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TUBA FIRAT

7TH INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRESS PROCEEDINGS BOOK



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DECEMBER 18-19, 2021

(ONLINE & FACE TO FACE PARTICIPATION)

ISBN: 978-605-71167-1-0

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7. INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRESS

DECEMBER 18-19, 2021,
ONLINE PARTICIPATION

CONGRESS PROCEEDINGS BOOK

Editors

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CONGRESS ID

CONGRESS NAME

7. INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRESS

DATE AND VENUE

DECEMBER 18-19, 2021

ONLINE PARTICIPATION (FROM 22 DIFFERENT COUNTRIES)

ORGANIZERS & PARTICIPANT INSTITUTIONS

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President of Coordinators'

Zelal ADANMIŞ

ACCEPTED PAPERS

77 Turkish Participants
81 Foreign Participants

REFUSED PAPERS

5 Turkish Participants
1 Foreign Participants

EVALUATION PROCESS

All Submissions Have Passed a Double-Blind Referee Evaluation Process
All Responsibility for the Works Belongs to the Author

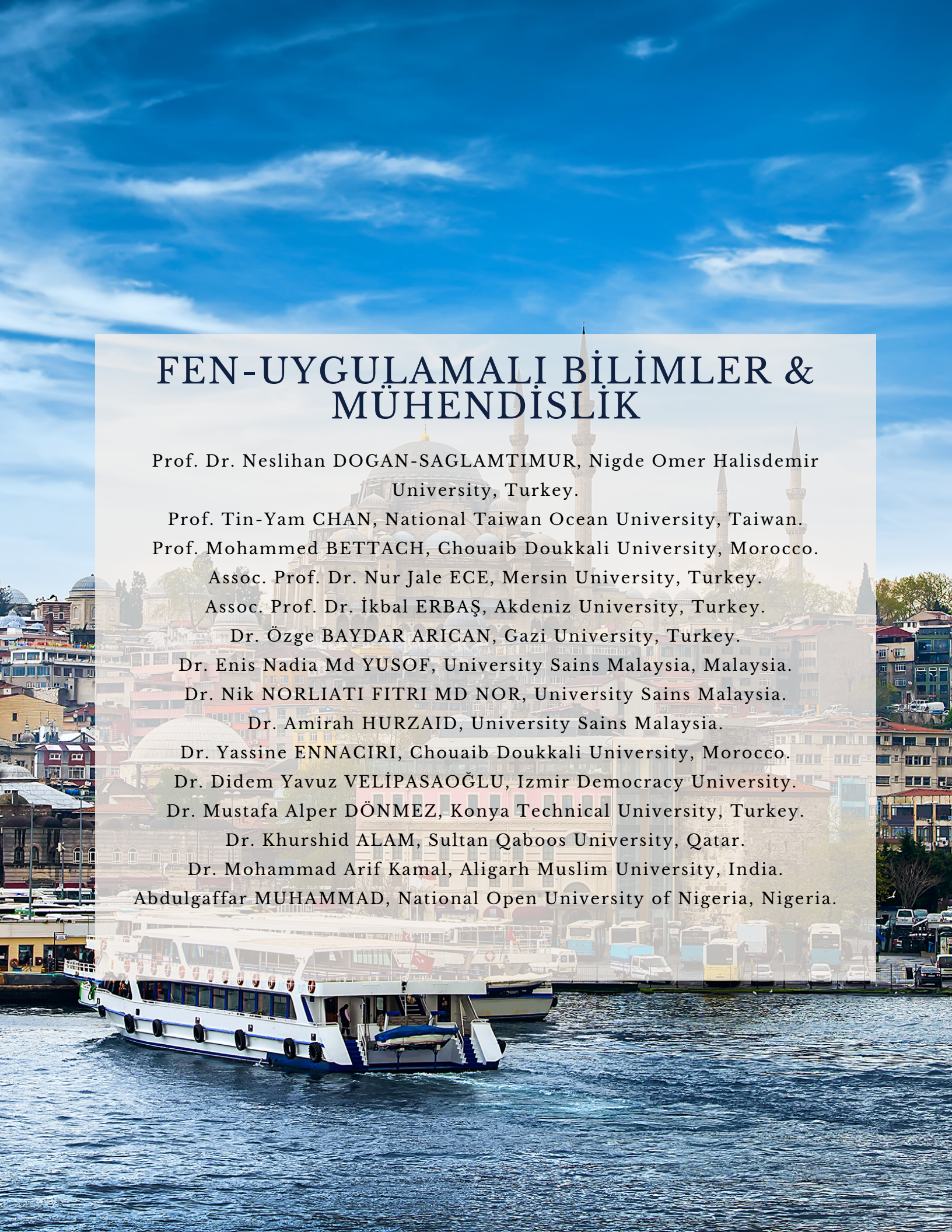
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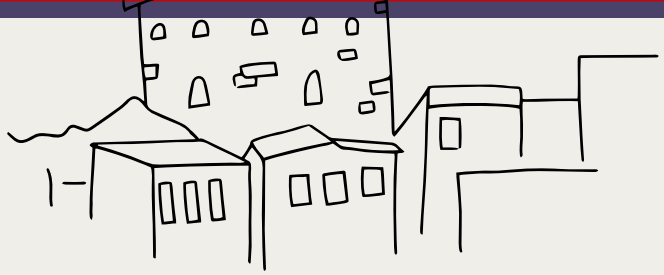
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For more information: changingworldcongress@gmail.com
or 0543 671 0123



MEETING ID: 826 3959 8250
PASSWORD: 616685

DECEMBER 18-19, 2021

7TH INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRESS

DAY I - 9:00-18:00
TURKEY LOCAL TIME

Program Flow

DAY 1
DECEMBER 18, 2021

OPENING SPEECH

09.00-09.15

Muhlise COŞGUN ÖGEYİK
Trakya University, Turkey

KEYNOTE SPEAKER - 1

09.15-09.30

Assoc. Prof. Dr. Ahmed BADRAN
Qatar University, Qatar

KEYNOTE SPEAKER - 2

09.30-09.45

Assoc. Prof. Dr. Teuta ILJAZI
University of Tetova, North Macedonia

ENTRANCE TO SESSIONS

09.45-10.00

7TH INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRES PROGRAM

DAY 1 - DECEMBER 18, 2021

December 18-19, 2021
Istanbul, TURKEY

CONGRESS PROGRAM

Online (with Video Conference) Presentation

Participant Countries:
Turkey, Azerbaijan, United States, France, Spain, Hungary, Poland, Lithuania, China, India, Kazakhstan, Ukraine, Kosovo, Libya, Algeria, Ethiopia, Qatar, Uganda, Laos, Rwanda, Namibia, Nepal.

Meeting ID: 826 3959 8250
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- The Zoom application is free and no need to create an account.
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- The application works on tablets, phones and PCs.
- The participant must be connected to the session 5 minutes before the presentation time.
- All congress participants can connect live and listen to all sessions.
- Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

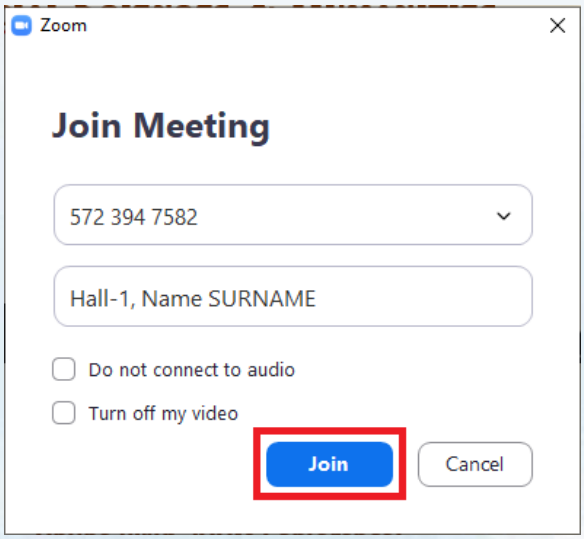
Points to Take into Consideration - TECHNICAL INFORMATION

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*(All speakers required to be connected to the session **15 min before** the session starts)*
Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

*Each presentation will take **10-15 minutes.** There will be a question and answer session for 5 minutes after the presentation.*

Before you login to Zoom please indicate your name_surname and HALL number:
exp. Hall-1, Name SURNAME



SESSION (1)- HALL (1)

Meeting ID: 826 3959 8250
Passcode: 616685

	18. 12.2021	Time: 10^{00}-12^{00} (Turkey Local time GMT+3)	MODERATOR: *Mesut Şöhret* *Emine Ayhan*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	Nurgün Topallı	*Nevşehir Hacı Bektaş Veli University*	THE RELATIONSHIP BETWEEN TRADE OPENNESS AND CO2 EMISSIONS: THE CASE OF TURKEY
10^{15}-10^{30}	Hakan Güvener Mehmet Aytekin Emine Ayhan	*Gaziantep University*	PERCEPTIONS OF HEALTHCARE PROFESSIONALS ABOUT PATIENT SAFETY CULTURE ACCORDING TO DEMOGRAPHIC CHARACTERISTICS
10^{30}-10^{45}	Emine Ayhan Mehmet Aytekin Hakan Güvener	*Gaziantep University*	COMPARISON OF PHARMACEUTICAL TRACKING SYSTEM USED IN PHARMACEUTICAL SUPPLY CHAIN IN TURKEY AND BLOCKCHAIN-BASED PHARMACEUTICAL SUPPLY CHAIN APPLICATIONS
10^{45}-11^{00}	Gizem Aydın Yasin Kırelli Şebnem Özdemir Pınar Gökçin Özuyar	*ERETEAM* *Sakarya University* *Istinye University*	THE CONCEPT OF ARTIFICIAL INTELLIGENCE-BASED SUSTAINABILITY ON BIODIVERSITY
11^{00}-11^{15}	Mesut Şöhret	*Gaziantep University*	CAN CHINA ABLE TO LEADER IN THE LIBERAL INTERNATIONAL SYSTEM?
11^{15}-11^{30}	Gökhan Özer Abdulah Kürşat Merter	*Gebze Technical University*	EFFECT OF AUDIT COMMITTEE EXPERIENCE ON AUDIT QUALITY IN TURKEY
11^{30}-11^{45}	Gökhan Özer Abdulah Kürşat Merter	*Gebze Technical University*	ASSOCIATION BETWEEN BOARD CHARACTERISTICS AND AUDIT REPORT DELAY: AN APPLICATION TO THE BIST
11^{45}-12^{00}	Özgur Bayraktar	*Karamanoglu Mehmetbey University*	DIVISION IN CHP AND MUHARREM INCE'S HOMELAND PARTY

SESSION (1)- HALL (2)

Meeting ID: 826 3959 8250
Passcode: 616685

	18. 12.2021	Time: 10^{00}-12^{00} (Turkey Local time GMT+3)	MODERATORS: *İsmail Düz* *Esin Uçal Canakay*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	İsmail Düz Enes Küçük	*Trabzon University*	THE EVALUATION OF THE ACTIVITIES IN THE HISTORY OF REVOLUTIONS AND ATATURKISM TEXTBOOK OF 8 TH GRADES IN TERMS OF HISTORICAL LITERACY
10^{15}-10^{30}	Esin Uçal Canakay	*Dokuz Eylül University*	PAINTING ART AS A SOURCE OF INSPIRATION FOR COMPOSING EDUCATIONAL MUSIC CLASS
10^{30}-10^{45}	Gülşah Tura Ali Rıza Subaşı	*Kocaeli University*	INVESTIGATION OF PSYCHOLOGICAL FLEXIBILITY LEVELS OF FACULTY OF EDUCATION STUDENTS
10^{45}-11^{00}	Serpil Sevimli Deniz Helin Yarcel	*Van Yüzüncü Yıl University* *MEB*	EXAMINATION OF INTERNET ADDICTION OF GIFTED STUDENTS
11^{00}-11^{15}	Basil Okoth Salim Şengel Serpil Altınırmak Hüseyin Yolcu Şirin Şengel Taylan Akgül	*Anadolu University*	CREATING A FINANCIAL LITERACY EDUCATION MODELS FOR CHILDREN IN THE 10-YEAR AGE GROUP
11^{15}-11^{30}	Ferhat Öztürk	*Kirikkale University*	EVALUATION OF PROSPECTIVE ELEMENTARY TEACHERS ON 21st CENTURY SKILLS IN TERMS OF MATHEMATICS EDUCATION
11^{30}-11^{45}	Aysel Kızılkaya Namlı Şadan Toğaçar	*Fırat University* *Munzur University*	THE EFFECT OF PLAY-ASSISTED BALANCE EDUCATION ON GROSSMOTOR SKILLS IN CHILDREN AGED 4-6
11^{45}-12^{00}	Aysel Kızılkaya Namlı Seçkin Doğaner	*Fırat University* *Ankara University*	PHYSICAL EDUCATION TEACHERS' PERSPECTIVES "TEACHER" METAPHORS

