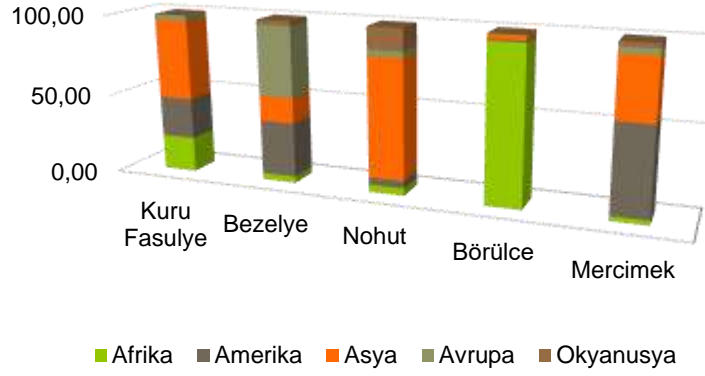
In this study, it was aimed to determine the factors affecting the attitudes of the farmers producing chickpea in the Central Anatolia Region towards risk. The Multinomial Logit model was used to determine the factors. The multinomial logit model is one of the most widely used methods in agriculture in investigating the relationship between variables when the dependent variable is binary. The Multinomial Logit regression model is an expanded version of the two-state Logit model for more than two categories. In this method, the effect of the independent variables on the dependent variable category without ranking is examined entirely at the same time. In the analyzes, the dependent variable was considered in three categories as "risk-taking", "risk-neutral" and "risk-averse". The reference group is the farmer group that is neutral to risk. Accordingly, farmers' attitudes towards risk were examined in terms of the effect of independent variables in the model. Results of analysis show that the model is statistically usable and the variables that are statistically significant are the selling price, cost elements, farmers' education level, distance to the market, information sources consulted on agricultural issues, yield and cooperative membership.

Keywords: Multinomial Logit, Chickpea Production, Risk, Agriculture.

GİRİŞ

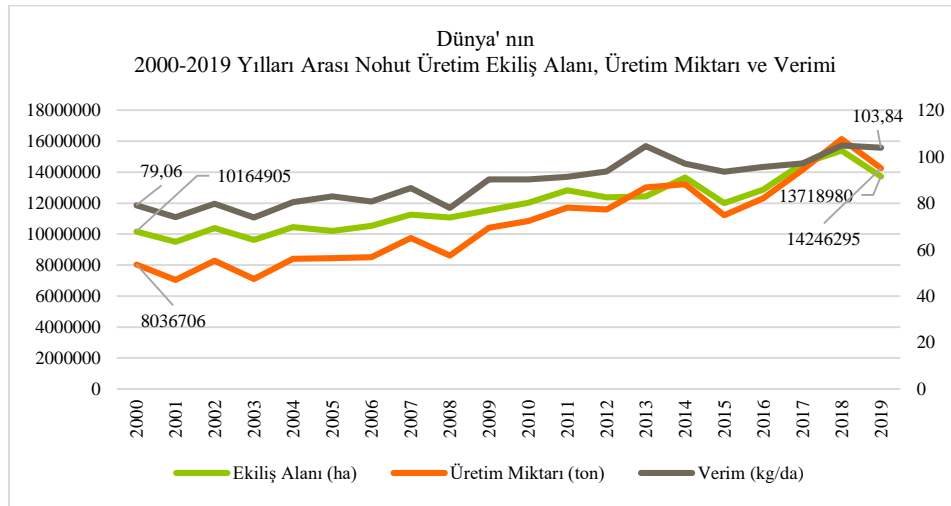
İnsan beslenmesinin en önemli unsuru olan tarımsal üretimin sürdürülebilirlik ilkesi çevresinde artırılması ve bölüşümde adaletin sağlanması birçok ülkenin stratejik hedefleri arasındadır. Özellikle gelişmiş ülkelerde gıda güvencesi konusunda önemli sıkıntılar olmasa da dünyada pek çok ülkede açlık ve dengesiz beslenme, önemli bir sorun olup, her yıl binlerce insanın hastalanmasına ya da ölmesine neden olmaktadır. Açlık ve dengesiz beslenme sorunlarını çözebilmek amacıyla tarımsal üretimin özellikle de bitkisel üretimin artırılması gereklidir. İnsanlar, protein gereksinimlerini ya bitkisel kaynaklı proteinlerden ya da hayvansal kaynaklı proteinlerle karşılamaktadırlar. Hayvansal kaynaklı proteinlerin, iklim koşullarının uygun olmaması vb nedenlerle sağlanamadığı bölgelerde, gerekli proteinin tamamlanabilmesi amacıyla bitkisel kaynaklara yönelim olmaktadır. Bu durumda da bitkisel protein açığının kapatılmasında yemeklik dane baklagiller oldukça önemlidir.

Baklagiller familyasına giren bitkilerin tümü kutup bölgeleri hariç dünyanın diğer bütün iklim şartlarında tek yıllık ve çok yıllık olmak üzere yetiştirilmektedir. Genel kapsamda 12.000 türü kapsamakta ve bunlardan sadece 200 türün tarımı yapılmaktadır. Bu türlerin içerisinde yemeklik dane baklagil olarak kullanılanlar fasulye (*Phaseolus vulgaris* L.), nohut (*Cicer arietinum* L.), mercimek (*Lens culunaris* Medik., *Lens esculenta* Moench.), bakla (*Vicia faba* L.), börülce (*Vigna sinensis* L.) ve bezelye (*Pisum sativum* L.)'dir (Akçin 1988). Yemeklik dane baklagiller; kuru tanelerinde %18 – 36 oranında protein içermeleri, proteinlerinin hazmolabilirlik derecelerinin (% 78) oldukça yüksek olması nedeniyle hem insan, hem de hayvan beslenmesinde, Rhizobim bakterileri ile ortak yaşama girerek havanın serbest azotunu fikse etmeleri nedeniyle ekim nöbetinde çok önemlidir (Çiftçi, 2004). Yemeklik baklagillerin sap ve samanlarının tahıl samanına göre iki katına yakın oranda protein içermesi hayvan beslenmesinde de önemlerini arttırmaktadır. Dünyada 2017 yılı itibari ile en fazla üretilen yemeklik tane baklagiller sırasıyla fasulye, nohut, bezelye börülce, mercimek ve bakladır (FAOSTAT, 2019). Kuru fasulye ve nohut Asya ülkelerinde yoğun üretilirken bezelye Avrupa'da, mercimek Amerika'da ve börülce ise Okyanusya ülkelerinde yaygın üretime sahiptir (Şekil 1).



Şekil 1. Dünyada Yemelik Tane Baklagiller Üretim Miktarının Bölgesel Dağılımı (%) (FAOSTAT, 2019)

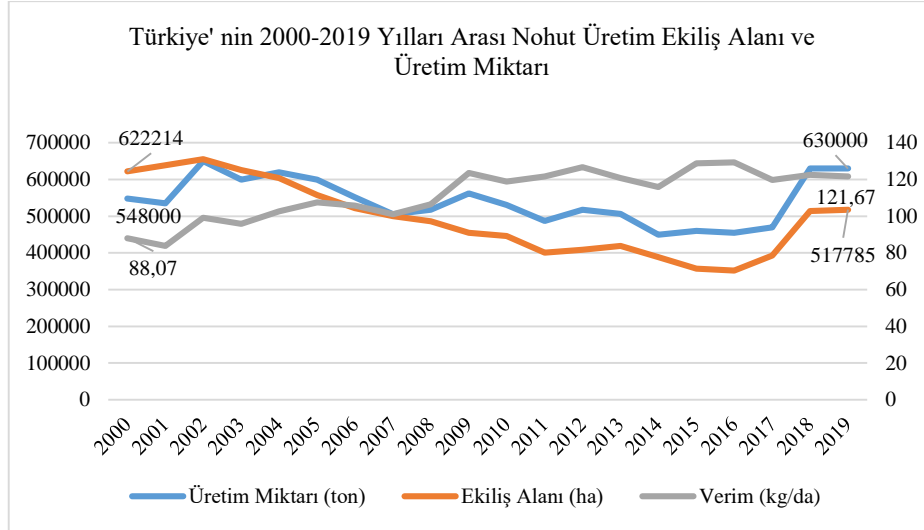
Nohut ise, yemelik dana baklagiller içerisinde yer alan, üretimi ve tüketimi yönünden oldukça önemli bir üründür. Dünya’ da özellikle kurak alanlarda yetiştirilen ve ülkeler itibariyle de çeşitli politikalarla desteklenmektedir.



Şekil 2. Dünya' nın 2000-2019 Yılları Arası Nohut Üretim Ekiliş Alanı, Üretim Miktarı ve Verimi (FAO,2021)

2000 yılında Dünya nohut ekiliş alanı 10.164.905 ha, üretimi 8.036.706 ton ve dekara verimi ortalama 79,06 kg/da olarak ifade edilmektedir. 2019 yılında ise, ekiliş alanları 13.718.980 ha, üretim miktarı 14.246.295 ton ve dekara verimi ortalama 103,84 kg/ da belirtilmiştir. Buradan hareketle, dekara verimin %31,34, ekiliş alanının %34,96 ve üretim miktarının %77,26 oranında arttığını söylemek mümkündür. Türkiye’ de nadas alanlarının daraltılması projesinde yer almış ve desteklenmiştir.

Baklagillerin iklim ve toprak özellikleri dikkate alındığında ülkemizin büyük bir baklagil yetiştirme potansiyeline sahip olduğu bilinmektedir. Baklagil üretimi ülke geneline yayılmış olmakla beraber nohut, Orta Anadolu ve geçit bölgelerinde yetiştirilmektedir. Çalışmanın konusunu oluşturan nohut önemli bir üründür. Hem beslenme olanakları yönünden, hem tarımsal değer ve katma değer oluşturması yönünden üretimi devlet tarafından da desteklenmektedir. Nadas Alanlarının Daraltılması Projesinde yer almış ve halen üretimi desteklenmektedir.



Şekil 3. Türkiye’ de 2000-2019 Yılları Arası Nohut Üretim Ekiliş Alanı, Üretim Miktarı ve Verimi (FAO, 2021).

Şekil 3 incelendiğinde, Türkiye’ de 2000 yılında nohut ekiliş alanı 622.214 ha, üretim miktarı 548.000 ton ve dekara ortalama verim 88,07 kg/ da olarak görülmüştür. 2019 yılında ise, ekiliş alanı 517.785 ha, üretim miktarı 630.000 ton ve dekara ortalama verim 121,67 kg/ da olarak belirlenmiştir. Buradan hareketle, ekiliş alanının %16,78 azalış, üretim miktarının %14,96 artış ve dekara verimin %38,15 oranında artış gösterdiği ifade edilebilir.

Şekil 2 ve Şekil 3’ teki veriler değerlendirildiğinde, tarım sektörünün bütününe kapsayan ve bu çalışmada nohut özelinde de söylenmesi mümkün olan risk veya belirsizlik kaynaklı üretim süreçlerindeki dalgalanmaları izlemek mümkündür. Bu risk ve belirsizliklerden bazılarını; ürün için uygun olan zamanda yağışın olmaması, ürün fiyatlarının ürün satışından sonra artması, gerekli zamanda yeterli işgücü bulunamaması, tarımsal araç gereçlerin beklenmeyen durumlarda arızalanması, hükümet politikalarındaki değişkenlik vb. olarak sıralamak mümkündür. Söz konusu riskler gelir dalgalanması yaratmaktadır. Üretimin sürdürülebilirliği ve işletmelerin değişik koşullarda da ayakta kalabilmesi için risk analizlerinin yapılması oldukça önemlidir (Karahana, 2002).

Bu araştırmada, Orta Anadolu Bölgesinde nohut üreten işletmelerin risk gruplarının genel yapısı ortaya koyulmaya çalışılmıştır. Böylelikle, risk ve belirsizliğe karşı üretici profilleri daha iyi analiz edilebilecektir.

MATERYAL VE YÖNTEM

Çalışmanın materyali, Türkiye’de Orta Anadolu Bölgesi’nde Çorum, Karaman, Kırşehir, Konya, Nevşehir ve Yozgat illerinde nohut üretimi yapan 644 çiftçiyi kapsayan bölgesel düzeyde gerçekleştirilen kapsamlı bir anket çalışmasıyla elde edilmiştir. Anket çalışmasının gerçekleştirildiği üretim bölgeleri, Türkiye’nin İç Anadolu bölgesinde nohut üretiminin yaklaşık %40’ ını oluşturan iller arasından seçilmiştir. Çalışmanın analizleri SPSS 21 istatistiksel paket program ile gerçekleştirilmiştir. İç Anadolu Bölgesi nohut üreticileri anketlerinin illere göre dağılımı Çizelge 1’de yer almaktadır.

Çizelge 1. İç Anadolu Bölgesi nohut üreticileri anketlerinin illere göre dağılımı.

İller	Üretici Sayısı	%	Verim Ortalaması	Std. Sapma
Çorum	80	12.4	10123.85	18669.13
Karaman	68	10.6	4713.514	4760.906
Kırşehir	178	27.6	14364.62	21030.41
Konya	94	14.6	8598.611	18036.09
Nevşehir	42	6.5	2589.881	2418.444
Yozgat	182	28.3	7133.049	10332.93
Total	644	100	9165.512	16066.79

İç Anadolu Bölgesi'nde çiftçilerin riske yönelik tutumlarını etkileyen faktörleri üretim, maliyet, işgücü ve pazarlama stratejileri bilgisi ışığında araştırmak için temel bileşenler analizi ve Multinomial Logit modeli birlikte ele alınmıştır. Nohut üretimi yapan 644 tarım işletmesinin üretim yapısını incelemek için öncelikle temel bileşenler analizi yardımıyla değişkenlere ilişkin ölçeklendirme yapılmış ve 200 değişken arasından 30 farklı değişken analizlere dahil edilmiştir. Anket çalışmasına incelenen konu başlıkları çiftçilerin sosyo-ekonomik durumu, işletmenin ekonomik ve yapısal özellikleri, maliyet unsurları, çiftçilerin tarımsal üretimde karşılaştığı sorunlar başlıkları altında incelenmiştir.

Multinomial Logit model, değişkenler arasındaki ilişkinin araştırılmasında tarımsal alanda yaygın olarak kullanılan yöntemlerden biridir. Multinomial Logit regresyon modeli, bağımsız değişkenlerin bağımlı değişken kategorisi üzerindeki etkisinin bir bütün olarak eş zamanlı olarak incelendiği, ikiden fazla kategori için iki durumlu Logit modelinin genişletilmiş bir versiyonudur (Çelik ve Oktay, 2014; Nguyen-Van ve ark., 2017) Bu çalışmada, Multinomial Logit model analizlerinde bağımlı değişken "risk alan (1)", "riskten nötr (2)" ve "riskten kaçınan (3)" olmak üzere üç kategoride ele alınmıştır. Ekonomik açıdan diğer gruplara göre daha tutarlı bir tutum sergilendiğinden referans grup riskten bağımsız çiftçi grubudur. Buna göre, modelde yer alan bağımsız değişkenlerin etkisi açısından çiftçilerin risk gruplarına etki eden faktörler incelenmiştir.

BULGULAR

Araştırma kapsamında gerçekleştirilen anket çalışmasında nohut üreticilerinin risk alan, riske karşı duyarsız ve riskten kaçınan başlıkları altında risk davranışları incelenmiştir. Buna göre, nohut üreticilerinin illere göre dağılımı ve risk tutumları Çizelge 2'de yer almaktadır.

Çizelge 2: Nohut üreticilerinin illere göre dağılımı ve risk tutumları

	Risk Alan		Riske Duyarsız		Riskten Kaçınan		Toplam	
	f	%	f	%	f	%	f	%
Çorum	59	73.80%	18	22.50%	3	3.80%	80	100.00%
Karaman	30	44.10%	4	5.90%	34	50.00%	68	100.00%
Kırşehir	123	69.10%	18	10.10%	37	20.80%	178	100.00%
Konya	50	53.20%	11	11.70%	33	35.10%	94	100.00%
Nevşehir	12	28.60%	3	7.10%	27	64.30%	42	100.00%
Yozgat	66	36.30%	58	31.90%	58	31.90%	182	100.00%
Toplam	340	52.80%	112	17.40%	192	29.80%	644	100.00%

Çizelge 3 ve Çizelge 4’te araştırma kapsamında ele alınan bağımsız değişkenlerin risk gruplarına göre dağılımı ve tanımlayıcı istatistikleri yer almaktadır. Çizelge 3’te yer alan tabloda nohut üreticilerinin kişisel özellikleri, üretim deseni ve maliyet unsurlarına dair tanımlayıcı istatistik bilgileri risk grupları bazında görülmektedir. Çizelge 3’te maliyet unsurlarının büyük bir bölümünün riske karşı duyarsız olan grup içerisinde daha düşük değerlere sahip olduğu belirlenmiştir.

Çizelge 3: Bağımsız değişkenlerin tanımlayıcı istatistikleri.

Değişkenler	Risk Alan $\bar{X} \pm Std. S.$	Riske Duyarsız $\bar{X} \pm Std. S.$	Riskten Kaçınan $\bar{X} \pm Std. S.$	Toplam $\bar{X} \pm Std. S.$
<i>Kişisel Özellikler</i>				
Çiftçi Yaşı	48.4794±12.09267	48.7232±12.19674	49.2656±11.76503	48.7562±12.00044
Öğrenim Durumu	4.15±1.30954	3.7589±1.28922	3.8594±1.1916	3.9953±1.28091
Ana Gelir	1.3853±0.48738	1.3214±0.46912	1.3229±0.46881	1.3556±0.47906
Tecrübe	26.0824±12.78731	26.1964±12.62904	28±12.13709	26.6739±12.57967
İş Gücü	3.0831±1.32284	2.9152±1.36377	2.8958±1.21329	2.9981±1.29964
<i>Üretim Deseni</i>				
Parsel Büyüklüğü	28.2417±28.16115	33.8185±46.23827	23.566±18.5077	27.8176±30.01163
Verim	97.5717±53.05732	97.7054±52.83367	101.8012±55.02017	98.8559±53.56251
Baklagil Oranı	34.0336±14.72642	34.4259±14.60538	29.6087±12.29651	32.7826±14.1556
<i>Maliyet Unsurları</i>				
Sürüm Maliyeti	42.3559±27.22364	28.6607±26.04035	43.7292±35.46091	40.3835±30.17709
Ekim Maliyeti	127.5249±69.68178	107.3347±69.49011	149.7308±74.73871	130.6339±72.53513
H. Gübre Uygulaması	0.9931±3.69175	2.177±6.3618	1.0088±3.69798	1.2037±4.29349
Taban Gübre	21.73±25.58792	16.3285±24.70141	34.2864±27.91847	24.5341±26.9506
Üst Gübre	4.4698±12.86127	3.8395±13.05083	11.5771±18.40606	6.4791±15.11137
Hastalık Zararlı Maliyeti	30.695±18.48044	29.4063±22.84808	32.3517±18.60022	30.9648±19.33858
Sulama	16.7358±56.06151	16.5±65.54264	25.3117±49.2009	19.2516±55.97557
Hasat Maliyeti	21.5794±5.03054	21.7054±5.7007	21.9375±3.49364	21.7081±4.75416
Taşıma Maliyeti	4.4698±12.86127	3.8395±13.05083	11.5771±18.40606	6.4791±15.11137
Satış Fiyatı	3.3882±0.96532	2.9387±0.82381	3.6455±1.31605	3.3867±1.0853

Çizelge 4’te tohum temini, çiftçi tutumları ve çiftçilere ilişkin çeşitli genel bilgilerin konu edildiği başlıkların farklı risk gruplarına göre dağılımı yer almaktadır. Tohum temini konusunda nohut üreticilerinin tüm risk gruplarında yeterli miktarda elde ettikleri yönünde görüş bildirdikleri tespit edilmiştir. Üretici tutumlarına ilişkin bulgular incelendiğinde teknoloji kullanımı ve yeterli ekipman varlığı açısından dengeli bir dağılım olduğu görülmektedir. Üreticiler yeterli ekipmana sahip olduklarını ve teknolojiyi kullanabildiklerini bildirmişlerdir. Ayrıca anket bulguları çiftçilerin nohut üretimini riskli orta seviyelerde riskli bulunduğunu ortaya koymaktadır.

Çizelge 4: Bağımsız değişkenlerin tanımlayıcı istatistikleri (devam).

Değişkenler	Risk Alan $\bar{X} \pm Std. S.$	Riske Duyarsız $\bar{X} \pm Std. S.$	Riskten Kaçman $\bar{X} \pm Std. S.$	Toplam $\bar{X} \pm Std. S.$
Tohum Temini				
Tohum Miktarı	1.2±0.46848	1.3036±0.48098	1.349±0.53963	1.2624±0.49672
Tohum Çeşidi	1.3059±0.60526	1.5179±0.56921	1.599±0.71674	1.4301±0.64783
Karlılık Paylaşımı	27.77±19.12	31.651±19.925	22.7604±21.590	26.9565±20.23327
Üretici Tutumu				
Teknoloji	1.35±0.56795	1.6161±0.588	1.5469±0.6615	1.455±0.61055
Ekipman	2.111±0.4470	2±0.48398	1.9635±0.3742	2.0481±0.43827
Genel Bilgiler				
Kooperatif, Oda, Üretici Birliği Üyeliği	1.3324±0.47175	1.5982±0.49246	1.3438±0.4762	1.382±0.48625
Bilgi Kaynağı	0.2382±0.42663	0.1696±0.37701	0.3229±0.46881	0.2516±0.43424
Pazara uzaklık	18.4076±11.97605	22.1982±15.6174	19.4359±13.8309	19.3734±13.28262
Üretimi Riskli Bulma	6.6824±1.97752	6.5179±1.88872	7.5104±2.10208	6.9006±2.03761
Son 5 Yılda Değişim	3.2559±1.3597	3.0625±1.12531	3.0313±1.53461	3.1553±1.37997

Multinomial logit model analizlerinde Pearson ve Deviance uyum iyiliği istatistikleri incelendiğinde analizlerin kabule denebilir sonuçlara sahip olduğu görülmektedir.

Çizelge 5: Uyum iyiliği sonuçları

	Chi-Square	df	Sig.
Pearson	1295.132	1226	0.083
Deviance	1045.185	1226	1

Çizelge 6: Model uyum bilgileri- Risk alan grup parametre tahmini.

	Coef.	Std. Error	Wald	Sig.
Intercept	1.975	1.592	1.539	0.215
Çiftçi Yaşı	0.015	0.013	1.237	0.266
Öğrenim Durumu	0.096	0.097	0.981	0.322
Ana Gelir	-0.052	0.227	0.053	0.818
Tecrübe	-0.016	0.012	1.85	0.174
İş Gücü	0.083	0.084	0.977	0.323
Parsel Büyüklüğü	0.002	0.004	0.253	0.615
Verim	-0.003	0.002	1.871	0.171
Baklagil Oranı	0.011	0.008	2.089	0.148
Sürüm Maliyeti	0.005	0.004	2.025	0.155
Ekim Maliyeti	-0.003	0.002	3.877	0.049
H. Gübre Uygulaması	0.053	0.03	3.163	0.075
Taban Gübre	-0.013	0.005	8.391	0.004
Üst Gübre	-0.033	0.011	8.598	0.003
Hastalık Zararlı Maliyeti	-0.004	0.006	0.528	0.467
Sulama	0	0.003	0.002	0.961
Hasat Maliyeti	0.005	0.004	2.025	0.155
Taşıma Maliyeti	-0.003	0.026	0.01	0.92
Satış Fiyatı	0.252	0.157	2.595	0.107

Çizelge 7: Model uyum bilgileri- Risk alan grup parametre tahmini (devam).

	Coef.	Std. Error	Wald	Sig.
Tohum Miktarı	0.063	0.288	0.047	0.828
Tohum Çeşidi	-0.772	0.232	11.088	0.001
Karlılık Paylaşımı	0.01	0.007	2.079	0.149
Teknoloji	-0.523	0.208	6.337	0.012
Ekipman	-0.319	0.209	2.336	0.126
Gelir	0.619	0.267	5.37	0.02
Kooperatif, Oda, Üretici Birliği Üyeliği	-0.205	0.231	0.792	0.374
Bilgi Kaynağı	0.21	0.259	0.658	0.417
Pazara uzaklık	-0.012	0.008	2.236	0.135
Üretimi Riskli Bulma	-0.129	0.063	4.148	0.042
Son 5 Yılda Değişim	-0.061	0.101	0.363	0.547

Çizelge 8: Model uyum bilgileri- Riskten kaçınan grup parametre tahmini

	Coef.	Std. Error	Wald	Sig.
Intercept	4.008	2.049	3.825	0.051
Çiftçi Yaşı	0.006	0.017	0.113	0.736
Öğrenim Durumu	-0.154	0.128	1.449	0.229
Ana Gelir	-0.083	0.304	0.074	0.785
Tecrübe	-0.012	0.015	0.573	0.449
İş Gücü	-0.091	0.113	0.642	0.423
Parsel Büyüklüğü	0.007	0.004	2.89	0.089
Verim	0.002	0.003	0.311	0.577
Baklagil Oranı	0.001	0.011	0.013	0.909
Sürüm Maliyeti	-0.018	0.006	8.806	0.003
Ekim Maliyeti	-0.008	0.002	13.241	0.000
H. Gübre Uygulaması	0.048	0.032	2.181	0.14
Taban Gübre	-0.011	0.006	3.164	0.075
Üst Gübre	0.015	0.013	1.174	0.279
Hastalık Zararlı Maliyeti	0.006	0.008	0.532	0.466
Sulama	-0.002	0.004	0.195	0.659
Hasat Maliyeti	-0.016	0.034	0.234	0.628
Taşıma Maliyeti	0.002	0.01	0.039	0.844
Satış Fiyatı	-0.371	0.209	3.152	0.076

Çizelge 6-8’de Multinomial logit model analiz bulguları yer almaktadır. Çalışmada multinomial logit model analizleri için referans grubu riske karşı duyarsız olarak isimlendirilen grup seçilmiştir. Buna göre bulgular öncelikle risk alan nohut üreticileri açısından parametre tahminlerinin verilmesi ile ele alınmıştır. Bulgular risk alan çiftçi grubunda ekim maliyetleri ile taban ve üst gübre masrafları, tohum çeşidinin temini, teknoloji ve gelir algısı ile nohut üretimini riskli bulma düşüncesinin parametre tahmininde istatistiksel açıdan önemli olduğunu göstermektedir ($p < 0.05$). Bunun yanı sıra riskten kaçınan çiftçi grubunda ise ekim ve sürüm maliyetleri ile birlik üyeliği ve son beş yıldaki değişimin parametre tahminlerinde istatistiksel açıdan önemliliğe sahip olduğu tespit edilmiştir ($p < 0.05$).

Çizelge 9: Model uyum bilgileri- Riskten kaçınan grup parametre tahmini (devam).

	Coef.	Std. Error	Wald	Sig.
Tohum Miktarı	0.039	0.346	0.012	0.911
Tohum Çeşidi	-0.31	0.294	1.111	0.292
Karlılık Paylaşımı	0.014	0.009	2.374	0.123
Teknoloji	-0.286	0.269	1.128	0.288
Ekipman	-0.283	0.267	1.117	0.291
Gelir	0.167	0.321	0.271	0.602
Kooperatif, Oda, Üretici Birliği Üyeliği	1.018	0.299	11.595	0.001
Bilgi Kaynağı	-0.617	0.373	2.734	0.098
Pazara uzaklık	0.016	0.01	2.531	0.112
Üretimi Riskli Bulma	-0.154	0.082	3.497	0.061
Son 5 Yılda Değişim	-0.29	0.127	5.196	0.023

Number of obs.= 644
LR $\chi^2=245.706$
Prob> $\chi^2=0.000$
Pseudo R^2 Cox and Snell=0.317,
Nagelkerke= 0.367, McFadden= 0.190,
-2 LogLikelihood= 1045.185

Analiz sonuçları, nohut üreten çiftçilerin risk gruplarını etkileyen en önemli değişkenlerin fiyat ve finansal faktörler olduğunu göstermektedir. Nohut üretiminde maliyet faktörleri incelendiğinde, risk almada özellikle gübre uygulama maliyetlerinin istatistiksel olarak anlamlı olduğu belirlenmiştir ($p<0.05$). Maliyetlerdeki düşüşler, çiftlerin risk almalarını olumlu yönde etkiler. Risk grupları incelendiğinde çiftçilerin kişisel özelliklerinin istatistiksel olarak anlamlı olmadığı bulgularda görülmektedir ($p>0.05$).

SONUÇ

Çalışmada, risk gruplarının karakterizasyonu yoluyla çiftçiler arasındaki temel farklılıklar vurgulanmıştır. Multinomial logit model kullanılarak yapılan analizlerde seçilen göstergelere göre çiftçilerin riskli davranışlarındaki çeşitliliğin gözlemlenmesi, bölgedeki nohut üreticilerinin riskli davranışlarının anlaşılmasına temel oluşturmaktadır.

Araştırmada elde edilen sonuçların, araştırma sonuçlarını kullanarak önümüzdeki yıllarda tarımsal iyileştirme veya kırsal kalkınma projelerine alt yapı hazırlamak için tarım politikası belirleyicilerine yol göstereceği düşünülmektedir. Bu kapsamda riske karşı farklı tutumlar benimseyen çiftçiler için farklı stratejilerin geliştirilmesine olanak sağlanması hedeflenmektedir. Özellikle, araştırma sonuçlarından da elde edildiği gibi, üreticilerin ekonomik/finansal olaylara ve fiyat hareketlerine göre risk pozisyonu almaları veya bunlara göre karar vermeleri sürekli göz önünde bulundurulmalıdır. Oluşturulacak politikalarda, mutlaka bu durum değerlendirilmelidir.

KAYNAKLAR

Karahan, Ö., 2002. Tarımda Üreticilerin Risk Karşısındaki Davranışları Üzerine Bir Araştırma : Ege Bölgesinden Bir Örnek Olay, (Doktora Tezi), Ege Üniversitesi Fen Bilimleri Enstitüsü Tarım Ekonomisi Anabilim Dalı.



- Çiftçi, C.Y. 2004. Dünyada ve Türkiye’de Yemelik Tane Baklagiller Tarımı. TMMOB, Ziraat Mühendisleri Odası, Teknik Yayınlar Dizisi No:5, http://www.zmo.org.tr/resimler/ekler/fea5f12603a9683_ek.pdf
- Celik, A. K., & Oktay, E. (2014). A multinomial logit analysis of risk factors influencing road traffic injury severities in the Erzurum and Kars Provinces of Turkey. *Accident Analysis & Prevention*, 72, 66-77.
- Nguyen-Van, P., Poiraud, C., & To-The, N. (2017). Modeling farmers’ decisions on tea varieties in Vietnam: a multinomial logit analysis. *Agricultural economics*, 48(3), 291-299.
- FAOSTAT, 2019. Crop Statistics. <http://www.fao.org/faostat/en/#data/QC>
- FAOSTAT, 2021. Crop Statistics. <http://www.fao.org/faostat/en/#data/QC>



THE EFFECTS OF ERGONOMIC CONDITIONS IN THE WORK ENVIRONMENT ON WORK PERFORMANCE AND PRODUCTIVITY

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ABSTRACT

Occupational working environmental circumstances are key components to the measure which environmental factors impact productivity and health. Individuals' influences could have ripple adverse and affirmative impacts on organizational productivity, helping the business an indirect impact on indicators of business performance and productivity. There are a lot of factors that can influence a working environment. These comprise noise, vibration, light, heat and cold, particulates in the air, gases, air pressures, gravity, etc. Three effects are usually considered; those on the health, comfort and performance of the occupants. The effects of total environments comprise the sum of the physiological, psychological and social sensations experienced via persons in or around buildings which follow from their use of the buildings. In this research, environmental effects are tried to defined over employees such as noise, lighting, climate and harmful matters as theoretical and with applications-case study in a manufacturing company via work analysis-method analysis, 5S and work analysis. This application-case study provides a perspective to increase productivity and performance in the business environment. Basically, the purpose of this research is to present a general understanding-overview about environmental ergonomics to improve work productivity and work performance with this way.

Keywords: business, environmental ergonomics, conditions, productivity, work analysis, manufacturing.

INTRODUCTION

Companies have introduced a variety of techniques to inspire employees, including performance-based compensation, terms and conditions of employment arrangements, strategies to assist balance work and family, and different types of information collaboration. Workers must have the skills and abilities to accomplish their work successfully in combination to commitment. Whereas money and promotions are generally assumed to be the most straightforward incentives for enhancing worker productivity, this may not necessarily the position. Indeed, current research on the underlying structure of optimum management of human resources has revealed that, in many circumstances, compensation has more to do with motivating than other essential elements (Chandrasekars, 2011; What is Ergonomics?, 2021).

Ergonomics additionally emphasizes the necessity for mobility throughout the day. Generally, workplace equipment has favored rigid, inflexible attitudes and limited mobility. A combination between sitting and standing, especially may be facilitated by an altitude workstation, is a demonstrated strategy to counteract the impacts of sedentary office practice (What is Ergonomics?, 2021).

The workplace atmosphere is critical in inspiring individuals to complete their given tasks. Because revenue is not an adequate motivation in boosting workplace success in today 's competing company climate. Administrators must be experienced dealing with the entire range



of workplace circumstances that impact work engagement. Capability to involve staff in cooperative goal formulation, establish position requirements, and offer frequent performance feedback are all necessary skills. Time and effort would also be required to provide meaningful achievement motivations, manage procedures, provide necessary resources, and provide workplace counseling (Chadha, 2007; Durand and Nord, 1976).

Ergonomics is frequently overlooked while assessing potential occupational hazards. This is because injuries caused by poor ergonomics are not as noticeable as injuries caused by falls from high heights or exposure to hazardous chemicals. However, if the hazards that cause ergonomics illnesses are not addressed, they may be just as harmful to the environment. Employees who are pressed for time may overlook pauses or exert undue pressure to complete tasks more quickly, at the expense of implementing excellent ergonomic materials management techniques. Check to ensure that staff are not overstressing themselves in this way. Instruction, communication, and influence throughout the ergonomics arrangement of a participant's workplace go a long way toward reducing the pressure that creates ergonomic difficulties. Several research have lately demonstrated that skeletal diseases are associated to physical and psychological assessed job requirements in the workplace (Fredriksson et al., 2001; Lee et al., 2008; Lapointe et al., 2009; Lin et al., 2009; Choobineh et al., 2011; 7 Simple Tips for Improving Workplace Ergonomics, 2021). The ergonomic approach can be used to demonstrate the link underlying behavioral risk components and musculo - skeletal illnesses (Harcombe et al., 2010).

Ergonomics retraining is the greatest starting technique for educating computer operators regarding workplace ergonomically in workplace working situations (Westgaard and Winkel, 1997; Ketola et al., 2002; Mahmud et al., 2011). Marcoux et al. (2000) employed a range of instructional strategies, such as signs, messages, images of stretching and stress-relief activities, seminars, and informational manuals. Several treatments raised workers' awareness of Musculoskeletal symptoms and contributed in modifications in thumb and neck/shoulder position while using workstations.

Developments in the structure of employment have subsequently drawn more emphasis to the relationship underlying stressors and physical problems. The present study's findings suggest suggested a well experimental strategy could reduce physical complaints and, to a lesser extend, behavioral problems at workplace (Marcoux et al., 2000; Ketola et al., 2002).

Psychological regulation over the physical work environment has been stronger including both improvement categories than in the control group. The intervention groups demonstrated a considerable gain in total ergonomic competence. Both participants in the intervention category demonstrated higher levels of cognitive transcription and had reduced physical risk than the comparison group. A prospective cohort study field manipulation research was conducted to assess the impact of ergonomic risk training combined with a comfortable chair on office workers' ecological understanding, computational habits and positions, and health and quality of life to strength and conditioning and control conditions. Through using instructional system design (ISD), researchers created an ergonomic risk training conversation with the purpose of persuading personnel to do self-evaluations and rearrange and change their workplace (Knirk and Gustafson, 1986; Lueder and Corlett, 1996; Lewis et al., 2002; Robertson et al., 2009).

A macroergonomics strategy involving adaptive workstation layout and ergonomics retraining was carried out to investigate the impact on the psychological work situation, physical health, and job performance in a computer-based workplace context.

Contributions to the economy is an appropriate organisational strategy which could decrease health hazards and boost effectiveness through offering adaptable physiological workplace environment and adapting the ergonomics demands of individual workers and program team



members. This strategy to organisational development encompasses an awareness of the distinct aspects of the production process as well as their interdependencies, notably the interpersonal, technological, and physical surroundings (Hendrick and Kleiner, 2002; Robertson et al., 2009).

Participation ergonomic (PE) stresses the use of personnel' abilities to undertake ergonomic changes at workplace. PE concepts and approaches vary from conventional ergonomics, that primarily depends on ergonomics professionals to effect improvement. PE is one of numerous macroergonomics methodologies for ergonomics implementation. The reality that PE is based on macroergonomics concept assures that institutional development and planning challenges are well considered (Hendrick, 1991). End-users should have been proactively integrated in the development and implementation of ergonomically initiatives, according to PE. An ergonomics improvement strategy had been implemented in an Iranian manufactured facility utilizing a participative method to enhance workplace environment and the workspace in the current research. The research was performed out at a medium-sized business, and a PE intervention approach had been devised and implemented over an eighteen - month duration considering the accompanying goals: Improving employment conditions; Continuing to improve quality; the performance of work experience and the efficiency of production; and Productivity improvement. In all applied solutions, the data revealed a significant tendency comparing the first and second measures. Unfortunately, owing to restricted budgetary constraints, poor fluency and socioeconomic background of assembly line personnel, market insecurity, and top management changes, the transition to enhanced employment arrangements and, ultimately, higher productivity improvement was difficult (Hendrick, 1991; Motamedzade et al.2003).

Improving attitudes and computational habits might well be noticed as a result of information obtained following a workplace ergonomic design treatment. The participants felt that the workplace ergonomics instruction had been effective and that they could implement what they learned in the classroom to their workplace surroundings. Furthermore, respondents' understanding and abilities in workplace ergonomically improved between pre- to post. An objective, questionnaire guide was used to evaluate: (i) the number of expandable capabilities within the working space and chair (accessibility of regulation), (ii) the amount of functionalities which staff members understood how to reconfigure within a work area and chair, and (iii) regardless of wether they had modified the objects with both the workbench and high back (Ketola et al., 2002; Lewis et al., 2002; Robertson et al., 2009). The influence of socio - technological and corporate changes on organisational context and ergonomics is investigated in the research. The discussion includes an extension of Balance Theory beyond the development of labor processes to the development of enterprises. Eventually, the topic of development is discussed. Several aspects and approaches for designing initiatives are covered (Carayon and Smith, 2000).

Employees who work in unpleasant surroundings might end up with poor productivity and occupational disease problems, resulting in significant staff turnover. Personnel in numerous businesses have challenges regarding working circumstances caused by environmental and physiological variables. According to Pech and Slade (2006), worker engagement is rising, and it is becoming increasingly necessary to create environments which ultimately inspire the employees. The emphasis, pertaining to Pech and Slade, is on the consequences of disconnection, such as concentration, loss of attention, bad judgments, and excessive absenteeism, rather than the core reasons. The workplace surroundings may be a major factor in worker involvement or dissatisfaction.

According to organizational behavior studies, both identity and meaning and purpose have an influence on the level of involvement which a worker is prepared to deliver. Some have also

mentioned the importance of confidence among a worker and his or her supervisor or boss. It might be claimed that a disconnected employee can nevertheless participate, especially if assigned to repetitious activities that require minimal cognitive attention. Nevertheless, if workers at the corporation's corporate strategy remain disinterested, the consequences could be crippling. There is enough data to imply that workforce disenchantment is increasing, and it is also clear that many administrators are unsure of the explanations or treatments required to re-engage the individual with the organization. Such modifications may weaken workers' involvement towards their employer. As businesses transition from doing to understanding, they might face increased expectations for intellectual instead of physiological contribution. They would encompass a dwindling feeling of purpose at work amid an expanding complicated living situation. They might be the outcome of scepticism about compensation and achievement equity. Employees have a perception of instability or unpredictability as a result of the legislature, unions, the neighborhood, or stockholders. Reduced confidence within management and employees might be one of the emotional causes. It is possible that such deterioration in confidence is the consequence of adjustments in the work situation, including such contractually modifications of engagement or management mobility. Such modifications may weaken workers' engagement with their employer. As businesses transition from doing to understanding, they might face increased expectations for intellectual rather than physical contribution. They might involve a dwindling feeling of purpose at work amid an expanding complicated living environment. They might be the consequence of skepticism about pay and performance equity, unfulfilled objectives, job indifference, or any number of other psychological disorders. More study into the reasons of disengagement will give a stronger foundation for developing a cure or a spectrum of therapies (Hochchild, 1983; Beech and Anderson, 2003; Pech and Slade, 2006).

Several CEOs believe that the quality of employee performance on the workplace is proportionate to the amount of the person's salary arrangement. Even though a pay scheme is an exogenous incentive strategy (Ryan and Deci, 2000), this has a restricted short-term influence on employee productivity. A generally held belief is having a superior office atmosphere stimulates people and provides greater performance. The office workplace may be divided into physical and behavioral aspects. Workers are heavily influenced by their working surroundings. Workers nowadays might just have a plethora of career options, therefore the office atmosphere represents a significant aspect in acquiring and/or retaining positions. The condition of the office environment might easily influence the amount of engagement, performance outcomes, and productivity of the workers (Kahya et al., 2019; Ryan and Deci, 2000).

MATERIALS AND METHODS

A case study in a manufacturing company via 5S Application: In this part of this study, ergonomic influence of a company or organization was accomplished in order to acquire an evaluation of the ergonomic framework in aspects of monitoring, satisfaction and Effects of Ergonomic Conditions of Employees for a Business located in the Marmara Region of Turkey in the manufacturing industry via work analysis and 5S. This application-case study provides a perspective to increase productivity and performance in the business environment. The goal of this study section is to provide a generalized comprehension of environmental ergonomics in order to increase job productivity and performance. 5S is a five-step strategy for ordering the work environment and assisting in the elimination of waste that is at the heart of all streamlining / reformation projects. The objective is to make the surroundings in which you live and work clean, orderly, healthful, and comfortable, and to maintain these circumstances indefinitely.

Quality factors would rise while expenses might fall. Waste becomes evident and easier to reduce when the 5S application is used in the industry. Floor surfaces should be non-slip, dust-free, and simple to clean, and if appropriate, the finest electrical and thermal protection should be supplied. The 5S approach may appear a little conceptual at this stage, but it is a very useful, practical learning tool that everybody else in the office can participate in. The 5S method entails examining everything in a place, eliminating what is superfluous, arranging things rationally, doing maintenance activities, and repeating this process. Arrange, clean, and then repeat. Waste is made apparent and easy to remove. Gives you more control over your equipment, resources, and workplace. It boosts employee morale and fosters collaboration since everyone can contribute. It has a wide-ranging impact: Setting – Setup times will be reduced. The rate of development and value creation per time interval would rise. 5S is a five-step strategy that aims to "order the working atmosphere and assist minimize waste," and it is at the heart of all streamlining / restructuring initiatives. The objective is to guarantee that the environment in which you live and work is clean, orderly, healthy, and safe, and to keep it that way. 5S, as you might expect, comprises of five stages; the original is represented with five syllables in Japanese. The components of Japonca are Seiri (Sort); Seiton (Set in Order / Straighten); Seiso (Shine / Sweep); Seiketsu (Standardize); Shitsuke (Sustain / Self-discipline) (What is 5S, 2021; 5S Training and Research Page, 2021; What Is 5S, 2021; What Are The Five S's (5S) of Lean, 2021).

CONCLUSION-COMMENTS

In the business world, study from disciplines such as cognition ergonomics and technical psychology is routinely used in the design of settings and panels to avoid problems, incidents, or just to decrease the drivers' psychological anguish. Every department in a collaborative ergonomic design engages in development activities from the start of the project. The benefits are that all departments possess the same knowledge and may perform their parts in the enterprise effectively and on budget. The range of techniques and languages communicating with one another might appear cacophonous at times, yet this variety might be viewed as a positive component of the profession. To appreciate the environment, it is vital to communicate diverse perspectives of perspective.

Ergonomics instruction should not be totally dependent on company resources and intentions, but a preventative ergonomics strategy and evaluation techniques should be integrated in every technology related instruction to engage a wider audience. The goal of this investigation would have been to gain a better understanding of what hinders preventive ergonomic interventions from being implemented and what could be performed to remedy the condition.

Disenfranchisement might be fostered through organizational systems, traditions, norms, regulations, circumstances, and processes. Workers may be expressing their dissatisfaction by withdrawing dedication and enthusiasm as degrees of knowledge and cultural understanding rise. Worker engagement could be exacerbated by a lumbering administration, an inadequate funding, low expectations, and the tolerance of bad performance (Pech and Slade, 2006; Robertson et al., 2009). Several of the aforementioned explanations might lead one to believe that the responsibility for disenchantment is always with the company or its management; however, this is not necessarily the situation. The worker would be to blame for the original issue that has turned him or her off, but the business is also to blame because it must now deal with the situation. Executives must handle such issues before they become established in the company's environment, including through counseling, training, rescission, reassignment, or bargaining.



Globalization, velocity, and uncertainty in the corporate world necessitate the greatest levels of ability to ensure organisational sustainability. In such turbulent situations, rivals with the proper balance of economic outcomes, trust, innovation, and management have the best chances of survival. No firm can afford to waste its employees' energy. Work involvement, it is suggested, is an important area for future investigation.

REFERENCES

- Beech, R. and Anderson, B. (2003), "Corporate America: the role of HR in re engaging restless employees", *Benefits & Compensation International*, 33(5), p.14.
- Carayon, P. and Smith, M.J. (2000). Work organization and ergonomics, *Applied Ergonomics*, 31 (6), 649–662.
- Chadha, P. (2007), *The Orderly Workplace: An Exploration into Holistically Disciplined Worklife*, Macmillan Publishers India, 2007.
- Chandrasekars, K. (2011), Workplace Environment and its impact on organizational performance in public sector organizations, *International Journal of Enterprise Computing and Business System International Systems*, 1(1), January 2011.
- Choobineh, A., Motamedzade, M., Kazemi, M., Moghimbeigi, A. and Heidari Pahlavian, A. (2011). The impact of ergonomics intervention on psychosocial factors and musculoskeletal symptoms among office workers. *International Journal of Industrial Ergonomics*, 41(6), 671–676. doi:10.1016/j.ergon.2011.08.007.
- Choobineh, A.R., Rajaeefard, A. and Neghab, M. (2006). Association between perceived demands and musculoskeletal disorders among hospital nurses of Shiraz University of Medical Sciences: a questionnaire survey, *International Journal of Occupational Safety and Ergonomics*, 12(4), 347-354.
- Durand, D.E. and Nord, W.R. (1976). Perceived Leader Behavior as a Function of Personality characteristics of Supervisors and Subordinates, *Academy of Management Journal*, September 1976, 427-428
- Fredriksson, K., Bildt, C., Hägg, G. and Kilbom, A. (2001). The impact on musculoskeletal disorders of changing physical and psychosocial work environment conditions in the automobile industry, *International Journal of Industrial Ergonomics*, 28(1), 31-45.
- Harcombe, H., McBride, D., Derrett, S. and Gray, A. (2010). Physical and psychosocial risk factors for musculoskeletal disorders in New Zealand nurses, postal workers and office workers. *Injury Prevention*, 16, 96-100.
- Hendrick, H.W., Kleiner, B.M. (Eds.), 2002. *Macroergonomics: Theory, Methods, and Applications*. Lawrence Erlbaum Associates, Mahwah, NJ.
- Hendrick, H.W. (1991). Human factors in organizational design and management. *Ergonomics*, 34, 743–756.
- Hochschild, A.R. (1983), *The Managed Heart. Commercialization of Human Feeling*, University of California Press, Berkeley, CA.
- Kahya, E., Ulutaş, B. and Özkan, F. (2019). The Effects of Environmental Factors on Job Performance in Metal Industry, *Endüstri Mühendisliği*, 30(1), 1-14.



- Ketola, R., Toivonen, R., Häkkänen, M., Luukkonen, R., Takala, E.P. and Viikari-Juntura, E. (2002). Effects of ergonomic intervention in work with video display units, *Scandinavian Journal of Work, Environment & Health*, 28 (1), 18-24.
- Knirk, F. and Gustafson, K.L. (1986). *Instructional Technology: A Systematic Approach to Education*. Holt, Rinehart & Winston, New York, USA.
- Lapointe, J., Dionne, C.E., Brisson, C. and Montreuil, S. (2009). Interaction between postural risk factors and job strain on self-reported musculoskeletal symptoms among users of video display units: a three-year prospective study, *Scandinavian Journal of Work, Environment & Health*, 35 (2), 134-144.
- Lee, H., Wilbur, J., Kim, M.J. and Miller, A.M. (2008). Psychosocial risk factors for work related musculoskeletal disorders of the lower-back among long-haul international female flight attendants, *Journal of Advanced Nursing*, 61 (5), 492-502.
- Lewis, R.J., Fogleman, M., Deeb, J., Crandall, E. and Agopsowicz, D. (2002), Effectiveness of a VDT ergonomics training program, *International Journal of Industrial Ergonomics*, 27 (2), 119–131.
- Lin, Y.H., Chen, C.Y., Lu, S.Y. (2009). Physical discomfort and psychosocial job stress among male and female operators at telecommunication call centers in Taiwan, *Applied Ergonomics*, 40 (4), 561-568.
- Lueder, R. and Corlett, N. (1996), A proposed RULA for computer users. In: *Proceedings of the Ergonomics Summer Workshop*, UC Berkeley Center for Occupational & Environmental Health Continuing Education Program.
- Mahmud, N., Kenny, D.T., Md Zein, R. and Hassan, S.N. (2011), Ergonomic training reduces musculoskeletal disorders among office workers: results from the 6 month follow-up. *Malaysian Journal of Medical Sciences*, 18 (2), 16-26.
- Marcoux, B.C., Krause, V. and Nieuwenhuijsen, E.R. (2000), Effectiveness of an educational intervention to increase knowledge and reduce use of risky behaviors associated with cumulative trauma in office workers, *Work* 14 (2), 127-135.
- Motamedzade, M., Shahnavaz, H., Kazemnejad, A., Azar, A. and Karimi, H. (2003). The Impact of Participatory Ergonomics on Working Conditions, Quality, and Productivity. *International Journal of Occupational Safety and Ergonomics*, 9(2), 135–147. doi:10.1080/10803548.2003.1107655.
- Pech, R. and Slade, B. (2006). Employee disengagement: is there evidence of a growing problem? *Handbook of Business Strategy*, 7(1), 21–25. doi:10.1108/10775730610618585.
- Robertson, M., Amick, B. C., DeRango, K., Rooney, T., Bazzani, L., Harrist, R. and Moore, A. (2009). The effects of an office ergonomics training and chair intervention on worker knowledge, behavior and musculoskeletal risk. *Applied Ergonomics*, 40(1), 124–135. doi:10.1016/j.apergo.2007.12.009.
- Ryan, R. M., and Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78.
- Westgaard, R.H. and Winkel, J. (2011). Occupational musculoskeletal and mental health: significance of rationalization and opportunities to create sustainable production systems e a systematic review, *Applied Ergonomics*, 42 (2), 261-296.



7 Simple Tips for Improving Workplace Ergonomics, <https://osg.ca/7-simple-tips-for-improving-workplace-ergonomics/>

What is 5S?, <https://www.5stoday.com/what-is-5s/> (Access Date: 10.10.2021).

5S Training and Research Page, Learn About 5S,

<https://www.creativesafetysupply.com/content/education-research/5S/index.html>, (Access Date: 10.10.2021).

What Is 5S ?, <https://www.graphicproducts.com/articles/what-is-5s/> (Access Date: 10.10.2021).

What Are The Five S's (5S) of Lean, <https://asq.org/quality-resources/lean/five-s-tutorial>, (Access Date: 10.10.2021).

What is Ergonomics?, <https://www.humanscale.com/ergonomics/what-is-ergonomics/index.cfm>, (Access Date: 12.10.2021).

A NEW METHOD OF DYNAMICAL STABILITY IN FRACTIONAL SYSTEMS

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ABSTRACT

In this article, by using the Lyapunov second method, we study the stability of nonlinear generalized fractional system. Then, in order to illustrate the effectiveness and availability of the our result, we provide an example. Further, by employing numerical simulation, we depict the numerical value of the example and show that the zero solution of the nonlinear fractional dynamical system converges to the origin or equilibrium point of the system when the time tends to infinity.

1. INTRODUCTION

Recently, the stability of nonlinear fractional systems has attracted a great attention, for example, [3,4,7,8]. However, stability analysis of nonlinear fractional systems is much more difficult and only a few are available with respect to the integer order systems. One of the available methods to study the stability of nonlinear fractional system is the Lyapunov direct method.

In the present paper by using the Lyapunov function, we intend to investigate the stability of the following nonlinear generalized fractional system with the regularized Prabhakar derivative

$${}^C D_{\rho, \mu, \omega, 0+}^{\gamma} x(t) = Ax(t) + f(t, x(t)), \quad x(t_0) = x_0, \quad (1)$$

where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$, $x(t) \in \mathbb{P}^n$ is a state vector, $A \in \mathbb{P}^{n \times n}$ is a constant matrix and $f(t, x) \in \mathbb{P}^n$ with $f(t, 0) = 0$.

The paper is organized as follows. In Section 2, some definitions of generalized fractional calculus are given. In Section 3, we state some properties of the regularized Prabhakar fractional derivative. Asymptotic stability of nonlinear generalized fractional system by using the Lyapunov direct method is provided in Section 4. In order to illustrate the applications of our result, in Section 5, an example is provided and numerical value of this example is depicted. Section 6 concludes the paper.

Definition 2.1 Let $f \in L^1[0, b]$. The Prabhakar integral operator with the generalized Mittag-Leffler function in its kernel is defined as follows [5]

$$E_{\rho, \mu, \omega, 0+}^{\gamma} f(x) = \int_0^x (x-u)^{\mu-1} E_{\rho, \mu}^{\gamma}(\omega(x-u)^{\rho}) f(u) du, \quad 0 < x < b \leq \infty, \quad (1)$$

where $\rho, \mu, \omega, \gamma \in \mathbb{X}$, $\Re(\rho), \Re(\mu) > 0$, and the generalized Mittag-Leffler function $E_{\rho, \mu}^{\gamma}(z)$ is of the following form [9]

$$E_{\rho,\mu}^{\gamma}(z) = \sum_{k=0}^{\infty} \frac{\Gamma(\gamma+k)}{\Gamma(\gamma)\Gamma(\rho k + \mu)} \frac{z^k}{k!}, \quad \gamma, \rho, \mu \in \mathbb{X}, \Re(\rho) > 0,$$

Definition 2.2 For $f \in L^1[0, b]$, the Prabhakar derivative is defined by [5]

$$D_{\rho,\mu,\omega,0+}^{\gamma} f(x) = \frac{d^m}{dx^m} E_{\rho,m-\mu,\omega,0+}^{-\gamma} f(x), \quad 0 < x < b \leq \infty, \quad (2)$$

where $\rho, \mu, \omega, \gamma \in \mathbb{X}, \Re(\rho), \Re(\mu) > 0$.

Also, the regularized Prabhakar derivative for $f \in AC^m[0, b]$, is given by

$${}^C D_{\rho,\mu,\omega,0+}^{\gamma} f(x) = E_{\rho,m-\mu,\omega,0+}^{-\gamma} \frac{d^m}{dx^m} f(x) = D_{\rho,\mu,\omega,0+}^{\gamma} f(x) - \sum_{k=0}^{m-1} x^{k-\mu} E_{\rho,k-\mu+1}^{-\gamma}(\omega x^{\rho}) f^{(k)}(0+). \quad (3)$$

3. SAME PROPERTIES OF REGULARIZED PRABHAKAR DERIVATIVE

Lemma 3.1 Let ${}^C D_{\rho,\mu,\omega,0+}^{\gamma} x(t) \geq {}^C D_{\rho,\mu,\omega,0+}^{\gamma} y(t)$ and $x(0) = y(0)$, where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$. Then $x(t) \geq y(t)$ for $t > 0$.

Proof. It is a straightforward result from ${}^C D_{\rho,\mu,\omega,0+}^{\gamma} x(t) \geq {}^C D_{\rho,\mu,\omega,0+}^{\gamma} y(t)$ that there exists a nonnegative function $n(t)$ satisfying

$${}^C D_{\rho,\mu,\omega,0+}^{\gamma} x(t) = n(t) + {}^C D_{\rho,\mu,\omega,0+}^{\gamma} y(t). \quad (4)$$

Applying the Laplace transform on the both side of (4) and using the Laplace transform of regularized Prabhakar derivative [10], we obtain

$$\frac{s^{-\rho\gamma+\mu}}{(s^{\rho}-\omega)^{-\gamma}} X(s) - \frac{s^{-\rho\gamma+\mu-1}}{(s^{\rho}-\omega)^{-\gamma}} x(0) = N(s) + \frac{s^{-\rho\gamma+\mu}}{(s^{\rho}-\omega)^{-\gamma}} Y(s) - \frac{s^{-\rho\gamma+\mu-1}}{(s^{\rho}-\omega)^{-\gamma}} y(0),$$

By taking into account $x(0) = y(0)$ and using the inverse Laplace transform, we obtain

$$x(t) = E_{\rho,-\mu,\omega,0+}^{\gamma} n(t) + y(t).$$

Since $n(t) \geq 0$, $x(t) \geq y(t)$.

Lemma 3.2 Let $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$ and $x(t) \in P$ be a differentiable function. Then, for any time instant $t > t_0$, the following inequality holds

$$\frac{1}{2} {}^C D_{\rho,\mu,\omega,t_0+}^{\gamma} x^2(t) \leq x(t) {}^C D_{\rho,\mu,\omega,t_0+}^{\gamma} x(t).$$

Proof. According to the definition of regularized Prabhakar derivative, the above inequality is equivalent to

$$\int_{t_0}^t (t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^{\rho}) [x(t) - x(u)] x'(u) du \geq 0. \quad (5)$$

Therefore, it is sufficient to show that the inequality (5) is true. By letting $z(u) = x(t) - x(u)$, the left hand side of (5) can be written as

$$\int_{t_0}^t (t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)[x(t)-x(u)]x'(u)du = -\int_{t_0}^t (t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)z(u)z'(u)du. \quad (6)$$

Integrating by parts of (6), and then using

$$\left(\frac{d}{dx}\right)^n [x^{\mu-1} E_{\rho,\mu}^\gamma(\omega x^\rho)] = x^{\mu-n-1} E_{\rho,\mu-n}^\gamma(\omega x^\rho), \quad n \in \mathbb{N},$$

we get

$$\begin{aligned} & \int_{t_0}^t (t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)z(u)z'(u)du \\ &= -\frac{1}{2} [z^2(u)(t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \Big|_{u=t} + \frac{1}{2} [z_0^2(t-t_0)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-t_0)^\rho)] \\ &+ \frac{1}{2} \int_{t_0}^t z^2(u)(t-u)^{-\mu-1} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)du. \end{aligned} \quad (7)$$

Now we take limit of the first term of the right hand side of (5), as

$$\begin{aligned} & \lim_{u \rightarrow t} \frac{1}{2} [z^2(u)(t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \\ &= \frac{1}{2} \lim_{u \rightarrow t} [(x(t)^2 - 2x(t)x(u) + x(u)^2)(t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)]. \end{aligned}$$

By employing the L'Hopital rule, we conclude

$$\begin{aligned} & \frac{1}{2} \lim_{u \rightarrow t} [(x(t)^2 - 2x(t)x(u) + x(u)^2)(t-u)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)] \\ &= \lim_{u \rightarrow t} [(x(t)x'(u) - x(u)x'(u))(t-u)^{-\mu-1} E_{\rho,-\mu}^{-\gamma}(\omega(t-u)^\rho)] = 0. \end{aligned}$$

Hence,

$$\frac{1}{2} [z_0^2(t-t_0)^{-\mu} E_{\rho,1-\mu}^{-\gamma}(\omega(t-t_0)^\rho)] + \frac{1}{2} \int_{t_0}^t z^2(u)(t-u)^{-\mu-1} E_{\rho,1-\mu}^{-\gamma}(\omega(t-u)^\rho)du \geq 0,$$

and this confirms the inequality (3).

Remark 3.3 It is clear that if $x(t) \in P^n$ is a vector of differentiable functions, then for any time instant $t > t_0$

$$\frac{1}{2} {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma x^T(t)x(t) \leq x^T(t) {}^C D_{\rho,\mu,\omega,t_0^+}^\gamma x(t). \quad (8)$$

This can be deduced by employing Lemma 3.2 and decomposing (8) into a sum of scalar products.

Theorem 3.4 [1]. Let $P \in P^{n \times n}$ be a real symmetric matrix. Then it may be transformed into a diagonal form by means of an orthogonal transformation, that is, there exists an orthogonal matrix $B \in P^{n \times n}$ and a diagonal matrix $\Lambda \in P^{n \times n}$ such that

$$P = B\Lambda B^T.$$

Lemma 3.5 Let $x(t) \in P^n$ be a vector of differentiable functions and $P \in P^{n \times n}$ be a constant, square, symmetric and positive definite matrix. Then, for any time instant $t \geq t_0$, the following relationship holds

$$\frac{1}{2} {}^C D_{\rho, \mu, \omega, t_0+}^\gamma (x^T(t) P x(t)) \leq x^T(t) P {}^C D_{\rho, \mu, \omega, t_0+}^\gamma x(t),$$

where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$.

Proof. The proof is straightforward, following the proof of Lemma 4 in [2], by using Theorem 3.4 and Remark 3.3.

4. LYAPUNOV DIRECT METHOD FOR STABILITY ANALYSIS OF GENERALIZED FRACTIONAL SYSTEM

Definition 4.1 x_0 is an equilibrium point of the system (1), if and only if $A(x_0) + f(t, x_0) = 0$.

Definition 4.2 The nonlinear generalized fractional system (1) is stable if for any initial value x_0 and $t > 0$, there exists an $\varepsilon > 0$ such that $Px(t)P < \varepsilon$. The system (1) is asymptotically stable if it is stable and $\lim_{t \rightarrow \infty} \|x(t)\| = 0$.

Remark 4.3 Without loss of generality, we suppose the equilibrium point $x_0 = 0$. Otherwise an equilibrium point $\hat{x} \neq 0$ can be transformed to the origin by the change of variable $y = x - \hat{x}$. So, the regularized Prabhakar derivative of y is given by

$$\begin{aligned} {}^C D_{\rho, \mu, \omega, 0+}^\gamma y &= {}^C D_{\rho, \mu, \omega, 0+}^\gamma (x - \hat{x}) = Ax + f(t, x) = A(y + \hat{x}) + f(t, y + \hat{x}) \\ &= By + g(t, y), \end{aligned}$$

where $B(0) + g(t, 0) = 0$ and in the new variable y , the system has equilibrium point at the origin.

Definition 4.4 [6] A continuous function $\alpha: [0, t) \rightarrow [0, \infty)$ belongs to class- K if it is strictly increasing and $\alpha(0) = 0$.

Theorem 4.5 Let $x = 0$ be an equilibrium point for the system (1). Suppose that there exists a Lyapunov function $V(t, x(t))$ and class- K functions $\alpha_i (i = 1, 2, 3)$ satisfying

$$\begin{aligned} \alpha_1(PxP) &\leq V(t, x(t)) \leq \alpha_2(PxP), \\ {}^C D_{\rho, \mu, \omega, 0+}^\gamma V(t, x(t)) &\leq -\alpha_3(PxP), \quad t \geq 0, x \in D, \end{aligned}$$

where $\gamma, \mu, \omega \in (0, 1)$, $\rho \geq 1$. Then the system (1) is asymptotically stable.

Proof. The proof is similar to that of Theorem 6.2 in [7], by considering Definition 4.1, Lemma 3.1.

Now, by using the Lyapunov function, we consider asymptotic stability of system (1).

Theorem 4.6 Let f be Lipschitz continuous. If there exists a positive definite matrix P such that

$$A^T P + PA + (L^2 + PPP^2)I < 0,$$

where L is Lipschitz constant, the trivial solution of nonlinear generalized fractional system (1) is asymptotically stable.

Proof. We get $V(t) = x^T(t)Px(t)$ as a Lyapunov function candidate. Employing regularized Prabhakar fractional derivative operator ${}^c D_{\rho, \mu, \omega, 0+}^\gamma$ on the Lyapunov function $V(t) = x^T(t)Px(t)$ and using Lemma 3.5, we get

$$\begin{aligned} {}^c D_{\rho, \mu, \omega, 0+}^\gamma V(t) &\leq 2x^T(t)P {}^c D_{\rho, \mu, \omega, t_0+}^\gamma x(t) \\ &= [Ax(t) + f(t, x(t))]^T Px(t) + x^T(t)P[Ax(t) + f(t, x(t))] \\ &= x^T(t)(A^T P + PA)x(t) + 2x^T P f(t, x(t)). \end{aligned}$$

Since f is Lipschitz continuous

$$\begin{aligned} {}^c D_{\rho, \mu, \omega, 0+}^\gamma V(t) &\leq x^T(t)(A^T P + PA)x(t) + 2x^T P f(t, x(t)) \\ &\leq x^T(t)(A^T P + PA)x(t) + x^T(t)P^2 x(t) + f^T(t, x(t))f(t, x(t)) \\ &\leq x^T(t)(A^T P + PA)x(t) + (L^2 + PPP^2)Px(t)P^2 \\ &\leq x^T(t)[A^T P + PA + (L^2 + PPP^2)I]x(t) < 0. \end{aligned}$$

Therefore, according to Theorem 4.5, the system (1) is asymptotically stable and the proof is completed.

5. EXAMPLE

We now present an example to consider asymptotic stability of generalized fractional system with the regularized Prabhakar derivative and depict numerical values of the system. In this example, we apply the numerical method in [3] to solve the systems and find numerical solution by using the well known fourth order Runge-Kutta method.

Example 5.1 Consider the following nonlinear fractional system

$$\begin{cases} {}^c D_{\rho, \mu, \omega, 0+}^\gamma x(t) = -5x - 10y + \log(\log(10 + x^2)), \\ {}^c D_{\rho, \mu, \omega, 0+}^\gamma y(t) = -10x - 5y + \log(\log(10 + y^2)), \end{cases} \quad (9)$$

with the initial conditions $x(t_0) = x_0, y(t_0) = y_0$ and $\gamma, \mu, \omega \in (0, 1), \rho \geq 1$. We choose $P = I_2, V(t) = x^T(t)x(t)$ and $\zeta = 1$. The function f is clearly Lipschitz continuous with Lipschitz constant $L = \frac{1}{\sqrt{10}}$ and the conditions of Theorem 4.6 hold. Therefore the trivial solution of system (7) is asymptotically stable.

Numerical values of system (7) are presented in Figure 1. We fix the set parameters $\gamma = 0.6, \rho = 1, \mu = 0.8, \omega = 0.05, h = 0.01$. Figure 1 is presented for $(x_0, y_0) = (-0.01, 0.06)$.

6. CONCLUSION

In this paper, we have investigated the stability of nonlinear generalized fractional system by means of the Lyapunov direct method.

Then, to examine the analytical obtained result, we have presented an example of nonlinear generalized fractional system and have performed numerical simulation to reveal asymptotical stability behavior of the presented system. $x = 0$ is an equilibrium point of the system (7),

Figure 1 converges to the equilibrium point $x = 0$, and shows the asymptotic stability behavior of system.

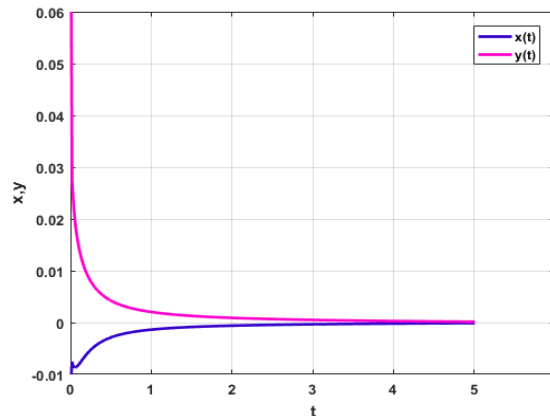


Fig. 1. Numerical value of $x(t), y(t)$ of system (7).

REFERENCES

- [1] Bellman, R. (1997). Introduction to matrix analysis, Society for Industrial and Applied Mathematics (SIAM).
- [2] Duarte-Mermoud, M.A., Aguila-Camacho, N., Gallegos, J.A., Castro-Linares, R. (2015). Using general quadratic Lyapunov functions to prove Lyapunov uniform stability for fractional order systems, *Commun Nonlinear Sci Numer Simulat*, vol. 22, p. 650-659.
- [3] Eshaghi, S., Khoshsiar Ghaziani, R., Ansari, A. (2019). Stability and chaos control of regularized Prabhakar fractional dynamical systems without and with delay, *Mathematical Methods in the Applied Sciences*, 42 (7) p. 2302-2323.
- [4] Eshaghi, S., Khoshsiar Ghaziani, R., Ansari, A. (2020). Hopf bifurcation, chaos control and synchronization of a chaotic fractional-order system with chaos entanglement function, *Mathematics and Computers in Simulation*, 172(C), 321-340.
- [5] Garra, R., Gorenflo, R., Polito, F., Tomovski, Z. (2014). Hilfer-Prabhakar derivatives and some applications, *Applied Mathematics and Computation*, vol. 242, p. 576-589.
- [6] Khalil, HK. (2002). Nonlinear Systems, third edition, Prentice Hall.
- [7] Li, Y., Chen, Y.Q., Podlubny, I. (2010). Stability of fractional-order nonlinear dynamic systems: Lyapunov direct method and generalized Mittag-Leffler stability, *Applied Mathematics and Computation*, vol. 59, p. 1810-1821.
- [8] Liu, S., Jiang, W., Li, X., Zhou, X-F. (2016). Lyapunov stability analysis of fractional nonlinear systems, *Applied Mathematics Letters*, vol. 51, p. 13-19.
- [9] Prabhakar, T. R., (1971). A singular integral equation with a generalized Mittag-Leffler function in the kernel, *Yokohama Journal of Mathematics*, vol. 19, p.7-15.
- [10] Eshaghi, S., Ansari, A., Khoshsiar Ghaziani, R., Ahmadi Darani, M. (2017). Fractional Black-Scholes model with regularized Prabhakar derivative, *Publications De L'institut Mathematique*, vol. 102, 121-132.

LINEAR INTEGRATED CIRCUITS WITHIN THE FRAMEWORK OF THEORETICAL-PRACTICAL TRAINING DURING PANDEMIC OF COVID-19

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ABSTRACT

The pandemic of COVID-19 affects the life of the world severely. Also it affects the teaching and learning. In this paper, we present the instruction of linear integrated circuits within the framework of combination of theoretical and practical skills during the pandemic of COVID-19. The integrated circuits course is very important because this course is one of the key subjects in undergraduate and postgraduate educations. The topics of this course are divided into two major groups. The first group proposes the design topics of integrated circuits and the second group discusses their applications. Student learning ability can be considerably increased by combining the theoretical training and the skill training, especially during the COVID-19 pandemic.

Keywords - Theoretical-practical training, integrated circuits course, learning, COVID-19.

1 INTRODUCTION

In recent years, the pandemic of COVID-19 affects the life of the world severely and unfortunately it affects the teaching and learning. On the other hand, the linear integrated circuits course and its laboratory is one of the key subjects in the undergraduate and postgraduate educations of the electronic engineering [1-4]. The topics of this course are divided into two main groups namely design and applications. Because of the difficulty of this course, the activity skills can be simultaneously presented with the theoretical topics. Using the design softwares such as Orcad and/or Pspice has effective role in the first section as design topics. In the second section including 10 chapters, the implementation of circuits on the breadboard using the test and measurement equipments assists the students to learn the theoretical materials of this course during the COVID-19 pandemic.

2 THE COMBINATION OF THEORETICAL AND PRACTICAL INSTRUCTIONS DURING THE COVID-19 PANDEMIC

As discussed in the previous section, it is better to complete with the skill training for deep understanding of the comments. Figure 1 shows the flowchart of theoretical and practical instructions. The first of all the only theoretical topics are transferred and learned to the students, as shown. Then the students based on the theoretical topics deal to design the desire circuits by using the input data. To be sure of its operation, the desire circuit is simulated. If it has poor performance, the design is revised and this loop is worked till obtaining the appropriate performance. After the final simulation, the relevant circuit is set on the breadboard and it is examined. The obtained practical design [5-7] is compared with the theoretical results of the design. The training objects are comprehensible for the students by comparison of these cases and data.

The overall view of the first section of this course is shown in Fig. 2. The design section has two main tests for measurement of Op-Amp characterization. In the second section namely applications, ten tests are considered to show the students for the applications of the topics. Figure 3 illustrates the additional topics of the applications. They are based on the operational amplifiers and other linear integrated circuits such as adder, integrators, single-supply Op-Amp, instrumentation amplifiers, zero-span, active filters, differential amplifiers, and so on.

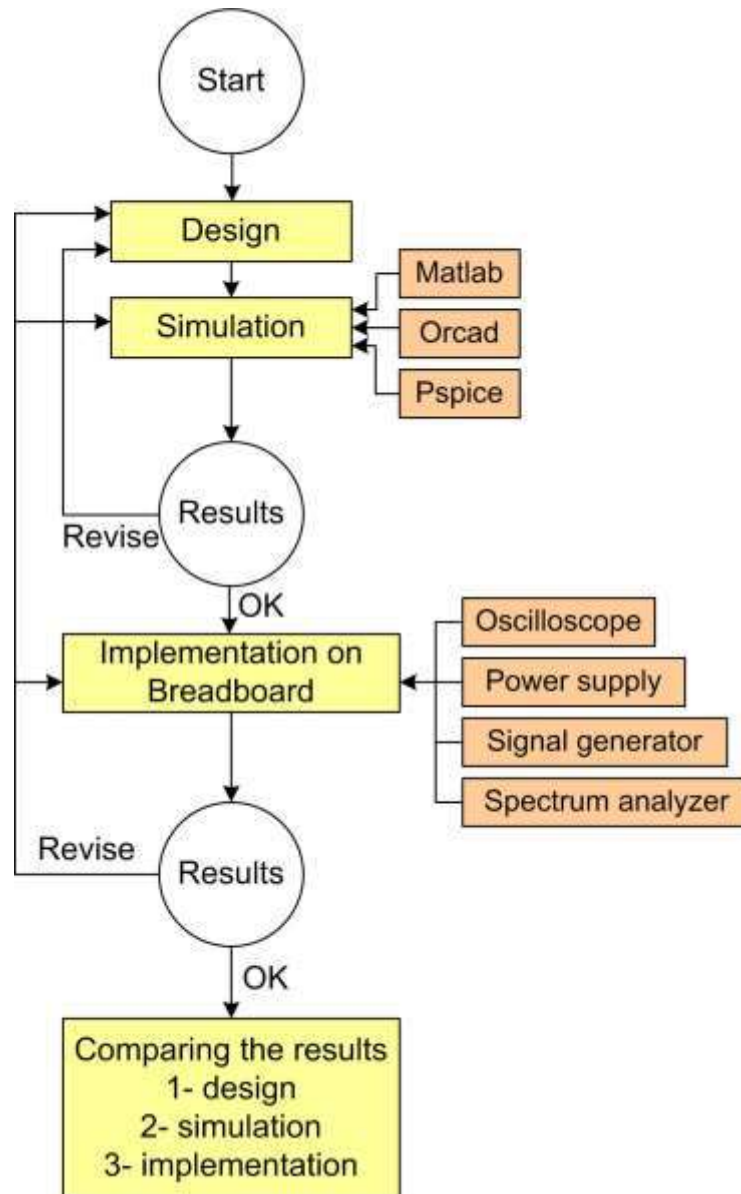


Fig. 1: The flowchart of theoretical and practical instructions sequence.

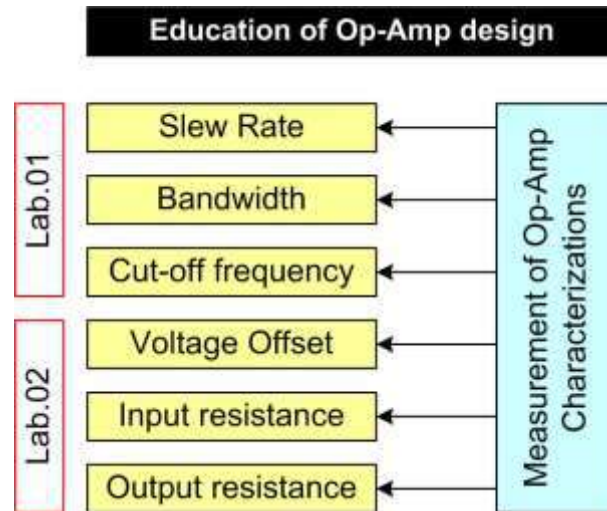


Fig. 2: Training of design in linear integrated circuits course.

3 CONCLUSIONS

In this paper, the instruction of linear integrated circuits using the combination of theoretical and practical training has been discussed during the COVID-19 pandemic. It is suggested that the design and applications are learned to the students by these steps:

- 1- Training of the theoretical objects (distance learning)
- 2- Training of the design of linear integrated circuits (distance learning)
- 3- Training of the circuits simulation to ensure performance (distance learning)
- 4- Training of the implementation of circuits on the breadboards (hybrid)
- 5- Training of the information comparison between the design, simulation and implementation of linear integrated circuits (hybrid)

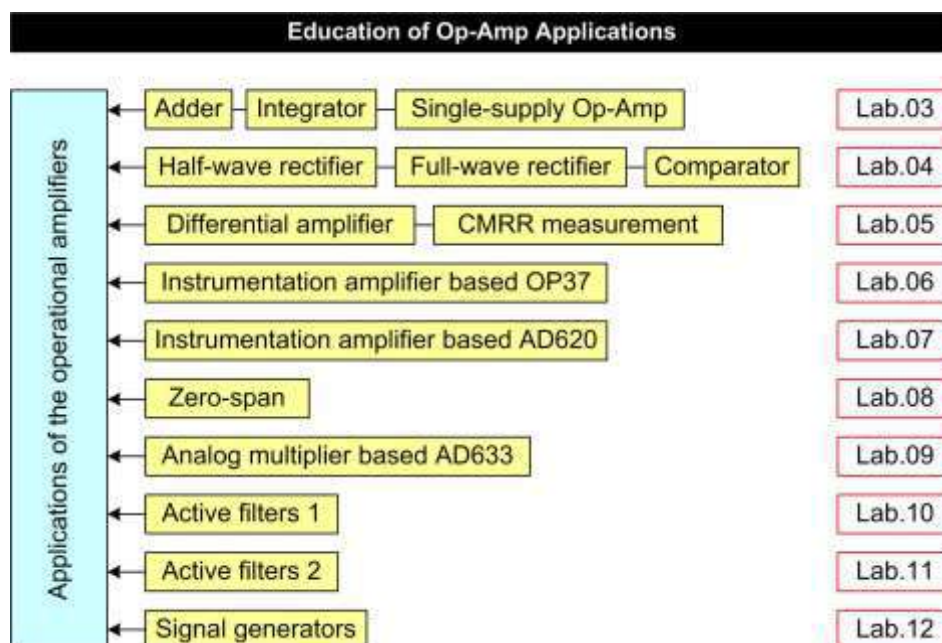


Fig. 3: Training of applications in linear integrated circuits course.



REFERENCES

- [1] P.R. Gray and R.G. Meyer, "Analysis and Design of Analog Integrated Circuits", John Wiley, 1993.
- [2] A.S. Sedra and K.C. Smith, "Microelectronic Circuits", Oxford University Press, 2004.
- [3] R. Ellis, "*Task-Based Language Learning and Teaching*", Oxford University Press, 2003
- [4] R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Prentice Hall, 1996.
- [5] <http://www.ti.com>, Texas Instrument website, 2021.
- [6] <http://www.burrbrown.com>, Burr-Brown website, 2018.
- [7] <http://www.analog.com>, Analog Devices website, 2021.

THE IMPACTS OF THE GREAT FINANCIAL CRISIS ON THE BANKING SECTOR OF A SMALL TRANSITION COUNTRY ON THE EXAMPLE OF BOSNIA AND HERZEGOVINA

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ABSTRACT

The effects of the great financial crisis on the banking sector of a small transition country are pronounced and great. Essentially, on the example of a small transition country such as Bosnia and Herzegovina, the mere existence of a major economic crisis, ie the financial crisis of 2008, means a great impact on all economic events in it. The crisis that has affected all economies has no impact on the conduct of macroeconomic policy of all national economies. In essence, it can be said that all economies, regardless of their size, adapt to the great economic or financial crisis in different ways. Adapting to the new conditions is an ongoing process. In this paper, the author pointed out how the transition of countries with weak economies, ie Bosnia and Herzegovina, was adjusted. Namely, immediately after the financial crisis, measures were adopted: balancing the trade balance, controlled opening of the economy, changing the sources of financing the trade deficit, reducing the inflation rate, limiting budget spending, increasing financial discipline and more. Another characteristic of the adjustment that the author pointed out was the diversification of banks in terms of ownership in Bosnia and Herzegovina. The results clearly show the existence of diversification in terms of ownership of banks in Bosnia and Herzegovina, which is illustrated by the authors by showing the banks and their ownership structure.

Keywords: financial crisis, bank, economy, Bosnia and Hercegovina.

INTRODUCTION

The financial crisis, which manifested itself especially after the middle of 2008, has become the subject of numerous researches. The scientific approach to the crisis is focused on the study of numerous facts that caused the economic or financial crisis.

In accordance with that, it was necessary for the state authorities to change the economic system and thus the banking system. The focus of the financial crisis of 2008 comes from explaining the situation on the real estate market in the USA and the growth of real estate prices in that market.

The starting point of that influence was great because the influence of real estate price movements was manifested on a large number of economies in the world. The impact was great, especially in transition countries, and especially in those countries that were both transitional and small in economic scope, such as Bosnia and Herzegovina.

The aim of the research in this paper was to show the impact of small country adjustment on the global financial crisis, by observing the adjustment of the banking system of Bosnia and Herzegovina.

Literature in scientific circles dealing with economic crises existed even before the financial crisis of 2008 [1].

A large number of authors point out in their studies that the crisis began in 2008, when the situation on the real estate market in the United States led to a real uncontrolled growth of their prices. However, even before that, there were authors such as Nobel laureates Schiller, who in 2005 warned of the possibility of inflating real estate prices [2].

There are other authors [3] who have warned of the dangers posed by the rapid growth of the mortgage market. He, in essence, pointed out that it is very unconscious that all households will have enough income at some point with which to pay their debts. He was among the first to point out the possibility of families falling into a debt crisis, which will be able to drag many households into bankruptcy.

Authors such as [4] in their research focus on studying the impact of government policies on the business of economies as a whole. They found that government policies promoted a housing boom and a credit expansion that ended in collapse.

Authors such as [5] pointed out that too much self-confidence in the state economy occurs just before the onset of a major financial crisis. In addition, the mentioned author pointed out that asymmetric information is the main cause of panic and crisis. The attitude of banks and their creditors towards the given real state of the economy is somewhat different. As long as the bank's assets are well rated and the credit rating is satisfactory, the bank's creditors are generally indifferent to the details of the bank's situation, as the owners of capital and state guarantees are able to amortize minor disturbances. The mentioned author points out that the problem of banks' operations was not in capital adequacy, but in liquidity. The author [5] points out that economists misunderstand financial crises, ie economists have equated financial crises with the creation of bank debt.

The author, like [6], sees the causes of the crisis in excessive self-confidence and shows how the strength of human belief affects the formation of financial markets, credit expansion, rising prices and indebtedness, and exposes the entire economy to great risks. They noticed that in the years before the crisis, people reacted correctly to macroeconomic information, but much more strongly than would be appropriate to the real situation.

A similar thing happened when observing the banking sector of Bosnia and Herzegovina. Since 2008, the impact of the financial crisis has been such that state bodies have begun to make valid decisions of regulatory state institutions. There were authors who pointed out in their works that the state should embark on reforms that would break the banking oligarchy in order to prevent new financial catastrophes [7-8].

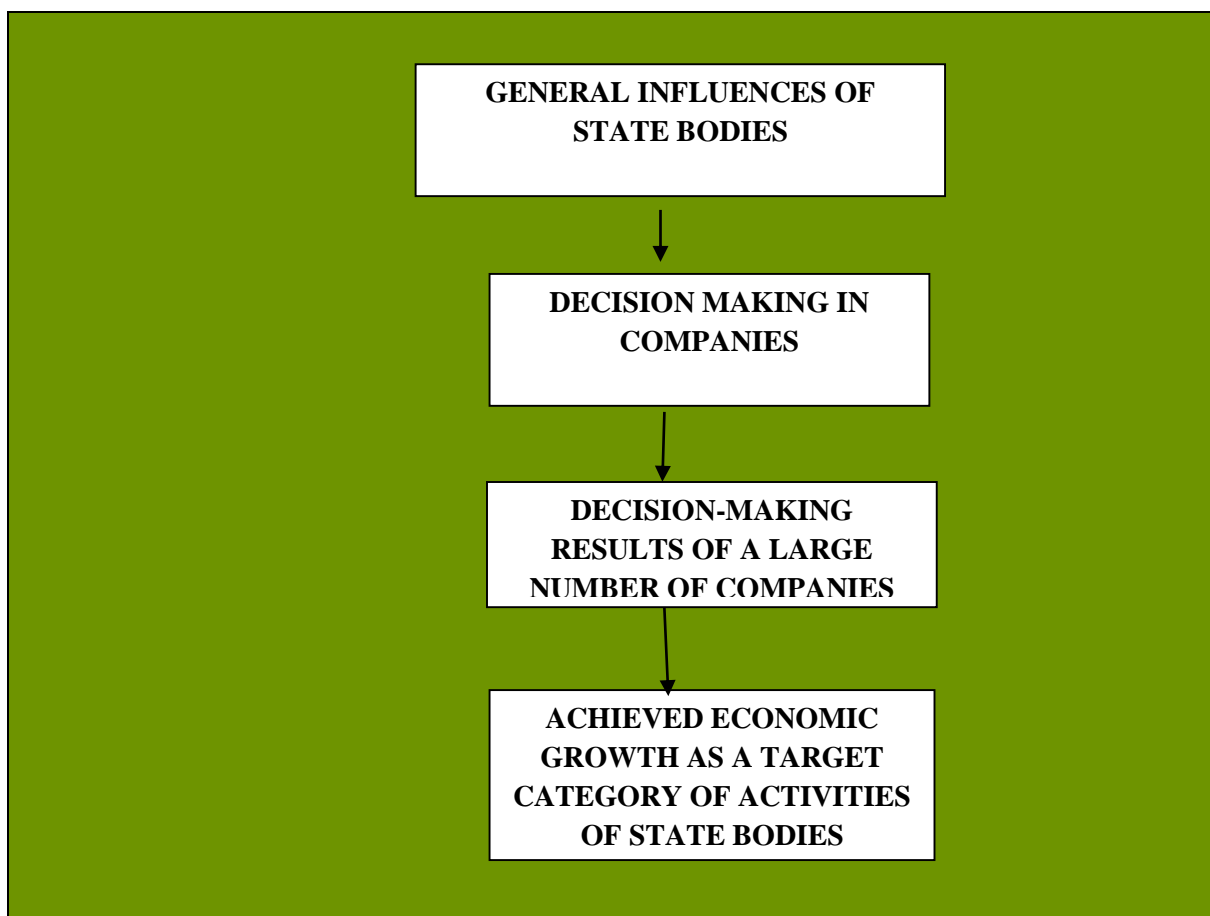
SMALL COUNTRY SIZE (BOSNIA AND HERZEGOVINA) RESPONSE TO THE 2008 FINANCIAL CRISIS

The financial crisis in 2008 affected the adjustment of a large number of economies in transition economies, such as the economy of Bosnia and Herzegovina, to the conditions in which the economic crisis was evident. Countries have made adjustments in their own way. Below, the author gives an overview of the visible effects of the adjustment of the transition country (Bosnia and Herzegovina) that wanted to respond to the state of crisis.

- Adjusting economic activities to the conditions of the financial crisis:
- Trade balance adjustment.
- Controlled opening of the economy.
- By increasing foreign direct investment.
- Moderate inflation growth rates.
- Limited budget spending.
- Disciplined application of fiscal policy measures, etc.

The general schematic presentation of the influence of state bodies would be illustrated by the general scheme of the influence of the state and this can be seen in the presentation in Table 1.

Table 1: Overview of general influences of state bodies on the economy of the transition country



Source: Author (2021).

Bosnia and Herzegovina, as a small country with weak economic activity, has taken measures of organization and reorganization, primarily in the banking sector. This was done in order to

respond to the financial crisis that was increasingly hampering the world economy at that moment. 3.

DIVERSIFICATION OF THE BANKING SYSTEM IN TERMS OF OWNERSHIP OF BANKS IN BOSNIA AND HERZEGOVINA

Based on the original research of the author [9], an overview of ownership over banks in Bosnia and Herzegovina is given, with an overview of the situation from 2020.

Table 1. Banks in Bosnia and Herzegovina, origin of founding capital, headquarters and shareholders, situation in 2020

Serial number	Name of the bank	Origin of the founding capital	Headquarters	Shareholders
1	Addiko Bank	Austria	Banja Luka	Addiko Bank
2	Addiko Bank	Austria	Sarajevo	Addiko Bank
3	ASA banka	Bosnia and Herzegovina	Sarajevo	
4	Bosna Bank International	Saudi Arabia	Sarajevo	Islamic Development Bank
5	Intesa Sanpaolo banka	Italy	Sarajevo	Intesa Sanpaolo
6	Komercijalna banka	Serbia	Banja Luka	Komercijalna banka
7	Komercijalno-investiciona banka	Bosnia and Herzegovina	Velika Kladuša	
8	MF banka	Bosnia and Herzegovina	Banja Luka	
9	Naša Banka	Bosna and Herzegovina	Bijeljina	
10	NLB banka a.d.	Slovenia	Banja Luka	NLB Group
11	NLB banka a.d.	Slovenia	Sarajevo	NLB Group
12	Nova Banka	Bosnia and Herzegovina	Banja Luka	
13	Privredna banka Sarajevo	Bosnia and Herzegovina	Sarajevo	
14	ProCredit Bank	Germany	Sarajevo	ProCredit Bank
15	Raiffeisen Bank	Austria	Sarajevo	Raiffeisen Bank
16	Sberbank a.d.	Slovenia	Banja Luka	Sberbank Europe
17	Sberbank a.d.	Slovenia	Sarajevo	Sberbank Europe
18	Sparkasse Bank	Austria	Sarajevo	Erste Group
19	UniCredit Bank	Italy	Mostar	UniCredit
20	UniCredit Bank Banja Luka	Italy	Banja Luka	UniCredit
21	Union banka	Bosnia and Herzegovina	Sarajevo	
22	Vakufska banka		Sarajevo	
23	ZiraatBank BH	Turkey	Sarajevo	Ziraat Bank

Source: Author (2021).

DISCUSSION

Based on this study, it can be seen that there is a great impact of the financial crisis in 2008 on the global economy, and thus on weak and small transition countries such as Bosnia and Herzegovina. In the conditions of the financial crisis, the existence of bad decisions of state bodies, ie regulatory measures adopted by state bodies, exceptionally affects the economic activity of an economy.

The authors point out that in such conditions, one can feel the attempt of the banking oligarchy to establish a strong influence on the state financial structures. This served as a basis for the author of this paper on the example of Bosnia and Herzegovina to emphasize the importance of diversification over bank ownership in a small country as a realistic response of state authorities to potentially possible bargaining by banking oligarchy in the country.

At the same time, this research can go in the direction of reducing the monopoly of certain banks on the economy of a small transition country such as Bosnia and Herzegovina.

CONCLUSION

With the onset of the great economic crisis, ie the financial crisis of 2008, it can be said that a situation is emerging in which all economies are adapting to the conditions of the financial crisis in various ways. In this paper, the author gives an example of the adjustment of a transition country (Bosnia and Herzegovina), which very soon after the crisis began to provide answers to state bodies by adopting economic policy measures in response to the crisis.

These are measures such as: balancing the trade balance, controlling the opening of the economy, changing the sources of financing the trade deficit, reducing the inflation rate, limiting budget spending, increasing financial discipline, etc. In addition, the concretization was manifested by the diversification of banking ownership on the example of the banking system in Bosnia and Herzegovina, which the author points out as a possible positive effect on the future development of the banking system of a transition country with a weak economy.

REFERENCES

1. Minsky, H. (1982). *Can It Happen Again*//ISBN 978-0-332213-3
2. Shiller, R. (2005). *Irrational Exuberance*, Princeton University Press.
3. Gramlich, E. M. (2007). *Subprime Mortgages: America's Latest Boom and Bust*, The Urban Institute Press, Washington.
4. Gennaioli, N. & Shleifer, A. (2018). *A Crisis of Beliefs: Investor Psychology and Financial Fragility*, Princeton University Press.
5. Gorton, G. B. (2010). *Slapped by the Invisible Hand: The Panic of 2007*, Oxford University Press.
6. Gorton, G. B. (2012). *Misunderstanding Financial Crises - Why We Don't See Them Coming*, Oxford University Press.
7. Johnson, S., Kwak, J. (2010). *13 Bankers: The Wall Street Takeover and the Next Financial Meltdown*, Knopf Doubleday Publishing Group, New York
8. Warren, E. (2014). *A Fighting Chance*, Henry Holt and Company, New York



9. Sonja Tomaš-Miskin (2021). Doktorska disertacija, Strategijsko upravljanje performansama banaka Bosne i Hercegovine u uslovima finansijske krize, Univerzitet Union Beograd, Beogradska Bankarska Akdemija, Fakultet za bankarstvo, osiguranje i finansije.

DEVELOPMENT OF SOFTWARE APPLICATIONS IN TRANSITION COUNTRIES AT THE REQUEST OF TOP MANAGEMENT OF LARGE COMPANIES

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ABSTRACT

The development of software solutions at the request of top management is performed by most software companies that undertake specific development for the needs of the company at the request of the customer. Software development methods are constantly changing and advancing in line with the development of software methodologies and information technologies. These requirements must essentially be met by a company that develops software for the needs of users.

Classical traditional methodologies in software architecture development are being upgraded in the form of new more reliable and flexible development techniques. Thus, the component based software development methodology (CBSD), as one of the possible directions of the traditional software methodology, takes precedence in the software development industry. New methodological trends are represented by the so-called agile methodologies, which are more flexible and which prefer to direct towards the development of smaller segments of the software system, so-called software iterations. The authors point out in this paper that the requirement of top management basically for the development of new software solutions must be done, but also the company that develops software should point out to the customer the possible consequences or advantages in terms of software development. At the same time, the authors of this paper point out that the choice of software development methodology affects the quality of the software itself, which is delivered to the client in this case, a large company and whose requirements set by top management should basically be met.

Keywords: software development, large enterprise, desires of top management, management.

INTRODUCTION

Doing business in transition countries requires the application of new business solutions. One way to improve the overall business is to implement new software solutions. This is especially evident in transition economies such as the Republic of Serbia.

It is especially important to introduce new methods of business improvement autonomously and without coercion by top management. This is especially important in large and important companies for the development of the economy of a transition country.

Top management needs to make a business decision in line with business policy goals. One way to improve is to make a business decision to develop new software. In this regard, software performance requirements are submitted to software development companies and software developers in accordance with the client's guidelines.

Quality parameters directly imply a change in all other elements that play a role in evaluating the software solution, where quality parameters are viewed from two most important points of view: (1) development software activities and procedures, or (2) immediate usability and purpose of the developed software system [1- 6].

Essentially, the application of new software solutions is of great importance for the economy as a whole, and especially for the application in large companies [6-11], which essentially have a great impact on very heterogeneous economic activities [12-14].

MAKING A GENERAL DECISION OF TOP MANAGEMENT ON THE DEVELOPMENT OF SOFTWARE SOLUTIONS IN THE COMPANY IN WHICH TOP MANAGEMENT MANAGES

In the study in the picture, the authors gave a general overview of the influence of external and internal factors that may be important on the overall business decision-making process in the company. This is important for large business systems as well as for the business decision-making process of developing new software solutions.

Impact and possible consequences for business and influence on possible decision-making processes, on this issue which can finally give visible results in the process of making valid decisions in the company, the authors presented in the form of Figure 1.

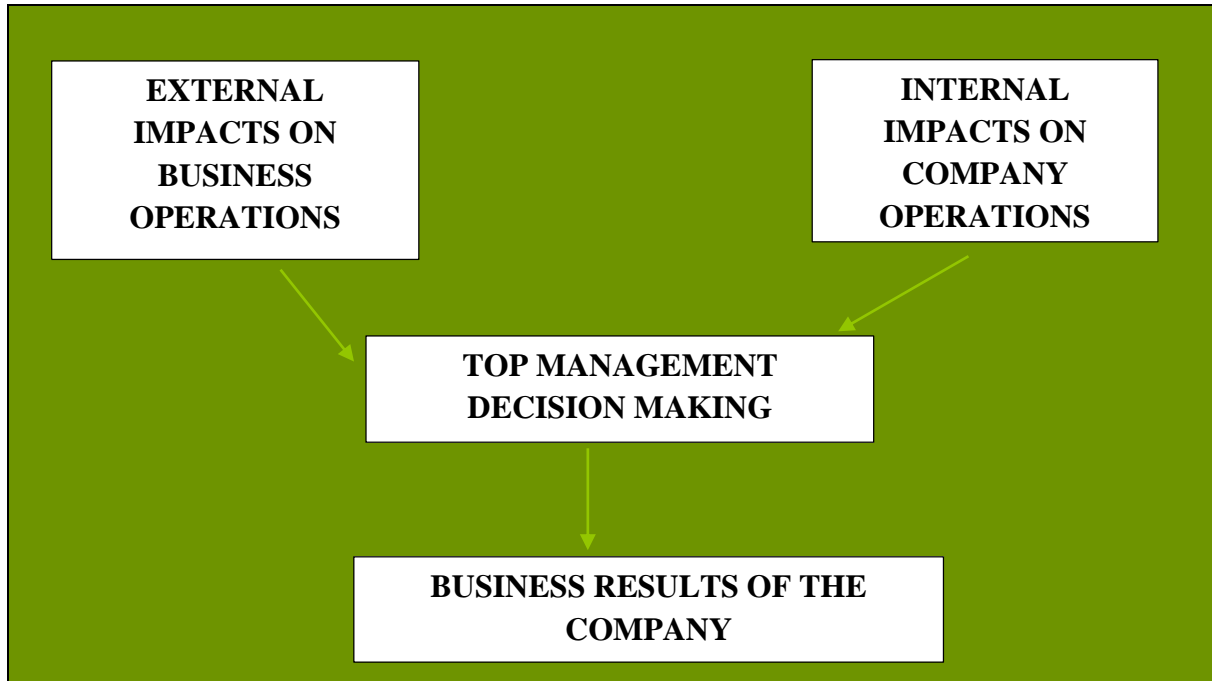


Figure 1: Overview of the general scheme of business decision making by the top management of a large Companies that can relate to deciding on the implementation of a new software solution

DEVELOPMENT OF PROGRAMMING LANGUAGES AND TECHNOLOGICAL STANDARDS IN THE PROCESSES OF DEVELOPING NEW SOFTWARE SOLUTIONS ACCORDING TO THE REQUIREMENTS OF TOP MANAGEMENT OF LARGE ENTERPRISES

The way of solving problems in development software activities, programming languages are divided into procedural and object-oriented (OO). OO software development approach creates technological opportunities to implement data and actions into a common practical-organizational scheme that defines the framework. Java and C # play a prominent role in OO languages.