SESSION (1)- HALL (3)

Meeting ID: 826 3959 8250
Passcode: 616685

	18. 12.2021	Time: 10^{00}-12^{00} (Turkey Local time GMT+3)	MODERATOR: *Özerk Yavuz*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	Özerk Yavuz	*Haliç University*	A MULTIPLE REGRESSION STATISTICAL ANALYSIS APPROACH IN UNDERSTANDING MARKETING ASSOCIATED VIRTUAL COMMUNITY PARTICIPATIVE BEHAVIOR: A CONSUMER BEHAVIOR FORM
10^{15}-10^{30}	Sami Arsoy Hafzullah Yıldırm	*Kocaeli University*	USE OF GEOTECHNICAL SOFTWARE OVER TIME IN TURKEY
10^{30}-10^{45}	Cihan Kürkçü Abdullah Candan	*Kırşehir Ahi Evran University*	THE STUDY OF THE ELECTRONIC, STRUCTURAL, AND ELASTIC PROPERTIES OF TaCoBi HALF-HEUSLER COMPOUND IN α, β, AND γ STRUCTURAL PHASES
10^{45}-11^{00}	Cihan Kürkçü Abdullah Candan	*Kırşehir Ahi Evran University*	FIRST-PRINCIPLES STUDY OF STRUCTURAL, DYNAMIC, ELASTIC, AND ELECTRONIC PROPERTIES OF C15-TYPE LAVES PHASE NdIr2
11^{00}-11^{15}	Feriştah Dalkılıç Yunus Doğan Alp Kut Kemal Can Kara Uygar Takazoğlu	*Dokuz Eylül University* *Kariyer.net R&D Centre*	FEATURE EXTRACTION FROM TURKISH RESUMES AND JOB POSTINGS AND EFFICIENT JOB-RESUME MATCHING
11^{15}-11^{30}	Burçin Özdemir Aytaç Gültekin	*Graduate School of Natural and Applied Sciences Karamanoglu Mehmetbey University*	ANALYSIS OF ENERGY EFFICIENCY USING EC AND AC MOTOR FANS IN 100% FRESH AIR TYPE AIR HANDLING UNIT
11^{30}-11^{45}	İsmail Ata	*Erciyes University*	INVESTIGATION OF THE EFFECT OF TURBULATOR APPLICATION ON THE EFFICIENCY OF SOLAR AIR HEATER
11^{45}-12^{00}	Özlem Ekinci Burcu Özkardeş	*Çanakkale Onsekiz Mart University*	PHOTOMETRIC ELEMENTS OF AN EA-TYPE ECLIPSING BINARY IN ASAS-SN DATABASE: TU CrB

SESSION (2)- HALL (1)

Meeting ID: 826 3959 8250
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	18. 12.2021	Time: 13^{00}-15^{00} (Turkey Local time GMT+3)	MODERATOR: *Elif Nur Boyacı* *Ibrahim Çetin*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Ibrahim Çetin Onur İçöz	*Akdeniz University* *Adnan Menderes University*	COVID-19 PANDEMIC AND REFLECTIONS FROM HIGHER EDUCATION TEACHING APPLICATIONS FROM TURKEY
13^{15}-13^{30}	Elif Nur Boyacı	*Yıldız Technical University*	THE CONNECTION BETWEEN ATTENTION AND READ Aloud SPEED IN PRIMARY SCHOOL 3rd GRADE STUDENTS
13^{30}-13^{45}	Bülent Alcı Esra Kaynar Cebeci	*Yıldız Technical University*	EVALUATION OF ERASMUS+ KA101 MOBILITY PROGRAM (SCHOOL EDUCATION STAFF MOBILITY) ACCORDING TO TEACHERS' OPINIONS
13^{45}-14^{00}	Serdar Takva Abdullatif Uyumaz	*Trabzon University*	GRAHAM SWIFT'S WATERLAND; A NEW WAY OF HISTORICAL UNDERSTANDING
14^{00}-14^{15}	Mustafa Taşcı	*Konya Technical University*	OCCUPATIONAL HEALTH AND SAFETY IN ARCHITECTURE EDUCATION
14^{15}-14^{30}	Meltem Kutlu Gürsel	*Dokuz Eylül University*	EXPROPRIATION APPLICATION UNDER THE LAW ON GEOTHERMAL RESOURCES AND NATURAL MINERAL WATER
14^{30}-14^{45}	Handan Bilici Altunkayalıer	*Bartın University*	TROUGH THE EYES OF A TRAVELER: WALTHER VON DIEST'S FINDINGS ON BARTIN AND AMASRA
14^{45}-15^{00}	N. Beril ÖZER TEKİN	*Doğuş University*	FROM CULTURE OF FEAR TO DIGITAL CULTURE: EXPERIENCES OF INDIVIDUALS OVER 65 IN THE COVID-19 PANDEMIC

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Meeting ID: 826 3959 8250
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	18. 12.2021	Time: 13^{00}-15^{00} (Turkey Local time GMT+3)	MODERATOR: *Çağdaş Yüksel* *Hatice Nuriye Dursun*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Zeynel Çılğın	*Munzur University*	ESTIMATION OF THE EQUILIBRIUM LINE ALTITUDE (ELA) OF THE LAST GLACIAL PERIOD ON MOUNT DEDEGÖL USING VARIOUS METHODS
13^{15}-13^{30}	Hatice Nuriye Dursun	*Kırıkkale University*	THE CONZETP OF OPINIONS ON IBN QAYYIM AL- JAWZIYYAH WORK OF I'LAAM UL MUWAQQI'EEN
13^{30}-13^{45}	Ovuakporoye Emmanuel Clarke Oktay Çetin	*Piri Reis University*	A CASE STUDY OF MARITIME BUSINESS MANAGEMENT AND SAFETY CONDUCT OF SHIP CREW MEMBERS DURING THE COVID-19 PANDEMIC
13^{45}-14^{00}	Fulya Memişoğlu Ayşe Altundiş	*Yıldız Technical University*	A POLITICAL ECOLOGY- FOCUSED LOOK AT CLIMATE REFUGEES
14^{00}-14^{15}	Çağdaş Yüksel	*Pamukkale University*	REFLECTIONS OF SOVIET STRAITS POLICY IN THE BRITISH HOUSE OF LORDS IN THE FINAL YEARS OF THE SECOND WORLD WAR
14^{15}-14^{30}	Yavuz Selim Balcıoğlu Gökhan Özer	*Gebze Technical University*	STOCK PRICE FORECASTING METHOD BASED DEEP NEURAL NETWORK OVER 5 STOCKS THAT PERFORMED THE BEST IN DURING COVID19 BETWEEN 2020-2021
14^{30}-14^{45}	Yasemin Dumrul Zerrin Kılıçarslan	*Kayseri University*	TERMS OF TRADE AND ECONOMIC GROWTH IN INDIA: NEW EVIDENCE USING FOURIER CO-INTEGRATION TEST
14^{45}-15^{00}	Yavuz Selim Balcıoğlu Bulent Sezen	*Gebze Technical University*	PREDICTING OF HEART DISEASE RISK FACTORS WITH R

SESSION (2)- HALL (3)

Meeting ID: 826 3959 8250
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	18. 12.2021	Time: 13^{00}-14^{30} (Turkey Local time GMT+3)	MODERATOR: *Deniz Akkaya* *Ali Karaman*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Ceylan Verda Bitirim	*Ankara University*	ENHANCEMENT OF FUNCTIONAL, ELECTROPHYSIOLOGICAL AND CLONING PROPERTIES OF CARDIOSPHERE DERIVED STEM CELLS AND SCA1+ CARDIAC STEM CELLS BY EX VIVO ESTROGEN TREATMENT
13^{15}-13^{30}	Gülengün Türk Emel Bayraktar Elem Kocaçal	*Adnan Menderes University* *Bingöl University* *İzmir Demokrasi University*	THE EFFECT OF CONCEPT MAP USE IN NURSING PROCESS TEACHING ON STUDENTS' USE OF NURSING DIAGNOSES
13^{30}-13^{45}	Deniz Akkaya Emel Sezici	*Kütahya Health Science University*	THE EFFECT OF TECHNOLOGY ON CHILDREN
13^{45}-14^{00}	Ali Karaman	*Bingöl University*	THE EFFECT OF DIGITAL PROMOTIONAL TOOLS USED IN PROMOTION OF DRUGS IN THE PHARMACEUTICAL INDUSTRY ON DRUG AWARENESS AND DRUG PRESCRIBE BEHAVIOR OF PHYSICIANS
14^{00}-14^{15}	Nazan Aktaş Penbe Merve Öner	*Selcuk University*	PRESENT CONDITIONS IN THE VISUALS OF THE FOOD-BASED NUTRITION GUIDE: EXAMPLES FROM AROUND THE WORLD
14^{15}-14^{30}	Beyrul Canbaz	*Istanbuk Yeni Yüzyıl University*	BASINS OF ATTRACTION IN SPINOR TYPE INSTANTON SOLUTIONS

SESSION (3)- HALL (1)

Meeting ID: 826 3959 8250
Passcode: 616685

	18. 12.2021	Time: 15^{30}-17^{45} (Turkey Local time GMT+3)	MODERATOR: *Tuğrul Varol* *Kübra Çınar Topçu*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Kübra Çınar Topçu Güzin Kaban	*Bayburt University* *Atatürk University*	SOME TECHNOLOGICAL PROPERTIES OF LACTIC ACID BACTERIA ISOLATED FROM PASTIRMA
15^{45}-16^{00}	Derya Bayrak Kul Zeynep Feyza Yılmaz Oral Güzin Kaban	*Atatürk University*	THE EFFECTS OF DIFFERENT SALT AND FAT LEVELS ON VOLATILE COMPOUNDS OF KAVURMA
16^{00}-16^{15}	Muhammet Gaffaroğlu Muradiye Karasu Ayata	*Kırşehir Ahi Evran University*	THE IMPORTANCE OF C-BANDED KARYOTYPES IN THE FRESHWATER FISHES OF TURKEY
16^{15}-16^{30}	Mertol Ertuğrul Tuğrul Varol	*Bartın University*	FOREST FIRES IN TURKEY AND THE FUTURE UNDER CHANGING CONDITIONS
16^{30}-16^{45}	Mükerrem Kaya Güzin Kaban	*Atatürk University*	EFFECTS OF RIPENING RATE, STARTER CULTURE AND FAT TYPE ON VOLATILE COMPOUNDS OF SUCUK
16^{45}-17^{00}	Hüseyin Özdemir	*Konya Technical University*	A VIEW FROM EXPO2020 SWEDEN PAVILION
17^{00}-17^{15}	Aylin Zekioğlu Şule Özgüneş	*Manisa Celal Bayar University*	RETROSPECTIVE INVESTIGATION OF THE PSYCHO-SOCIAL CAUSES OF SPORTS INJURIES
17^{15}-17^{30}	Tamer Güney Ömer Gündoğdu	*Iğdır University* *Atatürk University*	AN OVERVIEW OF COVID-19 PANDEMIC AND OCCUPATIONAL HEALTH AND SAFETY FROM THEORY OF RISK SOCIETY 1
17^{30}-17^{45}	Fatma Başar	*Kutahya Health Sciences University*	CURRENT TREATMENT APPROACHES IN GESTATIONAL DIABETES

SESSION (3)- HALL (2)

Meeting ID: 826 3959 8250
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	18. 12.2021	Time: 15^{30}-18^{00} (Turkey Local time GMT+3)	MODERATOR: *Nesrin Adıgüzel* *Ceren Tırtıl*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Nesrin Adıgüzel Muhammet Özgeriş	*Atatürk University*	SOLAR PV SYSTEM DESIGN AND FINANCIAL ANALYSIS USING PV*SOL PREMIUM SIMILATION: ATATÜRK UNIVERSITY CASE STUDY
15^{45}-16^{00}	Fatma Şimşek Mahmut Modanlı	*Harran University*	SOLUTION OF THE PSEUDO-HYPERBOLIC TELEGRAPH EQUATION BY LAPLACE TRANSFORM COLOCATION METHOD
16^{00}-16^{15}	Ceren Tırtıl Tülay Korkusuz Polat	*Sakarya University*	PROCESS IMPROVEMENT WORK FOR SUPPLIER-INDUCED PRODUCTION DISRUPTIONS
16^{15}-16^{30}	Ece Nur Duru Tülay Korkusuz Polat	*Sakarya University*	EXAMINING THE ADAPTATION PROCESS OF MOVIE THEATERS TO THE NEW NORMAL AFTER THE COVID-19 PANDEMIC
16^{30}-16^{45}	Nihan Gülmez	*Munzur University*	RSM-BASED OPTIMIZATION ON RECYCLING OF WASTE ADDITIVES IN MORTARS
16^{45}-17^{00}	Mehmet Uzun Sadık Alper Yıldızel Sertan Ozan	*Karamanoglu Mehmetbey University*	MECHANICAL PROPERTIES INVESTIGATION OF GLASS FIBER REINFORCED PERVIOUS CONCRETE
17^{00}-17^{15}	Mehmet Uzun Sadık Alper Yıldızel	*Karamanoglu Mehmetbey University*	INVESTIGATION OF MECHANICAL PROPERTIES OF BASALT FIBER REINFORCED VERTICAL COMPOSITE STRUCTURAL ELEMENTS
17^{15}-17^{30}	Uğur Sinan Eren Ezgi Güler Yıldız Şahin	*Kocaeli University* *Bilecik Şeyh Edebali University*	OPTIMIZING THE PERMUTATION FLOWSHOP SCHEDULING PROBLEM USING THE SCATTER SEARCH METHOD
17^{30}-17^{45}	Nuray Öz Ceviz Metin Yüksek Derya Saltık Çirkin	*Marmara University*	A STUDY ON MECHANIC CHARACTERISTICS OF NANOFIBER STRUCTURES OBTAINED BY EGG ALBUMEN/POLY (CAPROLACTONE) MIXED WITH BENZALKONIUM CHLORITE
17^{45}-18^{00}	Hale Yıldızay	*Kütahya Dumlupınar University*	EFFECTS OF PH ON CHEMICALLY DEPOSITED CDS THIN FILMS

SESSION (3)- HALL (3)

Meeting ID: 826 3959 8250
Passcode: 616685

	18. 12.2021	Time: 15^{30}-18^{00} (Turkey Local time GMT+3)	MODERATOR: *Cemre Polat* *Ahmet Teber*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Ahmet Teber	*Bayburt University*	ULTRA-THIN ENG METAMATERIAL ABSORBER USING LUMPED RESISTOR FOR C-BAND
15^{45}-16^{00}	Deniz Akın Şahbaz	*Pamukkale University*	RELEASE KINETICS OF VITAMIN E FROM CHITOSAN/GUM ARABIC MICROCAPSULES
16^{00}-16^{15}	İsmail Demir Cüneyt Doğan	*Afyon Kocatepe University*	PRODUCTION OF WASTE GRASS ADDED GEOPOLYMER INSULATION BOARD
16^{15}-16^{30}	Muhammet Elmalı İsmail Demir	*Afyon Kocatepe University*	GEOPOLYMER CONCRETE TECHNOLOGY
16^{30}-16^{45}	Halil İbrahim Akgün Okan Gül	*Kocaeli University*	STRESS ANALYSIS OF A TRAILER FIXED AXLE
16^{45}-17^{00}	Mustafa Soyler Cemre Polat Dogan Burak Saydam Coskun Ozalp	*Osmaniye Korkut Ata University*	INVESTIGATION OF FLOW STRUCTURE OF ROTARY OSCILLATING CYLINDER WITH PIV MEASUREMENT TECHNIQUE
17^{00}-17^{15}	Doğan Burak Saydam Mustafa Söyler Cemre Polat	*Osmaniye Korkut Ata University*	IMPACT OF GLOBAL SARS-COV-2 PANDEMIC (COVID 19) ON PM10 CONCENTRATIONS FROM CITIES IN VARIOUS GEOGRAPHIC REGIONS OF TURKEY
17^{15}-17^{30}	Cemre Polat Mustafa Söyler	*Osmaniye Korkut Ata University*	VORTICITY DISTRIBUTION ON A SURFACE MOUNTED CUBE AT RE=10000
17^{30}-17^{45}	Mustafa Söyler Cemre Polat	*Osmaniye Korkut Ata University*	NUMERICAL ANALYSIS OF THE EFFECTIVENESS OF DIMPLES ON A NACA WING PROFILE
17^{45}-18^{00}	Mine Ak	*Independent Researcher*	INVESTIGATION OF ORBITS IN A NONLINEAR FERMIONIC MODEL USING SURROGATE MODELS

7TH INTERNATIONAL ISTANBUL SCIENTIFIC RESEARCH CONGRES PROGRAM

DAY 2 - DECEMBER 19, 2021

December 18-19, 2021
Istanbul, TURKEY

CONGRESS PROGRAM

Online (with Video Conference) Presentation

Participant Countries:
Turkey, Azerbaijan, United States, France, Spain, Hungary, Poland, Lithuania, China, India, Kazakhstan, Ukraine, Kosovo, Libya, Algeria, Ethiopia, Qatar, Uganda, Laos, Rwanda, Namibia, Nepal.

Meeting ID: 856 1600 1329
Passcode: 127822

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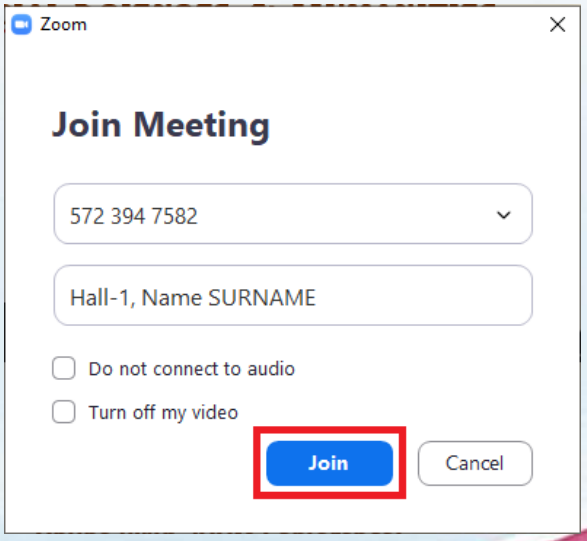
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*Each presentation will take **10-15 minutes.** There will be a question and answer session for 5 minutes after the presentation.*

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SESSION (1)- HALL (1)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 10^{00}-12^{15} (Turkey Local time GMT+3)	MODERATOR: *M. Afzal Wani*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	Rituraj Basumatary	*Tata Institute of Social Sciences, India*	THE CONCEPT, NATURE AND IMPORTANCE OF GENDER AND SEX EDUCATION IN CONTEMPORARY SOCIETY
10^{15}-10^{30}	Mahmudova Guney Salam gizi	*Baku State University, Azerbaijan*	PRESS UNION OF THE TURKISH PEOPLE
10^{30}-10^{45}	Mahmudova Guney Salam gizi	*Baku State University, Azerbaijan*	THE KARABAKH WAR IN THE REGIONAL PRESS IN AZERBAIJAN
10^{45}-11^{00}	Agaeva Nigar Ikram gizi	*Baku State University, Azerbaijan*	MEDIA FORUM OF TURKIC-SPEAKING COUNTRIES AND COMMUNITIES
11^{00}-11^{15}	Sadigova Afaq	*Baku State University, Azerbaijan*	UNITY OF LANGUAGE AND CULTURE
11^{15}-11^{30}	Elena Botts	*Johns Hopkins University, United States*	THE EFFECT OF POPULISM ON CHILEAN HUMAN RIGHTS- AND ITS REVERSAL
11^{30}-11^{45}	M. Afzal Wani	*GGS Indraprastha University, India*	UN RESPONSIBILITY FOR PROMOTION OF PEACEFUL SOCIETIES THROUGH JUST SYSTEMS OF GOVERNANCE
11^{45}-12^{00}	Aizhan Ye. Ryssaldiyeva	*Turan University, Kazakhstan*	TYPES OF CRIMINAL PENALTIES IN THE CRIMINAL-LEGA LAW SYSTEM OF THE REPUBLIC OF KAZAKHSTANL
12^{00}-12^{15}	Soulichanh Luangsombath Thipphavanh Khanthaphone Thiphachanh Nouthaphone Bounmy Phalychan Daovy Pongpanya Phonesouda Vongthong,	*Champasack University, Laos*	DIFFICULTY OF ENGLISH SPEAKING OF THE 3 RD YEAR STUDENTS IN ENGLISH DEPARTMENT,FACULTY OF EDUCATION, CHAMPASACK UNIVERSITY

SESSION (1)- HALL (2)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 10^{00}-12^{30} (Turkey Local time GMT+3)	MODERATOR: *Ahmed Badran*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	Aytekin Zeynalova	*Baku State University, Azerbaijan*	JOINT MEDIA PLATFORM BETWEEN AZERBAIJAN AND TURKEY
10^{15}-10^{30}	Neesha Rajkarnikar Deepanjal Shrestha	*Pokhara University, Nepal*	PROSPECT AND CHALLENGES OF OFF SEASONAL TOMATOES PRODUCTION: A CASE STUDY OF POKHARA, KASKI, NEPAL
10^{30}-10^{45}	Nikolina Petrovic	*Hungarian University, Hungary*	IS CROSS-BORDER COOPERATION BETWEEN HUNGARY AND SERBIA IN THE LINE WITH SERBIAN AND EUROPEAN STRATEGIC DEVELOPMENT GOALS?
10^{45}-11^{00}	Mohammad Mohammad Habil Szigeti Orsolya	*Szent István University, Hungary*	MARKET ORIENTATION AND SMALL AND MEDIUM ENTERPRISES PERFORMANCE IN DAIRY FUNCTIONAL FOOD IN HUNGARY
11^{00}-11^{15}	Anne Marie Kagwesage Marie Louise Nzayisenga Patrice Habinshuti Deo Mutambuka Patrick Nshimiyimana Peter Rwibasira	*University of Rwanda, Rwanda* *Envisage Rwanda, Rwanda*	TEACHERS' EXPERIENCES DURING COVID-19 LOCKDOWN - TOWARDS BUILDING A RESILIENT PRIMARY AND SECONDARY EDUCATION SYSTEM IN RWANDA
11^{15}-11^{30}	Marie Louise Nzayisenga Peter Rwibasira Deo Mutambuka Patrice Habinshuti Patrick Nshimiyimana Anne Marie Kagwesage	*University of Rwanda* *Envisage Rwanda*	REFLECTIONS ON THE LEARNERS' RESILIENCE TOWARDS EDUCATION CONTINUITY DURING THE COVID-19 PANDEMIC IN RWANDA
11^{30}-11^{45}	Rufat Rustamov	*Baku State University, Azerbaijan*	COMPOUND SENTENCE CONCEPT IN CONTEMPORARY TURKISH WRITTEN LANGUAGE
11^{45}-12^{00}	Ahmed Badran	*Qatar University, Qatar*	'CARBON MARKETS POTENTIALS IN THE GCC: IMPLICATIONS FOR THE STATE OF QATAR
12^{00}-12^{15}	Awol Ali Mohammed	*Hawassa University, Ethiopia*	THE SLUGGISH WAVE OF DEMOCRATIC TRANSITION ETHIOPIA
12^{15}-12^{30}	G.Latha	*Annamalai University, India*	3 CS FOR EFFECTIVE ENVIRONMENTAL MANAGEMENT