Major software vendors today have their own development tools, such as Microsoft's suite of applications called Visual Studio.Net with C #, currently a very advanced framework for Rapid Application Develop (RAD). In such a development environment, the robustness, i.e. the readiness of the software to respond to the unusual requirements and functional irregularities, is decreasing. The software is split into partial modules, objects and iterative units, which imply full functionality for a given program task.

The defined task is repeated many times, which implies the need for standardization of independent software solutions and their uniform implementation on different platforms.

OVERVIEW OF COMPLEX SOFTWARE DEVELOPMENT THAT CAN BE APPLIED IN LARGE COMPANIES IN TRANSITION COUNTRIES

The complex development of software solutions, different ways of thinking, approach and realization, procedures and methods of programming and development of software solutions,

as well as system architecture, historically, has evolved from primitive to very modern techniques of software development:

- writing program code - solving problems by programming until 1970, and it is still present today,
- structural methods of software development: analysis and design, until 1985,
- software development based on data models, databases and IV generation languages, since 1980,
- object-oriented methods of development, since 1980,
- standards - UML model of segmental or iterative software development, since 1998.
- Component-based software development.
- Agile methodologies in software solution development, since 2001.

In essence, it can be pointed out that the development of software solutions must be adapted to the requirements of top management, which in this case is also the customer of the service and which requires certain valid software solutions in order to manage the company purposefully.

CONCLUSION

Making valid business decisions regarding the improvement of business operations by the top management of large companies is a reality and takes place continuously in a large number of companies.

One of the possible ways to improve business in the work of the company is given in the review of this paper by the author and essentially relates to the application of new software solutions in the process of overall management in a large company.

The authors emphasized the importance of respecting the external and internal environment in the decision-making process of top management, so that in the end the effects of that decision-making would be possible evaluations in the achieved business results of the company.

The essential authors point out the importance of making a valid business decision related to the application of new software solutions in the business of large companies in a transition country such as the Republic of Serbia.

The goal of all the presented activities undertaken by top management is to improve the overall business results of the company it manages.

REFERENCES

- [1] Alain Abran. 2010. Software Metrics & Software Metrology. doi:10.1002/9780470606834.
- [2] Alain Amir Ghahrai. 2008. Iterative Model in Software Development and Testing.
- [3] Cristina Venera GEAMBAȘU, Iulia JIANU, Ionel JIANU, / Alexandru GAVRILĂ. 2011. „Influence factors for the choice of a software development methodology.“ *Accounting and Management Information Systems* 479–494.
- [4] Daniel Galin. 2004. Software Quality Assurance from theory to Implementation. Pearson Education Limited.
- [5] Ken Cottrell. 2002. „Achieving Enterprise Reuse.“ Presentation.



- [6] Wayne C. Lim. 1998. Managing software reuse. Prentice Hall PTR. doi:ISBN: 0-13-5523737.
- [7] Popović, S., Novaković, S., Đuranović, D., Mijić, R., Grublješić, Ž, Aničić, J., Majstorović, A. (2017). Application of international accounting standard-16 in a public company with predominantly agricultural activities, *Economic Research-Ekonomska Istraživanja*, 30(1): 1850–1864.
- [8] Popović, S. (2014). Socio-ekonomski faktori ograničenja razvoja agrara, *Monografija, Fimek*, Novi Sad, Srbija.
- [9] Popović, S., Ugrinović, M., Tomašević, S. (2015). Upravljanje menadžmenta poljoprivrednog preduzeća preko praćenja ukupnih troškova održavanja traktora, *Poljoprivredna tehnika*, 2: 101-106.
- [10] Popović, S., Ugrinović, M., Tomašević, S. (2015). Management of Agricultural Enterprises by Means of Fair Financial Reporting in Accordance with International Standards of the Finance and Accounting Reporting, *CDQM*, Number 3: 24-30.
- [11] Popović, S., Mijić, R., Grublješić, Ž. (2014). Interna kontrola i interna revizija u funkciji menadžmenta. *Škola Biznisa*, 1, 95-107.
- [12] Popović, S., Tošković, J., Majstorović, A., Brkanlić, S., Katić, A. (2015). The importance of continuous audit of financial statements of the company of countries joining the EU, *Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series, Special Issue*, 241-246.
- [13] Popović, S. (2015). Implementacija heterogenih rizika u radu interne revizije, *Revizor* 69.
- [14] Vitomir, J., Tomaš-Miskin, S., Ivić, M., Popović, S. (2020). Implementation of the Tender by the Municipal Service Administration from the Aspect of Management in the Municipalities of the Republic of Serbia, *Lex Localis – Journal of Local Self-Government*, 8, 3: 469 – 486.

The crisis of 2008 is a good example in which all the above phases can be identified in full.



**THE IMPORTANCE OF CONNECTING THE WORK OF INTERNAL CONTROL
AND INTERNAL AUDIT IN THE OPERATIONS OF ENTERPRISES IN
TRANSITION COUNTRIES LIKE THE EXPERIENCES OF THE ECONOMY OF
THE REPUBLIC OF SERBIA**

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ABSTRACT

The importance of linking the work of internal control and internal audit in the operations of companies in transition countries, and especially with respect for the practical experiences of the economy of the Republic of Serbia is reflected in the fact that it can significantly improve the overall business. At the same time, the work of internal control and internal audit can increase the quality of large business decisions of top management in companies. Another characteristic would be that their work can increase the overall security of business and work in the company. The third is that on the basis of such trends, the overall business in the economy can be increased and improved very quickly, but also within each business entity that has introduced internal control and internal audit in its regular operations. At the same time, the authors point out that the work of unified internal control and internal audit should take into account the existence of external factors that can definitely affect the company's operations, which are measurable in terms of business results achieved by the company. Business decisions should be made by top management, inter alia, based on the recommendations of internal auditors with prior consideration of the findings of internal control formed in the company. Both ways of control are formed by the decisions of the top management of the company. The goal of improving and better management, ie good corporate governance, is a permanent commitment of every well-intentioned top management in the companies in which it performs the function of management. In order to achieve this, or to achieve this goal, it is necessary to take into account the recommendations of internal auditors from the previous period of the company, but it is also necessary to take into account the views of internal control on internal control in the company in the previous observation period.

Keywords: internal audit, internal control, company, management.

INTRODUCTION

The work of a company's top management can be improved in various ways. One of the ways to improve the work of the company is the introduction of internal control and internal audit in the regular operations of the company.

This study emphasizes the importance of the practical application of the introduction of internal control and internal audit in the regular operations of the company, which builds on the

previously published numerous studies [1-5] which show the results of these activities that can be undertaken by top management. This is especially important for a large number of heterogeneous companies that can thus improve the overall business performance of the company.

The decisions of the management of the top management begin on the issue of introducing internal control and internal audit in the regular operations of the company by making a decision to form it, which fulfills the legal framework in the work of the company. In this way, the decisions of top management can significantly affect the improvement of business operations, [6-10].

In addition, the top management of the company adopts documents that monitor the regular operations of the company, and especially those documents that accompany the introduction of internal control and internal audit in the regular operations of the company in order to improve the overall business [11-15].

In addition, the decisions of top management regarding the improvement of management in companies should be based on taking into account the findings of the introduced internal control and internal audit in the regular operations of companies.

GENERAL CONDITIONS FOR THE INTRODUCTION OF INTERNAL CONTROL AND INTERNAL AUDIT IN THE REGULAR OPERATIONS OF THE COMPANY

The conditions for the introduction of internal control and internal audit in the regular business of the company are primarily the decisions of the top management of the company to improve the business of the company by increasing controlling at all levels in the work of the company. One of the possible ways to improve the work and functioning of the company is the introduction of internal control and internal audit in the regular operations of the company.

In addition, the decisions of top management regarding the improvement of management in companies should be based on taking into account the findings of the introduced internal control and internal audit in the regular operations of the company should be seen as a lasting value of improving management in the company. This means that the management of the company can be improved only if there is greater and stronger control of all functions within the functioning of sectors and departments in the company.

The entrusted tasks given to internal control and internal audit should be controlled and respected by the top management of the company in an economical way, ie in an efficient and effective way, during the entire management process in the company. At the same time, the mentioned process must not in any way interfere with the regular business and functioning of the company.

The goal of top management is to provide efficient and quality business decisions that will raise the quality of management in the company, and for such a goal it is necessary to organize all sectors in the company that will help perform the process of controlling the functioning of all parts of the company.

The situation presented in this way regarding the improvement of business decision-making by top management can essentially lead to the improvement of all management functions in the company.

Based on that, it can be said that the effects of top management decisions are visible in the short term after the introduction of internal control and internal audit in the company, especially when in the short term you can see real management improvements and better business results.

SWOT ANALYSIS REGARDING THE INTRODUCTION AND APPLICATION OF INTERNAL CONTROL IN SERBIA

The authors give an overview of SWOT analyzes regarding the introduction and application of internal control in Serbia in the form of Table 1.

Table No 1: SWOT analysis of the situation enterprises that implement the internal control

AVAILABLE OPTIONS	WEAKNESSES
<ul style="list-style-type: none"> • The existence of a signed Chapter 32 with the EU on financial control in the public sector, • The existence of positive attitudes of internal audit introduced in the public sector, • adopted internal audit procedures are compatible with internal control procedures, • Many years of tradition in applying audit procedures in the public sector 	<ul style="list-style-type: none"> • Lack of complete information on the importance of full implementation of internal control in the public sector, • Lack of interest of local self-government units to significantly increase the operational reliability of companies, • Insufficient interest of companies that have established local self-government units for internal control in terms of essential financial reporting to the founder, • The frequent change of the top management appointed by the local self-government causes discontinuity in the performance of commenced tasks in the introduction, control and implementation of internal control recommendations in enterprises
CHANCES	THREATS
<ul style="list-style-type: none"> • Increase in commitments based on signed pre-accession chapters with the EU, • Increasing the safety of top management that has implemented internal control in the companies it manages, • Increasing the security of financial reporting to local government and state authorities, • Facilitates public-private investment activities in the public sector, <p>Internal control contributes to the increase in the level of local government investment in the primary enterprises due to the increased security of investment and the return of funds into the budget based on the generated profit of the company</p>	<ul style="list-style-type: none"> • Insufficient sanctioning of companies established by local self-government in terms of poor financial reporting, • Insufficient sanctioning of public utility companies established by local self-government in terms of poor implementation of business programs

REVIEW OF THE GENERAL FUNCTIONING OF INTERNAL CONTROL AND INTERNAL AUDIT IN COMPANIES

In the following, the authors give an overview of the general functioning of internal control and internal audit in companies in the form of a general scheme of introduced internal control and internal audit in companies, all according to the decision of top management to improve overall business and increase business security.

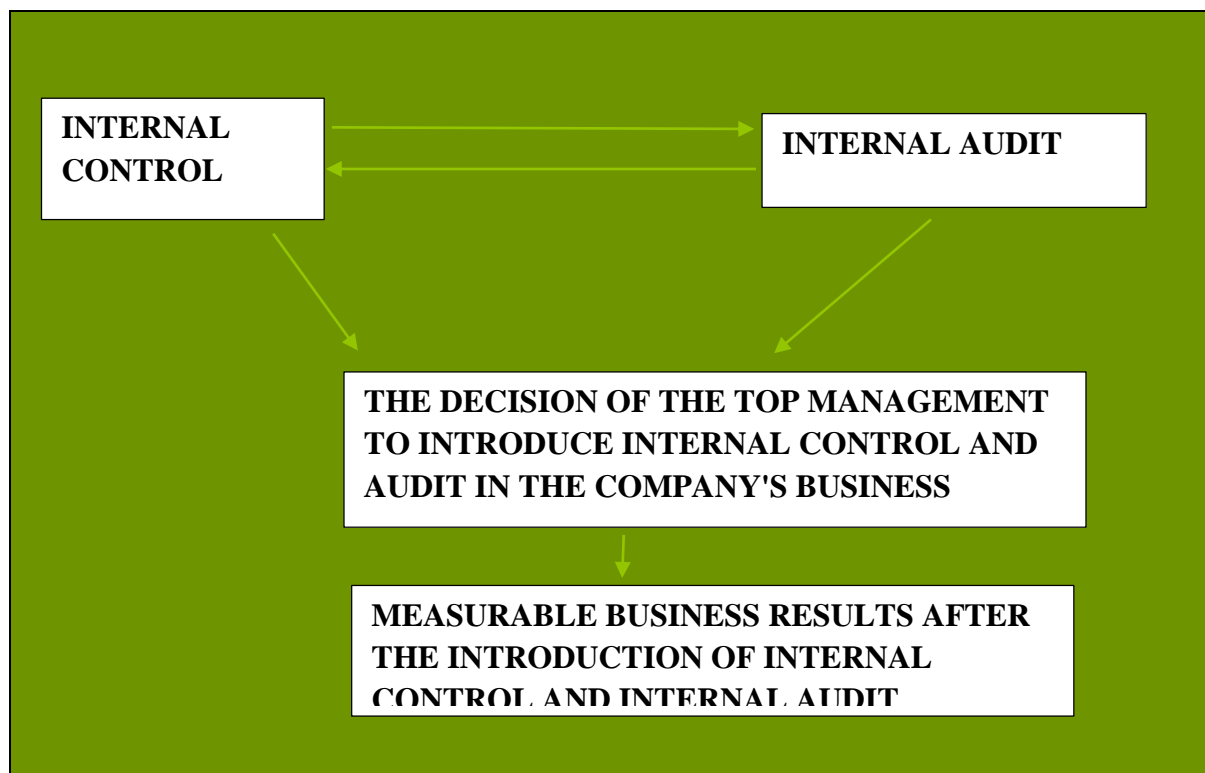


Figure 1: Management overview based on the introduced internal control and internal audit in the company's operations.

CONCLUSION

The top management of the company should make its decision, among other things, based on the recommendations of internal auditors and established internal control. It should base its business decision-making with prior consideration of the findings of internal control formed in the company, while respecting the recommendations of internal auditors received in the form of reports on the work of internal auditors. Both ways of control are formed by the decisions of the top management of the company. The goal of improving and better management, i.e. good corporate governance, is to achieve good business results of the company, and the use of results by internal control and internal audit can help a lot.

In this paper, the authors emphasize the importance of a realistic approach to internal audit by the top management of the company. This is the essential contribution of the author of this paper, because only in that way can an optimal business decision be made.

The report on the work of internal audit should serve as a goal for reviewing the safest possible operation and work of the company. This can improve the work of each company in the long run, and business decisions can be realistic and valid.

REFERENCES

- [1] Popović, D., Vitomir, J., Jokić, M., Arnautović, I., Vrhovac, D., Barović, N., Vujinović, K. & Popović, S. (2020). Implementation of internal audit in companies intending to operate on the principles of green economy in the Republic of Serbia, *Agriculture & Forestry*, Vol. 66 Issue 2: 93-98.

- [2] Popović, S., Ugrinović, M., Tomašević, S. (2015). Upravljanje menadžmenta poljoprivrednog preduzeća preko praćenja ukupnih troškova održavanja traktora, *Poljoprivredna tehnika*, 2: 101-106.
- [3] Mijić, R., Popović, S. (2016). *Finansijsko Računovodstvo*, Banja Luka: City print.
- [4] Majstorović, A., Popović, S., Volf, D. (2015). *Teorija i politika bilansa*, drugo izmenjeno i dopunjeno izdanje, Novi Sad: Feljton.
- [5] Popović, S. (2014). *Socio-ekonomski faktori ograničenja razvoja agrara*, Monografija, Fimek, Novi Sad, Srbija.
- [6] Wang, Q., Huang, D. & Young, E. (2014). Internal Control Information Disclosure Situation Analysis—Based on Studies of the Shenzhen Stock Exchange from 2008 to 2012, *Taxation and Economy*, 1, 57-62.
- [7] Popović, S., Ugrinović, M., Tomašević, S. (2015). Management of Agricultural Enterprises by Means of Fair Financial Reporting in Accordance with International Standards of the Finance and Accounting Reporting, *CDQM*, Number 3: 24-30.
- [8] Popović, S., Mijić, R., Grublješić, Ž. (2014). Interna kontrola i interna revizija u funkciji menadžmenta. *Škola Biznisa*, 1, 95-107, 2014..
- [9] Popović, S., Tošković, J., Majstorović, A., Brkanlić, S., Katić, A. (2015). The importance of continuous audit of financial statements of the company of countries joining the EU, *Annals of the „Constantin Brâncuși” University of Târgu Jiu, Economy Series, Special Issue*, 241-246.
- [10] Popović, S., Novaković, S., Đuranović, D., Mijić, R., Grublješić, Ž, Aničić, J., Majstorović, A. (2017). Application of international accounting standard-16 in a public company with predominantly agricultural activities, *Economic Research-Ekonomska Istraživanja*, 30, 1, 1850–1864.
- [11] Popović, S. (2015). Implementacija heterogenih rizika u radu interne revizije, *Revizor* 69.
- [12] Vitomir, J., Tomaš-Miskin, S., Ivić, M., Popović, S. (2020). Implementation of the Tender by the Municipal Service Administration from the Aspect of Management in the Municipalities of the Republic of Serbia, *Lex Localis – Journal of Local Self-Government*, 8, 3, 469 – 486.
- [13] Radović, M., Vitomir, J. & Popović, S. (2021). Kretanje dokumentacije u sklopu revizijskog izveštavanja top menadžmenta poljoprivrednog preduzeća, *Poljoprivredna tehnika*, Print ISSN 0554-5587 Online eISSN 2406-1123 UDK 631 (059).
- [14] Radović, M., Vitomir, J. and Popović, S. (2019). The Importance of Implementation of Internal Audit in Enterprises Founded by the Republic of Serbia, *Lex Localis - Journal of Local Self-Government*, 17, 4, 1001–1011.
- [15] Radović, M., Vitomir, J. Popović, S. (2021). Impact of internal control in enterprises founded by local self-government units: the case of Republic of Serbia, *Inzinerine Ekonomika-Engineering Economics*, 2021, 32(1), 82–90.

IMPLEMENTATION OF INTERNAL AUDIT IN LARGE ENTERPRISES WITH INFORMATION SYSTEM IN ALL SECTORS

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ABSTRACT

The introduction of internal audit in transition countries such as the Republic of Serbia is essentially reversed so that its basic function is aimed at performing internal audit activities in all parts of the company. It is founded by the top management of the company with the aim of performing the most optimal audit of the system and by order of the top management of the company. Internal audit should, as realistically as possible, perform a real analysis of the situation in companies on the basis of orders issued by top management. On that occasion, two principles should be followed. The first is to do the entire job of internal audit within the set deadline. The second principle is that the confidential work should be done in an economical way and that the internal auditor's report should be submitted to the top management for approval, leaving the same enough time to comment on the draft report. The work of the internal auditor is greatly facilitated if the company already has a built-in information system in the company and if it is functional in all parts of the company. It is important to point out that the company's information system should be built in all sectors and departments in the company.

Keywords: internal audit, internal control, company, management.

INTRODUCTION

Internal audit enables the increase of business security in companies. She performs internal audit work with a large dose of independence in her work. The authors point out that the organization of internal audit in transition economies is carried out continuously and gradually, while increasing the total number of controls that internal audit does each year [1-5].

It is expected that internal audit in companies will raise a large number of primarily professional issues related to true financial reporting. This is especially important for making valid business decisions by the company's top management [6-10]. In addition, the reports of internal auditors can be used for review by all other government agencies that require reporting on major business events that have occurred in the company [11-15].

It is expected that internal audit will play an increasingly important role in companies, especially in matters of checking the financial reporting of top management. It is an expert body of the company and in a true and primarily professional way it submits the found situation in the form of an internal auditor's report to the top management of the company.

In addition, the work of the internal auditor can be based on the provision of consulting services on various issues related to improving the overall management of companies.

RELIANCE OF THE INTERNAL AUDITOR ON THE MOST COMMON WRITTEN REPORTS IN THE COMPANY AND PREPARED IN ACCORDANCE WITH INTERNATIONAL ACCOUNTING STANDARDS

The most frequent reports in accordance with International Accounting Standards in writing are financial statements as follows:

- Balance Sheet
- profit and loss
- reports on changes in equity
- cash flow statements and
- notes to the financial statements.

In order to perform the work of internal audit, it is necessary to form three units in order to ensure the receipt of valid work results by internal auditors.

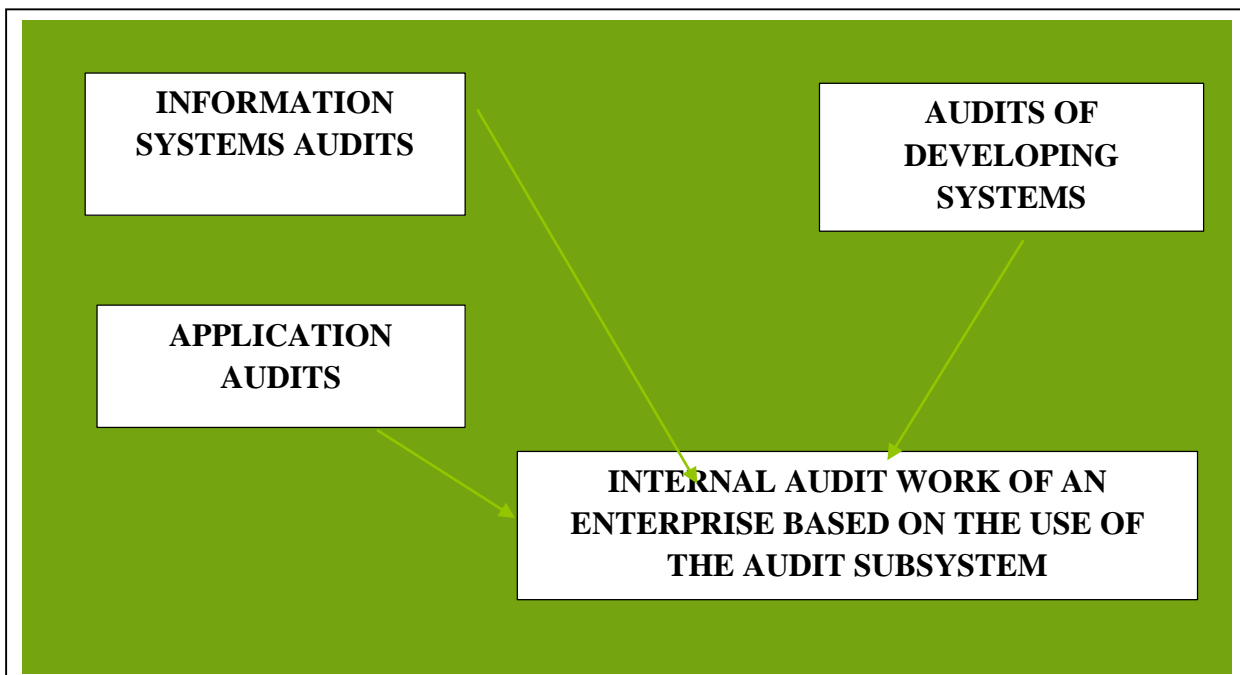


Figure 1. Internal audit presentation that includes three audits in its work.

THE IMPORTANCE OF THE FORMATION OF INFORMATION SYSTEMS IN COMPANIES AND THEIR IMPACT ON THE WORK OF INTERNAL AUDITORS

Internal audit activities are also related to performing audits of information systems. They include all forms of testing and evaluation of processed data by internal auditors.

An audit of information systems involves monitoring and evaluation to determine whether procedures:

- ensure that the assets of the organization are safeguarded, including data;

- ensure the correctness and availability of data as well as business continuity;
- maintain the integrity of the records;
- achieve the organization's goals in an efficient and effective manner.

Information systems auditing is about how the systems themselves operate, not the detailed content of the file / data file. The content and information in the files are only relevant in determining whether the controls are functioning properly.

The main categories of information systems audit are:

- general controls: assessment of the organization and administration of information technology, methods and systems of controls;
- computing capacity: audit of the functioning and procedures of the computing center;
- security: evaluation of logical and physical access, other security measures and controls related to the environment;
- System recovery capability: evaluation of plans and methods that ensure business continuity;
- system software: evaluation of operating systems and other software in the system, methods of development, maintenance and installation;
- Application development: An assessment of the methods, standards, jobs and procedures used to plan, develop, install, maintain and obtain applications.
- The control system components in the information systems are:
 - internal accounting controls used to secureguard the assets and integrity / credibility of accounting data;
 - operational controls, which are used to control day-to-day operations and to confirm that those operations support the business objectives of the organization;
 - Administrative controls that ensure the efficiency and effectiveness of operations, as well as compliance with management policies and regulations.

In the following, the authors gave an overview of the importance of performing control in companies and presented in Figure 2.

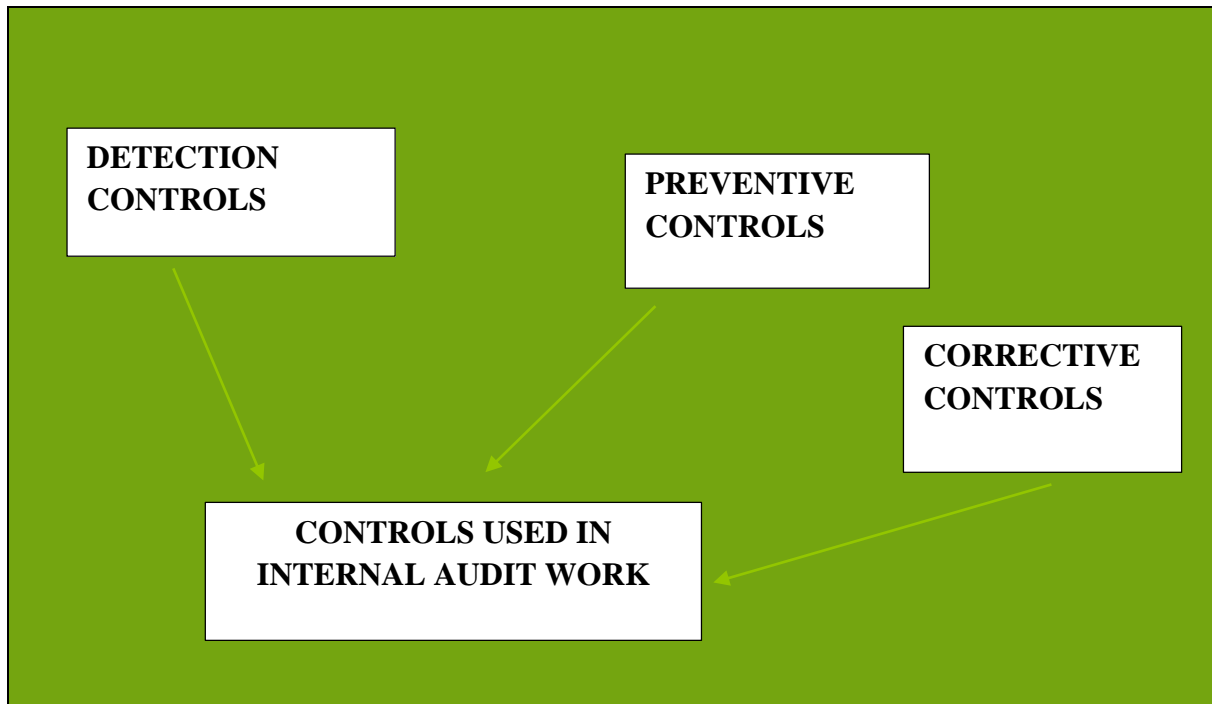


Figure 2: Overview of the impact of control on the company's internal audit work.

In the following, the authors give an overview of the connection between internal audit and the basic sector in relation to the operation of information systems in a large company in a transition country.

The presentation is given in the form of the illustration in Figure 3.

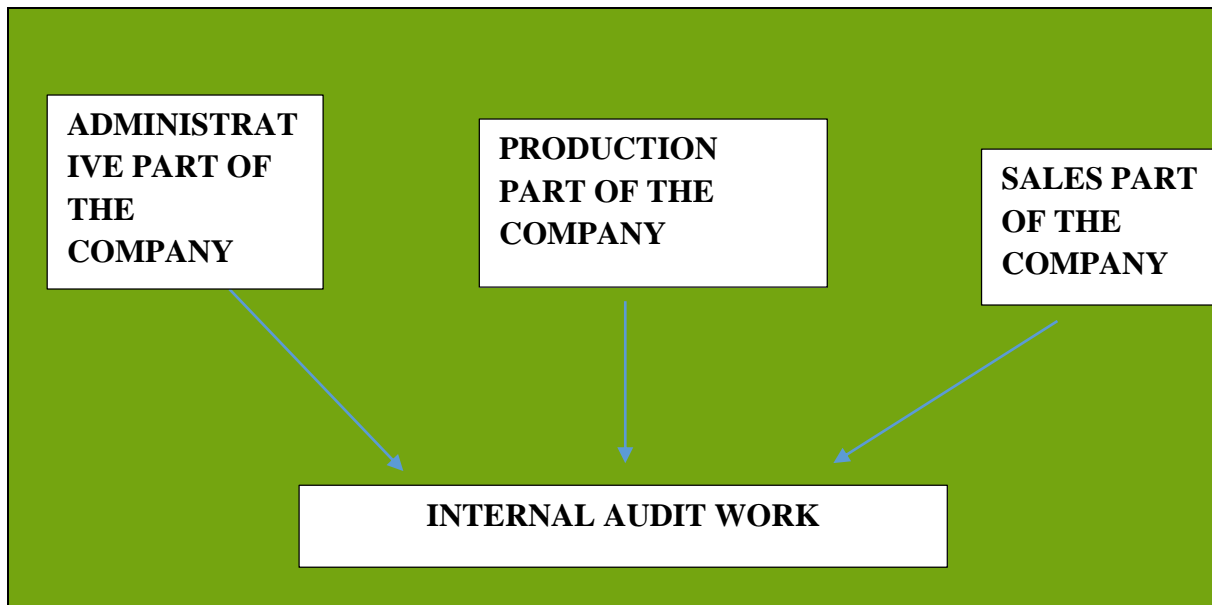


Figure 3: Overview of basic sectors and their connection with internal audit in the company.

CONCLUSION

Internal audit operates in all sectors of the company. It performs the entrusted tasks of internal audit in a professional manner. Internal audit takes into account the time of performing internal audit and the cost-effectiveness of performing internal audit work.

It carries out its justification by performing the duties of an internal auditor within the company, and on the basis of the authority of the top management. In the draft report of the internal auditor, as well as in the final document of the internal audit, which is called the report of the internal auditor, he truthfully reports to the top management on the observed irregularities.

Top management establishes internal audit with the aim of continuously performing the work of internal audit according to the internal audit plan, the existence of which it gives consent to.

REFERENCES

- [1] Cantino, V, Korporativno upravljanje, merenje performansi i normativna usaglašenost sistema internih kontrola, Data Status, Beograd, 2009.
- [2] Gritsenko, I, Skorba, A, Internal business control of service quality costs: managerial aspect, Actual problems of economics, No. 3, Kiev, 2015.
- [3] Ljutić, B, Finansijsko računovodstvo: alati za donošenje poslovnih odluka, Fimek, Novi Sad, 2014.
- [4] Majstorović, A, Popović, S, Volf, D, Teorija i politika bilansa, Fimek, Novi Sad, 2015.
- [5] Matijašević, J, Krivično pravna regulativa računarskog kriminaliteta, Pravni fakultet za privredu i pravosuđe, Novi Sad, 2013.
- [6] Pablo, F, Rodriguez, R, Segment disclosures under IFRS 8's management approach: has segment reporting improved?, Spanish Journal of Finance and Accounting, No. 44, 2015.
- [7] Panchuk, P, Harmonization of accounting and taxation accounting at reporting formation on income, Actual problems of economy, No. 3, Kiev, 2015.
- [8] Popović, S., Majstorović, A., Grublješić, Ž., Valuation of facilities in use and application of international accounting standards, Actual problems of economics, 165(3) 379-387, 2015.
- [9] Popović, S, Eremić-Đorđić J, Mijić R, Interna kontrola u funkciji menadžmenta, Ekonomija - teorija i praksa br.2, Fimek, Novi Sad, 2014.
- [10] Popović, S, Implementacija heterogenih rizika u radu interne revizije, Revizor 69/2015, Institut za ekonomiku i finansije, Beograd, 2015.
- [11] Popović, S, Majstorović, A, Grublješić, Ž, Valuation of facilities in use and application of international accounting standards, Actual problems of economics, No. 3, 2015.
- [12] Popović, S., Mijić, R., Grublješić, Ž., Interna kontrola i interna revizija u funkciji menadžmenta. Škola Biznisa, 1, 95-107, 2014.
- [13] Xu, Y, Jiang, L, Fargher, N, Carson, E, Audit reports in Australia during the global financial crisis. Australian Accounting Review, No. 56, 2011.
- [14] Soltani, B, Revizija, Međunarodni pristup, Mate, doo, Zagreb, 2009.
- [15] Stanišić, M, Modeli interne kontrole, Računovodstvo, br.9-10, Beograd, 2006.

DERIVATIONS ON LIE AND JORDAN ON SEMIPRIME RINGS

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ABSTRACT

The derivation is a map on a ring R such that

$$\delta(x + y) = \delta(x) + \delta(y) \text{ and } \delta(xy) = \delta(x)y + x\delta(y) \quad \forall x, y \in R.$$

An additive map on R is said to be a left (θ, φ) -derivation, where the maps θ, φ of R such that

$$\delta(xy) = \theta(x)\delta(y) + \varphi(y)\delta(x) \quad \forall x, y \in R.$$

In this research we prove that if $A \neq \{0\}$ is a Lie ideal and a subring of a semiprime ring R with $\text{char} R \neq 2$ and δ is a (θ, φ) -derivation of R satisfies the condition

$$\delta(ab) = \delta(ba) \quad \forall a, b \in A,$$

implies that $A \subseteq Z(R)$ and $[R, R] \subseteq Z(R)$.

Furthermore, if $A \neq \{0\}$ is a Lie ideal of a prime ring R with $\text{char} R \neq 2$ and $a^2 \in A$,

$\forall a \in A$ and if θ, φ are two automorphisms of R and $\delta : R \rightarrow R$ is a left (θ, φ) -derivation of R which is acting as a homomorphism (resp. an anti-homomorphism) on A , implies that $\delta = 0$ or $A \subseteq Z(R)$.

In addition, we prove that if $V \neq \{0\}$ is a Jordan ideal and subring of a prime ring R with $\text{char} R \neq 2$ and if θ, φ are two automorphisms of R and δ is a left (θ, φ) -derivation of R which is acting as a homomorphism (resp. an anti-homomorphism) on V , implies that $\delta = 0$ or $V \subseteq Z(R)$.

1. INTRODUCTION

Let $(R, +, \cdot)$ be an associative ring with unity and $Z(R)$ denotes the center of R , a ring R is prime if the identity $xRy = 0$, implies either $x = 0$ or $y = 0$, a ring R is said to be semiprime if the identity $xRx = 0$ gives $x = 0$, the $\text{char} R \neq 2$ of a ring R if whenever $2x = 0$, with $x \in R$, then $x = 0$.

2000 Mathematics Subject Classification: Primary 16W25, 16N60; Secondary 16B60

Key words and phrases: Derivation, prime and semiprime ring, Lie Ideal, Jordan Ideal

$[x, y] = xy - yx$ ($[x, y]$ is called a Lie commutator of x, y) and $(x, y) = x \cdot y + y \cdot x$

$((x, y)$ is called a Jordan commutator of x, y) for any $x, y \in R$, $R_L = (R, +, [-, -])$ is a Lie ring and $R_J = (R, +, (-, -))$ is a Jordan ring related with the associative ring R .

$[U, V]$ (resp. (U, V)) we denote the Lie (resp. Jordan) commutator subgroup of the additive group R^+ in a ring R generated by all $[u, v]$ (resp. (u, v)), where $u \in U$ and $v \in V$, $C(R)$ is the commutator ideal of R generated by the set $\{[x, y] : x, y \in R\}$.

Recall that an additive subgroup A of R is called:

- A Lie ideal of R if $[x, r] \in A$,
- A Jordan ideal of R if $(x, r) \in A$, for all $x \in A$ and $r \in R$.

Obviously, A is a Lie (resp. Jordan) ideal of R if and only if A_L (resp. A_J) is an ideal of R_L (resp. R_J).

The derivation is a map $\delta : R \rightarrow R$ on a ring R such that

$$\delta(x + y) = \delta(x) + \delta(y) \text{ and } \delta(xy) = \delta(x)y + x\delta(y) \quad \forall x, y \in R.$$

$\text{ann}T = \{r \in R : rT = 0 = Tr\}$ the annihilator of $T \subseteq R$.

The additive map δ is said to be (θ, φ) -derivation if

$$\delta(xy) = \delta(x)\theta(y) + \varphi(x)\delta(y) \quad \forall x, y \in R,$$

where, $\theta, \varphi : R \rightarrow R$ maps of R .

The left derivation is an additive map $\delta : R \rightarrow R$ such that

$$\delta(xy) = x\delta(y) + y\delta(x) \quad \forall x, y \in R.$$

In the same manner an additive map $\delta : R \rightarrow R$ is said to be a left (θ, φ) -derivation, where the maps θ, φ of R such that

$$\delta(xy) = \theta(x)\delta(y) + \varphi(y)\delta(x) \quad \forall x, y \in R.$$

All other definitions are standard and it can be found in [1, 2, 18, 19] and [20].

In [11] showed that if δ is a derivation on ring R which is a semiprime and δ is endomorphism (resp. anti-endomorphism) on R , implies that δ must equal zero.

Further, if δ is a derivation acts as a homomorphism (resp. anti-homomorphism) on a right ideal $A \neq \{0\}$ of a prime ring R , implies that δ must equal zero also. In addition, many authors have extended results of [11].

In this way Yengul and Argac [21] proved that these results is true for α -derivations of prime rings and semiprime rings.

Moreover, O. Golbasi and N. Aydin [17] have extended these results, where δ is (θ, φ) -derivations which acting as a homomorphism (resp. an anti-homomorphism) on a prime ring R , implies that d must equal zero.

Therefore, M. Asharf [9] concerning (θ, φ) -derivations δ acts as a homomorphism (resp. anti-homomorphism) on an ideal $A \neq \{0\}$ of a prime ring R . Also in [7] M. Ashraf, N. Rehman studied the same object for a left (θ, φ) -derivation δ .

There are different results related to the commutative property of a ring and the existence a derivations on this ring.

In [16] proved that the existence ideal $A \neq \{0\}$ of a semiprime ring R and derivation δ such that $\delta(uv) = \delta(vu) \quad \forall u, v \in A$, implies that $A \subseteq Z(R)$.

Furthermore, in [17] showed that if (θ, φ) -derivation δ acts as a homomorphism (resp. an anti-homomorphism) on a left ideal $A \neq \{0\}$ of a semiprime ring R , then δ must equal zero.

Finally, this problem has been actively studied by many authors as [3, 6, 7, 8, 14, 15] and others.

2. PRELIMINARIES

We will give some lemmas, which help us to prove the main results.

Lemma 2.1. [17]

Let $\delta \neq 0$ be a (θ, φ) -derivation on a prime ring of char $R \neq 2$ such that θ, φ be automorphisms of R . If $\delta(uv) = \delta(vu) \forall u, v \in R$, implies the commutativity of R .

Lemma 2.2. [14, Lemma 2]

Let R be a prime ring of char $R \neq 2$ and $A \not\subseteq Z(R)$ be a Lie ideal of R . If $xAy = \{0\} \forall x, y \in R$, implies that either $x = 0$ or $y = 0$.

Lemma 2.3. [18, Lemma 1.3]

Let R be a semiprime ring of char $R \neq 2$ the commutativity of a Lie ideal A of R , implies that $A \subseteq Z(R)$.

Lemma 2.4 ([9]).

Let R be a prime ring of char $R \neq 2$ and $A \neq \{0\}$ be a Lie ideal of R . Assume that θ and φ are automorphisms of R . Let R admitted (θ, φ) -derivation δ satisfies the condition

$\delta(A) = \{0\}$, implies that either $\delta = 0$ or $A \subseteq Z(R)$.

Lemma 2.5.

If $A \neq \{0\}$ is a Lie ideal of a prime ring R and $As = \{0\} \forall s \in R$, then $s = 0$.

Proof.

Assume that $A \neq \{0\}$ is a Lie ideal of a prime ring R and $[u, s] \in A, \forall u \in A, \forall s \in R$. Then $xus = 0 \forall u \in A, \forall s \in R$. This means that $xRs = \{0\}$. Hence the primeness R gives either $x = 0$ or $s = 0$. Using that $A \neq \{0\}$, hence $s = 0$. \square

3. DERIVATION ON IDEALS

Lemma 3.1. [18]

Consider A is a right ideal of semiprime ring R , hence $Z(A) \subseteq Z(R)$. Now we can get the same result in lemma (2 -1), when we apply the condition $\delta(uv) = \delta(vu) \forall u, v \in A$, where $A \neq \{0\}$ an ideal of R .

Proposition 3.2.

Let $A \neq \{0\}$ be an ideal of a semiprime ring R of a char $R \neq 2$. Assume that θ and φ are automorphisms of R . If R admitted (θ, φ) -derivation δ satisfies that $\delta(uv) = \delta(vu) \forall u, v \in A$, implies the commutativity of R .

Proof.

Assume that $s \in A$ such that $\delta(s) = 0$. Now let $s = [u, v]$, then

$$\delta(t)\theta(s) = \delta(ts) = \delta(st) = \varphi(s)\delta(t), \forall t \in A.$$

Hence,

$$[\delta(t), s]_{\theta, \varphi} = 0 \forall t \in A. \quad (3 - 1)$$

From $\delta(s) = 0$ and since A is an ideal of R , then by [10] [Theorem 1], we have $s \in Z(A) \forall s \in A$, since $[u, v] \in Z(A) \forall u, v \in A$, we get

$$[r, [u, v]] = 0 \quad \forall u, v, r \in A. \quad (3 - 2)$$

Now replacing v by uv in (3 -2), we have

$$[r, [u, uv]] = [r, u][u, v] = 0 \quad \forall u, v, r \in A. \quad (3 - 3)$$

Further, replace v by vu in (3 -3), we get

$$[r, u][r, vr] = [r, u]v[u, r] = 0 \quad \forall u, v, r \in A.$$

Then

$$[r, u]A[u, r] = \{0\} \quad \forall u, r \in A.$$

Since A is an ideal of R , we have $[r, u]RA[u, r] = \{0\} \quad \forall u, r \in A$. Hence R is prime, then

$$[r, u] = 0 \text{ or } A[u, r] = \{0\} \quad \forall u, r \in A.$$

Now if $A[u, r] = \{0\} \quad \forall u, r \in A$ and since $A \neq \{0\}$ is an ideal of R , we have $[u, r] = 0 \quad \forall u, r \in A$. Hence A is commutative. Then by Lemma (3 -2) we have the center of A contained in the center of R . Hence $A \subseteq Z(R)$ and by Lemma (3 -2) R is commutative. \square

4. DERIVATION ON LIE IDEALS

Let R be a semiprime ring of R with $\text{char } R \neq 2$. We extend Lemma (2 - 1) for a nonzero Lie Ideal and a subring A of R .

Theorem 4.1.

Let $A \neq \{0\}$ be a Lie ideal and subring of a semiprime ring R of $\text{char } R \neq 2$. Assume that $\delta : R \rightarrow R$ is (θ, φ) -derivation of R , where θ, φ are automorphisms of R and $\delta(ab) = \delta(ba) \quad \forall a, b \in A$, then A contained in the center of R and $[R, R] \subseteq Z(R)$.

Proof.

Assume that $\delta(c) = 0, c \in A$. Now, if $c = [a, b]$, then $\delta(a)\theta(c) = \delta(ab) = \delta(ca) = \varphi(c)\delta(a), \quad \forall a \in A$. Then $[\delta(a), c]_{\theta, \varphi} = 0 \quad \forall a \in A$.

From $\delta(c) = 0$ and using [10, Theorem 1]], we have $c \in Z(A), \quad \forall c \in A$. Since $[a, b] \in Z(A) \quad \forall a, b \in A$, then for all $a, b, d \in A$ we have

$$[d, [a, b]] = 0. \quad (4 - 1)$$

Further, replacing b by ab in (4 -1), we have for all $a, b, d \in A$ we have

$$[d, [a, ab]] = [d, a][a, b] = 0. \quad (4 - 2)$$

Now, replacing b by bd in (4 -2), we have

$$[d, a][a, bd] = [d, a]b[a, d] = 0. \quad (4 - 3)$$

Since for all $a, d \in A, [a, d] \in Z(A)$ and from (4 -3) we have

$$b[d, a]^2 = 0.$$

Further, replacing b by $[t, r], t \in A, r \in R$ we get $\forall a, d, t \in A$ and $r \in R$.

$$[t, r][d, a]^2 = 0.$$

Then

$$0 = \text{tr}[d, a]^2 - \text{rt}[d, a]^2 = \text{tr}[d, a]^2 \quad \forall a, t, d \in A \quad \forall r \in R.$$

Hence for all $a, d \in A$ we write $AR[d, a]^2 = 0$.

From R is a prime ring, then $\forall a, d \in A$, we have $A = 0$ or $[d, a]^2 = 0$.

On the other hand A is a nonzero Lie ideal of R , then $[d, a]^2 = 0$ for all $a, d \in A$.

Also, since A is a semiprime, then $\forall a, d \in A$ we have $[d, a] = 0$, hence A is commutative.

Now from Lemma (2-4) we have that $A \subseteq Z(R)$. Since $A \subseteq Z(R) \forall a \in A, r \in R$, then we have $[a, r] = 0$.

Further, replace a by $[a, u]$, $\forall u \in R$, we have $\forall a \in A, r, u \in R$.

$$0 = [[a, u], r] = [au, r] - [ua, r] = a[u, r] - [u, r]a = [a, [u, r]].$$

Thus $\forall a \in A, r, u \in R$ we have $[a, [R, R]] = 0$. Hence $[R, R] \subseteq Z(R)$. \square

Lemma 4.2.

Let $A \neq \{0\}$ be a Lie ideal of a prime ring R of char $R \neq 2$ and $A \not\subseteq Z(R)$, then occur an ideal U of R with $[U, R] \subseteq A$ and $[U, R] \not\subseteq Z(R)$.

Proof.

Since $A \not\subseteq Z(R)$, char $R \neq 2$, then from [18] $[A, A] \neq \{0\}$ and we get $[U, R] \subseteq A$ where

$U = R[A, A]R \neq \{0\}$ is the ideal of R . Thus it follows $[U, R] \subseteq Z(R)$, since if we suppose that $[U, R] \not\subseteq Z(R)$ then $[U [U, R]] = \{0\}$. Hence $U \subseteq Z(R)$. From $U \neq \{0\}$ is an ideal of R , hence $R = Z(R)$. \square

Lemma 4.3.

Let $A \neq \{0\}$ be a Lie ideal of a prime ring R of a char $R \neq 2$ and $A \subseteq Z(R)$ and if $cAd = 0$. Then either $c = 0$ or $d = 0$.

Proof.

Assume that U an deal in R , where $[U, R] \not\subseteq Z(R)$, but $[U, R] \subseteq A$. Suppose that $a \in A, b \in U, r \in R$ and $[bca, r] \in [U, R] \subseteq A$. Then

$$0 = c[bca, r]d = c[bc, r]ad + cbc[a, r]d = c(bcr - rbc)ad = cbcad.$$

Since $c[a, r]d \in cAd = 0$. Hence $cUcRAd = 0$. If $c \neq 0$ and since R is a prime then, we have $Ad = 0$. Now if $t \in R$ and $a \in A$, then

$$(at - ta) \in A,$$

whence $(at - ta)d = 0$. Hence $atd = 0$, this means $aRd = 0$. Since $A \neq \{0\}$ we have $d = 0$. \square

Theorem 4.4.

Let $A \neq \{0\}$ be a Lie ideal of a prime ring R of a char $R \neq 2$ and $a^2 \in A \forall a \in A$.

Now if θ, φ are automorphisms of R and $\delta : R \rightarrow R$ is a left (θ, φ) -derivation of R which is acting as a homomorphism (resp. an anti-homomorphism) on A . Then $\delta = 0$ or $A \subseteq Z(R)$.

Proof.

Firstly, assume that $A \not\subseteq Z(R)$ and δ is acting as a homomorphism on A , then we have

$$\delta(ab) = \delta(a)\delta(b) = \theta(a)\delta(b) = \varphi(b)\delta(a) \forall a, b \in A. \quad (4-4)$$

Further, replacing a by $2ab$ in (4-4) and since char $R \neq 2$, we have

$$(\theta(a)\delta(b) + \varphi(b)\delta(a)) = \theta(a)\theta(b)\delta(b) + \varphi(b)\delta(a)\delta(b) \forall a, b \in A.$$

Hence we get

$$\theta(a)\delta(a)\delta(b) = \theta(a)\theta(b)\delta(b) \quad \forall a, b \in A.$$

Also,

$$\theta(a)(\delta(b) - \theta(b)\delta(b)) = 0. \quad (4 - 5)$$

Replacing a by $2ac$, where $c \in A$ in (4 -5) and since $\text{char } R \neq 2$, then

$$\theta(ac)(\delta(b) - \theta(b)\delta(b)) = 0 \quad \forall a, b, c \in A.$$

Thus

$$ac\theta^{-1}((\delta(b) - \theta(b)\delta(b))) = 0.$$

Then we have

$$aA\theta^{-1}((\delta(b) - \theta(b)\delta(b))) = 0 \quad \forall a, b \in A.$$

From Lemma (2 -2) we have

$$a = 0 \text{ or } (\delta(b) - \theta(b)\delta(b)) = 0 \quad \forall a, b \in A.$$

Notice that $A \neq \{0\}$ of R , then we get

$$\delta(2b) = \theta(b)\delta(b),$$

since δ is a left (θ, φ) -derivation of R , then

$$\theta(b)\delta(b) - \varphi(b)\delta(b) = \theta(b)\delta(b).$$

So

$$\varphi(b)\delta(b) = 0, \quad \forall b \in A. \quad (4 - 6)$$

On Linearizing (4 -6) we get

$$\begin{aligned} 0 &= \varphi(b+a)\delta(b+a) \\ &= (\varphi(b) + \varphi(a))(\delta(b) + \delta(a)) \\ &= \varphi(b)\delta(b) + \varphi(b)\delta(a) + \varphi(a)\delta(b) + \varphi(a)\delta(a) \\ 0 &= \varphi(b)\delta(a) + \varphi(a)\delta(b) \quad \forall a, b \in A. \end{aligned} \quad (4 - 7)$$

Now substitute a by $2ab$ in (4 -7) and using that $\text{char } R \neq 2$, we get

$$\begin{aligned} 0 &= \varphi(b)\delta(b)\delta(a) + \varphi(b)\varphi(a)\delta(b) \\ &= \varphi(b)\varphi(a)\delta(b). \end{aligned}$$

This means that $b\varphi^{-1}(\delta(b)) = 0 \quad \forall a, b \in A$. i.e., $bA\varphi^{-1}(\delta(b)) = 0$. By Lemma (2 -2), we get $b = 0$ or $\delta(b) = 0 \quad \forall b \in A$.

Since $A \neq \{0\}$ is a Lie ideal of R , we have

$$\delta(b) = 0, \quad \forall b \in A. \quad (4 - 8)$$

Now replacing b by $[b, r]$, $r \in R$ in (4 -8) we get

$$\begin{aligned} 0 &= \delta([b, r]) = \delta(br - rb) = \delta(br) - \delta(rb) \\ &= \theta(b)\delta(r) + \varphi(r)\delta(b) - \theta(r)\delta(b) - \varphi(b)\delta(r) \\ &= \theta(b)\delta(r) - \varphi(b)\delta(r) \\ &= (\theta(b) - \varphi(b))\delta(r). \end{aligned}$$

So

$$(\theta(A) - \varphi(A))\delta(r) = 0, \forall r \in R.$$

Since θ, φ are automorphisms of R and $A \neq \{0\}$ is a Lie ideal, we see that $\theta A \neq \{0\}, \varphi(A) \neq \{0\}$ are a nonzero Lie ideals of R . Then, $(\theta(A) - \varphi(A)) \neq \{0\}$ is a nonzero Lie ideal of R . Now using Lemma (2 -1), we have $\delta(r) = 0$, this means $\delta = 0$ on R .

Secondly, assume that δ is acting as an anti-homomorphism on A , then

$$\delta(ab) = \delta(b)\delta(a) = \theta(a)\delta(b) + \varphi(b)\delta(a) \quad \forall a, b \in A. \quad (4 - 9)$$

Substituting b by $2ab$ in (4-9) and from that $\text{char } R \neq 2$ we have $\forall a, b \in A$, then

$$\begin{aligned} \delta(ab)\delta(a) &= \theta(a)\delta(b)\delta(a) + \varphi(b)\delta(a)\delta(a) \\ &= \theta(a)\delta(b)\delta(a) + \varphi(a)\varphi(b)\delta(a). \end{aligned}$$

Hence

$$\varphi(a)\delta(b)\delta(a) = \varphi(a)\varphi(b)\delta(a), \quad \forall a, b \in A. \quad (4 - 10)$$

Replacing in (4 -10) with b by $2sb, s \in A$ and using $\text{char } R \neq 2$, we have

$$\varphi(s)\varphi(b)\delta(a)\delta(b) = \varphi(a)\varphi(s)\varphi(b)\delta(a). \quad (4 - 11)$$

Using (4 -10) in (4 -11) we have for all $a, b, s \in A$,

$$[\varphi(a), \varphi(s)]\varphi(b)\delta(a) = 0.$$

Thus

$$[a, s]b\varphi^{-1}(\delta(a)) = 0,$$

equivalently,

$$[a, s]A\varphi^{-1}(\delta(a)) = 0.$$

From Lemma (2 -2) we have $[a, s] = 0$ or $\delta(a) = 0$. Suppose that

$$B = \{a \in A, [a, s] = 0 \forall s \in A\},$$

and

$$C = \{a \in A, \delta(a) = 0\}.$$

Then B, C are proper subgroups of A and $A = B \cup C$, hence $A = B$ or $A = C$.

Now if $A = B$, then for all $a, s \in A, [a, s] = 0$.

This means the commutative of A . From lemma (2 -3) we have $A \subseteq Z(R)$ and we get a contradiction.

Then for all $a \in A, \delta(a) = 0$. Replacing a by $[a, r]$ we have $\forall a \in A$ and $\forall r \in R$,

$$\begin{aligned} 0 &= \delta([a, r]) = \delta(ar - ra) = \\ &= \theta(a)\delta(r) + \varphi(r)\delta(a) - \theta(r)\delta(a) - \varphi(a)\delta(r) = \\ &= \theta(a)\delta(r) + \varphi(a)\delta(r) - (\theta(a) - \varphi(a))\delta(r). \end{aligned}$$

Equivalently

$$(\theta(A) - \varphi(A))\delta(r) = 0.$$

Now using the same technique as in part (1) we get the required.

5. JORDAN DERIVATION

we will state some lemmas, which helps us to prove the main results

Lemma 5.1. [22, Lemma 2-5]

Let $V \neq 0$ be a Jordan ideal of a prime ring R . If $rV = \{0\}$ or $Vr = \{0\}$, $r \in R$, then $r = 0$.

Lemma 5.2. [22, Lemma 2-6]

Let $V \neq 0$ be a Jordan ideal of a prime ring R of char $R \neq 2$. If $sVt = \{0\}$, then $s = 0$ or $t = 0$.

Lemma 5.3. [22, Lemma 2-7]

Let $V \neq 0$ be a Jordan ideal of a prime ring R of char $R \neq 2$. Then the commutativity of V gives that $V \subseteq Z(R)$.

Theorem 5.4.

Let $V \neq \{0\}$ be a Jordan ideal and subring of a prime ring R with char $R \neq 2$. Let θ and φ be automorphisms of R . If δ is (θ, φ) -derivation of R acting as a homomorphism on V . Then

$$\delta = 0.$$

Proof.

Assume that δ acts as a homomorphism on V . Thus

$$\delta(st) = \delta(s)\theta(t) + \varphi(s)\delta(t) = \delta(s)\delta(t) \quad \forall s, t \in V. \quad (5-1)$$

Now substituting in the identity (5-1) t by tr , then

$$\begin{aligned} \delta(str) &= \delta(s)\theta(t)\theta(r) + \varphi(s)(\delta(t)\theta(r) + \varphi(t)\delta(r)) = \\ &= \delta(s)(\delta(t)\theta(r) + \varphi(t)\delta(r)). \end{aligned}$$

From (5-1) we get

$$(\delta(s) - \varphi(s))\varphi(t)\delta(r) = 0.$$

Thus

$$\varphi^{-1}(\delta(s) - \varphi(s))t\varphi^{-1}\delta(r) = 0.$$

Hence

$$\varphi^{-1}(\delta(s) - \varphi(s))V\varphi^{-1}\delta(r) = \{0\}.$$

From lemma (5-2), we have $\delta(s) - \varphi(s)$ or $\delta(r) = 0$. Let $\delta(r) = 0$ and using lemma (5-3), we conclude that $\delta = 0$. Now let $\delta(s) - \varphi(s) = 0$, then

$$\delta(s) = \varphi(s) = 0. \quad (5-2)$$

substituting (5-2) in (5-1), we get

$$\delta(s)\theta(t) + \delta(s)\delta(t) = \delta(s)\delta(t).$$

$$d(u)s(v) + d(u)d(v) = d(u)d(v), \text{ for all } u, v \in J,$$

Hence

$$\delta(s)\theta(t) = 0. \quad (5-3)$$

Now substituting in the identity (5-3) t by tr , then we have

$$\delta(s)\theta(t)\theta(r) = 0.$$

This means that $\theta^{-1}\delta(s)\text{tr} = 0$, so $\theta^{-1}\delta(s)V r = 0$

In addition from lemma (5-2), we find $\delta(s) = 0$ or $r = 0$. Using the fact that $V \neq \{0\}$ is a Jordan ideal, hence $\delta(s) = 0$ and from lemma (5-3), we have $\delta = 0$. \square

Theorem 5.5.

Let $V \neq 0$ be a Jordan ideal and subring of a prime ring R with $\text{char } R \neq 2$. Now if θ, φ are automorphisms of R and δ is a left (θ, φ) -derivation of R which is acting as a homomorphism (resp. an anti-homomorphism) on V . Then $\delta = 0$ or $V \subseteq Z(R)$.

Proof.

Firstly, assume that δ is acting as a homomorphism on a Jordan ideal V not contained in the center of R , then

$$\delta(s)\delta(t) = \delta(st) = \theta(s)\delta(t) + \varphi(t)\delta(s) \quad \forall s, t \in V. \quad (5 - 4)$$

Now, replace s by st in (5-4), then

$$\begin{aligned} \delta(st)\delta(t) &= (\theta(s)\delta(t) + \varphi(t)\delta(s))\delta(t) = \\ \theta(st)\delta(t) + \varphi(t)\delta(st) &= (\theta(s)\theta(t) + \varphi(t)\delta(s))\delta(t). \end{aligned}$$

Thus

$$\theta(s)\delta(t)\delta(t) = \theta(s)\theta(t)\delta(t) \quad \forall s, t \in V.$$

Equivalently,

$$\theta(s)(\delta(t) - \theta(t))\delta(t) = 0.$$

This means that

$$\theta(V)(\delta(t) - \theta(t))\delta(t) = 0 \quad \forall t \in V.$$

Using the fact that $\theta(V)$ is a Jordann ideal, then by Lemma (5-1), we get

$$(\delta(t) - \theta(t))\delta(t) = 0,$$

hence

$$\delta^2(t) = \delta(t)\delta(t) = \delta(t^2) = \theta(t)\delta(t),$$

therefore,

$$\delta(t^2) = \theta(t)\delta(t) + \varphi(t)\delta(t) = \theta(t)\delta(t).$$

This implies that

$$\varphi(t)\delta(t) = 0 \quad \forall t \in V. \quad (5 - 5)$$

Furthermore, by linearizing identity (5-5)

$$\begin{aligned} 0 &= \varphi(s + t)\delta(s + t) = \\ \varphi(t)\delta(t) + \varphi(t)\delta(s) + \varphi(s)\delta(t) + \varphi(s)\delta(s) &= \\ \varphi(t)\delta(s) + \varphi(s)\delta(t). \end{aligned} \quad (5 - 6)$$

In addition, replacing s by ts in (5-6), then

$$\begin{aligned} \varphi(t)\delta(ts) + \varphi(ts)\delta(t) &= \\ \varphi(t)\delta(t)\delta(s) + \varphi(t)\varphi(s)\delta(t) &= \\ \varphi(t)\varphi(s)\delta(t) \quad \forall s, t \in V. \end{aligned}$$

Thus $t\varphi^{-1}(\delta(t)) = 0$. This means that

$$tV \varphi^{-1}(\delta(t)) = \{0\} \quad \forall v \in V.$$

From Lemma (5-2), we get

$$t = 0 \text{ or } \delta(t) = 0, \text{ so}$$

$$\delta(t) = 0. \quad (5 - 7)$$

Substituting t by $t \circ z$ in (5-7), such that $z \in R$, then

$$\begin{aligned} \delta(t \circ z) &= \delta(tz + zt) = \delta(tz) + \delta(zt) = \\ &= \theta(t)\delta(z) + \varphi(z)\delta(t) + \theta(z)\delta(t) + \varphi(t)\delta(z) = \\ &= \theta(t)\delta(z) + \varphi(t)\delta(z) = (\theta(t) + \varphi(t))\delta(z). \end{aligned}$$

Thus

$$(\theta(V) + \varphi(V))\delta(z) = 0 \quad \forall z \in R.$$

Since $\theta(V) \neq \{0\}$ and $\varphi(V) \neq \{0\}$ are Jordan ideals, then by Lemma(5-1) we get $\delta(z) = 0$ $\forall z \in R$. This means that $\delta = 0$ on R .

Secondly, assume that δ is acting as an anti-homomorphism on a Jordan ideal $V \neq \{0\}$ of R such that V is not contained in the center of R . Hence

$$\begin{aligned} \delta(st) &= \delta(ts) = \delta(t)\delta(s) = \\ &= \theta(s)\delta(t) + \varphi(t)\delta(z) \quad \forall s, t \in V. \quad (5 - 8) \end{aligned}$$

Substituting t by st in (5-8), then

$$\begin{aligned} \delta(st)\delta(s) &= \theta(s)\delta(st)\delta(s) + \varphi(st)\delta(s)\delta(s) = \\ &= \theta(s)\delta(st)\delta(s) + \varphi(s)\varphi(t)\delta(s). \end{aligned}$$

This means that

$$\varphi(t)\delta(s)\delta(s) = \varphi(s)\varphi(t)\delta(s). \quad (5 - 9)$$

Now, replace t by ct in identity (5-9), then

$$\varphi(c)\varphi(t)\delta(s)\delta(s) = \varphi(s)\varphi(c)\varphi(t)\delta(s) \quad \forall c, s, t \in R. \quad (5 - 10)$$

Concerning (5-9), then (5-10) gives that

$$[\varphi(s), \varphi(t)]\varphi(t)\delta(s) = 0.$$

Thus

$$[s, c]t\varphi^{-1}(t)(\delta(s)) = 0.$$

Equivalently,

$$[s, c]V \varphi^{-1}(t)(\delta(s)) = \{0\}.$$

From Lemma(5-2) conclude that

$$[s, c] = 0 \text{ and } \delta(s) = 0.$$

Assume that

$$U = \{s \in V : [s, c] = 0 \quad \forall c \in V\} \text{ and } W = \{s \in V : \delta(s) = 0\}.$$

Then $U \subset V$ and $W \subset V$ as a proper subgroups and $V = U$, hence $V = U$ or $V = W$.

Now, if $V = U$, then $[s, c] = 0$, implies V is commutative, then by Lemma (5-3) V is contained in the center of R , which is contradicting with assumption. Hence

$$\delta(s) = 0 \quad \forall s \in V. \quad (5 - 11)$$

Replace s by $s \circ z$ in (5-11), we get

$$\begin{aligned} 0 &= \delta(s \circ z) = \delta(sz + zs) = \delta(sz) + \delta(zs) = \\ &\theta(s)\delta(z) + \varphi(z)\delta(s) + \theta(z)\delta(s) + \varphi(s)\delta(z) = \\ &\theta(s)\delta(z) + \varphi(s)\delta(z) = (\theta(s) + \varphi(s))\delta(z). \end{aligned}$$

Therefore,

$$(\theta(V) + \varphi(V))\delta(z) = 0 \quad \forall z \in R.$$

To complete the rest of the proof, we follow the same method as in the first case.

REFERENCES

- [1] Al Khalaf A., Artemovych O. and Taha Iman, Derivations in differentially prime rings, *Journal of Algebra and its Applications*, 17, No. 7, (2018).
- [2] Al Khalaf A., Artemovych O. and Taha Iman, Derivations in differentially semiprime rings, *Asian-European Journal of Mathematics(AEJM)* 12, No. 5, (2019).
- [3] O.D. Artemovych and M.P. Lukashenko, Lie and Jordan structures of differentially semiprime rings, *Algebra and Discrete Math.* 20(2015), 13–31.
- [4] N. Argac, A. Nakajima, and E. Albas, On orthogonal generalized derivations of semiprime rings, *Turk J Math.* 28 (2004), 185 - 194.
- [5] M. Bresar and J. Vukman, On some additive mappings in rings with involution, *Aequationes Math.*, 38(1989), 178-185.
- [6] Kaya K. Prime rings with α -derivation. *Hacettepe Bull. Of Natural science and Engineering* 16-17 63-71 1987-1988.
- [7] M. Ashraf, N. Rehman and M. A. Quadri, On (σ, τ) -derivations in certain classes of rings, *Rad Math.* 9 (1999), 187 - 192.
- [8] M. Ashraf and N. Rehman, On Lie ideals and Jordan left derivation of prime rings, *Arch. Math. (Brno)* 36 (2000), 201 - 206 .
- [9] M. Ashraf, On left (θ, φ) -derivations of prime rings, *Archivum Mathematicum (Brno)*, Tomus 41 (2005), 157- 166.
- [10] N. Aydin and K. Kaya, Some generalizations in prime ring with (s,t) – derivation, *Doga Tr. Math.* 16 (1992), 169 - 176.
- [11] H. E. Bell and L. C. Kappe, Rings in which derivations satisfy certain algebraic conditions, *Acta Math. Hungar* 53 (1989), 339 - 346.
- [12] H. E. Bell and M. N. Daif, On derivations and commutativity in prime rings, *Acta Math. Hungar* 66 (1995), 337 - 343.
- [13] H.E. Bell, On some commutativity theorems of Herstein, *Archiv Math.* 24 (1973), 34–38.
- [14] J. Bergen, I. N. Herstein and J. M. Keer, Lie ideals and derivations of prime ring, *J. Algebra* 71 (1981), 254-267.



- [15] Chng, J.C. : alpha derivation with invertible values, Bulletin of the Intitite of Math. Acad. Sinica 13, (1985).
- [16] M. N. Daif and H. E. Bell, Remarks on derivations on semiprime rings, Internet. J. Math. Sci. 15 (1992), 205- 206.
- [17] O. Golbasi and N. Aydin, Some results on endomorphisms of prime ring which are (s,t) – derivation, East Asian Math. J. 18 (2002), 33-41.
- [18] I.N. Herstein, Topics in Ring Theory, The University of Chicago Press, Chicago London, 1965.
- [19] I.N. Herstein, Rings with involution, The University of Chicago Press, Chicago London 1976.
- [20] E. C. Posner, Derivations in Prime Rings. Proc. Amer. Math. Soc. 8 (1957), 1093-1100.
- [21] Yenigul M. and Argac N., On prime and semiprime rings with a – derivations, Turkish J. Math.18 (1994), 280 - 284.
- [22] S. M. A. Zaidi, M. Ashraf and S. Ali, On Jordan ideals and left (q,q) – derivations in prime rings, IJMMS 37 (2004), 1957-1964.

UNSTEADY FREE CONVECTION MOTION OF CASSON LIQUID PAST A SEMI-INFINITE VERTICAL POROUS PLATE ON NUMERICAL SOLUTION OF MHD, Soret, DUFOUR AND THERMAL RADIATION CONTRIBUTIONS

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ABSTRACT

In this paper, unsteady motion of Casson liquid over a half-infinite vertical penetrable plate with MHD, Soret, Dufour and thermal radiation contributions have been explored numerically. In the physical geometry, the Casson liquid flows to the layer from the penetrable vertical plate. At the layer, Casson liquid is set into motion and the flow equations are illustrated using coupled partial differential equations (PDEs). These set of PDEs are simplified to form a dimensionless PDEs with the use of normal non-dimensional transformation. The effects of controlling parameters on the working fluid is extensively discussed on velocity, concentration, and temperature and presented graphically. Computational values of engineering quantities of interest such as local skin friction, Nusselt plus Sherwood number for controlling parameters are depicted in tabular form. Our findings show that an increment in the Casson term depreciates the velocity plot because of the impact of the magnetic parameter on the flow. The Soret parameter was found to accelerate the coefficient of skin friction along with the Sherwood number. An incremental value of Dufour parameter was detected to hike the skin friction alongside the Nusselt number. Results of this work were found to be in conformity with previously published work.

Keywords: Casson fluid, Soret and Dufour, plastic dynamic viscosity, Spectral relaxation method

1. INTRODUCTION

The theory of Newtonian liquids has been used in describing many physical situations in diverse areas of fluid dynamics. This attracted many authors who have worked on Newtonian fluids to finalize that many liquids in ordinary conditions behaves like Newtonian fluids. However, in this modern year most especially the materialization of polymers fluids of this nature are different from Newtonian fluids. Fluids of this type are classified as non-Newtonian fluids. They are generally in different categories as couple stress fluids, power law fluids, Maxwell fluids dilatants fluids, micropolar fluids, Casson fluids etc; this paper is aimed to investigate the Casson fluids.

Casson (1995) presented the fluid model in relation to non-Newtonian liquid. He examined that the structure of the model is basically on the liquid interaction as well as solid phases with disclosed yield stress. Consider that the yield stress is more than the shear force applied, therefore liquid acts like solid. On the other hand, when the yield stress is feeble than shear stress, therefore the liquid begins to flow. Example of Casson liquid are jelly, honey, human blood concentrated juices, etc. the Casson liquid model is applicable in cancer therapy, blood

cells, fibrinogen, etc. because of the numerous application of Casson liquid, researchers have dedicated their time to elucidate the behaviour of Casson model with different controlling parameters. **Falodun et al. (2018)** investigated MHD Casson liquid motion past an infinite with the flow vertically upward plate. They solved their model using SRM and finalized that an increment in Casson liquid parameter declines the velocity plot. **Prasad et al. (2019)** examined mixed convection Casson liquid motion over a wavy inclined plate with double diffusive effects. Their flow analysis was numerically solved and it was finalized that velocity lessens with an increment in Casson term. Varying the concentration with temperature impact on MHD radiative chemically viscoelastic liquid flow on vertical plate. **Suneetha et al. (2020)**. **Raju et al. (2016)** elucidate stagnation motion of Casson liquid with induced magnetic field alongside homogeneous-heterogeneous reactions. Their findings revealed that performance of heat transport in Newtonian liquids was high as compared to non-Newtonian liquid. Recently, **Idowu and Falodun (2020)** examined the flow of both Casson and Walter's-B liquids with contribution of varying thermal conductivity with viscosity. **Rajakumar et al. (2020)** explored unsteadiness MHD Casson dissipative liquid motion over a half-infinite penetrable upward plate. Analytical approach was adopted on their flow equations and they concluded that velocity degenerated due to increment in Casson liquid parameter.

Magnetohydrodynamic (MHD) is the motion of an electrically conducting liquid when magnetic field is present. MHD takes place majorly when there is interaction between moving conducting liquids. This interaction occurs in liquids, plasma and gases. MHD finds applications in power pumps, power accelerators, power generators, design of heat exchanger, cooling reactors etc. Due to these numerous applications, researchers' have communicated MHD most especially on non-Newtonian liquids. **Shateyi et al. (2010)** explored MHD motion by mixed convection past a upward surface under the contribution of Soret, Dufour, thermal radiation and Hall currents. Their model equations were numerically solved and conclusion that as the Hartman parameter increases, degeneration in the fluid velocity was observed. **Anfuzzaman et al. (2018)** elucidate MHD liquid motion through vibratory vertical penetrable plate with chemically reactive as well as naturally convective high speed. **Balla et al. (2015)** examined MHD convective mass and heat transport past an upward plate with radiation, viscous dissipation, and chemical reaction. They employed Galerkin weighted residual approach on their model and found out that increment in the magnetic field parameter lessens the velocity profile. **Anwar Beg et al. (2011)** have examined unsteady MHD heat movement in a semi-infinite penetrable medium. They solved their model both numerically and analytically **Fagbade et al. (2018)** explored viscoelastic liquid flow past an accelerating penetrable surface with MDH. They profound results to their model numerically and finalized that increment in Hartman parameter lessens the velocity profile. **Ayegbusi et al. (2020)** recently explored unsteady MHD heat mass transport convectively motion with thermophoresis and thermal radiation. Their flow analysis was solved numerically, and they found out that higher magnetic term lessens the velocity plot. **Idowu et al. (2020)** recently explore MHD mass alongside heat transport motion of dissipation Casson liquid.

Mass and heat transport (double diffusion) finds application in numerous engineering processes such as petroleum reservoirs, heat exchanger devices, nuclear waste disposal etc. The simultaneous analysis of mass and heat transport in a flowing liquid leads to complication between the energy flux in temperature as well as composition gradient. Contributions of heat transfer on MHD free convection motion of non-Newtonian liquids were analysed **Tharapatla et.al (2021)**. **Reddy et. Aa (2021)** have explored the contribution of Cattaneo-Christov heat flux of Casson nanofluid past an accelerating penetrable plate alongside thermal radiation and Soret-Dufour phenomenon. Heat and mass transfer slip flow of MHD Casson liquid past a vertically rotting cone with convective conditions studied by **Vijaya et.al (2020)**. **Sandhya,**

et.al (2020) explored the radiation alongside chemical reaction contributions on MHD Casson fluid flow. **Santoshi et.al (2020)** recently explored the motion of non-Newtonian liquid through a paraboloid revolution. **Reddy et.al (2020)** considered the heat alongside mass transfer contribution on MHD on Newtonian flow. **Ibrahim et al (2020)** explored that the contribution of radiation on MHD mixed convective flow alongside mass transfer. **Padma et al (2020)** communicate the numerical exploration of three dimensional Casson-Carreau non fluid motion. The effect of Dufour signifies the energy flux due to composition gradient whereas the effect of Soret signifies mass fluxes created due to temperature gradient. Many authors have neglected Soret-Dufour effect because of the small magnitude order as prescribed by Fick’s laws. We find the effect of Soret-Dufour valuable in this study because of the usefulness of Soret effect in isotope separation **Alao et al. (2016)** communicate the effect of Dufour and Soret on an unsteadiness mass and heat transport motion of a reacting chemically liquid. **Jithender et al. (2016)** elucidate unsteadiness MHD liquid flow past a moveable vertical plate with Soret-Dufour influence **Muhammad et al. (2017)** communicate Soret and Dufour impact on motion of Jeffrey liquid with Newtonian mass and heat conditions. **Idowu and Falodun (2019)** elucidate Dufour-Soret impact on MHD mass and heat transport of Walter’s-B liquid past a half-infinite vertical plate. Ahmed et al. (2020) have communicated the mechanism of Dufour-Soret MHD together with mass and heat transport motion. Recently, **idowu and Falodun (2020)** considered mass and heat transport flow of non-Newtonian liquid in MHD under the influence of thermophoresis, Soret and Dufour.

This paper deals with the numerical examination of MHD, Soret, Dufour and thermal radiation impact on unsteadiness free convection motion of Casson liquid past a half-infinite vertical penetrable plate. The liquid is considered to be incompressible, viscous and electrically conducting due to the MHD nature of Casson liquid. The present study is an improvement on **Parmar and Jain (2018)** to consider MHD and the combine impact of Dufour-Soret. The set of flow equations are written in a dimensionless form by implementing a suitable non-dimensional quantifies. The set of dimensionless equations were then numerically solved utilizing spectral relaxation approach. The attribute of all controlling parameters on concentration, velocity, and temperature are presented graphically and discussed. Problem of this nature have not been considered in the past to the very best of our knowledge. Hence, the present study is necessary owing to its engineering applications such as cancer therapy, MHD accelerators, food processing, isotope separation, design of heat exchangers etc.

2.FORMULATION OF THE PROBLEM

Consider laminar, viscous, two-dimensional convective motion of yield exhibiting type of non-Newtonian liquid past a half-infinite vertical penetrable plate. The liquid is considered to flow into the layer through the upward plate with pores as shown in figure 1. At the starting point where $t = 0$. The moment $t > 0$, the entire system and the fluids are subjected into motion towards the y^* -axis. hence, the physical properties becomes a function of t^* and y^* respectively. The Casson fluid is set into motion within the boundary layer. Casson fluid constitutive equation as explained in Falodun et al. (2018) are describe in this study as follows: the equation of rheological of a Casson liquid is written as Idowu and Falodun (2020):

$$\begin{aligned} \tau_{ij} &= \left(\mu_b + \frac{P_y}{\sqrt{2\pi}} \right) 2e_{ij} \quad \text{when } \pi > \pi_c \\ \tau_{ij} &= \left(\mu_b + \frac{P_y}{\sqrt{2\pi_c}} \right) 2e_{ij} \quad \text{when } \pi < \pi_c \end{aligned} \quad (1)$$

here P_y signifies the liquid yield stress expressed as

$$P_y = \frac{\mu_b \sqrt{(2\pi)}}{\beta} \tag{2}$$

μ_b means Casson plastic viscosity, $\pi = e_{ij}e_{ij}$ means rate of deformation component product with itself and e_{ij} means deformation rate whereas π_c means critical value as regards Casson model. The Casson liquid flow and $\pi > \pi_c$ means that

$$\mu_0 = \mu_b + \frac{P_y}{\sqrt{2\pi}} \tag{3}$$

Utilizing (2) in (3), thus kinematic viscosity is subject to dynamic plastic viscosity μ_b , ρ signifies and Casson term β result to:

$$\mu_0 = \frac{\mu_b}{\rho} \left(1 + \frac{1}{\beta} \right) \tag{4}$$

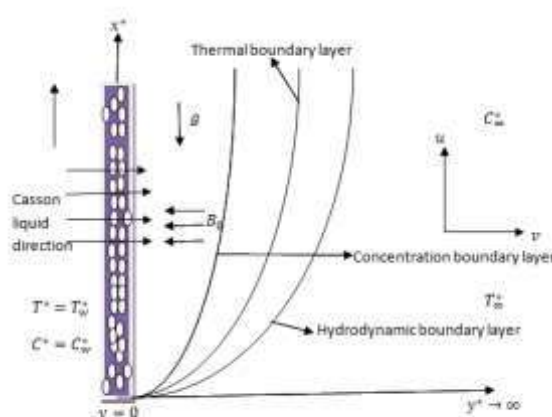


Figure 1: Flow geometry

The following assumptions are put in place to set up the problem are:

- (i) The fluid viscosity alongside thermal conductivity are considered constant;
- (ii) We assumed uniform magnetism of strength (B_0) subjected normal to the plate;
- (iii) In comparison to the imposed magnetism, the induced magnetism is forgone because the magnetic Reynolds number on the fluid is too small;
- (iv) The Dufour, Soret, heat source, heat generation and thermal radiation effects are assumed to be significant due to high electron-atom collision frequency;
- (v) Assumed first order homogeneous chemical reaction within diffusing species and the liquid;
- (vi) Assumed radiative heat flux with respect to y^* -direction because the plate moves towards the flow direction (that is y^* -direction);

$$\frac{\partial v^*}{\partial y^*} = 0 \tag{5}$$

$$\frac{\partial u^*}{\partial t^*} + v^* \frac{\partial u^*}{\partial y^*} = \nu \left(1 + \frac{1}{\beta} \right) \frac{\partial^2 u^*}{\partial y^{*2}} + g\beta_T(T^* - T_\infty^*) + g\beta_C(C^* - C_\infty^*) - \frac{\sigma B_0^2}{\rho} u^* - \frac{\nu}{K_p} u^* \tag{6}$$

$$\frac{\partial T^*}{\partial t^*} + v^* \frac{\partial T^*}{\partial y^*} = \frac{k}{\rho c_p} \frac{\partial^2 T^*}{\partial y^{*2}} - \frac{1}{\rho c_p} \frac{\partial q_r}{\partial y^*} + \frac{Q_1^*}{\rho c_p} (T^* - T_\infty^*) + \frac{Q_2^*}{\rho c_p} (C^* - C_\infty^*) + \frac{D_m k_T}{\rho c_p c_s} \frac{\partial^2 C^*}{\partial y^{*2}} \tag{7}$$

$$\frac{\partial C^*}{\partial t^*} + v^* \frac{\partial C^*}{\partial y^*} = D \frac{\partial^2 C^*}{\partial y^{*2}} - k_m(C^* - \phi_\infty^*) + \frac{Dk_T}{T_m} \frac{\partial^2 T^*}{\partial y^{*2}} \quad (8)$$

Subject to

$$u^* = u_0, T^* = T_w^* + \psi(T_w^* - T_\infty^*)e^{n^*t^*}, C^* = C_w^* + \psi(C_w^* - C_\infty^*)e^{n^*t^*} \quad (9)$$

$$u^* \rightarrow 0, T^* \rightarrow T_\infty^*, C^* \rightarrow C_\infty^*, \text{ as } y \rightarrow \infty \quad (10)$$

Furthermore, $\frac{Q_1^*}{\rho c_p}(T^* - T_\infty^*)$ signifies the amount of heat that is generated per unit volume.

$\frac{Q_2^*}{\rho c_p}(C^* - C_\infty^*)$ signified the amount of mass imposed to the fluid motion. However, $Q_1 < 0$ or $Q_1 > 0$ and $Q_2 < 0$ or $Q_2 > 0$. Also, $g\beta_T(T^* - T_\infty^*)$ signifies the body force; $g\beta_C(C^* - C_\infty^*)$ signifies body force. The continuity equation (5) is integrated and we surmised the suction velocity is a constant.

Therefore;

$$\int \frac{\partial v^*}{\partial y^*} = \int (0) \pm v_0 v^* = \pm v_0 \quad (11)$$

To use the heat flux, the Rosseland approximation as analyzed in **Alao et al. (2016)** is such that:

$$q_r = -\frac{4\sigma_0}{3k_e} \frac{\partial T^4}{\partial y} \quad (12)$$

From (12), σ_0 means Stefan-Boltzman constant while k_e is mean absorption coefficient. The temperature difference which in the flow is small and T^4 can be explored as a linear term by solving T^4 about T_∞^* by utilizing Taylor series and forgone higher to obtain

$$T^4 \approx T - 3T_\infty^4 \quad (13)$$

To simplify the flow equations (5)-(8) subject to the constraints (9) and (10), the following non-dimensional quantities are introduced

$$u = \frac{u^*}{u_0}, y^* = \frac{vy}{v_0}, t^* = \frac{vt^*}{v_0}, n = \frac{vn^*}{v_0} \quad (14)$$

$$\theta = \frac{T^* - T_\infty^*}{T_w^* - T_\infty^*}, C = \frac{C^* - C_\infty^*}{C_w^* - C_\infty^*} \quad (15)$$

Using equations (14) and (15) on the governing flow equations (5)-(8) subject to (9) and (10) to obtain

$$\frac{\partial u}{\partial t} \pm v_0 \frac{\partial u}{\partial y} = \left(1 + \frac{1}{\beta}\right) \frac{\partial^2 u}{\partial y^2} + Gr\theta + GmC - \left(M + \frac{1}{K_p}\right)u \quad (16)$$

$$\frac{\partial \theta}{\partial t} \pm v_0 \frac{\partial \theta}{\partial y} = \left(\frac{1+R}{Pr}\right) \frac{\partial^2 \theta}{\partial y^2} + Du \frac{\partial^2 C}{\partial y^2} + Q_1\theta + Q_2C \quad (17)$$

$$\frac{\partial C}{\partial t} \pm v_0 \frac{\partial C}{\partial y} = \frac{1}{Sc} \frac{\partial^2 C}{\partial y^2} - K_m C + Sr \frac{\partial^2 \theta}{\partial y^2} \quad (18)$$

subject to the constraints:

$$u(y, t) = 0, \theta(y, t) = 1 + \epsilon e^{nt}, C(y, t) = 1 + \epsilon e^{nt}, \text{ at } y = 0 \quad (19)$$

$$u(y, t) \rightarrow 0, \theta(y, t) \rightarrow 0, C \rightarrow 0, \text{ as } y \rightarrow \infty \quad (20)$$

In engineering computations, the physical quantity of interest are the local skin friction coefficient (S_f), local Nusselt number (Nu) and Sherwood number (Sh). They are given as

$$\rho u_0 v_0 C_f = \tau_w, \quad (T_w - T_\infty)Nu = -Kq_w, \quad (C_w - C_\infty)Sh = D_m \left(\frac{\partial C}{\partial y} \right)_{y=0}$$

where

$$\tau_w = \mu_0 \left(1 + \frac{1}{\beta} \right) \frac{\partial u^*}{\partial y^*} \Big|_{y^*=0}$$

$$q_w = -K \left(\frac{\partial T}{\partial y} \right)_{y^*=0} - \frac{4\sigma_0}{3k_e} \left(\frac{\partial T^4}{\partial y^*} \right)_{y^*=0}$$

3. SPECTRAL RELAXATION TECHNIQUES

The concept of spectral relaxation technique follows the iterative steps of Gauss-Siedel relaxation approach to decouple and linearize systems of differential equations. This method is credited to **Motsa (2012)** where he employed SRM to solve system of differential equations by implementing Chebyshev pseudo-spectral approach. The method has been proven accurate and consistence in literature. Authors such as **Idowu and Falodun (2019)**; **Alao et al. (2016)**, **Falodun et al. (2018)**; **Motsa et al. (2012)**; **Motsa et al. (2014)** has used this method in literature. The SRM basic steps are:

- (i) Linear terms are simplified at current level of iteration notated by $r + 1$ while nonlinear functions are noted from previous level of iteration notated by r .
- (ii) We proceed to decouple and linearise the systems of equation by employing the concept of Gauss-Seidel approach.
- (iii) The linearized equations are further discretized by employing the implicit finite difference scheme.
- (iv) Finally, the discretized linear equations is solved iteratively by utilizing Chebyshev pseudo-spectral techniques.

Now, employing the SRM on the simplified equations (16)-(18) with the constraints (19) and (20) to obtain

$$\frac{\partial u_{r+1}}{\partial t} = u'_{r+1} + \gamma_{0,r} u''_{r+1} + \gamma_{1,r} - \gamma_{2,r} u_{r+1} \tag{21}$$

$$Pr \frac{\partial \theta_{r+1}}{\partial t} = Pr \theta'_{r+1} + \Lambda_{0,r} \theta''_{r+1} - Pr Q_1 \theta_{r+1} + \Lambda_{1,r} \tag{22}$$

$$Sc \frac{\partial C_{r+1}}{\partial t} = Sc C'_{r+1} + C''_{r+1} - K_m C_{r+1} \tag{23}$$

Subject to the constraints

$$u_{r+1}(0, t) = 1, \quad \theta_{r+1} = 1 + \epsilon e^{nt}, \quad C_{r+1} = 1 + \epsilon e^{nt} \tag{24}$$

$$u_{r+1}(\infty, t) = 0, \quad \theta_{r+1}(\infty, t) = 0, \quad C_{r+1}(\infty, t) = 0 \tag{25}$$

SRM requires the introduction of Chebyshev differentiation matrix D on the set of equations (21)-(23) subject to the constraints (24) and (25). This Chebyshev is employed to evaluate the derivatives of all unknown variables exactly at the points of collocation matrix form of product vector defined as

$$\frac{du_r}{dy} = \sum_{k=0}^N D_{ik} u_r(\tau_k) = D u_r, \quad i = 0, 1, \dots, N \tag{26}$$

$$\frac{d\theta_r}{dy} = \sum_{k=0}^N D_{ik} \theta_r(\tau_k) = D \theta_r, \quad i = 0, 1, \dots, N \tag{27}$$

$$\frac{dC_r}{dy} = \sum_{k=0}^N D_{ik} C_r(\tau_k) = D C_r, \quad i = 0, 1, \dots, N \quad (28)$$

where $N + 1$ signifies grid points number $D = \frac{2D}{\eta}$ and $u = [u(Y_0), u(Y_1), \dots, u(Y_{Nx})]^T$, $\theta = [\theta(Y_0), \theta(Y_1), \dots, \theta(Y_{Nx})]^T$, and $C = [C(Y_0), C(Y_1), \dots, C(Y_{Nx})]^T$

The initial approximation for solving (17)-(20) with due consideration of the boundary conditions (21)-(22) when $y = 0$ is given as

$$u_0 = (y, t) = e^{-y}, \quad \theta_0(y, t) = e^{-y} + \epsilon e^{nt}, \quad C_0(y, t) = e^{-y} + \epsilon e^{nt} \quad (29)$$

From the initial approximation defined in equation (29) above, the system of equations in (21)-(23) subject to (24) and (25) are iteratively solved for $u_{r+1}(y, t)$, $\theta_{r+1}(y, t)$, and $C_{r+1}(y, t)$ when $r = 0, 1, 2, \dots$

The Gauss-Lobatto collocation points is employed to define the nodes in $[-1, 1]$ as

$$Y_j = \cos\left(\frac{\pi j}{Nx}\right), \quad j = 0, 1, \dots, Nx \quad (30)$$

After the implementation of the Chebyshev matrix, the finite difference approach with centering about a midpoint between t^{n+1} and t^n is further applied on the iteration schemes (21)-(23) subject to (24) and (25). The centering about $t^{n+\frac{1}{2}}$ to all the functions to solve, say $u(y, t)$ and its derivative is given below

$$u(y_j, t^{n+\frac{1}{2}}) = u_j^{n+\frac{1}{2}} = \frac{u_j^{n+1} + u_j^n}{2}, \quad \left(\frac{\partial u}{\partial t}\right)^{n+\frac{1}{2}} = \frac{u_j^{n+1} - u_j^n}{\Delta t} \quad (31)$$

$$\theta(y_j, t^{n+\frac{1}{2}}) = \theta_j^{n+\frac{1}{2}} = \frac{\theta_j^{n+1} + \theta_j^n}{2}, \quad \left(\frac{\partial \theta}{\partial t}\right)^{n+\frac{1}{2}} = \frac{\theta_j^{n+1} - \theta_j^n}{\Delta t} \quad (32)$$

$$C(y_j, t^{n+\frac{1}{2}}) = C_j^{n+\frac{1}{2}} = \frac{C_j^{n+1} + C_j^n}{2}, \quad \left(\frac{\partial C}{\partial t}\right)^{n+\frac{1}{2}} = \frac{C_j^{n+1} - C_j^n}{\Delta t} \quad (33)$$

Implementing both Chebyshev matrix and finite difference approach on the iterative schemes (21)-(23), one obtain

$$M_1 u_{r+1}^{n+1} = M_2 u_{r+1}^n + N_1 \quad (34)$$

$$M_3 \theta_{r+1}^{n+1} = M_4 \theta_{r+1}^n + N_2 \quad (35)$$

$$M_5 C_{r+1}^{n+1} = M_6 C_{r+1}^n + N_3 \quad (36)$$

subject to (24) and (25) where

$$M_1 = \frac{1}{\Delta t} - \frac{(D + \gamma_{0,r} D^2 - \gamma_{2,r})}{2}, \quad M_2 = \frac{1}{\Delta t} + \frac{(D + \gamma_{0,r} D^2 - \gamma_{2,r})}{2}$$

$$M_3 = \frac{Pr}{\Delta t} - \frac{(PrD + \Lambda_{0,r} D^2 - PrQ_1)}{2}, \quad M_4 = \frac{Pr}{\Delta t} + \frac{(PrD + \Lambda_{0,r} D^2 - PrQ_1)}{2}$$

$$M_5 = \frac{Sc}{\Delta} - \frac{ScD + D^2 - K_m}{2}, \quad M_6 = \frac{Sc}{\Delta} + \frac{ScD + D^2 - K_m}{2}$$

$$N_1 = \gamma_{1,r}^{n+1}, \quad N_2 = \Lambda_{1,r}^{n+1}, \quad N_3 = \omega_{0,r}^{n+1}$$

Also, the unknown functions together with the coefficient parameters are given as follows

$$u_{r+1} = \begin{bmatrix} u_{r+1}(x_0, t) \\ u_{r+1}(x_1, t) \\ \vdots \\ u_{r+1}(x_{N_x-1}, t) \\ u_{r+1}(x_{N_x}, t) \end{bmatrix}, \quad \vartheta_{r+1} = \begin{bmatrix} \theta_{r+1}(x_0, t) \\ \theta_{r+1}(x_1, t) \\ \vdots \\ \theta_{r+1}(x_{N_x-1}, t) \\ \theta_{r+1}(x_{N_x}, t) \end{bmatrix} \quad C_{r+1} = \begin{bmatrix} C_{r+1}(x_0, t) \\ C_{r+1}(x_1, t) \\ \vdots \\ C_{r+1}(x_{N_x-1}, t) \\ C_{r+1}(x_{N_x}, t) \end{bmatrix} \quad (37)$$

$$a_{0,r} = \begin{bmatrix} \gamma_{0,r}(x_0, t) & & & & \\ & \gamma_{0,r}(x_1, t) & & & \\ & & \ddots & & \\ & & & \ddots & \\ & & & & \gamma_{0,r}(x_{N_x}, t) \end{bmatrix}, \quad \gamma_{1,r} = \begin{bmatrix} \gamma_{1,r}(x_0, t) & & & & \\ & \gamma_{1,r}(x_1, t) & & & \\ & & \ddots & & \\ & & & \ddots & \\ & & & & a_{1,r}(x_{N_x}, t) \end{bmatrix}$$

$$\Lambda_{0,r} = \begin{bmatrix} \Lambda_{0,r}(x_1, t) & & & & \\ & \Lambda_{0,r}(x_2, t) & & & \\ & & \ddots & & \\ & & & \ddots & \\ & & & & \Lambda_{0,r}(x_{N_x}, t) \end{bmatrix}, \quad \Lambda_{1,r} = \begin{bmatrix} \Lambda_{1,r}(x_1, t) & & & & \\ & \Lambda_{1,r}(x_2, t) & & & \\ & & \ddots & & \\ & & & \ddots & \\ & & & & \Lambda_{1,r}(x_{N_x}, t) \end{bmatrix}$$

$$\omega_{0,r} = \begin{bmatrix} \omega_{0,r}(x_1, t) & & & & \\ & \omega_{0,r}(x_2, t) & & & \\ & & \ddots & & \\ & & & \ddots & \\ & & & & \omega_{0,r}(x_{N_x}, t) \end{bmatrix}$$

Implementing the SRM, a domain of computational analysis of extent $L = 20$ was used in the h –direction. During our numerical experiment, we observed that an accurate outcomes for pertinent parameters encountered in the analysis. Hiking the value of h does not affect the results. Also, collocation points number utilized during the discretization was $N_x = 100$ for all

our computational analysis of the spectral method. The numerical computations were computed until a tolerance level, ξ was attained. The level of tolerance is as defined below:

$$\max \|f_{r+1}^{n+1} - f_r^{n+1}\|_\infty, \|\theta_{r+1}^{n+1} - \theta_r^{n+1}\|_\infty, \|C_{r+1}^{n+1} - C_r^{n+1}\|_\infty$$

Furthermore, we used small step size $\Delta\xi$ in other to make sure that the outcomes are accurate. This step size was considered to be small in away that reducing the step size does not alter the flow properties that interest us in this study. We employed SRM over other methods in literature because of it's accuracy, flexibility, and easy computations. Due to the robustness of the method various researchers has applied it to different mathematical problems in sciences and engineering, researcher like **Idowu and Falodun (2019)**, **Alao et. al (2016)**, **Ayegbusi et al. (2020)**, **Motsa et al. (2014)**.

4. RESULTS AND DISCUSSIONS

This section gives detailed discussion of the outcomes in this study. The equations of motion (16)-(18) subject to the constraints (19) and (20) have been numerically solved using SHAM. The behavior of influencing parameters on dimensionless temperature, velocity and concentration are presented in figures while the Sherwood, Nusselt number and coefficient of skin friction are illustrated in tabular form. Figure 1 demonstrates physical geometry of the model. In figure 1, the Casson fluid flows into the layer through the upward penetrable wall. On getting to the layer, it moves with a constant viscosity alongside thermal conductivity. As shown in figure 1, the magnetism strength was imposed transversely to the flow direction while the flow is observed insignificant at the free stream (that is, far from the plate). Figure 2 demonstrate the influence of the Casson liquid β on the velocity profile. An increment in β is noticed to degenerates the velocity profile. The Casson liquid is a type of non-Newtonian liquid with plastic dynamic viscosity. Physically, a high plastic dynamic viscosity causes degeneration in the flow of the working fluid. This means that the moment the controlling parameter β for Casson fluid is increased, the plastic dynamic viscosity becomes very high that it causes a degeneration to the velocity and the entire momentum layer thickness. In addition, the imposed magnetism was found to cause a great effect to the Casson fluid by dragging the motion within the boundary layer. Our experiment shows that as the value of β becomes very large such that it tends to infinity ($\beta \rightarrow \infty$), the plastic dynamic viscosity obeys the law of viscosity. Hence, the present model changes to Newtonian model as $\beta \rightarrow \infty$. The present outcomes was found to be in conformity with that of Parmar and Jain (2018) when $R = Sr = M = 0$.