SESSION (1)- HALL (3)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 10^{00}-12^{30} (Turkey Local time GMT+3)	MODERATOR: *Shahboz SHOEV*
	Authors	**Affiliation**	**Topic title**
10^{00}-10^{15}	Sebahattin PÜSKÜLLÜ	*Yalova University, Turkey*	THE MANDATE REGIME IN THE PALESTINIAN TERRITORIES AND ITS EFFECTS ON TODAY'S POLITICS
10^{15}-10^{30}	Yabana NIKOLAEVNA	*SGH Warsaw School of Economics, Poland*	US-SOVIET UNION RELATIONS DURING COLD WAR ERA
10^{30}-10^{45}	Yabana NIKOLAEVNA	*SGH Warsaw School of Economics, Poland*	THE AFGHANISTAN CRISIS AND PAKISTAN'S SECURITY DILEMMA: DURAND LINE DISPUTE
10^{45}-11^{00}	Shahboz SHOEV	*Vistula University, Poland*	POLAND-IRAN RELATIONS AFTER IRANIAN ISLAMIC REVOLUTION IN 1979
11^{00}-11^{15}	Shahboz SHOEV	*Vistula University, Poland*	UN POLICY-MAKING MECHANISM: THE CASE OF THE SYRIA
11^{15}-11^{30}	Shahboz SHOEV	*Vistula University, Poland*	THE COMMON FOREIGN AND SECURITY POLICY OF EUROPEAN UNION : A HISTORICAL APPROACH
11^{30}-11^{45}	Shahboz SHOEV	*Vistula University, Poland*	GENDER INEQUALITY IN GLOBAL POLITICS
11^{45}-12^{00}	Shahboz SHOEV	*Vistula University, Poland*	WOMEN POLITICAL PARTICIPATION IN SOCIETY: EXAMPLE OF RUSSIA
12^{00}-12^{15}	Vugar Gahramanov	*Rovira i Virgili University, Spain*	THE EFFECTS OF COVID-19 PANDEMIC IN TOURISM INDUSTRY
12^{15}-12^{30}	Taleh ABBASLI	*Vilnius University, Lithuania*	FAKE FUTURE: INTERNATIONAL EXPERIENCE OF (NON) REGULATION OF DEEPFAKES
12^{30}-12^{45}	Abdullah Faeq ABDULLAH	*Vistula University, Poland*	CLIMATE CHANGE IN ANTARCTICA

SESSION (2)- HALL (1)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 13^{00}-15^{00} (Turkey Local time GMT+3)	MODERATOR: *Muna Tabuni*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Naveen Kumar Singh Md. Zubbair Malik Saurabh Kumar Sharma	*Jawaharlal Nehru University, India*	IDENTIFICATION OF KEY REGULATORS IN COMPLEX CERVICAL CANCER NETWORK AND THEIR FUNCTIONAL SIGNIFICANCE IN ORGANIZATION: A NETWORK THEORETICAL APPROACH
13^{15}-13^{30}	Satveer Singh Deo Prakash Vidyarthi	*Jawaharlal Nehru University, India*	TASK SCHEDULING IN FOG-INTEGRATED CLOUD ENVIRONMENT
13^{30}-13^{45}	Eht E Sham D.P.Vidyarthi	*Jawaharlal Nehru University, India*	QoS-BASED ADMISSION CONTROL USING MODIFIED MULTI-CRITERIA DECISION MAKING AND MODIFIED SIMILARITY MEASURE IN FOG INTEGRATED CLOUD ENVIRONMENT
13^{45}-14^{00}	Doukari Amine, Touffik Baouz Djerrad Nour El Houda	*University of Bejaia, Algeria*	THE TOUGHENING OF POLYAMIDE (PA) USING HIGH IMPACT POLYSTYRENE (HIPS) RECYCLED FROM WASTE ELECTRIC AND ELECTRONIC EQUIPMENT)
14^{00}-14^{15}	K.Thamizhmaran M.Pooja P.Nihariha	*Government College of Engineering Bodinayakkanur, India*	EFFICIENT CRYPTOGRAPHY TECHNIQUE USING IMAGE FILES
14^{15}-14^{30}	Muna Tabuni	*University of Tripoli, Libya*	ON MULTIMODE INFINITE QUANTUM SYSTEMS MUNA TUBANI AND MABROUKA ALFAGHI
14^{30}-14^{45}	Katia Hebbache Nadia Ait Ahmed Nabila Aliouane	*University of Bejaia, Algeria*	THE EFFECT OF THE ADDITIVE ON THE KINETIC PROPERTIES OF THE NICKEL-BASED ALLOY OBTAINED BY ELECTROCHEMICAL DEPOSITION
14^{45}-15^{00}	M. Seenivasan R. Abinaya	*Annamalai University, India*	MARKOVIAN QUEUEING MODEL WITH SINGLE WORKING VACATION AND FEEDBACK

SESSION (2)- HALL (2)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 13^{00}-15^{15} (Turkey Local time GMT+3)	MODERATOR: *M.Seenivasan*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Nour el houda DJERRAD Touffik BAOUZ	*University of Bejaia, Algeria*	INVESTIGATION OF POLYOXYMETHYLENE (POM) MODIFIED WITH HIGH IMPACT POLYSTYRENE (HIPS) RECYCLED FROM WASTE ELECTRIC AND ELECTRONIC EQUIPMENT
13^{15}-13^{30}	Chems Eddine BOUKHEDIMI	*University of Tizi Ouzou, Algeria*	THE EVALUATION OF KIA MOTORS ALGERIA'S PERFORMANCE BETWEEN 2016 AND 2021
13^{30}-13^{45}	M.Seenivasan S.Chandiraleka R.Abinaya	*Annamalai University, India*	M/M/1 MULTIPLE WORKING VACATION WITH CATASTROPHES AND UNRELIABLE SERVER
13^{45}-14^{00}	M. Seenivasan R. Abinaya	*Annamalai University, India*	MARKOVIAN QUEUEING MODEL WITH SINGLE WORKING VACATION AND FEEDBACK
14^{00}-14^{15}	Jayachitra.J P. Sivasakthivelan	*Annamalai University, India*	ISOLATION, CHARACTERIZATION AND EFFICACY STUDIES OF A POTENTIAL PLANT GROWTH PROMOTING RHIZOBACTERIA - Pseudomonas fluorescens FROM TOMATO RHIZOSPHERE SOILS
14^{15}-14^{30}	Sara oumenoune TEBBI Nadjet Debbache-benaiada	*Université Abderrahmane Mira de Bejaia, Algeria*	OPTIMIZATION OF EXTRACTION OF PHENOLIC COMPOUNDS FROM PISTACIA LENTISCUS SEEDS USING BOX BENHKEN DESING
14^{30}-14^{45}	Phonesouda Vongthong Soulichanh Luangsombath Daovy Pongpanya Thipphavanh Khanthaphone Chansy Phomphithak	*University of Health Sciences, Laos* *Naxaythong Education and Sports Office, Laos* *Champasack University, Laos* *Champasak College of Health Sciences, Laos*	PUBLIC'S PROTECTION BEHAVIOR, ATTITUDE AND KNOWLEDGE TOWARDS COVID-19 PANDEMIC
14^{45}-15^{00}	Amal Chandra Mondal	*Jawaharlal Nehru University, India*	NARINGENIN ALLEVIATES PARAQUAT-INDUCED DOPAMINERGIC NEURONAL LOSS IN SH-SY5Y CELLS AND A RAT MODEL OF PARKINSON'S DISEASE
15^{00}-15^{15}	Mohammed Jaradat	*Qatar University, Qatar*	THE RAMSEY NUMBERS FOR THETA GRAPHS VERSUS THE WHEEL GRAPHS

SESSION (2)- HALL (3)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 13^{00}-15^{15} (Turkey Local time GMT+3)	MODERATOR: *John DAVID*
	Authors	**Affiliation**	**Topic title**
13^{00}-13^{15}	Khan NAVEED	*Vistula University, Poland*	NATION-BUILDING PROCESS IN KYRGYZTAN AFTER INDEPENDENCE
13^{15}-13^{30}	Khan NAVEED	*Vistula University, Poland*	TSARIST RUSSIA AND CENTRAL ASIAN POLICIES
13^{30}-13^{45}	John DAVID	*Vistula University, Poland*	EXAMINING OF CHINA AS A GLOBAL ACTOR IN THE PERSPECTIVE OF GLOBALIZATION THEORY OF "FLAT WORLD" OF THOMAS FRIEDMAN
13^{45}-14^{00}	Abdullah Faeq ABDULLAH	*Vistula University, Poland*	HUMAN RIGHTS VIOLATIONS COMMITTED BY CHINA AGAINST EAST TURKESTAN
14^{00}-14^{15}	Jamshed ABDULLAEV	*Vistula University, Poland*	THE EFFECTS OF RUSSIA'S ANNEXATION OF CRIMEA ON BLACK SEA GEOPOLITICS
14^{15}-14^{30}	Jamshed ABDULLAEV	*Vistula University, Poland*	FASCISM IN EUROPE DURING SECOND WORLD WAR: ITALIAN VERSUS GERMAN PRACTICES
14^{30}-14^{45}	Laura WILLANISKA	*Warsaw University, Poland*	USA IMMIGRATION LAW POLICIES: EXAMPLE OF MEXICO
14^{45}-15^{00}	Laura WILLANISKA	*Warsaw University, Poland*	EXAMINING THE IMPACT OF THE ROLE OF THE NETHERLANDS WITHIN THE EU AND THE UN ON ITS ATTITUDE AS A REGIONAL POWER DURING THE DARFUR CRISIS
15^{00}-15^{15}	John DAVID	*Vistula University, Poland*	HUNGARY'S PLACE IN THE COLD WAR AND THE HUNGARIAN REVOLUTION

SESSION (3)- HALL (1)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 15^{30}-17^{30} (Turkey Local time GMT+3)	MODERATOR: *Andrew Gilbert Were*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Nguyễn Ngọc Quyến Getachew Worku Alebachew Balázs Kucska Gyula Kovács Béla Halasi-Kovács Árpád Ferincz Ádám Staszny László Horváth Béla Urbányi Tamás Müller	*Hungarian University of Agricultural and Life Sciences, Hungary*	THE NOVEL METHOD FOR INDUCED HYBRIDIZATION IN SPONTANEOUS SPAWNING:CLARIAS GARIEPINUS ♀ × HETEROBRANCHUS LONGIFILIS ♂
15^{45}-16^{00}	Ainur Zheldybayeva Oshakbai Zhibek Sagynysh Aman Orynbasar Akbota	*Almaty Technological University, Kazakhstan*	RESEARCH ON THE QUALITY AND SAFETY OF WILD MEAT PRODUCTS
16^{00}-16^{15}	Ainur Zheldybayeva Aigerim Tursynbek Zarina Shakhieva Zhibek Oshakbai Madina Mardenova	*Almaty Technological University, Kazakhstan*	RESEARCH ON THE QUALITY AND SAFETY OF BREAD PRODUCTS USING RAW MATERIALS FROM PLANT ORIGIN
16^{15}-16^{30}	Andrew Gilbert Were	*Makerere University, Uganda*	A MORALIST THEORY AND THE PERSISTENCE OF STREET VENDING.THE CASE STUDY OF KAMPALA CITY
16^{30}-16^{45}	Altafur Rahman Imre Majláth Magda Pál	*Hungarian University of Agriculture and Life Science, Hungary* *Agricultural Institute, Hungary*	METHYLGLYOXAL STIMULATES STRESS SIGNALING AND GERMINATION OF MAIZE AT SUBOPTIMUM TEMPERATURE
16^{45}-17^{00}	Melvin M. Mashingaidze Chiedza T. Nzuma	*University of Namibia, Namibia*	ESTABLISHMENT OF OPTIMUM MINERAL PARTICLE SIZE FOR TANTALITE CONCENTRATION BY JIGGING OF A HIGH-GRADE PEGMATITE ORE
17^{00}-17^{15}	Ammana Sabitha Rani	*Osmania University, India*	IN VITRO PRODUCTION OF DIOSGENIN FROM HAIRY ROOT CULTURES OF COSTUS PICTUS
17^{15}-17^{30}	Firas Alarawi	*Hungarian University, Hungary*	ELECTION OF SEVERAL GENOTYPES OF SOME SYRIAN WILD ALMOND SPECIES SCATTERED AT HOMS PROVINCE IN SYRIA FOR KERNELS BITTERNESS USING SSR TECHNOLOGY

SESSION (3)- HALL (2)