The effect of Dufour and Soret numbers are communicated separately in this paper. The investigation of Soret term is very essential because of its usefulness in the separation of isotope, hence the need to study the behavior in the present paper. The influence of Soret term (Sr) on velocity along with concentration plots is depicted in figure 3. Obviously from Figure 3, an increment in the value of Sr was found to elevate the velocity and concentration plots. Physically, the Soret effect signifies the relationship between the component flux due to thermal gradient. The Soret effect can otherwise be refers to as thermophoresis. This term occurs mostly in aerosol mixtures. However, the Soret effect is very useful in the mixture of particles. The results in figure 3 shows that the thermal gradient propelled the fluid motion by speeding up the velocity and the entire momentum layer. In addition, an increment in Sr was found to increase the concentration of fluid particles by elevating the concentration plot and the specie layer. Figure 4 portrays the effect of Dufour term (Du) on the velocity and the temperature plots. An increment in Du was found to hijack the velocity and temperature plot. Physically, the Dufour effect signifies the energy flux as a result of mass concentration gradient. This effect takes place mostly in coupled influence of irreversible processes. Hence, the outcomes of the concentration

gradient is to alter the temperature. The Dufour effect signifies reciprocal of Soret term. Interestingly, The Dufour term is a function of concentration and of second order added to the temperature equation in a problem of heat and mass transport. However, a large value of Du was found to enhance the fluid velocity and concentration plots. The outcomes in this paper is in conformity with that of Alao et al. (2016) when $Q_1 = Q_2 = 0$.

Figure 5 illustrate the impact thermal Grashof number Gr on the velocity plot. $Gr = \frac{g\beta_T v(T_w^* - T_\infty^*)}{u_0 v_0^2}$

portrays the quotient of buoyant forces to viscous forces. The outcome of this study shows that the buoyant forces are more than the viscous force which acted on the Casson fluid. Hence, the outcome in figure 5 indicate that an increment in Gr added more strength to the buoyant forces and hereby speed up the fluid velocity as well as the entire momentum layer thickness. In figure 6, a large value of the mass Grashof number (Gm) is seen to upsurge the velocity plot. This implies that the buoyant forces due to mass transport propelled the fluid flow and thereby lower the viscous forces. Hence, increase in Gm hiked the velocity and the entire momentum layer thickness. Figure 7 illustrate the effect of the chemical reaction parameter Km on the concentration and velocity plots. Chemical reaction on a substance is a process that arranges the constituent atom. In other words the reactants create a substance that is entire different to be products. In figure 7, an increment in the value of the chemical reaction parameter is observed to lessen the velocity and the concentration plots respectively. This shows a destructive reaction. An increment in Km also indicate an enhancement in the thickness of the momentum as well as specie layer. The effect of the imposed magnetic parameter on the velocity plot is depicted in figure 8. Physically, $M = \frac{\sigma B_0^2 v}{\rho v_0^2}$ produces a resistive force called Lorentz force. In the elementary physics, the Lorentz force combines electric together with magnetic force on a charge because of electromagnetic fields. Thus, the Lorentz force is responsible for lowering the motion of an electrically conducting fluid such as Casson fluid. In figure 8, an increment in M is found to degenerate the velocity and the entire momentum boundary layer because of this Lorentz force which drags the Casson fluid flow. Figure 9 illustrate the effect of Prandtl Pr on velocity along with temperature plots respectively. An increment in the value of Pr is noted to degenerate the velocity as well as temperature plots. Physically, $Pr = \frac{\nu \rho c_p}{k}$ signifies that momentum diffusivity divided by thermal diffusivity. It is an essential dimensionless number used in the calculations of heat transport. A higher Pr indicates much viscosity within the flow layers. Hence, an increase in Pr decreases the velocity alongside temperature of the liquid. Also, a large value of Pr decreases the momentum and the thermal layer.

Figure 10 depicts the influence of the thermal radiation term on the velocity alongside temperature plots. Thermal radiation impede convective motion by elevating the temperature of the liquid. Hence, R is very significant when the temperature of liquid particles is very high. Higher R in figure 10 is observed to elevate the velocity and temperature plots. Physically, an impede R boast the thermal constraints of the liquid environment. Hence, an increment in R as shown in figure 10 increases the hydrodynamic plus thermal layer thickness. Table 1 shows the computational values of local skin friction coefficient, Sherwood and Nusselt number for various controlling parameters. It is observed that a higher value Casson term elevates the skin friction coefficient and has no effect on the Nusselt and Sherwood number. A higher values of Gr and Gm hike the values of local skin friction coefficient. Increase in the value of M brings increase to the skin friction coefficient. A large value of Q_1 is noticed to elevate the skin friction as well as Nusselt number. A large value of Q_2 is noticed to enhance the skin friction and Sherwood number. The Soret parameter is observed to enhance the skin friction and lower the Sherwood number. Increase in Kp is observed to enhance the skin friction along with Nusselt

number. A large value of R is observed to degenerate the skin friction along with Nusselt number. Furthermore, large value of Pr enhances the skin friction along with Nusselt number. Increase in Du is observed to elevate the skin friction along with Nusselt number. A higher value of Km is detected to elevate the skin friction and Sherwood number.

Table 1. Computations of local skin friction (C_f), local Nusselt number (Nu) and local Sherwood number (Sh) for distinct values of flow terms $\beta, Gr, Gm, M, Q_1, Q_2, Sr, K_p, R, Pr, Du$ and Km

β	Gr	Gm	M	Q_1	Q_2	Sr	K_p	R	Pr	Du	Km	C_f	Nh	Sh
3	2	2	1	0.5	0.8	3	0.7	0.5	7	2	0.4	1.1558	0.6182	0.622
6												1.2389	0.6182	0.622
9												1.5456	0.6162	0.622
	0.5											1.4217	0.6385	0.3057
	1											2.1808	0.6385	0.3057
	2											2.5604	0.6385	0.3057
		0.5										2.1366	0.2649	0.373
		1										2.2796	0.2649	0.373
		2										2.5656	0.2649	0.373
			1									1.1558	0.5264	0.7305
			2									1.2389	0.5264	0.7305
			3									1.5456	0.5264	0.7305
				0.5								0.8407	0.5374	0.6223
				1								0.9635	0.532	0.6223
				2								1.1572	0.5481	0.6223
					0.4							1.5875	0.6115	0.8627
					0.8							1.78	0.6115	1.2732
					1							1.8725	0.6115	1.6808
						0						1.2849	0.6526	0.8633
						0.5						1.4217	0.6526	0.6993
						1						1.5584	0.6526	0.6633
							0.3					1.1057	0.2528	0.0576
							0.6					1.211	0.3814	0.0576
							0.9					1.3164	0.51	0.0576
								0.2				1.5046	0.6912	0.6993
								0.5				1.4217	0.6385	0.6993
								1				1.3127	0.5892	0.6993
									0.71			1.4217	0.6352	0.4373
									3			1.8992	1.3548	0.4373
									7			2.0948	2.6225	0.4373
										0		1.2151	0.4183	0.6976
										0.5		1.3442	0.5559	0.6976
										1		1.4733	0.6935	0.6976
											0.1	2.3865	0.6385	1.4353

										0.3	2.0905	0.6385	1.4111
										0.5	1.6334	0.6385	0.9547

Table 2. Validation of the present outcomes with Parmar and Jain (2018) for different values of M

M	Parmar and Jain (2018)		Present outcomes	
	Cf	Nu	Cf	Nu
0	-0.9430	4.5383590	-0.9429	4.5383589
2	-0.9430	3.9234124	-0.9429	3.9234121
5	-0.9430	4.4457634	-0.9429	4.4457630
10	-0.9430	5.2976789	-0.9429	5.2976786

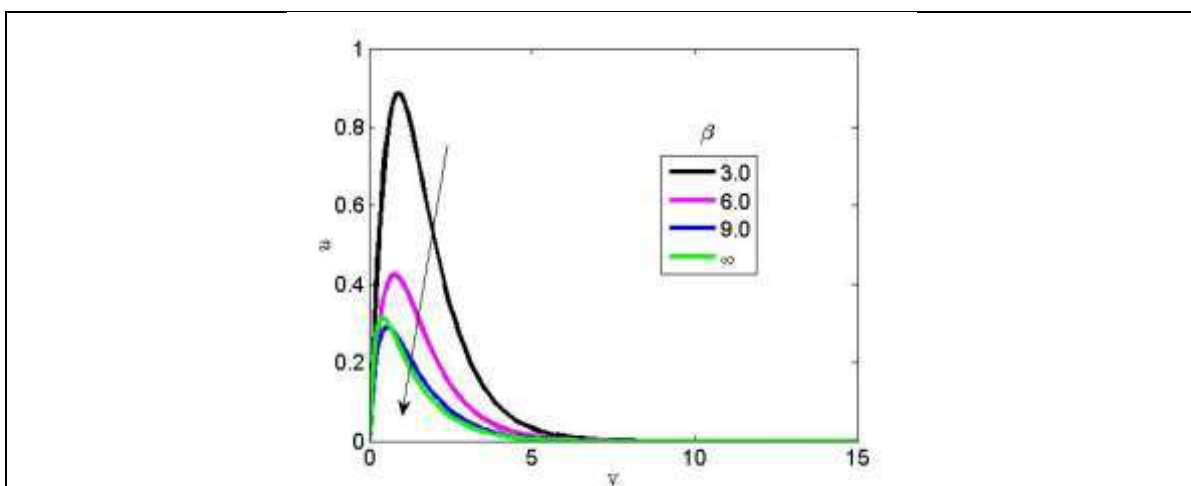


Figure 2: Contribution of Casson parameter on velocity plot

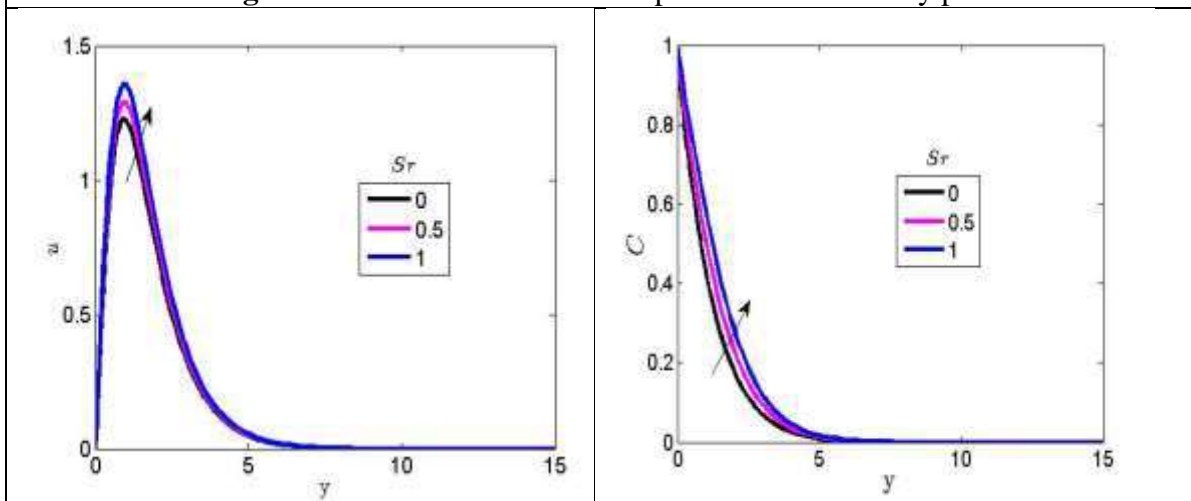


Figure 3: Contribution of Soret parameter on velocity and concentration plot

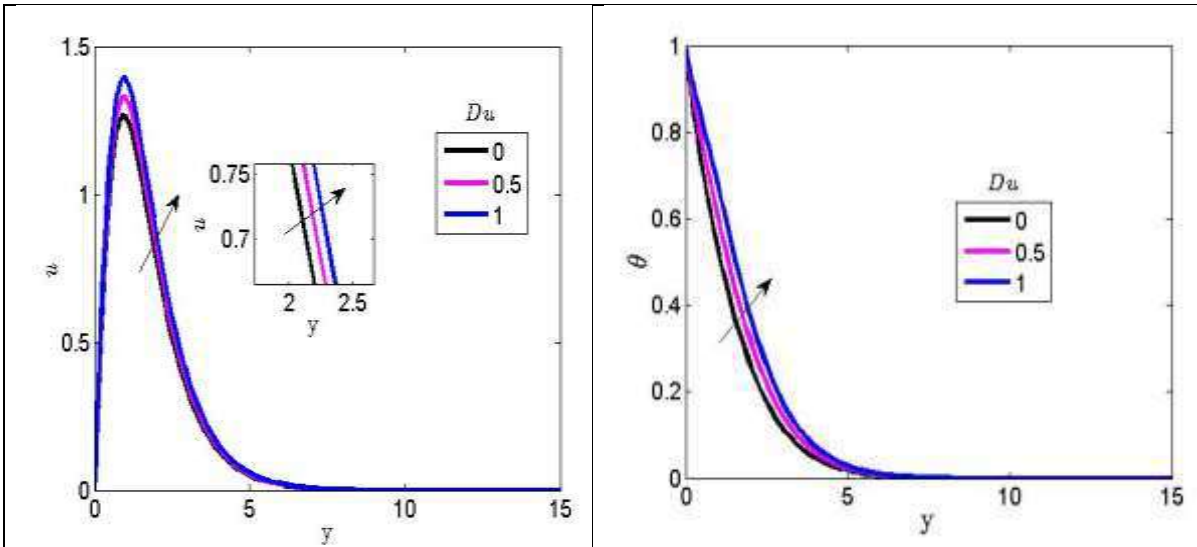


Figure 4: Contribution of Dufour parameter on velocity and temperature plot

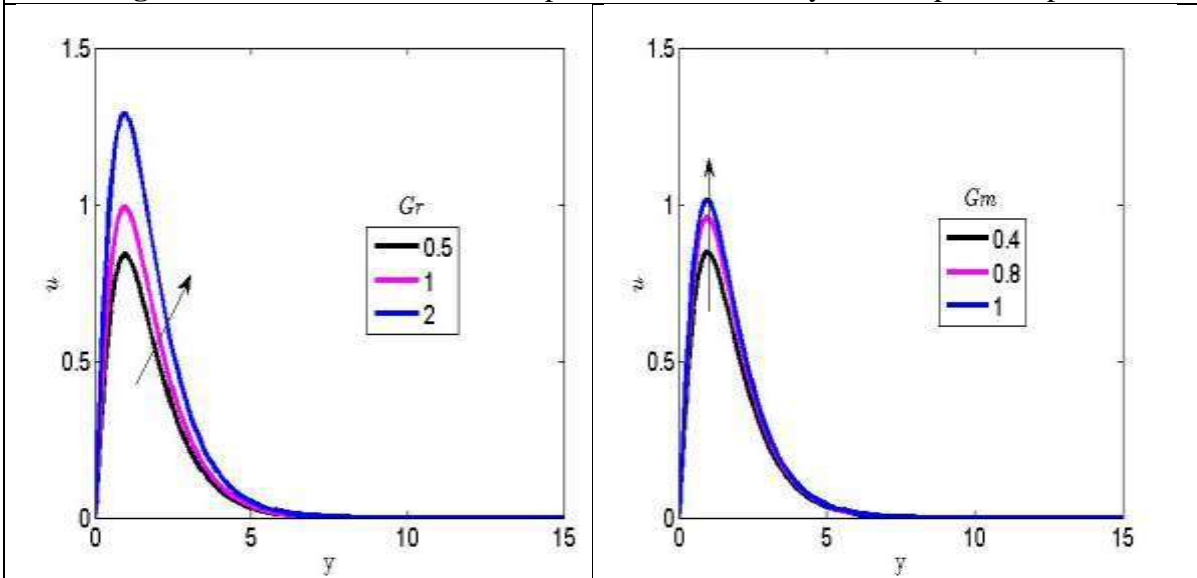


Figure 5: Contribution of thermal Grashof number on the velocity plot

Figure 6: Contribution of mass Grashof number on the velocity plot

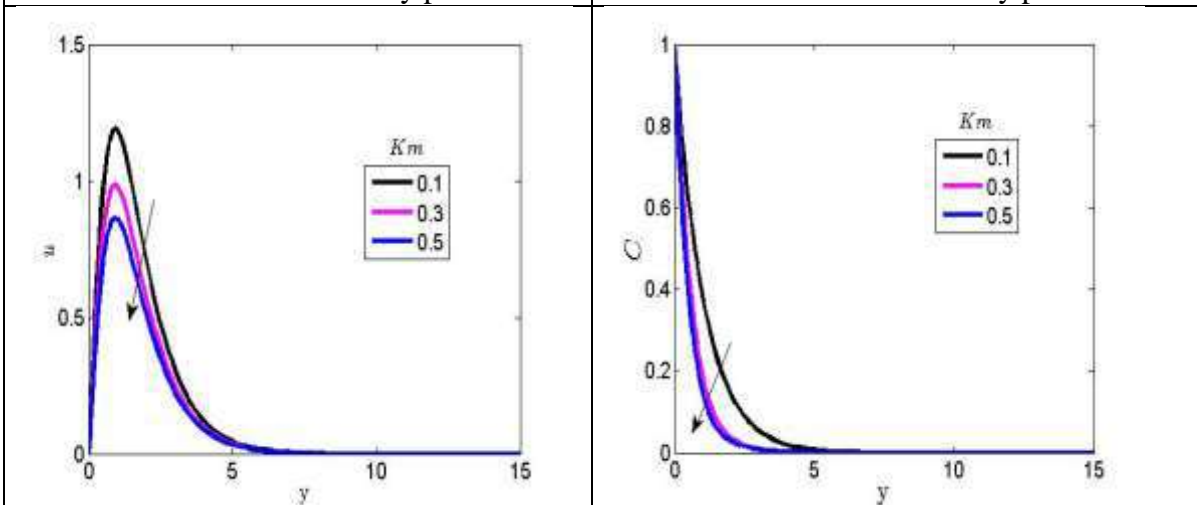


Figure 7: Contribution of chemical reaction parameter on velocity and concentration plot

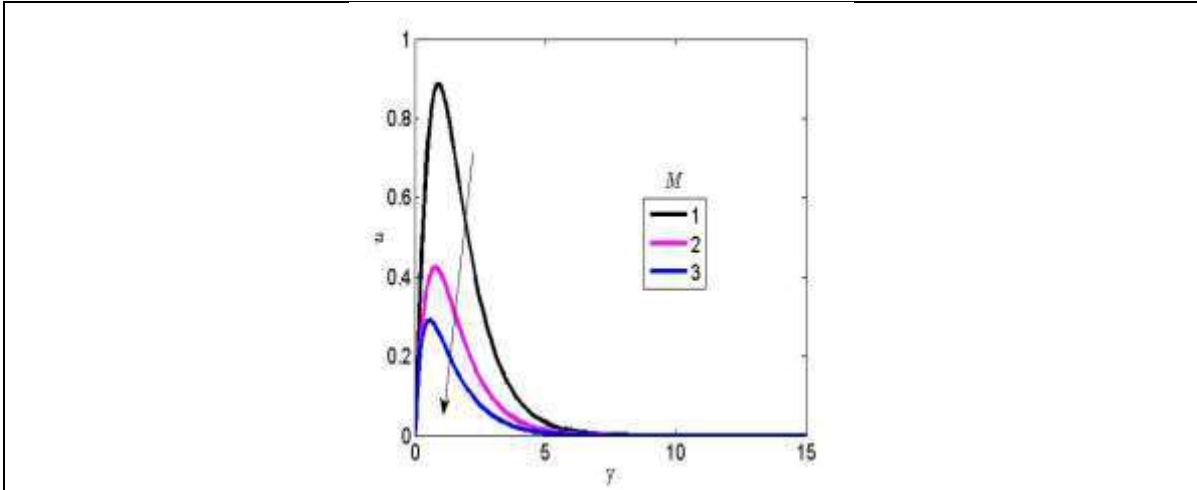


Figure 8: Contribution of magnetic parameter on the velocity plot

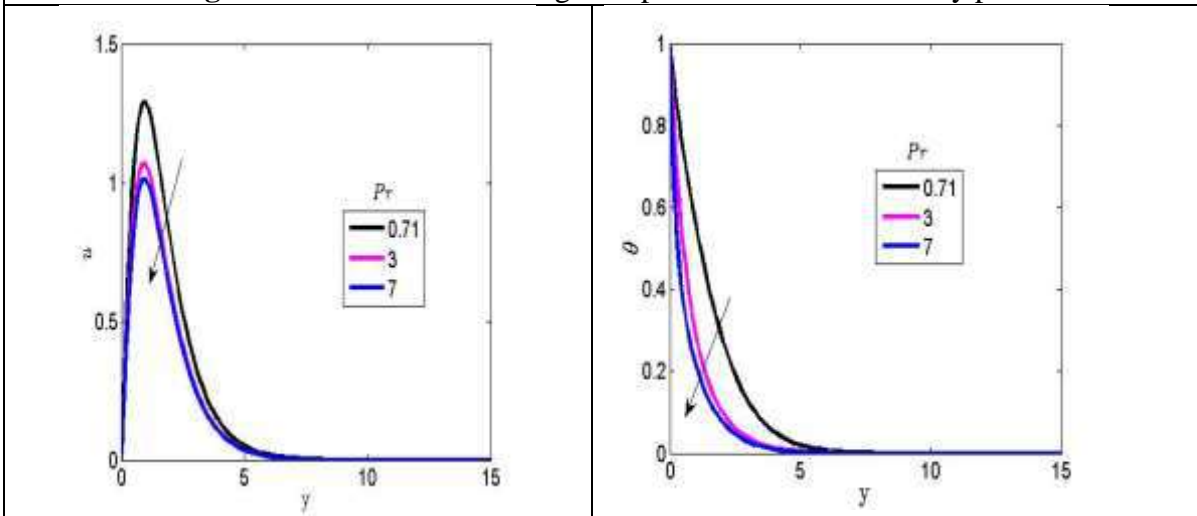


Figure 9: Contribution of Prandtl number on the velocity and temperature plot

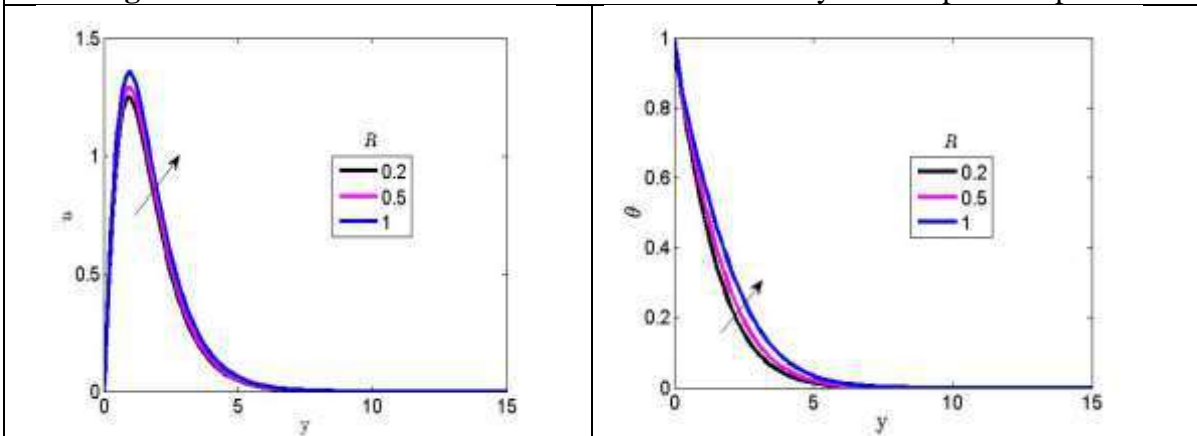


Figure 10: Contribution of thermal radiation parameter on velocity and temperature plot.

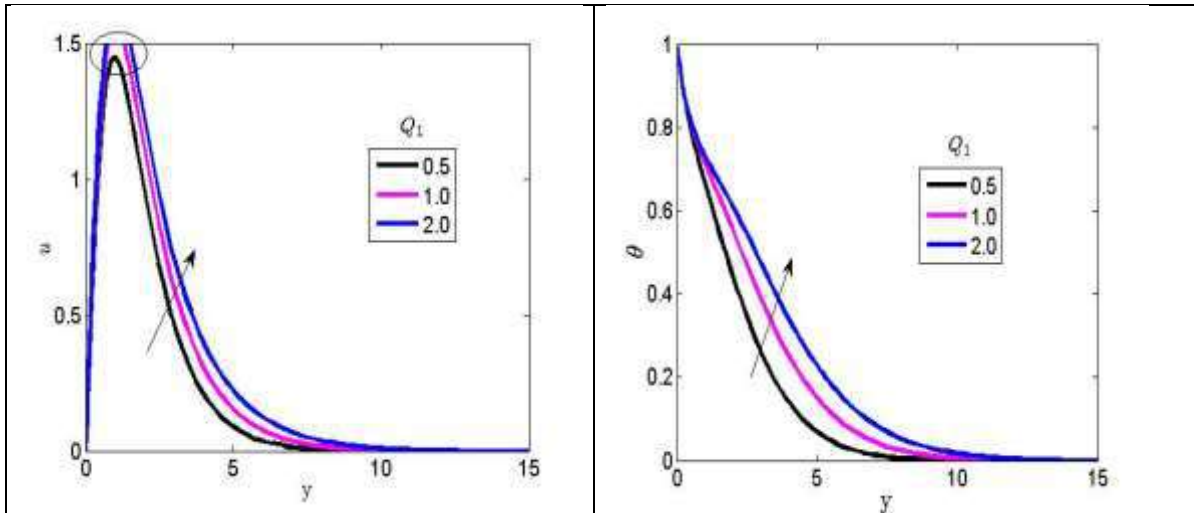


Figure 11: Contribution of heat generation parameter on the velocity and concentration plot.

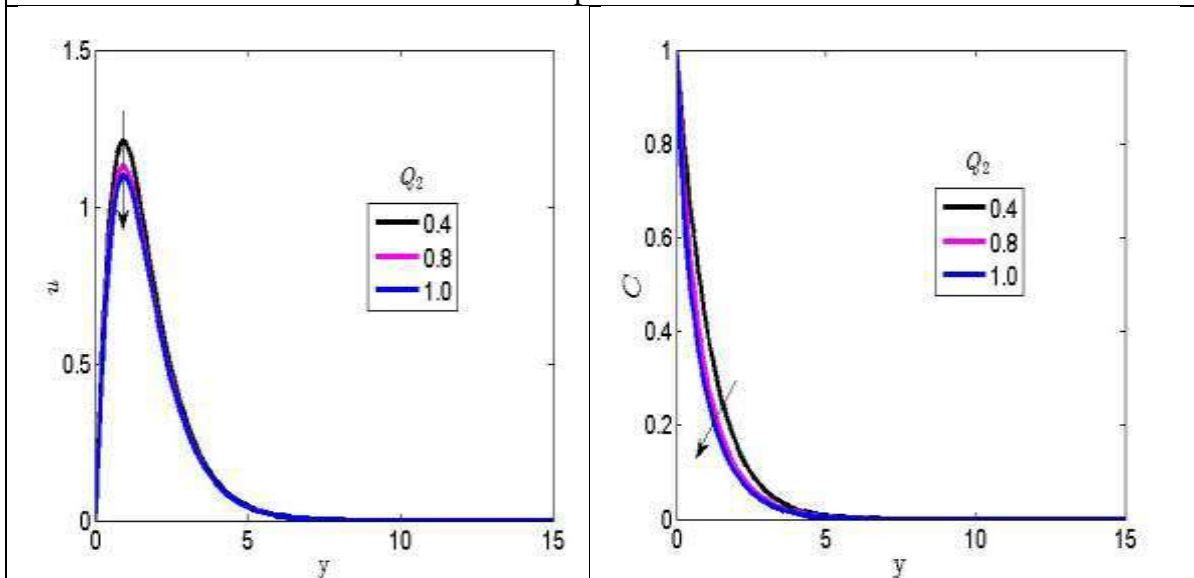


Figure 12: Contribution of radiation absorption parameter on the velocity and concentration plot

CONCLUSIONS

MHD, Soret, Dufour and thermal radiation impacts on unsteady flow of Casson liquid past an infinite vertical porous plate has been discussed in this study numerically. To explain the physics of the problem under investigation, the behavior of controlling parameters has been plotted for temperature, concentration and velocity. Calculations for skin friction, Nusselt and Sherwood number are tabulated. The transformed dimensionless set of equations has been solved numerically using SRM. The core findings of this study are illustrated as:

- (i) An imposed magnetic field shown in figure 1, an increment in the value of Casson parameter degenerate the velocity profile.
- (ii) An increment in the magnetic parameter increases the strength of the Lorentz force which drags the flow of the Casson fluid by degenerating the velocity profile.

- (iii) Increase in the thermal radiation parameter increases the thermal condition as well as the convective flow by enhancing the temperature and velocity profile.
- (iv) Increase in the Soret parameter enhances the velocity and concentration profile while increase in the Dufour parameter hike the velocity and temperature profile.
- (v) An alternate behavior of the Dufour and Soret is noticed on the temperature and concentration profile.
- (vi) An increment in the Casson parameter gives a significant increase to the skin friction coefficient.
- (vii) An increment in the heat generation and absorption is seen to enhance the skin friction coefficient as well as the Nusselt number.

The present study would be helpful in controlling the turbulence flow of blood due to the consideration of the magnetic field parameter. The MHD nature of the Casson liquid finds applications in power pumps, food processing, power accelerators, power generators, design of heat exchanger, cooling reactors etc. This study will be helpful in treating blood cancer by applying electromagnetic radiation; and this study will be helpful in moderating pores in pathological study.

REFERENCES

1. A.S. Idowu, B.O. Falodun Variable thermal conductivity and viscosity effects on non-Newtonian fluids flow through a vertical porous plate under Soret-Dufour influence, *Mathematics and Computers in Simulation* 177 (2020) 358–384.
2. S. Idowu & B. O. Falodun (2019) Soret–Dufour effects on MHD heat and mass transfer of Walter’s-B viscoelastic fluid over a semi-infinite vertical plate: spectral relaxation analysis, *Journal of Taibah University for Science*, 13:1, 49-62, DOI: 10.1080/16583655.2018.1523527.
3. A.I. Fagbade, B.O. Falodun, A.J. Omowaye MHD natural convection flow of viscoelastic fluid over an accelerating permeable surface with thermal radiation and heat source or sink: Spectral Homotopy Analysis Approach, *Ain Shams Engineering Journal* (2018) 9, 1029–1041.
4. Ahmed Lukman O., Bidemi O. Falodun, Jimoh Abdulwaheed Mechanism of Soret-Dufour, magnetohydrodynamics, heat and mass transfer flow with buoyancy force, and viscous dissipation effects, *Heat Transfer*. 2020;49:2831–2848.
5. Alao, F. I., Fagbade, A.I., Falodun, B.O. Effect of thermal radiation, Soret and Dufor on an unsteady heat and mass transfer flow of a chemically reacting fluid past a semi-infinite vertical plate with viscous dissipation. *Journal of the Nigerian Mathematical Society* 2016;35(1):142-158.
6. Amos S. Idowu , Mojeed T. Akolade , Jos U. Abubakar & Bidemi O. Falodun (2020) MHD free convective heat and mass transfer flow of dissipative Casson fluid with variable viscosity and thermal conductivity effects, *Journal of Taibah University for Science*, 14:1, 851-862, DOI: 10.1080/16583655.2020.1781431
7. Ayegbusi Florence D., Cletus Onwubuoya, Bidemi O. Falodun Unsteady problem of magnetohydrodynamic heat plus mass transfer convective flow over a moveable plate with effects of thermophoresis and thermal radiation, *Heat Transfer*. 2020;1–20.



8. Ayegbusi, F.D., Onwubuoya, C., Falodun, B.O. Unsteady problem of magnetohydrodynamic heat plus mass transfer convective flow over a moveable plate with effects of thermophoresis and thermal radiation, *Heat Transfer*. 2020; 1–20.
9. Balla Chandra Shekar, Kishan Naikoti Radiation effects on unsteady MHD convective heat and mass transfer past a vertical plate with chemical reaction and viscous dissipation, *Alexandria Engineering Journal* (2015) 54, 661–671.
10. C.S.K. Raju, N. Sandeep, S. Saleem Effects of induced magnetic field and homogeneous–heterogeneous reactions on stagnation flow of a Casson fluid, *Engineering Science and Technology, an International Journal* 19 (2016) 875–887.
11. D.V. Krishna Prasad, G.S. Krishna Chaitanya, R. Srinivasa Raju, Double diffusive effects on mixed convection Casson fluid flow past a wavy inclined plate in presence of Darcian porous medium, *Results in Engineering* 3 (2019) 100019.
12. F.I. Alao, A.I. Fagbade, B.O. Falodun Effects of thermal radiation, Soret and Dufour on an unsteady heat and mass transfer flow of a chemically reacting fluid past a semi-infinite vertical plate with viscous dissipation, *Journal of the Nigerian Mathematical Society* 35 (2016) 142–158.
13. Falodun B.O., Onwubuoya C., and Awoniran Alamu F.H. Magnetohydrodynamics (MHD) Heat and Mass Transfer of Casson Fluid Flow Past a Semi-Infinite Vertical Plate with Thermophoresis Effect: Spectral Relaxation Analysis, *Defect and Diffusion Forum*, Vol. 389, pp 18-35, doi:10.4028/www.scientific.net/DDF.389.18.
14. Falodun B.O., Onwubuoya C., and Awoniran Alamu F.H., Magnetohydrodynamics (MHD) Heat and Mass Transfer of Casson Fluid Flow Past a Semi-Infinite Vertical Plate with Thermophoresis Effect: Spectral Relaxation Analysis, *Defect and Diffusion Forum* 2018;389, 18-35, doi:10.4028/www.scientific.net/DDF.389.18.
15. G. Jithender Reddy, R. Srinivasa Raju, P. Manideep, J. Anand Rao, Thermal diffusion and diffusion thermo effects on unsteady MHD fluid flow past a moving vertical plate embedded in porous medium in the presence of Hall current and rotating system, *Transactions of A. Razmadze Mathematical Institute* 170 (2016) 243–265.
16. Idowu & B. O. Falodun (2020) Effects of thermophoresis, Soret-Dufour on heat and mass transfer flow of magnetohydrodynamics non-Newtonian nanofluid over an inclined plate, *Arab Journal of Basic and Applied Sciences*, 27:1, 149-165, DOI: 10.1080/25765299.2020.1746017
17. Idowu, A.S., Falodun, B.O. Soret–Dufour effects on MHD heat and mass transfer of Walter’s-B viscoelastic fluid over a semi-infinite vertical plate: spectral relaxation analysis, *Journal of Taibah University for Science* 2019; 13:1 49-62,
18. Komaravolu V.B. Rajakumar, Venkata S.R. Pavan Kumar Rayaprolu, Kuppareddy S. Balamurugan, Vedagiri Bharat Kumar, Unsteady MHD Casson Dissipative Fluid Flow past a Semi-infinite Vertical Porous Plate with Radiation Absorption and Chemical Reaction in Presence of Heat Generation, *Mathematical Modelling of Engineering Problems*, 7(1), 160-172.
19. Motsa S.S. New iterative methods for solving nonlinear boundary value problems. Fifth annual workshop on computational applied mathematics and mathematical modelling in fluid flow. *School of Mathematics, statistics and computer science, Pietermaritzburg Campus*, 2012: 9-13.



20. Motsa SS, Dlamini PG, Khumalo M. Spectral relaxation method and spectral quasilinearization method for solving unsteady boundary layer flow problems. *Advanced Mathematical Physics*. Article ID 341964, 2014;1–12.
21. Muhammad Ijaz Khan, Muhammad Waqas, Tasawar Hayat, Ahmed Alsaedi Soret and Dufour effects in stretching flow of Jeffrey fluid subject to Newtonian heat and mass conditions, *Results in Physics* 7 (2017) 4183–4188
22. O. Anwar Beg, J. Zueco, S. K. Ghosh, and Alireza Heidari Unsteady Magnetohydrodynamic Heat Transfer in a Semi-Infinite Porous Medium with Thermal Radiation Flux: Analytical and Numerical Study, *Advances in Numerical Analysis* Volume 2011, Article ID 304124, 17 pages doi:10.1155/2011/304124.
23. Reddy, K.V., Reddy, G.V.R, Krishna, Y.H., Effects of Cattaneo-Christov heat flux analysis on heat and mass transport of Casson nanofluid past an accelerating penetrable plate with thermal radiation and Soret-Dufour mechanism, *Heat Transfer*, 2021,50(4), 3458-3479.
24. S.M. Arifuzzaman, M.S. Khan, M.F.U. Mehedi, B.M.J. Rana, S.F. Ahmmed Chemically reactive and naturally convective high speed MHD fluid flow through an oscillatory vertical porous plate with heat and radiation absorption effect, *Engineering Science and Technology, an International Journal* 21 (2018) 215–228.
25. Sandhya,A. Ramana Reddy, G.V., Deekshithulu, G.V.S.R., Heat and mass transfer effects on MHD flow past an inclined porous plate in the presence of chemical reaction, *international journal of Applied Mechanics and Engineering*, 2020,25(3), pp.86-102.
26. Sandhya,A. Reddy, G.V.R, Deekshithulu, G.V.S.R., Radiation and chemical reaction effects on MHD Casson fluid flow past a semi-infinite vertical moving porous plate, *Indian Journal of Pure and Applied Physics*, 2020,58(7),pp.548-557.
27. Santoshi, P.N., Reddy, G.V.R., Padma, P., Flow features of Non-Newtonian Fluid through a paraboloid revolution, *International Journal of Applied and Computational Mathematics*, 2020, 6(3), 75-80.
28. Santoshi, P.N., Reddy, G.V.R., Padma, P., Numerical scrutinization of three dimensional Casson-Carreau non fluid flow, *Journal of Applied and Computational Mechanics*, 2020,6(3), pp.531-542.
29. Suneetha, K, Ibrahim, S.M, Reddy, G.V.R, Kumar, P.V., Variable temperature and concentration impacts on radiative chemically magnetohydrodynamic, viscoelastic fluid flow through porous moving vertical plate, *Mathematical Modeling of Engineering Problems*, 2020, 7(2), pp. 187-195.
30. Suneetha, K, Ibrahim, S.M, Reddy, G.V.R, The effects of radiation and chemical reaction on MHD mixed convective flow and mass transfer from a vertical surface with Ohmic heating and viscous dissipation, *Multidiscipline Modeling in Materials and Structures*, 2020, 16(1), pp.191-207.
31. Tharapatla. G, Raj Kumari. P and Ramana Reddy G. Effects of heat and transfer on MHD nonlinear free convection non-Newtonian fluids flow embedded in a thermally stratified porous medium, *Heat Transfer*, 2021, 50(4), 3480-3500.
32. Vijaya. K., Ramana Reddy, G.V, Influence of critical parameters of thermophoresis on MHD non-Darcy flow of a Casson fluid past a permeable stretching sheet, *Frontiers in Heat and Mass transfer*, 2020,14, pp.1-12.



LEGAL AND ECOLOGICAL SYSTEM OF THE REPUBLIC OF CROATIA

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ABSTRACT

Sustainable development is a complex matter from both a theoretical and a practical point of view, and it is characterized by a distinct interdisciplinarity. Rethinking sustainable development through environmental action arose as an attempt to find answers to the growing problems that arise within the environment and natural resources on a global scale, which have become an important issue in science, politics and economics. Important questions need to be answered about how to continue the economic growth of developed Western countries with the necessary modernization of underdeveloped economies without compromising climate stability, existing ecosystems and the availability of energy and other natural resources essential for further civilization. The complexity of the sustainability of environmental performance can be summarized in the environmental, sociological and economic dimensions that together determine the sustainability of society. As the pandemic has limited economic activity, consumption and movement, pollutant emissions and resource exploitation have temporarily slowed, and the rate of environmental damage has temporarily fallen in most areas. This is proof of how much damage human activity causes to the environment. The pandemic has only confirmed that the futures of nature and human activities are closely intertwined, so the interdependence of ecological interactions and socioeconomic dimensions requires a new relationship between nature and people. The collapse of any of these dimensions is sufficient to destroy the entire structure and survival of modern society, so sustainable development can and should be linked to national security as a political category. How sustainable development will be further treated in the * new normal * and numerous challenges posed by the situation around the COVID-19 pandemic should be considered as the civilizational sustainability of the national economy in the conditions of global movements and limitations in the world.

Keywords: Ecological system, sustainable development, national economy of the Republic of Croatia, legal regulations, pandemic COVID-19.

1. INTRODUCTION

Economic growth creates large amounts of pollution that threatens nature, while the capacity of the environment to receive all the created pollution is decreasing, and any further economic growth will cause a certain "synergy effect". Various materials and energy that are processed within the operation of the economic system as renewable and non-renewable resources. Forests, water, air and the like are renewable, and the mineral wealth of copper, coal, oil and the like are non-renewable. In the case when a renewable resource is used in a reasonable way, a certain part of such resources can be used in a certain period of time and allow it to be renewed, and no restrictions should be introduced because natural resources manage to renew themselves. Such a strategy cannot be used for non-renewable resources because such resources constitute "final inventory" status. In the use of such resources there is a certain limit of economic growth that can offer certain stocks. The lack of natural resources in itself means an increase in their prices while economies need to behave accordingly and develop new products and production methods that can stimulate further economic growth. Various predictions indicate that the scarcity of individual resources should not significantly affect the level of production, and this prediction arises from new estimates of discovered reserves of natural resources. It is assumed

that in the next hundred years there should be no significant constraints within technology, energy and environmental constraints even in the production of complex materials and products, stocks of natural resources should meet expectations. The collapse in distribution chains caused by the COVID-19 pandemic has opened up new problems that will greatly affect the further rethinking of a nation's economic development strategies. The aim of this paper is to review the development of the ecological paradigm and related legal regulations in the Republic of Croatia. Over time, awareness has developed of the need to preserve the natural environment and introduce sustainable development in order to put pollutants under a certain level of control. Contributions to the discussion of this topic are in the level of environmental impact and action towards sustainable development, which is significantly dependent on development trends. Croatia is under various pressures coming from the EU and as a member of the same union has accepted many norms. At the state level, various environmental protection strategies have been adopted, as well as the National Action Plan "Official Gazette", No. 82/94, and 128/99 on the environment from 2002. Such activity has significantly affected the level of environmental protection in Croatia.

2. SUSTAINABLE DEVELOPMENT IN THE REPUBLIC OF CROATIA

The state of sustainable development in the Republic of Croatia was discussed back in 1972, when Croatia was part of the SFRY community, and before the famous UN Conference on Human Protection in Stockholm was held. At that time, the "Resolution on the Protection of the Human Environment" was passed in Croatia. After the World Conference in Rio de Janeiro, Croatia adopted the "Declaration on Environmental Protection" in which Croatia declares itself as a country that accepts sustainable development as its basis for development. Although this document was accepted, its action on the protection of space and the environment and its connection with economic development and social issues was not further implemented in practice. It was not until 2000, when a slow economic development shift was achieved, that the problem of sustainable development began to appear on the social, economic and civil scene (Jelić 2002, 4).

The Sustainable Development Strategy in the Republic of Croatia is being used in accordance with the 2007 Environmental Protection Act. This document should direct economic and social action and environmental protection towards sustainable development in the long run. The Ministry of Environmental Protection, Physical Planning and Construction is responsible for the successful operation and harmonization of the Strategy. The new, more complete and harmonized Strategy was adopted by the Parliament in 2009, and contains the basic principles of organization, operation and behavior of all participants in the processes of sustainable development. The text sets goals and measures to encourage sustainable economic development, sustainable social development and environmental protection and points to difficulties in their use. The action of the Strategy is focused on long-term action in eight areas (Environmental Protection Act, 2007):

- encouraging population growth,
- protection of the environment and nature,
- directing social activities towards sustainable development and sustainable consumption,
- realization of social and territorial cooperation,
- achieving energy independence and encouraging efficiency in energy use,
- improving the functioning of the public health system,

- ecological and development connection of all parts of the country,
- effective protection of the sea, coast and associated islands. The strategy encourages the need for intensive and constant informing of the public about the goals of raising the awareness of the population with their participation in the processes in order to determine the priorities of economic development, social activity and environmental protection at the social level. Table 1 below shows barriers that limit or encourage sustainable development.

Table 1. Encouragement and obstacles to sustainable development

Obstacles to sustainable development	Encouraging sustainable development
Sectoral action of the Government and insufficient cross-sectoral cooperation	In 2009, the Sustainable Development Strategy of the Republic of Croatia was adopted
Lack of mutual cooperation - centralized decision making	The development of action plans for the adoption of the strategy has begun
Weakness of local government and other participants at the local level	Regional and local development plans developed
Shortness of program and financial measures	Targeted programs to encourage local sustainable developmen
	Use of EU accession funds
	Bilateral sustainable development projects
	Strengthening development capacities
	Civil sector development

Source: Author's research

Various scientific studies have shown that the level of pollution and the state of the environment is much better than in most European countries. It is not difficult to find a reason for this, because in Croatia all industry has been destroyed and all economic activity has been completed, so there is no one left who will pollute the environment. Important tasks related to environmental protection include the remnants of war chemical effects, demining, remediation of radioactive weapons pollution by NATO members in the vicinity of Gospić, collection and recycling of municipal and industrial waste and the realization of prescribed air and water standards in other industrial centers in Croatia. . The entire legal regulation of environmental protection is determined and focused on many different provisions and regulations, and is under the control of several state bodies and authorities. Economic instruments related to the environmental component were adopted gradually, slowly, without effects, mainly in the field of natural resource management, because they were the target of various entrepreneurs for illegal exploitation. In Croatia, the area of forest and water protection is the best legally covered. The level of use of natural space, territorial distribution of the population, the activities of industry and agriculture, but also the needs of the population for water, energy, transport and other important services strongly affect the state of the natural environment. Croatia is not evenly developed, nor is it geographically uniform of the total area, 7.6% of the area is urbanized, agriculture occupies 55.6%, forests cover 37% of the country. It should be noted that the trend of negative use of land is strongly developed, and it is especially bad that in the last ten years about 10,000 hectares of arable land and permanent crops have been lost in various ways, and more and more agricultural land is being converted into construction land. In parallel with some EU countries, such action in Croatia has not yet taken on worrying forms. The wider coastal area covers an area of about 11,542 km² with a population of 1,144,052. Due to the strong trend of urbanization and inadequate tourist construction, it has poor visual, economic and environmental consequences. Urbanization has so far occupied about 15% of coastal space legally or illegally. The surface of the territorial sea is about 31,000 km², and the coastline itself is about 6,278 km long. All these data enable Croatia a significant maritime, and especially

tourism sustainable development. In the Republic of Croatia, only 5.8% of the total area is under ecological protection, which is much less than in other European countries. According to the data from the Register of Protected Areas of the Directorate for Nature Protection of the MGOR, on February 26, 2021, a total of 410 protected areas in various categories were protected in the Republic of Croatia. The largest part of the protected area consists of nature parks 5.61% of the total state territory (Strategic Study on Environmental Impact of the Agriculture Strategy for the period 2020 to 2030).

Energy impact on the environment and the related energy sector in most countries has a particularly negative impact on the natural environment, and the burning of fossil fuels can significantly pollute the natural environment. Although primary energy production is in constant growth, the level that existed until 1990 has not yet been achieved. Total energy consumption in Croatia was the lowest in 1992, before growing at an average rate of 3.1% by 2005, in line with GDP growth. The emission intensity per GDP decreased by 34% in the period from 2004 to 2018, ie by about 2.5% per year. In line with these indicators, both CO₂ and SO₂ emissions have been moving in order to stabilize in recent years at the level of 35% of previous emissions from 1990, which was achieved under the influence of new environmental protection measures and the introduction of environmental management system - EMS, and which complies with European standards ISO 14001. Total greenhouse gas emissions in 2018 were reduced by 25.36% compared to greenhouse gas emissions in 1990 (Draft Strategy to 2030).

The introduction of gasification at the level of the whole of Croatia should significantly reduce CO₂ emissions, and for these reasons Croatia could soon reach the level of emissions determined by the Kyoto Protocol, which was set for Croatia during 2008-2012. years. Reduced energy consumption in industry would shift to households or the service sector. The industry pollutes about 30% of water that is discharged into the environment without treatment. The change and harmonization of the energy sector in Croatia needs to be urgently harmonized with the measures envisaged by the energy protection policy related to energy, which was done with the adoption of energy laws in 2001 when the energy sector reform began with the introduction of market relations in the energy sector. Energy reform is further developed with the adoption of new legal regulations during 2004, and gasification at the national level continues (Energy Regulation Act 2001 68). The application of various environmental projects related to production significantly reduces the amount of energy, water, waste, raw materials and other materials according to the amount of product, which together reduces production costs and contributes to lower environmental pollution. These environmental protection measures are determined according to the National Environmental Action Plan. Other activities related to the promotion of environmental protection significantly increase the effectiveness of supervision in industry and help the adoption of various economic instruments with the change of current inadequate environmental regulations. Identifying all relevant data related to environmental protection and creating effective mechanisms necessary for the implementation of legal regulations related to environmental protection, adopting appropriate forms of comprehensive approach to environmental protection with direct encouragement of investments related to environmental protection and sustainable development are not yet fully implemented. develop in the near future in the direction of harmonization with EU legal regulations.

During the last century, agriculture in Croatia has changed significantly. For an increasing number of residents it was necessary to provide food 28% of the total area is land under crops. During 2005, about 3,137 hectares of land in Croatia were sown with organic agriculture. In 2013, in organic production 40,660 ha, which is a share of 2.59% in total utilized agricultural area. In 2019, 108,169 ha are organic, which is 7.18% of the total used agricultural land (Ministry of Agriculture - ecological). Forest areas in Croatia occupy about 37% of the total area and are predominantly state-owned about 81%. Forests are especially grateful for their

economic value because they regulate and determine the climatic characteristics of the country, mitigate the effects of greenhouse gases, protect water quality, soil and protect against soil erosion while preserving biodiversity. Forests are particularly vulnerable to plant diseases, fires and various air pollutants, which usually come from cross-border areas, through the construction of transport and energy facilities (Črnjar and Črnjar 2009, 449). Croatian fisheries used to be a strong export branch, today participating in GDP with about 1%. The total catch of the Republic of Croatia in 2008 was 48,976 tons, in 2009 55,319 tons, and in 2010 52,360 tons, of which over 80% are small blue fish (sardines and anchovies). Of the total catch of white and blue fish is about 96%, cephalopods about 2 percent, crabs and shellfish about 2% (Ministry of Agriculture - Robolov). They fish on the inland or outer fishing sea of the Republic of Croatia, which includes the territorial sea and the protected ecological fishing zone - ZERP. Although the ZERP was declared a long time ago, it does not really exist, and EU members can hunt for it without any sanctions or payments.

Tourism and related tourist traffic is growing significantly every year. The very structure of visitors has changed over time, and there are more and more visitors who require a preserved and clean environment. Tourists are less and less staying in one place on their travels and shortening their stay. Tourist activities are not only focused on the sea and swimming, but are moving to the entire space of the tourist destination. Most tourist visitors reach the destination by road. Various new accommodation capacities are being built for the reception of tourists, so that in the period from 1997-2004. About 20% more new accommodation capacities of various types were built in In 2011, Croatia had 852.4 thousand permanent beds in registered commercial accommodation facilities, of which 13% in hotels, 25% in camps, 13% in other collective capacities and 49% in households (Croatian Tourism Development Strategy until 2020). The strong development of nautical tourism has brought with it a large increase, earnings and a large load on the coast and various types of pollution. The biggest problem is the issue of waste disposal from vessels and the use of various coatings on vessels that are particularly harmful to the marine flora and fauna. The marine environment is particularly badly affected by the large increase in vessels with petrol and diesel engines and fuel.

Various negative consequences of the impact of traffic on the environment are manifested through an increase in the amount of harmful emissions into the air as a result of an increase in the number of vehicles and higher fuel consumption, but also all types of accidents caused by traffic. The strong road construction carried out in recent years has significantly reduced or destroyed various plant and animal habitats. Lead emissions have been reduced by the use of unleaded petrol but increased by the use of diesel fuels and CO₂ emissions. Rail transport is stagnating even though it is one of the cleanest and cheapest transports. An increasing amount of transportation of about 40% is done by sea or land pipelines such as oil or gas. Transport in all its forms exerts strong pressure on the environment, nor have the adopted measures of the National Plan significantly improved the traffic situation. Croatia's transport development strategy encourages the operation of combined transport of goods with a stronger use of rail transport with the aim of reducing road traffic. Transport, as one of the sectors that pollutes the most, is not sufficiently accepted at lower levels of government or environmental protection programs. Only a small number of cities have transport studies, and those documents that have been adopted deal with the organization of transport and its harmonization, but without an analysis of their impact on the environment.

In 2005, the Waste Management Strategy was adopted, and the development of the Waste Management Plan and harmonization with EU legislation is still being developed. The adoption of the new Law on Waste Management is being prepared in 2021, as well as many various accompanying laws and provisions that regulate certain issues, uncoordinated issues in that area. In 2004, fees for environmental pollution with various types of waste were introduced,

and in 2005 fees for packaging waste were introduced. At the instigation of the EU, various activities are being carried out in Croatia to introduce clean technology in industry, and special attention is being paid to the formation of a waste exchange. Separate waste collection is encouraged, and the fee for the performed waste collection services is still calculated according to the size of the living space, although the Law determines the payment according to the amount of waste. In 2017, in Croatia in this way about 79% of waste or 1037 thousand tons are collected, in an unorganized way about 18%, separately collected about 2%, composted 1% (Croatian Environment and Nature Agency, 2018).

Packaging waste, which is constantly growing, in 2004 was collected about 250 thousand tons. According to the Ordinance on Packaging and Packaging Waste from 2005, the collection and reuse of this type of waste is encouraged. The collection of industrial and hazardous waste has been significantly hampered by the closure of waste incineration plants. The problem of disposing of used vehicles, vehicles, tires, white goods and electronics is particularly demanding. What does the Fund for Environmental Protection and Energy Efficiency, which financially helps 165 landfills in the country, do? Various types of chemical elements are found in various things, objects and food all around us, in various cosmetics and hygiene products, medicines, dyes and the like (Croatian Environment and Nature Agency, 2018). In nature, great damage is created by various organic pollutants - POPs, as they are collectively called all chemical compounds resistant to photolytic, biological and chemical degradation, and are collected in living organisms. Problems related to POPs substances were presented by the Stockholm Convention of 2001, which was accepted by Croatia so that the law on chemicals would be adopted in 2005 and harmonized with EU legislation.

The air situation in Croatia is much better than it was in 1990 due to the fact that a large part of the production, which until then had been the main source of pollution, was shut down. Environmental legislation has been gradually harmonized with that of the EU and international conventions and protocols. A new Law on Air Protection was adopted, which had the effect of reducing SO₂ emissions, which were reduced by 25% during 2004, compared to 1997. At the same time, the level of lead emissions in traffic decreased by 91%, although at that time there was an increase in the number of vehicles that affect the increase in emissions of nitrogen oxides, although the overall state of SO₂ is slightly better than European countries. In rural areas of Croatia, the air is clean, while in settlements it moves within the permitted limits. During 2004, 60.3 thousand tons of SO₂ were released into the air in Croatia, with power plants participating in this type of pollution with about 43%, and industry with 21%. In the same year, NO_x emissions accounted for about 68.9 thousand tons, and road transport participated with about 40% (Manual for calculation of air emissions for national E-PRTR, 2017). The calculation of emissions in Croatia was performed for the first time in 2004 when airborne emissions for 2001 and 2002 were calculated. This type of air pollution arises from the combustion of solid and liquid fuels. During 2001 and 2002, an average of about 13.1 tons of particles were released into the air per day, with the largest share in these emissions being combustion from non-industrial combustion plants 27.2%, road traffic 19.2%, and combustion in industry 16, 7%. At the same time, transboundary pollution in Croatia was about 80% for SO₂ and NO_x about 70%. SO₂ emissions during 2004 were reduced compared to 1997 to about 25% and are less than projected by the Protocol. In only about 15% of cities the air is polluted more than the allowed category III. The ratio of greenhouse gases is relative to the realized GDP rates. Energy and agriculture participate the most in the creation of harmful emissions, so that in 2004 energy participated in the creation of greenhouse gases with 74.9%, agriculture with 12.1% and industry with 10.8% (Greenhouse gas emissions by country and sector, 2018). According to these and realized emissions, Croatia is facing a serious problem regarding the obligations of the Kyoto Protocol.

Croatia has sufficient quantities of water for its development and operation, while mostly groundwater is used for supply, which is connected to public consumption with about 76%, and in the sewerage system about 43%, mainly in cities and other large settlements. About 25% of the water used is treated at about 83 treatment plants. Of these devices, only 34 have devices that can operate in accordance with the second stage of wastewater treatment. At the same time, only about 20% of industrial wastewater is treated (Ordinance on waste water emission limit values, 2020). The operation of the National Water Protection Plan indicates the poor implementation of the envisaged protection measures. Prevention of surface water pollution by various pollutants, along with the strengthening of control over pollution sources, is carried out only to a lesser extent. The new construction plan for various facilities and devices for wastewater treatment from various drainage systems should be urgently harmonized with the real needs because the existing legal regulations do not work. In the period from 1998-2004. in Croatia, as many as 516 pollution of the sea and marine property was recorded, of which 206 from an unknown perpetrator, 185 pollution from land and 125 pollution from vessels. The highest pollution was observed on the coast around Rijeka, about 56%. Every handling of dangerous goods is regulated by the Ordinance on the handling of dangerous goods, the necessary conditions and the manner of transport in maritime transport, loading and unloading (Report on the State of the Environment in the Republic of Croatia, 2007). By accepting the ZERP, which consists of about 25,207 km², Croatia has achieved a certain level of judicial authority, which has significantly increased the area of activity under Croatian law. The water quality of the Adriatic Sea is of high class I and satisfactory in all aspects. Slightly higher levels of pollution were recorded only in the Šibenik, Kaštela and Bakar bays on the II. level, and in some cases III. class. The quality of the sea on the beaches and fish farms is satisfactory, although the sea is under strong pressure from maritime transport or transshipment of dangerous or harmful substances. The most important program aimed at monitoring the ecological situation in the Croatian part of the Jordan Sea is the Adriatic Project, which was accepted in 1998 and the project involves Croatian scientific and research institutions that monitor, collect, process and review the data. The project is divided into four groups, the most important of which are (Adriatic Project 1998-2009):

- the impact of economic activities on the coastal sea;
- management of biological assets and protection of biological diversity;
- unusual phenomena that endanger human health, tourism and fisheries;
- development of technologies and economic instruments necessary for monitoring, use and protection of the sea.

The earth's soil is so far the most neglected natural resource in Croatia, which is especially endangered. Destruction of land by acid rain, excessive use of mineral and organic fertilizers, is evident in about 29% of land in Croatia. Soil salinity is recorded in the Neretva valley, Vrana Lake, and in the lower reaches of the Mirna and Raša rivers. In Slavonia, alkalization is in progress on about 410 hectares of land, while salinization and alkalization affect only about 2% of land in Croatia. In Croatia, there is a great diversity of ecological systems, plant and animal habitats that are among the largest in Europe. The very maintenance of biodiversity is becoming increasingly threatened by human activities such as infrastructure construction and various construction projects. Plant and animal species are particularly endangered by the disappearance of their habitats, and better protection could be achieved by increasing protected areas, which could amount to 9% of the land. Biological protection should also be implemented at the sectoral level. If we analyze plant and animal species in Croatia, there is a fairly large diversity of plant and animal species compared to other European countries. This is especially

true of vascular flora, such as plants but also freshwater fish and birds. Over the years, endangered species have included various fungi, birds, amphibians, while there are fewer endangered fish and butterflies than in other European countries. The most important reasons for the endangerment of these species are the change or destruction of their centuries-old habitats, overexploitation of natural resources such as hunting, logging, gathering and the like.

Croatia's accession to the EU has proven to be a strong impetus for the development of previously initiated reforms, but also a driver of new transition incentives. Although it is a very expensive and time-consuming process that changes almost all social areas of the new members, it should be noted that all previous members have achieved various benefits with their accession to the EU. The *acquis communautaire* in the field of environmental protection consists of about 300 legal documents. When they met the criteria for EU accession, all new members significantly raised the level of democracy in their countries as well as the rule of law, human rights, minority rights and the like. By adopting EU legislation, Member States have significantly raised their own standards in various parts of their economic systems. According to previous experience and practice, approximation to the policy and standards of European environmental protection and sustainable development will be particularly demanding and complex for all new member states because the new legal regulations are much more complex than those used in the past. The new regulations are much more different in terms of legal and administrative activities, but also in the state of the natural environment. All accession countries should spend some time before accession in close cooperation with EU member states, adopting, developing and implementing long-term national strategies with gradual adaptation to EU rules, especially with regard to water and air protection. Consideration of EU strategies should relate to the objectives and areas that should be subject to EU legislation. A list of all obligations has been compiled and entered into association agreements. EU accession necessarily entails certain costs. Croatia needed financial resources in the amount of 10 to 11 billion euros to implement environmental regulations and sustainable development. These funds should be collected from several sources: budget funds, extra-budgetary funds and various EU funds. With the accession to the EU, Croatia has the financial resources of European funds at its disposal, but for that it needs to prepare appropriate development programs in order to be able to successfully withdraw that money. There is a great benefit but also a high degree of uncertainty due to the fact that the benefits arising from the improvement of environmental quality are long-term, ie that the positive impact of improved environmental condition is visible and measurable at some delayed point in the future. Table 2 shows the five basic types of benefits that result from improving the state of the environment.

Table 2. Raising standards in the field of environment and types of benefits

	Air	Water	Waste	Nature protection
Benefits for health resources	Reducing damage to buildings and crops	Cleaner groundwater and surface water	Reducing the consumption of primary materials	Groundwater and forest fund protection
Benefits for ecosystem health	Reducing greenhouse gas emissions	Improved quality of aquatic ecosystems	Reducing greenhouse gas emissions	Protected areas of nature, protected plant and animal species
Social benefits	Minor damage to cultural heritage sites	Recreation on water resources	Awareness of one's own responsibility and impact on the environment	Access to protected areas of nature



Wider economic benefits	Increased attractiveness of the tourist offer; attracting investment; employment through the provision of environmental goods	Increasing tourist traffic; reducing the cost of preparing a particular investment	Reduced imports of primary raw materials; attracting investment due to the quality of the location	Eco Nature protection - tourism
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Source: Croatia 's Accession to the European Union, 2007

The process of accession to the Union in the field of environment is important not only for harmonization with environmental standards, but also for the adoption of new procedures. Croatian businessmen are introducing environmental standards in production. Process and product standardization encourages business collaboration as technological risks and liability for environmental damage are reduced. There are also new costs related to the administrative and institutional activities of the state according to environmental policy and sustainable development, as well as various infrastructure and operational costs of implementing EU environmental legislation related to water management, nature protection, industrial pollution control and various risk assessments, chemicals and GMOs. and especially noise. Croatia will be forced to invest much more in environmental protection than it has done in previous years, all in order to meet various EU environmental standards. Various types of benefits that can be achieved by changing attitudes in ecology, but also by opening opportunities for each individual to access and obtain the latest information related to environmental protection, natural resources and sustainable development, but also creating the right for each individual to be involved in counseling and other environmental activities and the right to legal remedies and compensation for persons whose health and the environment have been endangered. The adoption of EU legislation also encourages the adoption of the basic principles of the environmental acquis in the EU, and in particular the assistance of various organizations concerned with environmental protection. Realistically, the adoption of the environmental process brings significant financial burdens to all new members, but on the other hand, it brings many benefits that are manifested not only through the common market but also by improving the quality of life of its inhabitants while reducing costs for their health, forest protection land and fish stocks. The data obtained from the study accepted by the Commission for its activities, indicates that from 1999-2020. The overall benefit of alignment with the EU environmental and sustainable development acquis for the accession countries was between € 134 billion and € 681 billion, assuming that full alignment could be achieved by 2030. Harmonization of legal regulations is one of the conditions for accession to the EU and in this way it should be accepted and further developed because such action is not necessary for the EU itself but for the members themselves. Thus, the adoption of EU environmental legislation provides a cleaner, safer and more preserved environment, better functioning of the economy and a higher quality of life. By the very act of joining the EU, Croatia has achieved various benefits and costs in the field of environmental protection and sustainable development. The benefits of harmonizing environmental protection and sustainable development relate to (The European Commission-DG Environmental 2005, 5):

- benefits for human health: benefits for public health, reduction of various diseases, access to drinking water;
- benefits for the conservation of natural resources: benefits for the environment in which forests, fisheries, agriculture are used commercially;

- benefits for the ecosystem: reduction of global warming CO₂, improvement of water quality, protection of plant and animal species areas;
- social benefits: benefits for society as a whole and the preservation and access to natural and cultural heritage,
- economic benefits: benefits realized through direct economic exploitation, stimulation of local and regional development with increase of employment and growth of ecological efficiency.

By adopting various international conventions and other documents related to environmental protection and sustainable development, Croatia will strive to regulate its regulatory framework and harmonize it with that of the EU. Such implementation will inevitably present difficulties in reconciling the means of conflict mitigation and restructuring and the adoption of new technologies in the economic system. When implementing new environmental measures, Croatian state institutions are directing their finances towards new efficient investments and the creation of new companies. The use of new policies for protection and promotion of quality should set clear limits and rules of liability for real damage to the natural environment, and especially for new business owners. At the same time, the government should take its share of responsibility to repair previously caused damage through state environmental funds. The analysis of the achievement of the set goals as well as the implementation of measures determined by the National Plan according to sectors and other environmental factors indicates that the existing sectoral policies alone cannot ensure successful environmental protection. Practice shows that everyone formally accepts environmental protection as a desirable action, but the action and implementation of legal and organizational regulations was not used properly, which ultimately leads to the absence of implementing measures. In addition, the excessive division of responsibilities between state bodies significantly reduces their efficiency. It has been known for a long time that at the state level as well as at the local level, there is ignorance of obligations from one's own sector of activity, which arose from the new Environmental Strategy, National Environmental Action Plan and other environmental documents. Economic sectors otherwise offer strong resistance to measures that determine environmental protection and sustainable development. In order to successfully develop environmental protection strategies that would work in the future, various research, testing and verification of possible development scenarios should be carried out. Such scenarios are usually a continuation of previous incidents or other events of trends in the past and according to them one can realistically plan for the future as a continuation of the present or a future that develops as a repaired present.

3. CONCLUSION

In the intention and striving to achieve the strongest possible economic development, man has significantly disturbed his natural environment, and the harmful consequences of such actions are being felt more and more and in more severe forms. By acting in this way, man, in order to improve the quality of his life, actually achieved the opposite effect. Sustainable development is developed within small projects that evaluate their effectiveness as a concept for the future. At the global level, development cannot be divided into ecological and other, ie those who accept such a concept or those who do not want it. Every pollution spreads progressively and knows no national borders. In practice, economically sustainable development should not be forced to the detriment of other principles of sustainable development, because economically sustainable development depends on the amount of available capital that is invested in this environment. Natural capital has never been realistically valued in relation to financial capital, but if it seeks to develop sustainably, natural capital should also be realistically valued. This is the level of economic profit from business activity that is sufficient to cover all costs incurred

by repairing damage to the natural environment and offer some compensation for other negative consequences of business activities on a particular community. In making decisions related to sustainable development, consideration should be given to the extent to which the acceptance of one factor of sustainable development affects those of others. Such action may be accepted if the economic profitability is sufficiently profitable to compensate for any damage caused by the business. The purpose of the research of this paper is to point out that the economic sustainability of development should not be opposed to other principles of sustainability, but it should be accepted and developed in accordance with development factors. Croatia's action towards sustainable development is based on the principles of human health, human rights, involvement of citizens in all social and environmental activities, socially responsible employers, cooperation of economic, social and environmental factors in policy making, education for sustainable development, policy harmonization at all levels of government and local self-government, by using the best available technology in production, acting towards the renewal of natural resources, encouraging sustainable production and consumption, and in preventing the prevention of environmental incidents. Both the coronavirus pandemic and climate change are the result of a global economic model, based on forcing endless growth in a limited living space, on a planet with limited resources. Measures taken by governments to protect against coronavirus were swift and drastic and were implemented largely regardless of the economic consequences. On the other hand, measures to reduce pollution or mitigate climate change are far slower. The economy, capital, job preservation and profit are always at the forefront, and environmental protection is seen as a necessary evil or luxury.

LITERATURE

1. Črnjar, M. and Črnjar, K. (2009) Sustainable Development Management, Economics-Ecology-Environmental Protection, University of Rijeka
2. Greenhouse gas emissions by country and sector (2018) available at <https://www.europarl.europa.eu/news/hr/headlines/society/20180301STO98928/infografika-emisije-staklenickih-plinova-po-zemlji-i-sector>
3. Croatian Agency for Environment and Nature (2018) Biowaste and food waste, available at [http://www.haop.hr/sites/default/files/uploads/dokumenti/021_otpad/Projekti/SC18-313%20Biootpad%20i%20otpad%20od%20hrane%20-%20rezultat%201%20FINAL%20ZA%20WEB%20\(bez%20podataka%20MP%20i%20PRILOGA\)_rev.pdf](http://www.haop.hr/sites/default/files/uploads/dokumenti/021_otpad/Projekti/SC18-313%20Biootpad%20i%20otpad%20od%20hrane%20-%20rezultat%201%20FINAL%20ZA%20WEB%20(bez%20podataka%20MP%20i%20PRILOGA)_rev.pdf)
4. Report on the state of the environment in the Republic of Croatia (2007) Environmental Agency, available at http://www.haop.hr/sites/default/files/uploads/dokumenti/06_integrirane/dokumenti/niso/Izvjescje%20o%20stanju%20okolisa%20u%20RH_1997_2007.pdf
4. Jelić, V. (2002) Review and evaluation of the progress of the implementation of Agenda 21 in the Republic of Croatia, Mladost, Zagreb
6. Ministry of Agriculture - ecological available at <https://poljoprivreda.gov.hr/ekoloska/199>
7. Ministry of Agriculture - fishing available at <https://ribarstvo.mps.hr/default.aspx?id=13>
8. Draft proposal of low-carbon development strategies of the Republic of Croatia until 2030, available at <https://mingor.gov.hr/UserDocsImages/UPRAVA-ZA-PROCJENU-UTJECAJA-NA-OKOLIS-ODRZIVO-GOSPODARENJE->

9. Ordinance on limit values for wastewater emissions (2020) available at https://narodne-novine.nn.hr/clanci/sluzbeni/2020_03_26_622.html
10. Manual for calculation of air emissions for national E-PRTR (2017) available at http://www.haop.hr/sites/default/files/uploads/dokumenti/022_reg_oneciscivaca/ROO/Prirucnik_izracun_emisija_zrak_E_PRTR.pdf
11. Projekt Jadran 1998-2009 available at <https://pdfslide.tips/documents/hrvatski-nacionalni-monitoring-program-projekt-jadran--56cdd83bcd3e2.html>
12. Croatia's Accession to the European Union 2007, Expected Economic Effects (study), Institute of Economics Zagreb, available at https://www.eizg.hr/userdocsimages/publikacije/knjige/pristupanje_Europskoj_uniji_0cekivani_ekonomski_ucinci.pdf
13. Strategic Study on Environmental Impact of the Agriculture Strategy for the Period 2020 to 2030 available at https://poljoprivreda.gov.hr/UserDocsImages/dokumenti/Strategija_poljoprivrede_2020_2030/Strateska%20studija%20o%20utjecaju%20na%20okolis%20Strate%20za%20razdoblje%202020.%20do%202030._CISTOPIS_01.06.2021.pdf
14. Tourism Development Strategy of the Republic of Croatia until 2020 available at https://narodne-novine.nn.hr/clanci/sluzbeni/full/2013_05_55_1119.html
15. The European Commission-DG Environmental 2005 available at <http://ec.Europa.eu/environment/enlarg/pdf/task2-final-report.pdf>
16. Environmental Protection Act 2007, available at https://narodnenovine.nn.hr/clanci/sluzbeni/2007_10_110_3226.html
17. Law on Regulation of Energy Activities 2001, available at https://narodne-novine.nn.hr/clanci/sluzbeni/2001_07_68_1120.html

FAULT-TOLERANT CONTROL BASED ON SLIDING MODE CONTROLLER FOR DOUBLE-FED INDUCTION GENERATOR

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ABSTRACT

This paper presents a fault-tolerant control (FTC) strategy for Double Fed Induction Generator (DFIG) subject to rotor faults. To steer the active and reactive power to their desired references, a nonlinear sliding mode controller (SMC) is proposed. The suggested SMC can't deal with the effects of fault which can achieve gentle system degradation, in order to obtain better results [1] [4].

The Double Fed Induction Generator (DFIG) has many faults that affect its performance, such as stator winding short-circuit faults, broken rotor bars faults and mechanical rotor faults , for this reason, there are a lot of benefit to design FTC based on Sliding Mode Control that compensates for the impact of this faults [2].

When the fault occur (BRB) in the double fed induction generator a ripple operation can appear in the output of DFIG especially in the active and reactive power [3] , so we increase the gain of the SMC control gradually to compensate the fault effect .

Simulation results are presented to show the effectiveness of the proposed FTC in terms of active and reactive power. The obtained results confirm that the proposed FTC has a better robustness against the BRB fault where the DFIG operates with acceptable performance in both active and reactive power Compared with sliding mode control.

Keywords: Fault tolerant control, Double Fed Induction Generator, Sliding Mode Control, broken rotor bar.

SIMULATION RESULTS:

In this simulation part, some tests using the MATLAB/Simulink environment are performed to show the performance of the sliding mode control in the transitional and permanent regime for a balanced DFIG (faulty operation)

We applied a broken rotor bar fault by increasing the resistance value ($R_r = R_r + \Delta R$) so we get the DFIG faulty model presented in this equation:

$$\left\{ \begin{aligned}
 \frac{dI_{ds}}{dt} &= -a_0 \cdot I_{ds} + b_4 \cdot w_s \cdot I_{qs} - a_1 \cdot I_{qs} + a_4 \cdot R_r \cdot I_{dr} + \\
 &\quad - a_3 \cdot w_r \cdot I_{qr} + a_3 \cdot w_s \cdot I_{qr} + b_0 \cdot V_{ds} - a_4 \cdot V_{dr} + a_4 \cdot h_1(x) \\
 \frac{dI_{qs}}{dt} &= -a_0 \cdot I_{qs} + b_4 \cdot w_s \cdot I_{ds} + a_1 \cdot w_r \cdot I_{ds} + a_3 \cdot w_r \cdot I_{dr} + \\
 &\quad + a_4 \cdot R_r \cdot I_{qr} - a_3 \cdot w_s \cdot I_{dr} + b_0 \cdot V_{qs} - a_4 \cdot V_{qr} + a_4 \cdot h_2(x) \\
 \frac{dI_{dr}}{dt} &= a_5 \cdot I_{ds} - a_6 \cdot w_s \cdot I_{qs} + a_6 \cdot w_r \cdot I_{qs} - b_5 R_r I_{dr} + \\
 &\quad + b_4 \cdot w_r \cdot I_{qr} - a_8 \cdot w_s \cdot I_{qr} - a_9 V_{ds} + b_5 V_{dr} + b_5 \cdot h_3(x) \\
 \frac{dI_{qr}}{dt} &= a_6 \cdot w_s \cdot I_{ds} - a_6 \cdot w_r \cdot I_{ds} + a_5 \cdot I_{qs} + a_8 \cdot w_s \cdot I_{dr} + \\
 &\quad - b_4 \cdot w_r \cdot I_{dr} - b_5 \cdot R_r \cdot I_{qr} - a_9 \cdot V_{qs} + b_5 \cdot V_{qr} + b_5 \cdot h_4(x)
 \end{aligned} \right.$$

Where

$$\begin{cases}
 h_1(x) = \Delta R_r \cdot I_{dr} \\
 h_2(x) = \Delta R_r \cdot I_{qr} \\
 h_3(x) = \Delta R_r \cdot I_{dr} \\
 h_4(x) = \Delta R_r \cdot I_{qr}
 \end{cases}$$

The simulation results show in the figures bellow :

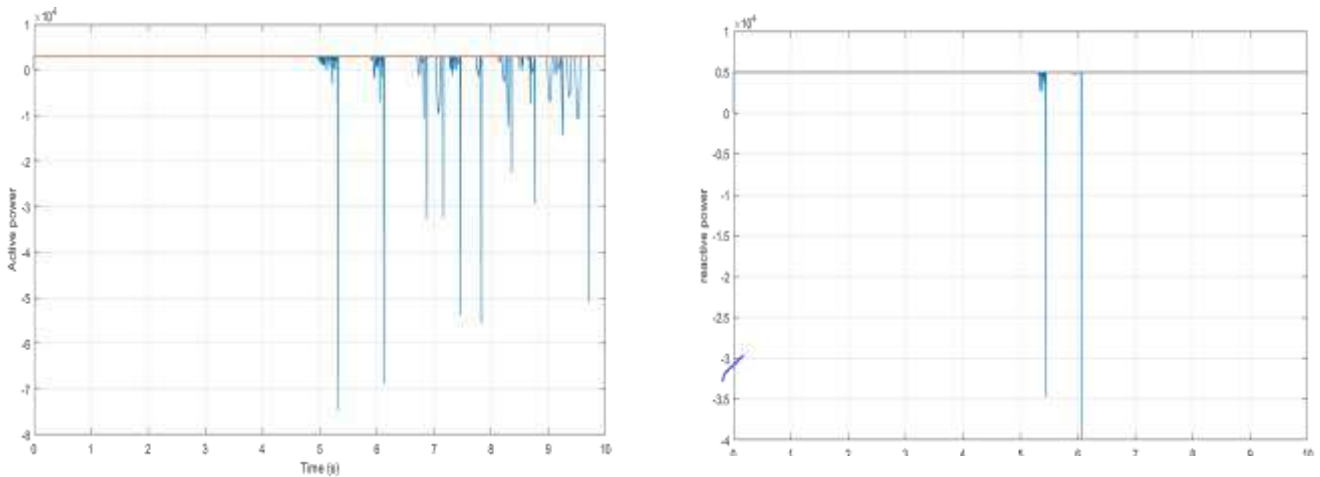


Figure.01 Simultaneous result of the active and reactive power when the fault occur

In order to prove the effectiveness and the robustness of the proposed FTC we increase the gain of the SMC control for reducing the ripple operation.

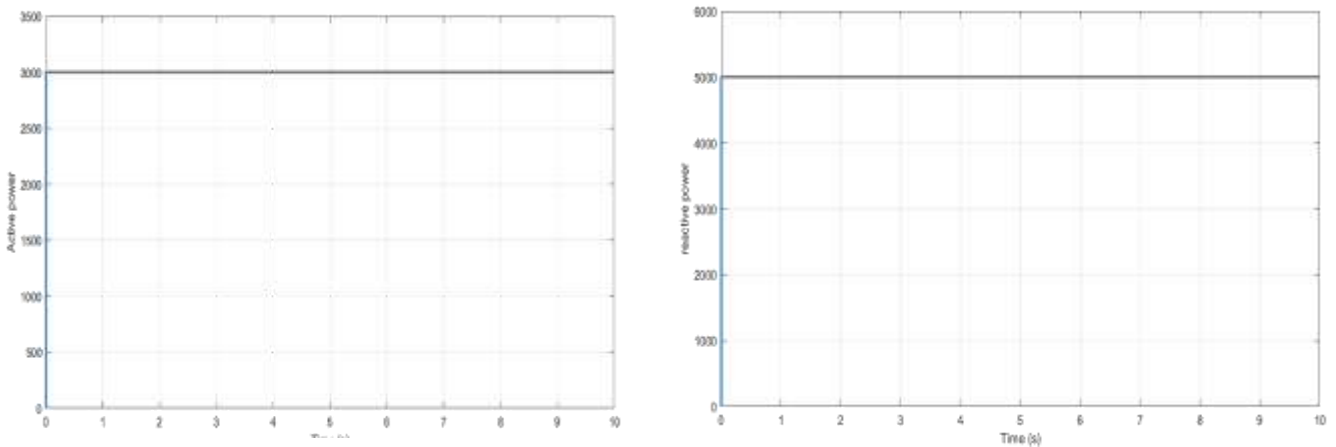


figure.02 Simultaneous result of the active and reactive power when the fault occurs where we increasing the SMC gain

CONCLUSION

The obtained results demonstrate the suggested FTC's great resilience and efficacy when compared to the SMC during defective operation. The suggested FTC is capable of handling post-fault operations adequately and may be employed in critical industrial applications.

REFERENCES

- [1] Nouredine Layadi, Samir Zeghlache, Ali Djerioui Hemza Mekki, Fouad Berrabah, Azeddine Houari and Mohamed-Fouad Benkhoris .“Backstepping Fault Tolerant Control for Double Star Induction Machine under Broken Rotor Bars” *Majlesi Journal of Electrical Engineering*, vol13 (3),pp60-68,2019
- [2] Gouichiche A, Boucherit SM, Tadjine M, Safa A, Messlem Y. An improved stator winding fault tolerance architecture for vector control of induction motor: theory and experiment. *Electr. Power Syst. Res.* 2013;104:129–37
- [3] Nouredine Layadi, Ali Djerioui, Samir Zeghlache, Hemza Mekki, Azeddine Houari3 , Mohamed,Fouad Benkhoris, Fouad Berrabeh, “New Fault Tolerant Control Based On Backstepping Controller For Double Star Induction Machine”, *Rev. Roum. Sci. Techn.– Électrotechn. et Énerg.* Vol. 64, 3, pp. 275–280, 2019
- [4] Mekki H, Benzineb O, Boukhetala D, Tadjine M, Benbouzid M, “Sliding mode based fault detection, reconstruction and fault tolerant control scheme for motor systems”, *ISA Trans*, 57,pp 340– 351 ,2015



**PROSTITUTION HANDLING STRATEGIES IN HIV/AIDS PREVENTION BASED
ON LOCAL WISDOM: BANYUWANGI REGENT REGULATION NO. 45 YEAR
2015**

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ABSTRACT

Background: The influence of modernization which gives negative effects of globalization which leads to one of the increasing prostitution. Banyuwangi regency one of the areas affected by the negative effects of globalization is the increase of prostitution that has been utilized into business opportunities. Business prostitution perpetrators not only women but has penetrated to men, this resulted in the opening of the entrance of HIV / AIDS in Banyuwangi Regency. The Regency Government has attempted to anticipate the rise of HIV / AIDS incidents which is the effect of the proliferation by issuing Banyuwangi Regent Regulation no. 45 years 2015 on prevention and control of HIV / AIDS. With the enactment of the local regulation is expected as a legal paying in the implementation of HIV / AIDS prevention in Banyuwangi Regency so that it can reduce and reduce the incidence of HIV / AIDS in Banyuwangi Regency.

Objectives: To illustrate the strategy for achieving policy implementation in the handling of prostitution in HIV / AIDS prevention efforts in Banyuwangi Regency based on Banyuwangi Regent Regulation No.45 year 2015.

Methods: The research is a qualitative research using descriptive approach based on Health Policy perspective.

Results: Prostitution handling strategy in HIV / AIDS prevention efforts based on Banyuwangi Regent Regulation no. 45 of 2015 implemented through: Local regulations governing HIV / AIDS prevention policies, policy strategies for the handling of prostitution in HIV / AIDS prevention efforts, the handling of prostitution and the handling of discrimination against people living with HIV / AIDS.

Keywords: Strategy of Prostitution handling , HIV / AIDS prevention, Banyuwangi Regent's Regulation, Banyuwangi Regency.

INTRODUCTION

The phenomenon of the practice of prostitution that occurs in the Banyuwangi community is one form of community disease that must be stopped. Nevertheless massive resistance to prostitution activities, but the reality on the other hand is that many people use prostitution as a business opportunity. This is more similar in economic principles, namely the sale and purchase. As time goes on, prostitution follows the development of modernization by

conducting prostitution transactions through the internet. This is a negative effect of globalization that affects the people of Banyuwangi, so that prostitution is the culprit not only for women but also for men.

The practice of prostitution in Banyuwangi has 14 points of prostitution that are localized, with the widespread practice of prostitution the attention of the Regent of Banyuwangi has been issued a circular to close the localization. However, the efforts made by the Regent of Banyuwangi must be more support from other stakeholders so that the practice of prostitution has truly stopped, so the circular issued is not just a formality. In fact, 14 ex-localization practices of prostitution are still active even though they are clandestine. The practice of prostitution in Banyuwangi has been innovating by conducting transactions following the development of the modernization era, namely online, according to Peter David Goldberg that is the use of the internet for sexual purposes, namely the use of the internet for sexual purposes or cyber sex.

Banyuwangi District Government seeks to deal with the practice of prostitution that is beginning to spread, where prostitution is the entry point for HIV / AIDS. Therefore a policy that is able to touch directly to the community is needed to prevent the increasing incidence of HIV / AIDS in Banyuwangi District. By Therefore, the implementation of policies on the handling of HIV / AIDS in Banyuwangi Regency based on the Banyuwangi Regent Regulation Number 45 Year 2015 must be right on target.

In order for a policy to achieve the desired goal or impact, the policy / program must be implemented and on target. Therefore, for the successful implementation of a policy, all elements of the implementation of the policy must absolutely be fulfilled, as stated by Tacjhan, 2006, namely: **Implementor policy**, Sharkansky stated in Tachjan, 2006 that bureaucratic units or administrative units are those who have the main obligation in implementing public policies. **Program**, a program that is implemented must describe the objectives of a policy, policies to be implemented, procedures, methods of implementing policies, standards in achieving a program, and budget in implementing policies / programs. This is in accordance with Grindle's statement, 1980 that in a policy implemented the program goals and objectives are clear and easily understood and implemented. **Target group**, the target group has an important role in implemntasi policy, because without any target group then nothing can be influenced by a policy as a recipient of goods and services. But the target group has its own characteristics, it is influenced by the geographical environment and the socio-cultural environment.

METHODS

Research is a qualitative study using a descriptive approach based on a health policy perspective. This research seeks to present the empirical facts of naturalistic government actions and also try to reveal hidden values so that it is expected to illustrate the strategy of government policy in handling prostitution in Banyuwangi Regency based on Banyuwangi Regent Regulation No. 45 of 2015.

RESULT

Banyuwangi Regent Regulation No.45 of 2015 concerning Prevention of HIV / AIDS. The policy for handling HIV / AIDS in Banyuwangi Regency based on the Banyuwangi Regent Regulation Number 45 Year 2015 is mentioned in Chapter IV in Article 6, namely:

Implementation of HIV / AIDS prevention and prevention includes:

- a. improve and develop promotion of HIV / AIDS prevention;
- b. promotional activities which include communication, information and education in order to foster clean and healthy attitudes and behavior;
- c. increase and broaden the scope of all prevention including prevention of transmission through injection equipment, prevention of transmission through unsafe sexual relations by using condoms, and prevention of transmission through mother to baby;
- d. increase and expand the scope of care, support and treatment;
- e. implementation of general awareness in order to prevent the occurrence of HIV / AIDS transmission in health service activities;
- f. examination and enforcement of HIV / AIDS diagnoses on all blood, blood products, semen, organs and tissues donated to VCT / KTS services and KTIP services that have been designated by the district government;
- g. regulate, guide and control places that are at risk of transmission;
- h. reduce the negative impact of the epidemic by increasing social, economic and psychological support;
- i. strengthen partnerships, health systems and community systems;
- j. improve coordination and participation of stakeholders and mobilization of funding sources;
- k. develop a comprehensive program;
- l. develop structural interventions; and
- m. implement planning, priorities and implementation of data-based programs.

Policy Strategy for Prostitution Management in the Prevention of HIV / AIDS in Banyuwangi Regency

In an effort to implement HIV / AIDS prevention policies in Banyuwangi Regency carried out based on Regent Regulation No. 45 of 2015, the elements that support the successful implementation of policies that are absolutely implemented are:

a. Implementor Policy

In policy implementation, the role of policy implementor is very important. The policy implementor as the policy implementer has the main obligation in implementing the policy. In an effort to deal with prostitution in Banyuwangi Regency, an active role is needed from the implementor of the policy that is in direct contact with HIV / AIDS prevention.

b. HIV / AIDS Prevention Program

The program to be implemented should be operational, easy to understand and easy to implement and have clear objectives from the policy / program. In this case the HIV / AIDS prevention program is clearly stated in Regent Regulation No. 45 of 2015, so that with the existence of clear regulations it is a law of in implementing the policy.

c. Target group

The target group that accepts the policy must be clear and does not rule out the possibility of geographical influence and the socio-cultural environment.

DISCUSSION

Banyuwangi District Regulation No.45 of 2015 concerning Prevention of HIV / AIDS

In an effort to prevent and control HIV / AIDS in Banyuwangi District, where the entrance is the practice of prostitution which is increasingly innovating by conducting transactions through internet media so the need for the role of various parties to overcome them. Therefore, as a follow-up in efforts to handle prostitution, cooperation between other stakeholders is needed so that the goal of handling prostitution can be achieved. The other stakeholders who play a role in the effort to subscribe to prostitution in Banyuwangi Regency, namely various parties both the government, the Aids Prevention Commission, the private sector and non-governmental organizations in Banyuwangi Regency. Moreover, Banyuwangi already has Regent Regulation number 45 of 2015 concerning prevention of HIV / AIDS which can accommodate and law of in every program implemented for HIV / AIDS prevention.

Handling prostitution is one of the health problems because with the increase in cases of prostitution it is the entrance to HIV / AIDS. Handling in the health sector is one of the obligatory functions of the regional government, which in this case focuses more on the implementation of the AIDS Commission in Banyuwangi Regency.

And until 2017, many programs were carried out by the Banyuwangi District AIDS Commission in an effort to prevent HIV / AIDS by involving various parties, such as the government, NGOs, and AIDS care communities.

The following is a table of cumulative cases of HIV / AIDS in Banyuwangi Regency, as follows:

No	Year	case HIV & AIDS
1	1999	1
2	2015	2.557
3	2016	2.910
4	Juni 2017	3.045

Source : BPS Banyuwangi district , Data is processed 2018

Policy Strategy for Prostitution Management in the Prevention of HIV / AIDS in Banyuwangi Regency

The strategy implemented in an effort to deal with prostitution in Banyuwangi Regency is to implement the elements that support the successful implementation of policies based on Regent Regulation no. 45 of 2015 in the effort to treat HIV / AIDS are:

a. Implementor Policy

Banyuwangi Regency AIDS Commission (KPA) is an implementor in the implementation of HIV / AIDS prevention policies because the Banyuwangi District AIDS Commission is the main unit that implements public policy in the prevention of HIV / AIDS. In connection with the AIDS Commission the main unit in implementing the policy, KPA has the main obligation to prevent HIV / AIDS which is an effect of the proliferation of prostitution in Banyuwangi Regency, where prostitution in Banyuwangi Regency has grown rapidly to innovate with online transactions.

The rampant practice of prostitution in Banyuwangi Regency has become the concern of the Banyuwangi Regency Government to carry out prevention and control of HIV / AIDS by issuing the Banyuwangi Regent Regulation Number: 45 of 2015, concerning: HIV / AIDS Prevention and Control Procedures. In this case it is the dominant bureaucratic unit in

implementing HIV / AIDS prevention policies. However, the role of KPA in Banyuwangi Regency in its implementation together with the district government, the private sector and the community is taking precautions based on partnership principles as stated in the Regulation No. 45 of 2015.

b. HIV / AIDS Prevention Program

Regent Regulation No. 45 of 2015 has underpinned the implementation of HIV / AIDS prevention programs in Banyuwangi District, which is expected to be a legal regulation in the implementation of HIV / AIDS prevention. Therefore the implementation of policies related to the handling of HIV / AIDS in Banyuwangi needs to be done wisely, in a situational manner that refers to the spirit of competence and insight into empowerment. The programs carried out by the AIDS Commission in Banyuwangi Regency have been adapted to the problems that are developing in Banyuwangi Regency, this is explained in the programs carried out by the Commission and the development of coverage carried out by the Banyuwangi District AIDS Commission specifically the HIV / AIDS prevention program. AIDS to vulnerable people.

Apart from that, the function of the Banyuwangi District AIDS Commission is not limited to early detection related to the development of HIV / AIDS in the community, but also to restore it so that the condition of the community is good.

The implementation of HIV / AIDS prevention and control has been explained in the Regulation No. 45 of 2015 in Chapter IV article 6. While in article 7 states that the implementation of prevention efforts is through approaches: promotion, treatment and care and support.

c. Target Group

In an effort to implement HIV / AIDS prevention policies in Banyuwangi Regency, it is necessary to get attention from the infrastructure group that is the recipient of services and goods by the policy. Infrastructure groups have certain characteristics depending on the environment that affects them so that the policies given should adjust to the characteristics of the target group. The target groups in implementing HIV / AIDS prevention policies in Banyuwangi Regency are those included in the program's target population. The target population of the program is injecting drug users, direct or indirect FSW, WPS sex customers / partners, gay, transgender, and male customers / sex partners with fellow men (MSM), prisoners / detention residents.

Handling Prostitution and discrimination against HIV / AIDS sufferers in Banyuwangi district

Prostitution which has penetrated Banyuwangi district, where the perpetrators are not only attracted by women but also men have raised concerns that it will be more widespread for teenagers. Therefore, the Banyuwangi Regency government seeks to stop prostitution in Banyuwangi Regency by involving stakeholders, where by involving stakeholders as policy holders it will produce policy products that lead to the prevention of HIV / AIDS which is the effect of rampant prostitution in Banyuwangi Regency.

In this case the community is also considered a stakeholder, this is with the new paradigm, namely people-centered development. The community together with the implementers of change determine everything related to the prevention and termination of prostitution. Organizations involved in the prevention and cessation of prostitution are organizations that participate in organizing development programs, such as the Health Office, KPA and Supporting NGOs. With the cooperation of various parties, so that prevention and cessation of prostitution in Banyuwangi Regency can be resolved properly. Given the issue of prostitution



can be an estuary of social diseases that occur from generation to generation and seems difficult to stop.

The efforts made by the Banyuwangi Regency Government do not stop at the HIV/AIDS prevention and treatment stage, but the Banyuwangi Regency Government must be able to anticipate and face discrimination efforts due to the development of HIV/AIDS that is spreading among the community. community based on Banyuwangi Regent Regulation Number: 45 of 2015 Through the Banyuwangi Regency AIDS Commission, the Banyuwangi Regency Government has carried out post-treatment recovery based on local wisdom for people who are vulnerable to HIV/AIDS by providing facilities for the creation of post-treatment recovery for vulnerable HIV/AIDS communities as a basis reconciliation, rehabilitation and reconstruction activities.

CONCLUSION

Based on the results of the research that the Banyuwangi District Government in this case the Banyuwangi District AIDS Commission as the main unit implementing the HIV / IDS prevention policy has implemented and fulfilled the elements that should be part of the implementation of the policy. But the success of policy implementation can not only be assessed from these three elements but there are other factors that influence the successful implementation of HIV / AIDS prevention policies such as the cultural and geographical social environment.

The Banyuwangi Regional Government has also made efforts to deal with prostitution which is increasingly prevalent in Banyuwangi, where prostitution has innovated into an online business. In addition, the Banyuwangi Regional Government has made recovery efforts for people with HIV / AIDS by providing facilities as an effort to reconcile, rehabilitate, and reconstruct activities.

Author's Contributions

Co-authors have made a substansial contribution to the manuscript, they revised it critically for important content and approved the final version.

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Thank-you note

Thank you for the support of the Banyuwangi Regency government and KPA Banyuwangi Regency which have helped provide HIV / AIDS data in this study.

REFERENCES

1. Adisasmito (2010). Wiku. Health system. Jakarta: PT Raja Grafindo Persada.2010
2. Anderson, J.E. (2006). Public Policy Making: An Introduction, Boston: Houghton Mifflin Company.
3. Creswell, John. (2014). Research Design: Qualitative, and Mixed Approach (Fourth edition). SAGE Publication.



4. Grindle, Merilee S. Thomas, John (ed). (2003). *Public Choices and Policy Change: The Political Economy of Reform in Developing Countries*.
5. Indonesian Ministry of Health (2011). *Policy of the Indonesian Ministry of Health*. In: Health, editor. Jakarta.
6. Noviana N. (2012). *Lecture Notes on Reproductive Health and HIV / AIDS*. Jakarta. Trans Info Media; 2012
7. Noviana.N. *Konsep HIV/AIDS, seksualitas dan Kesehatan Reproduksi*.2018. Trans Info Media
8. Nugroho, Riant (2009). *Public Policy. Policy Theory - Policy Analysis - Policy Processes, Formulation, Implementation, Evaluation, Risk Management Revision in Public Policy as The Fifth Estate - Policy Research Methods*. Jakarta: PT Elex Media Komputindo; 2009
9. Tachjan. (2006). *Implementation of Public Policy*. AIPI Bandung. 2006
10. KPA Banyuwangi Regency. (2017). *Report of the 2017 AIDS Commission*.
11. Indonesian Ministry of Health. (2011). *HIV Counseling and Volunteer Test Training*. Jakarta: Directorate General of Disease Control and Environmental Health; 2011
12. *Regional Regulation (Perda) number 6 of 2007 concerning HIV / AIDS prevention in Banyuwangi Regency*.2007
13. *Banyuwangi Regent Regulation Number 45 of 2015 concerning Procedures for HIV / AIDS prevention and control in Banyuwangi Regency*. 2015
14. Robbins. Stephen.P. (2016). *Organizational Behavior*. Issue 16. Salemba Empat. Jakarta. 2016
15. *Presidential Regulation No. 75 of 2006 concerning the Establishment of the AIDS Commission*. 2006
16. Samny S. (2009). *Universal Precaution*. *Journal of clinical research best practice* 2009; 5 no. 7.
17. Katowa P. Mukwato CMN, M.Maimbolwa. (2009). *Compliance with infection prevention guidelines for health care workers at the Chicago Ross General Hospital Mufulira District Medical Journal of Zambia*. 2009; 35. P
18. *eter David Goldberg in Barda Nawawi Arief, 2007, Mayantara Criminal Actions (Development of Cybercrime in Indonesia)*, Raja grafindo, Jakarta.

KUZEY CAROLINA MAKÜLER DİSTROFİSİ:OLGU SUNUMU
NORTH CAROLINA MACULAR DYSTROPHY:CASE REPORT

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ÖZET

Görme azlığı ve gözünde titreme şikayetiyle ailesi tarafından kliniğimize getirilen 6 yaşındaki erkek hastanın tashihsiz görme keskinliği bilateral 0.1 idi.Düzeltilmiş en iyi görme keskinliği 0.2 seviyesinde tespit edildi.Biomikroskobik incelemede nistagmus dışında patoloji saptanmadı.Göz içi basınçları sağ gözde 15 mmHg, sol gözde 13 mm Hg idi.Pupil dilatasyonu sonrası yapılan fundus incelemesinde bilateral toksoplazma koroiditi benzeri kolobomatöz skar ve optik sinire uzanan fibrotik bant tespit edildi.Toxoplazma serolojik test sonucu negatif olan hastaya genetik inceleme sonucu Kuzey Carolina Maküler Distrofi tanısı konuldu.

Anahtar Kelimeler: Kuzey Carolina Maküler Distrofisi, Toxoplazma, Kolobom

ABSTRACT

A 6 year old child with very low vision and nystagmus was presented to our clinic by his parents.Uncorrected visual acuity was 0.1 in both eyes.Corrected best visual acuity was 0.2.In biomicroscopic examination nystagmus was the only pathology detected.Intra ocular pressure was 15 mm Hg in his right eye and 13 mm Hg in his left eye.After pupil dilatation a toxoplasmosis choroiditis like colobomatous scar and a fibrotic tape extending to optic disc was detected bilaterally.Toxoplasma serology was negative and genetic examination results confirmed North Carolina Macular Dystrophy diagnosis in our patient.

Keywords: North Carolina Macular Dystrophy, Toxoplasmosis, Coloboma

GİRİŞ

Kuzey Carolina Maküler Distrofisi (KCMD) çok nadir görülen, doğumdan itibaren veya çocukluk döneminde başlayan, non-progresif , genellikle tam geçiş gösteren ve otozomal dominant kalıtılan, heterojen ve makülaya sınırlı bir retina distrofisidir. [1-3] Otozomal dominant kalıtım tam penetrans gösterirken, gen ekspresyonu yüksek oranda değişkenlik gösterir.

Hastaların az bir kısmında subretinal neovasküler membran gelişebilir. EOG ve ERG testleri normaldir. Lipofuskin birikimine bağlı olarak makülada otofloresans belirgindir.

KCMD de renkli görme korunurken, görme alanında santral skotom vardır ve periferik retina korunmuştur. Florescein anjiyografide evre 1 ve evre 2’de druzen benzeri lezyonlar geç boyanırken evre 3’te koryokapillarisin nonperfüzyonu gözlenir.

KCMD ilk olarak Kuzey Carolina dağlarında yaşayan büyük popülasyonlu bir ailede keşfedilmiştir. Ancak o zamandan beri Amerika Birleşik Devletleri, Belize, İngiltere, Almanya ve Fransa dahil olmak üzere birçok ülkede de tespit edilip literatürde tanımlanmıştır. [3]

KCMD’ nin patofizyolojisi tam olarak anlaşılamamıştır. Small ve arkadaşları , 1992 yılında yaptıkları çalışmada 6q13-q21 gen lokusunu bu hastalığa sebep olabilecek en olası bölge olarak tanımlamıştır. [4] Daha sonra Human Genom Organizator tarafından MCDR 1 (Gene ID: DHS6S1, OMIM 616842; Phenotype OMIM 136550) genetik lokusu tanımlanmıştır. [2]

KCMD klasik olarak, üç grade olarak sınıflandırılır.

Grade I, sarı-beyaz renkte druzen benzeri periferik depozitlerden ve parafoveal alanda retina pigment epiteli beneklenmesinden oluşur. Bu depositler hayatın ilk dekadında meydana gelir ancak hayat boyu asemptomatik kalabilirler.

Grade II, birleşme eğiliminde olan druzenler, retina pigment epiteli atrofisi ve makülada diskiform skardan oluşur. Bu evrede uzun dönem görsel prognoz korunurken bazı hastalarda neovasküler makülopati ve subretinal skar oluşabilir.

Grade III, makülayı içine alan koryoretinal koloboma benzeyen şiddetli koryoretinal atrofiden oluşur, stafilom veya toksoplazma skarını taklit edebilir. [5]

OLGU SUNUMU

6 yaşında erkek hasta kliniğimize her iki gözde görme azlığı ve gözlerde titreme şikayeti ile getirildi.

Anamnezinde akraba evliliği olmayan ailenin 9 çocuğundan 9.su olarak 39. Gebelik haftasında 1500 gram doğum ağırlığı ve normal vajinal yolla doğum öyküsü mevcuttu. Düşük doğum ağırlığı sebebiyle 20 gün yenidoğan yoğun bakımda kalmıştı. Ebeveynleri doğuştan beri göz teması olmadığını ve 1 yaşından itibaren de her iki gözünde titremeler başladığını ifade ettiler. Yürürken sık sık düştüğünü ve denge problemi yaşadığını belirttiler.

Yapılan oftalmolojik muayenesinde bilateral horizontal nistagmus izlendi. Görme keskinliği snellen eşeli ile bilateral 0,1 seviyesinde idi. Sikloplejinli otorefraktometre ölçüm değerleri: R: +4,25, -0.75 x65, L: +4,75, -0.50 x125 bulundu.

Düzeltilmiş en iyi görme keskinliği ise bilateral 0,2 olarak tespit edildi.

Biyomikroskopik muayenesinde bilateral ön segment doğal olarak izlendi.

Göz içi basınçları sağ gözde 15 mm Hg, sol gözde 13 mm Hg idi.

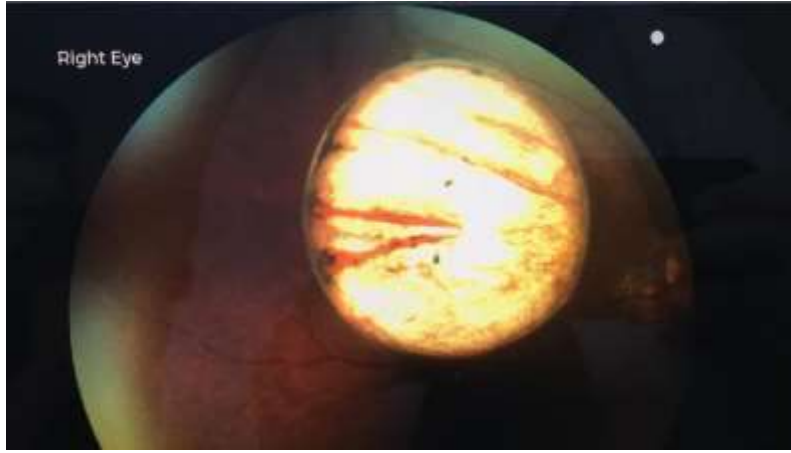
Pupil dilatasyonu sonrasında 90 D lens ile yapılan fundus muayenesinde sağ gözde makülayı içine alan kolobom benzeri koryoretinal atrofi sahası, sol gözde makülayı içine alan kolobom benzeri koryoretinal atrofi sahası ve optik diskle bağlantılı fibrotik bant tespit edildi.

Hastanın fundus lezyonunun sıklıkla konjenital toksoplazmozis ile karışabilmesi nedeniyle toksoplazma için seroloji testi yapıldı. Sonuç negatif bulundu.

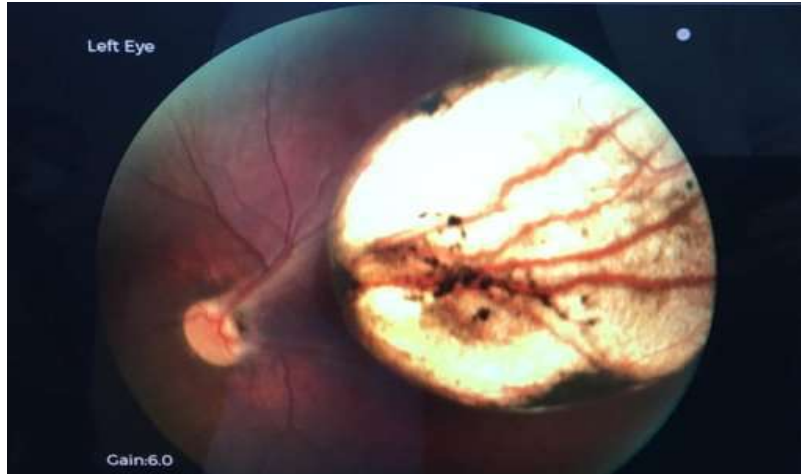
Hastanın yaşı ve yapılan muayene sonucunda tespit edilen bulguların Kuzey Carolina Maküler Distrofisi Grade III ile uyumlu olduğu düşünüldü ve maküler distrofiler açısından genetik inceleme yapıldı.

Genetik inceleme sonucunda hastada 6.kromozomda bulunan MCDR1 geninde mutasyon tespit edildi.

Fundus lezyonlarının bilateral olması ve hastalığın erken çocuklukta başlaması genetik sonucu ile birlikte değerlendirilince hastaya KCMD tanısı konuldu. (Resim 1,2)



Resim 1: Sağ gözde makulayı içine alan kolobom benzeri koryoretinal atrofi sahası



Resim 2: Sol gözde makulayı içine alan kolobomatöz koryoretinal atrofi sahası ve optik disk ile bağlantılı fibrotik bant

TARTIŞMA

Hastalığın çok ender görülen herediter maküla distrofilerinden olması ve bununla birlikte literatürde bildirilmiş az sayıda vaka bulunması KCMD hakkında bildiklerimizi sınırlamaktadır. Bu distrofinin gelişiminden maküla oluşumuyla ilişkili olduğu düşünülen MCDR1, MCDR2 VE MCDR3 gen lokusları sorumlu tutulmaktadır. Bizim olgumuzda 6. kromozomda bulunan MCDR1 lokusunda PRDM13 geninin duplikasyonu ile ilişkili olduğu düşünülen heterozigot mutasyon saptanmıştır. Literatürde bunun dışında 5.kromozomda bulunan MCDR3 lokusuyla ilgili mutasyon olan hastalar da saptanmıştır [6].

Tüm bunların yanı sıra maküla gelişiminde önemli olan PRDM13 VE IRX1, IRX2 VE IRX4 genlerindeki duplikasyon ve disregülasyon mutasyonları sonucu ortaya çıktığı düşünülen hastalar da literatürde tanımlanmıştır [7].

Bizim olgumuzda ailenin ihmali nedeniyle çocuğun tanısı 6 yaşında konulabilmiştir. Daha erken yaşlarda tanı almış hastalar olduğu bilinmektedir.

Görme keskinliği hastalığının evresine göre değişmektedir. Makülanın etkilenme derecesine göre hafif görme azlığından çok ağır görme kaybına kadar geniş bir spektrumda görülebilmektedir [8,9].

Bu hastalık doğumdan itibaren belirli bir evrededir ve evre 1'den evre 2'ye, evre 2'den evre 3'e progresyon göstermez [10].

Hastalığın ilerleyici olmaması, mevcut görme keskinliğinin korunması ve hastanın hayatını kendi başına sürdürebilmesi açısından önem taşımaktadır. KCMD nin birçok maküler distrofide olduğu gibi günümüzde kesin bir tedavisi yoktur. Gen tedavisi gelecekte diğer maküla distrofilerinde olduğu gibi umut vaat etmektedir.

KAYNAKLAR

1. Small KW. North Carolina Macular Dystrophy: clinical features, genealogy, and genetic linkage analysis *Trans Am Ophthalmol Soc* 1998; 96:925-61. [PMID: 10360311].
2. Small KW, Udar N, Yelchits S, Klein R, Garcia C, Gallardo G, Puech B, Puech V, Saperstein D, Lim J, Haller J, Flaxel C, Kellsell R, Hunt D, Evans K, Lennon F, Pericak-Vance M. North Carolina macular dystrophy (MCDR1) locus: A fine resolution genetic map and haplotype analysis. *Mol Vis* 1999; 5:[PMID: 10617775].
3. Telander D, Small KW. *Macular Dystrophies* 6.11, pp 560–568. *Ophthalmology* ed Mosby, London, Yanoff and Duker. 3rd edition, 2013.
4. Small KW, Weber JL, Roses AD, Pericak-Vance M. North Carolina macular dystrophy maps to chromosome 6. *Genomics* 1992; 13:681-5. [PMID: 1639395].
5. *The Retinal Atlas Second Edition* (Freund, Sarraf, Mieler, Yannuzzi 2017)
6. Valentina Cipriani , Raquel S Silva, Gavin Arno , Nikolas Pontikos, Ambreen Kalhor, Sandra Valeina , Inna Inashkina , Mareta Audere , Katrina Rutka , Bernard Puech, Michel Michaelides, Veronica van Heyningen, Baiba Lace , Andrew R Webster, Anthony T Moore Duplication events downstream of IRX1 cause North Carolina macular dystrophy at the MCDR3 locus 2017 Aug 8;7(1):7512. doi: 10.1038/s41598-017-06387-6.
7. Kent W. Small, M.D., Adam P. DeLuca, Ph.D., S. Scott Whitmore, Ph.D., Thomas Rosenberg, M.D., Rosemary Silva-Garcia, M.D., Nitin Udar et al . North Carolina Macular Dystrophy is caused by dysregulation of the retinal transcription factor PRDM13 *Ophthalmology*. 2016 Jan; 123(1): 9–18. doi: 10.1016/j.ophtha.2015.10.006.
8. Johannes Birtel , Martin Gliem, Philipp Herrmann , Christine Neuhaus , Frank G Holz , Robert E MacLaren, Hendrik P N Scholl, Peter Charbel Issa North Carolina macular dystrophy shows a particular drusen phenotype and atrophy progression *British Jour Ophthalmol* <http://dx.doi.org/10.1136/bjophthalmol-2021-318815>.
9. David J. Green; Eva Lenassi; Cerys S. Manning; David McGaughey; Vinod Sharma; Graeme C. Black; Jamie M. Ellingford; Panagiotis I. Sergouniotis North Carolina Macular Dystrophy: Phenotypic Variability and Computational Analysis of Disease-Associated Noncoding Variants *Investigative Ophthalmology & Visual Science* June 2021, Vol.62, 16. doi:<https://doi.org/10.1167/iovs.62.7.16>.
10. ‘Small KW, Van de Sompele S, Nuytemans K, Vincent A, Yuregir OO, Ciloglu E, Sariyildiz C, Rosseel T, Avetisjan J, Udar N, Vance JM, Pericak-Vance MA, De Baere E, Shaya FS. A novel duplication involving PRDM13 in a Turkish family supports its role in North Carolina macular dystrophy (NCMD/MCDR1). *Mol Vis*. 2021 Sep 1;27:518-527.

THE EMOTION WALK: EXPLORING RELIGIOUS AND HISTORICAL SPACES THROUGH PSYCHOGEOGRAPHY

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ABSTRACT

The understanding, which is based on the fact that space must be felt for it to make sense, has increased the importance of research that reveals the interaction between people and places through the exploration of various emotions. In this article, we aimed to explore through psychogeography how it affects the dynamic connections between religious and historical places, which are the legacy of past societies, and human behaviors or emotions. In the research, in which the case study model was adopted, we used document analysis and survey techniques, which are among the data collection methods. Based on the official website of the Tokat Governorship, we determined the religious and historical places in the city center and created a travel route. In our study, which consisted of university students as our study group, we preferred the open-ended questionnaire form and Plutchik's wheel of emotion method while obtaining the data. In addition, we asked the participants to photograph the point that affected them the most in the places on the tour route. During the analysis of the data, we examined the documents collected from the participants by subjecting them to descriptive and content analysis. After the analysis, we ended the article with some thoughtful views and suggestions on the emerging emotion maps.

Keywords: Human-Space Relationship, Psychogeography, Emotional Maps, Religious and Historical Spaces.

INTRODUCTION

Human beings are in constant interaction with their environment depending upon the elements that have influenced their development since they existed. Within this period, they both strive to adapt to the environmental conditions and shape it with the motivation of regulation, which is a part of its nature (Arslan et al., 2009, p. 36). The embodiment of the environment that is regulated and used by humans initially began with the need for shelter, then the concept of space emerged in time as a result of the need to determine a place of their own, to restrict and protect it from the natural environment in the face of the dangers they had due to the size of the environment they lived. (Alici and Paktaş, 2020, p. 90).

The concept of space, referring to the place, home, homeland, environment, living world, universe, derives from the verb kevn, which is an Arabic word and which ascribes to being, entity, event, incident, universe (Göka, 2001, p. 8; Mutçalı, 2011, p.788). Rāghıb al-Işfahānī specified that the word space originates from the verb kāne, and it is defined as place, position, importance and situation (al-Işfahānī, 2006, p. 949). Besides, Schick pointed out that

place and space have been near-synonymous for the past years; the concept of "place" does not contain the equivalent of experience, while that of space implies existence in its treasure of meaning (Güzelkahraman, 2019, p. 8). Therefore, it is highly probable that space is considered as existence. Having created a theory by making a detailed analysis about space, Henri Lefebvre indicated that space is a social landscape which emerges through processes that operate over three different dimensions: perceived, conceived and lived (Lefebvre, 1991, p. 190). Given the definition of space in terms of its relation with the architectural field, space is a three-dimensional formation that individuals can organize their behaviors and move in line with all kinds of objects and messages in their environment, and that is created with the combination of depth, width, height, range and distance relations (Özkan, 2007, p. 3). In this vein, it is evident that the concept of space has a multidimensional and rich meaning scheme, even though it cannot be clearly defined based on the views regarding its origins and different definitions.

Space awareness is conceivable with not only its physical dimensions, but also evaluation of it together with all human structures and variables since it witnesses human beings' birth, development and even mortality. This is because humans, perceiving their environment with five senses, are affected by factors such as social consciousness, aesthetic understanding, socio-cultural and economic structure, world of emotion-thought and belief, and they shape it accordingly. In this regard, a space theory based on human observation and perception psychology has been developed during the space analysis process. According to the theory, Norberg-Schulz proposed a fivefold classification as pragmatic, perceptual, existential, cognitive, and abstract space (Norberg-Schulz, 1985). In addition, Lefebvre emphasized the vitality of the space in daily life, namely, the living dimension in relation to the concepts mentioned in this study, and made a separate classification and thus distinguished five spaces: absolute space, religious space, historical space, contradictory space and differential space (Lefebvre, 1991). The spaces he categorized are not clearly differentiated in terms of their periods, and he explained each of them within the framework of various elements. Lefebvre also stressed that religious spaces include temples, palaces, memorial and cemetery monuments, privileged and designated places in societies where religious-political power produced since the emergence of the first city-states is predominated (Lefebvre, 2014, p. 251). This development has led to the emergence of a distinction between city and town in spaces dominated by a religious space; moreover, these spaces were fragmented during the process following the barbarian invasions in history, new public spaces aroused in conjunction with the developing commercial relations and historical places emerged (Ghulyan, 2017, p. 10). Therefore, it is of great importance to refer to Lefebvre's space classification in understanding the religious spaces, the symbols of the reflection of the sacred, which each society makes sense in their own period, as well as the historical places that are the material forms of their cultural remains.

Space retains social, physical and psychological effects on people in the mutual and interwoven interaction between human and space. In this sense, indicators such as the form and geometry of physical structures, historical texture, size, magnificence, location, proximity or distance to the city center in the architectural arrangement of settlements with different sizes also enjoy positive and adverse effects on the mood of individuals living in the city (Köse, 2018, p. 321). In fact, religious spaces, which can be regarded as a part of the process of reproducing any space within the framework of belief and as concrete indicators of the human's reference to belief in the perception and shaping of the environment, also affect human psychology in terms of physical, psychological and mental dimensions (Yakut & Dündar, 2020, p. 1115.). Defined as a sense of space, psychogeography is the field that seeks for this influence. Psychogeography was defined in the early 1950s by Guy Debord (1955), in

his article titled Introduction to a Critique of Urban Geography as "the study of specific effects of the geographic conditions, consciously organized or not, on the emotions and behaviors of individuals." (Şahin Yeşil, 2016, p. 130). Having presumed that an individual's emotions and behaviors in certain environments are directly caused and influenced by these environments, Debord concluded that psychogeography addresses the findings achieved by such a study, the effects of these findings on human emotions, or even more generally, it can be applied to any situation or behavior that reflects a similar spirit of exploration (Debord, 2006, p. 23). Briefly, the concept of psychogeography is regarded as a method that provides a framework for the perception of the space's spirit with the connection established between the city's present-day ideas and past traditions (Sarı, 2013, p. 49).

The above-mentioned studies, which attempt to reveal the effects of spaces on people, are mostly carried out in city centers and seek an answer to how spaces affect human emotions based upon the working groups' experiences. In the same breath, it provides an opportunity to comprehend how spaces create the formation of urban identity and memory through uncovering the connection with space. At that point, cities are paramount in terms of having survived to the present day by bearing the sociocultural and economic characteristics of the period when they were built along with containing religious and historical spaces.

Tokat, being a strategic point with its location where commercial and military roads meet and with favorable climatic conditions since its establishment, holds a rich cultural heritage especially embracing religious and historical places in the city center thanks to hosting many civilizations. The geographical coordinates of the province located in the Central Black Sea region of Anatolia are between 39° 51' – 40° 55' north latitudes and 35° 27' - 37° 39' East longitudes ("Tokat (province)", 2021). The city is in a valley-plain system formed by three mountain ranges and was established on two slopes of the Behzat river descending between the mountains in the south of the plain called Kazova, which extends to the east-west direction through which Yeşilirmak passes (Açikel, 2012, p. 219). Despite the imprecise date of establishment, archaeological data suggested that the settlement in the region dates back to the Chalcolithic Age (5400-3000 BC) (Boşdurmaz, 2021, p. 12). Many states and principalities, including Hittite, Phrygian, Cimmerian, Scythian, Persian, Med, Macedonian Kingdom, Pontus Kingdom, Roman Empire, Anatolian Seljuk and Ottoman Empire, dominated the city and were again invaded by them. According to the records, Christian, Jewish and Muslim believers resided in the same or different neighborhoods in the city where many nations such as Turks, Armenians and Greeks lived together (Kaş & Kaya, 2018, p. 397). Besides, it is understood from the abundance of "ahi" attribute and zawiyahs that Ahi organization, which was active in economic life and which was fed by the principles of Islamic-mystical thought and futuwwa in Anatolia, was a strong structure in Tokat. Since the 14th century, one of the schools of mystical thought, Mevlevi dervish, has become widespread in the city and only Tokat Mevlevihane, established in the 18th century, has reached the present day (Tanrıkorur, 2012, p. 227). Hence, the religious climate of the city is as diverse as its sociocultural structure.

Mosques, masjids, tombs, dervish lodges, madrasas, fountains, baths, inns, bridges, castles, civil buildings and covered bazaars are among the religious and historical spaces that have survived to the present day from the civilizations exercising sovereignty for a long time despite the earthquakes, natural disasters and invasions (Bilgen, 2014). Therefore, cities with such hectic historical heritage have physical, sociological and psychological effects on their residents. Herein, it is of utmost paramount to be able to define the effect of a historical urban texture on foreigners' emotional processes and to ensure their awareness about the city. In this sense, the basic research question was; "What is the effect of religious and historical spaces in the city center of Tokat, one of the historical cities of Turkey with many civilizations since

ancient times and artifacts belonging to these periods, on the young people who are unfamiliar to the city?”. The main aim of the study is to explore the effects of religious and historical spaces on individuals’ emotions through the university students’ experiences, and to try to describe them via different methods and to create an awareness about the city they live in. Before moving on to the methodology of the study focusing on the concept of psychogeography, it would be useful to cite relevant studies in the literature.

PSYCHOGEOGRAPHIC STUDIES

The individual and group meanings that people form by counting their experiences about that place are the most remarkable component in the formation of the identity of the place or the city (Relph, 1976, p. 56). These meanings are exposed in the act of walking, which plays a vital role in the pattern of the vital experience field. In reality, individuals’ experiences with walking individually or as a group lead to the emergence of various feelings (Gros, 2017, p. 124). In particular, numerous attempts have been made to collect emotions related to the site in urban contexts, and the idea of derive was introduced in the 1950s (Debord & Wolman, 1956, p. 1). Accordingly, studies based on walks were organized, and techniques such as emotion maps, mind maps, sound and smell analysis were used in these walks. In the first of these studies, Nold, who got to know the city through walking, created cities’ emotion maps in San Francisco, Stockport and Greenwich by measuring the changes in the sweat level of people's fingertips based on the GPS logic and making the emotional change data concrete (Nold, 2009, p. 3). This is also called "bio mapping" project. At a basic level, the maps show the sensory space of the embodied experience that personal response seems to be caused by a variety of visual and auditory stimuli. Another level suggests an experience of the city with a series of distinct events varying from taking pictures, crossing roads and to being annoyed by the surroundings. City and town centers were chosen as the study area, and the participants were asked to interpret their emotion maps recorded at the end of their walks. In another application, the places where the participants live and care about in longer walks were selected, and significant differences emerged according to the degree of the bond the participants established with the space. Another study aims to extract emotion maps from user-generated content on social media, which has become a unique medium for researchers and companies looking for personal information, including emotions (Hauthal & Burghardt, 2013; Resch et al., 2016). The endeavors for extracting emotions from photo titles, descriptions and labels in Twitter, Flickr and Panoramio applications suggested that the data on social media apparently reflected the associated emotions, not the deeply felt emotions, and thus the data in the emotion maps are the proxy of the real emotions. XYZ atlas project is another study conducted on the emotions of urban users in the city (XYZ Atlas - Fistera Studio Projects, t.y.). The project began in 2013 with a survey asking people from all age groups to find the places where they had emotional experiences that create meaning in their lives such as "Where have you encountered your own mortality?", and they were asked to mark the emotions they felt on the Plutchik emotion chart. The results displayed that experiences drive emotions, emotions drive behaviors and behaviors drive health. Another study carried out in Kayseri preferred psychogeography as a method to understand the experiences of people in the city, and to identify how emotion orientation affects urban use based on the memories and experiences of city users (Eren, 2020). The results of the emotion maps depicted that those who experience the city act with similar feelings in the same places, hence affecting the formation of the city; moreover, the results revealed that it plays a role in shaping its future.

The related literature also comprises studies using the mind mapping and emotion mapping methods to explore the individual-city interaction. In the study titled “A Reading Attempt of the Past and Present Urban Memory of Eskisehir via Cognitive Mapping”; university students who experienced the city for a short time and those over the age of 60 experiencing the city from the past to the present were asked to process the areas where they interacted with the city into the mind map with a view to determining what the city images of Eskişehir city are, and as a result, the elements of the changing urban memory were found by reading the mind maps of those experiencing the city in different periods (Öztürk, 2016). Another study was conducted in Samsun through use of mind maps in order to identify how people perceived the city. In this sense, three basic studies- mind mapping, odor analysis and sound analysis- were conducted to determine how it was perceived within the framework of the parameters formed by the participants with different identities at different age, gender, interests, awareness level, status, profession, upbringing and education level, and to locate which audience these places appealed to more, and which age and professional group were more active. During the interviews held at different places and times, participants were asked to map the information in their minds by considering the tokens, symbols, sketching the associations and the arguments, reference points, main arteries and the roads they use while describing the region, and they were also requested to rank the regions in order of importance by determining the priority points for themselves. The study findings showed that individuals' perceptions of the city varied across their own purposes, situations and needs (“A Student Project on Spatial Perception”, 2019).

The national and international literature is well-heelled regarding the effects of spaces on humans by means of using different methods. However, there is no such a study specifically published on the emotional effects of religious and historical spaces, which are significant building blocks of cultural heritage, on individuals through psychogeography method, referring to the significance of this study and its contribution to the relevant field.

METHODOLOGY

It is pivotal to shed light onto the quality of the mutual and indispensable interaction between the space and the human being based on the individuals' experiences in the city, both in theoretical grounds and in practical applications. In this regard, this study used the case study design, one of the qualitative research methods. The case study design is a qualitative approach that explores detailed and in-depth information about a situation in real life, current context or environment (Creswell, 2020, p. 99). This design was preferred in the study as it is not constructed on a single data source, but offers an opportunity to gather different types of data from interviews, documents and audio-visual materials along with understanding the originality of individual applications, unlike numerical statistics.

One of the purposive sampling models, criterion-sampling model was used in the current study while selecting the working group. Purposive sampling focuses on selecting situations that will illuminate the questions, and there are several different strategies for selecting these situations purposefully (Michael Quinn Patton, 2018, p. 230). The rationale of criterion sampling, which is one of these strategies, is to review and examine all situations that meet criteria of a predetermined importance. Taking the aim of the study into account, the working group consisted of six volunteer university students studying at the Department of Geography in Tokat Gaziosmanpaşa University and coming from other cities. All of the students live in the city center and one of them is a foreign-national. Table 1 depicts demographic information regarding the participants.

Table 1. Information Regarding the Participants.

Age	Gender	
	Female	Male
22	1	
23	2	2
24		1

Among the religious and historical spaces in the city center, which are on the official website of the Governorship of Tokat, the most suitable ones for the route were strategically determined during the selection of the travel route followed by walking. After the route was determined, the researchers visited the spaces one by one and calculated the time. Some of the spaces were closed due to the pandemic and restoration process; therefore, these places were removed from the route as they were far from the city center. The scope of the study held 18 religious and historical spaces, 14 of which are religious and 4 historical, located within the city center of Tokat. Religious and historical spaces in the districts of the city and those that are located in the city center but cannot comply with the travel route were excluded from the scope of the study. Table 2 demonstrates the locations on the tracking route, and Figure 1 presents the map of the identified tour route.

Table 2. Ranking and Names of the Religious and Historical Spaces on the Route.

Religious Site		Historical Site	
1.	Sentimur Tomb		
2.	Sümbül Baba Tomb		
3.	Garipler Mosque		
4.	Hatuniye (Square) Mosque		
6.	Grand (Ulu) Mosque	5.	Taşhan
7.	Takyeciler Mosque		
8.	Alaca Masjid Mosque		
9.	Rustem Celebi Mosque		
11.	Kazancılar Mosque	10.	Yağıbasan Madrasah
12.	Ali Tusi Tomb		
13.	Ali Pasha Mosque and Tomb		
14.	Burğaç Hatun Tomb		
17.	Behzat Mosque	15.	Latifoğlu Mansion/House
18.	Mevlevihane (Mevlevi Lodge)	16.	Clock Tower



Figure 1. Identified Travel Route Map.

Document analysis and questionnaire technique, which are among the data collection methods, were used in the present study. Document analysis includes the analysis of written materials containing information about the facts and events to be investigated, and it can be a data collection method alone or it can be used together with other data collection methods (K.D. Bailey, 1982). Thomas (1998) defined the survey technique as a research instrument consisting of a series of questions for describing people's living conditions, behaviors, beliefs or attitudes (Şener Büyüköztürk et al., 2016, p. 124). Thus, the aim is to have more detailed information about the subject. This study deployed three data collection tools: the Plutchick Wheel of Emotion, an open-ended questionnaire and photographs of the participants. Before starting the walk, a numbered excursion map indicating the starting and ending points was distributed to the participants. During the trip, short notifications taken from the official website of the Governorship of Tokat were announced for each space, and students were asked to mark the emotions they felt in these places. Then, they were appealed to photograph the symbols that could represent the inside and outside of the spaces. Finally, an open-ended questionnaire form consisting of 17 questions, which is valid for all spaces to reveal the emotions determined in the wheel of emotion, was distributed to the participants and they were expected to give their responses. The participants sent the photos via gmail address activated by the researchers.

Descriptive analysis focusing on the interpretation of the data according to predetermined themes and content analysis methods aiming at the careful, detailed and systematic examination and interpretation of a certain amount of material were used during data analysis. Wheel of Emotions was transferred to the computer program, and thematic maps that emotions correspond to each color were created in terms of gender. The surveys were analyzed through use of the MAXQDA18 program for coding and categorization. Participants were coded as P1, P2. The data were organized according to the themes and checked by the researchers. Moreover, similar photographs were removed among the photographs taken by the participants regarding the places, and a total of 18 photographs related to each place were classified as religious and historical spaces and mapped in the computer program. At the last stage, all photographs were combined in a single photograph, which serves as a representative image of Tokat city center.

Findings

This section covers the findings related to emotion maps, surveys and photographs of the participants. They were analyzed and presented in tables and figures.

1. Emotion Maps and Surveys

The concept of emotion defined as “Any upheaval or motion of mind, feeling, passion; any severe or stimulated mental state,” refers to a feeling and certain thoughts specific to this feeling, psychological and biological states, and a series of movement tendencies (Goleman, 2011, p. 895). With its variations and nuances, researchers cannot make a clear definition, but it is a concept that connects the experiential geographies of the human soul and physics (Davidson & Milligan, 2004, p. 524) and develops with experience about self and otherness (Sibley, 2003, p.392) specified.

Psychologist Robert Plutchick, who studied on the classification of emotions, developed a method to see tangibly the reflections of human emotions on the city. The method called the wheel of emotion proposes eight basic human emotions: anger, fear, sorrow, disgust, surprise, anticipation, trust, and joy (Plutchik, 2001, p. 350). The conic expression of colors depending on the intensity of the emotions is shown in Figure 2.

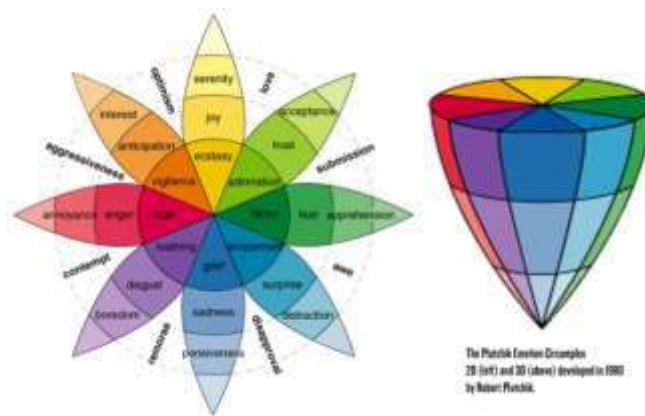


Figure 2. Plutchick’s Wheel of Emotions.

In Plutchick's three-dimensional circumplex model, the cone’s vertical dimension represents intensity and the circle dimension represents the degrees of similarity among the emotions (Mohsin & Beltiukov, 2019, p. 291). Half of the eight primary emotions in the wheel are positive and half are negative. Three emotions correspond to each color. These secondary and tertiary bipolar emotions can be categorized as joy versus sorrow, surprise versus expectation, trust versus disgust, and anger versus fear. Having explained each emotion in detail and dividing it into subgroups, Plutchick noticed that the intensity of emotion was high in the center of the wheel and this intensity decreased as the distance to the center increased. The colors associating with the basic eight emotions are as following:

Table 3. Plutchick Emotion-Color Associations.

Color	Emotions
Orange	Vigilance, Anticipation, Interest
Yellow	Ecstasy, Joy, Serenity
Light green	Admiration, Trust, Acceptance
Dark green	Terror, Fear, Apprehension
Light blue	Amazement, Surprise, Distraction
Dark blue	Grief, Sadness, Pensiveness
Purple	Loathing, Disgust, Boredom
Red	Rage, Anger, Annoyance

The participants were asked to mark the emotions aroused by each visited religious and historical spaces on the wheel of emotions. Open-ended questionnaires were distributed at the end of the trip in order to make an in-depth analysis regarding the feelings they had. The form includes questions about what they felt and what caused these feelings. Comparisons between genders were made while examining emotion maps and surveys during data analysis, and direct quotes were presented in order to reflect the participants’ views. Subsequently, 18 spaces on the route were divided into two with a view to making an analysis of the emotions more visually clear. Emotion maps were made in Adobe Illustrator program and divided into two according to gender and visualized with figures.

1.1. Results of Female Students’ Emotion Maps and Their Surveys

The highest intensity in the emotion maps obtained as a result of the markings of the female participants was found to be light green that met the feelings of admiration, trust and acceptance. This color emerged in all spaces except for Rüstem Çelebi Mosque. The highest intensity belonged to the feeling of admiration, and the places mostly marked with this feeling were Garipler Mosque and Ali Paşa Mosque.

Unlike the markings, the female participants' survey results showed that the places arising a sense of admiration were Garipler Mosque and Hatuniye Mosque. This may be due to the architectural ornaments of the mosques. The female students may be impressed by the value attributed to Hatuniye Mosque as it was built on behalf of Sultan II Bayezid's mother, Gülbahar Hatun. The places where they felt a sense of trust on the maps were identified as Sümbül Baba Tomb, Garipler Mosque, Hatuniye Mosque, Taşhan, Grand Mosque, Yağibasan Madrasah, Kazancılar Mosque, Ali Pasha Mosque, Latifoğlu Mansion and Mevlevihane. They also responded to the questions such as "Was there a place that made you feel safe? Where did you feel the most? Why?" as follows:

- *"Taşhan made me feel safe since it was used for security purposes during the period it was built." (P2)*
- *"The tomb of Sümbül Baba made me feel safe in terms of its architectural structure and location." (P6)*

Unlike other spaces, the participants marked the feeling of acceptance in Alaca Masjid Mosque. Accordingly, female participants intensely experienced the feelings of admiration, trust, acceptance by showing reasons as to the interior and exterior architectural elements of the spaces, their construction purpose as well as their location in both religious and historical spaces.

Another color following the color intensity on the emotion maps was yellow, referring to the feelings of ecstasy, joy and serenity. The places associated with the feeling of ecstasy were determined to be Hatuniye Mosque, Taşhan, Ali Paşa Mosque and Tomb, Latifoğlu Mansion and Behzat Mosque. Participants marked the feeling of joy in Sümbül Baba Tomb, Garipler Mosque, Hatuniye Mosque, Taşhan, Takyeciler Mosque, Ali Paşa Mosque, Latifoğlu Mansion, Clock Tower, Behzat Mosque and Mevlevihane. The greatest intensity was related to the sense of serenity, and the participants mostly preferred the Grand Mosque. The places that were free from any yellow marking can be sorted as Sentimur Tomb, Alaca Masjid Mosque, Kazancılar Mescid and Ali Tusi Tomb.

Considering the surveys with regard to the emotions corresponding to these colors, the participants outlined that they experienced the feeling of ecstasy in Grand Mosque, Yağibasan Madrasah, Hatuniye Mosque, Ali Paşa Mosque and Mevlevihane due to their architectural structure, history along with having a wide and calm area. They listed the places where they felt joyful as Rüstem Çelebi Mosque and Grand Mosque as the public used the term "stubby minaret" for the minaret structure of Rüstem Çelebi Mosque compared to other mosques, and mihrab was on the right in Grand Mosque, while at the entrance in other mosques. In both mosques, the participants expressed their happiness and smiles for this information. The places where they primarily experienced the feeling of serenity were Grand Mosque, Taşhan, Ali Pasha Mosque and Tomb, Hatuniye Mosque, and one participant mentioned that s/he generally felt peace and serenity in all mosques. The following excerpts indicate the participants' views on this issue:

- *"I felt very peaceful in mosques in general. Because the architecture of the mosques was quite peaceful. Hatuniye Mosque, in particular." (P2)*
- *"I felt peaceful, the spiritual atmosphere was very peaceful when I entered the mosques." (P3)*
- *"Taşhan, I felt peace and serenity. It was not crowded due to the pandemic." (P6)*

The findings revealed that the participants mostly experienced the emotions of ecstasy, joy and serenity in religious spaces. Corresponding to the feelings of interest, anticipation and

vigilance, the orange color was similar to the emotions in other religious and historical spaces except for Grand Mosque and Behzat Mosque. The participants marked Taşhan, Rüstem Çelebi Mosque, Yağbasan Madrasa, Ali Tusi Tomb, Ali Pasha Mosque as those where they felt the sense of anticipation. Two participants did not respond to the question related to this feeling in the survey, and one participant stated that s/he experienced a sense of anticipation in Latifoğlu Mansion since human being's value is reflected on every detail of the mansion.

Another intense color in maps was found to be the light blue color, which is associated with feelings of distraction, surprise and amazement. The least intensity emerged in the Sentimur Tomb, Takyeciler Mosque, Rüstem Çelebi Mosque and Kazancılar Masjid in terms of the feeling distraction, while the highest intensity belonged to the feeling of amazement in Sümbül Baba Tomb, Garipler Mosque, Hatuniye Mosque, Grand Mosque, Takyeciler Mosque, Yağbasan Madrasa, Ali Pasha Mosque, Latifoğlu Mansion and Mevlevihane spaces. They responded to the questions such as “Where do you think you were distracted or amazed? Why?” as follows:

- *“It is Rüstem Çelebi Mosque. As its minaret is smaller compared to other mosques, I was surprised.” (P2)*
- *“Clock Tower. It was noisy since it was located right next to the road, I felt distracted.” (P3)*
- *“Yağbasan Madrasah. It caused a distraction due to the renovation inside.” (P6)*

Corresponding to grief, sadness and pensiveness, dark blue intensity occurred in Sentimur Tomb, Taşhan, Takyeciler Mosque, Yağbasan Madrasa, Kazancılar Masjid, Ali Pasha Mosque, Burgaç Hatun Tomb, and Latifoğlu Mansion. The reasons may be the experiences in the visited spaces, the insufficient attention paid to historical artifacts and the atmosphere of sadness related to the mosque architecture. Besides, the participants linking deep sadness with the concept of mortality expressed their feelings as such:

- *“I felt deep grief and sadness as Ali Pasha, who actually built the mosque in the Ali Pasha Mosque, was executed and his name was later given to the mosque.” (P2)*
- *“I grieved when I saw the tomb of Behzad-ı Veli, whose name was given to the mosque, in the backyard of the Behzat Mosque.” (P3)*
- *“Ali Pasha Mausoleum reminded me of grief, writings on the frame hanging on the wall inside recalled the finitude of the world”. (P6)*

Another low-intensity emotion was determined as fear associated with dark green color, and the participants marked the spaces such as Sentimur Tomb, Sümbül Baba Tomb, Ali Tusi Tomb and Burgaç Hatun Tomb. A participant emphasized that s/he felt fear as they were the places of significant people.

The participants' emotion maps did not include the feelings of loathing, disgust, boredom corresponding to the color purple; moreover, they did not mark the feelings of rage and anger indicated by the red color. Only one participant pointed out that s/he had a feeling of annoyance in the Clock Tower, but did not state the reason. One participant responded to the questions in the survey, “Was there a place that made you angry or annoyed? Where did you feel? Why is that?”, and explained that he felt annoyed because the garbage contaminates the area around the Sentimur tomb.

Based upon the elicited data, female participants were determined to hold all positive emotions in religious and historical spaces except for disgust, loathing, boredom, rage and anger. They attributed the reasons for the emergence of these emotions to the observations of

the interior and exterior architecture of the spaces, to the construction purposes of the spaces, and to their current use.

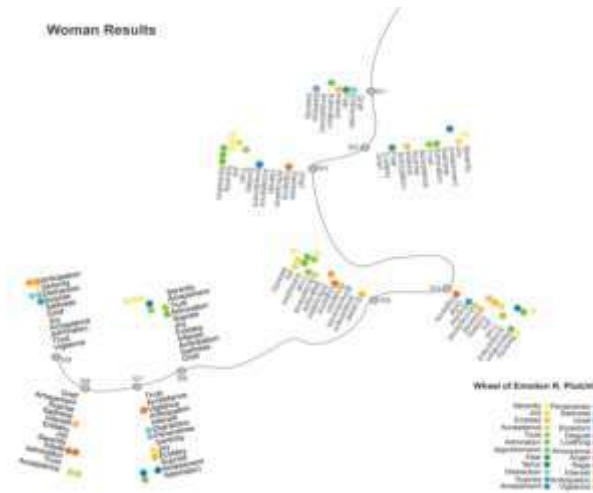


Figure 3. Female Students' Emotion Map in terms of the First Group Spaces.

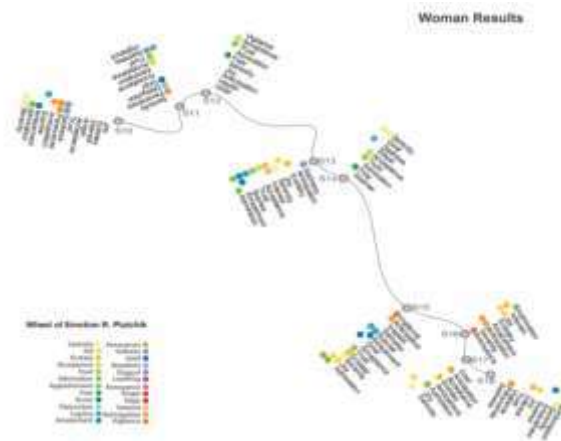


Figure 4. Female Students' Emotion Map in terms of the Second Group Spaces.

1.2. Results of Male Students' Emotion Maps and Their Surveys

The highest intensity on the emotion maps obtained with the markings of the male participants was found to be light green that is associated with the feelings of admiration, trust and acceptance. The highest intensity belonged to the feeling of admiration, which was mostly felt in Garipler Mosque, Hatuniye Mosque, Alaca Masjid Mosque and Ali Pasha Mosque. In the surveys, the participants listed the places where they felt admiration as Yağıbasan Madrasah, Ali Pasha Mosque, Hatuniye Mosque and Mevlevihane due to the positive emotions and their interior as well as exterior architectural features. The following quotes are related to the spaces where the participants felt the sense of trust:

- *“The fact that the Mevlevihane was large and surrounded by walls made me feel safe.” (P1)*
- *“Yağıbasan Madrasah made me feel safe as people with knowledge of science built it.” (P4)*
- *“Hatuniye Mosque was close, I found it safe because it was close to my house.” (P5)*

Another prominent color with high intensity was yellow, referring to serenity, joy and ecstasy. Participants marked the feeling of serenity mostly in Sentimur Tomb, Sümbül Baba Tomb, Garipler Mosque, Hatuniye Mosque and Grand Mosque. Associating this feeling with the feeling of "peace", the participants expressed their views as following:

- *“Grand Mosque made me feel very peaceful. I felt very peaceful as it keeps the historical features of the interior alive.” (P1)*
- *“Hatuniye Mosque and Ali Pasha Mosque were very peaceful.” (P4)*
- *“I was very impressed by the architecture of the Ali Pasha Mosque, the size of the windows gladdens my heart.” (P5)*

Following the feeling of serenity, the place where they marked their feelings as joy and ecstasy was Garipler Mosque on the map; however, the survey results demonstrated that they experienced these feelings as the minaret of Rüstem Çelebi Mosque is small and the mihrab in the Grand Mosque is on the right, not opposite as in other mosques.

Another intense color was the light blue color, which was associated with feelings of distraction, surprise and amazement. The male students mostly felt the sense of amazement in Hatuniye Mosque. They did not mention the feeling of distraction. It is noteworthy that Kazancılar Masjid was free from any of these emotions. The participants responded to the question “Where did you mostly feel surprised/distracted?” as Taşhan and Rüstem Çelebi Mosque. This may derive from the fact that the architectural structure of Taşhan was complicated and the external door of Rüstem Çelebi Mosque was open, while the interior door was closed.

The dark blue color, which corresponds to the feelings of pensiveness, grief and sadness, was intense in all other places, except for the Kazancılar Masjid, just as light blue color. There was no indication of the feeling of pensiveness. Participants expressed the following words about the places where they had sadness and grief:

- *“I felt sorrow at the Sümbül Baba Tomb, Grand Mosque, Latifoğlu Mansion, and Yağlıbasan Madrasa due to the lack of people of that time and the lack of beauty of that time. In fact, when we entered Ali Pasha's Tomb, I felt that the world was finite and I felt a glow of grief.” (P1)*
- *“Yes, I would like to live the life people had in that period after visiting all the places. I wish I could live in that period when the buildings were built. Kazancılar Masjid also seemed to me like a small, simple and endless well.” (P4)*
- *“I felt deep sadness in Latifoğlu Mansion. Life used to be better, trouble was less. I compared the clothes exhibited in the mansion to our own clothes in Iraq. The grand mosque was also very quiet and I could pray there and wait to die.” (P5)*

The least intensity on the maps was observed in the orange color, which corresponds to feelings of interest, anticipation and vigilance. Among these feelings, the most marked was interest, the least but the most intensely marked was the sense of vigilance. The participants experienced the feeling of vigilance in Ali Tusi Tomb and Burgaç Hatun Tomb. No markings expressing the orange color were made in the Sentimur Tomb, Alaca Masjid Mosque and Behzat Mosque. Considering the responses to the question regarding the sense of anticipation in the survey, one of the participants emphasized that s/he had an anticipation about humanity after feeling the conditions under which people were educated for science in Yağlıbasan Madrasah, while another participant pinpointed that his/her interest in people increased when s/he entered Hatuniye Mosque.

The participants' emotion maps did not include the feelings of loathing, disgust, boredom, corresponding to the color purple; moreover, they did not mark the feelings of rage and anger indicated by the red color. Only one participant marked the feeling of anger in Yağlıbasan Madrasa, which may arise from the idea that it was not made in accordance with the original during the restoration of the historical artifacts.

Based upon the elicited data, male participants were identified to hold all positive emotions in religious and historical spaces except for disgust, loathing, boredom, rage and anger. They demonstrated the reasons for the emotions they felt in all spaces as interior and exterior architectural elements and historical artifacts.

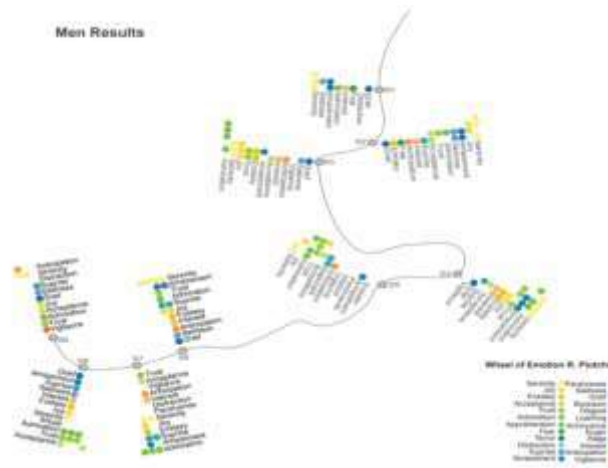


Figure 5. Male Students' Emotion Map in terms of the First Group Spaces.

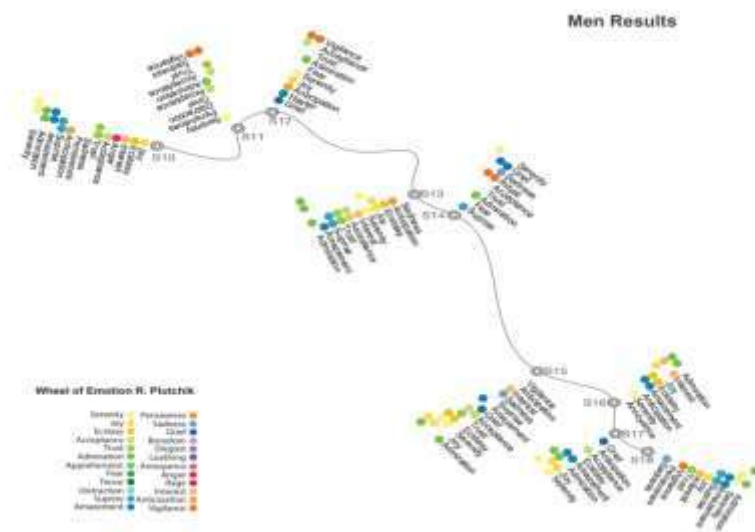


Figure 6. Male Students' Emotion Map in terms of the Second Group Spaces.

2. *Photographs of the Spaces from the Lens of Participants*

Photograph, which is frequently used in daily life, is a record of a particular object in a given historical/spatial context and records what our senses perceive and feel (Değirmenci, 2018, p. 88). On that point, it is crucial to consider photography not only as a concept but also as data on its own in empirical studies that concern people who communicate with their environment and who are in the process of making sense of the outside world. On this plane, a photograph was requested from the places that affected them the most on the route, based on the perspectives of the participants. Similar places were removed from the requested photographs

religious and historical places play a vital role in the interaction between human-space and geography, especially designed with the belief that divine power connects with the universe.

It is evident that spaces have some effects on people. Understanding these effects and their underlying factors is possible with conducting field studies that aim at exploring the city through experiences. Attendantly, this study is an attempt to propound the psychogeography of the religious and historical spaces in the city center by favor of the emotion maps obtained from the experiences of university students studying at the geography department. Despite available space, number of people, and epidemic constraints, the study provides some tangible, interpretable data.

At the outset, field studies create a satisfying opportunity for the interpretation and criticism of the theories as they enable the practices of the ideas produced on a theoretical basis. The study findings proved that participants intensely experienced the feelings of admiration, trust, acceptance, serenity, joy and ecstasy in religious spaces. On the other, another intriguing finding was the feeling of fear in the tombs. Although the graves of people who are regarded as significant and respected by the society are shown as a reason, it is worth examining from a psychological point of view. Historical places aroused the feelings of trust, ecstasy, joy, anticipation, distraction, sadness and anger. The interior and exterior architectural features of the spaces, their purpose of construction and environmental factors were effective in these emotions. Another notable finding was that religious and historical spaces did not evoke the feelings of loathing, disgust, boredom and rage. Thus, it may be wise to mention that the religious and historical places in the city center intensely awakened positive emotions.

The participants stated that they were not familiar with the city they lived in and regretted that they could not realize the historical beauties, yet they will visit especially religious and historical places more frequently thenceforwards. The also drew attention to the lack of information about the spaces and remarked that they established a bond with the spaces while taking photos. Hence, this kind of field study helps students develop an awareness of knowing the city in their urban space experiences.

Such studies provide opportunity to produce seminal methodological solutions such as to what extent the psychogeography method is effective in being acquainted with the city, what limitations are faced, what other methods can be determined to investigate the effects of spaces on people, and how comparisons can be made. Concordantly, geography students are enlightened about how to create visual combinations of spatial exploration and mapping with such an application. This point is momentous considering how crucial learning by doing is in the education process.

In conclusion, field studies progress cumulatively and recursively at different times, with different working groups and methods. Just as spaces can affect emotional processes, emotional processes can also vary across place, time and space. The working group and data collection methods selected within the scope of this study can be expanded with studies that will be organized in different places with different methods, with a larger or divided study groups. To exemplify, cognitive and mind maps can be manifested, sound and scent maps of the religious and historical spaces in the city center can be drawn, and derivative and flanging methods can be preferred. Thus, this study can provide academicians with a framework for their further studies.

Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article [and/or] its supplementary materials.

Declarations

This research was carried out with the permission of the Tokat Gaziosmanpaşa University Social and Human Sciences Research Ethics Committee, dated 29.04.2021 and numbered 36286.

Acknowledgments

First of all, we would like to thank the students of the geography department of our university who participated in this study. We would also like to thank Mahir Yerlikaya, Emre Duman, Adem Yücel and Mavera Kırtasiye, who contributed to the mapping stages, and Kübra Pamukçu for their comments and suggestions on the article. Finally, thanks also go to all those who have acted as peer reviewers for this article.

REFERENCES

- Açıkel, A. (2012). Tokat. İçinde *TDV İslam Ansiklopedisi* (C. 41, ss. 219-223). TDV İslam Ansiklopedisi. <https://islamansiklopedisi.org.tr/tokat#1>
- Ali Yıldırım – Hasan Şimşek. (2013). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri* (9.). Seçkin Yayıncılık.
- Alici, N., & Paktaş, M. G. (2020). İç Mekânda Renk Algısı ve Psikolojiye Etkileri. *Modular Journal*, 3(1), 89-105. <http://modular.gedik.edu.tr/tr/download/article-file/1174010>
- Arslan, H. D., Çınar, K., & Dinç, P. (2009). *Mekâna Yönelik Algısal Farkların Ölçülmesinde Lens Model Yaklaşımı: Model Açılımı ve Kullanım Örnekleri*. 24(4), 35-48. <https://dergipark.org.tr/tr/download/article-file/215840>
- Bailey, K.D. (1982). *Methods of Social Research* (2nd ed.). New York: The Free Press.
- Bilgen, Ç. (2014). *Erken Cumhuriyet Dönemi'ne Ait Bir Kitap Taslağı: Tokat Kent Tarihi Çalışmaları Tokat Müzesi Örneği* [Yüksek Lisans Tezi]. İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü.
- Boşdurmaz, N. (2021). *İpek Yolunda Bir Şehir: Tokat*. Tokat Belediyesi Kültür Yayınları.
- Creswell, J. W. (2020). *Nitel Araştırma Yöntemleri- Beş Yaklaşımına Göre Nitel Araştırma ve Araştırma Deseni* (Mesut Bütün - Selçuk Beşir Demir, Çev.; 5. bs). Siyasal Kitabevi.
- Davidson, J. & Milligan, C. (2004). Embodying Emotion Sensing Space: Introducing Emotional Geographies. *Social & Cultural Geography*, 5(4), 523-532. <https://www.tandfonline.com/doi/full/10.1080/1464936042000317677>
- Debord, G. (2006). “Introduction to a Critique of Urban Geography” (Ken Knabb, Çev.). *Les Levrés Nues*. <https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/1798/3-Debord.pdf?sequence=1&isAllowed=y>
- Debord, G., & Wolman, G. (1956). A User's Guide to Detournement. *Les Levrés Nues*, 8, 7. http://xenopraxis.net/readings/debord_detournement.pdf
- Değirmenci, K. (2018). Etnografik Bir Veri Olarak Fotoğraf: Temsil, Düşünümsellik ve Gerçekçilik. *Antropoloji*, 36, 87-102. https://doi.org/10.1501/antro_0000000360
- el-İsfahânî, R. (2006). *Müfredâtü elfâzı'l-Kur'ân: Müfredât Kur'ân Kavramları Sözlüğü* (Abdülbaki Güneş & Mehmet Yolcu, Çev.). Çıra Yayınları.

- Eren, E. (2020). *Palimpsest Kentte Psikocoğrafya Okuması: Kayseri Kenti Hunad Hatun Külliyesi ve Kayseri Kalesi* [Yüksek Lisans Tezi]. Kayseri Üniversitesi Fen Bilimleri Enstitüsü.
- Ghulyan, H. (2017). Lefebvre'nin Mekân Kuramının Yapısal ve Kavramsal Çerçevesine Dair Bir Okuma. *Çağdaş Yerel Yönetimler Dergisi*, 26(3), 1-29. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3046105
- Goleman, D. (2011). *Duygusal Zeka* (34. bs). Varlık Yayınları.
- Göka, Ş. (2001). *İnsan ve Mekan*. Pınar Yay.
- Gros, F. (2017). *Yürümenin Felsefesi* (16. bs). Kolektif Kitap.
- Güzelkahraman, B. Ö. (2019). *Mekân Ve İnsan İlişkisinde Yer Duygusunun Sanal Gerçeklikle Deneyimlenmesi Üzerine Bir İnceleme* [Yüksek Lisans Tezi]. TOBB Ekonomi ve Teknoloji Üniversitesinde Sosyal Bilimler Enstitüsü.
- Hauthal, E., & Burghardt, D. (2013). "Extraction of Location-Based Emotions from Photo Platforms" *Progress in Location-Based Services: Lecture Notes in Geoinformation and Cartography* (J. M. Krisp, Ed.). Springer.
- Kaş, B., & Kaya, Y. S. (2018). Uluslararası Geçmişten Günümüze Tokat'ta İlmî ve Kültürel Hayat Sempozyumu. *İki Amerikalı Misyonerin 19. Yüzyılın İlk Yarısında Tokat'a Dair Gözlemleri*, 2, 614. <http://tokatsempozyum2018.gop.edu.tr/>
- Köse, H. (2018). Yaratıcı Uzamlar ya da "Psikocoğrafya" Kavramı Odağında Mekânın Yeniden Üretimi. *Moment Journal*, 5(2), 23. <https://dergipark.org.tr/tr/download/article-file/653570>
- Lefebvre, H. (1991). *The Production of Space* (Donald Nicholson-Smith, Çev.). Blackwell.
- Lefebvre, H. (2014). *Mekânın Üretimi* (Işık Ergüden, Çev.; 2.). Sel Yayıncılık.
- Mekansal Algı Üzerine Bir Öğrenci Projesi: Samsun İncelemesi. (2019, Kasım 13). *Arkitera*. <https://www.arkitera.com/gorus/mekansal-algi-uzerine-bir-ogrenci-projesi-samsun-incelemesi/>
- Michael Quinn Patton. (2018). *Nitel Araştırma ve Değerlendirme Yöntemleri* (Mesut Bütün - Selçuk Beşir Demir, Ed.; 2. bs). Pegem Akademi Yayıncılık.
- Mohsin, M. A., & Beltiukov, A. (2019). *Summarizing Emotions from Text Using Plutchik's Wheel of Emotions*. 291-294. <https://doi.org/10.2991/itids-19.2019.52>
- Mutçalı, S. (2011). *Arapça-Türkçe Sözlük*. Dağarcık. <http://archive.org/details/ArapaTrkeSzlck->
- Nold, C. (Ed.). (2009). *Emotional Cartography. Technologies of the Self*. Space Studios.
- Norberg-Schulz, C. (1985). *The Concept of Dwelling: On the Way to Figurative Architecture*. Rizzoli.
- Özkan, A. (2007). *İç Mekan Tasarımı Kuram ve Yöntemleri Işığında Günümüz Türk İç Mekan Tasarımcıları ve Tasarım Anlayışlarına Bir Yaklaşım* [Yüksek Lisans Tezi]. Hacettepe Üniversitesinde Sosyal Bilimler Enstitüsü.
- Öztürk, A. Ç. (2016). *Eskişehir'in Geçmişteki ve Bugünkü Kent Belleğinin Zihin Haritaları Üzerinden Okuma Denemeleri*. 7(20), 25.
- Plutchik, R. (2001). The Nature of Emotions. *American Scientist*, 89(4), 344-350. <https://www.jstor.org/stable/27857503>

- Relph, E. (1976). *Place and Placelessness*. Pion.
- Resch, B., Summa, A., Zeile, P., & Strube, M. (2016). Citizen-Centric Urban Planning through Extracting Emotion Information from Twitter in an Interdisciplinary Space-Time-Linguistics Algorithm. *Urban Planning*, 1(2), 114-127. <https://doi.org/10.17645/up.v1i2.617>
- Sarı, J. (2013). *Kenti Deneyimleme Aracı Olarak Psikocoğrafya* [Yüksek Lisans Tezi]. İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü.
- Sibley, D. (2003). Geography and Psychoanalysis: Tensions and Possibilities. *Social & Cultural Geography*, 4(3), 391-399. <https://doi.org/10.1080/14649360309070>
- Şahin Yeşil, S. (2016). Psikocoğrafya ve Bir Şehir Gezgininin Anıları. *Monograf Dergisi*, 5, 124-149. <http://monografjournal.com/sayilar/5/psikocografya-ve-bir-sehir-gezgininin-anilari.pdf>
- Şener Büyüköztürk vd. (2016). *Bilimsel Araştırma Yöntemleri*. Pegem Akademi Yayıncılık.
- Tanrıkorur, Ş. B. (2012). Tokat Mevlevihanesi. İçinde *TDV İslam Ansiklopedisi* (C. 41, ss. 227-230). TDV İslam Ansiklopedisi. <https://islamansiklopedisi.org.tr/tokat-mevlevihanesi>
- Tokat (il). (2021). İçinde *Vikipedi*. [https://tr.wikipedia.org/w/index.php?title=Tokat_\(il\)&oldid=25437446](https://tr.wikipedia.org/w/index.php?title=Tokat_(il)&oldid=25437446)
- XYZ Atlas—Fisterra Stüdyo Projeleri. (t.y.). Geliş tarihi 05 Mayıs 2021, gönderen <https://fisterrastudio.com/projects/xyz-atlas/>
- Yakut, S., & DüNDAR, A. (2020). Mekânın Ruhü: Dinî Mekânların Psikolojik Dili. *Uluslararası Sosyal Araştırmalar Dergisi*, 13(73), 1113-1119. <https://doi.org/10.17719/jisr.11083>

BETA KATSAYILARININ KANTİL REGRESYON İLE TAHMİNİ: MSCI- İSLAMİ BORSA ENDEKSLERİ ÜZERİNE BİR İNCELEME

ESTIMATING THE BETA COEFFICIENTS BY QUANTILE REGRESSION: A STUDY
ON MSCI-ISLAMIC STOCK INDICES

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ÖZET

Sermaye Varlıkları Fiyatlama Modeli (SVFM) zaman serisi modellerinden iki aşamalı regresyonlara yada panel veri yöntemlerine varıncaya kadar birçok değişik üst düzey ekonometrik metodoloji ile test edilmiştir. Ancak bütün bu yöntemler borsaların içinde bulunduğu ekonomik koşulları dikkate almamaktadır. Koenker ve Bassett (1978) tarafından geliştirilen dilim (kantil) regresyon modeli ise borsa endeksinin yükseliş ve düşüş periyotlarını da dikkate alarak bu açığı kapatmaya çalışmaktadır. Bu çalışmada İslami borsa endekslerinin beta katsayıları kantil regresyon modeli ile tahmin edilmiştir. Sonuçlar beta katsayıları bütün kantiller boyunca değiştiğini, diğer bir anlatımla, endeksin durumuna göre beklenen getirilerin değiştiğini göstermiştir.

Anahtar Kelimeler: Beta katsayısı, Kantil regresyon, MSCI- İslami Borsa Endeksleri

ABSTRACT

The Capital Asset Pricing Model (CAPM) has been tested with many different high-level econometric methodologies, from time series models to two-step regressions or panel data methods. However, all these methods do not take into account the economic conditions of the stock markets. The quantile regression model developed by Koenker and Bassett (1978) tries to close this gap by taking into account the rising and falling periods of the stock market index. In this study, beta coefficients of Islamic stock market indices were estimated by quantile regression model. The results showed that the beta coefficients changed throughout all quantiles, in other words, the expected returns changed according to the state of the index.

Keywords: Beta coefficients, quantile regression, MSCI-Islamic stock indices

GİRİŞ

Sharpe (1964) tarafından geliştirilen Sermaye Varlıkları Fiyatlama Modeli (SVFM) zaman serisi modellerinden iki aşamalı regresyonlara yada panel veri yöntemlerine varıncaya kadar birçok değişik üst düzey ekonometrik metodoloji ile test edilmiştir. Ancak bütün bu yöntemler piyasadaki iyimserliği yada kötümserliği, diğer bir anlatımla borsaların içinde bulunduğu ekonomik koşulları dikkate almamaktadır. Koenker ve Bassett (1978) tarafından geliştirilen dilim (kantil) regresyon modeli ise borsa endeksinin yükseliş ve düşüş periyotlarını da dikkate alarak bu açığı kapatmaya çalışmaktadır. (Barnes & Hughes, 2002). Kantil regresyon bir

dağılımın uç noktalarını diğer bir anlatımla dağılımın kuyruk tarafını da modelleme üstünlüğüne sahip olduğu için en küçük kareler yöntemine göre daha tutarlı katsayılar elde etmektedir (Allen vd., 2013). Zaten, yatırımcı davranışı, yükseliş ve düşüş piyasası durumlarında heterojendir; aşağı yönlü risk ve yukarı yönlü potansiyel getiriler portföylerde farklı şekilde ağırlıklandırılmaktadır. Çünkü risk-getiri ilişkisi piyasanın yönünü ayıdan boğaya doğru çevirmesine bağlı olarak, negatiften pozitive dönebilmektedir. Piyasanın kötümser olduğu dönemlerde yani dağılımın alt dilimlerinde, yatırımcılar daha yüksek belirsizlik hissettikleri için oynaklık artmakta buda borsalarda satış baskısının artmasına yol açarak fiyatların düşmesine neden olmaktadır (Rehman vd., 2021). Bu çalışmada 6 gelişmiş ve 6 gelişmekte olan ülke borsasında, beta katsayıları kantil regresyon modeli ile tespit edilerek, literatüre katkı sağlanması amaçlanmıştır.

LİTERATÜR

Bazı akademik çalışmalar kantil regresyon modelini farklı hisse senedi piyasalarına uygulamıştır. Örneğin, Naifar (2016), hisse senedi getirisi dağılımlarında, çarpıklık ve basıklık yüksek olduğunda kantil regresyonun daha verimli tahminler sağladığını iddia etmiştir. Aygoren & Uyar (2016) Borsa İstanbul bağlamında, panel kantil modeli kullandıkları çalışmalarında, yatırımcıların yüksek getiri dönemlerinde oluşan iyimserlik yüzünden kazançlara odaklandığını bu yüzden de fiyatlamlarda sistematik riski olması gerekenden düşük düzeyde belirlediklerini kanıtlamışlardır. Bahloul & Amor (2021) çalışmalarında makroekonomik değişkenlerin (enflasyon oranı, döviz kuru, para arzı, endüstriyel üretim) ve küresel faktörlerin (ekonomik politika belirsizlik, finansal belirsizlik, petrol fiyatı) borsa getirileri üzerindeki etkisini MENA bölgesinde, kantil regresyon yaklaşımı uygulayarak test etmişlerdir. Sonuçlar, makroekonomik ve küresel faktörlerin etkisinin kantiller boyunca farklı olduğunu göstermektedir. Hakmaoui & El Jebari (2020) kantil regresyon modelini kullanarak Fas borsasında işlem gören şirketlerin fiyat hareketlerinde sürü davranışı olduğunu tespit etmişlerdir. Aziz & Ansari (2018) ise kantil regresyon uygulayarak, Hindistan borsasında en düşük getiri ile gelecekteki hisse senedi getirileri arasındaki ilişkinin olduğunu ortaya koymuşlardır. Chang vd., (2011) oluşturdukları portföyleri kantil regresyonu ile modellemişler ve düşük kantillerde risk-getiri ilişkisinin anlamsız olduğunu söylemişlerdir.

VERİ VE YÖNTEM

Bu çalışmada veri olarak günlük frekanstaki MSCI (<https://www.msci.com/end-of-day-data-search>) tarafından derlenen gelişmiş ve gelişmekte olan ülkelerin İslami borsa endeksleri kullanılmıştır. Veriler 18/08/2017 ile 18/08/2021 dönemi arasını kapsamaktadır. Verilerin analizinde kantil regresyon modeli tercih edilmiştir. Modelde bağımlı değişken olarak borsa endekslerinin getiri değerleri, bağımsız değişken olarak ise MSCI-dünya endeksinin getiri serisi kullanılmıştır. Kantil regresyonun metodolojisi için Gürler vd., (2018) ile Khalifa vd., (2018) makalelerine göz atılabilir.

BULGULAR

Tablo 1: MSCI - İslami Borsa endeksleri tanımlayıcı istatistikleri

Gelişmiş ülke MSCI-endeksleri					
	Ortalama	Std.sapma	Çarpıklık	Basıklık	ADF
ABD	0.0004	0.012	-0.966	20.840	0.000
Fransa	0.0003	0.012	-.1543	24.965	0.000
Almanya	0.0001	0.013	-1.366	18.544	0.000
İtalya	0.0001	0.018	-2.079	29.516	0.000
Japonya	0.0002	0.010	-0.160	8.136	0.000
İngiltere	0.0001	0.017	-0.653	27.685	0.000
Gelişmekte olan ülke MSCI-endeksleri					
Brezilya	0.0003	0.024	-1.091	15.875	0.000
G. Kore	0.0004	0.016	-0.009	8.097	0.000
Malezya	0.0002	0.010	-0.023	7.985	0.000
Rusya	0.0003	0.018	-0.795	12.360	0.000
G.Afrika	-0.0003	0.024	-0.986	13.492	0.000
Türkiye	0.0001	0.021	-1.265	14.079	0.000

Tablo 1 incelendiğinde, bütün getiri serilerinin durağan olduğu ADF birim kök testinden anlaşılmaktadır. Standart sapmaya bakımından değerlendirildiğinde, gelişmekte olan piyasa endekslerinin daha yüksek volatiliteye sahip oldukları görülmektedir.

Tablo 2: Gelişmiş ülke MSCI islami Borsa endeksleri

		Dilimler									
	EKK	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
ABD	1.122	1.127	1.135	1.109	1.107	1.113	1.123	1.122	1.138	1.159	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Fransa	0.849	0.958	0.990	0.931	0.903	0.880	0.875	0.851	0.822	0.810	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Almanya	0.904	1.039	1.036	0.994	0.957	0.928	0.922	0.932	0.905	0.831	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
İtalya	1.139	1.188	1.195	1.179	1.098	1.036	1.025	1.050	0.961	0.898	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Japonya	0.300	0.356	0.384	0.331	0.357	0.357	0.364	0.362	0.330	0.271	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
İngiltere	1.115	1.212	1.170	1.066	1.009	0.996	0.949	0.971	0.939	0.969	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Tablo 3: Gelişmekte olan ülke MSCI islami Borsa endeksleri

		Dilimler									
	EKK	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
Brezilya	1.443	1.512	1.463	1.424	1.383	1.315	1.312	1.195	1.211	1.259	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
G. Kore	0.519	0.613	0.696	0.673	0.537	0.486	0.449	0.497	0.506	0.547	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Malezya	0.156	0.263	0.196	0.171	0.172	0.134	0.152	0.157	0.184	0.125	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Rusya	0.796	0.895	0.840	0.828	0.838	0.867	0.817	0.753	0.720	0.800	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
G.Afrika	1.337	1.491	1.396	1.289	1.212	1.247	1.247	1.181	1.207	1.121	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Türkiye	0.396	0.436	0.455	0.463	0.513	0.474	0.503	0.472	0.372	0.285	
<i>P değeri</i>	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Tablo 2 ve 3'e bakıldığında, hem gelişmiş hem de gelişmekte olan ülkelerin beta katsayılarının değeri en küçük kareler (EKK) yöntemine göre kantil regresyon modelinde oldukça farklılık arz etmektedir. EKK yaklaşımına göre en az riskli borsalar sırasıyla; Japonya, Malezya ve Türkiye olurken en fazla sistematik riske sahip borsalar ABD, İngiltere, Brezilya ve G.Afrika olmaktadır. Kantil regresyon modelinde ise 0.5 kantilden aşağısı "piyasa kötümserliğini" yukarısı ise "piyasa iyimserliğini" vurgulamaktadır. Tablo 2 ve 3 söz konusu durum göze alınarak beraber değerlendirildiğinde, piyasa iyimser olduğunda dahi Fransa, Almanya, Japonya, G. Kore, Malezya, Rusya ve Türkiye'nin beta katsayılarının 1'den düşük olduğu göze çarpmaktadır. Bu ülkelerin borsa endeksleri yükseliş dönemine geçtiğinde şirket getirilerinin endeks getirisine olan duyarlılığı azalmaktadır. Bunun yanında, hem gelişmiş hem de gelişmekte olan ülkelerin tamamında beta katsayıları bütün kantiller boyunca değişmektedir.

SONUÇ

Beta katsayılarının doğru tahmini, hisse senedi risk-getiri ilişkisinin daha berraklaşmasına katkı sağlayacağı için, yatırımcıların portföylerini daha dengeli yönetmelerini kolaylaştıracaktır. Klasik ekonometrik yaklaşımlar ile tahmin edilen betalar sabit olduğu için, piyasadaki inişleri ve çıkışları dikkate almamaktadır. Bu çalışmada İslami borsa endekslerinin beta katsayıları kantil regresyon modeli ile tahmin edilmiştir. Sonuçlar beta katsayıları bütün kantiller boyunca değiştiğini, diğer bir anlatımla, endeksin durumuna göre beklenen getirilerin değiştiğini göstermiştir.

KAYNAKÇA

- Allen, D. E., Singh, A. K., & Powell, R. (2013). Analysing the return distributions of Australian stocks: the CAPM, factor models and quantile regressions. *Global Business and Economics Review*, 15(1), 88-109.
- Aygoren, H., & Uyar, U. (2016). The analysis of financial beta behaviour via panel quantile regression approach. *Journal of Economics Finance and Accounting*, 3(4), 255-265.
- Aziz, T., & Ansari, V. A. (2018). Are extreme negative returns priced in the Indian stock market?. *Borsa Istanbul Review*, 18(1), 76-90.
- Bahloul, S., & Amor, N. B. (2021). A quantile regression approach to evaluate the relative impact of global and local factors on the MENA stock markets. *International Journal of Emerging Markets*.
- Barnes, M., & Hughes, A. W. (2002). A quantile regression analysis of the cross section of stock market returns (No. 02-2). Federal Reserve Bank of Boston.
- Chang, M. C., Hung, J. C., & Nieh, C. C. (2011). Reexamination of capital asset pricing model (CAPM): An application of quantile regression. *African Journal of Business Management*, 5(33), 12684-12690.
- Gürler, Ö. K., Üçdoğruk Birecikli, Ş., & Köken Eryavuz, A. (2018). Türkiye'de Hanehalkı Tüketim Ve Gıda Harcamalarının Kantil Regresyon Yöntemiyle Araştırılması. *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, (18. EYİ Özel Sayısı), 219-238.
- Hakmaoui, A., & El Jebari, O. (2020). Is There a Herding Behavior in the Moroccan Financial Market? A Quantile Regression Approach. In 2020 IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD).



- Khalifa, M., Othman, H. B., & Hussainey, K. (2018). The effect of ex ante and ex post conservatism on the cost of equity capital: A quantile regression approach for MENA countries. *Research in International Business and Finance*, 44, 239-255.
- Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. *Econometrica: journal of the Econometric Society*, 33-50.
- Naifar, N. (2016). Do global risk factors and macroeconomic conditions affect global Islamic index dynamics? A quantile regression approach. *The Quarterly Review of Economics and Finance*, 61, 29-39.
- Rehman, S., Khilji, J. A., & Sharif, S. (2021). Risk vs Upside uncertainty: application of quantile regression in investment analysis. *Macroeconomics and Finance in Emerging Market Economies*, 1-21.

A SYSTEMATIC REVIEW ON DURABLE SECURITY SOLUTIONS FOR SECURITY-CRITICAL WEB-APPLICATIONS

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ABSTRACT

Cybersecurity is more critical than ever before in this new world we live in, where people are working remotely in increasing quantities than ever before, and using web apps to access information, resources, and collaborate instantly over the web. In today's society, a Web application might be impacted by a variety of challenges. Web application security is the practise of defending websites and digital operations from various security risks that take advantage of flaws in the design of the application. Mitigation and management controls can be established throughout the early phases of the SDLC to avoid any problems by finding the underlying cause of the vulnerability. During a Web application security assessment, understanding of how these threats work can also be used to target known places of interest. Professionals and developers must use durable security with qualities such as human trust, reliability, and dependability in order to reach the highest degree of security. Since security is among the sub elements of quality, improving security also means improving quality. Unfortunately, very few studies focus on this issue in a systematic, full, and unbiased way, in other words, none of them undertake a systematic review of durable security engineering, and thus there is an appropriate background in which to work. In this study, we conduct a systematic analysis of the existing research on durable security research in order to summarise the findings and give a conceptual model against which new research initiatives can be suitably positioned.

Keywords: Systematic Reviw, Durable Security, Literature Survey, Cybersecurity, Digital India

INTRODUCTION

With the Technological Evolution passing the globe, all business owners, big and medium, corporate bodies, organisations, and even government agencies are depending on computerised monitoring and managing their day-to-day operations, making cybersecurity a top priority to protect information from numerous cyberattacks or unauthorised access. As media coverage of data breaches, ransomware, as well as security breaches become the common practice, continuous technological faced a concurrent transition in cybersecurity developments [1-7].

In this modern paradigm, in which individuals are collaborating remotely in greater numbers than ever before, as well as utilising web apps to obtain personal data, infrastructure, and team

up quickly over the internet, information security is more important than ever. A Web application in today's modern culture may face a wide range of problems. Web application security is essential of protecting websites as well as electronic processes from numerous security risks that exploit weaknesses in the software's configuration. Management and mitigation regulations can be formed throughout the SDLC's initial stages to prevent issues by identifying the root cause of the security vulnerabilities [8-11].

Cybersecurity is essential because it safeguards all types of data against physical loss or damage. Sensitive information, protected health information (PHI), personally identifiable information (PII), private details, proprietary information, data, as well as government and private sector information systems are all included. Without a cybersecurity programme, ones organisation will be unable to protect itself against security breach initiatives, making it an easy target for computer hackers. The use of cloud services, such as Amazon Web Services, to record sensitive confidential documents is growing both innate and residual risk. Because of pervasive inadequate cloud service configuration and incredibly advanced cyber criminals, the danger that ones organisation will endure from a successful cybersecurity incident is on the emergence.

Cybercriminals are getting increasingly more advanced, evolving their targets, how they impact organisations, and the techniques they use to attack various security processes. Social engineering is still the most common type of cyber invasion, with ransomware, spoofing, and spyware being the most common entry points. Third-party as well as fourth-party distributors who handle ones data and have underprivileged cybersecurity practises are another prevalent attack vector, emphasising the importance of supplier risk management as well as third-party risk assessment.

COVID-19 has harmed most industries and the long-term repercussions are predicted to impact the industrial growth during the prediction period, an unparalleled worldwide public health crisis. Continuous research is underway to investigate and find workable solutions for the basic COVID-19 issues [11-13]. In this row, the research and markets report delivers insight into COVID-19, taking into account the changes in the behaviour and demand of the consumers, the purchase patterns, the supply chain reorientation, dynamics of the present markets, and major government involvement. Because of the impact of COVID-19 on the market, this updated report includes insights, analysis, estimates, and forecasting.

In the context of the COVID-19 crisis, the Perimeter Intrusion Detection Systems worldwide market is predicted to reach US\$11 trillion by 2020 and is anticipated at US\$24.2 trillion in revisions by 2027 to the compound annual growth rate (CAGR) 11.9% in 2020 to 2027. Solutions, one of the categories examined in the study, are expected to increase at an 11.7 percent CAGR to hit US\$ 19.8 probably by the completion of the review period. In the following seven years, growth in the services category is modified to a new 13.1 percent of CAGR following an early examination of the business effects of the pandemic and its causes for the financial downturn. Presently this sector represents 16.9 percent of the worldwide IDS perimeter market [14].

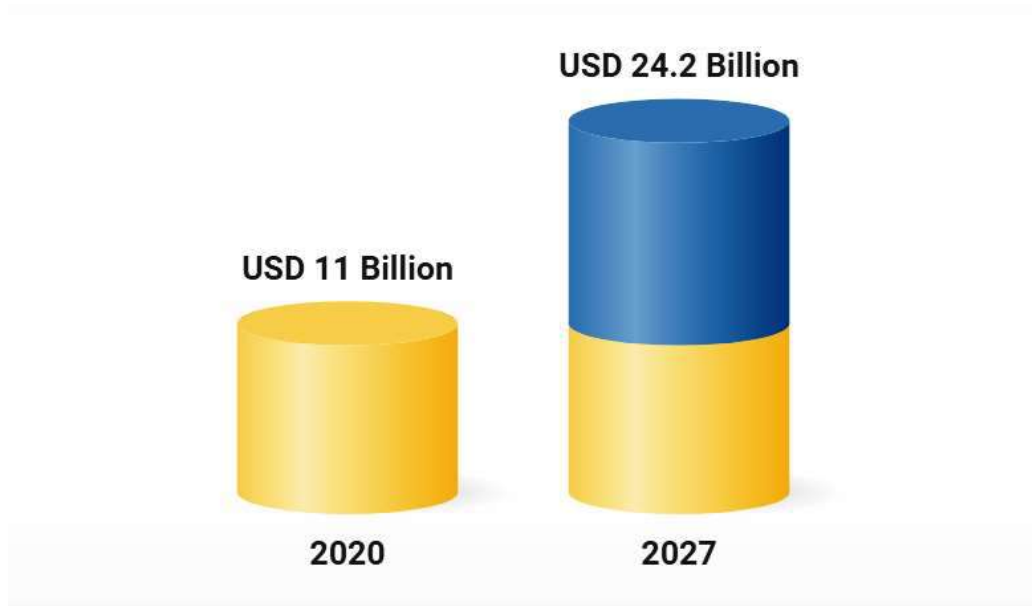


Figure 1. Global Perimeter Intrusion Detection Systems Market to Reach US\$ 24.2 Billion by the Year 2027

Enterprises are under enhanced pressure to keep precious information secure from continual hackers, with threats spanning from malware to IoT infringements to social manipulation plots as well as enhanced IDS demand in the global market. That is, individuals are searching for the most strict and long-lasting security options available, as well as optimum demonstrated threat detection capabilities.

DURABLE SECURITY

Changes have been prompted by the emergence of the marketing software industry. Numerous software vendors are transitioning from standalone processes to system software platforms with multiple integrated functionality. In this situation, the need for long-lasting and secure web application emerges. The term "durability" is specifically defined: In the perspective of a device or system, durability refers to the system's longer lifespan, whereas in the context of application, durability refers to the software's efficiency and effectiveness. Durability refers to the timeliness of an application security. The absence of timeliness in application perform tasks [17] prompted to the 'software emergency,' which in switch prompted to the requirement for and conception of software development itself. Durability is an important aspect of software security. Application security is a performance criterion. Quality can be improved by enhancing software security. It is well known that any application has a time frame. Numerous software securities are time-limited in accordance with the company's user agreement. We all understand that every virus protection application, operating system, and so on has a time frame. For instance, antivirus software can be installed from an online platform but becomes obsolete after a while. It is unable to identify advanced innovations and malicious programs and attacks mostly because malware and malicious behavior become active over time due to the lack of upgraded antivirus program. Thus it is stated that this time dependencies of application security are a security component. It is determined by software qualities how much application is secure; specifically, the durability determines how long application will be protected. One of most significant element for durability is configurable identity and access governance software security that endorses granular user access. Such application security enables companies to meet unforeseen future needs regarding who require access, what application security mechanisms must be available, and what authorizations different users require [18-20].

In software development, software durability refers to a software's capacity to be serviceable and satisfy the requirements of users for an extended period of time. The long-term viability of software is critical to customer satisfaction. For application security to be long-lasting, it must enable an organisation to adapt the software to changing business needs, often in rash ways. The durability of software is primarily determined by four attributes: software trustworthiness, software dependability, human trust for serviceability as well as software usability.

The durability of web application software is principally measured by the ability to confront unforeseeable future requirements, which is determined primarily by how an application is designed, or by the underpinning architect it employs. How long will application function efficiently to meet customer requirements? The longer a piece of software lasts, the higher its protection value. To improve software security, it shows that it is important to reduce the time it takes to execute commands on the output element from the input element. Survivability assessments are carried out by security experts as part of the security factors procedure. The emphasis on security has shifted to the software's survivability. The availability, survivability, and durability of application security are mutually reinforcing. We are interested in the durability impacts because we want to know how long application works. Numerous applications have time restrictions, such as anti-virus application for a year or a few months, and if users don't upgrade it, the application won't function properly since it has a time frame.

RELATED WORKS

Kumar et al. [21] proposed that trying to ensure security sustainable development slightly earlier in the web design and development procedure may lower costs and rework associated with the advancement of secure & durable software applications. They emphasized the importance of focusing on extending the life of a secure web - based application. Their research aimed to estimate the security and durability of web applications. They used a hybrid method of Hesitant Fuzzy (HF) sets, Analytic Hierarchy Process (AHP), as well as Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) methods to estimate security-durability.

Kumar et al. [22] identified usability-security as a challenge with multiple factors associated. They also described the significance of assessing this problem in order to satisfy the end consumer. They presented the Fuzzy AHP-TOPSIS technique for assessing the usable-security of web - based applications and identifying the most prioritised attribute making a contribution to the usable-security of web - based applications. Furthermore, they tested the outcomes on organisational web applications to validate the efficacy of their proposed strategy. According to Agrawal et al. [23], in order to accomplish the preferred goal of effective and feasible durability of security solutions, there must be a segmental concentrate on durability in addition to security. Regrettably, the highly secure layout of application is rendered useless since the durability of security solutions is inadequate. They estimated the security durability of two locally developed software versions, version 1 and version 2. The combination of fuzzy analytic hierarchy process decision analysis method was used by the authors to evaluate the security durability.

Attaallah et al. [24] discussed a method for software that can fight threats without relying on outer security programmes. As a result, it is critical to assess the impact of potential threats during software development. The investigators used the combination of Fuzzy AHP-Methodology in their work to analyze the risk for enhancing the security durability of various Institutional Web - based applications. Furthermore, they measured e-component of security risk in terms of software durability, and vice versa.

Khan et al. [25] suggested a new an efficient system for assessing software durability. Based on scientific evidence data from research, the authors proposed a fuzzy-based Analytic Network Process (ANP) as well TOPSIS was a precise technique for evaluating software durability. The authors used six different software programmes from a university to determine the effectiveness of their assessment.

Kelty and Erickson [26] presented that facilities and software be comprehended in terms of the various aspects of durability and transitivity they take. Authors draw ideas from evolution process, and yet with a skeptical eye forward into value(s) treatment as well as the requirement for maintenance and upkeep. They also examined instances from various cases, including infrastructure software, military software, software platforms, and file systems.

Alharbi et al. [27] conducted a case study that designated the primary security and durability aspects that impact each other direct and indirect, such as confidentiality, availability, integrity, human trust, and trustworthiness. The weighted significance of all characteristics is critical for their impact on the aggregate security during the web app development procedure. They used the Hesitant Fuzzy Analytic Hierarchy Process to assess the effectiveness of their task.

Sahu et al. [28] undertaken to demonstrate and numerically evaluate durability attributes. Their work discovered that the hesitant fuzzy-based technique of the AHP and TOPSIS is an efficient method for assessing the durability of web - based applications by describing the different attributes and their relevance towards durability. The authors evaluated the findings of 6 different University projects to determine the significance of the findings and their responsiveness.

DISCUSSION

A sequence of incidents and destruction wrought by unprotected software demonstrates that the timeframe of software security can become a serious concern of life and demise at any moment. As a serious concern, software application sectors are now concentrating on longer software security solutions. Among the most frequently discussed topics in organisations is software security measurement as well as advancement. Identify and resolve numerous security characteristics during application development may also reduce servicing time and expenses. Security durability is one of the assisting characteristics of security. Even though durability reinforces the fact that extended security does not require servicing for a specific period of time. This reduces the time and cost spent on maintenance. The security durability evaluation may have a significant impact on the system's security.

The research of security durability factors and their impact on security would then make it easier to expose the security weaknesses and strengths. Because there is allegedly no great understanding of the concept of security durability, the accurate assessment of security durability continues to remain a critical issue. Selecting an ideal method to quantify security durability as well as the majority of the angles associated with it is extremely difficult. As a result, security designers, programming software developers, as well as their clients must continue to examine security durability evaluation. Durability employs a methodology that signifies rigorous, thriving security to endorse, enable, and enhance security for all corporate strategy, including clouds and movement.

CONCLUSION

The field of durable software security has primarily gone unnoticed. This could be due to a variety of factors. There was a time when software security was simple, requiring only a few passwords or the installation of some software. With the passage of time, complicated antivirus application has supplanted simple-to-install software. The numerous linkages that make up a

computer strategy make it susceptible to viruses, making it unsafe for having to handle sensitive personal data. Though much work has been done in the area of application security to reach optimal security in the least amount of time and money, security also needs maintenance. Software maintenance costs and time are rising on a daily basis. Estimating security durability would then assist in minimising time and cost on repair for a specific timeframe, thereby reducing maintenance time as well as expense and improving the security life span of application.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the support from Council of Science & Technology, Uttar Pradesh (UPCST); Project Ref. No. CST/D-2300.

REFERENCES

1. Singh, A. N., Picot, A., Kranz, J., Gupta, M. P., & Ojha, A. (2013). Information security management (ism) practices: Lessons from select cases from India and Germany. *Global Journal of Flexible Systems Management*, 14(4), 225-239.
2. Van Greuning, H., & Bratanovic, S. B. (2020). *Analyzing banking risk: a framework for assessing corporate governance and risk management*. World Bank Publications.
3. Davenport, T., & Harris, J. (2017). *Competing on analytics: Updated, with a new introduction: The new science of winning*. Harvard Business Press.
4. Ansari, M. T. J., Pandey, D., & Alenezi, M. (2018). STORE: security threat oriented requirements engineering methodology. *Journal of King Saud University-Computer and Information Sciences*.
5. Zarour, M., Ansari, M. T. J., Alenezi, M., Sarkar, A. K., Faizan, M., Agrawal, A., ... & Khan, R. A. (2020). Evaluating the impact of blockchain models for secure and trustworthy electronic healthcare records. *IEEE Access*, 8, 157959-157973.
6. Ansari, M. T. J., Al-Zahrani, F. A., Pandey, D., & Agrawal, A. (2020). A fuzzy TOPSIS based analysis toward selection of effective security requirements engineering approach for trustworthy healthcare software development. *BMC Medical Informatics and Decision Making*, 20(1), 1-13.
7. Kumar, R., Alenezi, M., Ansari, M. T. J., Gupta, B. K., Agrawal, A., & Khan, R. A. (2020). Evaluating the impact of malware analysis techniques for securing Web applications through a decision-making framework under fuzzy environment. *International Journal of Intelligent Engineering and Systems*, 13(6), 94-109.
8. Ansari, M. T. J., & Pandey, D. (2018). Risks, security, and privacy for HIV/AIDS data: big data perspective. In *Big Data Analytics in HIV/AIDS Research* (pp. 117-139). IGI Global.
9. Alosaimi, W., Ansari, M. T. J., Alharbi, A., Alyami, H., Seh, A. H., Pandey, A. K., ... & Khan, R. A. (2021). Evaluating the Impact of Different Symmetrical Models of Ambient Assisted Living Systems. *Symmetry*, 13(3), 450.
10. Ansari, M. T. J., Baz, A., Alhakami, H., Alhakami, W., Kumar, R., & Khan, R. A. (2021). P-STORE: Extension of STORE methodology to elicit privacy requirements. *Arabian Journal for Science and Engineering*, 1-24.



11. Zarour, M., Alenezi, M., Ansari, M. T. J., Pandey, A. K., Ahmad, M., Agrawal, A., ... & Khan, R. A. (2021). Ensuring data integrity of healthcare information in the era of digital health. *Healthcare Technology Letters*, 8(3), 66.
12. Khatri, S., Alzahrani, F. A., Ansari, M. T. J., Agrawal, A., Kumar, R., & Khan, R. A. (2021). A Systematic Analysis on Blockchain Integration with Healthcare Domain: Scope and Challenges. *IEEE Access*.
13. Ansari, M. T. J., & Khan, N. A. (2021). Worldwide COVID-19 Vaccines Sentiment Analysis Through Twitter Content. *Electron J Gen Med*. 2021; 18 (6): em329.
14. R.ltd and M. (n.d.). Perimeter Intrusion Detection Systems - Global Market Trajectory & Analytics. Research and Markets - Market Research Reports - Welcome. <https://www.researchandmarkets.com/reports/4805855/perimeter-intrusion-detection-systems-global>.
15. McGraw, G. (2004). Software security. *IEEE Security & Privacy*, 2(2), 80-83.
16. Allen, J. H., Barnum, S., Ellison, R. J., McGraw, G., & Mead, N. R. (2008). *Software security engineering*. Pearson India.
17. Dowd, M., McDonald, J., & Schuh, J. (2006). *The art of software security assessment: Identifying and preventing software vulnerabilities*. Pearson Education.
18. Shin, Y., & Williams, L. (2008, October). Is complexity really the enemy of software security?. In *Proceedings of the 4th ACM workshop on Quality of protection* (pp. 47-50).
19. Dalton, M., Kannan, H., & Kozyrakis, C. (2007). Raksha: a flexible information flow architecture for software security. *ACM SIGARCH Computer Architecture News*, 35(2), 482-493.
20. August, T., & Tunca, T. I. (2006). Network software security and user incentives. *Management Science*, 52(11), 1703-1720.
21. Kumar, R., Khan, A. I., Abushark, Y. B., Alam, M. M., Agrawal, A., & Khan, R. A. (2020). A knowledge-based integrated system of hesitant fuzzy set, ahp and topsis for evaluating security-durability of web applications. *IEEE Access*, 8, 48870-48885.
22. Kumar, R., Khan, A. I., Abushark, Y. B., Alam, M. M., Agrawal, A., & Khan, R. A. (2020). An integrated approach of fuzzy logic, AHP and TOPSIS for estimating usable-security of web applications. *IEEE Access*, 8, 50944-50957.
23. Agrawal, A., Zarour, M., Alenezi, M., Kumar, R., & Khan, R. A. (2019). Security durability assessment through fuzzy analytic hierarchy process. *PeerJ Computer Science*, 5, e215.
24. Attaallah, A., Algarni, A., & Khan, R. A. (2021). Managing Security-Risks for Improving Security-Durability of Institutional Web-Applications: Design Perspective. *CMC-COMPUTERS MATERIALS & CONTINUA*, 66(2), 1849-1865.
25. Khan, S. A., Alenezi, M., Agrawal, A., Kumar, R., & Khan, R. A. (2020). Evaluating performance of software durability through an integrated fuzzy-based symmetrical method of ANP and TOPSIS. *Symmetry*, 12(4), 493.
26. Kelty, C., & Erickson, S. (2015). The durability of software. *There is no software, there are just services*, 39-55.



27. Alharbi, A., Ahmad, M., Alosaimi, W., Alyami, H., Agrawal, A., Kumar, R., ... & Khan, R. A. (2022). Evaluating the Impacts of Security-Durability Characteristic: Data Science Perspective. *COMPUTER SYSTEMS SCIENCE AND ENGINEERING*, 41(2), 557-567.
28. Sahu, K., Alzahrani, F. A., Srivastava, R. K., & Kumar, R. (2020). Hesitant fuzzy sets based symmetrical model of decision-making for estimating the durability of Web application. *Symmetry*, 12(11), 1770.

İSLAMİ İLİMLER FAKÜLTESİ ÖĞRENCİLERİNİN DİNİ MUSİKİ DERSİNE İLİŞKİN GÖRÜŞLERİ

THE OPINIONS OF THE STUDENTS OF THE FACULTY OF ISLAMIC SCIENCES ON THE RELIGIOUS MUSIC COURSE

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ÖZET

Bu makale, Tokat Gaziosmanpaşa Üniversitesi, İslami İlimler Fakültesi, Türk Din Mûsikîsi dersi alan öğrencilerin dini musiki dersine ilişkin görüşlerini ve hazırlanan görüşme neticesinde elde edilen sonuçlardan benzerlik ve farklılıkları tespit etmek gâyesiyle hazırlanmıştır. Öğrencilerin dini musiki dersine karşı tutumlarında dersin akademik personeli, derslerde kullanılan kaynak bilimsel eserler, enstrümanlar ile teknik araç gereçler, sınıfın fiziksel özellikleri ve öğrencilerin dersle alakalı hazırlık düzeyleri elbette önemlidir. Tüm bu etkenler göz önüne alındığında öğrencilerin dini musiki dersine ilişkin görüşleri bakımından incelenmesi ve sonuçların değerlendirilerek yorumlanması hedeflenmiştir. Yapılan çalışmada gönüllü olarak toplamda 88 öğrenci yer almıştır. Her bir öğrenciye dini musikin ne olduğu, dini musiki dersi statüsünün (seçmeli-zorunlu) kendilerince nasıl yorumlandığı, dini musiki dersine ihtiyaç duyup duymadıkları, dini musiki ders akademik personelinin cinsiyetinin kendileri için ne ifade ettiğini, dini musiki ders sonrası duygu durumlarında bir değişiklik olup olmadığına yönelik açık uçlu sorular sorulmuştur. Verilen yanıtlar neticesinde erkek ve kız öğrencilerin yanıtlarına çalışmada ayrı ayrı yer verilmiştir. Ayrıca tüm veriler grafiklerle de desteklenerek açıklanmıştır.

Anahtar Kelimeler: İlahiyat Fakültesi, Türk Din Mûsikîsi, Türk Din Mûsikîsi Dersi

ABSTRACT

This article was prepared to determine the opinions of the students of the Faculty of Islamic Sciences at Tokat Gaziosmanpaşa University on the religious music course and to find out the similarities and differences with the results obtained in the interviews that were prepared. The academic staff pertaining to the course, the scientific source materials used in the classes, instruments and technical equipment, the physical features of the classrooms and the level of preparation of the students for the classes are of course important with regards to the attitudes of the students towards religious music. By taking into account all of these factors, the objective was to analyse the opinions of the students on religious music course and to interpret them by evaluating the results. This study included a total of 88 student volunteers. Each student was asked open-ended questions on what religious music is, how they interpreted the status of the religious music course (elective vs compulsory), whether they felt a need for the religious music course, what the sex of the academic staff member teaching the religious course signified for them and whether there was any change in their feelings after the religious music course. The responses of the male and female students were given in the study separately. In addition, all data were explained by supporting them with graphics.