Meeting ID: 856 1600 1329
Passcode: 127822

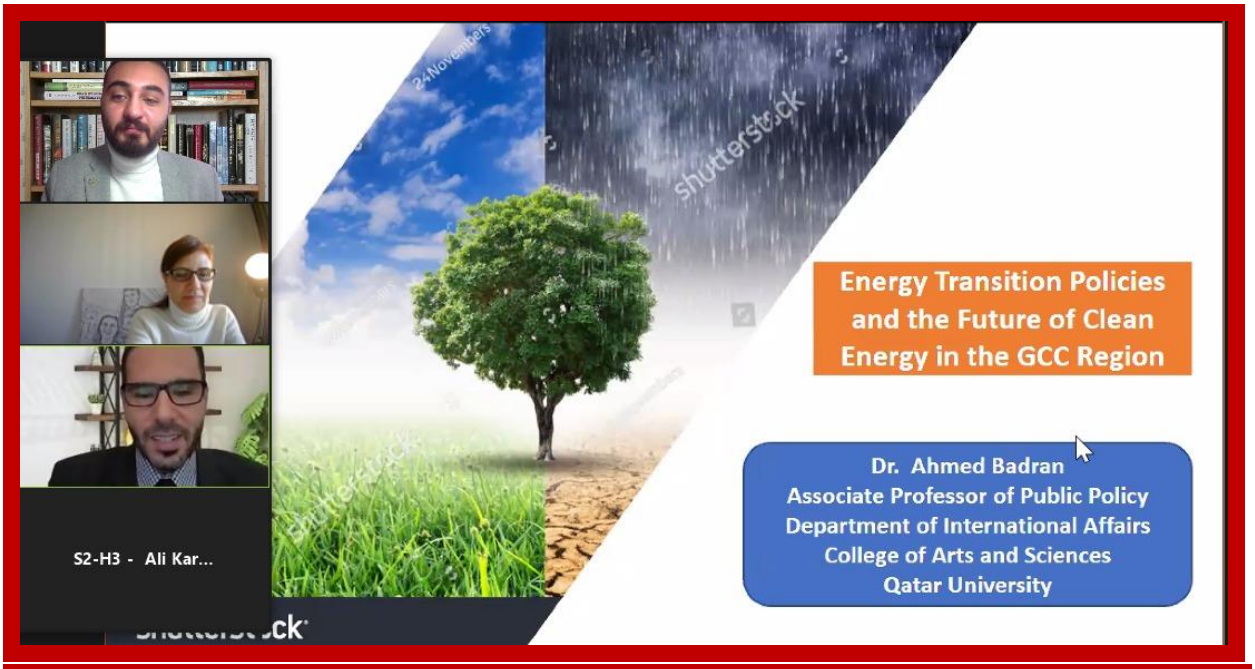
	19. 12.2021	Time: 15^{30}-18^{00} (Turkey Local time GMT+3)	MODERATOR: *Volodymyr Sulyma*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Volodymyr Sulyma Sergij Malinovskyj Igor Yuschenko Dmytro Yudin Olga Nikitina Oleg Kalyta Dmytro Kulchytskyj Andrij Gaponov Gennady Yarotskyj	*Dnipro State Medical University, Ukraine*	STEP-TO-STEP IN THE MODERN TREATMENT OF PATIENTS WITH CHRONIC HEMORRHOIDS
15^{45}-16^{00}	Volodymyr Sulyma Yakiv Bereznytskyj Ruslan Duka Kateryna Yaroshenko Sergij Malinovskyj	*Dnipro State Medical University, Ukraine*	ADMINISTRATIVE PROCESS FOR MODERN POSTGRADUATE TRAINING OF RESIDENTS-SURGEONS
16^{00}-16^{15}	Lujin A. Alshridey Samah A. Mahmud Abdelaziz M. Dwaya Osama R. Etekbali Abdulhamid M. Alkout	*University of Tripoli, Libya*	THE IMPACT AND ENHANCING HAND HYGIENE AMONG HEALTH CARE WORKERS DURING COVID-19 DISEASE PANDEMIC FOR PREVENTION THE INCIDENCE OF MRSA
16^{15}-16^{30}	Abduh Murshed	*Tongji University, China*	O-GLCNACYLATION ENHANCES THE SENSITIVITY OF HCC CELLS TO FERROPTOSIS
16^{30}-16^{45}	Eren Yalçınöz Burak Aslan Okan Gül	*Kocaeli University, Turkey*	FRONT LOWER SUSPENSION ARM ANALYSIS USING TOPOLOGY OPTIMIZATION
16^{45}-17^{00}	A. Djendel N. Ait Ahmed P. Knauth M.Eyraud	*Université de Bejaia, Algeria* *Aix Marseille University, France*	USE OF ELECTROCHEMICAL METHODS TO ELABORATE ON TITANIUM SURFACE NANOSTRUTURED LAYER COUPLED WITH A COMPACT OXIDE FILM FOR MEDICAL APPLICATIONS
17^{00}-17^{15}	Salah Eddin M. Kurdi Hanaa M. Ishtebaa	*University of Tripoli, Libya*	EARLY MANAGEMENT OF THE SEVERE FACIAL SOFT TISSUE INJURIES IN LIBYA
17^{15}-17^{30}	Umesh Chand Singh Yadav Johnna Francis Varghese	*Jawaharlal Nehru University, India* *Harvard Medical School, United States*	PREVENTION OF MACROPHAGE FOAM CELL FORMATION BY A FLAVONOID, FISETIN
17^{30}-17^{45}	Sivasakthivelan.P K. Arivukkarasu S. Gomathi A. Arunachalam	*Annamalai University, India*	CHITINOLYTIC BACTERIAL ISOLATES AND ITS CONSORTIUM BASED BIOFORMULATIONS AS AN EFFECTIVE BIOCONTROL AGENT AGAINST COLLAR ROT FUNGAL DISEASE IN GROUNDNUT – AN INNOVATIVE APPROACH
17^{45}-18^{00}	Zeynep Toprak	*Dicle University*	A MOLECULAR PHYLOGENETIC STUDY OF SILENE SORDIDA BASED ON THE NUCLEAR LOW-COPY EST14 LOCUS

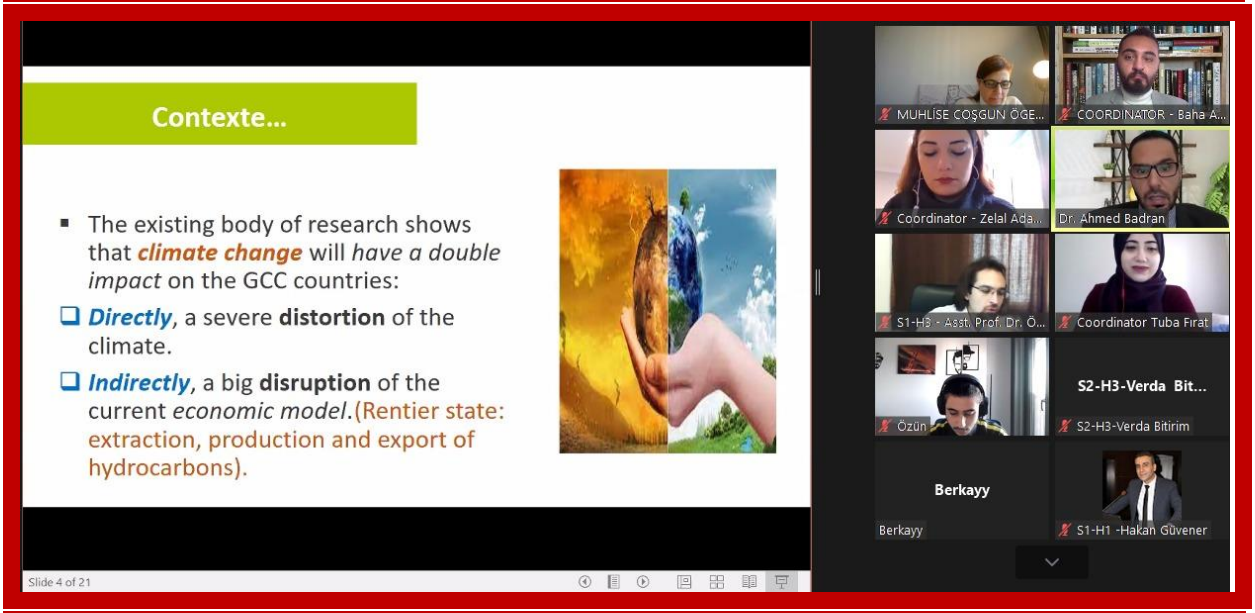
SESSION (3)- HALL (3)

Meeting ID: 856 1600 1329
Passcode: 127822

	19. 12.2021	Time: 15^{30}-18^{00} (Turkey Local time GMT+3)	MODERATOR: *Magda PIOTROW*
	Authors	**Affiliation**	**Topic title**
15^{30}-15^{45}	Magda PIOTROW	*Piotrowska Economic Science University, Poland*	HOW DO CULTURAL NATIONALISM AND POLITICAL NATIONALISM DIFFER?
15^{45}-16^{00}	Magda PIOTROW	*Piotrowska Economic Science University, Poland*	NATIONALISM AND INTERNATIONALISM COMPATIBLE
16^{00}-16^{15}	Mizango VIOLA	*Warsaw University, Poland*	NATION-BUILDING PROCESS IN TURKMENISTAN AFTER INDEPENDENCE
16^{15}-16^{30}	Mizango VIOLA	*Warsaw University, Poland*	NATION BULDING PROCCES AFTER INDEPENDENCE OF AZERBAIJAN
16^{30}-16^{45}	Nakimuli VIVIERNA	*Vistula University, Poland*	POLITICAL LEGITIMACY
16^{45}-17^{00}	Nakimuli VIVIERNA	*Vistula University, Poland*	DEMOCRACY IN MODERN SOCIETY?
17^{00}-17^{15}	Nahimuli OLIVIA	*SGH Warsaw School of Economics, Poland*	THE STALIN ERA USSR CENTRAL ASIA POLICIES
17^{15}-17^{30}	Nahimuli OLIVIA	*SGH Warsaw School of Economics, Poland*	BOLSHEVIK REVOLUTION
17^{30}-17^{45}	Abdullah Faeq ABDULLAH	*Vistula University, Poland*	ARAB SPRING EFFECTS ON CENTRAL EUROPEAN COUNTRIES
17^{45}-18^{00}	Ebru JILTA	*Banka Kombetare Tregtare, Kosovo*	OTTOMAN / TURKISH IMAGE IN KOSOVO: THE EXAMPLE OF HISTORY TEXTBOOKS