Keywords: Faculty of Theology, Turkish Religious Music, Turkish Religious Music course.

GİRİŞ

Dini musiki dersi uzun yıllardır gerek İlahiyat fakülteleri gerek İslami İlimler fakültelerinde müfredat kaynaklı zorunlu veya seçmeli ders olarak okutulmaktadır. Ayrıca dini musiki dersi başta Türk Müziği bölümleri olmak üzere konservatuvar ve müzik bölümleri ders müfredatlarında zorunlu veya seçmeli ders olarak da yer almaktadır. Özellikle İslami İlimler Fakültesi veya ilahiyat fakültesi göz önünde bulundurulduğunda dersin musiki içerikli olmasının öğrencileri ders seçim konusunda bazen ikiye böldüğü görülmektedir. Bu sebeplerin başında musikin hâlâ bazı çevrelerce haram-helal tartışmalarının yapılması, öğrencilerin müzikal manada kabiliyetli olup olmamaları veya ders akademik personelinin cinsiyeti ders seçimlerini etkilediği kabul edilebilir. 2021-2022 Eğitim-Öğretim yılı itibarıyla Tokat Gaziosmanpaşa Üniversitesi, İslami İlimler Fakültesi öğrencilerinin dini musiki derslerine ilişkin görüşlerinin daha önce tespit edilmediği görülmüştür. Bu nedenle hazırlanan görüşme ile bu açığın kapatılması hedeflenmiştir.

Yöntem

Araştırmaya konu olan çalışmanın temelini nitel araştırma oluşturacaktır. Bununla birlikte görüşme, gözlem ve anket yöntemi kullanılarak ilgili bölümler oluşturulacaktır. Çalışmaya konu olan tüm bilgi, bulgu ve veriler anket ,kişisel görüşme formu ve gözlem yöntemleriyle bir araya getirilmiştir.

Çalışmanın kapsamı içerisinde amaca ulaşmak için genel olarak şu sorulara cevap aranmıştır:

1. Sizce Dini Musiki Nedir? Dini Musiki Denilince Aklınıza İlk Ne Geliyor?
2. Dini Musiki Dersinin Statüsü (Seçmeli/Zorunlu) Olması Konusunda Ne Düşünüyorsunuz?
3. Dini Musiki Dersine İhtiyaç Duyduğunuzu Düşünüyor Musunuz? Sizi Bu Fikre İten Sebepleriniz Nelerdir?
4. Dini Musiki Dersinden Sonra Duygu Durumunuzda Bir Değişiklik Oluyor Mu? Hangi Duyguları Hissediyorsunuz?
5. Dini Musiki Dersinin Akademik Personelinin Cinsiyeti Sizin İçin Ne İfade Ediyor?
6. Ders Hakkında Eklemek İsteddiğiniz Bir Husus Var Mı?

Çalışmanın kapsamı tarihsel olarak 2021-2022 Eğitim-Öğretim süreci içerisinde Tokat Gaziosmanpaşa Üniversitesi, İslami İlimler Fakültesi zorunlu dini musiki dersi alan öğrenciler ile sınırlıdır. Çalışmaya konu olan açık uçlu görüşme formunda, öğrencilerin duygularını samimi ve doğru bir şekilde ifade ettikleri varsayılmaktadır. Çalışmanın örnekleme ise Tokat Gaziosmanpaşa Üniversitesi, İslami İlimler Fakültesi dini musiki dersi alan öğrencilerdir.

Verilerin Değerlendirilmesi ve İstatistiksel Analizler

Çalışmada öğrenciler ile yapılan açık uçlu görüşmelerde elde edilen veriler analiz amacıyla bilgisayara girilmiştir. Verilerin analizi için Microsoft Excel programı kullanılmıştır. Yapılan anketlerden elde edilen verilerin değerlendirilmesinde tanımlayıcı istatistikler, şekil ve tablolar kullanılmıştır.

Bulgular ve Yorumlar

Çalışmada uygulanan açık uçlu görüşme formunun ardından elde edilen veriler ve bulgular aşağıda şekil ve tablolarla desteklenerek açıklanmıştır.

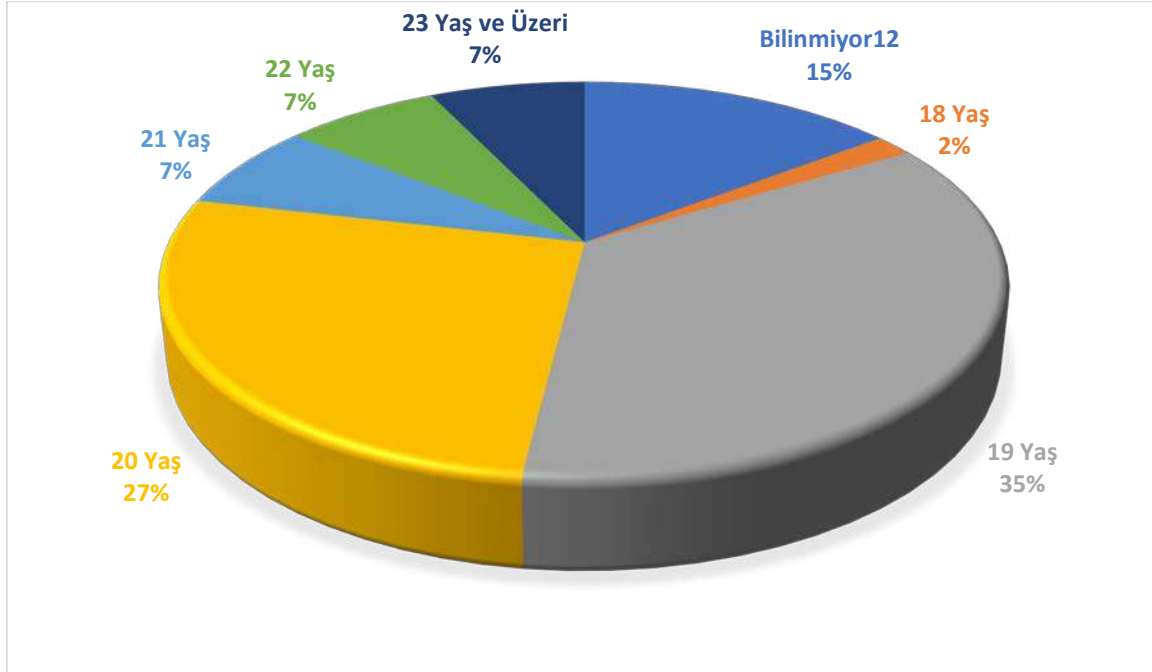
Yapılan Çalışmaya Katılan Öğrencilerin Demografik Özellikleri

Hazırlanan görüşme formuna toplamda 88 öğrenci katılmıştır. Bu öğrencilerin 26 sı erkek, 62 si kız öğrencilerden oluşmaktadır. Öğrencilerin cinsiyet dağılımı aşağıda grafiksel olarak belirtilmiştir.

ÇALIŞMAYA KATILAN ÖĞRENCİLERİN YAŞ VE CİNSİYET DAĞILIMI

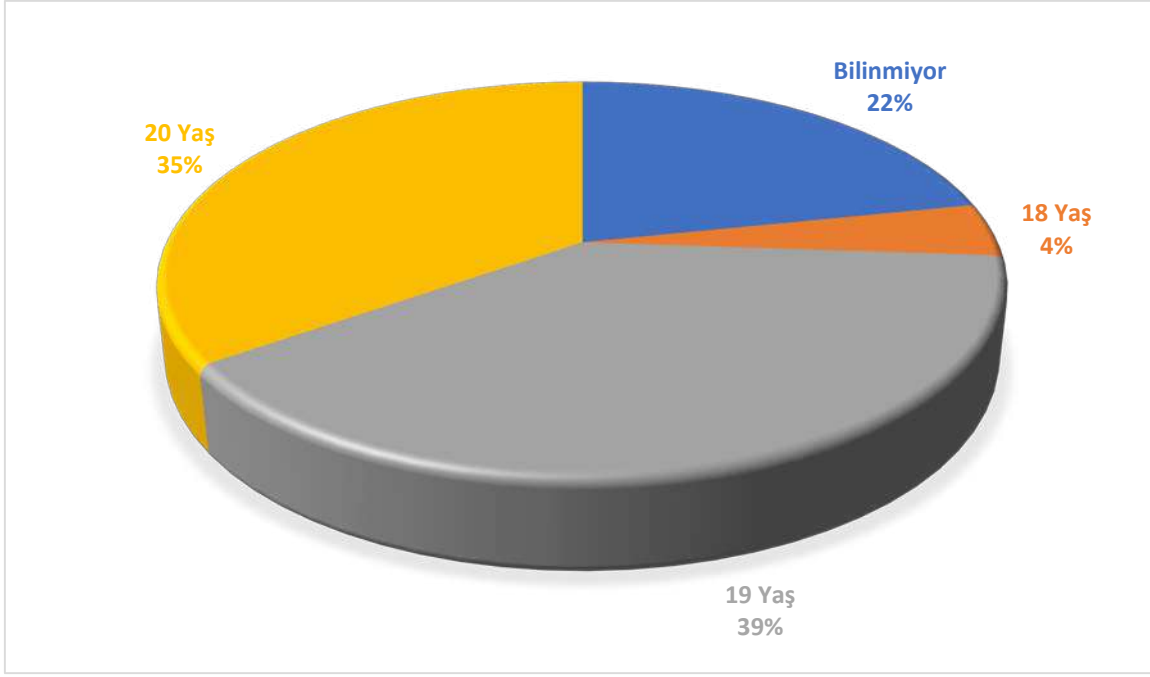
Çalışmaya Katılan Kız Öğrencilerin Yaş Dağılımı

Grafik -1: Kız Öğrencilerin Yaş Dağılımı



Çalışmaya Katılan Erkek Öğrencilerin Yaş ve Cinsiyet Dağılımı

Grafik -2: Erkek Öğrencilerin Yaş Dağılımı



“SİZCE DİNİ MUSİKİ NEDİR? DİNİ MUSİKİ DENİLİNCE AKLINIZA İLK NE GELİYOR?” sorusuna verilen cevaplar aşağıdaki gibidir.

Erkek öğrenciler ilgili soruya cevaben; dini hatırlatan, dini programlarda okunan tüm ilahilerin dini musiki olduğunu, kullanılan enstrümanların da dini musiki için bir araç olduğunu (ney, def gibi), cami formlarından ezan-ı şerif, sâlâ gibi formların da dini musiki olduğunu ifade etmişlerdir. Öğrencilerden bazıları ise Allah'ın varlığını ve birliğini, peygamberlerin emir ve buyruklarının yani kısacası din ile ilgili olayların tümüne dini musiki dediği görülmüştür. Özellikle Kuran-ı Kerim tilavetinin makamlı bir şekilde gerçekleşmesinin başlı başına bir dini musiki olduğu ifade edilmiştir. Dini musikinin camilerde veya tekkelerde yapılan mevlid gibi kutlamalarda okunan eserler olduğuna dikkat çekilmiştir. Sesle ilgili her şeyin din ile ilişkisi olduğu söylenmiştir. Dini musikinin insan ruhuna gıda ve bir yaşam tarzı olduğu belirtilmiştir. İnsanların var oluşundan itibaren okunan ses musikisi olduğu ve camide okunan eserlerin tümüne dini musiki denildiği düşünülmektedir. Hem cami hem tekkelerde okunan eserlerin hepsine denir. Kuran-ı kerim, ezan ve salanın makamlı okunmasıdır. Cenazelerde def eşliğinde okunan ilahilerdir.

Kız öğrenciler ilgili soruya cevaben; ruha iyi gelen ruhu dinlendirmek için söylenen güzel ve anlamlı söz dizilimi olduğu, yavaş ve akıcı bir şekilde söylenen ve ruhu dinlendiren müzik olduğu, ilahi bir aşk olduğu ve Allah aşkı için ritim eşliğinde söylenen ses ve kulağa güzel gelen her türlü ses musikisi olduğu ifade edilmiştir. İslam'a uygun olacak bir çerçevede yapılan tasavvufi ilahiler; sâlâlar, ezan, Kur'an-ı Kerim vb. formların olduğu, dini törenlerde okunan eserlerin dini musiki olduğu belirtilmiştir. Yine dini musiki denilince akıllara; cami, ezan, kamet, ilahi gibi kavramların geldiği, belli bir ölçü ve ritim ahenk ile söylenen eserlerin söylenildiği, ruhlara iyi gelen manevi yönü tatmin eden seslerin olduğu belirtilmiştir. İnsanlık tarihinin en eski döneminde İslami hayatın sonucu olarak ortaya çıkan ve dini hayatın zamanla camilerde, tekkelerde yapılan ibadetler ve zikir esnasında çeşitli vesilelerle insanların duygu ve hareketlerinin dışı yansıması olarak ifade edilmiştir.

Dini musikinin camilerde, sohbetlerde, mevlitlerde okunan bir musiki olduğu, içerisinde dinle alakalı söz geçen bir türü olduğu ve musikinin temelini oluşturan ses ve ölçüye dini özelliklere sahip birtakım hareketlerin eklenmesinin ve ruhu dinlendiren anlamlı heceler uyumunun dini musiki olduğu belirtilmiştir. Kur'an-ı Kerim okumanın başlı başına bir musiki olduğu, ney, def

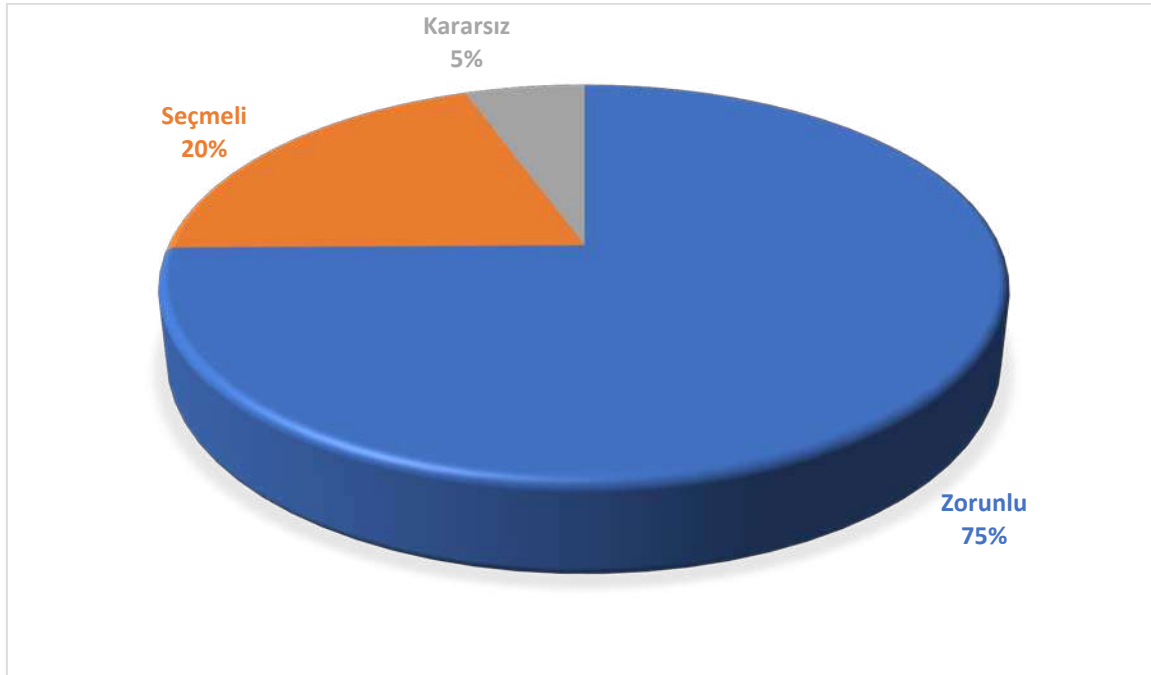
vb. sazlarla eşlik edilen ilahilerin, mevlidi şeriflerin dini musikinin örneklerinden olduğu belirtilmiştir.

Dini musikinin her ne kadar ilahi ve ezgi gibi türlere denilse de aslında Allah'ı andıran her sesin “dini musiki” olabileceği, insanın tabiatına iyi geldiği ifade edilmiştir. Dini musikinin aslında insanları eğlendirmek için olmadığını bir araç olduğunu belirtmişlerdir. Dini musikinin İslam dininde çok büyük bir yeri olduğunu, ders akademik personelinin derste bahsettiği Rabbanî bir duyuş olduğu söylenilmiştir. Kulağa hoş gelen ve ruhu dinlendiren, manevi duyguları yükselten ahenkli ses tını olarak açıklanmıştır. Seslerin ritimlerle insanın kalbine, ruhuna, bedenine ve nefesine tesir edip onları iyileştiren ve hakikati anlamasını, hissetmesini sağlayan araç olduğu ifade edilmiştir. Önemli günlerde (mesela düğün) okunan eserlerin dini musiki olduğu, okunan Kur'an-ı Kerim, günlük beş vaktin habercisi olan ezan, ilahilerin akıllara geldiği belirtilmiştir. İnsanı bu dünyevi çabalarından bir dakikalığına da olsa kurtaran bir araç olduğu ve Yunus Emre'nin eserlerini hatırlattığı söylenmiştir. İnsanları, Rabb'ine yakınlaştıran bir duyuş olarak ifade edilmiştir dini musiki.

DİNİ MUSİKİ DERSİNİN STATÜSÜ (SEÇMELİ/ZORUNLU) OLMASI KONUSUNDA NE DÜŞÜNÜYORSUNUZ? Sorusuna verilen cevaplar aşağıdaki gibidir.

Toplamda 26 erkek öğrenciden 19 kişi dini musiki derslerinin zorunlu olması gerektiğini düşünürken 5 kişi seçmeli olması gerektiğini belirtmiştir. 2 kişi de dini musiki dersinin zorunlu veya seçmeli olması konusunda kararsız olduğunu ifade etmiştir.

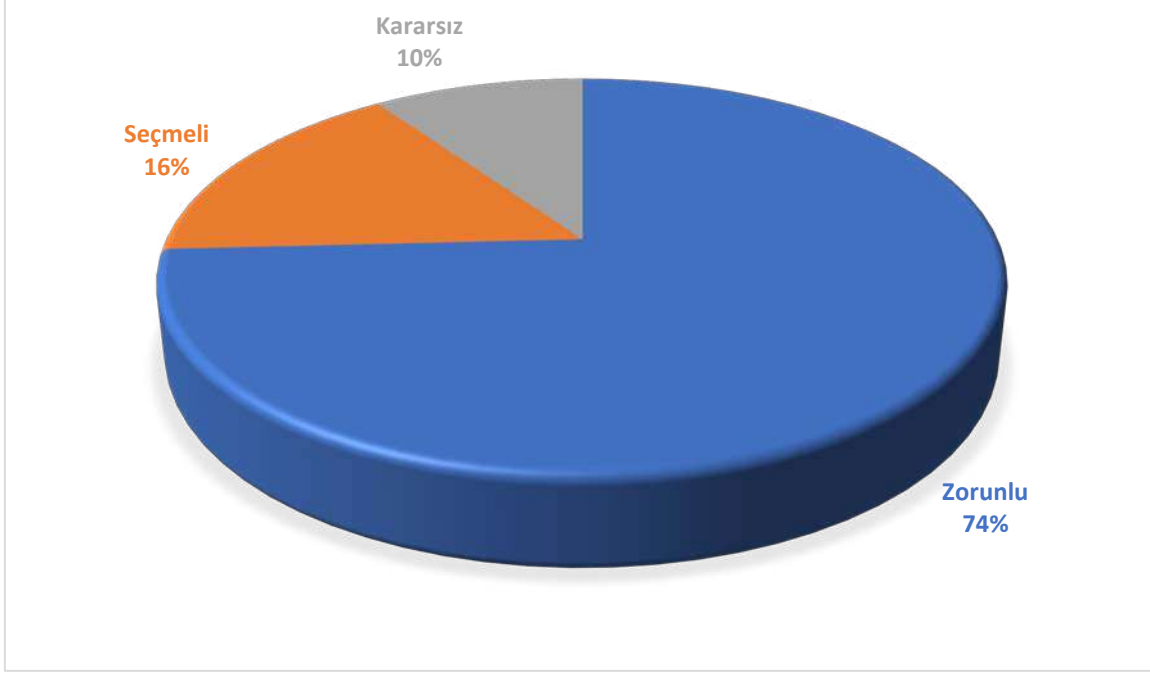
Grafik -3: Dini Musiki Dersinin Statüsününün (Seçmeli/Zorunlu) Hakkında Erkek Öğrencilerin Düşünceleri



Bu dersin zorunlu alınması gerektiğini düşünen öğrenciler, ancak bu şekilde dini musiki dersinin önemini kavranacağı, ilerde mezun olduktan sonra bu alana ilgi duyan öğrencilerin kesinlikle musiki hakkında bilgi sahibi olmaları gerektiğine inandıkları gerekçesiyle zorunlu olmasını ifade etmişlerdir. Kur'an-ı Kerim'in, ezan-ı şerifin, sâlâların, ilahilerin doğru ve güzel okunması için musiki dersinin gerekliliğini savunmuşlardır.

Bu dersi seçmeli talep edenler ise bu alanda yetenekli olmadıklarını, alana ilgi duyanların musiki dersini seçmeleri gerektiğini ifade etmişlerdir. Toplamda 62 kız öğrencinin 46 tanesi dini musiki dersinin zorunlu alınması gerektiğini düşünürken 10 tanesi bu dersin seçmeli olması gerektiğini düşünmektedir. Geri kalan 6 öğrenci ise bu konuda kararsız kaldıklarını ifade etmişlerdir.

Grafik -4: Dini Musiki Dersinin Statüsünün (Seçmeli/Zorunlu) Hakkında Kız Öğrencilerin Düşünceleri



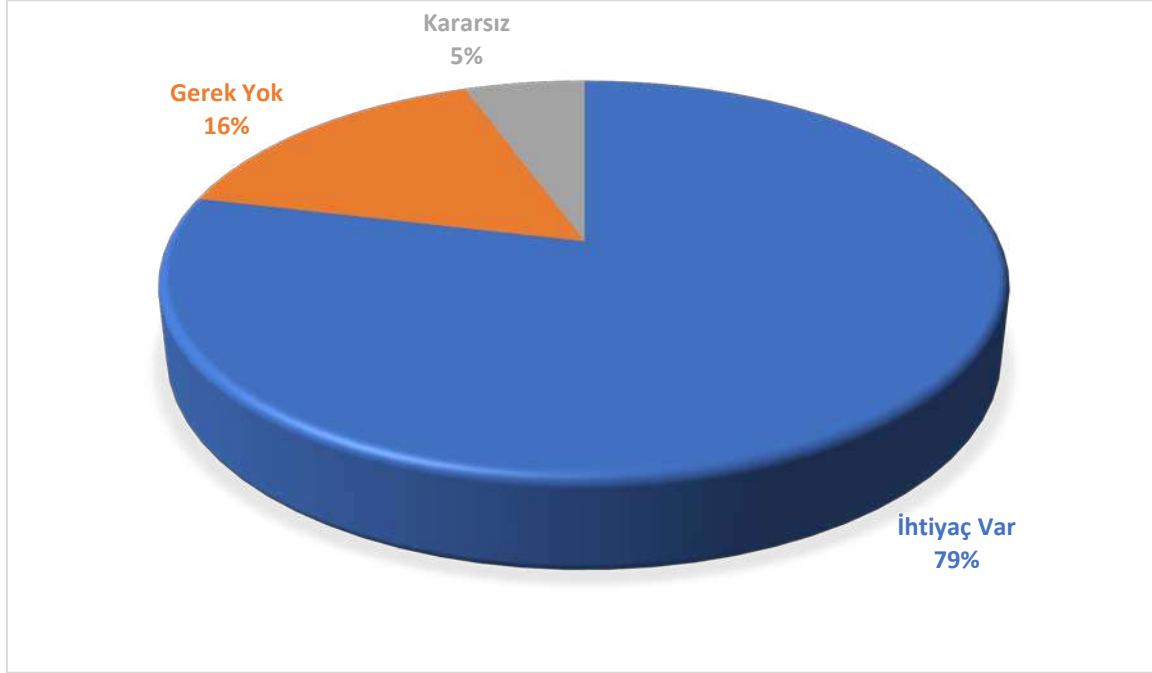
Dini musiki dersinin zorunlu alınmasını belirten öğrencilerin yaptığı açıklamalarda; insanın fiziksel açlığının yanı sıra ruhsal açlığını da doyurması gerektiği ve bu nedenle de dini musiki dersinin zorunlu olması gerektiği, ruhsal doyum sağladığı, bu dersin daha önce ne ve nasıl olduğu bilinmediğinden geri kalmışlık hissini yol açtığı sıkıntı, dersin uyandırdığı merak duygusu, kültürel anlamda katkı sağlaması açısından fayda sağladığı, mezuniyetten sonra imam hatiplik, müezzinlik, Kuran kursu öğreticiliği gibi meslekler gereğince Kur'an-ı Kerim'i güzel tilavet ile okuyabilmenin önemi, dini musikinin doğumdan ölüme kadar insan hayatında önemli bir yere sahip olduğu, güzel, farklı bir bilgiye sahip olmak, İslam dinini musiki ile kalplere naksetmenin önemi ifade edilmiştir. Bu dersin zorunlu olmasının çok faydalı olduğu çünkü birçoğunun ne yaptığı ya da neyi ne amaçla yaptığının farkında olmadan alışkanlık sebebiyle yapıldığı, kişiyi düşünmeye sevk ettiği ve araştırmayı sağlaması açısından olumlu olduğu belirtilmiştir. Okunan bölüm gereği ve özellikle günümüzde İslam dininde musikinin yerinin bilinmesinin gereği itibari ile zorunlu olması gerektiği düşünülmektedir. Ayrıca alınan dersin eğitim boyutunun yanı sıra insana manevi olarak getirilerinin de çok yüksek olduğunu düşünülmektedir.

Bireyler arasında bilinen musikinin haram olduğu düşüncesinin önüne geçilmesi ve bu durumun düzeltilmesi bakımından dini musiki dersinin zorunlu olması gerektiği düşünülmektedir. Sanat derslerinden biri olan dini musiki dersinin seçmeli ders olması öğrencilerin sanatsal derslerden faydalanabilme imkanını azalttığı, sanatın toplumsal bir ihtiyaç olduğu için dersin zorunlu olması gerektiği düşünülmektedir. Dini musiki dersinin seçmeli olması gerektiğini düşünen öğrenciler ise yine sadece bu alana ilgi duyan öğrencilerin bu dersi almaları gerektiğini, kendilerinin yetenekli olmadıkları için bu derste zorlanabileceklerini ifade etmişlerdir.

DİNİ MUSİKİ DERSİNE İHTİYAÇ DUYDUĞUNUZU DÜŞÜNÜYOR MUSUNUZ? SİZİ BU FİKRE İTEN SEBEPLERİNİZ NELERDİR? sorusuna verilen cevaplar aşağıdaki gibidir.

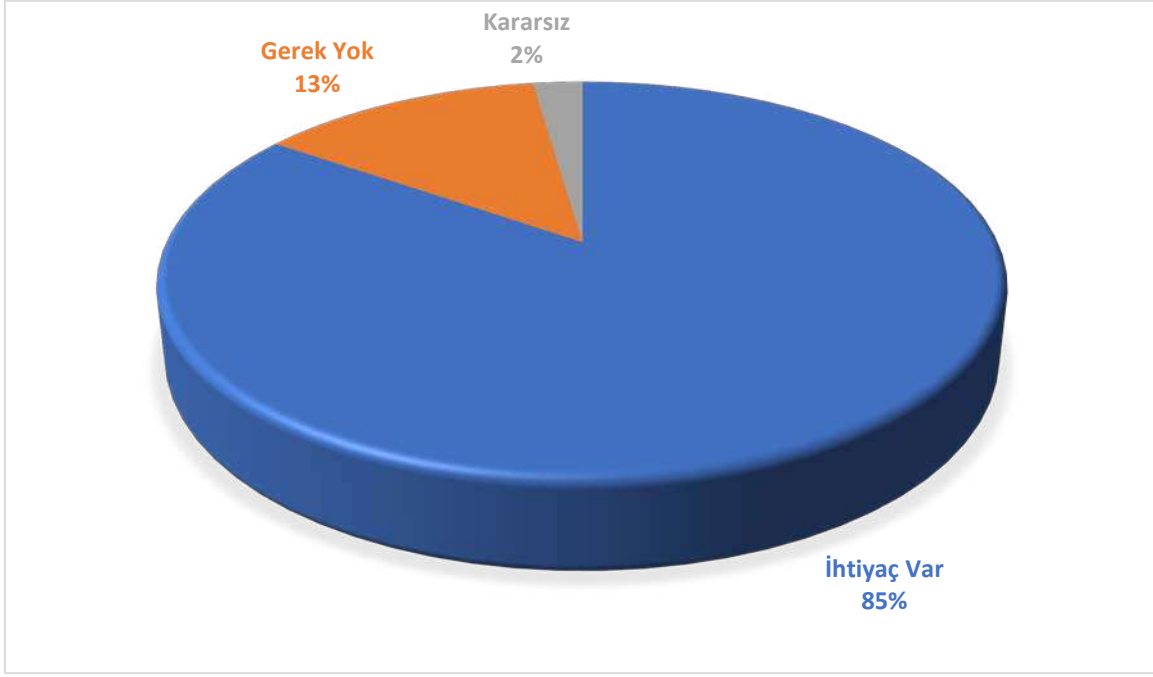
Erkek öğrenciler ilgili soruya cevaben; Çalışmaya katılan toplam 26 erkek öğrencinin 20 tanesi dini musiki dersine ihtiyaç duyduğunu belirtirken 4 tanesi gerek olmadığını 2 tanesi de kararsız kaldıklarını belirtmişlerdir.

Grafik -5: Dini Musiki Dersine İhtiyaç Duyulması Üzerine Erkek Öğrencilerin Düşünceleri



Dini musiki dersine ihtiyaç duyan öğrencilerin verdikleri yanıtlar ise şöyledir; musikinin ruhun gıdası olduğunu, her daim musikiye ihtiyaç duyulduğunu, musikinin haram yada helal olması hususundaki karışıklığın giderilmesi gerektiğini, çok keyifli bir ders olduğunu, özellikle ilahilere ilgi duyulduğunu, musikinin geçmişten günümüze olan yolculuğun merak edildiğini, musikinin kültürümüzün en önemli taşlarından olduğunu, Kur'an-ı Kerim, Sâlâ, ezan-ı şerif ve ilahilerin daha doğru okunmasının yanında güzel okunması gerektiğini, insana hem ruhsal hem fiziksel katkı sağladığını, Peygamber döneminde musikinin ne düzeyde olduğunu, musikiyi çok sevdiğini, her İslami ilimler ve ilahiyat fakültesi öğrencisinin muhakkak musiki dersi almasının önemli olduğunu belirtmişlerdir. Çalışmaya katılan toplam 62 kız öğrenciden 52 tanesi dini musiki dersine ihtiyaç duyduğunu belirtirken, 8 kişi bu derse ihtiyaç duymadığını 2 kişi de kararsız olduğunu belirtmiştir.

Grafik -6: Dini Musiki Dersine İhtiyaç Duyulması Üzerine Kız Öğrencilerin Düşünceleri

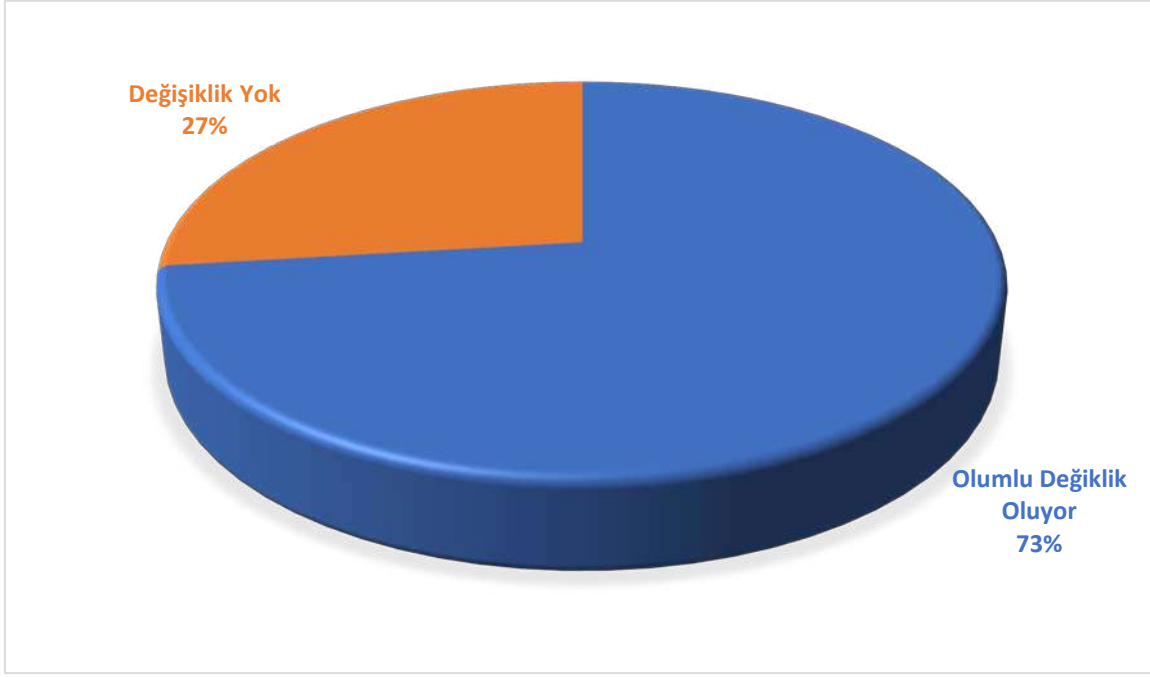


Öğrencilerin bazılarının açıklamaları şöyledir; bu dersin musiki ile ilgili insanların yanlış bildiklerini düzelttiği, musiki dinlemenin tüm yorgunluğu giderdiği, yaşanan tüm sorun ve dertlerden arındırdığı, ruha iyi geldiği, hayatın bir parçası olduğu, bu dersi almadan önce gerekli olması gerektiğinin fark edilmediği, İslam dininin musikiye nasıl baktığını öğrenmenin önemi, ders sayesinde çok mutlu ve huzurlu olduğu, gönle coşku verdiği, hayatın her alanında olduğu ve bunun doğru yorumlanması gerektiği, akademik olarak musikiyi anlamaların önemini, kalıplaşmış yanlış düşünceleri giderdiği, kalbe huzur verdiği, musikin sadece eğlence amaçlı olmadığı hatta ruha ve bedene şifa olduğu belirtilmiştir.

DİNİ MUSİKİ DERSİNDEN SONRA DUYGU DURUMUNUZDA BİR DEĞİŞİKLİK OLUYOR MU? HANGİ DUYGULARI HİSSEDİYORSUNUZ? Sorusuna verilen cevaplar aşağıdaki gibidir.

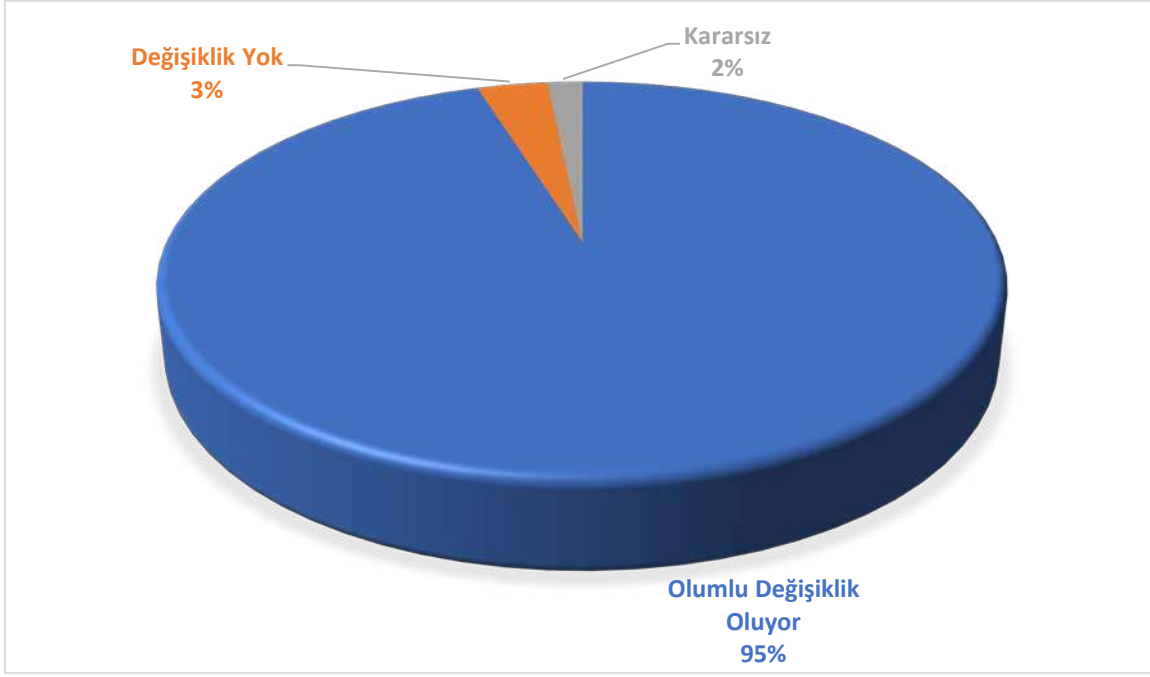
Çalışmaya katılan toplam 26 erkek öğrencinin 19'u dini musiki dersinden sonra duygu durumlarında olumlu değişiklik olduğunu ifade ederken 7 kişi bir değişiklik olmadığını belirtmiştir.

Grafik -7: Dini Musiki Dersinden Sonra Duygu Durumu Değişikliği Üzerine Erkek Öğrencilerin Düşünceleri



İşlenilen ders sonrası heyecan ve merak duygusunun arttığını, dersin çok keyifli olduğunu, özellikle ilahi formunu çok sevdiklerini, musikin ruhun gıdası olduğunu ve duyguların sözlere döküldüğü için mutluluk verdiğini, pozitif enerji ile dolduklarını, sınıfta okunan ezan, sâlâ ve ilahilerin ayrıca gönülleri coşku ,sevgi ve Allah aşkı ile doldurduğunu, bir çeşit şifâ bulduklarını, bazen duygulandıkları ve hüznlendiklerini, gerçek musikimizi gördükçe şuan varlığını devam eden musikin içler acısı olduğunu, seslerinin geliştiklerini, özgüvenlerinin arttığını, musiki sayesinde daha da sosyalleştiklerini, hoşnut olduklarını, bazen de şaşkınlık duygusunun hakim olduğunu belirtmişlerdir. Çalışmaya katılan toplam 62 öğrenciden 59 tanesi tamamen dini musiki dersinin duygu durumlarında olumlu değişiklik sağladığını belirtirken 2 kişi bir değişiklik olmadığını 1 kişi ise kararsız kaldığını ifade etmiştir.

Grafik -8: Dini Musiki Dersinden Sonra Duygu Durumu Değişikliği Üzerine Kız Öğrencilerin Düşünceleri

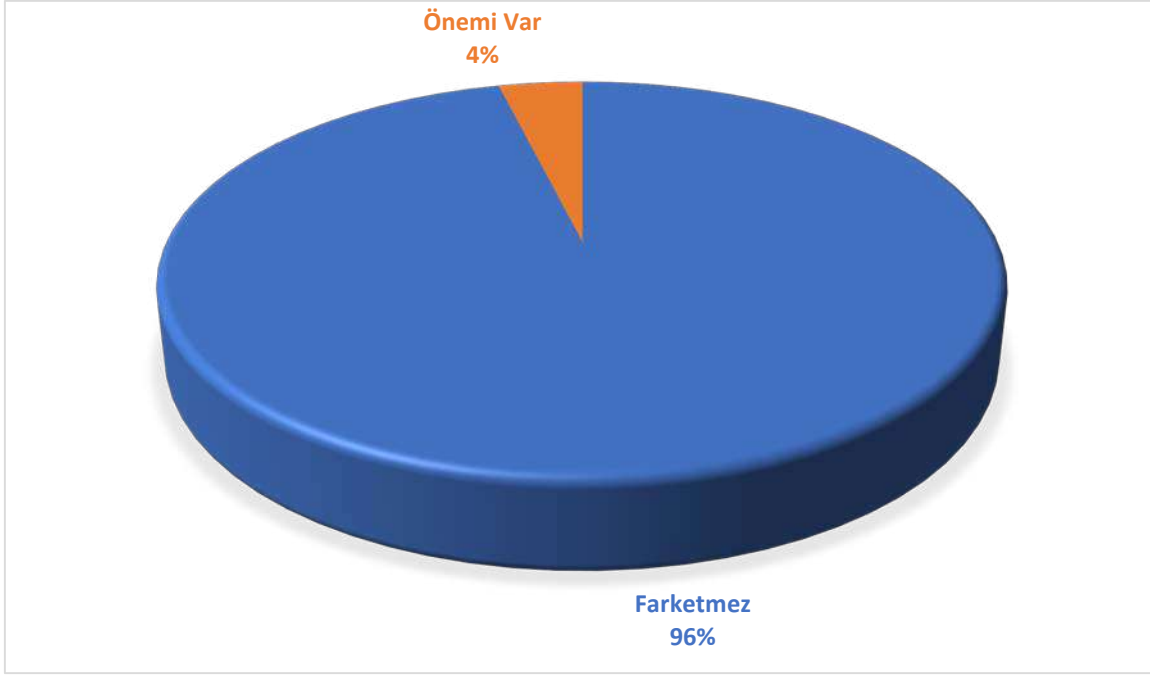


Yapılan açıklamalar şöyledir; musikinin rahatlama ve huzur hissettirdiğini, kalpleri ferahlattığını, gönüllere neşe verdiğini, ruhu ve bedeni dinlendirdiğini, mutluluk verdiğini, huzursuzluklardan arındırdığını, farklı bakış açısı kazandırdığını, daha enerjik hissettirdiğini, musikiyi öğrendikçe kendilerini daha da mutlu edeceğini, heyecan uyandırdığını, dingin hissettirdiğini, gurur ve sevinç duygusunu yaşattığını, dini musikiye olan merakı arttırdığını, rahat ve aydınlık hissettirip estetik anlayışı şekillendirdiğini, manevi açıdan doyurduğunu, merak ve araştırma isteği ile dolduklarını, tefekkürü ittiğini, şaşkınlık uyandırdığını, umut verdiğini, manevi açıdan tatmin ettiğini belirtmişlerdir.

DİNİ MUSİKİ DERSİNİN AKADEMİK PERSONELİNİN CİNSİYETİ SİZİN İÇİN NE İFADE EDİYOR? Sorusuna verilen cevaplar aşağıdaki gibidir.

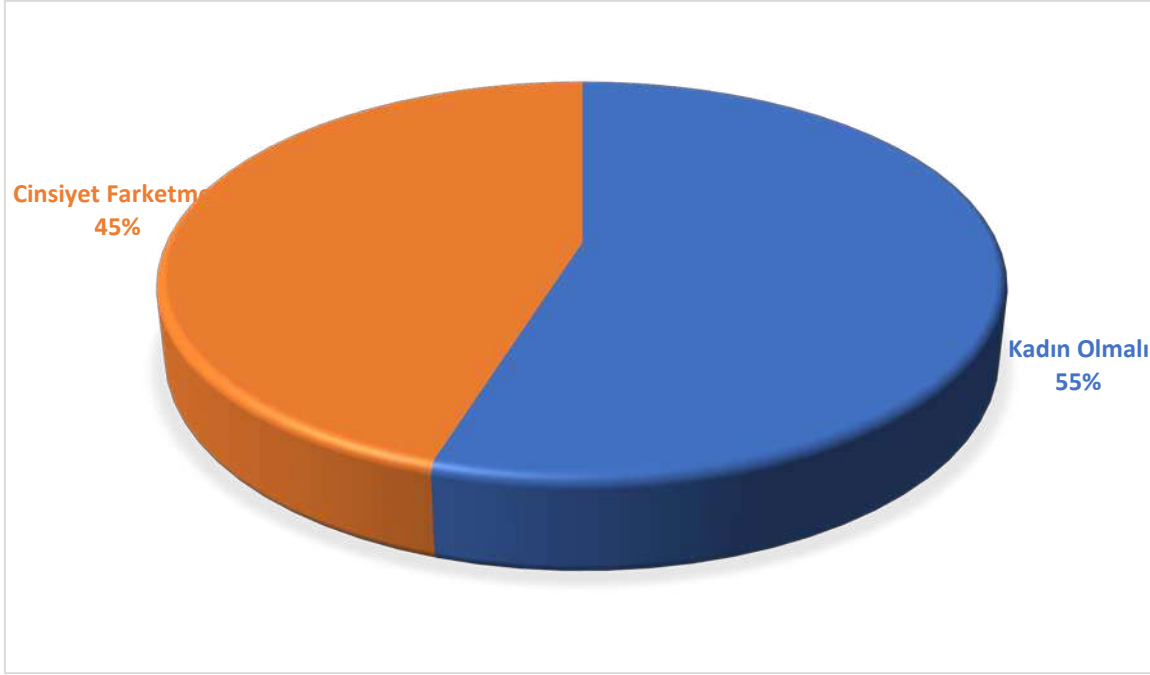
Çalışmaya katılan toplam 26 erkek öğrencinin 25'i derse giren akademik personelinin cinsiyetinin bir önemi olmadığını, kadın yada erkek olmasının bir şeyi değiştirmedğini ifade etmişlerdir.

Grafik -8: Dini Musiki Dersinin Akademik Personelinin Cinsiyeti Üzerine Erkek Öğrencilerin Düşünceleri



Önemli olanın dersin nasıl verimli geçtiği, akademik personelin öğrenciye olan tutum ve yaklaşımı ve bilgi birikimi olduğunu ifade etmişlerdir. Her ne kadar cinsiyetin fark etmediğini belirtse de, birkaç öğrenci akademik personelin kadın olmasının daha iyi olduğunu, bir kadın hocanın üslubunun daha nazik ve kibar olmasının öğrenci açısından daha etkili olduğunu da eklemişlerdir. 1 öğrenci ise derste çekinmeden daha rahat hareket edebilmek, sorular sorabilmek için ders hocasının erkek olmasını tercih etmiştir. Çalışmaya katılan toplam 62 öğrenciden 34 tanesi dini musiki dersinin akademik personelinin kadın olmasını tercih ettiklerini söylerken 28 tane öğrenci ise dersin akademik personelinin cinsiyetinin kadın ya da erkek olmasının fark etmeyeceğini belirtmiştir.

Grafik -9: Dini Musiki Dersinin Akademik Personelinin Cinsiyeti Üzerine Kız Öğrencilerin Düşünceleri



Genel olarak yapılan açıklamalar şöyledir; dersin güzel ve akıcı anlatılmasının önemli olduğunu, içlerindeki negatifiğin azaldığını, bir kadın akademik personelin erkek akademik personele göre daha pozitif olduğunu, derste daha rahat hissettiklerini, dersi sevdikten sonra dersin akademik personelinin cinsiyetinin önemli olmadığını, diğer derslerde cinsiyetin çok önemli olmadığını ancak musiki dersi için akademik personelin kadın olması gerektiğinin önemini ve bunun öğrenci açısından avantaj olduğunu, duygu ve düşünceli söyleme açısından daha rahat hissettiklerini, musiki söylendiğinde ve sınıfta mahrem birinin olmamasının kendilerini rahatlattığını, fikirlerini rahatça yani çekinmeden paylaşabildiklerini ifade etmişlerdir.

DERS HAKKINDA EKLEMEN İSTEDİĞİNİZ BİR HUSUS VAR MI? sorusuna verilen cevaplar aşağıdaki gibidir.

Erkek öğrenciler ilgili soruya cevaben; bu bölümde derslerde sürekli uygulama yapmanın gerek cami gerek tekke musikisi formlarını sürekli olarak seslendirme ve dinlemenin ders performanslarını olumlu yönde etkileyeceklerinden bahsetmişlerdir. Yine derslerde gerek solo gerek koro halinde ve enstrüman eşliğinde çalışmalar yapmanın kendilerinde uyandırdıkları olumlu duygulardan, dersin akademik personelinin derse olan hakimiyeti, bilgisi ve kendilerine olan yaklaşımının olumlu yansımalarını, öğrencilerinin seslerinin eğitimsiz ve güzel olmamasının ve bu nedenle kendilerince dini musiki dersinden çekindiklerini, hemen hemen her öğrencinin bir enstrüman çalmak istediklerini, ders saatlerinin kesinlikle yetersiz olduğunu, nazariyattan ziyade hep uygulama ile derslerin geçmesini belirtmişlerdir. Kız öğrenciler ilgili soruya cevaben; toplu bir şekilde sınıfta eser okumanın kendilerinde uyandırdıkları mutluluğu, dersin akademik personelinin her ders enstrüman ile derse gelmesini ve enstrüman eşliğinde dersin daha zevkli geçeceğini, dersin akademik personelinin bol bol soru sormasının ve anlattığı her konu ile ilgili örnekler sunması, eserler dinletmesinin ders performansını arttırdığını, dersin akademik personeli ile öğrencilerin sürekli iletişim halinde olmasının dersin verimliliği açısından son derece iyi olduğunu, musikinin günlük yaşantıda aslında bir çok yerde kullanıldığının ve musiki ,ses olmadan hayatın olamayacağını farkına varıldığını ifade etmişlerdir.

SONUÇ

Tokat Gaziosmanpaşa Üniversitesi İslami ilimler Fakültesi öğrencilerinin Türk din mûsikîsi dersine karşı görüşlerini tespit etmek ve değerlendirmek amacıyla yapılan bu çalışmada; öğrencilerin dini musiki dersine karşı olumsuz bir duygu içinde olmadıkları, bu ders ile birlikte dini musiki dersine karşı olan olumsuz tutum ve görüşlerden uzak kalınacağı ve öğrencilerin farkındalıklarının arttığı görülmüştür. Özellikle gerek cami musikisi gerek tekke musiki formlarının icrasının dini musiki dersi ile daha doğru ve güzel okunmasının İslam dini içinde önemi ve gerekliliği görülmüştür.

Dini musiki dersini aldıktan sonra makamlar hakkında ve musikinin gerek bidayeti gerek nihayeti hakkında bilgi sahibi oldukları, uygulamalı derslerden sonra duygu durumlarında oluşan değişiklikler açıklanmıştır.

Öğrencilerin daha duygusal, mutlu, heyecan, merak duygusu içinde oldukları ifade edilmiştir.

EK-1

STANDARTLAŞTIRILMIŞ AÇIK UÇLU GÖRÜŞME FORMU

Bu çalışmadaki veriler Öğr. Gör. Duygu TURAN tarafından hazırlanacak olan “İslami İlimler Fakültesi Öğrencilerinin Dini Musiki Dersine İlişkin Görüşleri (Tokat Örneği)” başlıklı bilimsel araştırma için kullanılacaktır.

Demografik Bilgiler

Yaşınız:

Cinsiyetiniz:

Sınıfınız:

1. SİZCE DİNİ MUSİKİ NEDİR? DİNİ MUSİKİ DENİLİNCE AKLINIZA İLK NE GELİYOR?
2. DİNİ MUSİKİ DERSİNİN STATÜSÜ (SEÇMELİ/ZORUNLU) OLMASI KONUSUNDA NE DÜŞÜNÜYORSUNUZ?
3. DİNİ MUSİKİ DERSİNE İHTİYAÇ DUYDUĞUNUZU DÜŞÜNÜYOR MUSUNUZ? SİZİ BU FİKRE İTEN SEBEPLERİNİZ NELERDİR?
4. DİNİ MUSİKİ DERSİNDEN SONRA DUYGU DURUMUNUZDA BİR DEĞİŞİKLİK OLUYOR MU? HANGİ DUYGULARI HİSSEDİYORSUNUZ?
5. DİNİ MUSİKİ DERSİNİN AKADEMİK PERSONELİNİN CİNSİYETİ SİZİN İÇİN NE İFADE EDİYOR?
6. DERS HAKKINDA EKLEMENİZ İSTEDİĞİNİZ BİR HUSUS VAR MI?

NEURAL NETWORK INTEGRATED WITH ACTIVE CONTOUR MODEL FOR SEGMENTATION OF MEDICAL IMAGES

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ABSTRACT

In medical image processing, image segmentation is a critical step. Image segmentation is a process of partitioning an image into multi segments. The reason for segmentation is to change the image into that form in which features can be easily extracted from the input image. Many different techniques are used for image segmentation. Recently, Deep Learning (DL) techniques are widely used for the segmentation of medical images whose results are better than other approaches of segmentation. DL approaches are based on neural networks. Neural network is a series of algorithms that recognize a set of data through a process that mimics the way the human brain operates. New methods based on DL have better results but these methods are limited to pixel-wise segmentation maps. Our objectives are to handle this restriction by developing a new approach based on DL which gives information about the area inside, outside as well as boundaries of the interested region. In this work, we will propose a new loss function by using an Active Contour Model building in region and length for the segmentation of biomedical images. We evaluate our approach on a dataset of 2500 skin cancer images. The experiments show that the proposed approach outperforms other state-of-the-art methods.

Keywords: deep learning, active contour, image segmentation

I. INTRODUCTION

Skin cancer is one of the deadly diseases all around the world. A recently created DL-based approach shown significantly better results for skin cancer classification, segmentation, and detection tasks. Various DL architectures have been designed for classification, segmentation, and detection problems in medical imaging and computational pathology. Image segmentation is a process in which we divide an image into different parts based on some specific criterion. The reason for segmentation is to change an image into a form such that features can be easily extracted from the input image. In clinical analysis image segmentation plays a vital role.

DL is a subset of artificial intelligence. Which train a network to think like the human brain. For this purpose neural network are used in DL which is inspired by natural neurons. There are various neural network such as recurrent neural network, artificial neural networks, and convolutional neural networks (CNNs). CNNs have been developed for different task such as image classification, object detection, image segmentation and recognition. There are various architecture based on CNNs like U-Net [4], ResNet, and VGG etc.

There are many methods based on deep Convolutional Neural Networks CNNs that have been proposed for several biomedical images, which perform better results and overcoming the restrictions of segmentation methods. In the CNNs model, during the training, a loss function is used, which compares the error between the ground truth image and the prediction mask. For this purpose, the loss function plays a very important role to measure the error between the prediction and the original image. Despite later advancements in utilizing CNNs for the Biomedical image segmentation, the frequently used loss functions are assessed through pixel-wise similarity for segmentation problems commonly used loss functions are Binary Cross-Entropy (BCE), Dice coefficient (DC). But these loss functions just give information about the pixel-wise similarity. We developed to address this limitation by new loss function by using Active Contour Models (ACMs) [1] and deep learning approach.

According to the World Health Organization (WHO), skin cancer causes 10 million death per year worldwide. Diagnosing skin cancer at its early stage is the critical step. But there is a limited number of approaches for skin cancer segmentation, which is necessary for skin cancer diagnosis at its early stage. Our proposed model is part of the effort to address this worldwide challenge by developing new techniques for the accurate analysis of skin cancer images to save lives.

II. METHODS

A. Segmentation Methods

Within the past few decades, several approaches have been proposed by using different segmentation techniques like thresholding, edge detection, clustering, and region growing, and other supervised segmentation models. Thresholding and region-based techniques can be implemented for the segmentation purpose, but the performance of these techniques is restricted. Active Contour Model (ACMs) [1] have attained better achievement. Later on, this model has been extended to multiphase segmentation. The major drawback of these models is their computational cost and processing time (CPU time).

B. Segmentation Method Based on CNN

Convolutional Neural Networks (CNNs) are the most important artificial neural network for segmentation, classification, and object detection. In modern convolutional neural networks (CNNs), the first work occurred in the 1990s. CNN plays a vital role in many computational tasks, such as classification, registration, and segmentation. CNN has a robust ability that they work end-to-end and during the learning process, they can extract the features. CNN architectures like U-Net [4] Dense-Net [12], Res-Net, Alex-Net, VGG-Net [13] have been proposed for the different image segmentation tasks. In 2015, U-Net was first presented as CNN based model on end-to-end encoder and decoder for the segmentation of biomedical images [4]. In U-Net, the encoder path containing 5 convolutional blocks, and every block have 3 convolutional layers.

C. Loss Function

In the CNN model, the loss function plays a significant role. Actually, during the training, the loss function measured the error between the original image and the predicted mask. Some well-known loss functions for the segmentation are Binary Cross-Entropy (BCE) loss, Dice-Coefficient (DC).

Identify the applicable funding agency here. If none, delete this text box. BCE is broadly utilizing for pixel-wise segmentation. During the training, DC is used as a metric for the analysis of segmentation performance. Although BCE

and DC loss functions have better performance in image segmentation, there are some restrictions that they are pixel-wise loss functions that count the similarity between ground truth and prediction.

III. OUR METHOD

We propose a loss function by using the global idea of the Active Contour Model in an account of length and region for the segmentation of the biomedical image. Further, for the model accuracy improvement, we introduce a new architecture named Lab v3_ResNet50 based on deep learning. Next, we give a detail description of the proposed architecture.

D. Lab v3_ResNet50 architecture

In this subsection, we discuss our proposed architecture named Lab v3_ResNet50. In the deep learning models, accuracy is always a well-studied and critical task. DeepLabv3+ [9] is a semantic segmentation architecture that builds upon DeepLabv2 [11] with various modifications. To tackle the problem of objects at multiscale, modules are planed which use atrous convolution by multiple atrous rates. Furthermore, the Atrous Spatial Pyramid Pooling (ASPP) module was added to image-level features. ResNet50 [10] is an alternative to the ResNet model which has 48 Convolution layers along with 1 MaxPool and 1 Average Pool layer. For the proposed work, we introduce Deep Lab v3+ as the encoder of ResNet50 and this is a new architecture as far as we know. In the proposed model, firstly, we pass the input image through ResNet50 and secondly, the output from the ResNet50 is passed through ASPP which has 5 convolutional blocks. 1st block has 1×1 Conv filter, 2nd block has 2×2 Conv filter with dilation rate 6, 3rd block has 3×3 Conv filter with dilation rate 12, 4th block has 3×3 Conv filter with dilation rate 18, as illustrated in Fig. 1.

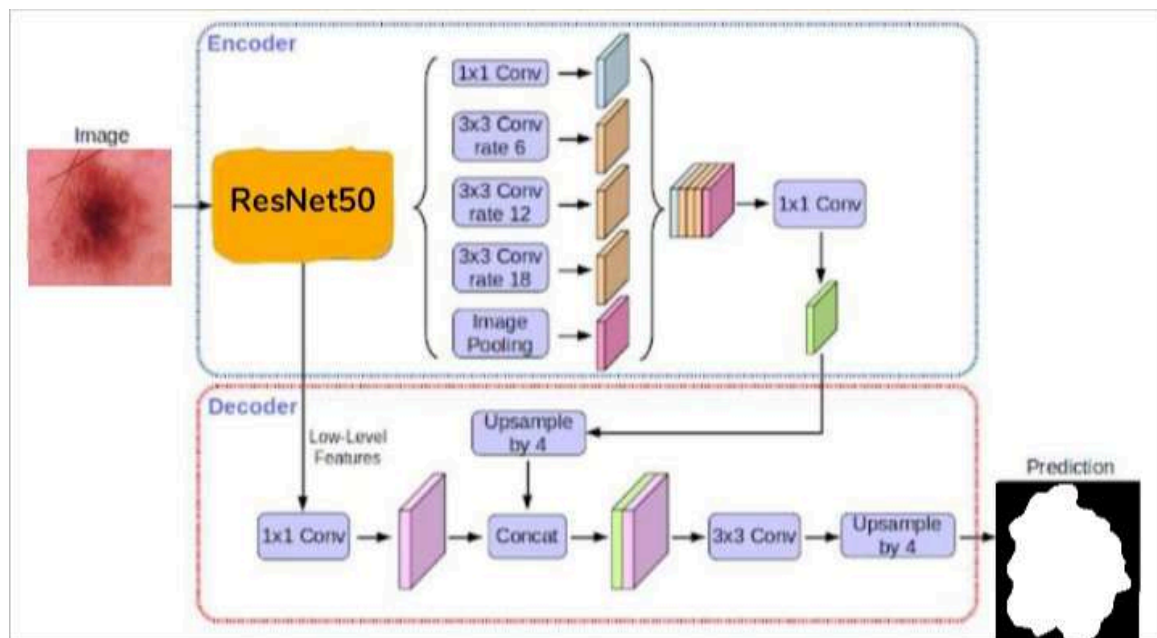


Fig. 1. Architecture of our proposed Lab v3_ResNet50

E. Active Contour Model

Active Contour Model is initially proposed by kass et al [4]. ACMs are partial differential equations based techniques. ACWE [2] determine an energy function for image segmentation,

which calculate the intensities of the inside and outside regions of the parameterized curve C of an image u_0 . The energy minimization function is expressed as [1], [2]:

$$\begin{aligned}
 F(c_1, c_2, C) &= \mu \cdot \text{Length}(C) + \nu \cdot \text{Area}(\text{inside}(C)) \\
 &+ \lambda_1 \int_{\text{inside}(C)} |u_0(x, y) - c_1|^2 dx dy \\
 &+ \lambda_2 \int_{\text{outside}(C)} |u_0(x, y) - c_2|^2 dx dy
 \end{aligned} \tag{1}$$

Where c_1 and c_2 are the mean value of image u_0 internal and external the contour C , and stated as follows:

$$c_1(C) = \frac{\int_{\text{inside}(C)} u_0(x, y) dx dy}{\int_{\text{inside}(C)} dx dy} \tag{2}$$

$$c_2(C) = \frac{\int_{\text{outside}(C)} u_0(x, y) dx dy}{\int_{\text{outside}(C)} dx dy} \tag{3}$$

The parameters μ , ν , λ_1 and λ_2 are arbitrarily fixed parameters for each term.

F. ACWE Loss function

To implement the ACWE [2] model and find an overall minimization of active contour energy for image segmentation, the energy minimization that occurs in (1) becomes a loss function $Loss_{ACWE}$ of the image u_0 . Consider $C = y(u_0)$ the contour, modeled by our proposed architecture Lab v3_ResNet50 of the image u_0 . The $Loss_{ACWE}$ is expressed as follows:

$$\begin{aligned}
 Loss_{ACWE} &= \nu \cdot \text{Area}(y(u_0) > 0) \\
 &+ \lambda_1 \sum_{y(u_0) > 0} |u_0 - c_1|^2 + \lambda_2 |u_0 - c_2|^2
 \end{aligned} \tag{4}$$

In $Loss_{ACWE}$, the first term check the size segmented image size, second and the last terms impose the segmentation of the interested region by calculating a balance intensity values inside (c_1) and outside (c_2) the contour.

IV. EXPERIMENTS

We used our proposed architecture Lab v3_ResNet50 with our loss function $Loss_{ACWE}$ and compare the final segmented performance with the other state-of-the-art existing models and loss functions BCE, DC.

G. Dataset

The dataset is used for this work is a collection of skin cancer images from International Skin Imaging (ISIC) 2018. In our experiments, we have used a total of 3000 images with their corresponding ground truth, which is divided into three parts: training (2000), validation (250), and testing (250). The original size of the image is approximately 600×450. We have resized it to 256×256. The input images were normalized.

H. Results

We apply our proposed model using Keras 2.6.0 with Tensor flow gpu 2.0 as the backend. For the training of our model we used the optimizer ADAM with a learning rate (LR) of 10^{-4} . The size of batches is set to 10. For the comparison, we use the U-Net model with the DC and BCE loss functions. Fig. 2 shows the input image with corresponding ground truth, and predicted mask noticed from our proposed model Lab v3_ResNet50 with $Loss_{ACWE}$ and UNet [4] with DC and BCE loss functions respectively. The results of our proposed model are showing better

TABLE I. ACCURACY COMPARISON OF THE UNET WITH DC AND BCE LOSS FUNCTIONS AND OUR PROPOSED $Loss_{ACWE}$ WITH DEEP LAB v3_RESNETT50

Methods	<i>Labv3_ResNet50</i> <i>+Loss_{ACWE}</i>	<i>UNet+DC</i>	<i>UNet+BCE</i>
accuracy	0.989	0.933	0.912

TABLE II. COMPARISON WITH PREVIOUS APPROACHES ON BIOMEDICAL IMAGE SEGMENTATION. THE PROPOSED APPROACH (LAB v3_RESNET50+ $Loss_{ACWE}$) IS COMPARED AGAINST THE OTHER STATE-OF-THE-ART MODELS IN THE BELOW TABLE RESPECTIVELY.

Methods	accuracy
Wolterink et al.	0.930
Baumgartner et al.	0.950
Yeonggul Jang et al.	0.938
Isensee et al.	0.950
Xu Chen et al.	0.986
Lab v3_ResNet50+Loss_{ACWE}	0.989

V. DISCUSSION

In this study, we proposed a new loss function which is $Loss_{ACWE}$, and deep learning novel model Lab v3_ResNet50. The model is applied to the skin cancer dataset. The results show that the new technique for skin cancer segmentation worked superior to the other state-of-the-art models.

VI. CONCLUSION

In this paper, we proposed *the* $Loss_{ACWE}$ loss function and new deep learning model Lab v3_ResNet50 for the segmentation task. The benefit of this loss function is that it can integrate the length and region information of an object and segment it better. Our proposed architecture gives better accuracy as compared to the other start-of-the-art models. Our proposed method gives promising results in segmentation. It is believed that this new approach will be applied to the other segmentation task. We hope that our research would provide a better facility in diagnosing cancer at its early stage and save lives.

References

- [1] T. F. Chan, L. A. Vase. “Active contours without edges”. IEEE Transaction on Image Processing. 10, 266-277, 2001.



- [2] X. Chen, B. M. Williams, S. R. Vallabhaneni, G. Czanner, R. Williams and Y. Zheng. "Learning active contour models for medical image segmentation". In Proceeding of the IEEE/CVI Conference on Computer Vision and Pattern Recognition, 11632-11640, 2001
- [3] R. Girshick, J. Donahue, T. Darrell, and J. Malik. "Rich feature hierarchies for accurate object detection and semantic segmentation". In Proceeding of the IEEE/CVI Conference on Computer Vision and Pattern Recognition, 580-587, 2014.
- [4] O. Ronneberger, P. Fischer and T. Brox. "U-Net: convolutional networks for biomedical image segmentation". International Conference on Medical Image Computing and Computer-assisted Intervention, 234-241, 2015.
- [5] D. C. Cireasan, A. Giusti, L. M. Gambardella, and J. Schmidhuber. "Deep neural networks segment neuronal membranes in electron microscopy images". Advances in Neural Information Processing Systems. 25, 2843-2851, 2012.
- [6] S. Geo and T. D. Bui. "Image segmentation and selective smoothing by using Mumford-Shah Model". IEEE Transaction on Image Processing. 14, 1537-1549, 2005.
- [7] A. Krizhevsky, I. Sutskever and G. E. Hinton. "ImageNet classification with deep convolutional neural networks". Advances in Neural Information Processing Systems. 25, 1097-1105, 2012.
- [8] K. Simonyan and A. Zisserman. "Very deep convolutional networks for large-scale image recognition". arXiv preprint arXiv, 1409-1556, 2014.
- [9] L. chieh chen, Y. zhu, G. papandreo, F. schroff. "Encoder-decoder with atrous separable convolution for semantic image for semantic image segmentation". 833-851, 2018.
- [10] G. Celano. "A ResNet50-based convolutional neural network model for language ID identification from speech recordings". 136-144.
- [11] A. King, M. Suchendra, Bhandarker and M. Brain Hopkinson. "A comparison of deep learning method for semantic segmentation of coral reef survey images". 1394-1402.
- [12] P. Carcagni, M. Leo, A. Cuna, P. Luigi Mazzeo, P. Spango, G. Celeste and C, Distance. "classification of skin lesions by combing multilevel learnings in a DenseNet architecture". 335-344, 2019.
- [13] M. Mateen, J. Wen, S. Song, Z. Haung. "fundus image classification using VGG-19 architecture with PCA and SVD". 2019.

SIĞIR YETİŞTİRİCİLİĞİ İŞLETMELERİNİN TESİS YERİ SEÇİMİ İÇİN BİR AHP KARAR MODELİ: KIRŞEHİR İLİ ÖRNEĞİ

AN AHP DECISION MODEL FOR FACILITY SITE SELECTION OF CATTLE
BREEDING ENTERPRISES: THE CASE OF KIRŞEHİR PROVINCE

Başar ALTUNTAŞ

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ÖZET

İşletmenin başarısında önemli bir faktör olan kuruluş yeri seçimi, çok kriterli bir karar problemidir. Kuruluş yeri seçimi uzun dönemli olarak alınan stratejik bir karar olması nedeniyle üzerinde hassasiyet ile durulması gereken önemli bir konudur. İşletmenin kuruluş yeri seçim kararında etkili olan çok fazla kriter olması ve birbirine karşı zıtlıklar içeren bu kriterler arasında uzlaşma gerektirmesinden dolayı karmaşık bir karar problemidir. Girişimcilerin karar vermelerine yardımcı olabilmek amacıyla çok kriterli karar verme yöntemleri geliştirilmiştir. Analitik Hiyerarşi Proses (AHP) yöntemi karar verecek kişilerin kriterleri birlikte değerlendirmeleri gerektiği durumlarda sıklıkla tercih edilen bir yöntemdir.

Bu çalışmanın temel amacı tarım sektörü içerisinde önemli faaliyet alanı olan sığır besiciliği işletmesi için kuruluş yeri seçim kararını etkileyen kriterleri ortaya koymaktır. Bu doğrultuda Kırşehir ilinde yeni kurulacak bir sığır besiciliği işletmesi için en uygun alternatif bölgenin belirlenmesi hedeflenmektedir. Kırşehir ilinin dört farklı lokasyonu, üç ana kriter ve onbir alt kritere göre karşılaştırılmış ve en uygun kuruluş yeri belirlenmiştir. Yozgat yolu olarak tanımlanan bölge ideal kuruluş yeri olarak belirlenirken, kriterlere göre uygunluğu en az olan bölgenin ise Savcılı yolu üzeri olduğu görülmüştür. Kuruluş yeri seçimini etkileyen en önemli ana kriterin pazara ilişkin faktörler olduğu tespit edilmiştir. Bu ana kriterin altında hammaddeye ve kesimhaneye yakın lokasyon olması bu seçim kararına etki eden önemli alt faktörler olarak belirlenmiştir. Kırşehir ilinde devlet teşvikleri, yasal zorunluluklar ve ulaşım imkanları alt kriterleri ise seçim kararını en az düzeyde etkileyen kriterlerdir. Çalışma yeni girişimcilere ve politika belirleyicilere önemli bir takım sonuçlar ortaya koymaktadır.

Anahtar Kelimeler: Hayvancılık, Sığır Besiciliği, Tarım sektörü, Analitik Hiyerarşi Proses, Kuruluş Yeri Seçimi, Tesis Yer Seçimi

ABSTRACT

The choice of facility location, which is an important factor in the success of the business, is a multi-criteria decision problem. Facility location is an important issue that needs to be carefully considered, since it is a long-term strategic decision. It is a complex decision problem because there are too many criteria that are effective in the decision of the facility location of the enterprise and it requires reconciliation between these criterias, which are contradictory to each other. Multi-criteria decision making methods have been developed to help entrepreneurs make decisions. The Analytical Hierarchy Process (AHP) method is often preferred when decision makers need to evaluate the criteria together.

The main purpose of this study is to reveal the criteria that affect the decision of the facility location for the cattle breeding business, which is an important field of activity in the agricultural sector. In this direction, it is aimed to determine the most suitable alternative

region for a cattle breeding business to be established in Kırşehir province. Four different locations of Kırşehir province were compared according to three main criteria and eleven sub-criteria, and the most suitable facility location was determined. While the region defined as the Yozgat road was determined as the ideal facility location, it was seen that the region with the least compliance according to the criteria was on the Savcılı road. It has been determined that the most important main criterion affecting the selection of the facility location is the market-related factors. Under this main criterion, the location close to the raw material and slaughterhouse has been determined as the important factors affecting this selection decision. State incentives, legal obligations and transportation facilities in Kırşehir province are the criteria that affect the selection decision at the least level. The study reveals a number of important implications for new entrepreneurs and policy makers.

Keywords: Livestock, Cattle breeding, Agriculture sector, Analytical Hierarchy Process, Establishment Location Selection, Facility Location Selection,

GİRİŞ

Tarım bitkisel ve hayvansal üretimden oluşan ve ekonomik kalkınma açısından önem arz eden stratejik bir sektördür. Bu sektör içerisinde hayvansal üretim faaliyeti, tarımsal işletme içerisinde bitkisel üretim ile elde edilmiş olan ürünlerin daha kazançlı biçimde değerlendirilmesini sağlaması, arazi verimliliğini arttırması ve riski azaltmasından dolayı önem taşımaktadır. Hayvansal üretim çeşitli mamullerin (*et, süt, deri, sakatad, yapağı, vb.*) üretimi için ekonomik değere sahip olan hayvanların yetiştirilmesi, onlardan yararlanılması ve ortaya çıkan ürünlerin piyasaya sunulması, pazarlanması faaliyeti olarak tanımlanabilir. Hayvansal üretim işletmenin kuruluşu aşamasından başlar yetiştirilecek hayvanın (*besi materyalinin*) temininden, hayvanların beslenmesi amacıyla hammadde (*kaba ve kesif yem*) tedarikine, hayvan sağlığı ve bakım hizmetlerinden pazarlama ve satış aşamasına kadar geçen birçok süreci kapsayan, karmaşık bir faaliyettir. Hayvancılık faaliyeti ülkelerin temel üretim alanlarından biri olmasının yanı sıra toplum fertlerinin yeterli ve dengeli beslenmesini sağlamasıyla, milli gelire olan katkısıyla, döviz girdisiyle ve tasarrufuyla, kırsal alanda yaratmış olduğu istihdamıyla ekonomide stratejik bir konuma sahiptir. Ne var ki uygulanan politikalar, piyasadaki risk ve belirsizlik seviyesinin yüksek olması, çiftçinin elde etmiş olduğu ürünü ettiği fiyattan satamaması gibi ciddi sorunlar nedeniyle bu faaliyet ülke genelinde arzu edilen düzeye henüz ulaşamamıştır.

Orta Anadolu Havzasında bulunan Kırşehir ili hem bitkisel hem de hayvancılık faaliyetinde önemli bir aktördür. Devlet destekli tarımsal krediler, hibe programlarının da etkisiyle şehirde hayvancılık faaliyeti her geçen gün artmaya devam etmektedir. Girişimcilerinde alana olan ilgisiyle Kırşehir ili gelecekte de kayda değer bir potansiyeli şimdiden barındırmaktadır. Bu nedenle Kırşehir ilinde hayvancılığın yaygınlaştırılması, geliştirilmesi ve modernizasyonuna yönelik çalışmalar hız kazanmıştır. Bununla birlikte Kırşehir ilinin öncelikli amaçlarından birisi sığır besiciliği faaliyetinde kırmızı et üretimini sürekli arttırmak ve bu alanda “*marka şehir*” olmaktır. Bu amaca katkı sunması açısından Kırşehir’de sığır besiciliğinin hem desteklenmesi hem de geliştirilmesi için yapılacak yatırımların gerçekleştirileceği bölgeler belirlenmeli ve yeni yatırımcılar bu konuda bilgilendirilmeli ve yönlendirilmelidirler.

O halde yürütülen bu çalışmanın temel amacı sığır besicilik işletmesi yatırımları için Kırşehir ilinde en uygun kuruluş yeri bölgesini belirlemektir. Böylelikle girişimcilere henüz yatırımlarının fizibilete aşamalarında kaynaklarını etkin ve verimli bir şekilde kullanmasına, maliyetlerini kontrol altında tutabilmesine, işgücü ve zamandan tasarruf sağlamasına katkı sunulması hedeflenmektedir. Ayrıca bölgesel kalkınma amacıyla devlet tarafından sağlanan

desteklerin ve yatırım teşviklerinin etkin kullanımı açısından politika geliştiricilere bilgi sağlamak da çalışmanın bir diğer amacı olarak görülmektedir.

HAYVANCILIK ve SIĞIR BESİCİLİĞİ

İnsanoğlunun hayatını devam ettirebilmesi için besin almaya ihtiyacı vardır. Kişinin fiziksel ve zihinsel olarak sağlıklı olabilmesi için yeterli düzeyde ve dengeli beslenmesi gerekmektedir. Bu nedenle besin maddeleri çeşitlilik içerisinde, kalite ve miktar yönünden belirli düzeyde tüketilmelidir. Dengeli beslenme için ihtiyaç duyulan günlük 75-80 gr. proteinin en az yarısının hayvansal kökenli gıdalardan alınmalıdır ve bu hayvansal proteininde temel kaynağı et ve et ürünleridir (Cankurt, Miran ve Şahin, 2010: 16). Sağlıklı birey, sağlıklı toplum demektir. Bu nedenle ülkede vatandaşlarının gıda maddelerine kolay, rahat, hızlı ve düşük maliyet ile ulaşabilmeli sağlanmalıdır. Hiç kuşkusuz gıda ihtiyacının karşılanmasında tarım sektörünün yeri ve önemi tartışılmazdır. Bireylerin gelişmesinde ve toplumların geleceğinde kritik rolü bulunan tarım sektörünün önemi her geçen gün daha da artmaktadır. Gelecekte nüfuslarını doyurabilen ve üretim fazlalığını ihraç edebilen ülkeler “büyük ekonomiler” olacaklardır.

Tarım sektörünün alt faaliyetlerinden biri olan hayvancılık gerek o ülke vatandaşlarının beslenmesi gerekse de ekonomik kalkınma için stratejik bir konuma sahiptir. İnsanoğlunun bildiği en eski faaliyetlerden olan hayvancılık gıda sektörü başta olmak üzere tekstil, ilaç, enerji, inşaat ve daha birçok sektörü doğrudan ya da dolaylı olarak desteklemekte, bu sektörlerle hammadde ya da yarı mamul temininde bulunmaktadır. Türkiye'nin coğrafi koşullarının uygunluğu ve alana ilişkin bilgi birikimi hayvancılık faaliyetinin ülke genelinde geliştirilmesine olanak sunmasına rağmen yaşanan hammadde temini, girdi maliyetlerinin her geçen gün yükseliyor olması, fiyatlandırma ve dağıtım başta olmak üzere pazarlamaya ilişkin sorunlar hayvancılık faaliyetinin ilerlemesini zorlaştırmaktadır. Her ne kadar devlet eliyle sunulan teşvikler, hibeler ve uygun kredi imkânları olsa da yeterli büyümenin sağlandığını söylemek son derece güçtür.

Hayvancılık küçükbaş yetiştiriciliği, damızlık sığır yetiştiriciliği, süt üretimine yönelik hayvancılık faaliyetleri, kanatlı hayvan yetiştiriciliği ile arıcılık faaliyetlerinden oluşmaktadır. Hayvancılığın önemli alt kollarından birisi de sığır besiciliğidir. Bu faaliyet kolu yaratmış olduğu katma değer ve sağlamış olduğu istihdam ile ülke ekonomisinde önemli bir konuma sahiptir (Köknaoğlu, Demircan, Yılmaz ve Dernek, 2017: 76). Şöyle ki, Türkiye’de kırmızı et üretiminin önemli bir kısmı *sığır etinden* oluşmaktadır. 2020 verilerine göre 18 milyon sığırın 3.7 milyonu besilik olarak yetiştirilmiş ve 1.2 milyon ton kırmızı et üretilmiştir (TÜİK, 2021; FAO, 2020). Kırmızı et üretiminin yüzde 89,5’i sığır etinden oluşmaktadır geriye kalan yüzde 9,1’ini koyun ve yüzde 1,4’ü de keçi etidir. Ülkemizde sığır besiciliği ile yetiştirilen hayvanların ortalama karkas ağırlığı 1990’lı yıllarda 145 kg iken günümüzde 296 kg ulaşmış ve Avrupa Birliği ülkelerinin ortalama karkas ağırlığından (279 kg) daha fazla bir değere gelmiştir. Besicilik faaliyetinin yetiştiriciler tarafından et verimi açısından olumlu yönde geliştiği, bu konuda tecrübe ve bilgi birikiminin sağlandığı görülmektedir. Ancak girdi maliyetlerinin artması yetiştiricinin arzu ettiği düzeyde gelir elde etmesinin önüne geçmektedir. Bunun farkında olan yetiştiriciler maliyetlerini düşürmek konusunda daha da bilinçlenmiş, besi materyali temini, hammadde tedariki ve diğer süreçlerde işletmenin bulunduğu lokasyonun önemini fark etmiş durumdadırlar. Bu nedenle henüz yatırımın ilk aşamalarında cari dönemde ve gelecekteki maliyetlerini düşürebilmek ya da kontrol altında tutabilmek için çözümler geliştirmeye başlamışlardır.

KARAR VERME PROBLEMİ ve KURULUŞ YERİ SEÇİMİ

Karar verme insanoğlunun ayırt edici özelliklerinden birisidir. Karar verici konumunda olan kişiler herhangi bir konuda karar alırken birden fazla alternatifin üzerinde durmayı tercih eder. Bunun gibi birden fazla alternatifi dikkate alan, çoklu seçimler arasından karar verilmesini zorunlu kılan problemlere çok kriterli karar verme problemleri adı verilir. Bu problemler ürün seçiminden performans değerlendirmeye kadar oldukça çeşitlidir. Tesis lokasyon seçimi kararı da çok kriterli karar verme problemidir. Tesis lokasyon seçimi işletmelerin faaliyetlerinde maliyet, karlılık, rut planlaması, ulaşım mesafesi, kaynaklara ve pazara erişim gibi konuların optimizasyon için mevcut ya da yeni kurulacak tesislerin konumlandırılmasına yönelik operasyonel araştırma dallarından birisidir (Farahani, SteadieSeifi ve Asgari, 2010: 1690). Herhangi bir tesisin kuruluş yeri o işletmenin uzun vadede faaliyetlerini yürüteceği, coğrafik bilgi içeren yerdir. Girişimcinin işletmeyi kuracağı ve faaliyetlerini yürüteceği bölgeyi ve o bölge içerisindeki alana ya da araziye karar vermesi, kuruluş yeri seçimi problemi olarak tanımlanabilir.

Yer seçimine yönelik çalışmaların 1909 yılında Alfred Takip eden yıllarda yeterli ilgiyi görmeyen konu 1964 yılında Hakimi tarafından gerçekleştirilen “*polis merkezlerinin yerleşim yerlerinin belirlenmesi*” çalışması ile tekrar önem kazanmaya başlamıştır. Günümüze kadar birçok çalışma ile kuruluş yeri seçim problemi ele alınmış, farklı matematiksel modeller kullanılarak en uygun kuruluş yeri tespit edilmeye çalışılmıştır.

Yeni kurulacak işletmeler açısından stratejik bir öneme sahip olan kuruluş yeri seçimine yönelik bilimsel çalışmaların mekan biliminin öncüsü olarak kabul edilen VonThünen’in ekonomik faaliyetlerin mekan üzerindeki dağılımını açıklamaya çalıştığı teorisi ile atmıştır (Topçuoğlu ve Çalışkan, 2016: 103). VonThünen 1826 yılında yayınladığı “The Isolated State” adlı çalışmasıyla tarımsal lokasyon teorisini ortaya koymuş ve tarımsal üretim ile arazi kullanımının mekansal düzeninde şehirden çevreye doğru dairesel olarak gelişme gösterdiğini ileri sürmüştür. Ardından Alfred Weber’in 1909 yılında yayınlanan “Endüstrilerin Lokasyonları Teorisi” adlı kitabı ile başladığı kabul edilir (Farahani ve ark., 2010: 1690). Weber kitabında satış merkezi ile müşterilerin arasındaki mesafeyi azaltmaya yönelik teorik modelleme çalışmasının temel amacı genel bir lokasyon teorisi geliştirmektir (Owen ve Daskin, 1998:425). Sonraki yıllarda uzunca bir süre konuya ilgi gösterilmemiştir. 1964 yılında İran asıllı Amerikalı bir matematikçi olan Seifollah Louis Hakimi tarafından yayımlanan “Anahtarlama merkezlerinin optimum konumları ve bir grafiğin mutlak merkezleri ve medyanları” adlı çalışmasıyla tekrar önem kazanmıştır. Çalışmasında otoyol sistemi içerisinde polis karakolu inşa etmek için en iyi ve uygun yeri tespit etmeye çalışmıştır (Hakimi, 1964: 450). Sonraki yıllarda bölgesel ya da uluslararası işletmelerin kuruluş yeri seçimlerine yönelik çalışmalar yoğunlaşmıştır.

Kuruluş yeri seçimi yapılacak olan yatırımın kapasitesi, genişliği ve gelecekte işin büyümesine yönelik etkileri dikkate alındığında bütün sektörler için stratejik öneme sahip bir konudur. Ayrıca kuruluş yeri seçim kararı uzun dönemli ve stratejik bir karar olmasından dolayı değiştirilmesi oldukça güç ve maliyetlidir. İşletmenin geleceği açısından da kritik bir öneme sahiptir (Ömürbek, Üstündağ ve Helvacıoğlu, 2013: 103). İşletmenin yanlış yerde kurulması hammadde temini, pazarlama, taşıma maliyetleri, ulaşım, haberleşme ve altyapı sorunları gibi birçok sorun ile ve bu sorunları çözmeye yönelik katlanılması gereken maliyetleri arttırmakta ve dolayısıyla birim maliyetin artışına neden olmaktadır (Eleren, 2010: 406). Kuruluş yeri seçiminin temel amacı ihtiyaçların hızlı biçimde tedarik edilmesi, işletme verimliliğinin artırılması ve maliyet avantajı sağlanmasıdır. Kuruluş yeri seçimini etkileyen birden çok kriterin bulunmaktadır. Bunlar objektif yani işletmeye özgü bir takım faktörler olabileceği gibi çevresel, ekonomik, hukuki gibi subjektif bir takım faktörlerde oluşabilmektedir. Bu kriterlerin birbiriyle çelişmesi kararı karmaşık hale getirmektedir. Söz

gelimi işletmenin hammadde kaynaklarına yakın olması istenilirken diğer taraftan tedarikçiden uzaklaşmak durumunda kalabilmektedir ya da arazi maliyetlerinin düşük olması arzu edilirken diğer taraftan kuruluş masrafları artabilmektedir. Birbiriyle çelişkiler içeren bu tür kriterler arasında uzlaşının sağlanarak karar verilmesi gerekmektedir. Karar verici için en uygun seçeneğin belirlenmesine yardımcı olmak amacıyla çok kriterli karar verme teknikleri geliştirilmiştir. Bu teknikler karar verici durumunda olanlar için nihai kararı vermeden önce parametreleri karşılaştırabilmeleri için oldukça değerli bilgi sağlayabilmektedir (Rezaeisabzevar, Bazargan ve Zohourian, 2020: 182). Kuruluş yeri için en uygun bölgenin seçimine yönelik *Analitik Hiyerarşi Proses, Analitik Ağ Süreci, TOPSİS, ELECTRE, Bulanık TOPSİS, VİKOR* gibi çok kriterli karar verme yaklaşımlarının yanı sıra matematiksel ve sezgisel yöntemler ile simulasyon yöntemleri de çeşitli çalışmalarda tercih edilmiş ve kullanılmıştır. Bu yöntemlerin kullanıldığı bazı çalışma örnekleri Tablo 1. 'de verilmiştir.

Tablo 1. Kuruluş Yeri Seçim Kararlarında ÇKKV Tekniklerinin Kullanıldığı Çalışmalar

Çalışmayı Yürüten	Kullanılan Yöntem	Amaç
Akyüz ve Soba (2013)	ELECTRE	Uşak ili özelinde kurulacak tekstil sanayi işletmesi için alternatif üç kuruluş yeri belirlenmeye çalışılmıştır.
Eleren (2010)	Analitik Hiyerarşi Süreci	Dericilik işletmesi için alternatif altı kuruluş yerinin öncelik sıralaması yapılmıştır.
Yang ve Lee (1997)	Analitik Hiyerarşi Süreci	Yeni bir tesisin konumu ya da mevcut tesislerin yerini değiştirmeyi planlayan kuruluşların tesis konumu seçimine ilişkin bir karar modeli sunmaya çalışmışlardır.
Cheng, Li, ve Yu (2005)	Analitik Ağ Süreci, Analitik Hiyerarşi Süreci	Alışveriş merkezi kuruluş yeri seçimi için en uygun tekniği belirlemeye çalışmışlardır.
Yavuz ve Deveci (2014)	Bulanık TOPSİS, Bulanık VİKOR	Erzincan ili özelinde açılacak yeni alışveriş merkezinin kuruluş yeri seçimi için potansiyel bölgelerin değerlendirilmesi ve bunun sonucunda en uygun yer seçimi belirlenmeye çalışılmıştır.
Özdemir (2020)	Analitik Hiyerarşi Süreci	Ülkemizde kurulan ve kurulmaya devam edilen teknoparkların başarısında önem arz eden ve kuruluş yeri seçiminde hangi faktörlerin ne kadar önemli olduğunu belirlemeye çalışılmıştır.
Aytemiz ve Cingöz (2020)	Analitik Hiyerarşi Süreci	Kayseri ili özelinde faaliyet gösteren fast-food restoranın kuruluş yeri seçim kararına etki eden kriterlerin önem düzeylerini belirlemektir.
Alnıpak ve Yorulmaz (2019)	Analitik Hiyerarşi Süreci - TOPSİS ve Analitik Hiyerarşi Süreci – MOORA	Bütünleşik olarak kullanılan yöntemler ile tersane sayısı diğer bölgelere göre az olan Akdeniz Bölgesi'nde yeni kurulacak ilave bir tersane için en uygun tersane kuruluş yerinin belirlenmesi amaçlanmıştır.
Kuyrukçu ve Alkan (2020)	Analitik Hiyerarşi Süreci ve TOPSİS	AHP ve TOPSİS yöntemleri birlikte kullanılarak üniversitelerin ülke içi yer seçiminin değerlendirilmesine yönelik yeni bir metodoloji geliştirilmeye çalışılmıştır.
Rezaeisabzevar ve ark. (2020)	Analitik Hiyerarşi Süreci, Analitik Ağ Süreci	Çok kriterli karar verme teknikleri kullanılarak katı atık depolama sahasının seçimi için en uygun tekniği belirlemeye çalışılmıştır.
Ustasüleyman ve Perçin (2007)	Analitik Ağ Süreci	Analitik Ağ Süreci yaklaşımıyla firmaların kuruluş yeri seçim kararları değerlendirilmeye çalışılmıştır.

Tablo 1’de verilmiş olan çalışma örneklerinde de görüldüğü üzere kullanılan tekniklerden en yaygın ve popüler olanı Analitik Hiyerarşi Proses (AHP) yaklaşımıdır.

ANALİTİK HİYERARŞİ PROSES (AHP)

Matematik Profesörü Thomas L. Saaty tarafından 1977 yılında geliştirilen ve literatüre kazandırılan Analitik Hiyerarşi Proses (AHP) belirli hiyerarşiye göre düzenlenen kriterleri içeren, bu kriterlerin ağırlıklarını değerlendiren, kriterlere göre alternatifleri karşılaştıran ve sıralama yapılmasını sağlayan bir yöntemdir. AHP yönteminin uygulanmasında işlem basamakları şu şekildedir;

1. Model kurulur ve problem tanımlanır

Karar sürecine etki eden nicel ve nitel bütün kriterler anket çalışması ya da alanında uzman kişilerin görüşleri alınarak belirlenir. Daha sonra amaç, kriterler, alt kriterler ve alternatifler belirlenerek hiyerarşik bir yapı oluşturulur.

2. İkili karşılaştırma matrisi oluşturulur

Hiyerarşik yapının oluşturulmasının ardından Tablo 2.’de verilen bağıl önemler ölçeği kullanılarak ikili karşılaştırmalar ile veri toplanır. Bu aşamda iki kriter birbirine göre ve her ikili alternatif herhangi bir kritere göre karşılaştırılır. Hangi kriterin daha önemli ve ne kadar önemli olduğu tespit edilir. Böylelikle ikili karşılaştırmalar matrisi elde edilir. Thomas L. Saaty hiyerarşik yapıda unsurların bağıl öncelik değerlerinin belirlenmesi için ikili karşılaştırmaların yapılmasını önermektedir (Saaty, 1994: 26). İkili karşılaştırmada kullanılan 1-9 bağıl önemler ölçeği Tablo 2.’de gösterilmektedir.

Tablo 2. Bağıl Önemler Ölçeği

Değer	Tanım	Açıklama
1	Eşit Önemli	İki seçenekte eşit derecede öneme sahip
3	Biraz daha fazla önemli	Tecrübe ve yargı ile bir faaliyet değerine göre biraz daha fazla derecede tercih edilir.
5	Kuvvetli Derecede Önemli	Tecrübe ve yargı ile bir faaliyet değerine göre kuvvetli derecede tercih edilir.
7	Çok Kuvvetli Derecede Önemli	Bir faaliyet güçlü bir şekilde tercih edilir ve baskınlığı uygulamada rahatlıkla görülür.
9	Tamamıyla Önemli	Bir faaliyetin değerine tercih edilmesine ilişkin kanıtlar çok büyük bir güvenilirliğe sahiptir.
2,4,6,8	Ortalama Değerler	Uzlaşma gerektiğinde kullanılmak üzere iki ardışık yargı arasına düşen değerler.

Kaynak: Saaty, T. (1994). How to make a decision: the analytic hierarchy process. *Interfaces*, 24(6), 19-43.

3. Kriter ağırlıkları ve alternatiflerin skorları belirlenir

İkili karşılaştırma matrisleriyle her bir alternatifin ağırlığı hesaplanır. Bu noktada ikili karşılaştırma matrisindeki her bir sütun değeri, bulunduğu sütun toplamına bölünerek matris normalleştirilir. Normalleştirilmiş matristeki her sütunun toplam değeri 1 olmaktadır. Satırda yer alan değerlerin ortalamaları hesaplanarak özvektörler elde edilir.

4. Tutarlılık oranı hesaplanır

İkili karşılaştırma matrisinin tutarlı olabilmesi için en büyük özdeğerinin (λ_{max}) matris boyutuna (n) eşit olması gerekmektedir

$$\text{Tutarlılık İndeksi (CI)} = \frac{\lambda_{\max} - n}{n - 1}$$

Tutarlılık oranı (Consistency Ratio-CR) tutarlılık indeksinin aynı boyuttaki matrise karşılık gelen rastgele indekse (RI) oranlanmasıyla elde edilir.

$$\text{Tutarlılık Oranı (CR)} = \frac{CI}{RI}$$

Karar matrisinin tutarlı kabul edilebilmesi için $CR < 0,10$ olması arzu edilir. CR ne kadar sıfıra yakınsa karşılaştırma sonuçları o kadar daha tutarlı kabul edilecektir. Rassal indeksi için değerlendirilen n faktör sayısına göre karşılık gelen değerler Tablo 3.'de verilmiştir.

Tablo 3. Rassal Değerler

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Rassallık İndeksi (RI)	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

METODOLOJİ

Bu bölümde öncelikli olarak çalışmanın amacı ortaya konulmakta ve önemi vurgulanmaktadır. Araştırma yönteminin ayrıntılı olarak anlatılmasının ardından saha çalışmasında elde edilen verilerin analizi yine bu bölümde yer almaktadır.

Tarım işletmeleri için kuruluş yeri hayvansal ve bitkisel üretim faaliyetlerini yürüttüğü, organize ettiği, tedarik ve depolama fonksiyonlarını gerçekleştirebildiği yer olarak tanımlanabilir. Kırşehir ilinin potansiyeli dikkate alındığında sığır besiciliği faaliyetine ilişkin yeni yatırımlar almaya devam ederken diğer taraftan mevcut işletmeler kapasite arttırımına yönelik yatırımlarını sürdürmektedir. Bu bakımdan yürütülen bu çalışmanın temel amacı sığır besicilik işletmesi yatırımları için Kırşehir ilinde en uygun bölgeyi belirlemektir. Böylelikle girişimcilere henüz yatırımlarının fizibilite aşamalarında kaynaklarını etkin ve verimli bir şekilde kullanmasına, maliyetlerini kontrol altında tutabilmesine, işgücü ve zamandan tasarruf sağlamasına katkı sunulması hedeflenmektedir. Bölgesel kalkınma amacıyla devlet tarafından sağlanan desteklerin ve yatırım teşviklerinin etkin kullanımı açısından politika geliştiricilere bilgi sağlamak da çalışmanın bir diğer amacı olarak görülmektedir.

Alanyazını incelendiğinde pek çok alanda ve sektörde kuruluş yeri seçimi problemlerine ilişkin çözümler üretilmiş ancak sığır besiciliği tesisinin kuruluş yerine yönelik yapılan çalışmaların son derece kısıtlı olduğu görülmüştür. Sığır besiciliği işletmesinin kuruluş yeri seçimi hayvan refahı, canlı ağırlık alışı, hayvanların gelişimi, veterinerlik hizmetleri, kesim sonrasında ise karkas verimi ve randımanı, et kalitesi, fire oranı gibi birçok değişkeni etkileyen yanı sıra işletmenin maliyeti ve karlılığı üzerinde doğrudan etkisi olan stratejik ve kritik öneme sahip bir konudur. Dolayısıyla yürütülen bu çalışmanın alanyazına katkı sağlaması hedeflenmektedir.

Girişimci bir araya getirmiş olduğu üretim faktörlerini doğru yer ve zamanda en doğru biçimde değerlendirerek sağlayacağı geliri ve faydayı üst düzeye çıkarmak isteyecektir. Yatırım yapılması her zaman için belirli oranda risk içerir ve karşılaşılan süreçlerde genelde karmaşıktır. Birçok faktörün etki etmiş olduğu kararların alınması bilimsel yöntemlerden faydalanmak hem riski ve belirsizliği azaltacak hem de karmaşıklığı daha basit hale dönüştürebilecektir. İşletmenin başarısında önemli bir faktör olan kuruluş yeri seçimi de çok kriterli bir karar verme yöntemlerinden yararlanılmıştır. Bu çalışmada kriter ağırlıklarının

belirlenmesinde ve alternatiflerin değerlendirilmesinde Analitik Hiyerarşi Proses (AHP) tekniği kullanılmıştır.