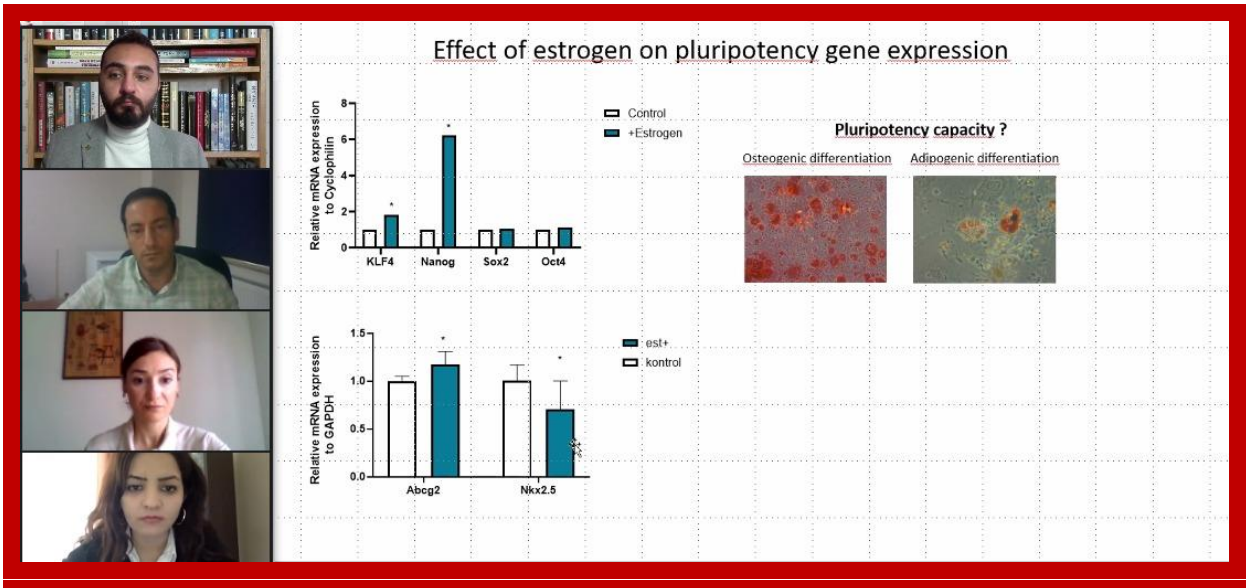
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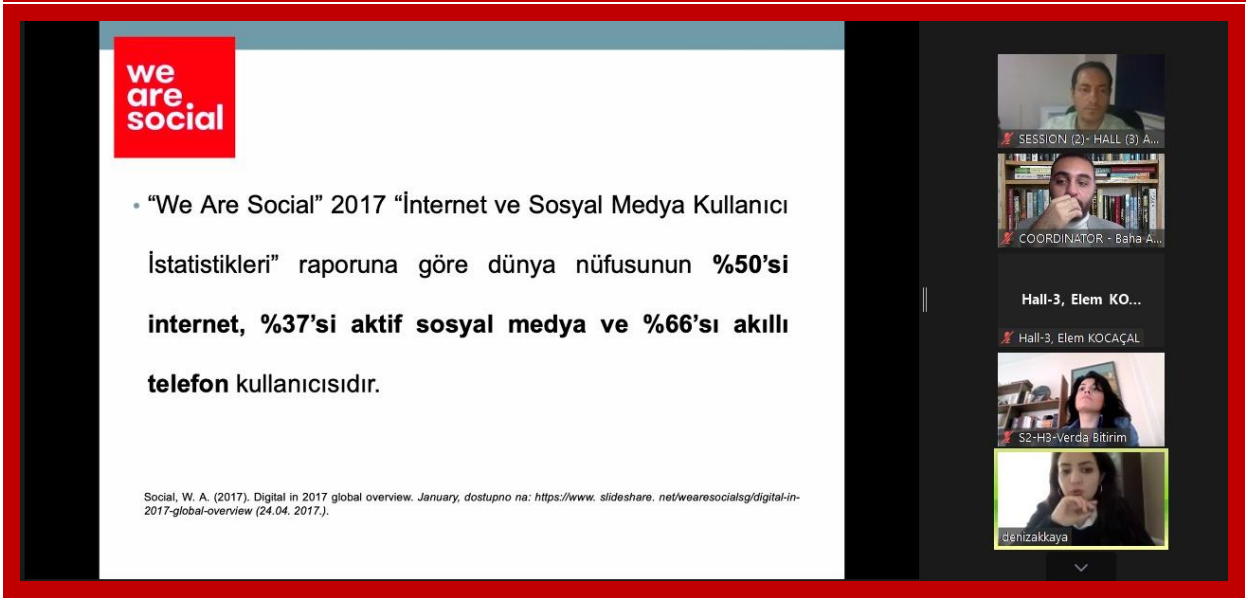




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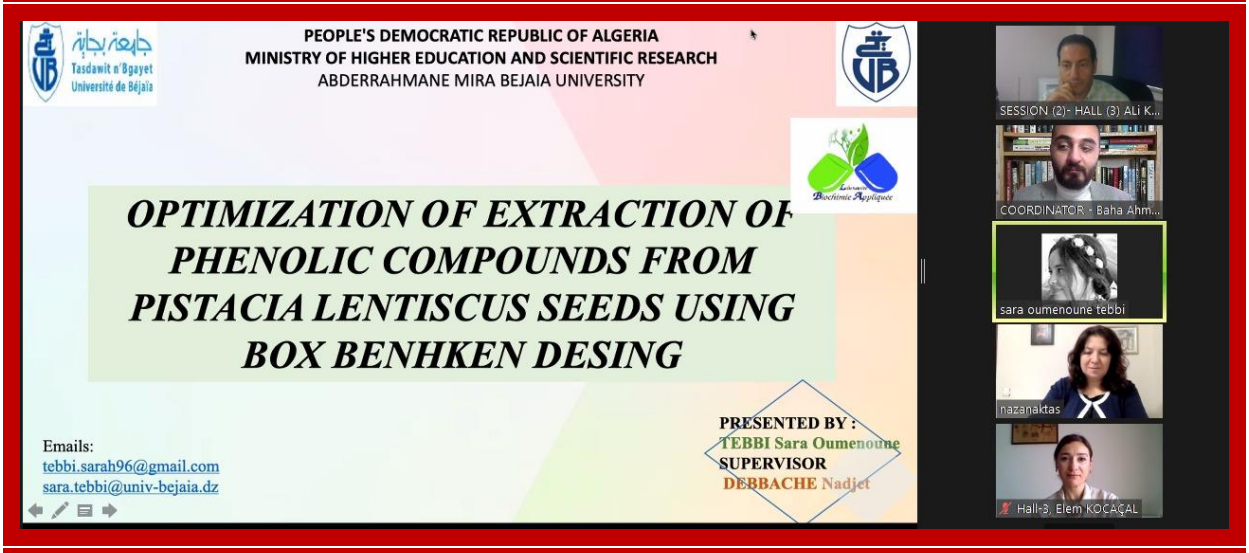






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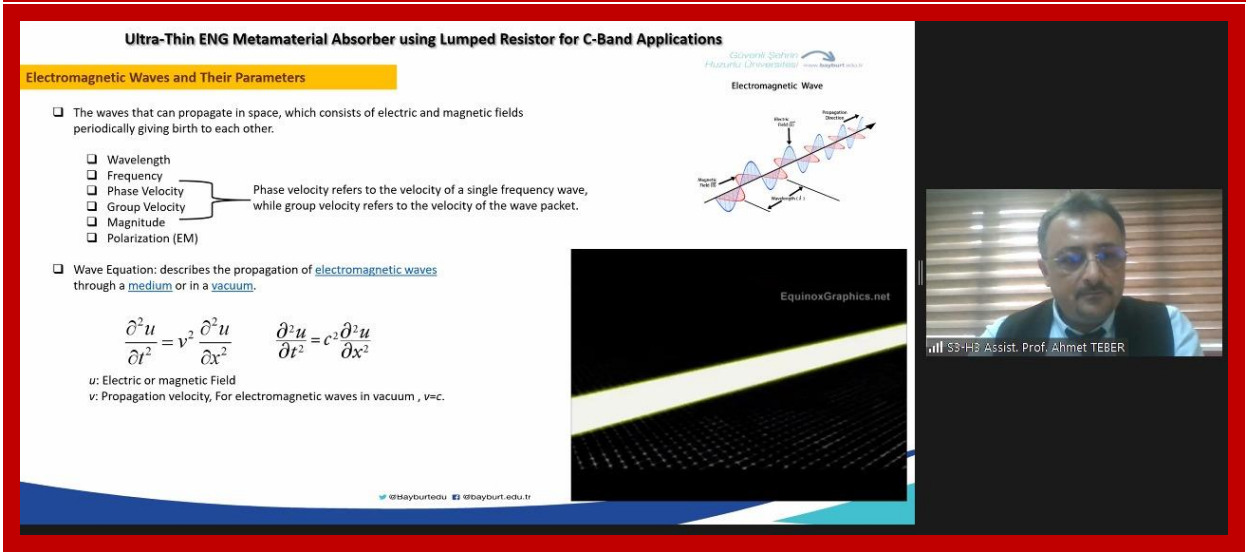






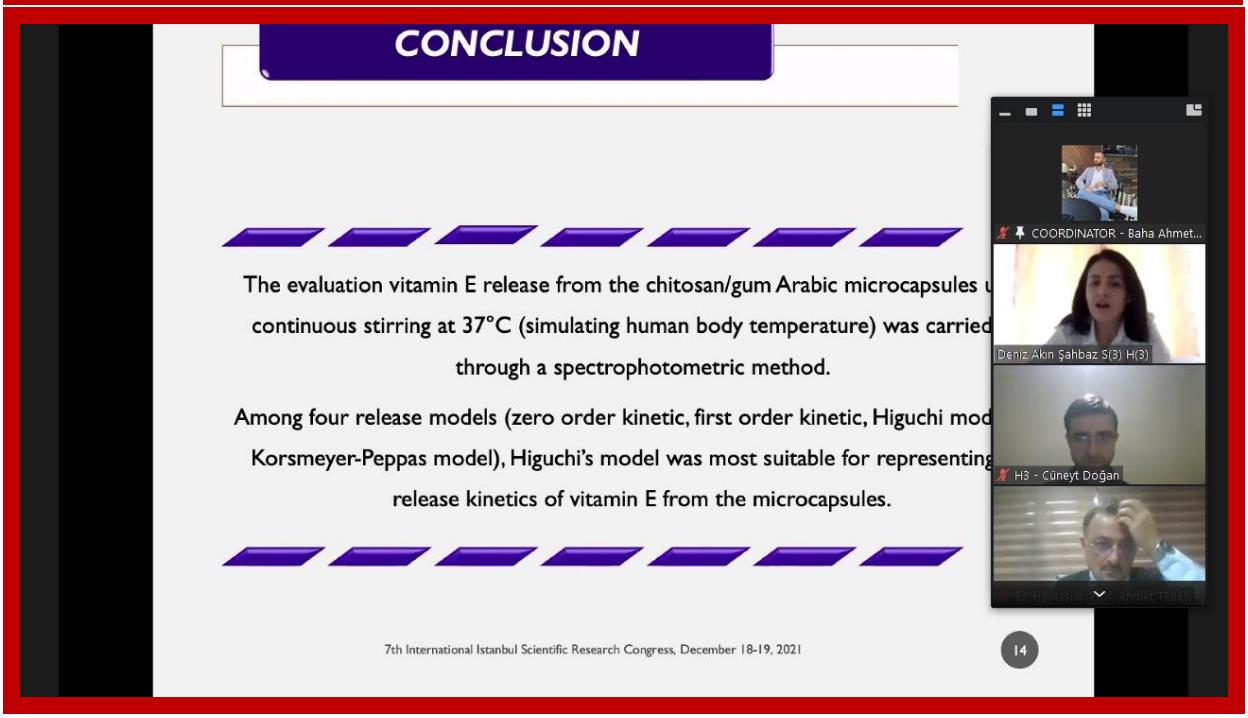
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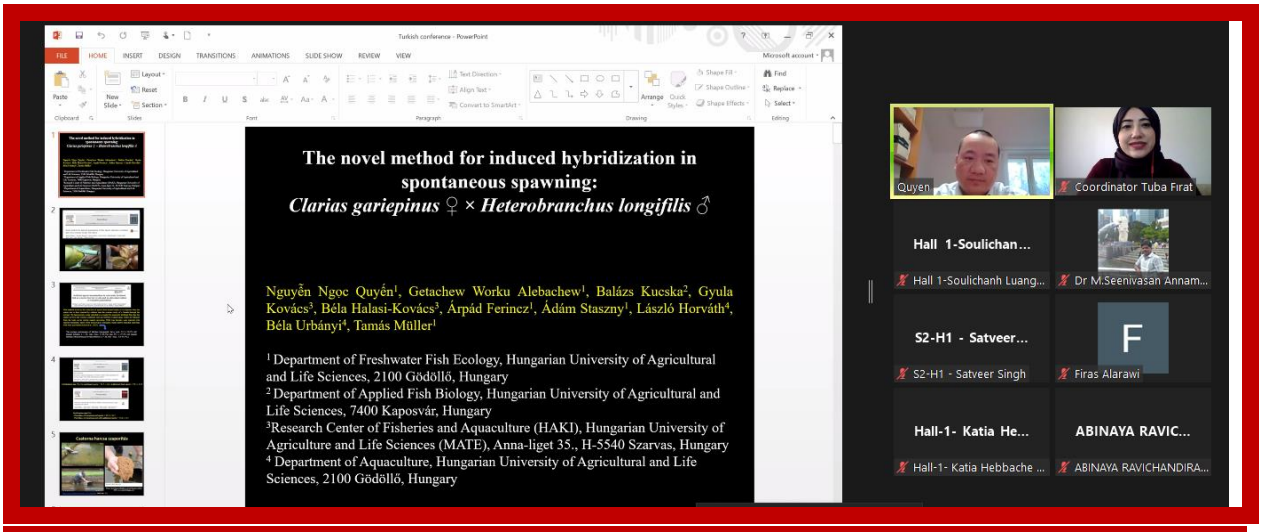