Hiyerarşik yapıyı kurabilmek için sığır besiciliği işletmesinin kuruluş yeri seçimini etkileyen nitel ve nicel kriterleri belirlenmiştir. Bu amaçla uzman görüşleriyle birlikte literatürde kuruluş yeri seçimi kararına yönelik Eleren (2010), Ömürbek ve ark. (2013), İmren (2011), Ustasüleyman ve Perçin (2007) ve Yang ve Lee (1997) tarafından gerçekleştirilmiş olan çalışmalardan faydalanılmıştır. Kuruluş yeri seçim kararını etkileyen 65 kriter ortaya konulmuştur. Tasnif işleminden sonra birbirine benzer ya da yakın olan kriterler birleştirilmiş, “*Yan sanayi, sendikaların etkinliği, yaşam kalitesi, kültür*” gibi besicilik faaliyeti için kurulacak işletmelerin kararlarını etkilemeyen ya da çok az etkisi olduğu belirlenen kriterler değerlendirmeye dahil edilmemiştir. Nihayetinde 22 kriter elde edilmiştir. Ardından besicilik faaliyetinde bulunan, kolayda örnekleme ile tespit edilen 40 işletme sahibine öntest amacıyla anket uygulaması gerçekleştirilerek, tespit edilen 22 kriteri değerlendirmeleri istenilmiştir. 5’li likert tipi ölçeğe göre cevaplandırılan kriterlerin ortalama puanları alınarak, toplam ortalama puan içerisindeki yüzdelik payları hesaplanmıştır. Sonuç olarak ağırlıklarına göre 11 alt kriter belirlenmiş ve bu kriterler pazara ilişkin, çevresel ve ekonomik kriterler olmak üzere 3 ana kriter altında gruplandırılmıştır. Bu gruplandırmalar şu şekilde gerçekleştirilmiştir:

A) Pazara İlişkin Kriterler

Besicilik işletmesinin faaliyeti esnasında ihtiyaç duyacağı hammadde ve malzemeler ile bunların işletmeye ulaştırılması maliyet kontrolü açısından son derece önemlidir. Hasat zamanı doğrudan çiftçinin yetiştirmiş olduğu hububat ve biçim sonrası saman, yonca, yulaf gibi kaba yemlerin işletmeye taşınması ya da sözleşmeli/kiralama usulü üretim yapabilmek için araziye yakın olmak girdi maliyetleri açısından önemlidir. Bu nedenle girişimci hammadde kaynaklarına yakın bir lokasyon tercih edebilir. Tedarikçilere yakın olmak da bir diğer kriterdir. Her bölgede her ürün yetiştirilemediğinden tedarik zincirinin planlanması ve organize edilmesi gerekir. Özel sektör işletmeleri, Toprak Mahsulleri Ofisi ya da Lisanslı depolara yakın bir konumda işletmeyi kurmak işletmeye avantaj sağlayabilir. Hayvancılıkta besi materyalinin işletmeye gelmesinin ardından bir dizi veterinerlik hizmetlerinden faydalanılmaya başlanılır. Hastalıklara karşı hayvanların aşılınması, bu aşılardan periyodik olarak tekrarlanması, hastalıkların tedavisi (münferit ya da sürü tedavisi şeklinde), rasyon hazırlama, hayvan refahı ve gelişiminin takibi gibi birçok hizmetten faydalanılabileceğinden veterinerlik hizmetlerine yakın olmak girişimci tarafından tercih edilebilecek bir kriterdir. Son olarak hayvanların gerek yetişkin hale geldiğinde gerekse de istenmeyen olumsuz durumlarla (hastalık, sakatlık vb. gibi) karşılaşıldığında fire vermemek için mümkün olan en kısa sürede ve en az maliyet ile hayvanın kesimhaneye sevk edilmesi gerekebilir. Bu gibi durumda kesimhaneye yakın bir lokasyon tercih edilebilir.

Netice itibarıyla pazara ilişkin kriterler

- a. Hammaddeye yakınlık
- b. Tedarikçiye yakınlık
- c. Veterinerlik Hizmetlerine Yakınlık
- d. Kesimhaneye Yakınlık

olmak üzere dört alt kriter olarak belirlenmiştir.

B) Çevresel Kriterler

Girişimci besicilik faaliyetinin yapacağı bölgedeki çevresel faktörleri dikkate almak durumundadır. *Ulaşım imkanları*, işletmenin kurulacağı bölgenin kolay ulaşılabilir bir yerde

olması istenilir. Ayrıca hava koşullarının zorlaştığı kış şartlarında dahi ulaşım ile ilgili sorun yaşanılmaması önemlidir. İşletmenin kurulacağı bölgede su kaynağının olması, enerji nakil hatlarına yakınlığı ve işletmede ortaya çıkacak katı ve sıvı gübrenin tahliyesi gibi *altyapı olanaklarının* varlığı da kuruluş yeri seçimine etki eden kriterlerdir. *Yasal zorunluluklardan* dolayı belirli bölgelerde besicilik işletmelerine müsaade edildiği gibi, kimi yerlerde ana yola belirli mesafede kurulmasına müsaade edilmektedir. Bu nedenle yasalar seçim kararında etkin bir diğer kriter olarak görülmektedir. Son olarak besicilik faaliyetinde bulunan *diğer işletmeleri ile olan mesafe* özellikle bulaşıcı hastalık riskini arttıracığından tercih edilmiyor iken işletmeler arasında yardımlaşma ve dayanışmayı olan olumlu etkisinden mesafenin yakın olması da istenilmektedir.

Buna göre çevresel kriterler;

- a. Ulaşım imkanları
- b. Altyapı olanakları
- c. Yasal zorunluluklar
- d. Diğer işletmelere olan mesafe

olarak dört alt kriter olarak belirlenmiştir.

C) Ekonomik Kriterler

Bu ana kriter daha çok niceliksel kriterler içermektedir. Yapılacak yatırımın finansal planlamasını etkileyen bu kriterler;

- a. Arazi maliyetleri
- b. Kuruluş harcamaları
- c. Devlet teşvikleri

olmak üzere üç alt kriterden oluşmaktadır.

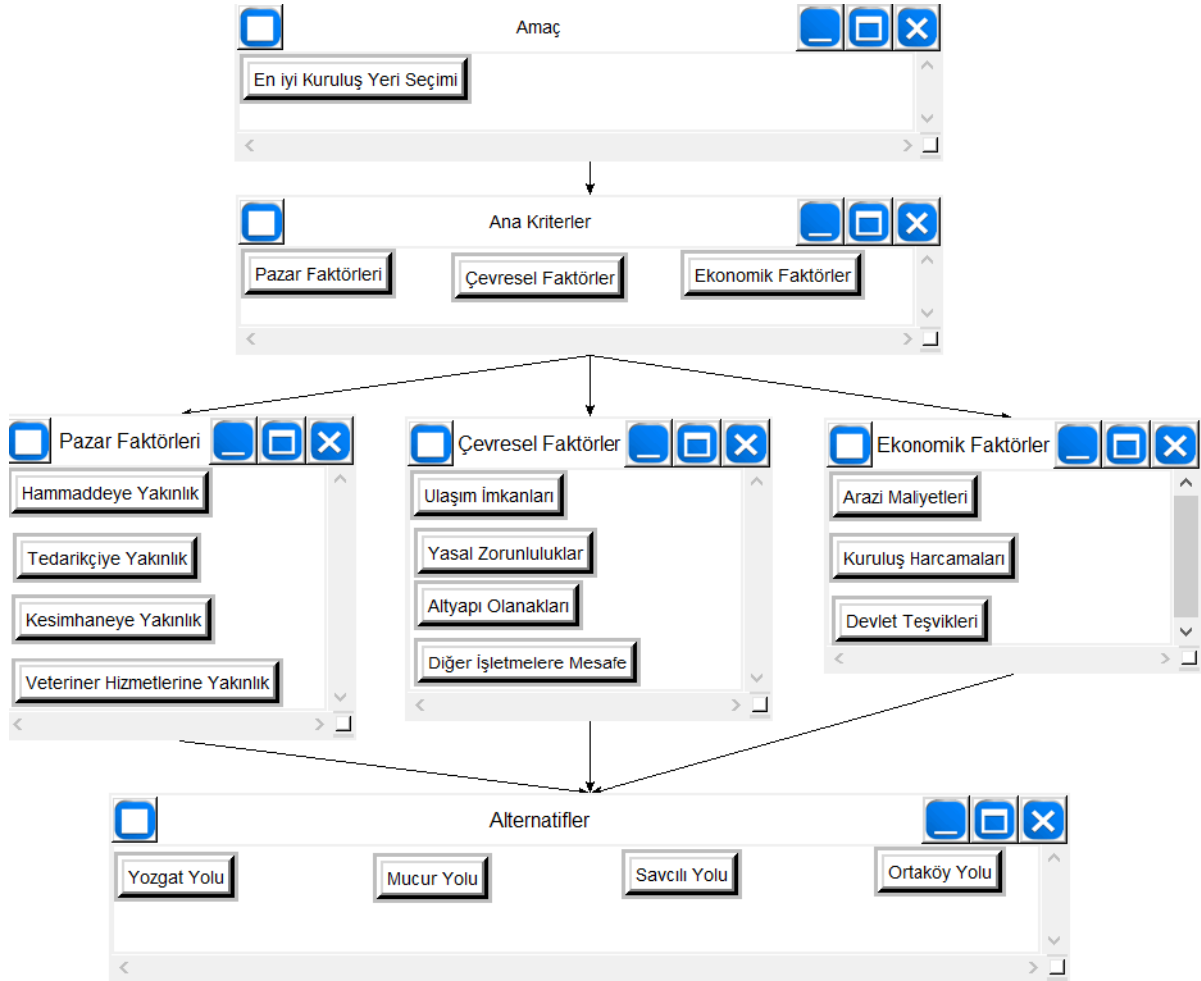
Ana ve alt kriterler belirlenmesinin ardından Kırşehir ilinde kurulacak besi işletmesinin kurulabileceği en uygun yerin seçilmesi için dört alternatif bölge belirlenmiştir. Bunun için öncelikle il genelinde hayvan dağılımı sayıları tespit edilmiş, daha sonra şehirlerarası ve ilçeler arası anayol bağlantıları dikkate alınmıştır. Kırşehir ilinde büyükbaş hayvan dağılımına bakıldığında 2019 verilerine göre Merkez’de 91 bin, Boztepe ilçesinde 45 bin, Mucur ilçesinde 39 bin, Kaman ilçesinde 25 bin, Çiçekdağ ilçesinde 20 bin ve diğer iki ilçenin toplamı 18 bin olarak dağılmaktadır (AHİKA, 2020:60). İl merkezinde D260 anayolu geçmektedir. Bu yol şehri komşu iller olan doğuda Kayseri, batıda Kırıkkale illerine bağlamaktadır. Ayrıca şehir merkezinden 15-20 km mesafe uzaklıkta bulunan Mucur ilçesi de yine bu D260 yolu üzerindedir. Kuruluş yeri olarak seçilmesi uygun olması bakımından ilk olarak “Mucur Yolu” ve çevresi çalışmaya dahil edilmiştir. Kırşehir’i kuzeyde Yozgat iline bağlayan D785 karayolu besicilik faaliyetinin yoğun olduğu bölgelerden biridir bu nedenle ikinci olarak “Yozgat Yolu” ve çevresinin değerlendirilmeye alınması uygun görülmüştür. Kırşehir’in Aksaray iline bağlantısı Ortaköy ilçesi üzerinden, D757 karayolu ile sağlanmaktadır. Son yıllarda bu bölgede de artan miktarda hayvancılık tesisi inşa edilmiştir. Üçüncü bölge olarak “Ortaköy Yolu” belirlenmiştir. Son olarak merkeze yakın olması, farklı sektörlerden yatırımcıların bölgeye olan ilgisi nedeniyle “Savcılı Yolu” dördüncü bölge olarak çalışmaya dâhil edilmiştir.

Kriterlerin ve alternatif bölgelerin belirlenmesinin ardından hiyerarşik yapı kurulmuştur. Hiyerarşik yapı Şekil 1.’de gösterilmektedir. AHP tekniğinde daha önce Tablo 2.’de verilen bağıl önemler ölçeği kullanılarak ikili karşılaştırmalar ile sahadan veri toplanır. Bu aşamada

iki kriter birbirine göre ve her ikili alternatif herhangi bir kritere göre karşılaştırılır. Hangi kriterin daha önemli ve ne kadar önemli olduğu tespit edilir. Böylelikle ikili karşılaştırmalar matrisi elde edilir.

Sahadan toplanan veri Excel 2016 ve Superdecisions 2.10 programları kullanılarak analiz edilmiştir. Çoklu karar vericilerden alınan yanıtlar ayrı ayrı hesaplanan kriter ağırlıklarını tek bir ağırlığa dönüştürmek için geometrik ortalaması alınarak analize devam edilmiştir.

Şekil 1. Hiyerarşik Yapı



Analizin bir sonraki aşamasında kriter ağırlıkları ve alternatiflerin skorları hesaplanır. Son olarak Karar matrisinin tutarlı kabul edilebilmesi için Tutarlılık Oranınının (CR) $<0,10$ olması arzu edilir. CR ne kadar sıfıra yakınsa karşılaştırma sonuçları o kadar fazla tutarlı kabul edilecektir. Yapılan hesaplamalar ile elde edilen kriter ağırlıkları ile tutarlılık oranları Tablo 4.'de sunulmuştur.

Tablo 4. Kriter Ağırlıkları ve Tutarlılık Oranı

Kriter ve Alt Kriterler	Gruplara Göre Normalleştirilmiş	Tutarlılık Oranı (CR<0,1)
Kuruluş Yeri Alternatifleri	Yozgat Yolu	0.51583
	Mucur Yolu	0.29470
	Ortaköy Yolu	0.13085
	Savcılı Yolu	0.05862
Ana Kriterler	Pazar Faktörleri	0.73064
	Ekonomik Faktörler	0.18839
	Çevresel Faktörler	0.08096
Pazar Faktörleri	Hammaddeye Yakınlık	0.54213
	Kesimhaneye Yakınlık	0.32838
	Tedarikçiye Yakınlık	0.05763
	Veteriner Hizmetlerine Yakınlık	0.07187
Çevresel Faktörler	Altyapı Olanakları	0.65739
	Diğer İşletmelere Mesafe	0.20269
	Ulaşım İmkanları	0.09419
	Yasal Zorunluluklar	0.04573
Ekonomik Faktörler	Kuruluş Harcamaları	0.64911
	Arazi Maliyetleri	0.27896
	Devlet Teşvikleri	0.07193

SONUÇ

Çok kriterli karar verme tekniklerinden Analitik Hiyerarşi Proses tekniği ile Kırşehir ilinde sığır besiciliği faaliyeti için kuruluş yeri seçiminde ideal bölge tespit edilmiştir. Kriterler arasında pazara ilişkin faktörler (hammaddeye-**0,54** kesimhaneye – **0,33**, tedarikçiye – **0,05** ve veteriner hizmetlerine yakınlık **-0,07**) kuruluş yerini etkileyen en önemli ana kriter olduğu görülmüştür. Hayvanların beslenmesi için girdi teminin hızlı yapılması gerekliliğinden dolayı hammadde (besi materyali dahil, kaba ve kesif yem) kaynaklarına yakın bir lokasyonda işletmenin kurulmasının maliyetler açısından önemli olduğu görülmüştür. Ayrıca hayvanların gerek besi süresinde gerekse de besi tamamlama aşamasında mümkün olan en kısa sürede ve en az ulaşım maliyeti ile kesimhaneye sevk edilmesi gerektiğinden, kesimhaneye yakınlık da kuruluş yeri belirlenmesinde önemli diğer bir kriterdir.

Çevresel faktörler içerisinde *alt yapı olanakları* (0,66), ekonomik faktörler içerisinde de *kuruluş harcamaları* (0,64) kriterleri işletmenin kuruluş yeri seçimine etki eden alt kriterler olarak tespit edilmiştir.

Yasal zorunluluklar, ulaşım imkanları ve devlet teşvikleri kuruluş yeri seçimine etkisi son derece düşük kriterlerdir. Kırşehir ilinde sığır besiciliği tesis kurulumu için belirli bölgelerde yasal kısıtlamalar bulunmaktadır. Kırşehir – Kayseri güzergahında anayola mesafe belirli bir mesafeden sonra kuruluşu izin verilmektedir. Ayrıca Boztepe ilçesi içerisinde bu faaliyette bulunmak isteyenler mandralar bölgesi olarak isimlendirilen alanda izin verilmektedir. Bunun dışında kuruluş yeri ile ilgili yasal zorunluluklar yatırımcılar açısından önemli bir kriter olarak değerlendirilmemiştir. Kırşehir gerek yüzölçümünün küçük olması gerekse de anayol bağlantılarının güçlü olması nedeniyle ulaşım yönünden kolaylıklı şehirlerden birisidir. Devlet teşvikleri kapsamında ise kırsal kalkınma fonları ve ekonomik yatırım destekleri il genelinde uygulanmaktadır. Ne var ki il genelinde bu tarz desteklerden yararlanma eğiliminin düşük olduğu, kuruluş yeri seçimi içinde kararı etkileyecek bir kriter olmadığı görülmektedir.

Bu konunun daha ayrıntılı olarak irdelenmesi gerekmektedir. Teşviklerden faydalanma isteğinin olmamasının altında yatan sebepler ortaya konulmalıdır.

Kırşehir ilinde ideal kuruluş yeri lokasyonu olarak Kırşehir-Yozgat karayolu güzergahında olan bölge seçilmiştir. Bahsi geçen bölge Yozgat yolu olarak anılmakta ve bu alternatif bölge 0,52 gibi yüksek bir ağırlığa sahiptir. Bölgede kesimhanenin bulunması, yem fabrikasının yer alması, biogaz tesisinin yakın geçmişte faaliyete geçmiş olması, ana güzergah olması nedeniyle de ulaşım imkanlarının son derece kolay ve rahat olması yine o bölgede yoğun olarak sığır besiciliği faaliyetlerinin yapıyor olması yürütülen bu çalışmanın doğruluğunu ve tutarlılığını ortaya koymaktadır.

Mucur Yolu 0,29 ağırlığı ile kuruluş yeri seçiminde Yozgat yolundan sonra güçlü bir alternatif bölgedir. Savcılı yolunun ağırlığı 0,05 olarak hesaplanmış kuruluş yeri seçimi için en olumsuz alternatif bölge olarak belirlenmiştir. Tedarikçiye yakınlık ve ulaşım imkanları alt kriterlerine göre Ortaköy Yolu daha çok tercih edilmiş olsa bile işletmenin kuruluş yeri olarak belirlenmesinde 0,13 ile en düşük ağırlığa sahip ikinci bölge olarak tespit edilmiştir.

Bölgeye yapılacak yeni yatırımlarda, uygulanacak teşvik ve hibe desteklerinde bölgeler arasındaki farklılıkların göz önünde bulundurulmasında fayda görülmektedir. Söz gelimi Savcılı Yolu kuruluş yeri alternatifinde en olumsuz bölge olarak tespit edilmiştir. Bu bölgenin de sığır besiciliği açısından cazip bir yatırım alanı haline dönüştürülmek isteniliyorsa geliştirilmesi gereken hususlar ortaya konulmuştur. Kesimhaneye uzak algılanması, altyapı olanaklarının yetersiz görünmesi gibi alt kriterler doğrultusunda düzenlemeler o bölgenin de yatırım alabilmesi için etkili faktörlerdir.

Gelecekte bu alanda yapılacak çalışmalarda sığır besiciliğinin gelişmiş olduğu diğer iller ile kıyaslamalar yapılabilir. Tespit edilecek bulgular bölgeler arasındaki benzerlikleri ve farklılıkları ortaya koyacağından, Kırşehir ili için geliştirilmesi gereken zayıf yönleri belirlenebilir. Yapılabilecek bir diğer çalışmada ildeki sığır besiciliği işletmelerinin bulanık kümeleme analizi benzer özellikler gösteren gruplar tespit edilip, bu grupların il genelinde dağılım haritası ortaya konulabilir ve bu çalışmanın sonuçları ile kıyaslanabilir.

KAYNAKÇA

- AHİKA (2020). Kırşehir İli Et İşleme Entegre Tesisi Ön Fizibilite Raporu, Ahiler Kalkınma Ajansı, <https://www.ahika.gov.tr/dokuman-merkezi/fizibilite-raporlari/kirsehir-ili-et-isleme-entegre-tesisi-on-fizibilite-raporu> Erişim Tarihi: 8 Kasım 2021
- Akyüz, Y., ve Soba, M. (2013). ELECTRE yöntemiyle tekstil sektöründe optimal kuruluş yeri seçimi: Uşak ili örneği. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 9(19), 185-198.
- Alnıpak, S., ve Yorulmaz, M. (2019). Tersane Yöneticileri Bakış Açısından Bütünleştirilmiş AHS-TOPSİS ve AHS-MOORA Yöntemleri ile Tersane Kuruluş Yeri Seçimi: Akdeniz Bölgesi Örneği. *Beykoz Akademi Dergisi*, 7(2), 106-125.
- Aytemiz, T., ve Cingöz, K. (2020). Kuruluş yeri seçiminde analitik hiyerarşi süreci: Kayseri’de bir fast-food zinciri uygulaması. *Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 3(50), 248-261.
- Cankurt, M., Miran, B., ve Şahin, A. J. H. Ü. (2010). Sığır eti tercihlerini etkileyen faktörlerin belirlenmesi üzerine bir araştırma: İzmir ili örneği. *Hayvansal Üretim*, 51(2).
- Cheng, E. W., Li, H., ve Yu, L. (2005). The analytic network process (ANP) approach to location selection: a shopping mall illustration. *Construction Innovation*.

- Eleren, A. (2010). Kuruluş yeri seçiminin analitik hiyerarşi süreci yöntemi ile belirlenmesi; deri sektörü örneği. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 20(2), 405-416.
- Farahani, R. Z., SteadieSeifi, M., ve Asgari, N. (2010). Multiple criteria facility location problems: A survey. *Applied Mathematical Modelling*, 34(7), 1689-1709.
- FAO (2020). Livestock Primary, <http://www.fao.org/faostat/en/#data/QL> Erişim Tarihi: 2 Kasım 2021
- Hakimi, S. L. (1964). Optimum locations of switching centers and the absolute centers and medians of a graph. *12(3)*, 450-459.
- İmren, E. (2011). *Mobilya endüstrisinde analitik hiyerarşi prosesi (ahp) yöntemi ile kuruluş yeri seçimi*. Bartın Üniversitesi Fen Bilimleri Enstitüsü,
- Köknaoğlu, H., Demircan, V., Yılmaz, H., ve Dernek, Z. (2017). Besi sığırcılığı üretim faaliyetinde üreticilerin eğitim düzeylerinin besi performansı ve kârlılığa etkisi. *Ziraat Fakültesi Dergisi*, 12(1), 75-84.
- Kuyrukçu, Z., ve Alkan, A. (2020). Üniversitelerin Kuruluş Yeri Seçiminin Ahp ve Topsis Yöntemleri Kullanılarak Değerlendirilmesi. *Uluslararası Sosyal Araştırmalar Dergisi*, 13(69), 625-638.
- Owen, S.H. ve Daskin, M.S. (1998). Strategic Facility Location: A Review, *European Journal of Operation Research*, Vol. 111, pp. 423-447.
- Ömürbek, N., Üstündağ, S., ve Helvacıoğlu, Ö. C. (2013). Kuruluş yeri seçiminde analitik hiyerarşi süreci (AHP) kullanımı: Isparta bölgesinde bir uygulama. *Yönetim Bilimleri Dergisi*, 11(21), 101-116.
- Özdemir, Y. (2020). İnovasyon Odaklı Girişimlerin Desteklendiği Teknoparkların Kuruluş yeri Seçiminde Etkili Olan Değişkenlerin AHP İle Önem Katsayılarının Belirlenmesi. *Uluslararası Yönetim Bilişim Sistemleri ve Bilgisayar Bilimleri Dergisi*, 4(1), 74-83.
- Rezaeisabzevar, Y., Bazargan, A., ve Zohourian, B. (2020). Landfill site selection using multi criteria decision making: focus on influential factors for comparing locations. *Journal of Environmental Sciences*, 93, 170-184.
- Saaty, T. L. (1994). How to make a decision: the analytic hierarchy process. *Interfaces*, 24(6), 19-43.
- Topçuoğlu, A., ve Çalışkan, M. (2016). Bölgesel İktisatta Mekânın Önemi Üzerine Bir Değerlendirme: Yeni Ekonomik Coğrafya Yaklaşımı. *Ardahan Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 2(4), 101-112.
- TÜİK (2021). Hayvansal Üretim İstatistikleri,
<https://data.tuik.gov.tr/Bulten/Index?p=Hayvansal-Uretim-Istatistikleri-Aralik-2020-37207>
- Ustasüleyman, T., ve Perçin, S. (2007). Analitik ağ süreci yaklaşımıyla kuruluş yeri seçimi. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 9(3), 37-55.
- Yang, J., ve Lee, H. (1997). An AHP decision model for facility location selection. *Facilities*, Vol.15 No.9/10 pp.241-254 <https://doi.org/10.1108/02632779710178785>
- Yavuz, S., ve Deveci, M. (2014). Bulanık TOPSIS ve bulanık VIKOR yöntemleriyle alışveriş merkezi kuruluş yeri seçimi ve bir uygulama. *Ege Akademik Bakış*, 14(3), 463-479.

TARIMSAL KOOPERATİFÇİLİĞİN GELİŞİMİ VE KIRŞEHİR İLİNİN TARIMSAL KOOPERATİFÇİLİK POTANSİYELİNİN SWOT ANALİZİ İLE DEĞERLENDİRİLMESİ

DEVELOPMENT OF AGRICULTURAL COOPERATIVES AND EVALUATION OF AGRICULTURAL COOPERATIVE POTENTIAL OF KIRŞEHİR PROVINCE WITH SWOT ANALYSIS

Başar ALTUNTAŞ

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ÖZET

Eski çağlarda insanların tek başına üstesinden gelemedikleri zorluklar karşısında işbirliği yapma davranışı sergiledikleri ve nihayetinde ekonomik yarar sağladıkları bilinmektedir. Birlikte hareket etme ihtiyacı zaman içerisinde kooperatif olarak adlandırılan modern örgütlenme yapısının ortaya çıkmasını sağlamıştır. Günümüzde kooperatifçilik sürdürülebilir bölgesel kalkınmada etkili bir model olarak kabul edilmektedir. Kırsalın kalkındırılmasında temel amaçlardan birisi kent ve kırsal arasındaki gerek ekonomik gerekse de sosyo-kültürel farklılığı en aza indirmek koşuluyla, kırsal nüfusu yerinde tutabilmektir. Bu bakımdan kooperatifçiliğin tarım sektörü üzerinde geliştirilmesini sağlamak kırsalda yaşayan çiftçilerin ekonomik yönden yetersiz kalması sorununa çözüm olabilecek ya da etkisini en aza indirecektir. Küçük çaplı üretim yapan çiftçiler üretimlerinin az olması, buna karşılık maliyetlerinin fazla olması nedeniyle düşük gelir elde etmektedirler. Karşılaşılan bu sorunun üstesinden gelebilmek için küçük üreticileri örgütlü bir yapıya kavuşturmak ve oluşturulan bu yapısında etkin biçimde çalışması sağlanmalıdır. Bu bağlamda yürütülen çalışmanın temel amacı Kırşehir ilinde tarımsal kooperatifçiliğin potansiyelini irdelemek, mevcut potansiyeli SWOT analizi ile değerlendirmek, kooperatifçiliği geliştirme ve yaygınlaştırmaya yönelik öneriler geliştirmektir.

Anahtar Kelimeler: Kooperatif, Kalkınma, SWOT Analizi, Nitel Araştırma, Kırşehir

ABSTRACT

It is known that in ancient times, people exhibited cooperative behavior in the face of difficulties that they could not overcome alone and ultimately provided economic benefits. The need to act together has led to the emergence of a modern organizational structure called cooperative over time. Today, cooperatives are accepted as an effective model for sustainable regional development. One of the main purposes in rural development is to keep the rural population in place, provided that the economic and socio-cultural differences between the city and the countryside are minimized. In this respect, ensuring the development of cooperatives on the agricultural sector will either be a solution to the economic insufficiency of rural farmers or minimize its impact. Small-scale farmers earn low income because their production is low and their costs are high. In order to overcome this problem, small producers should have an organized structure and work effectively in this structure. The main purpose of the study carried out in this context is to examine the potential of agricultural cooperatives in Kırşehir, to evaluate the current potential with SWOT analysis, and to develop suggestions for developing and disseminating cooperatives.

Keywords: Cooperative, Development, SWOT Analysis, Qualitative Research, Kırşehir

GİRİŞ

Ülkeler açısından stratejik sektörlerinden belki de en önemlisi tarım sektörüdür. O ülke vatandaşlarının beslenmesi başta olmak bir çok temel ihtiyacını karşılayabilmesi ancak ve ancak tarım ve tarımsal üretim ile mümkün olabilmektedir. Sektör içerisinde yaşanan girdi maliyetlerinin yüksekliği, tarım arazilerinin verimsizleşmesi, sulama imkanlarının gün geçtikçe kısıtlanması gibi sorunları olan sektörde bir taraftan da etkin bir örgütlü yapının olmaması ya da kurulamaması gibi bir diğer önemli sorunu daha bulunmaktadır. Tarımda örgütlenme salt olarak çiftçilerin ekonomik örgütlenmesi olarak değil, mesleki bir örgütlenme olarak da ele alınması gereken çok boyutlu bir konudur. Verimli ve etkin çalışan örgütlü bir yapının sektörde aktif olması hem üretici hem de tüketici açısından son derece önemli kazanımların olmasına, fayda sağlamasına sebebiyet vereceği gibi ülke ekonomisine de başta istihdam ve kaynakların efektif kullanımı olmak üzere birçok avantaj sağlayacağı mutlaklıdır.

Yürütülen bu çalışma ile öncelikli olarak tarımsal örgütlenme konusu açıklanmıştır. Tarımsal örgütlenme modeli içerisinde stratejik konuma sahip olan tarımsal kooperatifçiliğin gelişimi hakkında bilgiler aktarılmıştır. Çalışmanın temel amacı Kırşehir ilinin tarımsal kooperatifçilik potansiyelini irdelemektir. Ortaya konulan mevcut potansiyel SWOT analizi yöntemi ile değerlendirilmiş ve il genelinde kooperatifçiliği geliştirme ve yaygınlaştırmaya yönelik tavsiyeler geliştirilmiştir.

ÖRGÜTLENME ve TARIMDA ÖRGÜTLENME

Günümüzde küreselleşme olgusundan etkilenmeyen hiç bir sektör yoktur. Sınırların tamamen ortadan kalktığı yeni düzen içerisinde tarım sektörü de üstüne düşen payı almış ve değişim sürecine girmiştir. Nihai tüketicilerin gıda güvenliği, sağlıklı tüketim, çevreyi koruma ve kaliteli ürün gibi beklentileri haliyle bu ürünlerin hammaddesini üreten çiftçilerinde bütün üretim süreçlerine katılmasını zorunlu kılmıştır. Çiftçilerin üretim desenlerinde etkin ve verimli olabilmesi için ihtiyaç duyduğu bilgilendirmenin yapılması, teknik bir dizi danışmanlıklara ihtiyaç duyması (*münavebe sistemi, rasyon hazırlama, hayvan refahı, toprak verimliliği vb. konular*), katlanmış oldukları risk ve belirsizlikleri azaltma, tarımsal üretim için gerekli olan girdi temini hususlarında çiftçiye yardımcı olacak, ona yön verebilecek, bağımsız yapılara bir diğer ifade ile örgütlere ihtiyaç duyulmaktadır.

Örgütlü yapıların üreticilere katma değerden daha fazla pay alabilme, tarımsal girdi maliyetini azaltma, daha iyi bir fiyatlandırma, teknik bilgiye erişim kolaylığı, pazarlık gücünü artırma gibi avantajlar sağlamaktadır (Sayın ve Sayın, 2004, 466). Bu tür avantajların farkında olan ekonomik yönden gelişmiş ülkelerde belli bir konuda uzmanlaşmış, ar-ge faaliyetlerini önemseyen ve çalışmalarını yoğunlaştırmış, sanayi ile entegre olabilmiş ve hatta o ülkenin tarım politikalarının oluşturulmasında lobi faaliyetleri yürütebilen güçlü ve özerk örgütlenme yapılarının olduğu görülmektedir.

Örgütlenme oldukça geniş bir kavram olmakla birlikte temel olarak ortak yaşama arzusu, birlikte hareket etme ve işbirliği içerisinde bulunma şeklinde tanımlanmaktadır (Karlı, Gül, Kadakoğlu ve Gürsoy, 2018:319, Kızılaslan ve Doğan, 2013:148). Gülçubuk (2007) örgütlenmenin benzer sorunlara sahip bireylerin sorunlarını çözmek için bir araya geldikleri yapı olarak nitelendirmektedir. Böylelikle bireyler sorunlarını çözmekte ve bireylerle ilgili uygulanacak politikalara yön vermek için baskı grupları oluşturabilmektedirler.

Türkiye’de tarımsal örgütlenme yapısı çeşitli kriterlere göre farklı sınıflandırmalara tabi tutulmaktadır. Tarımsal örgütlenme yapısı üretici ve yetiştirici örgütlenmesi olarak ele alındığında altyapı ve hizmet kurumları, finansman kurumları, meslek örgütleri ve ekonomik ve sosyal amaçlı kurumlar olmak üzere dört temel başlık altında özetlenmektedir (Can ve

Sakarya, 2012:32). Bir diğer inceleme şeklinde ise kamu örgütlenmesi ve üretici örgütlenmesi olarak iki başlık altında konu ele alınmaktadır. Bu ayrıma göre kamu örgütlenmesi içerisinde ilgili bakanlıklar yer alırken, üretici örgütlenmesi mesleki örgütlenme (*Ziraat Odaları, Çiftçi Birlik ve Dernekleri, Sendikalar*) ve ekonomik örgütlenme (*Tarimsal Kooperatifler, Birlikler, Üretici Birlikleri*) olmak üzere iki alt başlıkta incelenmektedir (Yercan, 2007: 20). Ülkemizin mevcut tarımsal örgütlenme yapısının daha kapsamlı sınıflandırılmasını ise Ekmen (2003)'de yapmış olduğu çalışma ile ortaya koymuştur. Buna göre:

1. Ekonomik Amaçlı Kuruluşlar: Tarım kooperatifleri, Birlikler, Şirketler
2. Politika Oluşturan Mesleki Amaçlı Örgütlenmeler: Türkiye Ziraat Odaları Birliği
3. Baskı Grubu Oluşturan Gönüllü Kuruluşlar: Vakıflar, Dernekler
4. Sosyal Amaçlı Örgütlenmeler: Ziraat Mühendisleri Odası, Veteriner Hekimleri Odası
5. Tarıma Hizmet Sunan Kamu Kuruluşları: Bakanlıklar (Tarım ve Orman, Kalkınma), DSI,

Kooperatifler, ziraat odaları ve birliklerin önemli rol üstlendiği bu yapı içerisinde sektörün ihtiyaçlarını karşılamada yeterli olmadığı görülmektedir (Subaşı ve Uysal, 2018).

KOOPERATİFÇİLİK ve TARIMSAL KOOPERATİFÇİLİĞİN GELİŞİMİ

Tarihsel süreçte insanların ekonomik olarak çözülemez diye düşünmüş oldukları birçok sorunu işbirliğine giderek çözmüşlerdir. Böylelikle sosyal-psikolojik ve fiziksel ihtiyaçlarını karşılayarak yaşamlarını devam ettirmişlerdir. Kooperatifçilik hareketinin kişilerin bireysel güçlerinin yetmemesi ve bu nedenle biraraya gelmeleri geleneğine ve bu geleneğe ait prensiplere dayalı köklerinden yeniden şekillenerek modern tarzda doğması ancak 19. yüzyıla rastlamaktadır (Öksüz, 1982:330). Modern kooperatifçilik geçmişin yeniden yorumlanmasından ziyade sanayinin gelişmesi ile birlikte üretim hızla artmış, pazar alanını genişletmek gerekliliği ile ekonomik ve sosyal sorunlar başta olmak üzere ortaya çıkan zorlu yaşam koşullarının neticesinde ivme kazanmıştır. Kooperatifler prensip olarak kâr elde etmekten ziyade ortaklarına hizmet etmek amacıyla çalışan ekonomik örgütlenmelerdir. Buradaki temel amaç ortakların ihtiyaçlarını karşılamak, sorunlarını çözmek, daha verimli çalışmalarına zemin hazırlamak ve ortaya çıkan ürünleri en iyi şekilde değerlendirmektir. Kooperatifler sayesinde kişiler birlikte hareket ederek, bir kişinin yapamadığını ortaklaşa olarak gerçekleştirebilme kabiliyetine erişirler. Ayrıca bireylerin benzer menfaatlerini gütmek amacıyla bir araya gelmeleri sosyal yaşamın da devamlılığı açısından önemlidir. Benzer menfaatlerin ahenksiz olduğu yerde mücadele ortaya çıkacaktır (Kaya, 1999:443). O halde kooperatif için belirli bir kavramsal çerçevede tanımlamak gerekirse “gönüllü kişilerin bir araya gelip, ekonomik, sosyal ve kültürel ortak ihtiyaçları için birlikte çalıştıkları, demokratik ve özerk örgütlerdir” (ILO, 2021). Yerel kalkınma başta olmak üzere bölgesel ve ülke ekonomisinin de büyüüp gelişmesine katkı sağlayan bu örgütlü yapılar, bir diğer taraftan da sosyal ve kültürel hizmetler de sunabilmektedir. Ayrıca kooperatiflerin gönüllülük, demokratik katılım, dayanışma ve işbirliği ilkeleri olmasından dolayı toplumsal eşitsizliklerin azaltılmasında, toplum yararına faaliyetlerin düzenlenmesinde önemli bir rol üstlenir.

Kooperatif ile ilgili en eski kayıtlar 1761 yılında İskoçya, Fenwick’de yerel dokumacıların bir araya gelerek oluşturdukları Fenwick Dokumacılar Derneği’ne aittir. Esas modern kooperatifçiliğin öncülere 1844 yılında İngiltere’nin kuzeyindeki Rochdale kasabasında bulunan pamuk fabrikasında çalışan 28 zanaatkarın bir araya gelerek Rochdale Adil Öncüler Derneği adıyla kurmuş oldukları tüketim kooperatiftir. Bu zanaatkarlar kasabada tüketim mağazası açmış ve bir takım ilkeler belirleyerek kooperatifçiliğin temelini atmışlardır (İnan,

2008:24). Rochdale Öncüleri olarak da bilinen bu hareket kooperatifçiliğin Avrupa’da hızlı bir şekilde gelişmesini tetiklemiştir (ICA, 2021). Her ne kadar İngiltere’de ortaya çıkan kooperatifçilik anlayışı öncü olarak kabul edilsede o tarihten daha önce 1830 yılında Fransa’da kurulan halk sandığı ile tarımsal üretimin yanında küçük esnaf ve sanatkarın da desteklenmesi gerektiği belirtilmiştir. Fransa’da üretim kooperatifçiliğinin ön plana çıkması nedeniyle bu alanda öncü olarak kabul edilmektedir. Almanya’da kooperatifçilik hareketi Herman Schultze-Delitzsch’in 1849 yılında hammadde alım kooperatifi kurmasıyla başlar ve Raiffeisen Bankasının 1864 yılında kurulmasıyla dönüm noktası yaşar. Bu banka kırsal kesimde yaşayanlara uygun kredi hizmetleri ve tasarruf imkanı sağlamaktaydı (Pakdemirli, 2019:178). İsrail 1909 yılında kurulan Kibbutz ve 1921 yılında kurulan ilk Moşav Ovdim köyleri ile üretim ve tüketim faaliyetlerinin kollektif anlayışa göre yürütülmüş ve tarımsal kooperatifçiliğin sosyalist ilkelere dayandırılarak sürdürüldüğü başarılı uygulamalar olmuşlardır. Rusya’da ise 1917 ihtilaliyle toprak mülkiyeti ve işletme düzeninde değişiklikler ile Sovkhoz ve Kolkhoz adıyla tarımsal işletme tipleri ortaya çıkmış ve kollektif biçimde tarımsal faaliyetler yürütülmüştür. Sovkhoz’lar devlet çiftlikleri anlamına gelirken, Kolkhoz’lar toprak, hayvan ve araç gereçlerde kısmen mülkiyet hakkı veren bir yapı olarak faaliyetlerini sürdürmüştür.

Türkiye’de çağdaş kooperatifçiliğin başlangıcı 1861 yılında Tuna valisi olan Mithat Paşa’nın kurmuş olduğu Memleket Sandıklarına dayanmaktadır. Bu sandıkların kuruluş amacı tefecilerden yüksek faizler ile kredi alan çiftçilerin ihtiyaç duyduğu nakdi uygun koşullarda sağlamaktı. Bu sandıklar zaman içerisinde işlevini yitirmesinden dolayı yerini Menafi Sandıklarına ardından da 1888 yılında kurulan Ziraat Bankasına bırakmıştır (Pakdemirli, 2019:179). 1913 yılında kurulan Aydın İncir Müstahsilleri Kredi ve Satış kooperatifi günümüz kooperatifçiliğine oldukça yakın kabul edilen ilk kooperatiftir. Kooperatifçilik alanında asıl gelişmenin yaşandığı Cumhuriyet dönemidir. 1924 yılında yürürlüğe konulan İtibari Zirai Birlikleri Kanunu, 1925’de kurulan Ankara Memurlar Kooperatifi, 1926 tarihli Ticaret Kanununda kooperatiflerin bir şirket türü olarak kabul edilmesi, ardından 1929 Zirai Kooperatifler Kanunu, 1935 yılında Tarım Satış ve Tarım Kredi Kooperatifleri kanunu ile devletin kooperatifleşme verdiği önemi ve devletin belirleyici bir rol oynadığını göstermektedir (Can ve Sakarya, 2012:30). Dolayısıyla kooperatifçiliğin gelişmesinde, düzenlenmesinde ve uygulanmasında Mustafa Kemal Atatürk en önde gelen destekçisi ve üyesi olduğu görülmektedir.

Türkiye’de tarım sektöründe küçük aile işletmelerinin yoğun olduğu görülmektedir. Bu işletmelerin temel finansman sorunlarını çözüme mücadelesi, teknoloji kullanımının düşük olması, tarımsal faaliyetle ilgilenen nüfusun demografisi, sektör içerisinde oluşan bilgi birikimi yetersizliği, pazarlama altyapısının yetersizliği, üretim altyapısına yönelik düzenlemenin olmayışı, yetersiz ihtisaslaşmanın varlığı gibi sebepler neticesinde arzu edilen düzeyde verimli işleyen bir mekanizmanın olmadığı bir yapı görülmektedir. Dağınık bir kırsal yerleşim yapısının mevcudiyeti, üretimden tüketime uzanan sürecin neticesinde tüketicilerin ödemek durumunda kaldıkları fiyatların yüksek olmasına rağmen üreticinin marjının son derece düşük iken araçların payı büyük kalmaktadır. Bu nedenle Türkiye içerisinde üreticilerin dayanışma halinde olabilecekleri, teknolojiyi ve yenilikleri takip edebilecekleri, birim başına kazancını arttırabileceği üretim deseni, üretim tekniklerini öğrenebileceği ve üreticilerin haklarını savunacak güçlü bir örgütlü yapıya ihtiyaç duyulmaktadır.

Bu bağlamda güçlü birer yapı olan kooperatifler ortakları için karşılanmasında zorluk çektiği ihtiyaçlarını temin etmek için maddi ve manevi güçlerini birleştiren dayanışma araçlarıdır. Yardımlaşma, dayanışma ve iş başarıma amacı içerisinde hareket eden kooperatifler üreticinin yürütmüş olduğu faaliyetlerinde etkin ve verimli olmasını sağlamanın yanı sıra tüketiciler de güvenilir gıdaya daha uygun maliyetlerle erişir. Kooperatifler piyasa içerisinde bir denge unsuru da yaratırlar. Pazarda fiyatların aşırı yükselmesini önlediği gibi fiyatın oluşması

suretiyle üreticinin olası zararını ortadan kaldırmakta bir nevi sigorta görevi üstlenir. Ayrıca kooperatiflerde demokratik yönetim olduğundan seçim ile göreve gelme ve görevden ayrılma sayesinde topluma hizmet konusunda en güzel kurumlardır. İşsizliğin azaltılmasında önemli rol oynayan kooperatifler, israfında önüne geçerek ekonomiye önemli katkı sunan örgütlenmelerdir.

Tarımsal amaçlı kooperatifler tarımsal kalkınma kooperatifleri, sulama kooperatifleri, su ürünleri kooperatifleri ve pancar ekicileri kooperatifi olmak üzere dört ana grupta toplanmaktadır. Tarımsal kalkınma kooperatifleri ortaklarının bitkisel, hayvansal üretimini geliştirmek ve ihtiyaçlarına yönelik tedarik, işleme ve pazarlama faaliyetlerini sürdürmeyi amaç edinmiştir. Yaratacağı istihdam ile iş sahası açmak ve ortakların ekonomik ve sosyal yönden gelişmelerini sağlamak da tarımsal kalkınma kooperatiflerinin amaçları arasında yer almaktadır.

Tarım sektörünün karşı karşıya kalmış olduğu riskleri azaltmak ve sektörü güçlendirmenin en etkili yolu üreticilerin örgütlenmesidir. (Doğan ve Ersoy, 2017:954). Kırsal kalkınmada önemli bir model olarak kabul edilen kooperatifçiliğin, Türkiye genelinde yaygınlaştırılması ve yönetim-organizasyon yönünden güçlendirilmesi gerekmektedir.

Kırşehir İlinin Tarımsal Faaliyetleri Açısından Değerlendirilmesi

Kırşehir'in Fiziki, Sosyolojik ve Tarımsal Profili

Kırşehir ili 1867 yılında bucak iken 1869 yılında ilçe olan Kırşehir 1924'den itibaren il statüsüne alınmıştır. Tarihi Hitit Dönemine kadar uzanan ilin ismi ilk zamanlarda Akova Saravena ardından Makissos ve Jüstinianopolis adlarıyla anılmıştır. Bozkırın ortasında yükselmiş olan şehire Türkler tarafından Kır-Şehir adı verilmiştir.

Kırşehir ili Türkiye'nin merkezi bir konumunda olan Orta Kızılırmak Havzasında yer almaktadır. Nevşehir, Kayseri, Yozgat, Kırıkkale ve Aksaray illerine komşu olan Kırşehir'de ulaşım olanağı karayolu ile sağlanmaktadır. İlin yüzölçümü 6.570 kilometrekaredir ve merkez dahil olmak üzere 7 ilçesi bulunmaktadır.

Anadolu coğrafyasında nadide bir yere sahip olan Kırşehir kültür ve sanat şehridir. Bununla birlikte Ahilik felsefesinin piri Ahi Evran-ı Veli'nin yaşadığı ve öğretisini yaydığı bir il olmasının yanı sıra 13. Yüzyılda Türkçeyi büyük bir inançla savunup Türkçe şiirler yazarak Türk edebiyatının önemli ismi Aşık Paşa, gökbilimi, islam hukuku ve felsefe-tasavvuf bilgini Caca Bey 'i yetiştirmiş olan kadim bir ildir. Aşık Said, Muharrem Ertaş, Neşet Ertaş, Şemsi Yastıman, Çekiç Ali gibi büyük halk ozanlarının ve Bozlak geleneğinin yeni kuşak temsilcilerinden İsmail Altunsaray'ın doğduğu, yetiştiği şehir olma özelliklerine sahiptir.

2020 yılı nüfus kayıt sistemi sonuçlarına göre il nüfusu toplam 243.042 kişidir. Nüfusun yaklaşık olarak %20,39'u (49.572 kişi) köylerde ikamet etmektedir. Şehrin yapısı gereği her ne kadar köyde yaşayan nüfus az olarak görülse de şehir merkezli ikamet ediliyor olsa da köy bağlantıları devam etmekte ve tarımsal üretim yapan kişiler çok sayıda bulunmaktadır.

Kırşehir'in temel ekonomisi tarıma dayanmaktadır. Faal nüfusun yaklaşık yüzde 80'i tarım, hayvancılık ve balıkçılık ile ilgilenmektedir. Toplam tarım alanı 3.248.179 dekar olan ilde 2019 yılı verilerine göre Çiftçi Kayıt Sistemine kayıtlı 20.343 çiftçi bulunmaktadır. Deniz seviyesinden yüksekliği 900 ila 1200 rakım olarak değişen ilde karasal iklim hakimdir. Genelde kahverengi toprak yapısı yoğun olmasına rağmen, kırmızı toprak, alüvyon toprak yapısında bulunmaktadır. Şehrin çeşitli bölgelerinde tarıma alışverişsiz olan çorak topraklarda bulunmaktadır. İl genelinde hububat (buğday, arpa, yulaf) başta olmak üzere, baklagiller (nohut, yeşil mercimek, fasulye), endüstri bitkileri (şeker pancarı, ayçiçeği), yem bitkileri (yonca, mısır, fiğ, korunga) ve yumrulu bitkiler (patates, soğan, sarmısak) yetiştirilmektedir

(Kıymaz, 2011:80). Bununla birlikte ilin uygun bölgelerinde meyve ve sebze tarımı gerçekleştirilmektedir. Hayvansal üretime yönelik faaliyetlerde son 10 yılda yoğun biçimde artmış bu kapsamda besicilik, damızlık yetiştiriciliği ve sağmal tesisler kurulmuştur. Bitkisel üretimine bakıldığında nohut üretiminde 66 bin ton ile Türkiye’de 1. Sıradadır. Biralık arpa üretiminde 3., yeşil mercimek üretiminde 4. ve korunga (tohum olarak) üretiminde 2. Sırada yer almaktadır. Hayvansal üretim yönünden 237 bin adet büyükbaş hayvan sayısı ile kişi başına düşen hayvan sayısında Türkiye’de 4. TR71 bölgesinde de 1. Sıradadır.

Kırşehir’in tarımsal örgütlenme yapısı içerisinde Tarım Kredi Kooperatiflerinin 23 bölgede yayılmış ve Tarımsal Kalkınma Kooperatifleri de 8 adet bulunmaktadır. Ayrıca Kırşehir Yağlı Tohumlar Tarım Satış Kooperatifi (Karadenizbirlik), Kırşehir Pancar Ekicileri Kooperatifi (Panko Birlik), Damızlık Sığır Yetiştiricileri Birliği ve Kırmızı Et Üreticileri Birliğinin de olduğu bir yapı söz konusudur. 2019 yılı Ticaret Bakanlığı verilerine göre Kırşehir’de toplam 42 kooperatiften 15’inin aktif olduğu, 27 tanesinin de faal olmadığı bunun yanı sıra 24 kooperatifin de terkin işlemlerinin yapıldığı görülmektedir (Ticaret Bakanlığı, 2019)

Kırşehir İlinin Tarımsal Kooperatifçilik Potansiyelinin SWOT Analizi

Herhangi bir ülkenin, bölgenin ya da işletmelerin iç ve dış çevresini analiz etmek için tercih edilen stratejik bir yönetim tekniği olan SWOT (*Strengths-Weaknesses-Opportunities-Threats*) analizi sistematik bir düşüncenin ve analize konu olan faktörlerin geniş çaplı araştırılmasını gerekli kılan bir tekniktir. İngilizce güçlü ve zayıf yönler ile fırsatlar ve tehditler sözcüklerinin baş harflerinden oluşan bir kısaltmadır. Analiz edilecek olan yapılar bu dört parametreye göre irdelenmekte, gerek niceliksel gerekse de niteliksel değerlendirmeler analiz edilmekte ve nihayetinde oluşturulan SWOT matrisi yorumlanarak bir takım görüşler ortaya konulmaktadır.

SWOT analizi dış çevreden gelen tehditleri ve oluşan fırsatları tespit etmeyi sağlayan, iç çevrede ise güçlü yönleri ile geliştirilmesi gereken zayıflıkları inceleyen stratejik planlama aracıdır. Bu yöntem net bir genel bakış içeren ve önemli problemleri tanımlayan, kullanımı kolay bir yöntemdir (Toksoy, Yenigün ve Şen, 2009:15). Bu analiz güçlü yönleri arttırmayı, zayıf yönler asgari düzeye indirmeyi, tehditlere karşı hazırlık yapmayı, risk ve belirsizlikleri azaltmayı ve fırsatları değerlendirmeyi amaçlar. Tespit edilen tehditlerin güçlü yönler ile bütünleştirilerek fırsata çevirmek ve ortaya çıkacak fırsatları da güçlü yönler ile en iyi şekilde değerlendirmeyi sağlayacak stratejilerin oluşturulmasına yönelik planlamaya katkı sağlar.

Araştırmanın amacına ulaşabilmesi için saha çalışması tasarlanmıştır. Bu çalışma Kırşehir il merkezinde gerçekleştirilmiştir. Sahadan elde edilen verilerin değerlendirilmesinde ve sonuçların geliştirilmesi sürecinde SWOT analizi tekniğinden faydalanılmıştır.

Araştırmanın örneklemini tarımsal üretim ile uğraşan çiftçiler oluşturmaktadır. Nitel araştırma olması nedeniyle örneklem büyüklüğünün belirlenmesinde alt sınır bulunmamaktadır. Bu tür araştırmalarda kritik husus az sayıda birimden, derinlemesine ve ayrıntılı bilgi edinmek olduğundan küçük örneklem grupları kullanılmaktadır. Nitel araştırmalarda örneklemin niceliği değil niteliği önemlidir (Baltacı, 2018:237). Ayrıca derinlemesine gerçekleştirilecek görüşmelerde örnek büyüklüğünün yaklaşık 30 görüşme olması gerektiği belirtilmektedir (Nastasia, 2015:4). Bu bağlamda yürütülen bu çalışmada bitkisel ve hayvansal üretim gerçekleştiren çiftçilerden oluşan 37 kişi ile yüzyüze görüşmenin yapılmasına karar verilmiştir. Görüşmenin gerçekleştirileceği kişilerin belirlenmesinde amaca yönelik örnekleme metodu kullanılmıştır. Katılımcılar belirlenirken bir takım kriterler göz önünde bulundurulmuştur. Bunlar sektör tecrübesinin en az 3 yıl olması, faaliyetini yürütmüş olduğu bölgede “örnek çiftçi” olarak nitelendiriliyor ya da potansiyelinin olması, farklı ürün deseni ve üretim tekniklerini kullanıyor olması, yenilikçi ve değişime açık kişilik yapısında olması. Çalışmaya katılan kişiler ile farklı zamanlarda, bire bir görüşmeler sağlanmıştır. Yapılandırılmış görüşme formu

hazırlanmış ve katılımcılara 10 temel soru yönlendirilmiştir. Görüşme esnasında yer yer formda yer almayan bir takım sorular ile daha ayrıntılı veriler toplanmıştır. Görüşmeler ortalama 35 dakika sürmüştür. Katılımcılara yönlendirilen sorular şu şekildedir:

1. “Tarımsal faaliyetlerinizde tek başınıza aşamadığınız sorunlarınız var mıdır?”
2. “Karşılaştığınız sorunları çözebilmek için benzer üretim yapan bir başka kişiyle işbirliği yaptığınız oldu mu?”
3. “Benzer işi yapanların birlikte, ortaklaşa hareket ederek daha başarılı olabileceğine inanıyor musunuz?”
4. “Kooperatifçilik ve kooperatifleşme hakkında ne düşünüyorsunuz?”
5. “Kırşehir ilinde üretim faaliyetinizle ilgili bir örgütlenme olsa katılır mısınız?”
6. “Sizce Kırşehirli üreticiler birlikte hareket etmeyi başarabilir mi?” bu sorunun cevabına göre
- 6a. Hayır ise “Kırşehir ilinde kooperatifleşmenin önündeki en büyük engel ya da zayıflık ne olabilir?”
- 6b. Evet ise “Kırşehir ilinde kooperatifleşme için elindeki güç nedir?”
7. “Kırşehir ilinin tarımsal faaliyetlerinde güçlü olduğu yönlerinin olduğunu düşünüyor musunuz?”
8. “Kırşehir’de kooperatif hareketinde bulunmanın yaratacağı fırsatlar neler olabilir?”
9. “Kırşehir’in hangi özelliklerinin kooperatifleşmenin önünde engel olabileceğini düşünüyorsunuz?”
10. “Gelecekte daha fazla kazanç elde edebileceğiniz bir işbirliğine girer ya da ortak hareket etmede gönüllü olarak yer alır mısınız?”

Görüşme formundan elde edilen veriler, elektronik ortama aktarılmış ve analiz edilerek SWOT etmenleri belirlenmiştir. Bu etmenlerin matriste yerleştirilmesinde herhangi bir kuvvet alanına tabi tutulmuş ve her bir etmenin ilgili matris kutusu içerisinde ağırlıkları eşit kabul edilmiştir.

BULGULAR

Araştırma kapsamında elde edilen veriler ayrıntılı olarak değerlendirilmiştir. Katılımcılara ilişkin demografik bilgileri Excel 2016 programı ile düzenlenmiş ve yüzdelerle dağılımları hesaplanmıştır. Katılımcılara ilişkin demografik bilgiler aşağıda ayrıntılı olarak sunulmuştur.

Tablo 1. Katılımcıların Yaş Dağılımı

Yaş	Kişi	%
18-39	6	16
40-59	22	60
60 ve üstü	9	24
Toplam	37	100

Katılımcıların yaş dağılımı Horng, Lee ve Chen (2001:189) tarafından yapılan sınıflandırmaya temel alınmıştır. Bu sınıflandırmada 0-2 yaş bebek grubudur ve genç yetişkin grubu da 3 yaş itibarıyla başlamaktadır. Bu çalışmada en küçük yaş grubu olarak 18 yaş alınarak sınıflandırılmıştır. Buna göre 18-39 yaş “genç yetişkin”; 40-59 yaş arası “orta yaş yetişkin; 60 yaş ve üzeri “yaşlı yetişkin” olarak sınıflandırılmaktadır. Katılımcıların yüzde 60 gibi büyük bir kısmı orta-yaş yetişkin grubunda yer almaktadır.

Tablo 2. Katılımcıların Gelir Dağılımı (Aylık)

Geliri	Kişi	Yüzde
1-3.049 TL	-	-
3.050-9.949 TL	34	92
9.950 ve üstü	3	8
Toplam	37	100

Gelir dağılımında sendikalar tarafından yapılan araştırmaların sonuçlarına göre hesaplama yapılmıştır. Buna göre Eylül 2021 itibariyle 4 kişilik bir ailenin sağlıklı, dengeli ve yeterli beslenebilmesi için yapması gereken aylık gıda harcaması tutarı yani açlık sınırı 3.049 TL/ay; bununla birlikte giyim, konut, ulaşım, eğitim, sağlık ve benzeri ihtiyaçlar için yapılması zorunlu aylık harcama toplam tutarı yani yoksulluk sınırı ise 9.931,59 TL/ay olarak hesaplanmıştır (Türkiş, 2021). Katılımcıların yüzde 92 gibi büyük bir kısmı yoksulluk sınırı olarak belirlenmiş olan gelir seviyesine sahiptir.

Tablo 3. Katılımcıların İş Tecrübesi (Yıl)

İş Tecrübesi	Kişi	Yüzde
1-5 Yıl	2	6
6-10 Yıl	9	24
11 yıl ve üstü	26	70
Toplam	37	100

Çalışmamıza katılan kişilerin sektör tecrübesinin yüksek olduğu görülmektedir. Yüzde 94 oranında 6 yıldan daha fazladır tarımsal üretim ile ilgilenmektedir.

Tablo 4. Katılımcıların İşletme Büyüklüğü

Tarım Arazisi (Dekar)	Kişi	Yüzde
1-50	1	2
51-250	24	65
251 ve üstü	12	33
Toplam	37	100
Küçükbaş Hayvan (Adet)	Kişi	Yüzde
1-100	2	5
101-250	21	57
251 ve üstü	14	38
Toplam	37	100
Büyükbaş Hayvan (Adet)	Kişi	Yüzde
1-100	18	49
101-250	14	38
251 ve üstü	5	13
Toplam	37	100

Katılımcıların arazi büyüklüğü ile işletmede ticari olarak yetiştirilen hayvan varlığı dikkate alınmıştır. Öztüketimi için yetiştirilen bitkisel ve hayvansal ürünler dikkate alınmamıştır. Katılımcıların işletme büyüklüklerine göre değerlendirildiğinde küçük ve orta büyüklükte işletmelerin ağırlıklı olduğu dikkat çekmektedir.

Katılımcılardan elde edilen veriler, il genelinde yapılan gözlemler, uzmanlar ile gerçekleştirilen mülakatlar ve sivil toplum örgütleri ve özel idare tarafından yayımlanmış raporlarında incelenmesiyle şekillendirilen SWOT matrisi aşağıda verilmiştir (Tablo 5.)

Tablo 5. Kırşehir İli Tarımsal Kooperatifçilik SWOT Analizi

Güçlü Yönler	Zayıf Yönler
<ol style="list-style-type: none"> 1. Güçlü ve köklü bir tarih 2. Ulaşılabilirlik, şehrin ulaşım olanaklarının gelişmiş olması 3. Halkın temel ekonomik faaliyetinin tarım olması nedeniyle ilgili birikimin yüksek olması. 4. Bilinçli bir çiftçi kesiminin bulunması 5. Hububat üretimi yüksek bir ildir 6. Nohut üretiminde Türkiye’de birincidir 7. Tarıma dayalı sanayi gelişmektedir 8. Besi sığırcılığı gelişmiştir 9. Ceviz, seker pancarı, ayçiçeği üretimi yaygındır. 10. Çiftçiler öğrenmeye ve gelişmeye istekli ve arzuludur. 11. Birlikte hareket etme eğilimi yüksektir 12. İlin jeotermal su kaynakları mevcuttur 13. İlde Tarıma ilişkin Lise ve Fakülte düzeyinde eğitim veren kurumları bulunmaktadır. 14. Çiftçilerin tarımsal üretimde tecrübeli olması. 15. Yeniliğe açık bir çiftçi kitlesi mevcuttur. 16. İl ve ilçe Tarım Müdürlükleri personeli kalifiyedir ve çiftçilere yardım etmekte isteklidirler. 17. İlde şeker fabrikasının bulunması. 	<ol style="list-style-type: none"> 1. Üreticilerin şimdye kadar tarımsal kooperatifçilik ile ilgili herhangi bir tecrübesinin olmaması. 2. Ürün pazarlamasına ilişkin sorunların mevcudiyeti. 3. Meralar verimsizdir. 4. Geleneksel üretim yöntemleri ağırlıklı olarak kullanılmaktadır 5. Yem bitkisi yetiştirme yetersizdir. 6. Tarımsal arazileri sulama yetersizdir 7. Üreticilerin birlikte hareket etme ile ilgili yeterli bilgileri bulunmamaktadır 8. Ortaklaşa hareket edilmesi halinde elde edilecek kazanımların farkında olunmaması 9. Entergre et tesisi bulunmamaktadır 10. Damızlık yetiştiricilik gelişmemiştir 11. Süt sığırcılığı yaygın değildir 12. Kırsaldan kente göç yoğunudur 13. Üretici birliklerine güven duygusu düşüktür. 14. Süt ve süt ürünlerinin üretilmesi ve paketlenmesine yönelik herhangi bir tesisleşmenin olmaması 15. Sulu tarım yapılan arazi varlığının çok düşük olması 16. Çiftçilere sulu tarım yapma müsaadesinin verilmemesi. 17. Tarım ürünü ihracatı konusunda bilgi yetersizliği 18. Kooperatifçiliğin üretici faydasına olacağına dair yeterli istatistiki veri ve göstergelerin olmaması
Fırsatlar	Tehditler
<ol style="list-style-type: none"> 1. İşletmelerin standardize edilmesine yönelik çalışmalar devam etmektedir 2. Jeotermal kaynağın örtü altı tarımda kullanılmasına başlanmıştır. 3. Ceviz eylem planı çalışmalar sürdürülmektedir 4. Malya, Karacaören ve Yeniköy Ovaları Büyük Ova Koruma Alanı kapsamına dahil edildi 5. İl Konya Ovası Projesi kapsamında yer almaktadır. 6. Hayvancılık sektörü cazibesini korumaya devam etmektedir. 7. Genç kesiminin kırsalda kendi girişimlerini kurmaya istekli olmaları 8. Hükümet politikaların ve yerel yönetimlerin kooperatifleşmeyi desteklemesi 9. Ülke genelinde başarılı kooperatifçilik uygulamalarının olması (Tire, Aydın gibi) 10. İlde bulunan üniversitede tarım ve kooperatifçilik ile ilgili fakülte ve bölümlerin olması 11. Üniversitenin bölgesel kalkınma misyonu çerçevesinde üreticilerle birlikte projeler gerçekleştirilmesi 	<ol style="list-style-type: none"> 1. Birlikte hareket etmeye yönelik önyargılar mevcuttur. 2. Genç nüfus kırsalı terk etme eğilimindedir 3. Yeraltı su kaynakları her geçen gün zayıflamaktadır 4. Üretim planlaması yapılmamaktadır. 5. Tarımsal girdi maliyetleri hızla yükselmektedir. 6. Meralar her geçen gün daha da verimsiz hale gelmekte hatta işgal edilmektedir. 7. Yatırım maliyetlerinin yüksek olması 8. Kooperatiflerin amacının dışına çıkacağına yönelik bir inancın gelişmiş olması 9. Kuraklık-soğukluk artışları nedeniyle oluşan riskler 10. Tarımsal ilaç ve kimyasal gübre kullanımının toprakları verimsiz hale getirmesinin farkında olunmaması 11. Enerji (elektrik, ısınma) ve akaryakıt maliyetlerinin artması

Gerçekleştirilen analiz neticesinde Kırşehir ilinin tarımsal kooperatifçilik yönünden güçlü ve zayıf yönleri ile bu tür bir örgütlü yapının geliştirilmesinin önündeki fırsatlar ve tehditler ortaya

konulmaya çalışılmıştır. Üreticilerin birlikte hareket etme, ortaklaşa çalışma ve kazanma istekliliği, bu konuya hevesli olmaları, tarım konusunda bilgi ve tecrübenin artmış olması, gençlerin kırsalda kendi girişimlerinde bulunma arzuları tarımsal kooperatifçiliğin şehrin genelinde yaygınlaşması için önemli avantajlar ve artı değerler sunmaktadır.

SONUÇ ve ÖNERİLER

Orta Kızılırmak havzasında yer alan Kırşehir, coğrafi konumu ve özellikleri, toprak yapısı ve iklimi ile tarımsal üretim için elverişli bir bölgedir. Bu nedenle ilin temel ekonomisini tarım ve hayvancılık sektörü oluşturmaktadır. Ancak tarım sektöründe etkin bir örgütlü yapının olmaması bir başka ifade ile üreticiler arasında kuvvetli bir işbirliği, birlikte hareket etme bağının olmaması, özellikle küçük üreticilerin gerçekleştirdiği faaliyetlerde arzu ettikleri geliri sağlayamamasına, istedikleri yaşam standartlarını yakalayamamalarına sebep olmaktadır. Düşük kapasite ile üretim yapan çiftçiler karşılaşmış oldukları başta pazarlama olmak üzere, tedarik, finansman ve diğer hizmetler (veteriner, zirai mücadele gibi) ile ilgili sorunları tek başlarına çözmekte zorlanmakta çoğu zaman ise bu sorunlarını çözmeden, mevcut koşulları kabullenmek durumunda kalmaktadır.

Kırşehir ilinin tarımsal kooperatifçiliğin gelişimine ilişkin potansiyeli değerlendirildiğinde, üreticilerin *birlikte hareket etme, işbirliği ve dayanışma* içerisinde bulunma eğilimlerinin yüksek olduğu görülmektedir. Çiftçilerin her geçen gün artan maliyetler başta olmak üzere ekonomik riskleri, pazarlama dair sorunları, üretmiş oldukları ürünlerin pazarda arzu ettikleri değeri bulamaması, mera alanların her geçen gün daha verimsiz hale geliyor olması, tarım ve hayvancılık ile ilgili işleme, toplama, paketleme tesislerinin yetersiz kalması, genç nüfusun gün geçtikçe kırsalı terk etmesi gibi önemli sorunlar ile tek başlarına mücadele edebilme ya da çözüm üretebilme imkanı bulamayacaklarının farkındadırlar. Bu nedenle örgütlü bir yapı içerisinde, üniversite, yerel yönetim ve özel idareler tarafından verilecek teşvik ve destekler ile bu sorunların üstesinden gelebileceklerini inanmaktadırlar.

Tarımsal kooperatifçiliğin il genelinde yaygınlaştırılmasının bölgesel kalkınmaya önemli katkı sağlayacağı muhakkaktır. Küçük üreticilerin ölçek ekonomisinden faydalanarak daha uygun koşullarda ham madde, yarı mamul tedarik edebilecek olması, üretim maliyetlerini düşürecektir. Tam rekabet piyasa koşullarının olmuş olduğu sektörde satış fiyatına üreticilerin etkisinin olmadığı bir piyasada çiftçilerin kazançlarını arttırabilmesinin yöntemi maliyetlerini kontrol altında tutabilmektedir. Bu yönüyle kooperatif çatısı altında bir araya gelmek maliyet kontrolü açısından çiftçilere avantaj sağlayacaktır. Böylelikle tehdit olarak görünen girdi maliyetleri, yatırım maliyetleri ve enerji ile akaryakıt maliyetlerinin etkisi azaltılabilecektir.

Çiftçilerin kooperatifleşme ile ilgili önlerinde ki en büyük engellerden birisi konu hakkında yeterli düzeyde bilgi sahibi olmamalarıdır. Geçmiş yıllarda diğer kooperatifçilik hareketleri ile ilgili (özellikle yapı kooperatifleri) yaşanılmış olan olumsuzluklar neticesinde tarımsal kooperatifçilikle de ilgili önyargılarının olması, başarısız olma korkusu neticesinde bir takım hukuki sorumluluklar altında kalma endişesi bu türden bir örgütlenme için önemli bir zayıflık olarak görülmektedir. Bir diğer taraftan ülke genelinde uygulanmakta olan başarılı kooperatifleşme örnekleri, bu önyargının ya da inancın ortadan kaldırılmasına yönelik önemli bir fırsat sunmaktadır. Düzenlenecek eğitim seminerleri sayesinde bölge çiftçilerinin bu konuda bilgilendirilmesi, teşvik edilmesi ve kamu desteğinin olduğu yapıların kurulması çiftçileri örgütlü bir yapı içerisine girmelerine katkı sağlayacaktır. Kamu kurumlarının ve yerel yönetimlerin kooperatifleşmeyi desteklemeleri çiftçiler nezdinde güven duygusunun oluşturulması açısından son derece gerekli bir husustur.

İl genelinde yapımı tamamlanmış bir adet, yatırım süreci devam eden iki adet Biogaz tesisi bulunmaktadır. Bu tesislerden elde edilen elektrik enerjisi nakil hatları ile diğer bölgelere dağıtılmaktadır. Halbuki yapılan SWOT analizinde üreticiler tarafından belirtilen “enerji maliyetlerinin her geçen gün artıyor olması” tehdit unsuru olarak karşımıza çıkmaktadır. Bu tesislerde üretilen enerji bölge üreticilerine daha düşük maliyetler ile ulaştırılabilme imkanı bulunmaktadır.

İlde bulunan üniversitede tarım sektörü, kooperatifçilik, kırsal kalkınma ve ekonomi politikaları yönünden kayda değer bir bilgi birikimi söz konusudur. Hali hazırda tarım ve jeotermal alanında pilot üniversite olarak seçilen üniversitenin bölgesel kalkınmaya katkı sağlamaya yönelik gerçekleştirmekte olduğu projeler sayesinde üreticiler kaba yem yetiştirme, örtü altı tarıma geçme ve organik gübre üretme konularında bilgi sahibi olmuşlardır. Böylelikle üreticiler maliyetlerini düşürebilecekleri alternatif ve katma değeri yüksek üretim çeşitliliğine gidebileceğini fark etmişlerdir. Üreticilerin kooperatifleşme konusunda da endişelerini ortadan kaldıracak, örgütlü yapının sunacağı avantajlar için farkındalık oluşturacak projelerin hazırlanması da tarımsal kooperatifçiliğin bölgede gelişmesine katkı sağlayacaktır.

SWOT matrisi hücrelerinde tespit edilen etmenlerin kuvvet analizini gerçekleştirmek üzere gelecekte çok kriterli karar verme teknikleri ya da konjoint tekniği ile birlikteliklerin analizi irdelenerek etmenlerin ağırlıkları ortaya konulabilir. Yine gelecekte görüşme yapılan örneklem il içerisinde bulunan kamu kurumları ve sivil toplum örgütleri ile kalkınma ajanslarından uzman kişilerin katılımları sağlanarak ilin potansiyeli farklı boyutlarla değerlendirilebilir.

KAYNAKÇA

- Baltacı, A. (2018). Nitel Araştırmalarda Örneklem Yöntemleri ve Örnek Hacmi Sorunsalı Üzerine Kavramsal Bir İnceleme. *Bitlis Eren Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 7(1), 231-274
- Can, M. F., & Sakarya, E. (2012). Dünya ve Türkiye’de tarım ve hayvancılık kooperatiflerinin tarihsel gelişimi, iktisadi önemi ve mevcut durumu. *Veteriner Hekimler Derneği Dergisi*, 83(1), 27-36.
- Doğan, N.Ö. ve Ersoy, Y. (2017). Tarımsal Kalkınma Kooperatiflerinde SWOT Analizi: Uşak İli Örneği, Üçüncü Sektör Sosyal Ekonomi, Özel Sayı, 52, 952-969.
- Ekmen, E. (2003). Türkiye’de Çiftçi Örgütlenmesi. *Tarım ve Köyişleri Bakanlığı (Yayımlanmamış Hizmet içi Çalışması)*, Ankara.
- Gülçubuk, B. (2007). Kalkınma Stratejileri Açısından Tarımda Tabana Dayalı Kooperatif Örgütlenmesinin Sosyo-Ekonomik ve Kültürel Temelleri. 2007-Ulusal Kooperatifçilik Sempozyumu, Gazi Üniversitesi Koop-Mer, 25-26 Mayıs 2007, Ankara, s:129-139.
- Hornig, W. B., Lee, C. P., & Chen, C. W. (2001). Classification of age groups based on facial features. *Journal of Applied Science and Engineering*, 4(3), 183-192.
- İnan, İ. Hakkı, Türkiye’de Tarımsal Kooperatifçilik ve AB Modeli. İTO Yayınlar, No:2008-73, İstanbul, 2008.

ICA (2021). International Cooperative Alliance, Our History,

<https://www.ica.coop/en/cooperatives/history-cooperative-movement>, Erişim Tarihi: 22.11.2021

- ILO- Uluslararası Çalışma Örgütü (2021). Kooperatif Nedir? https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/genericdocument/wcms_766969.pdf Erişim Tarihi: 16 Kasım 2021
- Karlı, B., Gül, M., Kadakoğlu, B. ve Gürsoy, K.,A. (2018). Türkiye’de Tarımda Üretici Örgütlenmesinin Önemi Ve Gelişimi. *Akademia Sosyal Bilimler Dergisi*, Özel Sayı – 1, 318-329.
- Kaya, Y. (1999). İşbirliği ve Mücadele. *Selçuk Üniversitesi Edebiyat Fakültesi Dergisi*, (13), 437-445.
- Kıymaz, S. (2011). Kırşehir ili toprak ve su kaynaklarının tarımsal açıdan değerlendirilmesi. *Süleyman Demirel Üniversitesi Ziraat Fakültesi Dergisi*, 6(2), 76-85.
- Kızılaslan, H., Doğan, H. G., (2013). AB ve Türkiye’de Tarım Sektöründe Örgütlenme ve Üretici Birlikleri. *Sosyal Bilimler Araştırmaları Dergisi*. I, 146-159.
- Nastasia, B. (2015). Study Notes: Qualitative Research: Sampling & Sample Size Considerations. <https://www.studypool.com/documents/90822/sampling-sample-size-considerations-adapted> Erişim Tarihi: 13 Kasım 2021
- Öksüz, E. (1982). Kooperatifçilik Kavramı ve İlkelerinin Işığında, Türkiye’de Köy Kalkınma Kooperatifleri. In *Journal of Social Policy Conferences*, No. 31, pp. 329-358.
- Pakdemirli, B. (2019). Tarımsal kooperatiflerin dünya ve Türkiye’de mevcut durumunun karşılaştırılması. *ANADOLU Ege Tarımsal Araştırma Enstitüsü Dergisi*, 29(2), 177-187.
- Sayın, B., & Sayın, C. (2004). Türkiye’de tarımsal üretici örgütlenmesi, Avrupa Birliğine uyum hazırlıkları ve tarımsal üretici birlikleri kanunu. *Türkiye VI. Tarım ekonomisi kongresi*, 16-18.
- Subaşı, O. S., ve Uysal, O. (2018). Tarımsal Üretici Örgütlenmeleri ve Üretici Birlikleri. Uluslararası Erdemli Sempozyumu
- Ticaret Bakanlığı (2019). İllere Göre Kooperatif Dağılımı. <https://ticaret.gov.tr/kooperatifcilik/bilgi-bankasi/illere-gore-kooperatif-dagilimi> Erişim Tarihi: 09 Kasım 2021
- Türkîş (2021). Eylül 2021 Açlık ve Yoksulluk Sınırı, <http://www.turkis.org.tr/EYLUL-2021-ACLİK-VE-YOKSULLUK-SINIRI-d563758> Erişim Tarihi: 14 Kasım 2021
- Toksoy, D., Yenigün, M., ve Şen, G. (2009). Orman köylerindeki Tarımsal Kalkınma Kooperatiflerinin Swot analizi ile değerlendirilmesi (Maçka ilçesi örneği). *Kastamonu University Journal of Forestry Faculty*, 9(1), 12-18.
- Yercan, M. (2007). Türkiye ve Avrupa Birliğinde Tarımın Örgütlenme Deseni Ve Tarımsal Kooperatifler. *Turkish Journal of Agricultural Economics*, 13(1).

ÜNİVERSİTE ÖĞRENCİLERİNİN AKADEMİK ÖZ YETERLİLİKLERİ VE EMPATİK EĞİLİMLERİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

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ÖZET

Bu araştırma üniversite öğrencilerinin akademik öz yeterlilikleri ile empatik eğilimleri arasındaki ilişkiyi belirlemek için amaçlanmıştır. Araştırmanın örneklem grubunu 2021-2022 eğitim öğretim yılında Kırıkkale Üniversite Sağlık Bilimleri Fakültesi'nde öğrenim gören 197 öğrenci oluşturmaktadır. Araştırma, iki temel değişken arasında bir ilişkinin olabileceği varsayımı hareketiyle ilişki desende tasarlanmıştır. Elde edilen verilerde değişkenler arasındaki ilişkiyi belirlemek amacıyla Pearson korelasyon analizi yapılmıştır. Araştırmada veri toplama aracı olarak, araştırmacı tarafından oluşturulan "Genel Bilgi Formu", Dökmen (1988) tarafından geliştirilen "Empatik Eğilim Ölçeği" ve Owen ve Froman (1988) tarafından geliştirilip, Kemer (2006) tarafından Türkçe'ye uyarlanan Akademik Öz-Yeterlik Ölçeği kullanılmıştır. Araştırma sonunda bulgular incelendiğinde; Empatik Eğilim Ölçeği ve Akademik Özyeterlilik Ölçeği puanları arasında anlamlı düzeyde ilişki bulunmuştur ($r=-.33$). Empatik eğilim ile akademik öz yeterlilik, iyi bir vatandaş olma, sosyal öz yeterlilik, akademik yardım etkinliği ve nicel özyeterlilik arasında anlamlı düzeyde ilişki bulunmuştur. Ancak puanlar arasındaki ilişkinin düşük düzeyde olduğu sonucuna varılmıştır. Empatik eğilim ile anlayış ve toplum akademik öz yeterlilik puanları arasında ise orta düzeyde anlamlı bir ilişki olduğu saptanmıştır.

Anahtar Kelimeler: Akademik öz yeterlilik, empatik eğilim, üniversite öğrencileri.

Abstract

This research was aimed to determine the relationship between academic self-efficacy and empathic tendencies of university students. The sample group of the research consists of 197 students studying at Kırıkkale University Faculty of Health Sciences in the 2021-2022 academic year. The research was designed in relational design with the assumption that there may be a relationship between two main variables. In the obtained data, Pearson correlation analysis was performed in order to determine the relationship between the variables. As a data collection tool in the research, "General Information Form" created by the researcher, "Empathic Tendency Scale" developed by Dökmen (1988), and Academic Self-Efficacy Scale developed by Owen and Froman (1988) and adapted into Turkish by Kemer (2006). When the findings are examined at the end of the research; A significant correlation was found between Empathic Tendency Scale and Academic Self-Efficacy Scale scores ($r=-.33$). A significant relationship was found between empathic disposition and academic self-efficacy, being a good citizen, social self-efficacy, academic helping effectiveness and quantitative self-efficacy. However, it was concluded that the relationship between the scores was low. It was determined that there was a

moderately significant relationship between empathic tendency and understanding and community academic self-efficacy scores.

Keywords: Academic self-efficacy, empathetic disposition, University students.

GİRİŞ

İnsan yaşamının önemli bir yeri olan üniversite yaşamında, kişi kendini yeni bir çevrede ve akademik ortamda bulmaktadır. Üniversite yaşantısı akademik ve kişisel uyum açısından zorlukların yaşandığı bir dönemdir. Bu dönemde birey tanımadığı kişilerle bir arada olmakta, onlarla sosyal uyum konusunda zorluklar yaşamaktadır. Tüm bu psikososyal sorunların yanısıra, üniversite sisteminin gerekliliği olan akademik ortama uyum sağlama sorunuyla karşı karşıya kalmakta ve akademik yönden de başarılı olmak zorundadır.

Öz yeterlilik; bireylerin ne kadar çaba harcayacakları, engellere ne kadar dayanabilecekleri gibi davranışsal durumlarını ve aktivitelerini etkilerken, zorluklarla başa çıkabilme becerisi o kadar güçlü olacaktır (Bandura ve Adams, 1977) ve bireylerin düşüncelerini, hislerini, motivasyonlarını ve hareketlerini de etkileyecektir (Bandura, 1995). Bunun sonucu olarak da; bireyin öz-yeterlilik kabiliyeti insanların gösterecekleri kararlılığı, girişkenliği, uyumu ve empatik düzeylerini belirleyecektir.

Öz-yeterlilik; kişinin belirlemiş olduğu hedeflere ulaşmak için, engelleri aşmada kendi yeteneklerine olan inancı ve güveni olarak tanımlanırken (Bandura, 1993); empatik eğilim ise hem sosyo-duygusal hem de bilişsel bir süreç içerdiği ve kişinin kendini karşısındakinin yerinde hissetme ve benzer yaşantıları hatırlaması olarak ifade edilmiştir (Budak, 2009). Bu bağlamda; Öz yeterlilik ve empati arasındaki duyuşsal boyutlar bireylerin kararlarını belirlemede önemli rol oynamaktadır.

Bandura ve araştırmacılar bir işi başarma konusunda düşük akademik öz yeterlilik algısına sahip bireylerin o işten kolay vazgeçeceklerini; işi başarma kabiliyetlerinin yüksek olduğunu düşünen bireylerin ise daha istekli olduklarını, başarma konusunda daha azimli ve ısrarcı olacaklarını dile getirmektedirler (Bandura, 1997; Margolis vd., 2006). Öz yeterlilik algısı yüksek olan bireylerin akademik başarılarının da yüksek olması beklenmektedir. Bu durum öz yeterlilik ile akademik başarı arasında pozitif yönlü bir ilişkiyi kanıtlamaktadır. Ancak akademik öz yeterlilik düzeyin yüksek olması bireyde kaygı düzeyi artıracak ve bu da sosyal uyum için gerekli olan empatik eğilimlerini etkilemektedir. Öğrencilerin empatik eğilim ve kaygı arasındaki ilişkinin araştırıldığı bir çalışmada, empatik eğilim düzeyleri ile sürekli kaygı düzeyleri arasında negatif yönlü ilişki olduğu bulunmuştur (Pişkin, 1991).

Ülkemizde literatür incelendiğinde üniversite öğrencilerinin akademik öz yeterliliklerine (Zimmerman, 2000; Satıcı, 2013; Tabancalı ve Çelik, 2013; Kandemir, 2014) ve empatik eğilimlerine (Pişkin, 1991; Dinçyürek, 2004; Yüksel, 2004; Nazik ve Arslan, 2011; Akgün ve Çetin, 2018) yönelik ayrı başlıklarda araştırmaların olduğu, ancak üniversite öğrencilerinin akademik öz yeterlilikleri ile empatik eğilimleri arasındaki ilişkiye dair ilgili konularda yeterli çalışmanın yapılmadığı görülmüştür. Bu gereksinim doğrultusunda; bu çalışmanın amacı üniversite öğrencilerinin akademik öz yeterlilik ve empatik eğilim düzeyleri arasında ilişki olup olmadığını saptamaktır.

YÖNTEM

Araştırma Modeli

Belirlenen amaç bağlamında bu araştırmada değişkenler arasındaki ilişkiyi ortaya çıkaran ilişkiyel tarama modeli kullanılmıştır. İlişkiyel tarama modelinde, birden fazla değişken arasındaki birlikte değişim olup olmadığını, eğer değişim var ise değişimin derecesini belirlemeyi amaçlayan araştırma modellerinden birisidir (Karasar, 2008).

Çalışma Grubu

Araştırmada çalışma grubu; 2021-2022 eğitim öğretim yılında Kırıkkale Üniversite Sağlık Bilimleri Fakültesi'nde öğrenim gören 197 üniversite öğrenciden oluşturmaktadır.

Veri Toplama Aracı

Kişisel Bilgi Formu; araştırmacılar tarafından, araştırmada kullanılan bağımsız değişkenler hakkında veri elde edilmesine yönelik olarak hazırlanmıştır. Çalışma grubunu oluşturan öğrencilerin; yaş, cinsiyet, anne ve baba eğitim ve çalışma durumu hakkında bilgi toplanması amaçlanmıştır.

Empatik Eğilim Ölçeği; Dökmen (1988) tarafından geliştirilen ölçek 20 maddeden oluşmakta olup, puanlar (3, 6, 7, 8, 11, 12, 13, 15 sorular) tersten toplanmaktadır. Ölçekte alınabilecek puanlar “20 ile 100 arasında değişmekte ve yüksek puan empatik eğilim düzeyinin de yüksek olduğuna” işaret etmektedir. Ölçeğin örneklem grubu için Cronbach Alpha ile hesaplanan güvenilirlik katsayısı 0.72 olarak bulunmuştur.

Akademik Öz Yeterlilik; Owen ve Froman (1988) tarafından geliştirilip, Kemer (2006) tarafından Türkçe'ye uyarlaması yapılmış olan Akademik Öz-Yeterlik Ölçeği kullanılmıştır. Ölçek sınıfa düzenli olarak katılma, not alma, soru cevaplama, yazma, bilgisayar kullanımı gibi öğrencinin sahip olduğu güven miktarını ölçen konularla ilgilidir. Otuz üç sorudan oluşan ölçeğin altı alt boyutu bulunmaktadır. Bunlar İyi Öğrenci Özellikleri (İÖÖ) “Characteristics of a Good Citizen”, Sosyal Öz-yeterlik (SÖ) “Social Self-efficacy”, Kavrama (KA) “Comprehension”, Akademik Öz-yeterlik (AÖ) “Academic Self-efficacy”, Akademik Yardım Yeterliği (AYY) “Academic Helping Efficacy” ve Nicel Öz-yeterlik (NÖ) “Quantitative Self-efficacy” alt boyutlarından oluşmaktadır (Kemer, 2006).

Verilerin Analizi

Araştırmada ölçeğin alt boyutlardan elde edilen puanların normal dağılım gösterip göstermediği çarpıklık ve basıklık katsayılarına göre incelenmiştir. Çarpıklığın ve basıklığın ± 1 arasında değer oluşturması verilerin normal dağılım gösterdiği anlamına gelmektedir (George & Mallery, 2016). Akademik Öz Yeterlilik Ölçeği'nin alt boyutlarından “İyi bir vatandaş olma” ve “Nicel öz yeterlilik” boyutlarında verilerin normal dağılım göstermediği görülmüştür. Ölçek puanları arası ilişkiyi incelemek için ise pearson korelasyon analizi yapılırken, normal dağılım göstermeyen alt boyutlarda spearman korelasyon katsayısına bakılmıştır. Ölçek alt boyutlarının hipotetik olarak ortalama puanı hesaplanırken likert ölçeğin ortanca değeri ile madde sayısının çarpımı kullanılmıştır (Tezbaşaran, 2008; Can, 2019).

BULGULAR

Empatik Eğilim Ölçeği ile Akademik Öz Yeterlilik Ölçeği puanlarına ilişkin verilerden elde edilen bulgular bu bölümde ele alınmıştır.

Tablo 1: Empatik Eğilim Ölçeği Puanları ile Akademik Öz Yeterlilik Ölçeği Puanlarına İlişkin Betimsel Bulgular

Ölçek Boyutları	n	\bar{X}	Std. sapma	Min.	Max.	Çarpıklık		Basıklık	
						İst.	Std. hata	İst.	Std. hata
Akademik Öz yeterlilik	197	30,28	7,51	15	49	,21	,17	-,30	,34
İyi bir vatandaş olma	197	19,56	5,32	7	47	,79	,17	3,07	,34
Sosyal öz yeterlilik	197	20,20	5,15	6	30	-,24	,17	-,29	,34
Anlayış	197	10,72	3,03	4	20	,29	,17	,19	,34
Akademik yardım etkin.	197	5,57	1,98	2	10	,08	,17	-,49	,34
Nicel öz yeterlilik	197	7,99	3,51	3	37	3,02	,17	22,75	,34
Toplam Akademik Öz yet.	197	94,31	19,47	43	151	-,02	,17	,12	,34
Toplam Empatik Eğilim	197	69,12	8,78	47	89	,02	,17	-,60	,34

Tablo 1’de yer alan ortalama puanlar incelendiğinde Akademik öz yeterlilik alt boyutunun ortalama puanının ($\bar{X}=30,28$) ölçekten alınabilecek ortalama puanın ($\bar{X}_{\text{hipotetik}}=33$) altında kaldığı görülmektedir. İyi bir vatandaş olma alt boyutunda da ortalama puan ($\bar{X}=19,56$) varsayımsal ortalamanın ($\bar{X}_{\text{hipotetik}}=21$) altında kalmaktadır. Sosyal öz yeterlilik alt boyutunun ortalama puanı ($\bar{X}=20,20$) ise ölçeğin ortalamasının ($\bar{X}_{\text{hipotetik}}=18$) üzerinde yer almaktadır. Anlayış alt boyutunda alınan ortalama puanın ($\bar{X}=10,72$) ölçekten beklenen ortalama puanın ($\bar{X}_{\text{hipotetik}}=12$) altında olduğu belirlenmiştir. Akademik yardım etkinliği alt boyutunda ise öğrencilerin ortalaması ($\bar{X}=5,57$) beklenenin ($\bar{X}_{\text{hipotetik}}=6$) altında bulunmuştur. Nicel öz yeterlilik alt boyutunda öğrencilerin ortalamasının ($\bar{X}=7,99$) benzer şekilde hipotetik ortalamanın ($\bar{X}_{\text{hipotetik}}=9$) altında kaldığı görülmektedir. Toplam akademik öz yeterlilik ölçeği puanlarının ortalamaları ($\bar{X}=94,31$) incelendiğinde de ölçekten beklenen puanın ($\bar{X}_{\text{hipotetik}}=99$) altında olduğu görülmektedir. Empatik eğilim ölçeği için ise öğrencilerin ortalama puanı ($\bar{X}=69,12$) ölçeğin ortalamasından ($\bar{X}_{\text{hipotetik}}=60$) yüksek bulunmuştur. Bu durum öğrencilerin akademik öz yeterliliklerinin ortalamasının altında kaldığını, empatik eğilim düzeylerinin ise ortalamasının üzerinde olduğunu göstermektedir.

Tablo 2: Empatik Eğilim Ölçeği Puanları ile Akademik Öz Yeterlilik Ölçeği Puanları Arasındaki Korelasyon

Alt Boyutlar		Empatik Eğilim Ölçeği	
		Empatik Eğilim Toplam	
Akademik Özyeterlilik Ölçeği	Akademik Özyeterlilik	r	-,22**
		p	,002
		n	197
		η^2	,19
	İyi Bir Vatandaş Olma	rs	-,28**
		p	,001
		n	197
		η^2	,22
	Sosyal Özyeterlilik	r	-,24**
		p	,001
		n	197
		η^2	,20
	Anlayış	r	-,30***
		p	,000
n		197	
η^2		,19	
Akademik Yardım Etkin.	r	-,28***	
	p	,000	
	n	197	
	η^2	,11	
Nicel Özyeterlilik	rs	-,24**	
	p	,002	
	n	197	
	η^2	,16	
Akademik Özyeterlilik Toplam	r	-,33***	
	p	,000	
	n	197	
	η^2	,42	

* p<.05, ** p<.01, *** p<.001

r=.00-.30 düşük, .30-.70 orta, .70-1.00 yüksek (Büyüköztürk, 2017)

rs= Spearman's Korelasyon Katsayısı

Tablo 2’de Empatik Eğilim Ölçeği puanları ile Akademik Öz Yeterlilik Ölçeği puanlarına ilişkin bulgulara yer verilmiştir. Normallik varsayımı sağlanan puanlar arasındaki ilişki incelenirken Pearson Korelasyon Katsayısı (r) hesaplanmıştır. Sağlanmayan boyutlarda Spearman's Korelasyon Katsayısı (rs) hesaplanmıştır. Akademik öz yeterlilik alt boyutu ile empatik eğilim puanları arasında ters yönlü anlamlı bir ilişki bulunmuştur (r=-,22; n=197; p=,002). Spearman katsayıları incelendiğinde iyi bir vatandaş olma (rs=-,28; n=197; p=,001) ve nicel öz yeterlilik (rs=-,24; n=197; p=,002) alt boyut puanları ile empatik eğilim puanları arasında ters yönlü anlamlılık düzeyi yüksek bir ilişki bulunmuştur. Ancak ilişki düzeyi düşük seviyede (rs<,30) gözlenmektedir. Sosyal öz yeterlilik (r=-,24; n=197; p=,001), akademik yardım etkinliği (r=-,28; n=197; p<,000) ve anlayış (r=-,30; n=197; p<,000) boyutları ile empatik eğilim puanları arasında benzer şekilde ters yönlü bir ilişki bulunmaktadır. Ancak

puanlar arasındaki ilişkinin düşük düzeyde bir korelasyon olduğu tespit edilmiştir. Ölçeklerin toplam puanları arasındaki ilişki incelendiğinde, akademik öz yeterlilik ile empatik eğilim arasında ters yönlü orta düzeyde bir korelasyon görülmektedir ($r=-,33$; $n=197$; $p<,000$). Bu durum öğrencilerin akademik öz yeterliliklerinin azalırken empatik eğilimlerinin arttığını göstermektedir.

TARTIŞMA

Bu çalışmada üniversite öğrencilerinin akademik öz-yeterlikleri ile empatik eğilim düzeyleri arasındaki ilişki incelenmiştir. Çalışma sonucunda; öğrencilerin akademik öz yeterliliklerinin ortalamasının altında kaldığını, empatik eğilim düzeylerinin ise ortalamasının üzerinde olduğu sonucuna varılmıştır.

Akademik öz yeterlilik alt boyutu ile empatik eğilim puanları arasında ters yönlü anlamlı bir ilişki bulunmuştur. İyi bir vatandaş olma ve nicel öz yeterlilik alt boyut puanları ile empatik eğilim puanları arasında ters yönlü, anlamlılık düzeyi yüksek bir ilişki bulunmuştur. Ancak ilişki düzeyi düşük seviyede gözlenmiştir.

Sosyal öz yeterlilik, akademik yardım etkinliği ve anlayış boyutları ile empatik eğilim puanları arasında benzer şekilde ters yönlü bir ilişki bulunmakta olup, ancak puanlar arasındaki ilişkinin düşük düzeyde bir korelasyon olduğu tespit edilmiştir. Ölçeklerin toplam puanları arasındaki ilişki incelendiğinde, akademik öz yeterlilik ile empatik eğilim arasında ters yönlü orta düzeyde bir korelasyon görülmüştür. Bu durum öğrencilerin akademik öz yeterliliklerinin azalırken empatik eğilimlerinin arttığını göstermektedir.

Yapılan çalışmalar sonucu, akademik öz-yeterlilik düzeyi yüksek olan bireylerin, hedeflerini daha yüksek belirlediklerini, vermiş oldukları kararlarda daha tutarlı oldukları (Yılmaz, Gürçay & Ekici, 2007), olumsuzluklarla karşılaştıklarında ısrarlı ve sabırlı oldukları (Aşkar & Umay, 2001) tespit edilmiştir. Öz (1988) yapmış olduğu çalışmada; empatik eğilim ve akademik başarı arasında pozitif bir ilişki olduğunu, ancak istatistiksel olarak anlamlı olmadığı sonucuna varmıştır. Empatik eğilime sahip olmak; yaratıcılık, bellek, algı, dikkat gibi bilişsel özellikleri de gerektirdiğinden, bu kabiliyetlere sahip olmanın öğrenmeyi kolaylaştırdığı, dolayısıyla akademik başarıyı arttırdığı düşünülmektedir.

Uzun (2016), yapmış olduğu çalışmada akademik öz yeterliğin yetileri olarak belirsizlik, tahammülsüzlük, endişe ile ilgili olumlu inanç ve akademik kontrol odağını incelemiştir. Araştırma sonucunda üniversite öğrencilerinin; akademik öz-yeterliliklerinin endişe ile ilgili olumlu inançlar ve akademik kontrol odağı tarafından pozitif; belirsizliğe tahammülsüzlük ve akademik dışsal kontrol odağı tarafından negatif yönde anlamlı şekilde etkilediği bulgusuna ulaşmıştır.

Çalışma kapsamında yapılan alan yazın taraması sonucunda elde edilen bulgularda; Akademik öz yeterliliğe ve empatik eğilime etki eden birçok faktörün olması ve bu çalışma kapsamında sadece akademik öz yeterlilik ve empatik eğilim düzeyi olmak üzere iki faktörün ele alınmış olması çalışmanın sınırlılığından biri olarak değerlendirilebilir. Daha sonraki yapılacak çalışmalarda akademik öz yeterlilik ve empatik eğilim düzeyi farklı faktörler ve değişkenler ile değerlendirilebilir. Aynı zamanda bu çalışmada sadece üniversite öğrencileri ile bir araştırma yürütülmüş olup; ilkökul, ortaokul ve lise düzeyinde eğitim alan öğrenciler ile yürütülecek araştırmalar, belirlenen değişkenler açısından daha kapsamlı tespitler yapılabilmesi ve ortaya çıkan yeni ve farklı sonuçların karşılaştırılabilmesine imkân verebilecektir.