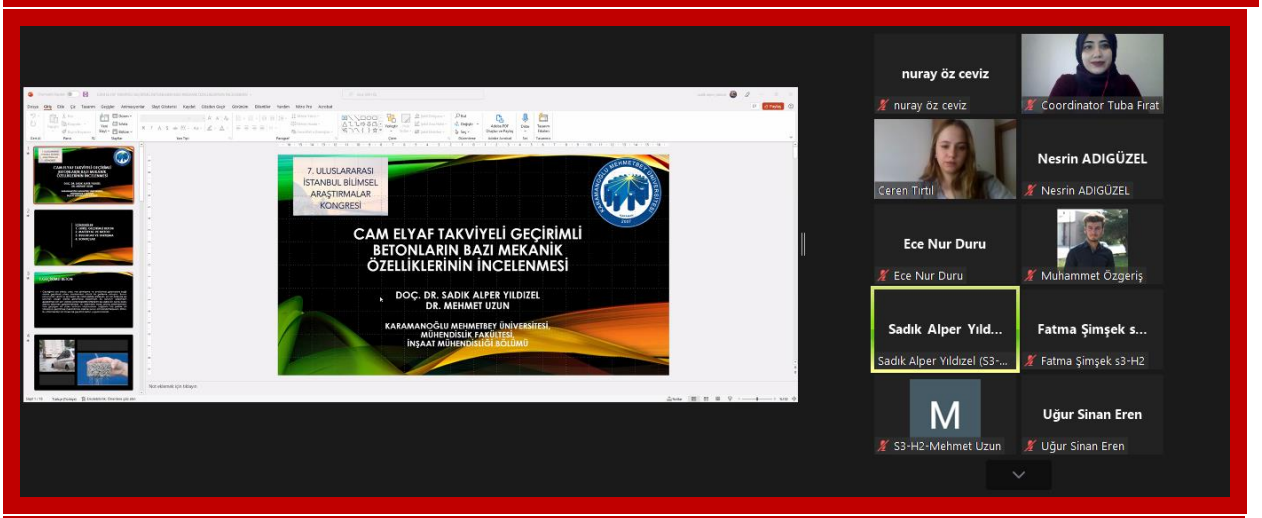
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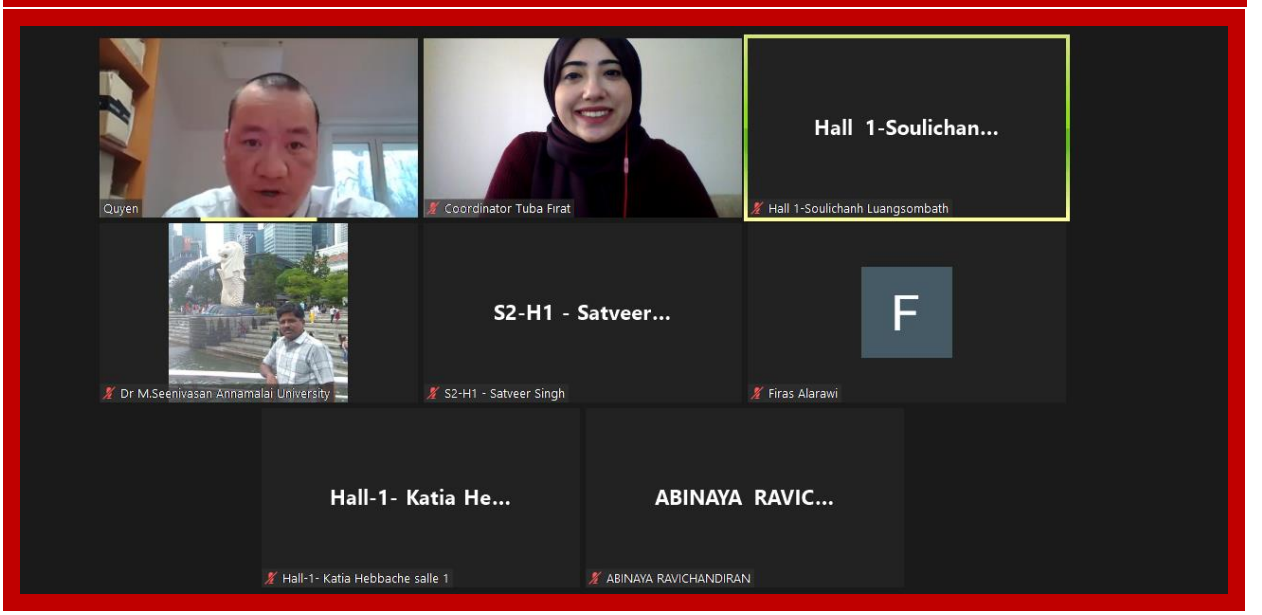




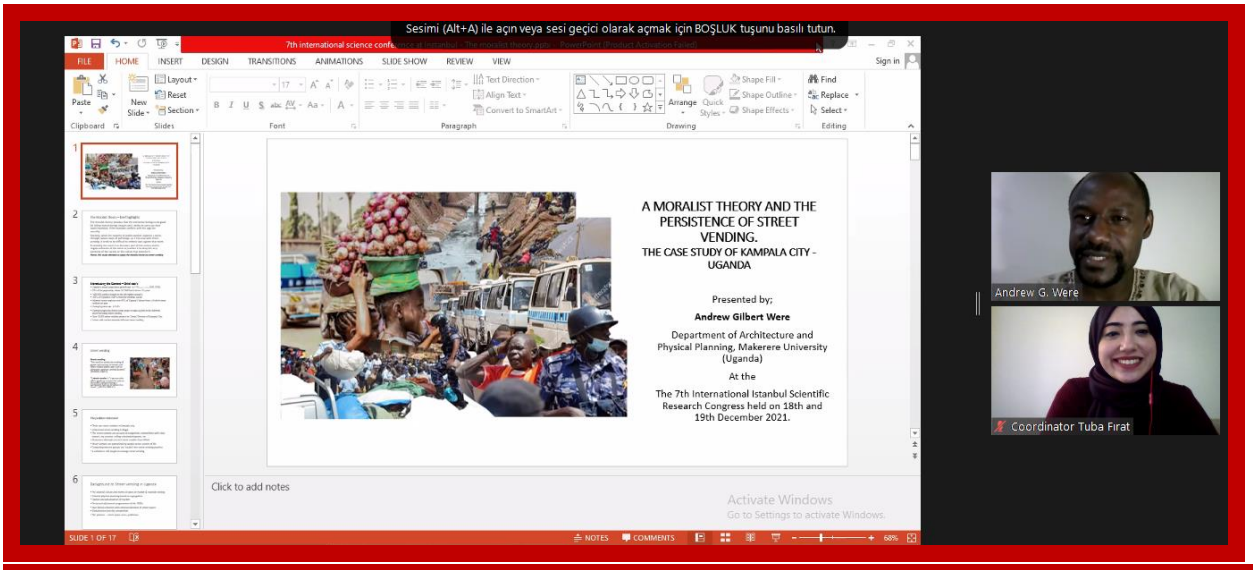
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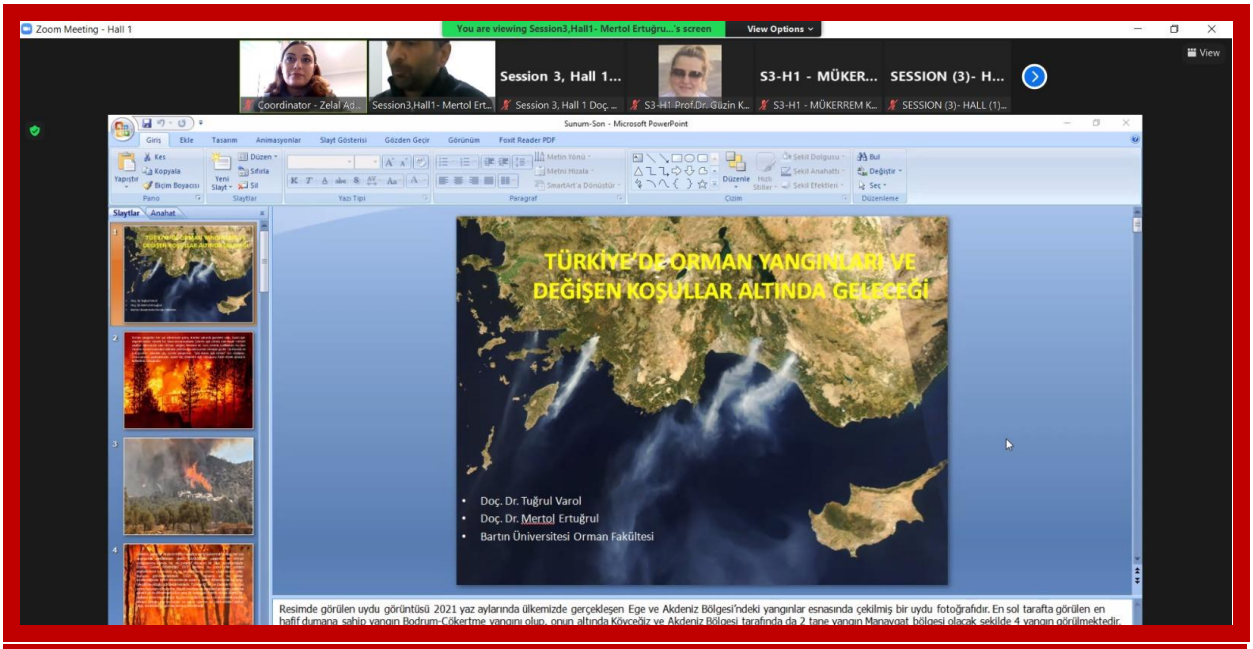
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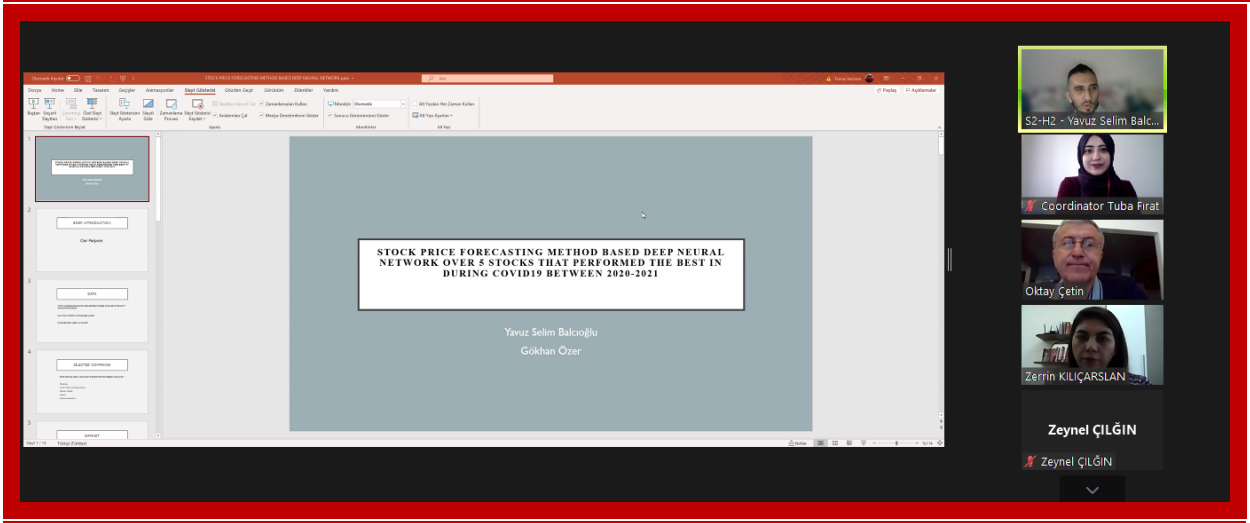