Lisans düzeyinde eğitim alan öğrencilerin kendilerini daha adil, sorumluluk alabilen, yeni fikirleri araştıran, yeniliklere açık gibi olumlu kişilik özelliklerine sahip oldukları, meslek

seçimindeki hazırbulunuşluk ve bilinçliliğin yanı sıra eğitim öğretim sürecinde sosyal-duygusal desteğin önemine ilişkin, empatinin güçlendirilmesine yönelik ders içerikleri, öğrencilerinin bu kriterler boyutunda var olan potansiyellerine katkı sağlayacaktır.

KAYNAKÇA

- Akgün, R. ve Çetin, H. (2018). Üniversite öğrencilerinin iletişim becerilerinin ve empati düzeylerinin belirlenmesi. *Manas Sosyal Araştırmalar Dergisi*, 7(3), 103-117.
- Aşkar, P. & Umay, A. (2001). İlköğretim Matematik Öğretmenliği Öğrencilerinin Bilgisayarla İlgili Öz Yeterlik Algısı, *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 21, 1-8.
- Bandura, A., and Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research*, 1(4), 287-310.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychology*, 28, 117-148.
- Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-Efficacy in Changing Societies* (pp. 1-45). New York: Cambridge University Press.
- Budak, S. (2009). *Psikoloji Sözlüğü*. Ankara: Bilim ve Sanat Yayınları 4. Basım.
- Can, A. (2019). SPSS ile bilimsel araştırma sürecinde nicel veri analizi. Pegem.
- Dinçyürek, S. (2004). Üniversite öğrencilerinin empatik becerilerinin çeşitli değişkenler açısından incelenmesi. *Marmara Coğrafya Dergisi* 10, 99-116
- Dökmen, Ü., (1988). Empatitin Yeni Bir Modele Dayanılarak Ölçülmesi ve Psikodrama ile Geliştirilmesi, *Ankara Üniversitesi Eğitim Bil. Fak. Dergisi*, 21, 1–2, 155–190.
- George, D., & Mallery, P. (2016). Frequencies. In *IBM SPSS Statistics 23 Step by Step* (pp. 115-125). Routledge.
- Kandemir, M. (2014). Akademik ertelemenin yordayıcıları: Sorumluluk, başarı/başarısızlığa yönelik yükleme stilleri ve akademik öz yeterlik inançları. *Eğitim ve Bilim*, 39, 171.
- Karasar, N. (2008). *Bilimsel araştırma yöntemi*. Ankara: Nobel Yayın Dağıtım.
- Kemer, G. (2006). The role of self-efficacy, hope, and anxiety in predicting university entrance examination scores of eleventh grade students. Unpublished master's thesis. Ankara: Middle East Technical University.
- Margolis, H ve McCabe, P. P. (2006). "Improving Self-Efficacy and Motivation: What To Do, What To Say". *Intervention in School and Clinic*, 41 (4): 218–227.
- Nazik, E. ve Arslan, S. (2011). Hemşirelik öğrencilerinin empatik becerileri ile öz duyarlılıkları arasındaki ilişkinin incelenmesi. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*, 14(4), 69-75.
- Owen, S. V., & Froman, R. D. (1988). Development of a college academic self-efficacy scale. ERIC Document Reproduction Service.
- Pişkin, M. (1991). Empati, kaygı ve çatışma eğilimi arasındaki ilişki. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, 22 (2), 775-784.
- Satıcı, S. A. (2013). Üniversite öğrencilerinin akademik öz-yeterliklerinin çeşitli değişkenler açısından incelenmesi. Yayımlanmamış yüksek lisans tezi, Anadolu Üniversitesi, Eskişehir.



- Tabanlı, E., Çelik, K. (2013). Öğretmen adaylarının akademik öz yeterlikleri ile öğretmen öz yeterlikleri arasındaki ilişki. *International Journal of Human Sciences*, 10, 1, 1167-1184.
- Tezbaşaran, A. (2008). Likert tipi ölçek hazırlama kılavuzu. Türk Psikologlar Derneği Yayınları, Ankara.
- Uzun, K. (2016). Akademik öz yeterliğin yordayıcıları: belirsizliğe tahammülsüzlük, endişe ile ilgili olumlu inanç ve akademik kontrol odağı. T.C. Mehmet Akif Ersoy Üniversitesi Eğitim Bilimleri Enstitüsü Eğitim Bilimleri Anabilim dalı, (Yayımlanmamış Yüksek Lisans Tezi).
- Yılmaz, M., Gürçay, D. & Ekici, G. (2007) Akademik Özyeterlik Ölçeğinin Türkçe'ye Uyarlanması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 33, 253-259.
- Yüksel, A. (2004). Empati eğitim programının ilköğretim öğrencilerinin empatik becerilerine etkisi. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*, 17(2), 341-354.
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25, 82-91.

YÜKSEKÖĞRETİMDE KALİTEYE ULAŞMADA SİSTEMSEL BİR SORUNA ELEŞTİREL BAKIŞ: HER AKADEMİK YÜKSELMEDE YENİDEN ATANMA ZORUNLULUĞU

A CRITICAL LOOK AT A SYSTEMIC PROBLEM IN ACHIEVEMENT OF QUALITY IN
HIGHER EDUCATION: REAPPOINTMENT OBLIGATION IN EVERY ACADEMIC
PROMOTION

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ÖZET

Son yıllarda, akademik işe alım ve yükseltmelerle ilgili yayımlanan ilanlarda işe alınmak yada yükseltmek istenen personelin “akademik yetkinliğini” tanımlayan açıklamalara yönelik eleştiriler oldukça fazlalaşmıştır. Bu durum üniversitelerin toplum nezdindeki kurumsal itibarına gölge düşürmektedir. Bu olumsuz durumla birlikte, hak ettiği her akademik unvanda “ilk defa atanan bir akademisyenin yaşadığı tüm süreçleri” defalarca yeniden yaşayan akademisyenlerin maruz kaldıkları baskı, belirsizliğin getirdiği kaygılar, ekonomik kayıplar ve yaşanan stres ise akademisyenlerin performansına ve üniversitelerin verimliliğine olumsuz etkilerde bulunabilmektedir. Bu çalışmada, mesleğe ilk girişten itibaren hak ettiği akademik unvanların kadrosunu alabilmek için her seferinde yeniden kadro ilan edilmek ve yeniden atanmak zorunda kalan (yada kadro ilan edilmediği için yükseldiği kadroya atanamayan) akademisyenlerin durumu yükseköğretimde kalite yönetimi ölçütleri ve eleştirel kuram çerçevesinde değerlendirilmekte, eleştirel kuramın hegomanya teorisi çerçevesinde yükseltmelerin akademisyenler üzerinde kurulan bir hakimiyete dönüştüğü tespiti yapılmakta ve akademik yükseltme konusunun yol açtığı sorunlar irdelenmektedir. Çalışmada, üniversite kadrolarına bir kez atanan bir öğretim elemanının unvanı ne olursa olsun her akademik yükselmesinde, yükselme ile doğru orantılı, eş zamanlı ve sistematik olarak, herhangi bir uygun görme yada ilan şartına gerek olmadan, yükseldiği kadroya atanması önerilmektedir.

Anahtar Kelimeler: Akademik Yükseltme, Atanma ve Yükselme, Hegomanya Teorisi, Stratejik İnsan Kaynakları Yönetimi, Yükseköğretimde Kalite.

ABSTRACT

In recent years, in the advertisements published on academic recruitment and promotions, the criticism of the explanations describing the "academic competence" of the person hired or promoted has increased considerably. This situation casts a shadow on the institutional reputation of universities in the eyes of society. Along with this negative situation, the pressure that academics are exposed to, anxieties caused by uncertainty, economic losses and stress experienced by academics who repeatedly experience "all the processes experienced by an academic who is appointed for the first time in every academic title they deserve" can have adverse effects on the performance of academicians and the productivity of universities. In this study, the situation of academicians who have to be re-announced and reassigned every time in

order to receive the academic titles they deserve from the first entry into the profession (or cannot be appointed to the position they were promoted to because the cadre was not announced) is evaluated within the framework of quality management criteria in higher education and critical theory; Within the framework of the hegemonic theory of critical theory, it is determined that promotions have turned into a dominance established over academics and the problems caused by academic promotion are examined. In the study, it is recommended that an academician who is appointed to a university staff once, regardless of his title, should be appointed to the position he has been promoted to, in direct proportion to the promotion, simultaneously and systematically, without the need for any appropriate approval or announcement.

Keywords: Academic Promotion, Appointment and Promotion, Hegemony Theory, Strategic Human Resources Management, Quality in Higher Education.

GİRİŞ

Son yıllarda, akademik işe alım ve yükseltmelerle ilgili yayımlanan ilanlarda işe alınmak yada yükseltmek istenen personelin “akademik yetkinliğini” tanımlayan açıklamalara yönelik eleştiriler oldukça fazlalaşmıştır. Özellikle, Sayıştay Raporlarına yansıyan bulguların ve ilan metinlerindeki açıklamaların haberleştirilmesiyle öğretim elemanı atama ve yükseltmeleri kamuoyu gündemine getirilmekte ve genellikle özel şart bulunan bütün atamalar “haksız atamalar” şeklinde nitelendirilmektedir (SAYIŞTAY, 2021; www.birgun.net, 2020; www.gazeteduvar.com.tr, 2021; www.memurlar.net, 2020, 2021a, 2021b, 2021c, 2021d). Akademik alanda mevcut görevine devam ederken yükselen akademisyenlerin ilanlarının da yer aldığı bu raporlarda ve haberlerde, atamanın yükseltme mi ilk atama mı olduğu bilinemediği için akademik rekabetin engellendiği, liyakate ve objektif kriterlere uyulmadığı ve ilanların kişiye özel olduğu iddia edilmektedir.

Konu ile ilgili olarak, 2020 yılı Sayıştay Dış Denetim Genel Değerlendirme Raporu’nda Üniversitelerle ilgili şu ifadeler yer almaktadır (SAYIŞTAY, 2021, s. 72):

“Denetimlerde bazı öğretim üyeliği kadrolarına yapılacak atamalar için ek koşul getirilirken objektiflik ve denetlenebilirlik ilkelerine riayet edilmediği, ilanların büyük çoğunluğunda belli bir kişiye işaret eden şartların istendiği ve bu sebeple de sadece birer kişinin başvurabildiği tespit edilmiştir.”

Bu durum üniversitelerin toplum nezdindeki kurumsal itibarına gölge düşürmektedir. Bu olumsuz durumla birlikte, hak ettiği her akademik unvanda “ilk defa atan bir akademisyenin yaşadığı tüm süreçleri” defalarca yeniden yaşayan akademisyenlerin maruz kaldıkları baskı, belirsizliğin getirdiği kaygılar, ekonomik kayıplar ve yaşanan stres ise akademisyenlerin performansına ve üniversitelerin verimliliğine olumsuz etkilerde bulunabilmektedir.

Mesleklerinde başarılı olan ve gelişim gösteren akademisyenlerin ödüllendirilmesi gerekirken, akademik olarak her yükselme başarısı gösterildiğinde yeniden atanma gerekliliği bilimsel gerçeklikle bağdaşmamakta, yeniden atanma akademik camiada bir sorun olarak görülmekte ve akademisyenleri olumsuz etkilemektedir.

Bu hususlar yürürlükte olan yasal mevzuata uygun olmakla birlikte stratejik insan kaynakları yönetimine ve yükseköğretimde kalite yönetimi standartlarına uygun değildir ve bilim üretim merkezi olan üniversitelere yakışmamaktadır.

Bu çalışmada, mesleğe ilk girişten itibaren hak ettiği akademik unvanların kadrosunu alabilmek için her seferinde yeniden kadro ilan edilmek ve yeniden atanmak zorunda kalan (yada kadro ilan edilmediği için yükseldiği kadroya atanamayan) akademisyenlerin durumu

yükseköğretimde kalite yönetimi ve eleştirel kuram çerçevesinde değerlendirilmekte, akademik yükseltme konusunun yol açtığı sorunlar irdelenmekte ve çözüm önerileri sunulmaktadır.

1. ÖĞRETİM ELEMANI KADROLARINA ATANMA VE YÜKSELME MEVZUATI

2547 sayılı Yükseköğretim Kanununun Öğretim Elemanları başlıklı Beşinci Bölümü (22-35. Maddeler) öğretim elemanlarının atanma ve yükselme usullerini belirlemektedir (YÜKSEKÖĞRETİM KANUNU, 1981). Kanuna göre, Araştırma Görevlisi, Öğretim Görevlisi, Dr. Öğretim Üyesi, Doçent ve Profesör olmak üzere 5 farklı öğretim elemanı kadrosu bulunmaktadır. Diğer taraftan, Kanunun 35. Maddesine göre yükseköğretim kurumları öğretim elemanı yetiştirmekle mükelleftirler.

Kanunun 33 maddesinde Araştırma Görevlilerinin, 31. Maddesinde Öğretim Görevlilerinin, 23. Maddesinde Doktor Öğretim Üyelerinin, 24. Maddesinde Doçentlerin atama şartları belirtilirken, 26. Maddesinde ise Profesörlüğe yükselme ve atama şartları belirtilmektedir. Kanunda genel olarak bütün atamalar “açık bulunan kadroların rektörlükçe ilan edilmesi” sürecine dayanmakta ve diğer özel hükümler ayrıca belirtilmektedir.

Ek olarak, 2547 sayılı Yükseköğretim Kanununa dayanılarak çıkartılan Öğretim Üyeliğine Yükseltme ve Atanma Yönetmeliği hükümlerine göre de bütün öğretim üyesi kadroları için atanılacak kadronun ilan edilme şartı bulunmaktadır (YÖK, 2018).

2. ATAMA- AKADEMİK YÜKSELME AYRIMI

Literatürde akademik yükselme, lisansüstü eğitimle başlayan ve profesörlük unvanı kazanılmasına kadar yapılan tüm akademik çalışmalar sonucu elde edilen neticeler olarak (Erdoğan, 2018, s. 2) tanımlanmaktadır. Akademik yükselmeler yetkin bilim insanlarının bilimsel değerlendirmeleri sonucu verdikleri kararlarla gerçekleşmektedir.

Diğer taraftan, öğretim elemanları için atama ve yükselme aynı düzeyde yapılan işlemler değildir. Atama işleminde, öğretim elemanının üniversitede görev alabilmesi, ders verebilmesi için gerekli koşullara sahip olup olmadığının tespiti yapılırken, yükselme işleminde de ilgilinin akademik yönden yeterli olup olmadığının tespiti (Çağlayan, 1994, s. 33 aktaran Erdoğan, 2018, s. 17) yapılmaktadır. Uzmanlık, doktorluk ve doçentlik bilimsel değerlendirmeler sonucu kadroya bağlı olmaksızın kazanılırken mevcut yasal düzenlemelere göre profesörlüğe yükseltme ise bir profesörlük kadrosuna atanma şartına bağlıdır. Kanun'da profesörlük için yükseltme ifadesi yer almasına rağmen buradaki yükselmede “Profesörlüğe yükseltilerek atama yapılabilmesi için profesörlük kadroların rektörlük tarafından ilan edilmesi” hükmü ile yükseltme yine ilan şartına bağlanmıştır. Yani, profesörlüğe yükseltme ile atanma adeta iç içe geçmiş bir şekilde biri olmazsa diğeri olmayacak bir hal almış ve yükseltme kriterlerini taşıyan bir doçent açısından profesörlüğe yükselmek için kadroya atanmak (Erdoğan, 2018, s. 49) zorunluluk boyutuna ulaşmıştır. Dolayısıyla, profesör olabilmek için kanunda öngörülen 5 yıl doçent olarak görev yapmış olmak, ilgili bilim alanında özgün yayınlar veya çalışmalar yapmak ve ilgili üniversitenin profesörlüğe atanma kriterlerini karşılamak (YÜKSEKÖĞRETİM KANUNU, 1981) yeterli olmamakta, profesör unvanını alabilmek için ilan edilen kadroya atanma zorunluğu bulunmaktadır. Bu durumda olan bir doçent için profesörlük kadrosu ilan edilmedikçe şartları taşımasının bir anlamı bulunmamaktadır.

Bu durum kamu görevlilerinin atanma ve yetiştirilmelerini, ilerlemelerini ve yükselmelerini düzenleyen 657 sayılı Devlet Memurları Kanunu ile de bağdaşmamaktadır. Kanunun temel ilkeleri arasında yer alan sınıflandırma, kariyer ve liyakatin eşit imkanlarla uygulanması

Devletin sorumluluğunda (DEVLET MEMURLARI KANUNU, 1965) olmasına rağmen öğretim elemanları için bu hükümlerin uygulanmasında ayrımcılık yapılmaktadır. Kanunda belirtilen hiçbir sınıf için benzeri işlem ve süreçlerde belirtilen şartları taşımak kaydıyla memuriyete yeniden atanmayı gerektirecek ilk atama sürecindeki işlemler tekrar edilmemektedir.

3. ELEŞTİREL KURAM ÇERÇEVESİNDE AKADEMİSYENLERİN GÖREVE YÜKSELMELERİ

Yönetim faaliyet ve ideolojilerinden etkilenen grupların söz hakkı olması gerektiğini savunan (Alvesson ve Willmott, 1992, s. 8) eleştirel kuram, baskının olmadığı, eşit fırsatların olduğu işyerleri oluşturmayı amaçlar (Alvesson ve Deetz, 2012, s. 192) ve bu doğrultuda örgüt düzeyindeki tespitlerinden yola çıkarak sosyal ve ekonomik sistemlerdeki sosyal adaletsizliklerin değiştirilmesi gerektiğini (Adler, Forbes ve Willmott, 2007; Alvesson ve Willmott, 1996) savunur (Yıldırım, 2015, s. 396). Bu çerçevede, öğretim elemanlarının sorunları ile ilgili yapılmış olan tespitler eleştirel kuram açısından önem kazanmaktadır.

“Akademisyenlerin Kariyer Basamakları ve Yükseltme Ölçütlerine İlişkin Görüşler” isimli çalışmada Karataş ve diğerleri (2017), öğretim elemanlarının akademik yükseltme ölçütlerini kendilerine engel olarak algıladıklarını (Şenel, Kılıçaslan, Köksal, Demir ve Sertelin, 2004), ücret düşüklüğü ve yükseltme zorluklarının öğretim elemanlarının en önemli sorunları olarak belirlendiğini (Arı, 2007) ve akademisyenlerin bilimsel çalışma konusu seçiminde yükseltme kaygısının daha önem kazandığını (Karataş ve diğerleri, 2017, s. 90) belirtmektedir.

Konu ile ilgili bir başka ilgi çekici çalışmada, Özdemir ve Özdoğru (2017, s. 110) “Unvan Almış Ama Unvanına Uygun Kadroya Atanamamış Akademisyenlerin Sorunları” isimli araştırma ile üniversitelerdeki atama süreçlerinde eşitlik ve adaletin sağlanmadığı, akademik kadroların informal ilişkilere dayalı olarak kişilere göre açıldığı, bilimselliğin yeterince gözetilmediği, hak edilen kadroya atanma süresinin kişiden kişiye değiştiği sonuçlarına ulaşmıştır. Çalışmada, kazandığı unvana uygun bir kadroya atanamayan/yükselemeyen akademisyenlerin bu durumdan olumsuz etkilendiği ve bu durumun da motivasyon, iş yeri stresi, örgütsel bağlılık ve iş doyumu üzerinde olumsuz etkileri olduğu belirtilmiştir.

Yaman'ın (2008, s. 325) “Üniversitelerde Bir Eğitim Yönetimi Sorunu Olarak Öğretim Elemanının Maruz Kaldığı İnfomal Cezalar: Nitel Bir Araştırma” isimli araştırmasında ise akademik yükseltmelerde öğretim elemanlarına kadro verilmemesinin/engellenmesinin öğretim elemanlarının çalıştıkları kuruma ve meslektaşlarına güven duygularını zedelediği ve öğretim elemanlarını mutsuz ettiği belirtilmektedir.

Gelinen noktada, akademik yükseltmelerde yaşanan eşitsizlikler ve yükseltmelerdeki keyfi uygulamalar o kadar ileri boyutlara ulaşmıştır ki akademik yükseltme imkanı sağlanması öğretim elemanları için birinci sırada öneme sahip doğal ödüller (Sarpkaya et al., 2016, p. 478,485) arasında görülmeye başlanmıştır. Sarpkaya ve diğerlerine (2016, s. 478,485) göre üniversitelerdeki kadro yetersizlikleri, kadroların dağıtımında birim bazlı adaletsizlikler yaşanması, atama ve yükseltmelerdeki görülen kayırmacılık uygulamaları gibi nedenler akademik yükseltme sürecine önem kazandırmaktadır (Sarpkaya ve diğerleri, 2016, s. 485). Akademik yükseltme sürecine önem kazandıran diğer bir husus ise Türkiye’de doçent ve profesör unvanlı akademik personelin kadrolu olması diğer unvanlardaki akademik personelin ise sözleşmeli olmasıdır ve bu durum görevde yükseltme endişesi yaşanmasına sebep olabilecek bir unsur olarak değerlendirilmiştir (Aksoy, Erbay ve Kör, 2017, s. 1557).

Sonuç olarak, kurum içindeki hiyerarşik yapılanma, akademik yükseltme sürecindeki kadroların sınırlılığı, başarı kriterlerinin objektif ölçütlerle değerlendirilmemesi ya da

ödüllendirilememesi, yönetim ve çalışanlar arasındaki iletişimsizlik ve güvensizlik, iş güvencesinin bulunmaması gibi nedenler üniversitelerde örgüt iklimini tehdit etmekte ve mobbing aracı olarak kullanılabilir (Uzun ve Şafak Uzun, 2018, s. 326).

Belirtilen bütün bu olumsuz hususlar, kamuda ve özel sektörde başka bir örneği bulunmayan akademik yükseltme uygulamalarının amacının sorgulanmasına neden olmaktadır. Akademik yükseltmelerdeki bu keyfi durumu eleştirel kuramın “bir birey veya grubun, diğerleri üzerinde sahip olduğu hâkimiyete odaklanan” (Dever, 2013, s. 402) hegemonya teorisi ile açıklamak mümkündür.

Bu çerçevede, hegemonya teorisinde belirtilen yönetici sınıfın karar verici rolünün baskı, güç ve egemenlik vasıtasıyla hakimiyete dönüşmesi paradigması, Türk yükseköğretim sisteminde yönetim yetkisini elinde bulunduran güçlü sınıfın baskı, güç ve egemenlik araçlarını ve akademik yükseltmelerdeki karar verici rolünü kullanması ile akademisyenler üzerinde kurulan bir hakimiyete dönüşerek gerçekleşmektedir.

Bu durumda “yönetmeye talip olan sınıf, öncelikle hegemonik üstünlüğünü kurmalıdır” (Dural, 2012, s. 312) anlayışı 1981 tarihli Yükseköğretim Kanunu’nda vücut bulmuş ve yükseltmelerin bir vesayet aracı olarak kullanılması süre gelen bir alışkanlık haline almıştır. Zira, akademisyenlerin yükselmeleri sonucu hak ettikleri görevde yükselmeyi elde edebilmeleri için öncelikle yönetenlerin bu durumu uygun görmesi ve yükselmeyi hak eden akademisyenin yeni atanacağı kadro için ilana çıkması gerekmektedir. Böylelikle bir taraftan karşıt gruplar üzerinde uygulanabilecek zorunlu bir güç elde edilirken diğer taraftan yönetici elit ile işbirliği yapmaya hazır olanlara fayda sağlayabilecek (Gramsci, 1997, s. 28 aktaran Dural, 2012, s. 312) bir sistem kendiliğinden oluşmuş olacaktır. Bu sistemde iktidarda kimin olduğu önemli değildir. Önemli olan her siyasal akımın kendi saflarında yer alanları diğer saflarda olanlardan ayırt etmek (Dural, 2012, s. 312) için bu sistemi kullanmak istemesidir.

4. YÜKSEKÖĞRETİMDE KALİTE AÇISINDAN AKADEMİK YÜKSELME

Yükseköğretim Kurumlarının kalite güvence süreçlerinin değerlendirilmesinde Yükseköğretim Kalite Kurulu (YÖKAK) tarafından belirlenen ölçütler ve alt ölçütler Yükseköğretim kurumlarına standardı yakalayabilmeleri için rehberlik etmektedir. Bu standartlar içerisinde Yönetim Sistemi başlığı altındaki Kaynakların Yönetimi ölçütü kurumların insan kaynaklarının ve mali kaynaklarının tümünü etkin ve verimli kullandığını güvence altına almak üzere bir yönetim sistemine sahip olması (YÖKAK, 2021a) gerektiğini belirtmektedir. Bu ölçüt başlığı altındaki İnsan Kaynakları Yönetimi alt ölçütünde ise uygulamaların şeffaf olması gerektiği, eğitimin, liyakatin ve çalışan memnuniyetinin öncelikli kriter arasında olması gerektiği ve yetkinliklerin artırılmasının hedeflenmesi gerektiği belirtilmektedir (YÖKAK, 2021b). Dolayısıyla, kurumların kalite yönetiminin gerektirdiği standartları yakalayabilmek için Stratejik İnsan Kaynakları Yönetiminin (SİKYY) gerekliliklerini uygulamaları bir zorunluluk olarak karşımıza çıkmaktadır.

“İç kariyer olanakları, eğitim, sonuç odaklı değerlendirme sistemi, kâr paylaşımı, iş güvencesi, katılımcılık ve görev tanımları” şeklinde ifade edilen SİKYY uygulamaları (Delery ve Doty, 2016, s. 809), çalışanların yeteneklerini idare etmek, işe almak, seçmek, eğitmek, çalışan performansını değerlendirmek, organizasyonda yükselmeyi sağlamak, kariyer ve ücret planlarını ortaya koymak gibi faaliyetleri kapsayan süreçlerden (İbadbeyli, 2020, s. 21) meydana gelmektedir.

Bu çerçevede, yükseköğretim kurumlarının SİKYY uygulamalarını doğru bir şekilde uygulayabilmeleri için öncelikle öğretim elemanlarının yükselmelerinde eşitliği ve şeffaflığı

tesis etmesi gerektiği değerlendirilmektedir. Bunun için de yasal mevzuatta değişiklik yapılması bir zorunluluktur.

SONUÇ VE ÖNERİLER

Nitelikli insan gücü gereksiniminin karşılanması için üniversitelerde nitelikli akademisyenlerin varlığı önemlidir. Nitelikli akademisyenlerin yetişmesinde ise sahip olunan lisansüstü eğitim başta olmak üzere akademik kariyer basamakları ve yükseltme ölçütleri ön plana çıkmaktadır (Karataş ve diğerleri, 2017, s. 82). Günümüzde gerek ÜAK doçentlik kriterleri gerek YÖK Akademik Teşvik Kriterleri gerekse üniversitelerin atama/yükseltme kriterleri birbiri ile benzerlik gösteren tanımlı ölçütler olarak uygulanmaktadır. Ancak, mevcut yükseköğretim politika ve uygulamalarında, jüriler önünde akademik unvan ve terfi hak eden ve bilimsel yeterliliği ispatlanan tüm akademisyenlerin atanma ve yükseltmeleri kadro ilan etme yetkisini elinde bulunan rektörlerin inisiyatifine bırakılmıştır (Yaman, 2008, s. 28,29).

Öğretim elemanlarının akademik yükseltme ve atamalarında bilimsel yeterliliğin ve liyakatin ön planda olması, süreçlerin önceden tanımlı standartlara uygun olarak, sistematik, objektif, adil ve eşit bir biçimde yürütülmesi yükseköğretimde kalite yönetiminin tesis edilmesinde önemli adımlardan biridir. Ayrıca, üniversitelerin en önemli unsurları olan akademisyenlerin moral ve motivasyonlarının artırılmasında, iş doyumunu ve örgütsel bağlılıkların geliştirilmesinde ve tükenmişliklerinin ortadan kaldırılmasında (Özdemir ve Özdoğru, 2017, s. 110; Sarpkaya ve diğerleri, 2016, s. 477) atanma ve yükseltme hakkının eşit, şeffaf ve sistematik olarak kullanılmasının oldukça önemli olduğu değerlendirilmektedir. Böyle bir yapının kurulması Türk yükseköğretiminin geleceği açısından olmazsa olmazlardandır.

Bütün bu anlatılanlar ışığında olması gereken yöntem olarak, üniversite kadrolarına bir kez atanan bir öğretim elemanının unvanı ne olursa olsun her akademik yükseltilmesinde, yükseltme ile doğru orantılı, eş zamanlı ve sistematik olarak, herhangi bir uygun görme yada ilan şartına gerek olmadan, yükseldiği kadroya atanması önerilmektedir.

Bu yöntem ile kurumlar tarafından önceden ilan edilmiş tanımlı kriterlere uymak ve gerekli jüri süreçlerinin işletilmesi şartıyla, doktorasını bitiren araştırma görevlilerinin ve öğretim görevlilerinin Dr. Öğretim Üyesi; Doçentlik Belgesi alan Dr. Öğretim Üyelerinin Doçent; kriterleri ve yasal bekleme süresini sağlayan Doçentlerin ise Profesör olarak, hiçbir kadro ilanına yada uygun görmeye gerek kalmadan sistematik bir şekilde atanması gerçekleştirilerek Türk yükseköğretim sisteminde bir reform hayata geçirilmiş olacaktır.

Böylelikle akademisyenlerin her seferinde yeniden atanması ile ilgili olumsuz yansımalar ortadan kaldırılabilir, üniversitelerde iş doyumunu yükselecek, öğretim elemanları kendilerini daha özgür ve mutlu hissedecek, keyfi kararlar son bulacak, ilan sürecinin kamuya getirdiği iş yükü ve maliyetlerden tasarruf etme imkanı sağlanabilecek ve 1981 yılındaki vesayet sisteminin öngördüğü “yönetici elitin hegemonyası” ortadan kaldırılmış olacaktır.

Üniversiteler, bilginin üretildiği, kullanıldığı ve topluma yayılımının sağlandığı eğitim kurumları (Sarpkaya ve diğerleri, 2016, s. 485) olarak bu tür hegemonyal süreçlerin ortadan kaldırılmasında topluma öncülük etmek zorundadır.

KAYNAKÇA

Adler, P. S., Forbes, L. C. ve Willmott, H. (2007). Critical Management Studies. *Academy of Management Annals*, 1(1), 119–179. doi:10.5465/078559808

- Aksoy, H., Erbay, H. ve Kör, H. (2017). Üniversite Akademik Personellerinin Yaşam Boyu Öğrenme Tutumlarının İncelenmesi. *Hitit Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 10(2), 85–86. doi:10.17218/hititsosbil.340987
- Alvesson, M. ve Deetz, S. (2012). Critical Theory and Postmodernism: Approaches to Organizational Studies. *Studying Organization: Theory & Method* içinde (ss. 185–211). SAGE Publications Ltd. doi:10.4135/9781446218556.n7
- Alvesson, M. ve Willmott, H. (1996). *Making Sense of Management: A Critical Introduction*. New Delhi: SAGE Publications.
- Alvesson, M. ve Willmott, Hugh. (1992). *Critical Management Studies: An Introduction*. Sage.
- Arı, A. (2007). Üniversite Öğretim Elemanlarının Sorunları. *Manas Üniversitesi Sosyal Bilimler Dergisi*, (17), 65–74.
- Çağlayan, R. (1994). *Akademik Personelle İlgili İşlemlerde Yargısal Denetim*.
- Delery, J. E. ve Doty, D. H. (2016). Modes of Theorizing in Strategic Human Resource Management: Tests of Universalistic, Contingency, and Configurational Performance Predictions. *The Academy of Management Journal*, 39(4), 802–835. <https://www.jstor.org/stable/256713> adresinden erişildi.
- Dever, A. (2013). *Endüstriyel Futbol ve Taraftarlık: Kayseri İli Örneği*.
- DEVLET MEMURLARI KANUNU. Resmi Gazete (1965).
- Dural, A. B. (2012). Antonio Gramsci ve Hegemonya. *Elektronik Sosyal Bilimler Dergisi*, 11(39), 309–321. doi:10.17755/esosder.63174
- www.gazeteduvar.com.tr. (2021). Sıçan araştırması yapan akademisyen Sayıştay raporunda. www.gazeteduvar.com.tr. Gazete Duvar. 5 Ekim 2021 tarihinde <https://www.gazeteduvar.com.tr/sican-arastirmasi-yapan-akademisyen-sayistay-raporunda-haber-1536718> adresinden erişildi.
- Erdoğan, K. (2018). *AKADEMİK YÜKSELTİLME, ATAMALAR VE YARGISAL DENETİM*. <http://dx.doi.org/10.1053/j.gastro.2014.05.023%0Ahttps://doi.org/10.1016/j.gie.2018.04.013%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/29451164%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC5838726%250Ahttp://dx.doi.org/10.1016/j.gie.2013.07.022> adresinden erişildi.
- Gramsci, A. (1997). *Hapishane Defterleri*. İstanbul: Belge Yayınları.
- İbadbeyli, C. (2020). *Stratejik İnsan Kaynakları Yönetiminin Kurumsal Performansa Etkisi; OMÜ Örneği*.
- Karataş, T., Özen, Ş. ve Gülnar, E. (2017). Akademisyenlerin Kariyer Basamakları ve Yükseltme Ölçütlerine İlişkin Görüşler. *Yükseköğretim Dergisi*, 7(2), 82–93. doi:10.2399/yod.17.006
- ÖZDEMİR, S. ve ÖZDOĞRU, M. (2017). Unvan Almış Ama Unvanına Uygun Kadroya Atanamamış Akademisyenlerin Sorunları. *13. Uluslararası Eğitim Yönetimi Kongresi* içinde (ss. 110–119). Sivas.
- Sarpkaya, R., Sarpkaya, P. Y., Yılmaz, T. ve Altun, B. (2016). Öğretim Elemanlarına Yönelik Ödüllendirme Uygulamaları. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD)*, 17(2), 473–493.
- SAYIŞTAY. (2021). *2020 Yılı Dış Denetim Genel Değerlendirme Raporu*. Ankara.

- Şenel, H. G., Kılıçaslan, A., Köksal, A., Demir, İ. ve Sertelin, Ç. (2004). Öğretim Elemanlarının İşleri ile İlgili Olarak Algıladıkları Olumlu ve Olumsuz Özellikler. *Hasan Ali Yücel Eğitim Fakültesi Dergisi*, 2, 201–210.
- Uzun, Z. ve Şafak Uzun, A. M. (2018). Akademide Mobbing: Okutmanların Mobbing Hakkındaki Görüşlerine Dair Nitel Bir Araştırma, 326–347.
- www.birgun.net. (2020). Sayıştay’dan kişiye özel ilan ve ‘liyakat’ uyarısı. *birgun.net*. 5 Ekim 2021 tarihinde <https://www.birgun.net/haber/sayistay-dan-kisiye-ozel-ilan-ve-liyakat-uyarisi-318920> adresinden erişildi.
- www.memurlar.net. (2020). Sayıştay’dan üniversiteye akademik ilanların kişiye özel uyarısı! *memurlar.net*. 5 Ekim 2021 tarihinde <https://www.memurlar.net/haber/931228/sayistay-dan-universiteye-akademik-ilanlarin-kisiye-ozel-uyarisi.html> adresinden erişildi.
- www.memurlar.net. (2021a). Üniversiteden adrese teslim kadro. *memurlar.net*. 5 Ekim 2021 tarihinde <https://www.memurlar.net/haber/992991/universiteden-adrese-teslim-kadro.html> adresinden erişildi.
- www.memurlar.net. (2021b). Sayıştay denetçileri DEÜ’de 20 farklı olumsuzluk tespit etti. *memurlar.net*. 5 Ekim 2021 tarihinde <https://www.memurlar.net/haber/993257/sayistay-denetcileri-deu-de-20-farkli-olumsuzluk-tespit-etti.html> adresinden erişildi.
- www.memurlar.net. (2021c). Sayıştay Üniversitedeki adrese teslim atamaları eleştirdi. *memurlar.net*. 5 Ekim 2021 tarihinde <https://www.memurlar.net/haber/993353/sayistay-universitedeki-adrese-teslim-atamaları-elestirdi.html> adresinden erişildi.
- www.memurlar.net. (2021d). Sayıştay, üniversitenin atamalarda yaptığı usulsüzlükleri üç başlıkta sıraladı. *memurlar.net*. 5 Ekim 2021 tarihinde <https://www.memurlar.net/haber/993480/sayistay-universitenin-atamalarda-yaptigi-usulsuzlukleri-uc-baslikta-siraladi.html> adresinden erişildi.
- Yaman, E. (2008). *ÜNİVERSİTELERDE BİR EĞİTİM YÖNETİMİ SORUNU OLARAK ÖĞRETİM ELEMANININ MARUZ KALDIĞI İNFORMAL CEZALAR: NİTEL BİR ARAŞTIRMA*.
- Yıldırım, E. (2015). Örgüt Kuramında Yeni Gelişmeler: Postmodern ve Eleştirel Bakış. A. S. Sargut ve S. Özen (Ed.), *Örgüt Kuramları* içinde (ss. 379–406). İmge Kitabevi.
- YÖK. ÖĞRETİM ÜYELİĞİNE YÜKSELTİLME VE ATANMA YÖNETMELİĞİ. Resmi Gazete (2018). <https://www.resmigazete.gov.tr/eskiler/2018/06/20180612-6.htm> adresinden erişildi.
- YÖKAK. Kurumsal Dış Değerlendirme ve Akreditasyon Ölçütleri (Sürüm 2.0) (2021). Ankara.
- YÖKAK. Kurumsal Dış Değerlendirme Akreditasyon ve İzleme Programları Kılavuzu (2021).
- YÜKSEKÖĞRETİM KANUNU. Kanun No. 2547 (1981). Resmi Gazete. <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.2547.pdf> adresinden erişildi.

ÜNİVERSİTE ÖĞRENCİLERİNİN E-SAĞLIK OKURYAZARLIK DÜZEYLERİ İLE SAĞLIKLI YAŞAM BİÇİMİ DAVRANIŞLARI ARASINDAKİ İLİŞKİ

THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' E-HEALTH LITERACY LEVELS AND HEALTHY LIFESTYLE BEHAVIORS

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ÖZET

Toplum sağlığının korunması ve geliştirilmesi her zaman önde gelen konulardan biri olmuştur. Sağlığın korunmasına yönelik çalışmalara bir süre sonra var olan sağlığı geliştirme çalışmaları da eklenmiştir. Dünya Sağlık Örgütü sağlığı, yalnızca hastalık ve sakatlığın olmayışı değil, bedenen, ruhen ve sosyal yönden tam bir iyilik halinde olmak şeklinde ifade etmiştir. Dönemin şartlarına göre sağlık anlayışı toplumun sağlığını koruyan ve geliştiren bir sağlık merkezli bakım yaklaşımını gerekli kılmaktadır. Bu anlayış bireyi kendi sağlığıyla ilgili sürece dahil ederek, bireyin sağlığını korumayı, sürdürmeyi ve geliştirmeyi amaçlayan davranışlar kazanmasına dayanmaktadır. Bu davranışların kazanılması sağlıklı yaşam biçimi davranışı olarak açıklanmaktadır. Bu davranışı yaşam biçimi haline getiren birey sağlığını korumak ve geliştirmek için etkili olabilmektedir. Sağlık anlayışında ve sisteminde meydana gelen değişiklikler sağlıklı yaşam biçimi davranışı sergilemek için gerekli olan yetkinlikleri de değiştirmektedir. Mevcut sağlık sistemine dahil olarak sağlığı korumak ve geliştirmek belli seviyede teknoloji kullanımını ve sağlık okuryazarlığını gerekli kılmaktadır. Sağlık sistemlerinde meydana gelen dijital dönüşümün gereği olan bu beceriler bireylerin sağlık durumlarındaki ilerleyişi anlama, analiz etme ve müdahale etmelerini kolaylaştırmaktadır. Bu sebeple günümüz şartlarında bireylerin sağlıklı yaşam biçimi davranışı gösterebilmeleri için yeterli seviyede e-sağlık okuryazarı olmaları beklenmektedir. Bu çalışmada üniversite öğrencilerinin e-sağlık okuryazarlığı düzeylerini belirlemek ve e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışı arasında ilişki olup olmadığını belirlemek amacıyla gerçekleştirilmiştir. Araştırmanın evrenini Kırıkkale Üniversitesi'nde 2018-2019 eğitim öğretim döneminde eğitim veren 10 fakültenin öğrencileri oluşturmaktadır. Fakültede eğitim gören öğrenci sayılarına göre tabakalı örneklem yöntemi uygulanmış ve 1583 öğrenci araştırmaya dahil edilmiştir. Öğrencilerin e-sağlık okuryazarlığı düzeylerini belirlemek için Norman ve Skinner (2006) tarafından geliştirilen ve Coşkun ve Bebiş (2015) tarafından Türkçe geçerlik ve güvenirlik çalışması yapılan "E-Sağlık Okuryazarlığı Ölçeği (e-HEALS:

The e-Health Literacy Scale)” kullanılmıştır. Öğrencilerin sağlıklı yaşam biçimi davranışlarını belirlemek için ise Walker ve arkadaşları (1996) tarafından geliştirilen ve Bahar ve arkadaşları (2008) tarafından Türkçe geçerlik ve güvenirlik çalışması yapılan sağlıklı yaşam biçimi davranışları ölçeği kullanılmıştır. Araştırma sonucunda e-sağlık okuryazarlığı düzeyleri ve sağlıklı yaşam biçimi davranışlarının fakültelere göre anlamlı farklılıklar gösterdiği ve e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışı arasında pozitif ve anlamlı bir ilişki olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: E-Sağlık Okuryazarlığı, Sağlıklı Yaşam Biçimi, Sağlık Davranışı

ABSTRACT

Protection and improvement of public health has always been one of the leading issues. After a while, existing health promotion studies were added to the studies aimed at protecting health. The World Health Organization has defined health as not merely the absence of disease or infirmity, but a state of complete physical, mental and social well-being. According to the conditions of the period, the understanding of health necessitates a health-centered care approach that protects and improves the health of the society. This view is based on the acquisition of behaviors aimed at protecting, maintaining and improving the health of the individual by including the individual in the process of his own health. The acquisition of these behaviors is explained as a healthy lifestyle behavior. Individuals who make this behavior a lifestyle can be effective in protecting and improving their health. Changes in the understanding and system of health also change the competencies required to exhibit healthy lifestyle behaviors. Protecting and improving health by being included in the existing health system requires the use of technology and health literacy at a certain level. These skills, which are required by the digital transformation in health systems, make it easier for individuals to understand, analyze and intervene in the progress of their health conditions. For this reason, in today's conditions, individuals are expected to be e-health literate enough to show healthy lifestyle behaviors. This study was carried out to determine the e-health literacy levels of university students and to determine whether there is a relationship between e-health literacy and healthy lifestyle behavior. The population of the research consists of the students of 10 faculties providing education at Kırıkkale University in the 2018-2019 academic year. Stratified sampling method was applied according to the number of students studying at the faculty and 1583 students were included in the study. “E Health Literacy Scale (eHEALS)” which was developed by Norman and Skinner (2006) and adapted by Coşkun and Bebiş (2015) to Turkish, has been used to determine e health literacy level of students. The healthy lifestyle behaviors scale which was developed by Walker et al. (1996) and adapted by Bahar et al. (2008) to Turkish, has been used to determine healthy lifestyle behaviors of students. As a result of the research, it was concluded that e-health literacy levels and healthy lifestyle behaviors showed significant differences according to faculties, and there was a positive and significant relationship between e-health literacy and healthy lifestyle behavior.

Keywords: E-Health Literacy, Healthy Lifestyle, Health Behavior

GİRİŞ

Kronik hastalıkların yaygınlaşması ve son yıllarda tüm dünyayı etkisi altına alan pandemi süreci kendi sağlık durumunu doğru anlamının ve bu sağlık durumuna özgü kişisel müdahaleleri bilmenin önemini daha da artırmıştır. Çocuk yaşlardan ileri yaşlara kadar herkes için sağlıklı yaşam biçimi davranışlarının ortaya koyulabilmesinde sağlık okuryazarlığı pozitif bir role sahiptir. Günümüzde elektronik bilgi kaynaklarının geleneksel kaynakların yerini

almasıyla birlikte sağlıkla ilişkili bilgilere erişim noktası da değişim yaşamıştır. İnternet birçok insanın bilgiyi ücretsiz ve hızlı şekilde edinebildiği bir mecra halini almıştır. İnternet kullanıcıları bir doktora görünmeden önce sağlık durumları hakkında bilgi aramakta ve konsültasyondan sonra uzman tavsiyesi veya önerileri almak için tekrar internet'i ziyaret etmektedir (Korkmaz Aslan et al. 2021).

Bilgiye erişimin kolaylaşması sağlık okuryazarlığını daha kritik hale getirmekte ve çeşitli tanımlamalarda değişiklikler yaratmaktadır. Sağlık okuryazarlığı ile ilgili ilk net tanım 1995 yılında Ulusal Sağlık Eğitimi Standartları Ortak Komitesi (JCNEHS) tarafından “bireylerin temel sağlık bilgi ve hizmetlerini edinme, yorumlama ve anlama kapasitesi ve bu bilgi ve hizmetleri sağlığı iyileştirecek şekillerde kullanma yeterliliğidir” şeklinde yapılmıştır. Bu tanımın ardı sıra sağlık okuryazarlığı ile ilgili birçok tanım yapılmıştır. Bu tanımların her biri ortak paydalara sahip olsa da genellikle sağlık okuryazarlığının belirli bir yönüne vurgu yapmaktadır. Sağlık okuryazarlığı, bireylerin bilgiyi tanımlamak ve bilgi ve eyleme dönüştürmek için kullanabilecekleri beceri temelli bir süreçtir. Bu nedenle, yalnızca insanların takip ettiği bilgiyle ilgili değil, daha da önemlisi, bilginin kendilerinin ve başkalarının sağlığını korumak ve geliştirmek için nasıl hareket etmelerini ve genel olarak toplumun rolünün farkında olmalarını nasıl sağladığıyla ilgilidir. Son tartışma ve güncel tanımlamalar bireysel bir odağın ötesine geçmenin ve sağlık okuryazarlığını sağlık sistemlerinin talepleri ile bireylerin becerileri arasındaki bir etkileşim olarak görmenin önemini vurgulamaktadır (Okan et al. 2019).

Elektronik sağlık okuryazarlığı ise, farklı okuryazarlık becerilerinin özelliklerini birleştirmekte ve bunları e-sağlık bakımına uygulamaktadır. Geliştirilen e sağlık okuryazarlığı modelinin temelinde altı ana beceri yer almaktadır: geleneksel okuryazarlık, sağlık okuryazarlığı, bilgi okuryazarlığı, bilimsel okuryazarlık, medya okuryazarlığı ve bilgisayar okuryazarlığı. Bir zambak şeklinde e-sağlık okuryazarlığının orta noktada yer aldığı ve diğer becerilerin de yapraklar şeklinde orta noktaya bağlı olduğu “lily” modeli analitik (geleneksel, medya, bilgi) ve bağlama özgülü (bilgisayar, bilimsel, sağlık) olmak üzere iki temel bileşene sahiptir. Analitik bileşen, konu veya bağlamdan bağımsız olarak çok çeşitli bilgi kaynaklarına uygulanabilen becerileri içerirken, bağlama özel bileşen daha çok duruma özel beceriye dayanmaktadır (Norman and Skinner 2006).

Çeşitli araştırmalar, düşük sağlık okuryazarlık düzeylerinin hastalıkların zamanında teşhis edilmesinde gecikmeye, öz bakım becerilerinde yetersizliğe, acil servis kullanımının artmasına, çeşitli hastalıkların insidansında artışa ve bunların sonucunda erken mortalite oranlarına neden olabildiğini göstermektedir. Sağlığı geliştirici davranışlar, birçok hastalığın önlenmesinde arka plan faktörü olarak kabul edilen sağlığın belirleyicilerinin ana kriterlerinden biridir. Sağlığı geliştirici davranışların yanı sıra sağlıklı bir yaşam tarzı, yaşam süresini ve yaşam beklentisini uzatmada önemli bir etkiye sahiptir. Kronik hastalıkların gelişmesini ve ilerlemesini önleme, yaşam kalitesini iyileştirme ve sağlık hizmetlerinin yükünü azaltma becerisindeki bu potansiyel nedeniyle, sağlığı geliştirici davranışlar toplumda önemli bir rol oynamaktadır. Sağlığı teşvik eden yaşam tarzı profilinin altı önemli bileşeni sağlık sorumluluğu, fiziksel aktivite, beslenme, stres yönetimi, ruhsal gelişim ve kişilerarası ilişkileri içermektedir (Bayati et al. 2018).

Sağlıksız beslenme davranışlarındaki eksiklik ve kötü egzersiz alışkanlıkları, yaşamın ilerleyen dönemlerinde birçok sağlık sorununa neden olabilmektedir. Gençlerin kimlikleri ve sağlık alışkanlıkları, ergenlikten yetişkinliğe geçişlerinde şekillenmektedir. Bu nedenle lise ve üniversite dönemi, yaşam boyu olumlu sağlık davranışları oluşturmaya odaklanmak için ideal zamandır. Ancak üniversite dönemi, öğrencileri kötü sağlık sonuçları açısından riske sokan sağlıksız alışkanlıkların ortaya çıkmasıyla da dikkat çekmektedir (Huang et al. 2020). Bu

süreçte öğrenciler genellikle ebeveynlerinden uzakta yaşamaya, yeni sosyal ağlar geliştirmeye ve eskisinden daha fazla boş zamana sahip olmaya başladıkları için yaşam tarzlarında köklü bir değişiklik meydana gelebilmektedir. Üniversite öğrencilerinin sağlık durumlarındaki düşüş, bu yaşam tarzı değişiklikleri ile ilişkilendirilebilmektedir. Bu nedenle, sağlıklı bir yaşam tarzının sürdürülmesi üniversite öğrencileri için aşılması gereken bir zorluktur (Tsukahara et al. 2020). Bu zorlukların aşılması sürecinde elektronik sağlık araçları, hedeflenen kullanıcıların bunlarla etkin bir şekilde etkileşim kurma becerilerinden yoksun olması durumunda çok az fayda sağlamaktadır. Elektronik sağlık bilgisiyle etkileşim kurabilmek kendine ait bir beceri seti ya da okuryazarlık düzeyi gerektirmektedir (Norman and Skinner 2006). Tüm bu nedenlerden ötürü bu çalışmada üniversite öğrencilerinin e-sağlık okuryazarlık düzeyleri ile sağlıklı yaşam biçimi davranışları arasındaki ilişkiyi incelemek ve bu ilişki üzerinde etkili olabilecek sosyo-demografik özellikleri araştırmak amaçlanmaktadır.

YÖNTEM

Bu çalışmada üniversite öğrencilerinin e-sağlık okuryazarlığı düzeylerini belirlemek ve e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışı arasında ilişki olup olmadığını belirlemek amacıyla gerçekleştirilmiştir. Araştırmanın evrenini Kırıkkale Üniversitesi'nde 2018-2019 eğitim öğretim döneminde eğitim veren 10 fakültede eğitim gören öğrenciler oluşturmaktadır. Ağırlıklı tabakalı örnekleme yöntemiyle 10 fakültenin her biri için hesaplanan örneklem büyüklüğüne göre örnekleme gidilmiştir ve 1583 öğrenci araştırmaya dahil edilmiştir. Veri toplama aracı olarak üç bölümden oluşan bir anket kullanılmıştır. Anketin ilk bölümünde katılımcıların kişisel özelliklerine yönelik ifadeler yer alırken, ikinci bölümünde e-sağlık okuryazarlığı ölçeği, üçüncü bölümde ise sağlıklı yaşam biçimi davranışları ölçeği kullanılmıştır. Öğrencilerin e-sağlık okuryazarlığı düzeylerini belirlemek için Norman ve Skinner (2006) tarafından geliştirilen ve Coşkun ve Bebiş (2015) tarafından Türkçe geçerlik-güvenirlik çalışması yapılan “E-Sağlık Okuryazarlığı Ölçeği (e-HEALS: The e-Health Literacy Scale)” kullanılmıştır. Beşli likert tipi ölçekleme (1= kesinlikle katılmıyorum – 5= kesinlikle katılıyorum) kullanılan ölçekten en düşük 8, en yüksek 40 puan alınabilmektedir (Norman ve Skinner, 2006). Sekiz maddeden ve tek boyuttan oluşan bu ölçek, Yılmaz ve diğerleri (2020), Aktürk (2018), Ergün ve diğerleri (2019) tarafından toplam puan üzerinden ve Özer ve diğerleri (2020), Deniz (2020), Tosun ve Hoşgör (2021), Yüksel ve Deniz (2019) tarafından ise ortalama puan üzerinden değerlendirilmiştir. Her iki değerlendirme yöntemine göre ölçekten alınan puan yükseldikçe katılımcıların e-sağlık okuryazarlık düzeyi de artmaktadır. Öğrencilerin sağlıklı yaşam biçimi davranışlarını belirlemek için ise Walker ve arkadaşları (1996) tarafından geliştirilen ve Bahar ve arkadaşları (2008) tarafından Türkçe geçerlilik ve güvenilirlik çalışması yapılan sağlıklı yaşam biçimi davranışı ölçeği (SYBDÖ) kullanılmıştır. SYBDÖ, 52 ifade ve altı alt boyuttan oluşmaktadır. Kişilerin kendi sağlığı için sorumluluk hissetmesi “sağlık sorumluluğu”, yaşam tarzı olarak düzenli egzersiz yapması “fiziksel aktivite”, öğünleri ve yiyecek seçimini düzenlemesi “beslenme”, iç huzur sağlama ve gelişimi “manevi gelişim”, başkalarıyla iletişim içinde olmayı “kişilerarası ilişkiler” ve gerilim ve kaynaklarını azaltmayı ya da yönetmeyi “stres yönetimi” ile bu alt boyutlar tanımlanmıştır. Dörtlü likert tipi ölçekleme (1= hiçbir zaman – 4= düzenli olarak) kullanılan ölçekten en düşük 52 ve en yüksek 208 puan alınabilmektedir (Walker et al., 1996; Bahar ve diğerleri, 2008). Verilerin analizinde SPSS 24.0 paket programı kullanılmıştır. Çalışmada kullanılan ölçeklerin güvenilirliğini test etmek amacıyla Cronbach Alpha katsayısından yararlanılmıştır, e-sağlık okuryazarlığı ölçeğinin cronbach alpha katsayısı 0,901; sağlıklı yaşam biçimi davranışları ölçeğinin cronbach alpha katsayısı 0,912 olarak bulunmuştur. Çalışma kapsamında elde edilen verilerin analizinde demografik ve karakteristik özelliklere ilişkin sayı ve yüzde gibi tanımlayıcı istatistikler

uygulanmıştır. Katılımcıların bireysel özellikleri açısından e-sağlık okuryazarlığı ve sağlıklı yaşam biçimi davranışı skorlarının farklılaşp farklılaşmadığı t-testi ve tek yönlü varyans analizi (ANOVA) testi ile değerlendirilmiştir. Gruplar arası farklılıkların belirlenmesinde Tukey HSD post hoc testi kullanılmıştır. Anlamlılık düzeyi ise $p < 0,05$ olarak belirlenmiştir. E-sağlık okuryazarlığı ve sağlıklı yaşam biçimi davranışı arasındaki ilişki ise Pearson korelasyon analizi ile değerlendirilmiştir.

BULGULAR

Araştırma kapsamında elde edilen verilerin analizine ilişkin bulgular aşağıdaki tablolarda sunulmaktadır.

Tablo 1: Öğrencilerin e-Sağlık Okuryazarlık Ölçeği ve Sağlıklı Yaşam Biçimi Davranışları Ölçeği Puan Ortalamaları

Ölçekler	n	Minimum	Maksimum	Ortalama	Std. Sapma	α
e-Sağlık Okuryazarlık Ölçeği	1517	8,0	40,0	27,8	6,5	0,901
SYBDÖ	1583	52,0	212,0	133,7	21,8	0,912
Sağlık sorumluluğu	1542	9	47	21,5	4,9	0,753
Fiziksel aktivite	1554	8	46	18,4	5,3	0,793
Beslenme	1549	9	52	21,3	4,6	0,647
Manevi gelişim	1552	9	66	25,6	4,9	0,657
Kişilerarası ilişkiler	1526	9	62	25,4	4,6	0,694
Stres yönetimi	1560	8	48	19,6	4,1	0,653

Çalışmaya katılan tüm öğrencilerin, e-sağlık okuryazarlık ölçeği puan ortalaması $27,8 \pm 6,5$ ve SYBDÖ puan ortalaması ise $133,7 \pm 21,8$ olarak bulunmuştur (Tablo 1). SYBDÖ alt boyutlarına bakıldığında, en yüksek puan sırasıyla manevi gelişim ($25,6 \pm 4,9$), kişilerarası ilişkiler ($25,4 \pm 4,6$), sağlık sorumluluğu ($21,5 \pm 4,9$) ve beslenme ($21,3 \pm 4,6$) boyutlarında meydana gelmiştir. Bunları takiben ise stres yönetimi ($19,6 \pm 4,1$) ve fiziksel aktivite ($18,4 \pm 5,3$) boyutları gelmektedir.

Tablo 2: Demografik ve İnternet Kullanım Özelliklere Göre Sağlıklı Yaşam Biçimi Davranışları Ölçeği ve e-Sağlık Okuryazarlık Ölçeğinin Karşılaştırılması

Değişkenler	n	%	e-Sağlık Okuryazarlık Ölçeği		SYBDÖ	
			Ort \pm Ss	Test İstatistiği p	Ort \pm Ss	Test İstatistiği p
Cinsiyet						
Kadın	864	54,8	27,8 \pm 6,2	t= 0,135	132,1 \pm 21,1	t= -3,282
Erkek	712	45,2	27,7 \pm 6,8	0,893	135,7 \pm 7,0	0,001
Yaş (21,6 \pm 2,2; min:18-maks: 44)						
21 yaş ve altı	831	52,5	27,1 \pm 6,5	t= -4,510	132,3 \pm 20,1	t= -2,827
22 yaş ve üstü	751	47,5	28,6 \pm 6,4	p<0,001	135,3 \pm 23,3	p=0,005
Fakülte						
Sağlık Bilimleri ¹	160	10,1	28,0 \pm 5,3	F= 2,110	131,4 \pm 19,0	
Fen Edebiyat ²	150	9,5	27,5 \pm 6,7	p= 0,026	130,0 \pm 21,5	
İİBF ³	180	11,4	27,2 \pm 7,5	1-10 p<0,001	134,3 \pm 22,8	F= 4,941
Veterinerlik ⁴	170	10,7	27,6 \pm 5,9	2-10 p<0,001	131,4 \pm 19,9	p<0,001
Mühendislik ⁵	185	11,7	27,1 \pm 6,3	3-10 p=0,005	133,4 \pm 18,7	3-10 p=0,050
Tıp ⁶	140	8,8	28,3 \pm 6,5	4-10 p<0,001	133,8 \pm 18,7	
Eğitim ⁷	172	10,9	27,7 \pm 5,9	5-10 p=0,001	132,9 \pm 21,3	

Dış Hekimliği ⁸	130	8,2	29,0±5,9	6-10 p=0,005	130,2±24,2	
Hukuk ⁹	161	10,2	27,0±8,1	7-10 p=0,001	136,7±25,6	
Spor Bilimleri ¹⁰	135	8,5	29,3±5,8	8-10 p<0,001	143,7±21,7	
Bilgisayar kullanma yılı (9,8±3,8; min:0-maks:25)						
1-10 yıl	953	64,9	27,8±6,3	t= -0,451	133,0±22,0	t= -2,273
11 yıl ve üzeri	516	35,1	28,0±6,7	p= 0,652	135,7±21,6	p= 0,023
Bilgisayar kullanma becerisi						
Zayıf ^f	222	14,1	25,9±6,4	F=20,325 p<0,001	126,1±20,5	F=54,350 p<0,001
İyi ²	841	53,2	27,5±6,2	1-2 p=0,004	131,1±19,5	1-2 p=0,005
Çok iyi ³	517	32,7	29,1±6,7	1-3 p<0,001 2-3 p<0,001	141,3±23,5	1-3 p<0,001 2-3 p<0,001
İnternet kullanma becerisi						
Zayıf ^f	83	5,3	24,9±7,8	F= 19,789 p<0,001	126,5±21,2	F= 41,604 p<0,001
İyi ²	748	47,3	27,2±6,1	1-2 p=0,011	129,5±19,9	1-3 p<0,001
Çok iyi ³	749	47,4	28,8±6,5	1-3 p<0,001 2-3 p<0,001	138,8±22,5	2-3 p<0,001
İnternet kullanım sıklığı						
Hiç ya da ayda bir	31	2,0	26,5±7,3		127,5±20,7	
Haftada bir	44	2,8	27,0±7,3	F= 0,732	135,3±21,5	F= 0,959
Her gün	927	58,7	27,9±6,5	p= 0,533	133,6±22,6	p= 0,411
Günde birkaç kez	577	36,5	27,8±6,3		134,0±20,5	

Öğrencilerin %54,8'i kadın ve %52,5'i 21 yaş ve altında olup yaş ortalaması 21,6±2,2 olarak bulunmuştur. Tabakalı olarak seçilen öğrencilerin fakültelere göre dağılımı %8,2 ve %11,7 aralığında değişmektedir. Öğrencilerin %64,9'unun 1 ile 10 yıl aralığında bilgisayar kullanmakta olduğu, %53,2'sinin iyi düzeyde bilgisayar kullanma becerisinin olduğu, %47,4'ünün çok iyi düzeyde internet kullanma becerisinin olduğu ve %58,7'sinin her gün internet kullandıkları belirlenmiştir (Tablo 2).

Öğrencilerin demografik ve internet kullanım özelliklerine göre SYBDÖ ve e-sağlık okuryazarlık ölçeği puan ortalamalarının karşılaştırmaları Tablo 2'de verilmiştir. Buna göre, erkek öğrencilerin sağlık yaşam biçimi davranışları puan ortalaması kadınlara göre anlamlı olarak daha yüksek olduğu bulunurken (p<0,05), cinsiyete göre e-sağlık okuryazarlık puan ortalamaları arasında anlamlı farklılık bulunamamıştır. Yaşa göre farklılıklara bakıldığında, 22 yaş ve üstündeki öğrencilerin, 21 yaş ve altındaki öğrencilere göre e-sağlık okuryazarlık ve SYBDÖ puan ortalamaları anlamlı olarak daha yüksek bulunmuştur (p<0,05). Öğrencilerin öğrenim gördükleri fakültelere göre e-sağlık okuryazarlık ve SYBDÖ puan ortalamaları istatistiksel olarak anlamlı bulunmuştur (p<0,05). Spor bilimleri fakültesinde öğrenim gören öğrencilerin, hukuk fakültesi dışında diğer tüm fakültelerdeki öğrencilere göre e-sağlık okuryazarlık ve yine bu öğrencilerin iktisadi ve idari bilimler fakültesi öğrencilerine göre SYBDÖ puan ortalamalarının anlamlı olarak daha yüksek olduğu saptanmıştır. Öğrencilerin bilgisayar kullanım deneyimlerine göre e-sağlık okuryazarlık puan ortalamaları arasında anlamlı farklılık bulunamazken 11 yıl ve daha fazla zaman bilgisayar kullanan öğrencilerin nispeten daha az zaman bilgisayar kullananlara göre SYBDÖ puan ortalamaları anlamlı olarak daha yüksek bulunmuştur (p<0,05). Bilgisayar kullanma becerisi çok iyi olan öğrencilerin diğerlerine göre ve iyi olanların zayıf olanlara göre e-sağlık okuryazarlık ve SYBDÖ puan ortalamaları anlamlı olarak daha yüksek olduğu saptanmıştır (p<0,05). İnternet kullanma becerisi çok iyi olan öğrencilerin diğerlerine göre hem e-sağlık okuryazarlık hem de SYBDÖ puan ortalamaları ve buna ek olarak internet kullanma becerisi iyi olan öğrencilerin de zayıf olanlara göre e-sağlık okuryazarlık puan ortalamaları anlamlı olarak daha yüksek bulunmuştur (p<0,05). Çalışmaya katılan öğrencilerin internet kullanım sıklığına göre e-sağlık okuryazarlık ve SYBDÖ puan ortalamaları arasında istatistiksel olarak anlamlı farklılık tespit edilememiştir (p>0,05).

Tablo 3: Öğrencilerin e-Sağlık Okuryazarlık ve Sağlıklı Yaşam Biçimi Davranışları Puan Ortalamaları Arasındaki İlişki

Ölçekler ve alt boyutları	1	2	3	4	5	6	7	8
e-Sağlık Okuryazarlık (1)	r= 1,000							
SYBDÖ (2)	r= 0,272* p<0,001	r= 1,000						
Sağlık sorumluluğu (3)	r= 0,240* p<0,001	r= 0,803* p<0,001	r= 1,000					
Fiziksel aktivite (4)	r= 0,176* p<0,001	r= 0,774* p<0,001	r= 0,572* p<0,001	r= 1,000				
Beslenme (5)	r= 0,201* p<0,001	r= 0,737* p<0,001	r= 0,603* p<0,001	r= 0,565* p<0,001	r= 1,000			
Manevi gelişim (6)	r= 0,189* p<0,001	r= 0,714* p<0,001	r= 0,432* p<0,001	r= 0,335* p<0,001	r= 0,349* p<0,001	r= 1,000		
Kişilerarası ilişkiler (7)	r= 0,229* p<0,001	r= 0,695* p<0,001	r= 0,458* p<0,001	r= 0,311* p<0,001	r= 0,341* p<0,001	r= 0,663* p<0,001	r= 1,000	
Stres yönetimi (8)	r= 0,209* p<0,001	r= 0,786* p<0,001	r= 0,573* p<0,001	r= 0,583* p<0,001	r= 0,501* p<0,001	r= 0,526* p<0,001	r= 0,458* p<0,001	r= 1,000

*p<0,01

Çalışmada kullanılan e-sağlık okuryazarlık ölçeği ve SYBDÖ arasında pozitif yönde düşük düzeyde ancak anlamlı bir ilişki olduğu saptanmıştır (r= 0,272; p<0,001) (Tablo 3). Yine SYBDÖ alt boyutları ile e-sağlık okuryazarlık ölçeği arasında da pozitif yönde düşük düzeyde ancak anlamlı bir ilişki olduğu saptanmıştır (r= 0,176-0,240; p<0,001)

TARTIŞMA VE SONUÇ

Sağlık sistemlerinde meydana gelen dijital dönüşüm ve internetin sunduğu her türlü bilgiye erişim kolaylığı insanların yaşam davranışlarında değişikliğe sebep olmaktadır. Mevcut sağlık sisteminde etkili bir katılımcı olabilmek, bireysel sağlığımız için karar alabilmek ve aldığımız kararlarla sağlıklı yaşam biçimi seçilemek sağlık okuryazarlığı yanında e-sağlık okuryazarlığı da gerekli kılmaktadır. Ondokuz Mayıs Üniversitesi öğrencileri üzerinde yapılan bir çalışmada öğrencilerin e-sağlık okuryazarlık düzeylerinin kabul edilebilir seviyede olduğu, %65,2'si sağlıkla ilgili karar verirken internetin yararlı olduğu ve %86,7'si internette sağlık kaynaklarına erişebilmenin önemli olduğu sonucuna ulaşılmıştır. Yani katılımcıların yarıdan fazlasının sağlıklı yaşam biçimi davranışı sergilemeye çalışırken internette faydalandığı görülmüştür. Ayrıca çalışmada e-sağlık okuryazarlığı seviyesinin cinsiyete göre anlamlı bir farklılık oluşturduğu sonucuna ulaşılmıştır (Mıdık ve Aker, 2021). İstanbul'da bir üniversitenin hemşirelik bölümü öğrencileri üzerinde yapılan çalışmada öğrencilerin %83,9'unun sağlıkla ilgili gelişmeleri takip etmek için, %73,2'si sağlıkla ilgili karar alabilmek için interneti kullandığı ve öğrencilerin %51,7'sinin bir önceki hafta internette sağlıkla ilgili araştırma yaptığı sonucuna ulaşılmıştır. Çalışmada e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi, kişilerarası ilişkiler, stres yönetimi, manevi sağlık arasında istatistiksel olarak anlamlı ilişkiler ve e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışları arasında pozitif yönlü yüksek bir ilişki bulunmuştur. Ayrıca sağlıkla ilgili bilgileri elektronik kaynaklardan elde eden öğrencilerin ruhsal sağlık düzeylerinin diğer öğrencilere göre yüksek olduğu görülmüştür (Turan et al., 2020). Öztürk Eyimaya ve arkadaşlarının (2020) sağlık bilimleri fakültesi öğrencileri üzerinde yaptığı çalışmada e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışları arasında güçlü bir ilişki olduğu sonucuna

ulaşmışlardır. Kaya ve Yılmaz (2019) bireylerin sağlıkla ilgili bilgiye ulaşma, bilgiyi anlama, bilgiyi değerlendirme ve bilgiyi uygulamaları ile genel sağlık durumları arasında ve bilgiyi anlama ile acil servise başvuru sayısı arasında istatistiksel olarak anlamlı bir ilişki olduğu sonucuna ulaşmışlardır. Balıkesir’de ergenler üzerinde yapılan bir çalışmada, katılımcıların e-sağlık okuryazarlık puan ortalaması 25,98 ve sağlıklı yaşam biçimi davranışları puan ortalaması ise 127,26 olarak bulunmuştur. Cinsiyete ve yaşa göre puan ortalamaları arasında anlamlı farklılık bulunamazken günde 2-3 saat internet kullananların sağlıklı yaşam biçimi davranışları ve e-sağlık okuryazarlığı puan ortalamasının anlamlı olarak daha yüksek olduğu saptanmıştır. E-Sağlık okuryazarlığı ölçeği ve SYBDÖ arasında ise pozitif yönde zayıf ancak anlamlı bir ilişki olduğu bulunmuştur ($r=0,197$) (Ergün et al., 2019).

Brit ve arkadaşlarının (2017) Amerika’da bir üniversitede eğitim gören öğrenciler üzerinde yaptığı çalışmada e-sağlık okuryazarlığının, bireyin genel sağlık durumu, egzersiz rejimi, uyku düzeni, aşı olma, cinsel sağlığın korunması, dengeli bir diyet, istikrarlı arkadaşlıklar ve zararlı maddelerden arınmış bir yaşam tarzı ile önemli ölçüde ilişkili olduğu sonucu bulunmuştur. Ayrıca öğrencilerin e-sağlık okuryazarlık seviyelerinin yukarıda belirtilen durumlarla ilgili internetten bilgi aramada etkili olduğu belirtilmiştir. E-sağlık okuryazarlığının gelecekteki sağlığı korumada etkili olduğu ve buna yönelik davranışlardan pozitif sosyal ilişkilerin sürdürülmesi, dengeli beslenme ve güvenli cinsel hayat ile e-sağlık arasında yüksek korelasyon olduğu belirlenmiştir. Son olarak gelecekteki çevrimiçi sağlık kayıtlarını kullanmaya yönelik yüksek bir öngörü olduğu sonucu ulaşılmıştır. Tsukahara ve arkadaşlarının (2020) Japonya’da bir üniversitede eğitim, mühendislik, bilim, bahçecilik, beşerî bilimler, halkla ilişkiler, hukuk, siyaset ve ekonomi, liberal sanatlar ve bilimler, edebiyat, tıp, hemşirelik, eczacılık, hukuk fakültesi öğrencileri üzerinde yaptıkları çalışmada tıp öğrencilerinin diğer bölüm öğrencilerine göre, lisans öğrencilerinin ise önlisans öğrencilerine göre daha yüksek e-sağlık okuryazarlığı skoru elde ettikleri bulunmuştur. Yalnız yaşayanlar ile e-sağlık okuryazarlığı skoru arasında istatistiksel açıdan anlamlı bir ilişki olduğu görülmüştür. Ayrıca e-sağlık okuryazarlığı yüksek olan grupta sağlıklı yaşam davranışı (egzersiz, kahvaltı yapma) sergileyenlerin sayısı, düşük olan gruba göre daha fazladır. Her iki grupta sayıları az olmasına rağmen kilolu olanların zayıf olanlara göre daha yüksek e-sağlık okuryazarlığına sahip olduğu görülmüştür. Stellefson ve arkadaşlarının (2011) yaptığı sistematik derlemede geleceğin sağlık çalışanı olacak öğrencilerin e-sağlık yetkinliklerinin olması gerektiği ve bunun iki önemli araştırma sorusu ortaya çıkardığı belirtilmiştir. Bu sorulardan ilki “Sağlık meslekleri için profesyonel olarak hazırlanan üniversite öğrencileri, kanıta dayalı sağlık bilgilerini almak için elektronik kaynaklarda gezinme becerilerine sahip mi?” ikinci soru ise “sağlık profesyoneli olmak için okuyan üniversite öğrencileri, internet’te kaliteli sağlık bilgilerini bulma ve değerlendirme konusundaki gerçek yetenekleriyle ilgili olarak geliştirilmiş bir öz-yeterlik duygusuna sahip mi?” şeklindedir. Bu sistematik derleme sonucunda öğrencilerin e-sağlık okuryazarlık düzeylerini artırmaya yönelik girişimlerin desteklenmesi gerektiği ileri sürülmüştür.

Literatürde yapılan çalışmalar incelendiğinde öğrencilerin interneti sağlıkla ilgili bilgiler elde etmek için kullandıkları, teknolojik cihazlar kullananların e-sağlık okuryazarlığı düzeylerinin daha yüksek olduğu ve e-sağlık düzeyi ile sağlıklı yaşam davranışı arasında istatistiksel açıdan anlamlı ilişki olduğu görülmüştür. Yaptığımız bu çalışmada öğrenciler e-sağlık ölçeğinden ortalama $27,8\pm 6,5$, sağlıklı yaşam biçimi davranışı ölçeğinden ise $133,7\pm 21,8$ ortalama puan elde etmişlerdir. 22 yaş ve üzerinde olanların, sağlık bilimleri, diş hekimliği, tıp, spor bilimleri fakültelerinde okuyan öğrencilerin e-sağlık okuryazarlığı puan ortalamaları diğer gruplara göre yüksek bulunmuş ve yaş ve eğitim görülen fakülte ile e-sağlık okuryazarlığı puan ortalamasında istatistiksel açıdan anlamlı bir ilişki olduğu görülmüştür. Bilgisayar ve internet kullanma becerileri, internet kullanım sıklığı ile e-sağlık okuryazarlığı

puan ortalamasında istatistiksel açıdan anlamlı bir ilişki olduğu, beceri arttıkça ve interneti kullanma sıklığı arttıkça e-sağlık okuryazarlığı puanının arttığı görülmüştür.

Analizlerin sonuçları cinsiyet, yaş, eğitim görülen görülen fakülte, bilgisayar kullanım yılı ve becerisi ve internet kullanım becerisi ile sağlıklı yaşam biçimi davranışı arasında istatistiksel açıdan anlamlı ilişki olduğunu göstermiştir. Erkeklerin kadınlara göre, yaşı büyük olanların küçüklere göre, beden eğitimi bölümünde okuyanların, bilgisayar ve internet kullanım yılı yüksek olanların ve bilgisayar kullanım becerileri yüksek olanların diğer gruplara göre sağlıklı yaşam biçimi ölçeğinden daha yüksek puanlar elde ettikleri görülmüştür. Ayrıca literatüre paralel olarak e-sağlık okuryazarlığı ile sağlıklı yaşam biçimi davranışı ölçeği arasında pozitif yönlü düşük düzeyde anlamlı bir ilişki elde edilmiştir. Yani her iki yönde bir ilişki olup e-sağlık okuryazarlığı seviyesi yükseldikçe öğrencilerin sağlıklı yaşam biçimi davranışı arttığı gibi sağlıklı yaşam biçimi davranışı gösteren öğrencilerin de e-sağlık okuryazarlığı düzeyi yüksek olduğu sonucuna ulaşılmıştır. Bu sonuçlar doğrultusunda bireylerin dijital ortamlardan bilgiye erişebilmeleri için küçük yaşlardan itibaren eğitimler alabilmeleri, bunu alışkanlık haline getirebilmeleri önerilmektedir. Ayrıca öğrencilerin sağlıkları ile ilgili doğru bilgiye ulaşmaları ve sağlıklı seçimler yapmaları konusunda interneti daha bilinçli kullanmaları fayda sağlayacaktır.

KAYNAKÇA

- Aktürk, Ü. (2018). Bir Aile Sağlığı Bölgesindeki 18-49 Yaş Arası Kadınların E-Sağlık Okur Yazarlık Düzeylerinin ve Bunu Etkileyen Faktörlerin Belirlenmesi. *Journal of Human Rhythm*, 4(1), 52-58.
- Bahar, Z, Beşer, A, Gördes, N, ve ark. (2008). Sağlıklı Yaşam Biçimi Davranışları Ölçeği II'nin Geçerlik ve Güvenirlik Çalışması. *Cumhuriyet Üniversitesi Hemşirelik Yüksekokulu Dergisi* 12: 1-13.
- Bayati, T, Dehghan, A, Bonyadi, F, Bazrafkan, L. (2018). Investigating the Effect of Education on Health Literacy And Its Relation to Health-Promoting Behaviors In Health Center. *Journal of Education and Health Promotion*, 7, 1-6.
- Britt, RK, Collins, WB, Wilson, K, Linnemeier, G, Englebert, AM. (2017). Ehealth Literacy and Health Behaviors Affecting Modern College Students: A Pilot Study of Issues Identified By The American College Health Association. *Journal Of Medical Internet Research*, 19(12), e392.
- Coşkun, S, Bebiş, H. (2015). Adolesanlarda E-Sağlık Okuryazarlığı Ölçeği: Türkçe Geçerlik ve Güvenirlik Çalışması. *Gülhane Tıp Dergisi*, 57(7), 378-384.
- Deniz, S. (2020). Bireylerin E-Sağlık Okuryazarlığı ve Siberkondri Düzeylerinin İncelenmesi. *İnsan ve İnsan*, 7(24), 84-96.
- Ergün, S, Sürücüler, HK, Işık, R. (2019). Ergenlerde E-Sağlık Okuryazarlığı ve Sağlıklı Yaşam Biçimi Davranışları: Balıkesir Örneği. *JAREN*, 5(3), 194-203.
- Eyimaya AO, Özdemir F, Tezel A, Apay SE. (2021). Determining the Healthy Lifestyle Behaviors and E-Health Literacy Levels in Adolescentes. *Rev Esc Enferm USP.*, 55: e03742.
- Huang, CL, Yang, SC, Chiang, CH. (2020). The Associations Between Individual Factors, eHealth Literacy, and Health Behaviors among College Students. *International journal of environmental research and public health*, 17(6), 2108.

- Kaya M, Yılmaz FÖ (2019). Sağlık Okuryazarlığı Üzerinde Etkili Olan Faktörlerin İki Farklı İstatistiksel Yöntemle İncelenmesi. Cumhuriyet 1. Uluslararası Multidisipliner Çalışmalar Kongresi, 19-21 Nisan, Sivas.
- Korkmaz Aslan, G, Kartal, A, Turan, T, Taşdemir Yiğitoğlu, G, Kocakabak, C. (2021). Association of Electronic Health Literacy with Health-Promoting Behaviours in Adolescents. *International Journal of Nursing Practice*, 27(2), e12921.
- Mıdık, Ö, Aker, S. (2021). Tıp Fakültesi Öğrencilerinin Pandemi Sürecinde E-Sağlık Okur Yazarlık Düzeyleri ve Sağlık Bilgisi Arama Davranışları. *Sürekli Tıp Eğitimi Dergisi*, 30(4), 245-251.
- Norman, CD, Skinner, HA. (2006). eHealth Literacy: Essential Skills for Consumer Health in A Networked World. *Journal of Medical Internet Research*, 8(2), e506.
- Norman CD, Skinner HA. (2006). eHEALS: The eHealth Literacy Scale. *Journal of Medical Internet Research* 2006; 8(4): 1-7.
- Okan, O, Bauer, U, Levin-Zamir, D, Pinheiro, P, Sørensen, K. (2019). *International Handbook of Health Literacy: Research, Practice and Policy Across the Lifespan* (p. 764).
- Özer, Ö, Özmen, S, Özkan, O. (2020). Sosyal Medya Kullanımının E-Sağlık Okuryazarlığına Etkisinin İncelenmesi. *Alanya Akademik Bakış*, 4(2), 353-367.
- Stellefson, M, Hanik, B, Chaney, B, Chaney, D, Tennant, B, Chavarria, EA. (2011). eHealth Literacy Among College Students: A Systematic Review With Implications for eHealth Education *J Med Internet Res* 2011;13(4): e102.
- Tosun, N, Hoşgör, H. (2021). A Research to Determine the Relationship Between E-Health Literacy and Rational Drug Use Awareness. *Cumhuriyet University Journal of Economics and Administrative Sciences*, 22(2), 82-102.
- Tsukahara, S, Yamaguchi, S, Igarashi, F, Uruma, R, Ikuina, N, Iwakura, K, ... Sato, Y. (2020). Association of Ehealth Literacy with Lifestyle Behaviors in University Students: Questionnaire-Based Cross-Sectional Study. *Journal of medical Internet research*, 22(6), e18155.
- Tuğut, N, Yılmaz, A, Çelik, BY. (2021). Hemşirelik Öğrencilerinin Sağlık Okuryazarlığı Düzeyleri ile Sağlıklı Yaşam Biçimi Davranışlarının Belirlenmesi. *Cumhuriyet Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi*, 6(2), 120-128.
- Turan, N, Güven Özdemir, N, Çulha, Y, Özdemir Aydın, G, Kaya, H, Aştı, T. (2020). The Effect of Undergraduate Nursing Students'e-Health Literacy on Healthy Lifestyle Behaviour. *Global Health Promotion*, 1757975920960442.
- Walker, SN, Hill-Polerecky, DM. (1996). Psychometric Evaluation of the Health Promoting Lifestyle Profile II. Unpublished manuscript, University of Nebraska Medical Center.
- Yılmaz, A, Saygılı, M, Kaya, M. (2020). Sağlık Bilimleri Fakültesi Öğrencilerinin E-Sağlık Okuryazarlığı Düzeylerinin Belirlenmesi. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (31), 148-157.
- Yüksel, O, Deniz, S. (2019). Bireylerin E-Sağlık Okuryazarlık Düzeyinin Belirlenmesine Yönelik Bir Araştırma. In *2nd International Conference on Data Science and Applications (ICONDATA'19)*.

**AKSARAY HASANDAĞI ETEĞİNDE YAŞAYAN HALI DOKUMA
YERLEŞKELERİNE BİR ÖRNEK ‘AKÇAKENT KASABASI’**

AN EXAMPLE OF CARPET WEAVING CAMPUS LIVING ON THE SKIRT OF
AKSARAY HASANDAĞI AKÇAKENT TOWN

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ÖZET

Dokuma sanatı yüzyıllar boyunca toplumların kültürünü yansıtan el sanatlarından biridir. Toplumların dokudukları halı veya kilim örnekleri o toplumun kültür kimliğinin bir parçasıdır. Dokumalarda kullanılan desen ve renk kompozisyonları, malzemeleri ve düğüm tekniği bazı özellikleri dokumanın yapıldığı dönem ve toplum hakkında bilgi veren kaynaklardır. Anadolu'nun birçok köy ve kasabaları dokuma sanatı ile eski zamanlardan beri uğraşmaktadır.

Dokuma köy ve kasaba yaşamında önemli geçim kaynaklarından biri olmuştur. Özellikle tarım ve hayvancılıkla uğraşan kırsal bölgelerde dokuma sanatı yaygındır. Yaz mevsimlerinde tarımla uğraşan halk kış aylarında dokuma yapmaktadır. Köy ve kasaba gibi kırsal alanlarda iş bulma imkanı oldukça az olması bu bölgelerde yaşayan halkın dokuma sanatı ev ekonomisi için önemli gelir kaynaklarından olmuş, bu bölgelerde dokuma sanatı bir meslek haline gelmiştir.

Aksaray köy ve kasabalarında dokuma sanatının yaygın olduğunu ve eskiden dokuma merkezi olduğunu elde edilen örneklerden ve yazılı kaynaklardan anlaşılmaktadır. Halı ve kilim dokumalarının ev ekonomisine büyük katkı sağladığı yerleşkeler bulunmaktadır. Kırkitli dokuma yerleşkelerine örnek olarak Aksaray merkeze bağlı Akçakent Kasabası alan araştırması olarak çalışılmıştır. Akçakent kasabası Hasandağı eteğinde olup kasabada hayvancılık, tarım ve kırkitli dokumalardan elde edilen gelirler aile ekonomisine katkı sağlamaktadır. Kasabada dokumalar daha çok kadınlar tarafından yapılmaktadır. Dokumaların bir bölümü maddi geçim kaynağı olarak Pazar ürünü dokunduğu gibi kız veya erkeklerin çeyizi için de dokunmaktadır. Günümüzde dokuma sanatı ile uğraşan kişi sayısı azalsa da kasabada dokuma yapılmaktadır. Dokumalar tek kişi tarafından dokunuyorsa genellikle yastık, minder, yolluk gibi küçük ebatlı, birden fazla kişi dokuma yapıyorsa çeyrek veya taban gibi büyük ebatlı dokumalar dokunmaktadır.

Yerleşkede elde edilen dokuma örneklerinin sözlü görüşme ile ses ve görüntü kayıtları alınarak dokuma örneklerinin kullanım alanlarına göre sınıflandırılması yapılmıştır. Dokuma örneklerinin genel olarak kalitesi ve kullanılan düğüm tekniği, dokumalarda kullanılan hammadde, renk ve desen kompozisyonları incelenerek değerlendirilmiştir. Dokuma örneklerinde kullanılan dokuma iplerinin renklendirilmesinde kullanılan doğal boyar maddeler alan araştırması kapsamında değerlendirilmiş ve elde edilen bilgilerin literatüre kazanımı için paylaşımı yapılmıştır.

Anahtar Kelimeler: Halı, Kilim, Sanat, Kültür, Akçakent

ABSTRACT

The art of weaving is one of the handicrafts that reflects the culture of societies for centuries. Carpet or kilim samples woven by societies are a part of the cultural identity of that society.

Pattern and color compositions, materials and knot technique used in weaving are sources that provide information about the period and society in which weaving was made. Many villages and towns of Anatolia have been dealing with the art of weaving since ancient times.

Weaving has been one of the important livelihoods in village and town life. The art of weaving is common especially in rural areas dealing with agriculture and animal husbandry. The people who are engaged in agriculture in the summer, weaving in the winter. The weaving art of the people living in these regions has become an important source of income for the home economy, and the art of weaving has become a profession in these regions.

It is understood from the samples and written sources that the art of weaving was widespread in the villages and towns of Aksaray and that it was a weaving center in the past. There are campuses where carpet and kilim weaving contributes greatly to the home economy. As an example of Kirkitli weaving campuses, Akçakent Town, which is connected to the center of Aksaray, was studied as a field study. The town of Akçakent is on the skirts of Hasandağı and the incomes obtained from livestock, agriculture and weaving with kirkit contribute to the family economy. Weaving in the town is mostly done by women. Some of the weavings are woven for the dowry of girls or boys as well as Sunday products as a source of financial livelihood. Today, although the number of people dealing with the art of weaving has decreased, weaving is still practiced in the town. If the weaving is woven by a single person, small sized woven fabrics such as pillows, cushions and runners are generally woven, and if more than one person is weaving, large sized fabrics such as quarters or soles are woven.

The weaving samples obtained in the campus were classified according to their usage areas by taking verbal interview and audio and video recordings. The general quality of the weaving samples and the knot technique used, the raw materials, color and pattern compositions used in the weavings were evaluated by examining. The natural dyestuffs used in the coloring of the weaving yarns used in the weaving samples were evaluated within the scope of the field research and the information obtained was shared for the acquisition of the literature.

Keywords: Carpet, Rug, Art, Culture, Akcakent

GİRİŞ

Aksaray ve çevresi de köklü bir halı dokuma geleneğine sahiptir. Aksaray yöresi halıcılığını “Selçuklular devri Aksaray halıcılığı, Osmanlılar devri Aksaray halıcılığı ve günümüz Aksaray halıcılığı şeklinde üç dönemde ele almak mümkündür. Günümüz Aksaray halıcılığı “Taşpınar Halıları” adıyla tanınmaktadır. (Deniz, 2013, s:177).

Aksaray Selçuklular devrinden beri ünlü bir halı merkezidir. Bu gelenek Osmanlılar devrinde de sürmüştür. Yörede, devrinde yatak ve yorgan yerine kullanılan ve bugün halk arasında desenlerinden dolayı it izi veya kedi izi desenli halı adıyla isimlendirilen halılar mevcuttur (Aslanapa, 1972, s: 12).

Halı olarak Taşpınar adının ilk geçtiği yazılı kaynak 1869-70 tarihli 2. Konya Salnamesidir. Salname’de Aksaray hakkında geniş bilgiler verilirken kilim ve seccadelere söz edilerek Taşpınar’da dokunan halıların da iyi halıların başında geldiği kaydedilir (Kaya, 2009:232).

Halı desenleri 1960 yıllarına kadar Aksaray çevresindeki her köyde özgün bir karaktere sahipken, bu tarihlerden sonra Taşpınar halısı modeli yaygınlaşmıştır. Günümüzde de Taşpınar halısı modeli uygulanmaktadır: Desenlerin büyük bir bölümünün nasıl ortaya çıktığı bilinmemektedir (Arık 1983, s:23)

Halının ana malzemesi yün olup, Aksaray'ın dağ ve ova köylerinde yaşayan ve koyun yetiştiriciliği ile uğraştıkları için koyunlardan yılda bir kereye mahsus yapılan kırkım işlemi ile elde edilen yünler dokumalarda ham madde olarak kullanılmaktadır (Kılıç Karatay, 2019, s:49).

Akçakent, Aksaray ili **Hasandağı** eteklerinde kurulu bir kasabadır. Bu kasabanın sakinleri Konya, Aksaray ve Niğde'den buraya göçmüştür. Akçakent kasabasının tarihi 19yy dayanmaktadır. Akçakent 19yy da Cumhuriyetin kurulmasından(1923) daha önce kurulan Aksaray ilinin en eski köylerinde biridir (<https://akcakentkasabasi.tr.gg/Kasabamiz-Hakkinda.htm> 30 Ekim2021).

Aksaray iç Anadolu bölgesinde yer alan bir ildir. Eski dönemlerden beri dokuma merkezi olarak bilinmektedir. Aksaray ve köylerinde çok eskiden beri yapılmaktadır. Eski zamanlarda beri halı veya kilim dokuması yapan dokuma yerleşkeleri mevcuttur. Akçakent köyü dokuma yerleşkelerine bir örnektir. Dokuma sanatı kendi içinde farklı çeşitlere ayrılmaktadır. Akçakent kasabasında dokuma sanatının çeşitlerinden olan halı dokuma sanatı yaygındır.

Hasandağı eteğinde ve Aksaray ili sınırları içerisinde yer alan kasabanın geçim kaynağı hayvancılık, tarım ve dokumacılıktır. Günümüzde kasabada halı dokuması devam etmektedir. Günümüzde kasabada hala çeyiz geleneğinde halı dokuma örnekleri görülmektedir. Çeyizlerde altı adet yastık, altı adet minder ve bir taban veya çift halı olarak bilinen iki adet çeyrek halı dokuma örneği bulunmaktadır. Yörede dokunan halı örnekleri Taşpınar kasabasına komşu olmaları nedeni ile çoğunlukla Taşpınar ve Arısama halısı desen kompozisyonu olup bunun yanında 'Toplu halı', 'göbekli halı', 'yıldızlı halı', 'döşemeli halı' gibi dokumalarda kullanılan desenlere isimler verilmiştir. Dokumalar daha çok desen kompozisyonunda kullanılan motiften ismini almaktadır.

Hasandağı eteğinde yer alan kasabada dokumalarda kullanılan dokuma ipleri doğar boyar maddelerle boyanmaktadır. Hasandağı eteklerinde yetişen geven otu bitkisinin kökü ile sarı, bağ yaprağı ile yeşil, ceviz kabuğu ile siyah, kökboyası bitkisi ile kırmızı ve pelit bitkisinin şapkası olarak bilinen cevt bitkisi doğal boyar madde olarak kullanılarak kahverengi elde edilmektedir(Kaya, 2021).

Kasabada bayanlar dokuma yapmaktadır. Halı dokumaların elde edilmesinde hammadde yündür. Dokuma iplerinin renklendirilmesinde hem doğadan hem de kimyasal boyar maddelerden yararlanılmaktadır. Dokuma örnekleri taban, çift, yolluk, yastık, minder, örnek ve düz dokuma örnekleridir. Dokumalarda desen olarak daha öncesinde ¼ rapor şeklinde dokunmuş ve içerisinde birden fazla desen kompozisyonu içeren desen örnek dokumalar kullanılmaktadır. Desen örnekler dokumalarda birden fazla bordür deseni, göbek deseni, sandık ve kelle gibi desen kompozisyonları bulunmaktadır. Dokumacılar dokuyacakları desenin kompozisyonunda bu desen örnekler içerisinde yer alan desen kompozisyonlarından oluşturmaktadırlar. Desen kompozisyonlarında dokumacılar özgün davranarak bir dokuma içerisinde birden fazla iç içe yerleşecek şekilde birden fazla göbek deseni kullanılmaktadırlar. Ayrıca bordür, kelle veya diğer her hangi bir desen seçiminde dokumacılar istediği deseni dokumalarına uygulamaktadırlar.

AKÇAKENT KASABASI DOKUMA ÖRNEKLERİ

TABAN DOKUMALARI:



Fotoğraf 1. Yer yaygısı Taban Halısı örneği (Kılıç Karatay, 2019).

Genelde evlerde sergi amaçlı dokunan büyük ebatlı dokuma örnekleridir. Ölçüleri 180X250cm ile 200X300 cm arasında değişmektedir. Köşe göbek desen kompozisyonun hakim olduğu halı dokuma örneklerinin renk kompozisyonunda kırmızı ve mavi yoğunlukla kullanılmaktadır.

Kalite olarak 10 cm de 28X30 ile 30X32 değişen dokuma örnekleri Türk düğümü ile dokunmuştur. Desen kompozisyonlarında yıllardır Taşpınar ve Arısama desen kompozisyonu görülmekte olup desen kompozisyonunda herhangi bir değişiklik olmamıştır (Güler, 2021).

Çift Dokuma Örnekleri:



Fotoğraf 2. Çift halısı örneği (Elçi, 2019). **Fotoğraf 3.** Çift halısı örneği (Elçi, 2019).

Ölçüleri 120X160 ile 130X180 cm aralarında değişen ve genelde çift olarak dokunan halı dokuma örnekleridir. Desen kompozisyonunda genel olarak köşe göbekli ¼ rapor desen

kompozisyonu kullanıldığı gibi tekrar eden desen örnekleri de kullanılmaktadır. Desen kompozisyonlarında göç kültürünün etkisi olmuştur.

Öncesinde köşe göbekli desen kompozisyonları kullanılırken günümüzde tekrar eden geometrik motiflerden oluşan desen kompozisyonları da dokumalarda kullanılmaktadır. Köşe göbekli Desen kompozisyonlarında çoğunlukla bitkisel motifler kullanılmıştır. Dokumalarda sandık motifi de desen kompozisyonlarında yer almaktadır (Dinke, 2021).

Yolluk dokuma Örnekleri:



Fotoğraf 4. Yolluk halısı örneği
(Kılıç Karatay, 2021).



Fotoğraf 5. yolluk halısı örneği
(Kılıç Karatay, 2021).

Genel olarak 100X300 ile 120X500 cm aralıklarında dokunan halı örnekleri olup uzun ince ve yörede 'Ara' olarak bilinen ince koridorlara serilmek üzere dokunmaktadır. Desen olarak 'Top' diye bilinen motif tekrarıyla oluşan desen kullanılmaktadır. Dokuma kalitesi ortalama 10 cm de 28X30 olup hav yüksekliği 5 mmdir.

Yastık dokuma Örnekleri:



Fotoğraf 6. Yastık halısı
(Kılıç Karatay 2021).



Fotoğraf 7. Yastık halısı
(Kılıç Karatay 2021).



Fotoğraf 8. Yastık halısı
(Kılıç Karatay 2021).



Fotoğraf 9. Yastık halısı
(Kılıç Karatay 2021).



Fotoğraf 10. Yastık halısı
(Kılıç Karatay 2021).



Fotoğraf 11. Yastık halısı
(Kılıç Karatay 2021).

Minder Dokuma Örnekleri:

Evlerde üzerine oturulmak için dokunan halı örnekleridir. Ölçüleri 50x50, 60X60, 70X70 ile 80X80 cm ölçüleri arasında değişmektedir. Desen kompozisyonları ¼ rapor tekniği kullanıldığı gibi raporsuz çiçek, kuş gibi doğada var olan nesnelerin stilize edilerek desn olarak dokunmuş örnekleri de görülmektedir. Hav yüksekliği beş ile altı mm arasında değişmektedir. Dokumalar yakın tarihli dokumalar olup günümüzde çeyizlerde önemli yer tutmaktadır.



Fotoğraf 12. Minder halısı (Kılılç Karatay, 2021).



Fotoğraf 13. Minder halısı (Kılılç Karatay, 2021).



Fotoğraf 14. Minder halısı (Kılılç Karatay, 2021).



Fotoğraf 15. Minder halısı (Kılılç Karatay, 2021).

Desen Örnek Dokumaları:

Kasabada dokuma çok eski zamanlardan beri yapılmaktadır. Kasabada yapılan dokuma örneklerinde desen kompozisyonu için hazır çizilmiş desen kağıdı kullanılmamaktadır. Dokumalarda desenler elde dokunmuş desen örneklerinden elde edilmektedir. Desen örneğinde dokumada kullanılacak ayak takımı, göbek veya sandık gibi birçok desen kompozisyonunu oluşturacak motifler yer almaktadır (Dinke, 2021).

Desen örneğinde göbek desenini $\frac{1}{4}$ rapor olarak dokunmuştur. Dokuma yapılırken dokuma yapan bayanlar deseni halının her iki kenarından ortaya doğru deseni yerleştirip orta telde dokuma desenini birleştirmektedirler. Desen örneklerinde birden fazla desen kompozisyonunu görmek mümkündür.



Fotoğraf 16. Desen Örnek halısı
(Kılıç Karatay 2021).



Fotoğraf 17. Desen örnek halısı
(Kılıç Karatay 2021).



Fotoğraf 18. Desen örnek
Halısı (Kılıç Karatay 2021).

Kasabada elde edilen dokuma örnekleri içerisinde bir adet ilikli kilim tekniğinde dokunmuş yer yaygısına da rastlanmıştır. Desen kompozisyonunda kenar ayak kısmında elibelinde, koç boynuzu ve göz motifi kullanılan düz dokuma örneğinin zemininde ise bereket motifinin çevreleyen çengellerden elde edilen topların tekrarından oluşmaktadır.

Top deseninin etrafı bukağı motifi üstten, alttan sağdan ve soldan çevrilidir. Dokuma 130X380 cm ölçülerinde olup dokumasında kullanılan atkı iplikleri doğal boyar maddelerle renklendirilmiştir (Huy, 2021).

Kilimler çözümlü iplikleri üzerinde deseni veren renkli ipliklerin bir alttan, bir üstten çözgüleri örtecek şekilde gidip gelmesiyle oluşurlar. Her iplik kendi desen alanı içerisinde gidip gelir. Böylece yan yana gelen desenler arasında küçük aralıklar oluşur, bunlara ilik denir (Bayraktaroğlu, 1990, s:303).



Fotoğraf 19. İlikli Kilim örneği (Kılıç Karatay, 2021)



Fotoğraf 20. İlikli kilim zemin kısmından detay (Kılıç Karatay, 2021)

SONUÇ

Aksaray ve çevresinin dokuma sanatının tarihi oldukça eskidir. Hemen hemen her köy veya kasabasında dokuma örneği bulmak mümkündür. Dokuma örneklerinde dokumaların yapıldığı köy veya kasabaya ait motifler olduğu gibi göç kültürü ile zenginleşen desen kompozisyonlarını da dokuma örneklerinde görmek mümkündür. Aksaray yöresine ait olan Taşpınar dokumasının desen ve renk kompozisyonu Aksaray ve çevresinde dokunan dokumalarda yoğun olarak görmek mümkündür. Özellikle taban ve çeyrek dokumalarda Taşpınar halılarının yanı sıra Arısama halılarının desen kompozisyonlarını da görmek mümkündür. Aksaray iline bağlı birçok köy ve kasaba kirkitli dokuma yerleşkelerine örnektir. Bu dokuma yerleşkelerinden biri de Akçakent kasabasıdır.

Kasabada taban dokumaların desen kompozisyonlarında bir değişim olmadan yıllardır Taşpınar ve Arısama desen kompozisyonları kullanırken çift dokumaların deseninde farklılık olarak birbirinin tekrarı olan geometrik desenli dokumalar yapılmaktadır. Minder dokumaların desen kompozisyonu oldukça zengindir. Dokumacının isteğine göre hayvan figürleri ve çiçek gibi bitkisel motifler yer aldığı gibi geometrik motiflerden de oluşan desen kompozisyonları da dokumalarda kullanılmaktadır. Dokumaların desenlerin oluşturulmasında örnek desen dokumalarından yararlanılmaktadır. Örnek desenler genelde dokuma sonrası artan çözüğünün tezgahtan çıkarılmadan dokuma ile örnek desen dokuması arasına saçak payı bırakılarak dokunmaktadır. Günümüzde kasabada canlılığını koruyan çeyiz geleneğinde dokumaların önemli bir yeri vardır. Özellikle yastık ve minder dokumalar mutlaka kız ya da erkeğin düğün evinde mutlaka olmalıdır. Eğer düğün evi dokumaları yapamamışsa kasabada dokuma yapan başka aileden satın almaktadır. Bu durumda ev ekonomisine maddi olarak destek olmakta ve gelir kaynağı olmaktadır.

Kasabada elde edilen dokuma örnekleri dokuma sanatının bölgede yaygın olarak bilindiği göstermektedir. Halı dokuma örneklerinin yanı sıra elde edilen düz dokuma örneği olan ilikli kilim örneği de dokuma sanatının yaygın olduğunu göstermektedir. Düz dokuma örneği öncesinde dokunmuş bir dokuma örneği olup dokuma anneden evlada miras olarak kalmıştır. Yörede dokuma ile uğraşanların sayısında azalma olsa da tamamen bitmemiştir.

KAYNAKLAR

BAYRAKTAROĞLU Suzan (1990), Eskişehir Ve Çevresi Halı-Kilim Ve Düz Dokuma Yaygıları, Vakıflar Genel Müdürlüğü

ARIK Rüçhan, “Manzaralı Halılar”, II. Milletlerarası Türk Folklor Kongresi Bildirileri, 1983

ASLANAPA Oktay (1972) Türk Halı Sanatı, İstanbul



KAYA Erdoğan (2009). On Bin Yıllık Tarihi Kent Aksaray, Yeni Aksaray Basın Yayını

DENİZ Bekir (2013).Türk Dünyasından Halil Açıkgöz'e Armağan, Doğu Kitabevi, 1. Baskı, İstanbul

KILIÇ KARATAY Semra (2019). Aksaray Yöresi Halı Ve Düz Dokuma Örnekleri, Kalemşi Dergisi, Cilt:7 Sayı:14

İnternet Kaynakları

(<https://Akcakentkasabasi.Tr.Gg/Kasabamiz-Hakkinda.Htm> 30 Ekim2021).

Sözlü Görüşmeler Ve Görsel Kaynaklar:

ELÇİ Metin, Sözlü Görüşme, 10.05.2019

DİNKE Melek, Sözlü Görüşme, 18.06.2021

HUY Kerziban, Sözlü Görüşme, 10.05.2019

DİNKE Fadimana, Sözlü Görüşme, 18.06.2021

KAYA Kamile, Sözlü Görüşme, 18.06.2021

GÜLER Elif, Sözlü Görüşme,18.06.2021

ALTAN Şehri, Sözlü Görüşme, 18.06.2021

KURU TARIM KOŞULLARINDA FARKLI YAĞLIK AYÇİÇEĞİ (*HELİANTHUS ANNUUS L.*) ÇEŞİTLERİNİN BÜYÜME VE VERİM PARAMETRELERİNİN KARŞILAŞTIRILMASI

COMPARISON OF GROWTH AND YIELD PARAMETERS OF DIFFERENT SUNFLOWER (*HELİANTHUS ANNUUS L.*) CULTIVARS IN DRY FARMING CONDITIONS

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ÖZET

Çalışma kuru tarım koşullarında ayçiçeği çeşitlerinin büyüme ve verim parametrelerinin karşılaştırılması amacıyla Kırşehir ekolojik koşullarında 2018 yılında yürütülmüştür. Denemede 7 adet ayçiçeği çeşitleri (Sanbro, Transol, Cadix, Tunca, Bosfora, LG5880 ve Sanay) tesadüf blokları deneme desenine göre üç tekerrürlü olarak kurulmuştur. Araştırmada ayçiçeğinde bitki boyu (cm), sap kalınlığı (mm), tabla çapı (cm), 1000 tohum ağırlığı (g), tohum verimi (kg/da), iç oranı (%), ham yağ oranı (%) ve ham yağ verimi (kg/da) belirlenmiştir. Araştırmada çeşitler arasında bitki boyu, sap kalınlığı, tabla çapı, 1000 tohum ağırlığı, tohum verimi, iç oranı ve ham yağ verimi yönünden önemli ($P<0.01$) farklılıklar tespit edilirken, ham yağ oranı çeşitler arasında önemli farklılık göstermemiştir. Araştırmada kuru tarım koşullarında Transol, Bosfora ve LG5880 çeşitleri diğer çeşitlere göre bitki boyu, sap ve tabla çapı, bin dane ağırlığı tohum ve yağ verimi yönünden daha üstün gruplamada yer almıştır. Tohum iç oranı yönünden Sanbro ve Tunca çeşitleri daha yüksek orana sahip çeşitlerdir. Yarı kurak iklim koşullarında tohum ve yağ verimi dikkate alındığında Transol, Bosfora ve LG5580 çeşitleri daha iyi sonuçlar sağladığı gözlenmiştir.

Anahtar Kelimeler: Ayçiçeği, kuru tarım, verim, yağ oranı

ABSTRACT

The study was carried out in 2018 in Kırşehir ecological conditions in order to compare the growth and yield parameters of sunflower cultivars under dry farming conditions. In the experiment, 7 sunflower cultivars (Sanbro, Transol, Cadix, Tunca, Bosfora, LG5880 and Sanay) were established in a randomized block design with three replications. In the research, plant height (cm), stem diameter (mm), table diameter (cm), 1000 seed weight (g), seed yield (kg/da), kernel ratio (%), crude oil ratio (%) and crude oil yield (kg/da) were investigated. In the study, significant ($P<0.01$) differences were detected between the cultivars in terms of plant height, stem thickness, table diameter, 1000 seed weight, seed yield, kernel ratio and crude oil yield, but no significant differences in crude oil rates. In the research, Transol, Bosfora and LG5880 cultivars have higher plant height, stem diameter, table diameter, thousand-grain weight, seed, and oil yield under dry farming conditions. In this context, Transol, Bosfora and LG5580 cultivars have better results in terms of seed and oil yield under semi-arid climate condition.

Keywords: Sunflower, dry farming, yield, oil rate

GİRİŞ

Nüfus artışı, gıda talepleri ve beslenme alışkanlıklarındaki değişimler tarımsal üretim üzerinde önemli bir baskı yaratmaktadır. Sağlıklı yaşamak için gerekli olan temel besin ögesi olan proteinler, karbonhidratlar ve yağları düzenli olarak alınmak zorundadır. İnsanların günlük yaşam faaliyetleri için gerekli enerjiyi sağlamak için ise en çok enerji sağlayan yağları tüketmektedir. Yağlar hayvansal ve bitkisel olarak elde edilmekle birlikte bitkisel yağların hayvansal yağlara göre daha sağlıklı, ucuz ve çok miktarda olması nedeniyle insan beslenmesinde önemli yer tutmaktadır. Türkiye yağ üretiminin % 80'i bitkisel yağlardan karşılanmaktadır. Bitkisel yağ üretiminin de yaklaşık % 65'i ayçiçeğinden geri kalan kısmı ise çığıt, zeytin, soya ve diğer yağ bitkilerinden sağlanmaktadır (Erol & Başalma, 2005).

Ayçiçeği ülkemizin en önemli yağlı tohum bitkisi olup, geniş bir adaptasyon kabiliyeti ve ekimden hasada fazla bir işgücü gerektirmemesi nedeniyle, başta Trakya-Marmara bölgesi olmak üzere, birçok bölgede ekilmektedir. Ülkemizde genelde kurak şartlarda ve yazın yetiştirildiğinden, yazın hüküm süren olumsuz iklim koşulları, ayçiçeği verimini önemli ölçüde etkilemektedir. Son yıllarda bu dönemdeki yağışların düzensiz olması, özellikle süt olum devresindeki aşırı sıcaklar, tane veriminin yanında, yağ oranını düşürüp kabuk oranını artırarak, birim alandan alınan yağ verimini de önemli ölçüde azaltmaktadır (Yalçın et al., 2009). Ayçiçeği kuvvetli ve derine gidebilen kök sistemi nedeniyle kurağa nispeten dayanıklı bir bitki olarak bilinmektedir (İlbaş et al., 1996).

Diğer kültür bitkilerinde olduğu gibi ayçiçeği tarımında da birim alan verimini artırabilmek için, gerekli kültürel uygulamaların (yetiştiricilik teknikleri, bitki koruma önlemleri gibi) yanında tercih edilen çeşidin fizyolojik, morfolojik ve genetik özelliklerinin bilinmesinin büyük önemi vardır ((Baydar, 2000; Coşge & Ulukan, 2005; Kılı, 1997; Seiler, 1983; Vasudevan et al., 1997). Ülkemizde yetiştirilen yağlık ayçiçeklerinin hemen hepsi hibrit çeşitler olup, bu çeşitler sayesinde yüksek verimlere ulaşabilmektedir (Göksoy, 1999). Son 20 yılda ülkemize çok sayıda hibrit çeşit girmiştir. Bu çeşitler çoğunlukla küresel şirketler aracılığıyla üreticiye ulaştırılmaktadır (Turhan et al., 2005). Erkencilik ve morfolojik özellikleri bakımından farklılık gösteren ayçiçeği hibrit çeşitlerinin farklı yetiştirme koşullarına yanıtları da farklı olabilmektedir (Angadi & Entz, 2002). Bu bakımdan yüksek tohum ve yağ verimine sahip, hastalık ve zararlılara dayanıklı, yöre koşullarına uygun çeşitlerin belirlenmesi amacıyla yapılacak çeşit-adaptasyon çalışmaları büyük önem taşımaktadır. I. Demir (2019); Güvercin et al. (2002); Karaaslan et al. (2010); Tamer et al. (2016); Tunçtürk et al. (2005); Yalçın et al. (2009) farklı ekolojik koşullarda ayçiçeği çeşitleri ve verim çalışmalarında elde ettikleri sonuçlardaki farklılıklar nedeniyle bölge verim denemelerinin önemi ortaya çıkmaktadır. Bu çalışmada Kırşehir ekolojik koşullarında kuru tarım koşullarında farklı ayçiçeği çeşitlerin verim ve verim öğeleri karşılaştırılarak çeşitler arasındaki farklılıkların tespit edilmesi ve bölge için uygun çeşitlerin önerilmesi amaçlanmıştır.

MATEYAL VE YÖNTEM

Araştırma, Kırşehir Ahi Evran Üniversitesi Ziraat Fakültesi Araştırma ve Uygulama alanında 2018 yılında gerçekleştirilmiştir. Deneme alanı, deniz seviyesinden 1014 metre yükseklikte, 39.15° Kuzey enlemi ve 34.11° Doğu boylamında yer almaktadır. Deneme arazi toprağı killi-tınlı dokulu, alkali karakterli, kalkerli, tuzsuz, belirli miktarda kullanılabilir fosfor konsantrasyonuna sahip, potasyumca zengin, azot ve organik maddece fakir sınıflarına girmektedir (Tablo 1) (Kacar 1994).

Tablo 1. Deneme yerinin toprak özellikleri

Toprak parametreleri	0-30 cm
Saturasyon (İşba%)	55
pH	7.58
EC (mmhos/cm)	0.58
Tuz (%)	0.024
Alınabilir P2O5 (%)	0.18
Kireç CaCO3 (%)	23.1
Alınabilir K2O K (ppm)	65.12
Organik Madde (%)	1.32

Denem yılında yıllık yağış toplamı uzun yıllara yıllık toplam yağış miktarına göre yaklaşık 62.6 mm (%16) daha fazla olduğu görülmektedir (Tablo 3). Ayçiçeğinin Nisan ayından Ağustos ayı sonuna kadar olan dönemdeki yağışı ise 2018 yılında 107.1 mm iken uzun yıllarda bu değer 142.1 mm olarak hesaplanmıştır. Bu durumda ayçiçeğinin yetiştirme döneminde uzun yıllara göre daha kurak bir yetiştirme dönemi olduğu görülmektedir.

Ortalama hava sıcaklığı ise uzun yıllara göre daha sıcak (2.3 C°) olduğu görülmektedir (Tablo 3). Hava nemi yönünden 2018 yılı daha kuru bir hava koşullarına sahip olduğu görülmektedir (Tablo 2).

Tablo 2. Deneme alanı iklim verileri

Aylar	Toplam Yağış (mm)		Sıcaklık (°C)		Nem (%)	
	2018	1980-2018	2018	1980-2018	2018	1980-2018
Ocak	74.4	44.3	2.1	-0.1	79.3	79
Şubat	17.0	31.6	6.5	1.3	71.4	74.1
Mart	87.6	36.7	9.7	5.6	56.4	67.2
Nisan	4.4	42.4	14.0	10.9	64	63.3
Mayıs	69.5	45.6	17.3	15.4	52.7	61.3
Haziran	26.5	36.4	21.5	19.7	56.1	55.5
Temmuz	3.5	8.9	25.2	23.3	47.5	48.9
Ağustos	3.2	8.8	25.1	23.4	49.9	48.1
Eylül	1.2	14.5	20.2	19.1	49	51.6
Ekim	41.4	30.4	14.4	13.1	52.8	62.7
Kasım	21.0	41.6	8.2	6.3	60.6	72.4
Aralık	101.1	47.1	3.3	2.0	80.8	79
Toplam/	450.8	388.2	14.0	11.7	60.0	63.6
<i>Ortalama</i>						

Araştırma tesadüf blokları deneme desenine göre 3 tekerrürlü olarak kurulmuştur. Çalışmada materyal olarak kuru şartlar için geliştirilmiş olan 7 farklı hibrid ticari çeşit (Sanbro, Transol, Cadix, Tunca, Bosfora, LG5880 ve Sanay) kullanılmıştır. Ekim işlemi 05 Nisan 2018 tarihinde yapılırken hasat işlemi ise 01-08 Eylül 2018 tarihleri arasında yapılmıştır. Denemde bitkilerden ölçüm alınırken her parselden kenardan iki sıra ve uçlardan 2 bitki kenar tesiri bırakılmış ve kalan bitkilerden tesadüfen 20 bitki seçilmiş ve ölçümler bu bitkiler üzerinden yapılmıştır. Araştırmada ayçiçeğinde bitki boyu (cm), sap kalınlığı (mm), tabla çapı (cm), 1000 tohum ağırlığı (g), tohum verimi (kg/da), iç oranı (%), ham yağ oranı (%) ve ham yağ verimi (kg/da) belirlenmiştir. Çeşitler arasında görülen farklılığın önemli olup olmadığını belirlemek için önce varyans analiz uygulanmış ve önemli çıkan karakterlerde farklılığın hangi çeşit ya da

çeşitlerden kaynaklandığını belirlemek için çoklu karşılaştırma testlerinden DUNCAN testi uygulanmıştır (Düzgüneş et al., 1987).

BULGULAR VE TARTIŞMA

Araştırmada ayçiçeği çeşitleri arasında bitki boyu, sap kalınlığı, tabla çapı ve bin dane ağırlığı yönünden farklılıklar olduğu ve bu farklılıklarında istatistiksel anlamda $P < 0.01$ düzeyinde önemli olduğu saptanmıştır (Tablo 3). Araştırmada bitki boyu ortalaması 133.22 cm olmuş ve 130 cm altında Sanay (125.07cm) ve Cadix (124.70 cm) çeşitleri boylanma göstermiştir. En yüksek bitki boyu ise 140.47 cm ile LG5881 çeşidinden gözlenmiştir (Tabla 3). Bitki boyu genelde genetik bir özellik olmasının yanında çevre koşullarına bağlı olarak da farklılık gösterebilmektedir. Araştırmada sulama yapılmaması bunun yanında yağışın özellikle ayçiçeği yetiştirme döneminde düşük olması bitki boyu gelişimini önemli ölçüde olumsuz etkilemiştir.

Bitki sap kalınlığı 21.70 mm ile 25.67 mm aralığında değişim göstermiş ve en yüksek sap kalınlığı ise Sanbro (25.67mm) ayçiçeği çeşidinden gözlenmiştir (Tabla 3). Kısa boyluluk ve kalın sap özellikle bitki yatmaya karşı dayanıklılıkta önemli parametre olmaktadır. Çeşitlerdeki bitki boyu ve sap kalınlığı arasında önemli negatif ilişkiler olsa da araştırma dönemindeki kuraklık genetik özelliklerin oluşmamasından daha fazla etkiye sahip olmuştur. Cadix ve Sanay çeşitleri hem bitki boyu hem de sap kalınlığı yönünden en düşük grupta yer almıştır. Canavar et al. (2010), yaptıkları araştırmada kullandıkları çeşitlerin sap kalınlığının 15.88 mm ile 21.68 mm arasında değiştiğini bildirmişlerdir. Sap kalınlığı aynı zamanda uzun bitkilerde düşerken kısa boylu bitkilerde de artmaktadır.

Tablo 3. İncelenen özelliklere ait varyans analiz sonuçları ve ortalamaların karşılaştırılması

	SD	Bitki Boyu (cm)	Sap Kalınlığı (mm)	Tabla Çapı (cm)	Bin Dane Ağırlığı (g)
Tekerrür	2	1.99	0.23	0.37	2.13
Çeşit	6	132.91**	5.46**	11.22**	382.59**
Hata	12	5.6	0.27	0.34	5.03
VK%		1.78	2.25	73	3.68
Çeşitler					
Cadix		124.70e	21.88cd	14.19c	47.28d
Sanay		125.07de	21.70d	14.67c	47.7d
Tunca		130.62cd	22.6bcd	16.64b	54.43c
Sanbro		133.79bc	25.67a	17.91ab	63.08b
LG5881		140.47a	23.31b	18.16a	68.4ab
Bosfora		139.81a	23.11bc	18.62a	73.19a
Transol		138.09ab	23.86b	19.04a	73.21a
Ortalama		133.22	23.16	17.03	61.04
AÖF		5.9	1.3	1.46	5.95

SD: serbestlik derecesi, VK: varyasyon katsayısı, AÖF: Asgari. Önemli Fark, öd: önemli değil, *: 0.05 seviyesinde, **: 0.01 seviyesinde önemlilik gösterir. Benzer harf ile gösterilen ortalamalar Duncan testine göre %1 hata sınırları içinde istatistiksel olarak farklı değildir

Tabla çapı 14.19 cm ile 19.04 aralığında değişim göstermiş ve çeşitlerin ortalama tabla çapı 17.03 cm olmuştur. En düşük tabla çapı Cadix ve Sanay çeşitlerinden sırasıyla 14.19 ve 14.67 cm olarak gerçekleşirken en yüksek tabla çapı ise 19.04 cm ile Transol çeşidinden elde edilmiştir. Her ne kadar Transol çeşidi en yüksek tabla çapına sahip olsa da LG5881 (18.16 cm) ve Bosfora (18.62 cm) çeşitleriyle arasındaki fark istatistiksel anlamda önemi olmadığından aynı grupta yer almışlardır (Tabla 3). İ. Demir (2019) sulu ve kuru koşullarda yaptığı benzer çalışmada tabla çapının kuru koşullarda önemli düzeyde düştüğünü ve kullandığı çeşitlerin kuru koşullarda tabla çapının 12.9 cm ile 15.53 cm aralığında değiştiğini bildirmiştir.

Önemli verim parametrelerden birisi olan bin dane ağırlığı 47.28 g ile 73.21 g arasında değişim göstermiştir. Cadix çeşidi bin dane ağırlığı yönünden en düşük değere sahip olsada Sanay çeşidi ile arasında istatistiksel anlamda fark olmadığından her iki çeşitte en düşük grupta yer almıştır. Bunun yanında Transol çeşidi ile Bosfora çeşidi bin dane ağırlığı yönünden aralarındaki fark istatistiksel anlamda önemli olmadığından aynı ve en yüksek grupta yer almışlardır (Tablo 3). Ayçiçeğinde bin dane ağırlığı, çeşide, yetiştirme şartlarına ve kültürel uygulamalara göre değişiklik gösterebilmekte olup 35-120 g arasında değişmektedir (İ. Demir, 2019; Göksoy & Turan, 2007; İlbaş et al., 1996; Ozer et al., 2004).

Yağlık ayçiçeğinde yağ veriminde önemli parametre olan iç oranı çeşitler arasında farklılık göstermiş ve bu farklılık $P < 0.01$ düzeyinde önemli bulunmuştur (Tablo 4). Çeşitlerin iç oranı %70.45 ile %73.10 aralığında değişim göstermiştir. En yüksek iç oranı Sanbro çeşidinden (%73.10) elde edilirken Tunca çeşidi %72.68 iç oranıyla aynı ve en yüksek grupta yer almıştır. En düşük iç oranı ise Transol çeşidinden %70.45 olarak belirlenmiştir.

Araştırmada çeşitlerin tohum verimleri 126.28 kg/da ile 244.76 kg/da aralığında değişim göstermiş ve bu değişim istatistiksel anlamda $P < 0.01$ önem düzeyinde önemli bulunmuştur. En düşük tohum verimi (126.28 kg/da) Cadix çeşidinden elde edilirken Sanay çeşidi de 134.29 kg/da verim ile Cadix çeşidi ile aynı grupta yer almıştır. En yüksek verim Transol çeşidinden 244.76 kg/da olarak elde edilmiş olsa da LG5881 ve Bosfora çeşitleri de sırasıyla 229.41 ve 241.75 kg/da tohum verimiyle Transol ile aynı verimli grupta yer almıştır (Tablo 4). Tohum veriminin tabla çapı ve bin dane ağırlığı ile önemli pozitif ilişkili olduğu (Demir & Demirel, 2016) ve kurak koşullarda özellikle bitki büyüme ve gelişme dönemlerinde yağışın varlığı önemli derecede verimi etkilemektedir (Demir, 2016).

Ham yağ oranı %46.07 ile %47.39 arasında değişim göstermiş ve bu sonuçlara göre çeşitler arasındaki fark istatistiki olarak önemli çıkmamıştır (Tablo 4). Genel olarak değerlendirildiğinde çeşitlerin araştırmada ortalama %46.86 düzeyinde ham yağ içeriyor olması yağ oranına göre fiyatlamada önemli avantaj sağlamaktadır. Elde edilen ham yağ içeriği Çil et al. (2011) %46.1-47.6 ve (İ. Demir, 2019) %46.97 -49.74 bildirdiği değerlerle ile benzerlik gösterirken Öztürk et al. (2017) %41.57-45.6, Karaaslan and Hakan (2007) %39.1-45.9 ve Kara et al. (2013) %40.40-41.44 bulduğu değerlerden daha yüksektir.

Tablo 4. İncelenen özelliklere ait varyans analiz sonuçları ve ortalamaların karşılaştırılması

	SD	Tohum İç Oranı (%)	Tohum verimi (kg/da)	Ham Yağ Oranı (%)	Ham Yağ Verimi (kg/da)
<i>Tekerrür</i>	2	0.13	10.39	0.08	5.09
<i>Çeşit</i>	6	2.89**	7687.69**	0.69öd	1555.95**
<i>Hata</i>	12	0.42	84.97	0.84	31.72
<i>VK%</i>		0.9	4.88	1.95	6.32
Çesitler					
<i>Cadix</i>		72.08ab	126.28d	46.38	58.61d
<i>Sanay</i>		72.08ab	134.29d	46.86	62.94d
<i>Tunca</i>		72.68a	158.79c	47.31	75.10c
<i>Sanbro</i>		73.10a	187.75b	47.02	88.28b
<i>LG5881</i>		71.92abc	229.53a	46.96	107.75a
<i>Bosfora</i>		70.65bc	241.75a	47.39	114.60a
<i>Transol</i>		70.45c	244.76a	46.07	112.74a
<i>Ortalama</i>		71.85	189.02	46.86	89.13
<i>AÖF</i>		1.61	22.99		11.38

SD: serbestlik derecesi, VK: varyasyon katsayısı, AÖF: Asgari. Önemli Fark, öd: önemli değil, **: 0.01 seviyesinde önemlilik gösterir. Benzer harf ile gösterilen ortalamalar Duncan testine göre %1 hata sınırları içinde istatistiksel olarak farklı değildir

Ham yağ verimi tohum verimi ve ham yağ oranının çarpılıp 100 oranlanması ile elde edilen veri olduğundan ve tohum verimindeki sayısal değer büyük olması nedeniyle tohum verimine daha yüksek düzeyde bağlı bir parametredir. Ham yağ verimi 58.61-114.60 kg/da aralığında değişim göstermiş ve çeşitler arasında ham yağ verimi bakımından farklılık $P<0.01$ düzeyinde önemli olduğu saptanmıştır (Tablo 4). En düşük ham yağ verimi Cadix ve Sanay çeşitlerinden sırasıyla 58.61 ile 62.94 kg/da elde edilirken her iki çeşit arasında ki fark önemsiz çıktığından en düşük yağ verim grubunda yer almışlardır. En yüksek ham yağ verimi ise Bosfora çeşidinden 114.60 kg/da olarak elde edilmiş olmasına rağmen Transol (112.74 kg/da) ve LG5881 (107.75 kg/da) çeşitlerinin ham yağ verimleri Transol çeşidinden farklı olmadığından üç çeşitte aynı grupta yer almıştır.

SONUÇ

Kuru tarım koşullarında ayçiçeği çeşitlerinin büyüme ve verim parametrelerinin karşılaştırılması amacıyla yürütülen çalışmada 7 adet ayçiçeği çeşitleri (Sanbro, Transol, Cadix, Tunca, Bosfora, LG5880 ve Sanay) kullanılmıştır. Araştırmada ayçiçeğinde bitki boyu (cm), sap kalınlığı (mm), tabla çapı (cm), 1000 tohum ağırlığı (g), tohum verimi (kg/da), iç oranı (%), ham yağ oranı (%) ve ham yağ verimi (kg/da) belirlenmiştir. Araştırmada incelenen özellikler bakımından ham yağ oranı dışında diğer parametrelerde çeşitler arasında önemli ($P<0.01$) farklılıklar tespit edilmiştir. Kuru tarım alanlarında sadece yağışa bağlı su sağlandığından ekim yılında özellikle ayçiçeğinin büyüme ve gelişme döneminde yağışın önemli olduğu görülmektedir. Araştırmada ayçiçeğinin büyüme gelişme döneminde yağışın uzun yıllar ortalamaya göre daha düşük olması kurak alanlarda verimli çeşitlerin seçilmesinde önemli olmuştur. Araştırmada sonucunda birim alanda daha yüksek tohum ve yağ verimi elde edilmesi amaçlandığından Transol, Bosfora ve LG5880 çeşitleri diğer çeşitlere göre daha üstün grupta yer alarak bölge koşulları için daha uygun olacağı düşünülmektedir.

KAYNAKÇA

- Angadi, S., & Entz, M. (2002). Agronomic performance of different stature sunflower cultivars under different levels of interplant competition. *Canadian journal of plant science*, 82(1), 43-52.
- Baydar, H. (2000). Bitkilerde yağ sentezi, kalitesi ve kaliteyi artırmada ıslahın önemi. *Ekin Dergisi*, 11, 50-57.
- Canavar, Ö., Ellmer, F., & Chmielewski, F. (2010). Investigation of yield and yield components of sunflower (*Helianthus annuus* L.) cultivars in the ecological conditions of Berlin (Germany). *Helia*, 33(53), 117-130.
- Coşge, B., & Ulukan, H. (2005). Ayçiçeği (*Helianthus annuus* L.) Yetiştiriciliğimizde Çeşit ve Ekim Zamanı. *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 9(3).
- Çil, A., Çil, A., Evcı, G., & Kılıç, F. (2011). Bazı yağlık ayçiçeği (*Helianthus annuus* L.) hibridlerinin Çukurova koşullarında bitkisel ve tarımsal özelliklerinin belirlenmesi. *Türkiye IX. Tarla Bitkileri Kongresi*, 12-15.
- Demir, I. (2016). Determination of the yield and yield components performance of some sunflowers (*Helianthus annuus* L.) under rainfed conditions. *19th International Sunflower Conference. Edirne, Turkey*, 985-992.
- Demir, I. (2019). The effects of sowing date on growth, seed yield and oil content of sunflower (*Helianthus annuus* L.) cultivars under rainfed conditions.
- Demir, İ. (2019, 10-12 Haziran). Bazı Hibrid Ayçiçeği Çeşitlerinin Sulu ve Kuru Koşullarda Verim ve Verim Öğelerindeki Değişimler. *Ispen Uluslararası Tarım ve Kırsal Kalkınma Kongresi, Siirt*.

- Demir, İ., & Demirel, A. (2016). Kurak Koşullarda Yetiştirilen Ayçiçeği (*Helianthus annuus* L.) Çeşitlerinde Verim ve Kalite Ögeleri Arasındaki İlişkiler. *Biyoloji Bilimleri Araştırma Dergisi*, 9(1), 14-17.
- Düzgüneş, O., Kesici, T., Kavuncu, O., & Gürbüz, F. (1987). Araştırma ve deneme metodları (İstatistik Metodları-II). *Ankara Üniversitesi Ziraat Fakültesi Yayınları*, 1021(295), 10-13.
- Erol, Ç., & Başalma, D. T. D. (2005). *Ayçiçeğine (Helianthus annuus L.) farklı gelişme dönemlerinde uygulanan yaprak gübresinin verim ve verim ögeleri üzerine olan etkileri* Ankara Üniversitesi Fen Bilimleri Enstitüsü Tarla Bitkileri Anabilim Dalı].
- Göksoy, A., & Turan, Z. (2007). Correlations and path analysis of yield components in synthetic varieties of sunflower (*Helianthus annuus* L.). *Acta Agronomica Hungarica*, 55(3), 339-345.
- Göksoy, A. T. (1999). Kendilenmiş Ayçiçeği (*Helianthus annuus* L.) Hatlarından Geliştirilen Sentetik Çeşitlerin Bazı Tarımsal Özellikleri Üzerinde Bir Araştırma Abdurrahim. *Turkish Journal of Agriculture and Forestry*, 23(supp2), 349-354.
- Güvercin, R., Tanrıverdi, M., & Yılmaz, H. (2002). Harran Ovasında yetiştirilebilecek bazı ayçiçeği çeşitlerinin verim ve verim unsurları üzerinde bir araştırma. *Har. Ü. Zir Fak. D.*, 6(3-4), 57-64.
- İlbaş, A., Yıldırım, B., Arslan, B., & Günel, E. (1996). Sulama sayısının bazı ayçiçeği (*Helianthus annuus* L.) çeşitlerinde verim ve önemli bazı tarımsal özellikler üzerine etkisi. *Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Dergisi*, 6(4), 9-22.
- Kara, K., Öztürk, E., & Polat, T. (2013). Farklı yetiştirme sürelerine sahip yağlık ayçiçeği çeşitlerinin kuru ve sulu koşullarda kışlık (dondurma) ve yazlık olarak yetiştirilmesi üzerine bir araştırma. *Türkiye XTarla Bitkileri Kongresi*, 78-85.
- Karaaslan, D., & Hakan, M. (2007). Diyarbakır koşullarında aspir için en uygun yazlık ekim zamanının ve çeşitlerinin belirlenmesi. *Türkiye VII. Tarla Bitkileri Kongresi*, 25-27.
- Karaaslan, D., Hatipoğlu, A., Türk, Z., & Kaya, Y. (2010). Determination of potential sunflower (*Helianthus annuus* L.) cultivars for the irrigated conditions of diyarbakır. *Helia*, 33(52), 145-152.
- Kıllı, F. (1997). Kahramanmaraş ekolojik koşullarında yağlık melez ayçiçeği (*Helianthus annuus* L.) çeşitlerinin verim ve verim unsurları üzerine bir araştırma. *Turkish Journal of Agriculture and Forestry*, 21(2), 149-155.
- Ozer, H., Polat, T., & Ozturk, E. (2004). Response of irrigated sunflower (*Helianthus annuus* L.) hybrids to nitrogen fertilization: growth, yield and yield components. *Plant Soil and Environment*, 50(5), 205-211.
- Öztürk, E., Volkan, G., & Polat, T. (2017). Yağlık ayçiçeği tanelerinin bazı karakteristik özelliklerinin belirlenmesi. *Atatürk Üniversitesi Ziraat Fakültesi Dergisi*, 48(2), 81-85.
- Seiler, G. J. (1983). Effect of Genotype, Flowering Date, and Environment on Oil Content and Oil Quality of Wild Sunflower Seed 1. *Crop Science*, 23(6), 1063-1068.
- Tamer, N., Başalma, D., Türkmen, C., & NAMLI, A. (2016). Organik toprak düzenleyicilerin toprak parametreleri ve ayçiçeği (*Helianthus annuus* L.) bitkisinin verim ve verim ögeleri üzerine etkileri. *Toprak Bilimi ve Bitki Besleme Dergisi*, 4(1), 11-20.
- Tunçtürk, M., Eryiğit, T., & Yılmaz, İ. (2005). Van-Erciş Koşullarında Bazı Ayçiçeği (*Helianthus annuus* L.) Çeşitlerinin Verim ve Verim Ögelerinin Belirlenmesi Üzerine Bir Araştırma. *Türkiye VI. Tarla Bitkileri Kongresi*, 5-9.
- Turhan, H., Kaya, Y., & Öztürk, İ. (2005). Bazı hibrit ayçiçeği çeşitlerinin verim, verim unsurları ve yağ oranlarının karşılaştırılması. *Türkiye VI. Tarla Bitkileri Kongresi*, 1, 21-24.
- Vasudevan, S., Virupakshappa, K., & Bhaskar, S. (1997). Yield and yield components of sunflower (*Helianthus annuus* L.) cultivars as influenced by season. *Journal of Oilseeds Research*, 14, 216-220.



Yalçın, K., Göksel, E., Pekcan, V., Gücer, T., & Yılmaz, M. İ. b. (2009). Ayçiçeğinde Yağ Verimi ve Bazı Verim Öğeleri Arasında İlişkilerin Belirlenmesi. *Journal of Agricultural Sciences*, 15(04), 310-318.

THE RELATIONSHIP BETWEEN TECHNOLOGICAL INNOVATIONS AND GROWHT

TEKNOLOJİK YENİLİKLER VE BÜYÜME ARASINDAKİ İLİŞKİ

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ÖZET

Günümüzün küreselleşmiş piyasalarında rekabet gücünü geliştirmenin ve dolayısıyla sürdürülebilir bir ekonomik büyümenin sağlanması teknolojik inovasyon kapasitesi ile yakından ilişkilidir. Teknolojik gücü elinde bulunan ülkelerin diğer ülkelere kıyasla üretim ve milli geliri daha yüksek olduğu görülmektedir. Bu çalışmada dünya bankası verileri kullanılarak Türkiye verileri üzerinden Granger nedensellik analizi kullanılarak bir analizi yapılmıştır. Çalışmanın neticesinde Ar-genin yüksek teknoloji ihracatı üzerinde ivme kazandırdığı sonucuna varılmıştır.

Anahtar kelimeler: Yenilik, Ekonomik Büyüme.

ABSTRACT

In today's globalized markets, ensuring the development of competitiveness and thus a sustainable economic growth is closely related to the technological innovation capacity. It is seen that countries with technological power have higher production and national income data analysis was performed using an analysis of causality. As a result of the study, it was concluded that the Ar-gene accelerated on high technology exports.

Keywords: Innovation, Economic Growth.

1. GİRİŞ

Sanayi devrimi ile birlikte iktisadi ve soysal alanda birçok değişim yaşanmıştır. Yaşanan değişimlerin en önemlilerinden biri, üretimin yöntem ve miktarında ortaya çıkmıştır. Sanayi devrimi ile birlikte sanayi sektöründe yaşanan hızlı ve kesintisiz üretim artışları II. Dünya savaşı sonrasında ekonomik büyüme ve üretim zincirinin birlikte anılmasına yol açmıştır. Özellikle gelişmekte olan ülkeler, gelişmiş ülkelerin seviyesine ulaşma güdüsüyle hareket ederek, ekonomik büyüme ve kalkınmalarını sağlamak ve refah seviyelerini arttırmak amacıyla üretmek sanayileşmeyi önemli bir hedef olarak kullanmışlardır. Sanayi sektöründe oluşturulacak üretim artışının etkin ve verimli bir şekilde gerçekleştirilmesi için atılacak adımların neler olması gerektiği beraberinde, teknolojik gelişmelerin ve uygulanan bilim ve sanayi politikalarının önemini ortaya koymuştur. Bu gelişme ekonomik büyüme ile teknolojik gelişmelerin birbiriyle yakından ilişki halinde olduğu sonucuna ulaşılmıştır.

Günümüzde büyüme olgusunun, ülkelerin sahip oldukları teknoloji düzeyi ile ilişkili olduğu vurgulanmaktadır. Teknoloji; iktisatçıya göre, milletlerin refahını ve yaşam standardını yükselten bir araç ve kaynak girdileri ile üretim çıktıları arasında sıkışmış bir ölçme tekniği, mühendise göre bir malın üretilmesi için kullanılan yöntemler dizisidir. Diğer bir tanımla teknoloji, var olan malların ve hizmetlerin üretimini, pazarlama etkinliğini iyileştirmek, yeni mal ve hizmet üretmek için faydalanılan bilgi kaynağıdır (Kılınçarslan ve Dinç, 2007). Dinamik bir yapıya sahip olan teknoloji, ülkelerin sınıflandırılmasında kullanılan bir ölçüt niteliği taşımaktadır. Gelişmiş ülkelerde belirlenen sanayileşme ve ekonomi politikaları, teknolojiye göre belirlenmektedir. Dünya arenasında genel kabul görmüş görüş, ülkelerin ileri teknoloji ile üretim yapması ile ekonomik büyüme ve kalkınmaları arasında önemli bir pozitif ilişki olduğu yönündedir. Bu görüşe dayalı olarak teknolojik gelişmelerden bağımsız olarak değerlendirilen bir ekonomik büyüme politikalarının noksan kalacağı açıkça ifade edilebilir. (Kaynak: Prof. Dr. N.Algan, Prof. Dr.M. Tekooğlu, Ph.D. C.M. Morgan-2017)

Bu çalışmanın amacı; Teknolojik yeniliklerle ekonomideki büyüme arasındaki ilişkileri incelemenin yapılmasıdır.

2. TEKNOLOJİK YENİLİK OLGUSU VE EKONOMİYE ETKİLERİ

Teknoloji terimi konusunda genel kabul görmüş bir tanım olmamakla birlikte en basit ve dar tanımıyla teknoloji: Bir mal veya hizmetin üretim için gerekli ve uygulanan bilgi ve deneyimdir. Daha geniş kapsamlı tanımıyla teknoloji: Malların veya hizmetlerin üretiminin planlanmasından, dağıtımın gerçekleştirilmesine kadar geçen süre içerisindeki teknik veya yönetsel yöntemlerin ve bilgilerin tümüdür. Teknoloji; insanın bilimi kullanarak doğaya üstünlük kurmak için tasarladığı rasyonel disiplindir. Dünya iktisadında yaşanan büyüme ile ilgili iki gerçeğin açıklanması gerekmektedir. Bunlardan ilki, çok uzundur bazı ülkelerde kişi başına düşen gelirin önemli oranlarda yükselmekte olmasıdır. İkincisi ise, zaman dilimi sabit tutulduğunda ülkelerarası büyüme oranlarının farklı olması ve ülke sabit tutulduğunda ise çeşitli zamanlarda büyüme oranlarının farklılık göstermesidir. Gelişmekte olan ülkelerde, araştırma ve geliştirme için yapılan harcamalar son yıllarda belirgin bir şekilde artış göstermiştir. Teknolojik yeniliğin iktisadi büyümeye katkısını ölçmek zordur. İktisadi büyüme ile üretim fonksiyonundaki emek ve sermaye faktörlerinin verimlilik oranları mukayese edilmekte, emek ve sermaye faktörleri ile açıklanamayan büyümenin teknolojik yenilikten kaynaklandığı kabul edilmektedir. Gelişmekte olan ülkelerde ise teknolojik yenilik iktisadi büyüme sürecinde belirleyici bir faktör değildir. Sözkonusu ülkelerde araştırma ve geliştirme faaliyetlerine önem verilmemektedir. Gelişmekte olan ülkeler grubu, dünya iktisadı açısından orjinal yenilikler gerçekleştirilememektedir. Ancak, sözkonusu ülkelerdeki sanayileşme sürecinde teknolojik değişim yaşanmaktadır. Yoğun rekabet nedeniyle giderek azalan kârsızlığın ilacı, muhakkak ki farklılaşma ve yenilik. Ancak farklılaşma ve yenilik de yeni teknolojilerin geliştirilmesi ve uygulanması ile mümkün olabiliyor. Doğal olarak, sanayinin yabancı kaynak ihtiyacını azaltacak bu formülle büyüme hızlanacaktır. Elbette ki bu sonuca bir sihirli değnek ile hemen ulaşılamaz. Öncelikle çalışmaların yapılacağı zeminin hazırlanması gerekecektir. Ürettiğimiz ürünleri emsallerine göre daha katma değerli hale getirecek olan bu teknolojiler, bilginin paylaşıldığı merkezlerde geliştirilebilir.

1970'lerde dünya kapitalizminin içine girdiği krizde, ekonomik ortamın yarattığı belirsizlik, özellikle teknolojik değişim karşısında hem firmalar hem de hükümetler açısından doğru değerlendirmeler yapılarak, doğru politikalar ve stratejiler saptamayı çok önemli kılıyordu. Dünya ekonomisinde kriz sonrası ortaya çıkan tüm bu gelişmeler rekabetin koşullarını da değiştirdi ve Batılı ülkelerin sanayilerini bir yeniden yapılanmaya zorladı. 1970'lerden bu

yana, dünya pazarlarında dalgalanan ve sürekli değişen talebe karşı esneklik kazanma çabası içinde üretim süreçlerinde teknolojik bir dönüşüm gerçekleştiriliyor. Üretim süreçlerinde ortaya çıkan bu teknolojik dönüşümün doğası, yönü, nedenleri ve sonuçları üzerine farklı alanlarda yapılan çeşitli çalışmalar, bu dönüşümün çok farklı yanlarını ön plana çıkarıyor. Bu çalışmaların hemen tümünün vurguladıkları nokta, ürün geliştirmenin ve yeni teknolojilerin yaygın kullanımının ülkelerin ekonomik büyüme süreçleri üzerinde çok önemli rolleri olduğudur. Genellikle gelişmiş ülkelerde yapılan bu çalışmalarda ulaşılan teknolojik yeniliklerin ekonomik büyümenin itici gücü olduğu sonucu kabul görmüştür. Son dönemlerde uluslararası ticaret alanında yürütülen teorik ve ampirik çalışmalarda da, ülkelerin rekabet gücü kazanmasında teknolojinin önemi vurgulanıyor. Kaynak: sorubank.com/blog

SANAYİ

Yeni teknolojilerin yeni sanayi dalları doğurduğu doğru bir tespittir. Ama yeni teknolojiler, yalnızca yeni sanayi dalları doğurmakla kalmaz, özellikle de jenerik/yayılgan karakterde olanları, mevcut sanayi dallarını da aslında bütün ekonomik faaliyet alanlarını değişime uğratar. Teknolojideki hızlı ve kapsamlı gelişmelerle iç içe geçmiş olarak, ürün profiline, üretimin dayandığı teknoloji tabanının, istihdam profiline ve üretim normlarının, hatta sanayi kavramının kendisinin değişmekte olduğunu görüyoruz. Örneğin, prodüktif hizmet sanayilerinden, içerik (content) ya da yazılım sanayilerinden söz edebiliyor; ya da sanayiye özgü normların giderek tarım sektöründe de egemen üretim normu haline geldiğini görüyoruz. Yeni teknolojilerin mevcut sanayi dallarını değişime uğratması olgusunun ekonomiye olan etkisi, yeni sanayi dalları doğurma etkisinden çok daha önemlidir. Onun içindir ki, bu iki olguyu, özellikle de stratejik planlamada ya da ulusal politikalar belirlenirken sanayide değişim ve yeni sanayiler olarak birlikte ele almak gerekiyor.

Ürün profil ve karakteristikleri, üretim yöntemleri ve üretim organizasyonuna ilişkin yöntemler, söz konusu teknolojiler tabanında, hızla değişime uğramakta; yeni ürünler, yeni üretim yöntemleri ortaya çıkmaktadır. Bu bağlamda, Fordist iş süreci (seri üretim) ve bu sürece özgü normlar değişime uğramaktadır. İş sürecindeki yeni biçimlenmiş ulusal inovasyon sisteminde olduğu gibi, yeni kurumsal yapılar, yeni ilişkiler yaratmakta ya da mevcut kurumsal / toplumsal yapıları, şu ya da bu ölçüde, değişime uğramaktadır. Teknolojideki ilerlemeler ya da yeni teknolojiler mal ve hizmet üretiminde prodüktiviteyi yükseltmektedir. Ancak, prodüktivitenin yükselmesi, mevcut sanayilerde, istihdamda azalma demektir. Toplumsal refah, boşta kalan işgücünün yeni teknolojilerin yarattığı yeni üretim alanlarına, yeni iş alanlarına aktarılabilmesine; tersinden söyleyerek, yeni teknolojilerin taşıdığı potansiyelden yararlanılarak, boşta kalan işgücünü massedecek yeni üretim, yeni iş alanları yaratılabilmesinde gösterilecek başarıya bağlıdır. Onun içindir ki, sanayide değişim ve yeni sanayiler meselesini bir bütün olarak ele almak gerekir. Günümüzde jenerik teknolojiler tabanındaki nu yeni biçimleyişin, son çözümlemede, bu iktisadi sistemi sürdürmeye, onu yeniden üretmeye yönelik olduğunu belirtmek gerekir. Sisteme dahil ülkeler ve bu sistem içinde yer alan tek tek firmalar söz konusu olduğunda, günümüz jenerik teknolojilerine egemen olmak ve bu teknolojiler tabanında inovasyon yeteneğini kazanmak sistemi sürdürmenin ötesinde, sistem içinde kendi varlığını sürdürebilmenin ve dünya nimetlerinin paylaşımında kendi çıkarlarını koruyabilmenin olmazsa olmaz koşulu haline gelmektedir. (Kaynak: Göker-MMO sanayi kongresi 19 Kasım 1999)

İSTİHDAM

Firmaların yatırım tercihlerini belirleyen beklenen kar faktörü (Emek,2013:368) gibi alternatif faktörler arasında en verimli ve kazançlı olanı seçmek, tüm toplumların ortak iktisadi

kaygılarından olagelmıştır (Gökdere, 1997: 37). Beklenen kara ulaşmak veya en kazançlı olanı seçmek, teknolojik yeniliklerle mümkün olabilir. İktisat dünyası teknolojik yenilikleri, ürün ve süreç yenilikleri olmak üzere ikiye ayırmaktadır. Tamamen yeni bir ürünün ilk ticari üretimini veya mevcut bir ürünün kalitesini artıran değişiklikler “ürün yeniliği” olarak tanımlanmaktadır. Mevcut bir ürünün yeni bir süreç ile üretilmesine ise “süreç yeniliği” denmektedir.

Teknolojik değişimin istihdam üzerindeki etkisi, öncelikle değişimin çeşidine bağlıdır. Ürün yenilikleri daha çok talep üzerinde, süreç yenilikleri ise maliyet ve arz üzerinde etki göstererek (İrmiş ve Özdemir, 2011: 113-114) istihdamın yönünü çizmektedir.

Teknolojiye dayalı yatırımların istihdamı olumlu etkileyeceği durumlar şu iki şekilde ortaya çıkmaktadır:

- i. Rekabet temelli durumlar,
- ii. Telafi edici mekanizmaların devreye girdiği durumlar.

Yatırımlarda ileri teknoloji kullanımının istihdam üzerinde olumlu etki gösterebilmesi bir başka deyişle teknoloji merkezli gerekçeler sebebiyle iş akitlerinde fesihlerin asgari seviyeye indirilebilmesi için uygulamaya ilişkin çeşitli yöntemler geliştirilmiştir:

- İşçilerin teknolojik yönden yeterliliği ve teknolojik gelişmelere uyumlu göz önünde tutulmalıdır.
- Rekabet dünyasının gerçekleri göz önünde tutularak rekabet edilen firmaların teknolojik gücü kontrol edilmeli, reel politikalarla izlenmelidir.
- Teknolojik yatırımdan en rantabl sonucu alabilmek için en kalifiye elemanlara yer verilmeli, teknolojik yarışta firmayı duraklatan elemanların eğitimine kaynak ayrılmalıdır.
- Teknolojinin her zaman olumlu sonuç doğuracağı teorisine katı bir şekilde bağlanılmadan olası olumsuz etkilerin ne olabileceği de hesap edilmelidir.
- Ülkenin iktisadi politikalarının teknolojik yatırımın konusuyla uyum içinde olup olmadığını irdelenmeli; olası yatırıma uygun istihdamın başarı boyutu hesaplanırken reel-politiğin “ücret” gibi unsurlarının etkisine de denklemlerde yer verilmelidir.
- Teknolojik yatırımlara karar verilmesi mekanizmasında; işçilerle sermaye sahipleri arasında fikir teatisi yapılmalıdır. Gözden kaçan eksiler ve artılar böylelikle daha net görülebilecek ve gerekli müdahaleler zamanında yapılabilecektir.
- Gerek iş sahipleri gerekse işçiler olsun; teknoloji ile bütünleşik bir iş hayatı modülü benimsenmelidir.

Teknolojinin sürekli ilerleyen dinamik boyutunun yanı sıra istihdam edilenlerin de istifa, emeklilik gibi sebeplerle firmalardan ayrılabilmesi ve bu sebeple istihdam alanında da dinamik bir politika benimsenmesi gerektiği açıktır. Bu bağlamda işçiler için arzi değil sürekli ve düzenli eğitimler verilmelidir. Bu eğitimler her zaman basit bir seminer mahiyetinde olmamalı; işçilerin ufkunu geliştirecek ve diri tutacak uluslararası ziyaretler ve işgücü alışverişi gibi programlar hayata geçirilmelidir (Kaynak: Sayıştay Dergisi -Sayı 95/Ekim-Aralık 2014)

ÜRETİM

Teknolojinin, günümüze kadar olan gelişimini üç ana evreye ayırmak mümkündür. İlk evre; sanayi devriminden sonra meydana gelen tarımdan sanayi sektörüne işçi akımının yaşandığı ve kitle üretiminin gerçekleştiği dönemdir. (Akgeyik,1998)

İkinci evre ise, büyük üretim hatları kullanarak daha önce insan eksenli olan üretim ve montaj işinin büyük oranda otomatik makine serilerine yaptırdığı mini ve makro bilgisayarların üretim hatlarına uyguladığı dönemdir. Bahsedilen her iki dönemde de ağırlıklı olarak belli standartlara sahip bir ya da birkaç mamul büyük miktarlarda seri ve kütle üretimine yönelik ve yerleşik bir teknolojiye dayanmaktadır. (Şakrak, 1997)

Son evre ise, özellikle 1980'li yıllarda büyük çıkış yapan enformasyon ve bilgi teknolojisinin getirdiği yeni bir dönemdir. Daha önceki teknolojilerden birçok bakımdan farklı olan bu teknolojiler hem gelişim hem de yayılma hızları bakımından diğerlerinden çok farklıdır. (Akgeyik,1998) Son yıllardaki yaşanan teknolojik değişim ile birlikte birçok yeni otomasyona bağlı sistemler geliştirilmiştir. Bunlar;

- 1- Bilgisayar Destekli Üretim (Computer Aided Manufacturing – CAM)
- 2- Robotlar
- 3- Bilgisayarla Bütünleşik Üretimleri (Computer Integrated Manufacturing – CIM)
- 4- Esnek Üretim Sistemleridir. (Flexible Manufacturing Systems – FMS)

Bilgisayar destekli üretim

Bilgisayar destekli üretimde, (CAM) üretim elemanlarının kontrolü ve yönetimi, özel bilgisayar programları ile yapılır. (Heizer ve diğerleri, 1995) Bilgisayar destekli üretim, özellikle parti halinde üretim yapan işletmelerde, üretim sürecinin tasarımında, makine araçlarının kontrolünde ve üretimde kullanılan madde ve malzemelerin akışının kontrolünde bilgisayarları kullanır. Bilgisayarın kullanımı ile farklı partilerin üretimine geçmek çok hızlı ve kolay olur. (Schroeder,2000)

Bilgisayar destekli üretim sistemleri, bilgisayarların hız ve güvenilirliğinden faydalanarak, çok çeşitli mamullerin, hızlı, kaliteli, düşük maliyetli bir şekilde üretilmesine olanak sağlamaktadır. (Tavukçuoğlu,1999)

Robotlar

Tutma, hareket etme ve kavrama gibi işlemlere sahip esnek makineler, robot olarak adlandırılmaktadır. (Heizer ve diğerleri, 1995) Bunlar insan hareketlerini yapabilen makinalardır. İnsana uygun olmayan tehlikeli ve tekdüze işlerin, sıcak ve kirli ortamlarda yapılmasını kolay hale getirmektedir. (Schroeder,2000)

Bilgisayarla Bütünleşik Üretim

Bilgisayarla bütünleşik üretim kavramı, işletmenin üretim fonksiyonu ile ilgili tüm işlemlerin ve üretimi destekleyen tüm fonksiyonların bir bilgisayar sistemi içinde bütünleştirilmesini ifade eder. (Tavukçuoğlu,1999) Bilgisayar destekli üretim, robotlar, esnek üretim sistemleri ve diğer otomasyona bağlı sistemler arasında bağlantı kurarak bunları bütünleştirir.

Esnek Üretim Sistemleri

Günümüzde artan rekabet koşulları nedeniyle, tüketicilerin talepleri de çok hızlı bir şekilde değişmektedir. Üretim sistemlerinin bu değişime cevap vermesi bilgisayarla bütünleşik üretim sistemlerinin bir uzantısı olarak gelişen esnek üretim sistemleri ile mümkün olabilmektedir.

(Tavukçuoğlu,1999) Esnek üretim sistemleri, ileri derece otomasyona dayalı üretim araçları üzerinde siparişe göre tasarlanmış ürünlerin, yüksek hacimlerde üretilmesini sağlayacak bilgisayar destekli süreçlerdir.

3. LİTERATÜR TARAMASI

Grossman ve Helpman (1991), teknolojik gelişmenin hem piyasa teşvikleri, hem de ekonominin kaynak stoğuna bağlı olduğu düşüncesiyle yeni bir ürünün, önceki ürünlerin eskimesine neden olduğu dikey ürün geliştirme yoluyla büyümenin içselleştirildiği bir model ortaya koymuşlardır. Bu modelde, büyümenin kaynağı ar-ge faaliyetleri sonucunda ara mallarının çeşitliliği ya da kalitesini arttıran yenilik olgusudur. Karını maksimize etmek isteyen üreticiler, marjinal fayda, marjinal maliyete eşitleninceye kadar ar-ge faaliyeti yürütmekte; ürün kalitesini iyileştiren firmaların varlığı büyüme hızını arttırmaktadır. işgücü stoğu nispeten büyükse, ar-ge faaliyetlerine yönelik teşvikler artmakta; buluş sahiplerinin kısa bir dönem için elde ettikleri kazançlar, teknolojik gelişmeyi hızlandırmaktadır.

Aghion ve Howitt (1992), büyümeyi yenilikler üzerine odaklanarak açıklamaya çalışmışlar; bireysel yeniliklerin bütün ekonomiyi etkilediğini varsayan bir model geliştirmişlerdir. Büyümenin kaynağı, rekabetçi ar-ge sektöründe gerçekleşen ve ürün kalitesini iyileştiren dikey yeniliklerdir. Dikey yenilikler ile kalite geliştirme çabalarının temel özelliği, yeniliklerin mevcut bir teknoloji veya ürünü eskitmesidir (Aghion, and Howitt, 1998: 53; Bucci, 2005: 6). Bu yaklaşım, Schumpeter'in teknik ilerleme sürecini biçimlendiren yaratıcı yıkım fikrine dayanmaktadır. Yeni geliştirilen bir ürün, mevcut tasarımların değerlerini düşürmek suretiyle monopol karlarını ortadan kaldırmaktadır.

Romer'in (1990), yayılmalar ve monopolistik unsurları ar-ge sektöründe bir araya getirmesi, büyüme literatürüne katkı sağlamaktadır (Rensman, 1996: 35). Yalnızca ar-ge ile oluşturulan bir model, kamu harcamaları, yaparak öğrenme ya da beşeri sermayeyi esas alanlarla benzer sonuçlar ortaya koymaktadır. Grossman ve Helpman (1991) modeli, uluslararası bilgi yayılmaları ve ürün çeşitliliğinin önemini açıklarken; Schumpeter'in yaratıcı yıkım düşüncesinden yola çıkan Aghion ve Howitt (1992: 346), ayrı bir araştırma sektörünün verimlilik artışlarına yol açan içsel yenilikleri oluşturduğuna vurgu yapmaktadır. Teknolojik gelişme, keşiflerden kar elde etmeyi amaçlayan girişimcilerin ar-ge faaliyetleri sonucu meydana gelmektedir. Yeni bir malın ortaya çıkması ve mevcutlarının düşük maliyet ve/veya yüksek kalite ile üretimine olanak tanıyan her türlü bilgi, beceri ve süreci içeren teknoloji, bir şeyin nasıl üretildiği, tüketildiği veya kullanıldığına ilişkin sistematik bilgiler demetidir (Bayraktutan ve Bıdırdı, 2016: 4). Diğer üretim girdilerinden farklı olarak rekabetçi olmayan yeni bilgi, artan getirilerin kaynağı olarak görülmektedir. İçsel büyüme modelleri, ar-ge yatırımlarının yeni ürün ve/veya hizmetler oluşturduğu ya da mevcutların kalitesini iyileştirdiği argümanı doğrultusunda açıklamalar geliştirmiş; sermayenin marjinal verimliliğinin azalmadığı ve ülkeler arasında yakınsamanın gerçekleşmeyebileceğini öne sürmüşlerdir.

Weng vd. (2012) çalışmasında, VAR analizi yardımıyla 1991-2009 yılları Şanghai için doğrudan yabancı yatırımlar, patent başvurusu, teknolojiye dayalı ticaret payı ve ekonomik büyüme arasındaki ilişki analiz edilmeye çalışılmıştır. Uygulanan yöntem sonucunda, ekonomik büyüme ile diğer teknolojik göstergeler arasında pozitif yönlü ilişki olduğu sonucu elde edilmiştir. Song ve Nan (2014) çalışmasında 1993-2012 yılları arasında Çin ekonomisindeki teknolojik inovasyon endeksi ve patent başvuru endeksi ile ekonomik büyüme arasındaki ilişkinin test edilmesi amacıyla VAR modelinin kullanıldığı çalışmada, uzun dönemde değişkenler arasında karşılıklı ilişkinin söz konusu olduğu, kısa dönemde ekonomik büyüme tarafından teknolojik inovasyon ve patent başvurusunun etkilendiği ancak

tersi yönde bir ilişkinin söz konusu olmadığı sonucuna ulaşılmıştır. Bir başka çalışmada, Ülkü (2004) 1981-199 dönemi için 20 OECD ülkesi 10 OECD olmayan ülkedeki Ar-Ge harcamaları inovasyon ve ekonomik büyüme arasındaki ilişkiyi panel veri yöntemi ile analiz ederek seçilmiş tüm ülkelerde inovasyon ile ekonomik büyüme arasında pozitif yönlü ilişkinin var olduğu sonucuna ulaşılmıştır.

Çin üzerine yapılan bir başka çalışmada Wu ve Zhou (2007), Ar-Ge harcamaları ile ekonomik büyüme arasındaki ilişki eşbütünleşme ve nedensellik yaklaşımları ile test edilerek Ar-Ge harcamaları ile ekonomik büyüme arasında çift yönlü nedensellik ilişkisinin var olduğu tespit edilmiştir. Işık (2014) çalışmasında, 1990:1-2010:4 yılları arasında Türkiye’deki patent harcamaları ile ekonomik büyüme arasındaki nedensellik ilişkisinin analiz edilmesi amacıyla uygulanan Granger testi sonucunda, patent harcamalarından ekonomik büyümeye doğru tek yönlü nedensellik ilişkisinin söz konusu olduğu sonucuna ulaşılmıştır. Sungur vd. (2016), Türkiye’deki 1990-2013 yılları arasındaki Ar-Ge harcamaları, Ar- Ge araştırmacı sayısı, patent ve inovasyon faaliyetlerinin ihracat ve ekonomik büyüme arasındaki nedensellik ilişkisi iki farklı model kurularak test edilmesinin amaçlandığı çalışmalarında, patent sayısından büyümeye; ihracattan AR-GE harcamalarının milli gelir içindeki payına, patent sayısından ihracata ve Ar-Ge faaliyetlerinde çalışan sayısından ihracata doğru tek yönlü nedensellik ilişkisinin olduğu tahmin edilmiştir.

Göçer (2013a) çalışmasında, 1996-2012 yılları arasındaki 11 farklı Asya ülkesi için AR-GE harcamaları, yüksek teknolojlili ürün ihracatı, bilgi-iletişim teknolojileri ihracatı, toplam ihracat ve ekonomik büyüme arasındaki ilişki ele alınmıştır. Yapılan çalışmada, Ar-Ge harcamalarındaki artışın, ekonomik büyüme, yüksek teknolojlili ürün ihracatı, bilgi iletişim teknolojileri ihracatını pozitif yönde etkilediği sonucuna ulaşılmıştır. Göçer (2013b) çalışmasında ise, Yeni sanayileşen ülkelerdeki 1996-2012 dönemleri baz alınarak teknolojik ilerleme göstergeleri ile Ar-Ge harcamaları arasında çift yönlü nedensellik olduğu görülmüştür. Önder ve Hatırlı (2014), 1994-2009 dönemi Türkiye’si yapılan analiz sonucunda, patent değişkeni ile ekonomik büyüme arasında pozitif ancak istatistiksel olarak anlamsız bir ilişki olduğu sonucuna ulaşılmıştır.

Ustabaş ve Ersin (2016) çalışmasında, 1989-2014 yılları arasında Güney Kore ve Türkiye ‘deki yüksek teknolojlili ürün ihracatı ile ekonomik büyüme arasındaki ilişki nedensellik ve koentegrasyon testleri ile analiz edilmiştir. Yapılan çalışmada, Güney Kore’de uzun ve kısa dönemde Türkiye’de ise, kısa dönemde ekonomik büyümenin yüksek teknolojlili ürün ihracatından pozitif yönde etkilendiği sonucuna ulaşılmıştır. Kılıç vd. (2014) çalışmasında, 1996-2011 yılları arasında G-8 ülkelerinde Ar-Ge harcamaları ile yüksek teknolojlili ürün ihracatı arasındaki ilişki analiz edilmiştir. Elde edilen sonuçlara göre, Ar-Ge harcamaları ile reel döviz kurunun yüksek teknolojlili ürün ihracatı üzerinde pozitif yönlü ilişkisi söz konusudur. Ayrıca yüksek teknolojlili ürün ihracatı ile Ar-Ge harcamaları ve Ar-Ge harcamaları ile reel döviz kuru arasında çift yönlü nedensellik, yüksek teknolojlili ürün ihracatından reel döviz kuruna doğru ise, tek yönlü nedensellik ilişkisi mevcuttur.

4. ANALİZ VE BULGULAR

Çalışmada kullanılan veriler dünya bankası veri tabanından alınmıştır ve yıllıktır. 1996-2018 döneminde Türkiye’ye üzerinden bir analiz yapılmıştır. Analizimiz Granger nedensellik analizi yöntemiyle yapılmıştır. Uygulama iki aşamadan oluşmaktadır. Birinci aşama, değişkenlerin birim kök testleri yapılarak, durağanlık durumları ve entegrasyon dereceleri tespit edilmiştir. İkinci aşamamızda Granger nedensellik testi yapılmıştır. İlk aşamada yapılan durağanlık testinde Augmented Dickey-Fuller testi yapılmıştır. Denklem aşağıdaki gibidir.

Standart Dickey-Fuller (DF) testi $y_t = \phi y_{t-1} + \varepsilon_t$ denkleminin verilen rassal yürüyüş sürecinin birinci farkından yararlanılmaktadır. Denklemin birinci farkı için eşitliğin her iki tarafından y_{t-1} çıkarılarak yeni denklem elde edilir.

$$y_t - y_{t-1} = \phi y_{t-1} - y_{t-1} + \varepsilon_t$$

$\Delta y_t = (\phi - 1)y_{t-1} + \varepsilon_t$ ve $\delta = \phi - 1$ olmak üzere aşağıdaki gibi elde edilir:

$$\Delta y_t = \delta y_{t-1} + \varepsilon_t$$

Elde edilen model sabitsiz ve trendsiz (none) model olmaktadır. Aşağıda ilk denklemde sabitli model (intercept); sabitli ve trendli model (trend and intercept) ise ikinci denklemde verilmiştir.

$$\Delta y_t = \mu + \delta y_{t-1} + \varepsilon_t$$

$$\Delta y_t = \mu + \beta t + \delta y_{t-1} + \varepsilon_t$$

Dolayısıyla birim kökün varlığından $\delta = 1 - \phi = 0$ (yani $\phi = 1$) olurken durağan bir seri için $\delta = \phi - 1 < 0$ (yani $\phi < 1$) olacaktır. Böylece standart DF testi için hipotezler aşağıdaki gibi yazılabilir:

$H_0: \delta = 0$ (Birim kök vardır, seri durağan dışıdır.)

$H_0: \delta < 0$ (Birim kök yoktur, seri durağandır.)

Bu hipotez için test istatistiği $t_\delta = \hat{\delta}/S_{\hat{\delta}}$ olmaktadır ve Dickey ve Fuller (1979) bu test istatistiğinin standart t dağılımı göstermediğini kanıtlamışlar ve farklı örneklem genişlikleri için kriter değerler üretmişlerdir. Daha sonra MacKinnon (1991, 1996), çok daha geniş kapsamlı simülasyonlar yaparak kritik değerler üretmişlerdir. (s.99

GSYİH, Ar-Ge, yüksek teknoloji ürün ihracatı için ADF kök testi sonuçları aşağıdaki tabloda verilmiştir.

TABLO 1: Birim Kök Testi Sonuçları

DEĞERLER	ADF DEĞERLERİ	OLASILIK DEĞERLERİ
GSYİH	-4.292992	0.0031
Ar-Ge	-2.133614	0.0348
High	-5.281154	0.0081

Adf %1, %5, ve %10 değerleri için anlamlıdır. Yukarıdaki tabloda görüleceği üzere değişkenler seviyede durağandır. Burada Ar-Ge serinin birinci farkı alınarak durağanlaştırılmıştır. Durağanlık sağlandıktan sonra Granger nedensellik analizine geçilir. Granger nedensellik analizi sonuçları tablo 2’de verilmiştir.

TABLO 2: Granger Nedensellik Testi

Hipotez	Gözlem	F istatistiği	Olasılık değerleri
Ar-Ge Gsyih nedeni değildir.	20	1.03851	0.3781
Gsyih Ar-Ge nedeni değildir.		0.36344	0.7012
High Gsyih nedeni değildir.	10	0.73311	0.5258
Gsyih High nedeni değildir.		0.63703	0.5670
High Ar-Ge nedeni değildir.	9	39.1682	0.0024
Ar-ge High nedeni değildir.		8.87844	0.0338

Yukarıdaki Granger Nedensellik Testi sonuçlarına göre High Ar-Ge aralarında nedensellik ilişkisi vardır. “High Ar-Ge nedeni değildir” şeklindeki hipotez reddedilmektedir. İkinci hipotezde ise Ar-ge High aralarında nedensellik ilişkisi vardır. “Ar-Ge High nedeni değildir” şeklindeki hipotez reddedilmektedir. Bu sonuçlardan High ve Ar-Ge serileri arasında çift yönlü Granger nedensellik ilişkisi olduğu görülmektedir.

5. SONUÇ

Bu çalışmada teknolojik yeniliklerin ekonomik büyüme arasındaki ilişki araştırılmıştır. Bu amaçla teknolojik yenilik olgusunun ve ekonomiye etkileri incelenmiştir. Göstergelerde çizelge ve grafik yardımıyla incelenmiştir. Ekonomiye etkilerinde ise ihracat, sanayi, üretim ve istihdam alanlarında ne gibi etkileri olduğu araştırılmıştır. Araştırmada elde edilen verilerde teknolojik yeniliklerin bu alanlarda olumlu sonuçlar doğurduğu görülmüştür. Teknolojik yenilikler ve ekonomik büyüme ilişkisi üzerinde yapılan ekonometrik çalışmalarda araştırılmıştır. Bu çalışmalarda Grossman ve Helpman, Aghion ve Howitt, Romer, Weng, Wu ve Zhou, Göçer, Ustabas ve Ersin, Işık gibi isimlerin çalışmalarından yararlanılmıştır. Çalışmada Granger nedensellik analizi kullanılarak bir analiz yapılmıştır. Çalışma iki aşamadan oluşmuştur. İlk aşama serinin durağanlığı incelenmiştir. Burada ADF analizi yapılmıştır. Analizde seri durağan bir analiz olduğu sonucuna varılmıştır. Daha sonra çalışmanın ikinci aşamasında Granger nedensellik analizinden yararlanılarak bir analiz yapılmıştır. Analiz sonucunda Ar-Ge ve High serileri arasında çift yönlü Granger nedensellik analizi olduğu sonucuna ulaşılmıştır.

KAYNAKÇA

- Akgeyik, T., 1998, “Stratejik Üretim Yönetimi”, İstanbul: Sistem Yayıncılık.
- Aghion ve Howitt, Phillippe, Peter (1992). “A model of growth through creative destruction”, *econometrica*, V. 60(2),.323-352.
- Aghion, and Howitt, (1998) *Endogenous growth theory*, cambridge: MIT Press.
- Aghion, P.; P. Howitt (1992) “A Model of Growth Through Creative Destruction”
- Bayraktutan, Yusuf ve Bıdırdı, Hanife (2016). Teknoloji ve rekabetçilik: temel kavramlar ve endeksler bağlamında bir değerlendirme”, *akademik araştırmalar ve çalışmalar dergisi*, s.8(14), ss.1-24.
- Göker -MMO sanayi kongresi 19 Kasım 1999

- Göçer, İ. 2013 a. “Ar-Ge Harcamalarının Yüksek Teknolojili Ürün İhracatı, Dış Ticaret Dengesi ve Ekonomik Büyüme Üzerindeki Etkileri”. Maliye Dergisi, 165, 215-240.
- Grossman ve Helpman (1991), “quality ladders in the theory of growth”, review of economic studies, V. 58, p. 43-61.
- Isik, C. 2014. "Patent Harcamaları ve İktisadi Büyüme Arasındaki İlişki: Türkiye Örneği", Sosyoekonomi 1, 69.
- İrmiş ve Özdemir, (2011) İrmiş Ayşe, Lütfiye Özdemir (2011), “Girişimcilik ve Yenilik İlişkisi”, Çanakkale Onsekiz Mart Üniversitesi Yönetim Bilimleri Dergisi, S: 9, Çanakkale.ss.113-114
- Kılıçarslan, O. & Dinç, O. 2007. “Türkiye Ekonomisinde Teknoloji ve Transferi”, GAU J. Soc. & Appl. Sci., 3(5), ss. 73-75
- M. Mert, A, Çağlar, 2019, “Eviews ve Gauss Uygulamalı Zaman Serileri Analizi”, Ankara: Detay Yayıncılık
- Prof. Dr. N. Algan, Prof. Dr. M. Tekooğlu, Ph. D. C.M. Morgan-2017)
- Rensman, Marieke (1996). "Economic Growth and Technological Change in the Long Run: A Survey of Theoretical and Empirical Literature"
- Romer (1990). “endogenous technological change”, journal of political economy, V.98(5),p. 71-102.
- Sayıştay Dergisi -Sayı 95/Ekim-Aralık 2014)
- Schroeder, R. G., 2000, “Operations Management” Minnesota; Irwin McGraw-Hill.
- Şakrak, M., 1997, “Maliyet Yönetimi”, İstanbul: Yasa Yayınları.
- Tavukçuoğlu, C., 1999, “2000 Yılına Girerken Yeni Üretim Tekniklerine Bir Bakış” www.kho.edu.tr.
- Ustabaş ve Ersin (2016) Yüksek Teknolojili Ürün İhracatı: Lider Ülkeler ve Türkiye Analizi
- Weng vd. (2012) Weng, L., Song, W., & Sheng, S. 2012. “Empirical Research on Scientific and Technical Innovation and Economic Growth in Shanghai”, American Journal of Operations Research, 2, pp. 82-90
- Wu ve Zhou (2007), WU, Y. ve ZHOU, L. (2007), “Cointegration and Causality Between R&D Expenditure and Economic Growth in China: 1953-2004” International Conference on Public Administration, 869-76.

2008 KÜRESEL FİNANS KRİZİ, TÜRKİYE'YE ETKİLERİ VE ALINMASI GEREKEN ÖNLEMLER

2008 GLOBAL FINANCIAL CRISIS, AND THE EFFECTS OF OBTAINING NECESSARY PRECAUTIONS TO TURKEY

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ÖZET

2007 yılında ABD'de risk taşıyan konut kredilerinin geri ödemelerinde ortaya çıkan sorunlarla başlayan finansal kriz, 2008 yılının Eylül ayında Lehman Brohters'ın iflasının baş göstermesi ile mali sistemin kilitlenmesine yol açmıştır. Tüm dünyaya yayılan bu kriz Türkiye Ekonomisini de etkilemiştir. Bu kriz ilk olarak sermaye hareketleri ve finans piyasalarında etkilerini sürdürmüş ilerleyen dönemlerdeyse reel sektör ve iç piyasada bundan etkilenmiştir. Bu sebeple krizin yıkıcı etkilerini gidermek ve istikrarı yeniden sağlamak amacıyla para ve maliye politikaları ülkeler tarafından önemle uygulanmıştır. Bu çalışmada 2008 Krizi'nin Türkiye'ye etkileri zaman serisi analizi yöntemi kullanılarak gösterilmeye çalışılmış, Krizden çıkış için uygulanan politikaların ortaya çıkardığı sonuçlar tespit edilmiştir.

Anahtar Kelimeler: Küresel Kriz, Türkiye Ekonomisi, Mortgage

ABSTRACT

The financial crisis, which started with problems in the repayment of risky housing loans in the USA in 2007, caused the financial system to crash with the outbreak of the bankruptcy of Lehman Brohters in September 2008. All across the world, this crisis has affected the economy Turkey. This crisis initially continued its effects on capital movements and financial markets, and in later periods it was affected by the real sector and domestic market. For this reason, in order to eliminate the destructive effects of the crisis and restore stability, monetary and fiscal policies have been implemented by countries with great care. This study attempts to show the Crisis of 2008 using time series analysis method implications for Turkey, the results revealed that the policies implemented have been identified for exit from the crisis.

Keywords: Global Crisis, Economy of Turkey, Mortgage

1.GİRİŞ

2007 yılında Amerika Birleşik Devleti'nde finansal kriz olarak başlayan ve daha sonraları tüm dünyayı etkisi altına alan 2008 küresel finans krizi, 1929 yılı buhranından sonra yaşanan en büyük küresel kriz olmuştur.

2000'lerin başında ABD büyük bir durgunluğun içindeydi ve yaşadığı bu durumdan kurtulabilmek için FED faiz oranları düşürme kararı almıştı. Faizler 2000-2003 yılları

arasında %6.5 düzeyinden %1'lere kadar gerilemiştir. Buradaki amaç insanların tüketim alışkanlıklarını arttırarak ekonomiyi daha canlı bir hale sokmaktır. Faiz indirimleri yatırım yapmak isteyen vatandaşları konut piyasasına itmiş, konut için kullanılan kredilere talepler gittikçe artmaya başlamıştır, bankalardan yüksek miktarda konut kredileri kullanılmıştır. Faiz oranlarının düşük olması finans kurum ve kuruluşlarını daha çok risk almaya itmiş, kar paylarını arttırabilmek amacıyla ellerindeki aşırı durumdaki likiditeyi geliri düşük olan insanlara ipotekli konut kredisi olarak kullanılmaya başlamıştır. Yani önceden kredilerin büyük çoğunluğundan zengin müşteriler (prime mortgage) paylarını alırken, daha fazla kar elde arzusu geri ödeme riski olan düşük kalitedeki müşterilere de(subprime mortgage) kullanılmaya başlanmıştır. Subprime kredilerinin alanı 2008 yılına gelindiğinde 1,5 milyon dolara kadar artmıştır. FED'in 2004'ten sonra faizleri tekrar arttırmaya başlaması, bu kişilerin aldıkları kredileri geri ödeyememesine neden olmuştur (Eğilmez, 2009: 66).

Kriz yaşanmayan önce konut kredisi kullanımına izin veren bankalar, ellerindeki bu kredi imkanlarına güvenerek, başka finansal araçlar ayarlayarak ve bunları piyasaya çıkararak kendilerine daha önce olmayan fon akışları sağlamıştır. 29 Buhranı sonrası yaşanan en büyük finansal kriz olan 2008 krizinin yaşanmasının temelinde, konut fiyatlarının birden yükselişinin yanında, bu kredilere güvenilerek atılan adımlarında neden olduğu sonuçlar da bulunmaktadır. Bunlar başka işlemlerden kaynaklanan risklerin, alışverişe dahil olmasını sağlayabilen sözleşmelerdir.

Bu bahsedilen sözleşmeler, mortgage kredisi kullandıran kurum ve kuruluşların kredinin ödenmemesi ihtimalini 'riskten korunma fonlarına' devretmesine yaramaktadır. Riski başkasına geçiren kredi kuruluşları risklerini daha da arttırmış, yeni eklenen kredilerle türevi olan ürünlerin piyasası giderek büyümüştür. 2007 yılına gelindiğinde konut kredisi ve türevleri için kullanılan kredilerin toplam değeri 10 trilyon doları bularak dünyanın en yüksek kredi piyasasına sebep olmuştur.

Case-Shiller endeksi ev fiyatlarının gelişimini ölçen bir endekstir. Bu endekse göre 2007 yılının sonunda ABD'de bulunan ev fiyatları zirveye çıktıktan sonra, hızlı bir düşüşe geçmiştir. Düşük krediler sayesinde ev sahibi olan kişiler, ellerindeki gayrimenkulleri satarak borçlarını kapatma şanslarını da kaybetmiş oldular. Yine bankalar da borcunu ödemeyen kişilerden haciz ettikleri evlerin satışına yaparak vermiş buldukları kredilerin negatif izlerini silemediler. Bu yaşanan olay bankalara ödenememiş kredi miktarını arttırmış, bankaları finansman ve likidite problemiyle karşı karşıya bırakmıştır.

Lehman Brothers kriz olmadan önce benzer ürünlerin en çok toplandığı bankadır. Konut kredilerinin birden aşırı düşmesi ve mortgage kredilerinin ödenmesinde risklerin doğması Lehman Brothers'ı batmanın eşiğine sürüklemiştir. FED ve Hükümette açıklama yaparak Lehman için ellerinden gelen bir şey olmadığını söyleyince, bu bankadan alacaklı olan tüm diğer bankalar için risk faktörü oluşmuştur. Bu bankalardan alacaklı olan insanlar, paralarını çekmek için can atar duruma gelmiş, böylece bankalar iyice zora sürüklenmiştir.

2008 yılının yarısına gelindiğinde ABD hükümeti yaşanan olaylara ve finansal krize karşı iyice sessiz kalmayı seçmiş, 15 Eylül 2008 tarihinde finans devi olarak adlandırılan Lehman Brothers iflas etmiştir. Hemen ardından ABD hükümeti için önemli nitelikler taşıyan diğer ortaklıkların da iflaslarının kaçınılmaz olacağına anlaşılması üzerine, hükümet yaşanan olayları kurtarmak amaçlı bir paketi senatodan geçirmiştir.

2008 yılı büyük krizin diğer bir nedeni olarak da ABD'nin cari açığının çok yüksek düzeylerde seyir etmesi söylenebilir. Yükselmekte olan yatırım talebinin iç tasarruflar tarafından karşılığının olmaması cari açığın oluşmasına sebebiyet vermiştir. Giderek gelişen ABD ekonomisinde, talebin kaçınılmaz yükselişi ile beraber ithal mallara olan talebin de

artması cari açığı yükselişe geçirmiştir. ABD'nin krizlere karşı daha hassas hale gelmesine neden olan şey budur.

2.2008 KRİZİNİN TÜRKİYE'YE ETKİLERİ

Krizin Türkiye üzerindeki etkileri hem reel ekonomi hem de finansal piyasalar aracılığıyla gözlemlenebilir. Türkiye ekonomisi kuruluşundan bu yana birçok ekonomik krizle karşı karşıya kalmıştır. Bu krizlerin bazıları ekonominin iyi yönetilmemesinden, bazıları da diğer ülkelerde yaşanan krizlerin bize yansması olarak karşımıza çıkabilir. Krizler finansal piyasalarda baş göstererek oradan reel ekonomiyi kapsayarak bütün ekonomiyi ilgilendirir hale gelir.

Finansal piyasalar, “menkul kıymetlerin değişime uğradığı yerler” olarak tanımlanmaktadır (Korkmaz, 2006 : 9) Kıymetlerin değişimi bir endeks aracılığıyla gösterildiğinde finansal piyasalar hakkında da değerlendirme yapabilmek mümkündür. Aşağıda Menkul Kıymetler Borsası endeksine bakıldığı zaman Türkiye ekonomisi de dahil olmak üzere küresel ekonomide krizin olduğu yıllarda endeks düşüştür. Ekonomik dalgalanmaların güzel ilerlediği senelerde ise endeks artmaktadır.

Finans piyasalarının önemli doğruluklarından birisi de uygulanan kur ve döviz rejimleridir. Ülkemizde de kullanılan dalgalı kur anlayışına göre, kur direkt olarak piyasa tarafından belirlendiği için sistem düzgün bir şekilde işlememektedir.

Özellikle 2003 yılından itibaren istikrarlı bir şekilde artış gösteren dövizle borçlanma ve sıcak paranın giriş yapması kur üzerinde baskı oluşturarak döviz kurunu azalış seyrine sokmuştur.

Kur düşük olduğunda ithal mallar daha ucuz hale bürüneceği için net ihracat dengesinde oynamalar olmuş, enflasyon pozitif etkilense bile cari ödemeler açığı dengesini yükseltmiştir. Türkiye ekonomisinde 2007 yılında cari işlemler açığı yaklaşık 37.575 milyon dolar olurken, 2002-2007 yılları arasında toplam cari işlemler açığı 114.178 milyon dolar olmuştur (TOBB, 2007 : 151).

Yıllar	Aylar					
	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran
1998	3.547,0	3.272,0	3.259,0	4.194,0	3.728,0	4.100,0
1999	2.568,0	3.891,0	4.554,0	5.354,0	5.069,0	4.950,0
2000	16.714,0	15.945,0	15.920,0	19.204,0	16.206,0	14.466,1
2001	10.685,1	8.791,6	8.022,7	12.367,4	10.879,8	11.204,2
2002	13.252,3	11.055,7	11.679,0	11.441,5	10.413,7	9.379,9
2003	11.032,0	11.574,0	9.475,1	11.509,0	11.381,4	10.884,4
2004	17.259,3	18.889,2	20.190,8	18.022,7	17.081,1	17.967,6
2005	27.330,4	28.396,2	25.557,8	23.591,6	25.236,5	26.957,3
2006	44.590,2	47.015,9	42.911,3	43.880,8	38.132,2	35.453,3
2007	41.182,6	41.431,0	43.661,1	44.984,5	47.081,5	47.093,7
2008	42.697,6	44.776,9	39.015,4	43.468,1	39.969,6	35.089,5
2009	25.934	24.027	25.765	31.652	35.003	36.949
	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık
1998	4.322,0	2.635,0	2.266,0	2.196,0	2.578,0	2.598,0
1999	5.805,0	5.018,0	6.071,0	6.556,0	8.459,0	15.029,0
2000	13.870,0	13.132,0	11.351,3	13.538,4	8.747,7	9.437,0
2001	9.914,6	9.878,9	7.625,9	9.848,8	11.633,9	13.728,8
2002	10.236,5	9.547,3	8.842,2	10.251,9	13.300,4	10.370,0
2003	10.572,0	11.611,8	13.055,9	15.754,3	14.617,5	18.625,0
2004	19.380,9	20.218,4	21.953,5	22.900,0	22.486,2	24.971,7
2005	29.615,3	30.908,0	33.333,2	31.964,0	38.088,7	39.777,7
2006	36.067,9	37.285,9	36.924,9	40.582,3	38.168,5	39.117,5
2007	52.824,9	50.198,6	54.044,2	57.615,7	54.213,8	55.538,1
2008	42.200,8	39.844,5	36.051,3	27.833	25.715	26.814
2009	47.641	46.551	47.910	47.185	48.442	-

Kaynak: DPT, Mali Piyasalarda Gelişmeler, Aralık 2009, s.16 (İMKB'den alındı)

Ekonomik krizin önemli etkilerinden birisi sektörlerin büyüme oranı hızlarında ve GSYİH'da görülür. Aşağıdaki tabloya göz atıldığında büyüme hızı 2006 senesinde %6,9 iken 2007'ye gelindiğinde düşüş göstererek %4,6 olmuştur. Gayri Safi Yurtiçi Hasıladaki bu yükseliş hızında meydana gelen düşüş devam ederek krizin de var olan etkisiyle 2008 sene sonuyla %0,9 a gerilemiştir. Tarıma ait olan büyüme hızı azalmış, GSYİH'daki yeri de düşüş geçmiştir.

Sanayi sektöründe gerçekleşen toplam büyüme hızı 2006 senesinde %8,3 iken 2008 yılına gelindiğinde krizin etkisiyle %1,1'e gerilemiştir. Bu azalışlar sektörde bazı şeylerin yolunda gitmediğini, üretim hızınının bir düşüşe tabi olduğunu gözler önüne sermektedir.

2006 senesinde hizmet sektörü %7,2 oranında kendini geliştirirken birbirini takip eden seneler oranında bu gelişim hızı giderek yavaşlamıştır. Krizin hizmet sektörünü de etkilediğini buradan görebiliriz.

Sektörler	2006					2007					2008				
	I	II	III	IV	Toplam	I	II	III	IV	Toplam	I	II	III	IV	Toplam
Tarım	-2,7	0,5	0,2	6,2	1,4	-4,4	-1,0	-8,2	-10,2	-6,9	5,4	-0,3	5,4	2,4	3,5
Sanayi	6,4	12,2	9,0	5,7	8,3	10,1	4,6	5,0	4,1	5,8	9,0	5,0	0,7	-9,6	1,1
Madencilik	3,6	12,6	11,3	-5,6	5,2	9,3	9,4	10,9	2,7	8,1	8,4	7,7	3,9	2,7	5,4
İmalat	6,1	12,4	9,0	6,0	8,4	10,4	4,1	4,6	4,0	5,6	9,1	4,8	0,3	-10,8	0,8
Enerji	12,1	9,4	8,9	5,8	8,6	6,6	8,3	6,6	5,8	6,8	8,3	5,9	4,0	-1,2	3,7
İnşaat	14,5	20,4	20,2	18,5	18,5	12,7	7,3	3,9	0,3	5,7	-3,3	-5,2	-9,8	-14,8	-8,2
Ticaret	6,0	9,6	5,4	2,5	5,8	7,0	2,4	5,6	6,2	5,3	9,2	4,2	-1,8	-13,9	-0,9
Ulaştırma	7,0	10,4	6,2	3,8	6,8	8,4	5,3	6,7	7,2	6,9	7,9	4,2	1,2	-7,4	1,3
...															
Konut Sahipliği	2,5	2,8	2,2	3,3	2,7	2,6	2,4	2,6	1,0	2,1	1,5	1,6	2,5	3,5	2,3
...															
Hizmetler	6,4	9,9	7,0	5,7	7,2	8,2	4,6	5,8	5,5	6,0	6,5	2,3	0,1	-6,5	0,4

Kaynak: Maliye Bakanlığı, Yıllık Rapor 2009, s.11 (TÜİK' ten alıntı)

3.KRİZ NEDENİYLE TÜRKİYE'DE ALINMASI GEREKEN ÖNLEMLER

Üretime yönlendirilen sermayenin üretimden çekilerek finansa doğru geçiş yapılması krizi oluşturan baş etmenlerdendir. Ekonomi son zamanlarla malileşme ile başa çıkmaya çabalamıştır. Kapitalizmin malileşmesi; iktisadi etkinliğin ağırlık merkezinin üretimden (ve hatta büyüyen hizmetler sektöründen) finansa doğru kayması günümüzün kilit sorunlarından birini oluşturmaktadır (Foster, 2008 : 45). Küresel sermaye ekonomiyi üretim yerine sıcak para da denilen parasal tarafa sıkıştırmıştır. Bu sıcak paranın üretimle dolaylı olan ilişkisi vardır. Oluşan krizlerin başında üretimle doğrudan alakası olmayan bu sıcak paranın etkileri vardır.

Dünya Bankası ve IMF'nin ekonomik krizle baş etmede yetersiz kaldığı görülmektedir o halde uygulanabilir para politikasını düzenleyecek başka şeylere ihtiyaç doğar. Krizin nedeni olarak gördüğümüz sıcak parayı, üretime aktarmanın ya da disiplin çerçevesinde tutabilmenin mümkünatı için global tedbirler alınması gerekmektedir. Bu tedbirlerin başı olarak 1944 yılında Keynes'in teklif sunduğu gibi bir Dünya Merkez bankasının oluşturulması gelmektedir. Dünya para sistemi de yeniden düzenlenmeli, ülkelerarası ödemelerde dolar dışındaki diğer paralar da göz ardı edilmeyerek bir sepet oluşturulabilir. Örneğin dünya para sistemi dolar yerine dolar, Euro ve yenden oluşan bir sepete bağlanabilir ve bu üç para ülkelerinin GSYH'leri ile orantılı olarak temsil hakkına sahip olabilir (Korkmaz, 2008 : 6). Küresel krizlerle daha az karşı karşıya kalmak ve içinde bulunulan mevcut durumdan çıkabilmek için yeni ve daha iyi bir finansal piyasaya gereksinim duyulmaktadır. Ayrıca gücünü kapitalist sistemden alan liberalizmin çökmesiyle beraber yeni ekonomik sistem oluşturulabilir.

Yüksek faizli üretim teknolojisi, izlenen düşük kur gibi Türkiye'de uygulanan yanlış makro ekonomik politikalar, herhangi bir kriz olmasa dahi daha fazla devam edemeyeceğimizi gözler önüne sermekte.

Türkiye'nin ekonomik yapısı yatırım malları ithalatı ve ara mal ithalatını sürekli duruma getirdiği için GYMH'da yeterli büyüme oluşamamıştır. Az miktarda gerçekleşen büyüme de istihdama olanak sağlayamamıştır. Bu bağlamda Türkiye IMF politikalarına uygun şekilde büyümeye çalışmış fakat başarılı olamamıştır. Barro ve Lee'ye ait olan çalışmalarda IMF politikalarıyla büyümenin başarı sağlanamayacağı ortaya konmuştur. Bu çalışmada 130 ülkeyi kapsayan bir "panel analizi" uygulaması ile IMF kontrolü altında istikrar programı uygulayan

ülkelerde uygulamanın başladığı ilk beş yılı izleyen sonraki beş yılda büyümenin negatif yönde etkilendiği belirtilmektedir (Doğruel 2006 : 35).

Türkiye'nin alması gereken önlemlerin başında kriz zamanlarında talep artırıcı politikalar gelmektedir. Harcamaların artırılması durgunluğu azaltarak enflasyona sebebiyet vermemektedir. Merkez bankası fazla olan reel faizlere düşürerek bankalara dış ödemelerde kolaylık sağlamak amaçlı kredi kullanabilir.

Kredilerin geri dönüşlerinin olmaması durumunda bankalar ödemelerde kolaylık sağlayacak yöntemleri denemelidir. Kontrollü bir kur sistemi uygulanarak dövizin yetersiz kalması sebebiyle arz ve talep durumlarına göre uygun bir kur belirlenememe durumu ortadan kaldırılmalı. Üretim odaklı büyüme modeli esas alınarak sıcak para terk edilmelidir.

Dış ticaret açıklarına sebebiyet vermemek için sermaye mallarını kendi ülkemizde üretip ithalat azaltılmalıdır. Böylece istihdam ortamı da sağlanmış olur. Türkiye kendi kendine yetebilecek hale gelmelidir bunun için de tarımsal üretimde ve enerji üretiminde yeni projeler yapılmalıdır. Bu alanlarda Türkiye kendisine yetebilecek düzeye geldiğinde herhangi bir kriz durumu olursa bile en az hasarla atlatılabilir.

İhracatımızı sadece AB ülkelerine değil, Orta Asya Türk Cumhuriyetleri, Rusya ve komşu ülkelerde de yaygın hale getirirsek AB ülkelerinin yoğun olarak geçirdiği krizlerden dış talebimiz çok fazla etkilenmeden çıkabiliriz.

5. SONUÇ

2008 yılında ABD'de finans krizi olarak baş gösteren bu kriz başta Avrupa ülkeleri olmak üzere tüm dünyayı etkisi altına almıştır. Krizin Türkiye'ye olan etkileri 2008 yılının Ekim ayı itibari ile hissedilmeye başlanmıştır.

Krizle birlikte, ülkelerin gelirlerinde azalış meydana gelmiş ve durgunluk dönemi yaşamaya başlamışlardır. Kriz yaşanmadan önce 60 trilyon dolar dünya milli gelirine sahipken krizle beraber bu rakam 40 trilyon dolara gerilemiştir. Ülkeler arası ticaret sürekli bir daralma içine girmiştir.

Kriz sürecinde menkule ve değerli kağıtlara yatırım yapanlar zararlı çıkmış, parasını nakit olarak tutanlar ise kazanmıştır.

Krizle beraber insanların beklentileri olumsuz hal almış, sanayiye ve finans sektörüne duyulan güven düzeyi bozulmuş, işsizlik artış göstermiş, şirketlerin karları azalmıştır. Bu durum diğer ülkeler gibi Türkiye'de de yaşanmıştır.

Krizin olumsuz sonuçlarının en aza indirilmesi için dünya ülkelerinin ve Türkiye'nin yerine getirmesi gereken sorumlulukları vardır. Dünya merkez bankası kurularak kaydi para yaratılmasının önüne geçilmesi ve uluslararası para birimi belirlenerek dünya ticaretinin bu şekilde yapılması gerekmektedir.

Türkiye ise işsizliğin sebep olduğu talep düşüşünü ortadan kaldırmak için önlemler alması gerekmektedir. Talebin düşmesiyle beraber fabrikaların maliyetini karşılayamadığı için işçi çıkartmak istemesi ve böylece stokların elde birikmesi kaçınılmazdı. Ekonomi kısır bir döngü halini almadan talep artırıcı politikalar uygulanmalıydı.



KAYNAKÇA

- Alantar, D . (2008). “Küresel Finansal Kriz: Nedenler ve Sonuçları Üzerine Bir Değerlendirme “. Maliye Ve Finans Yazıları , 1 (81) , . Retrieved From <https://Dergipark.Org.Tr/Tr/Pub/Mfy/Issue/16299/170871>
- Erdönmez Pelin Ataman,(2009), “Küresel Kriz ve Ülkeler Tarafından Alınan Önlemler Kronolojisi”Bankacılık Dergisi, S.69, ss.85-101.
- Maliye Bakanlığı, Yıllık Ekonomik Rapor (2009)
- Seyidoğlu, Halil, (2017),,Uluslararası İktisat, Güzem Can Yayınları, İstanbul.
- Eğilmez, Mahfi, (2012), Krizin Neresindeyiz? [Küresel Krizin Neresindeyiz? \(mahfiegilmez.com\)](http://mahfiegilmez.com)
- Yavuz, Arif, (2010), “Küresel Kriz ve İstihdama Etkisi”, Sosyal Siyaset Konferansları Dergisi, C.0,, S.1,ss:1-32, <https://dergipark.org.tr/tr/pub/iusskd/issue/887/9863>.
- Yıldırım, Sümeyye, (2010)“2008 Yılı Küresel Ekonomi Krizinin Dünya ve Türkiye Ekonomisine Etkileri” Karamanoğlu Mehmetbey Üniversitesi Sosyal ve Ekonomik Araştırmalar Dergisi, C.2010, S.1, ss:47-55, <https://dergipark.org.tr/tr/pub/kmusekad/issue/10218/125605>
- www.dunya.com
- www.yusufyuksel.com