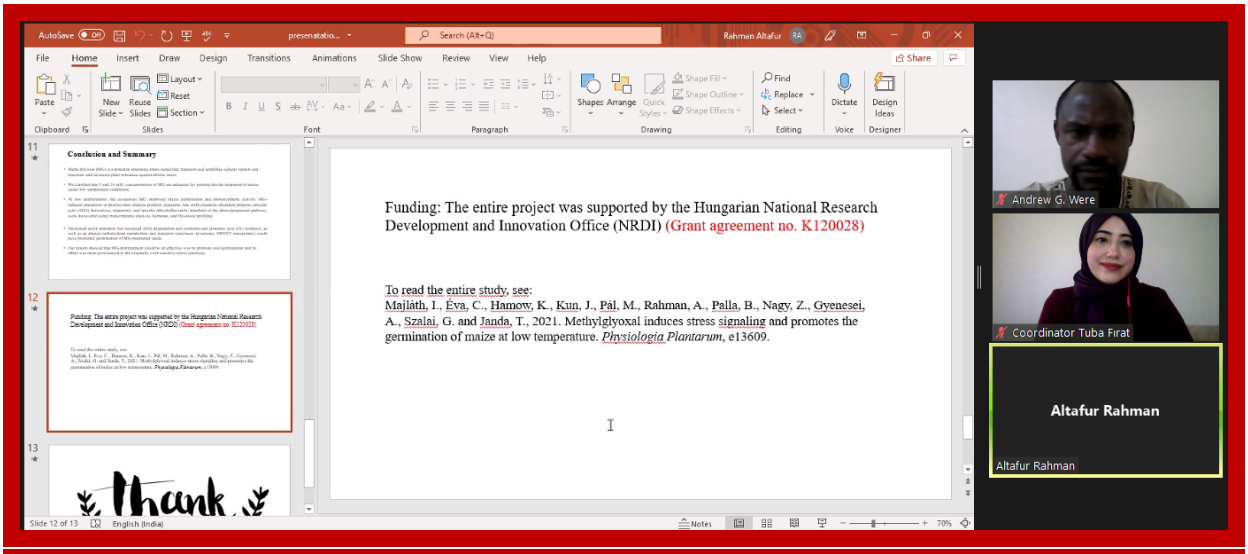
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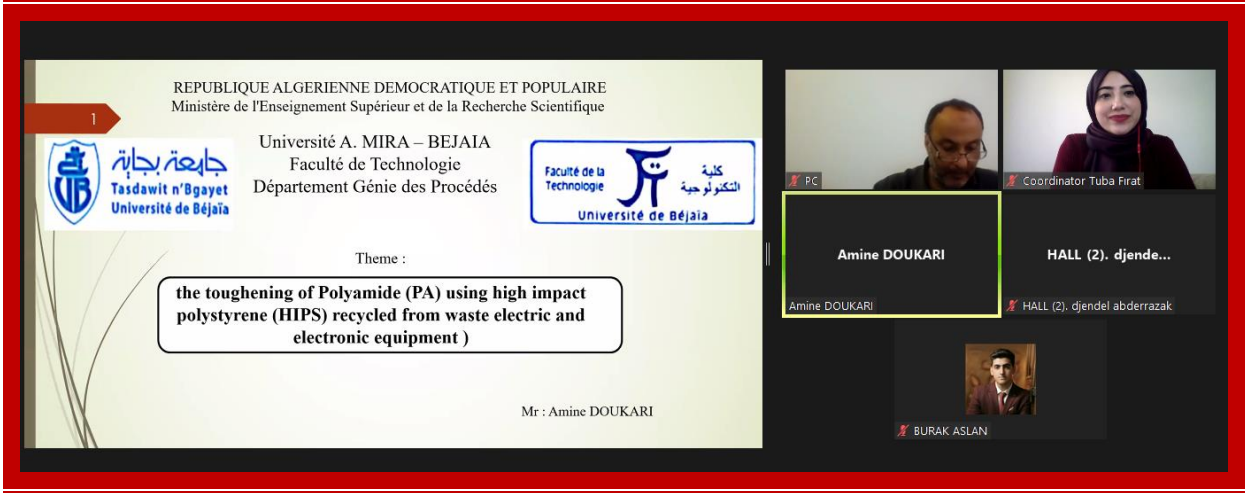


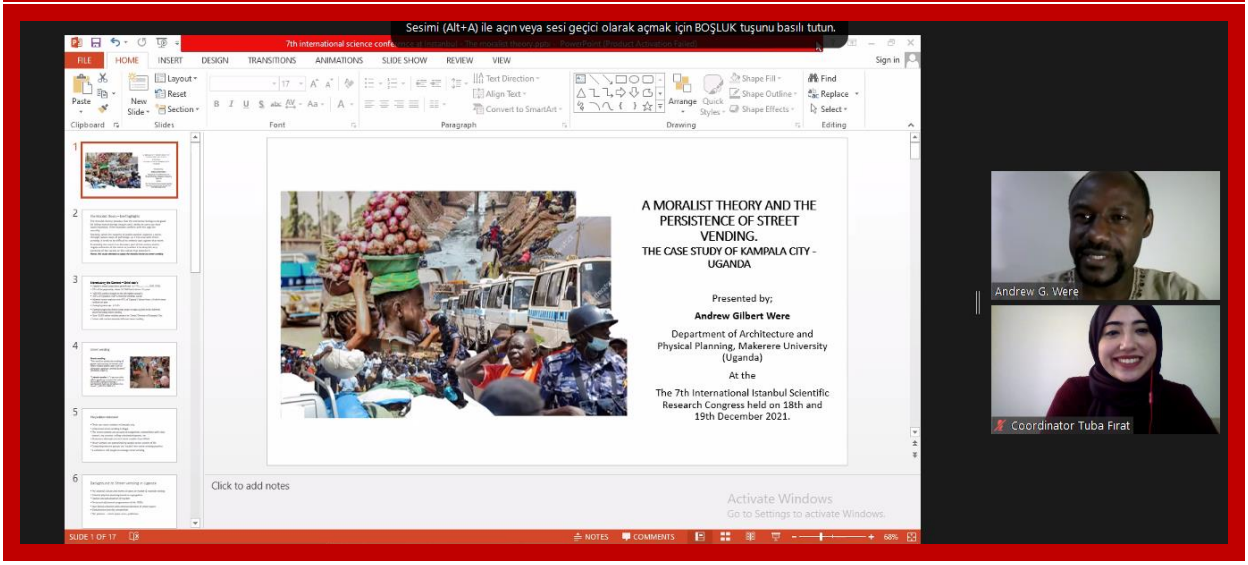




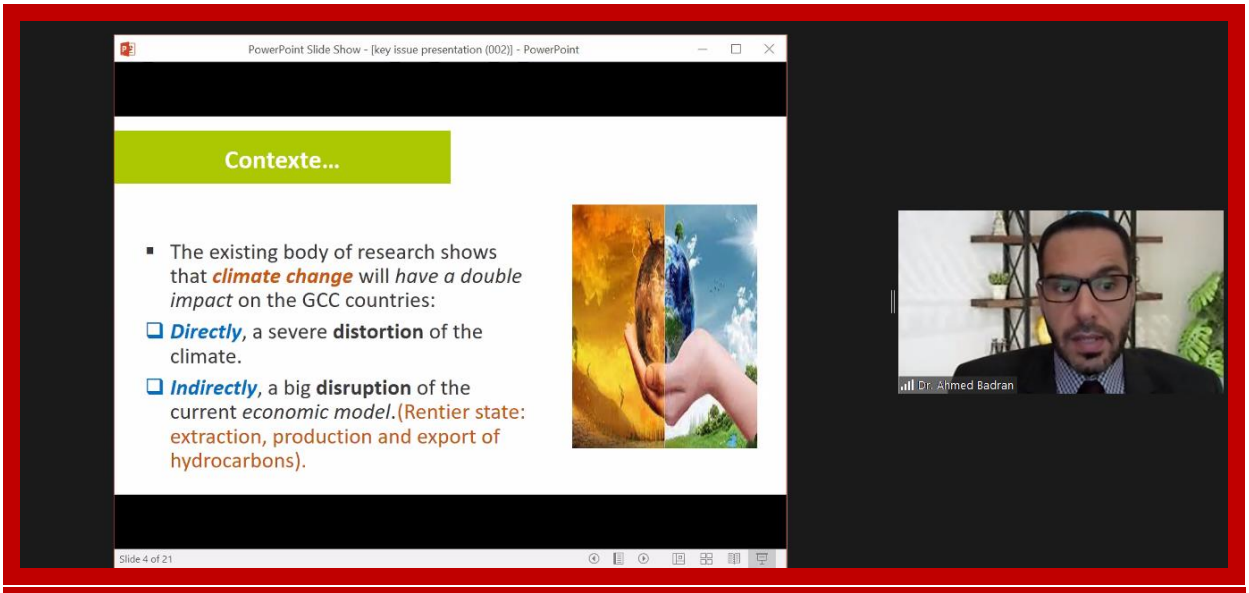
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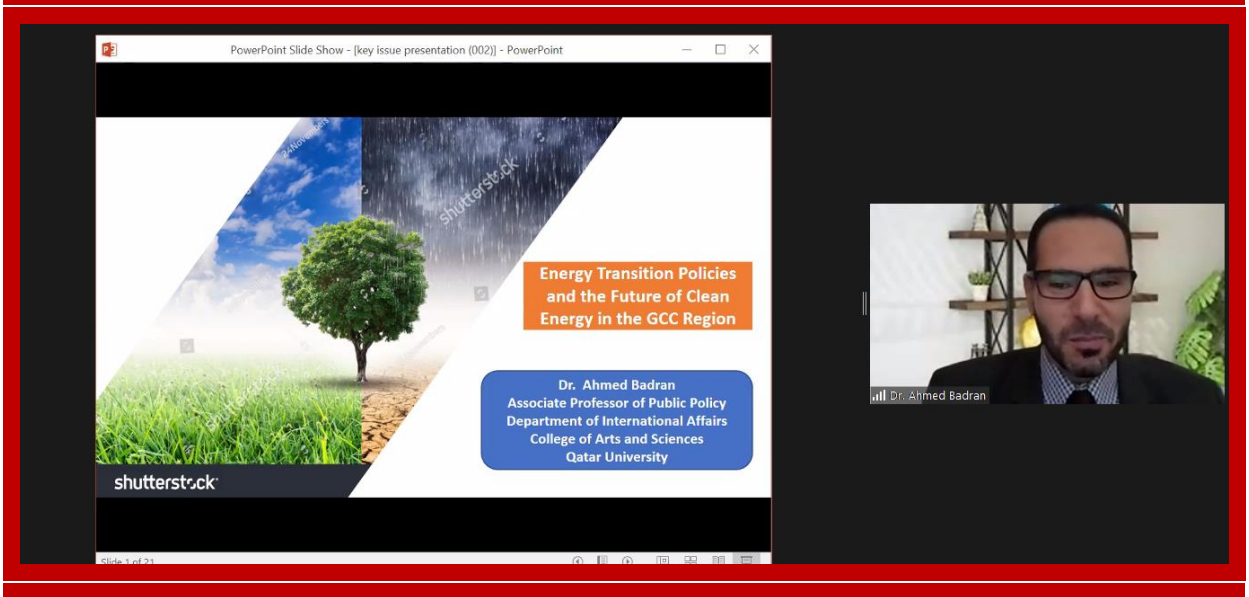


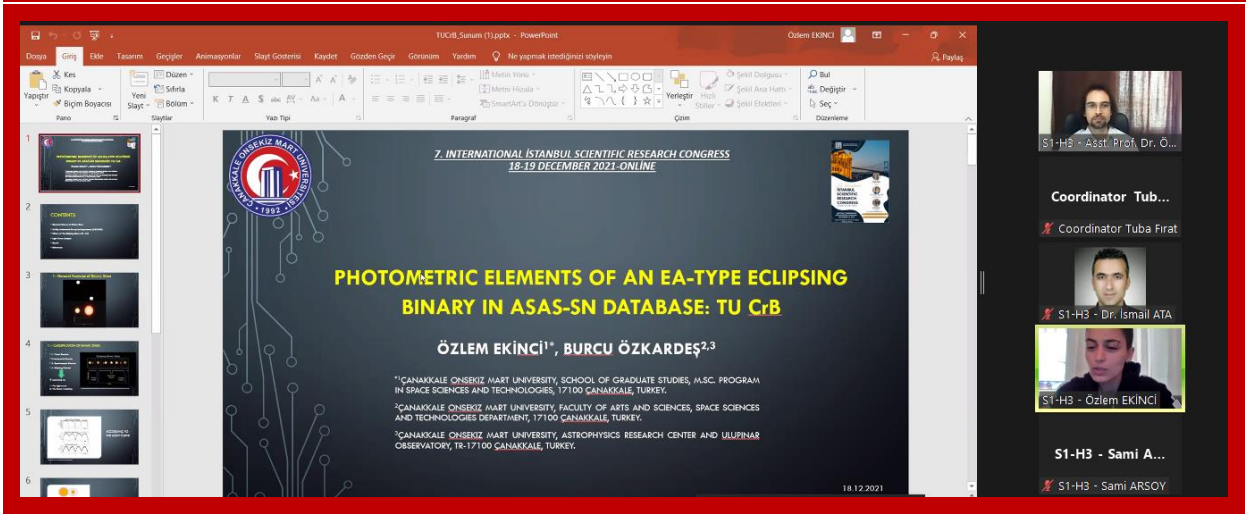




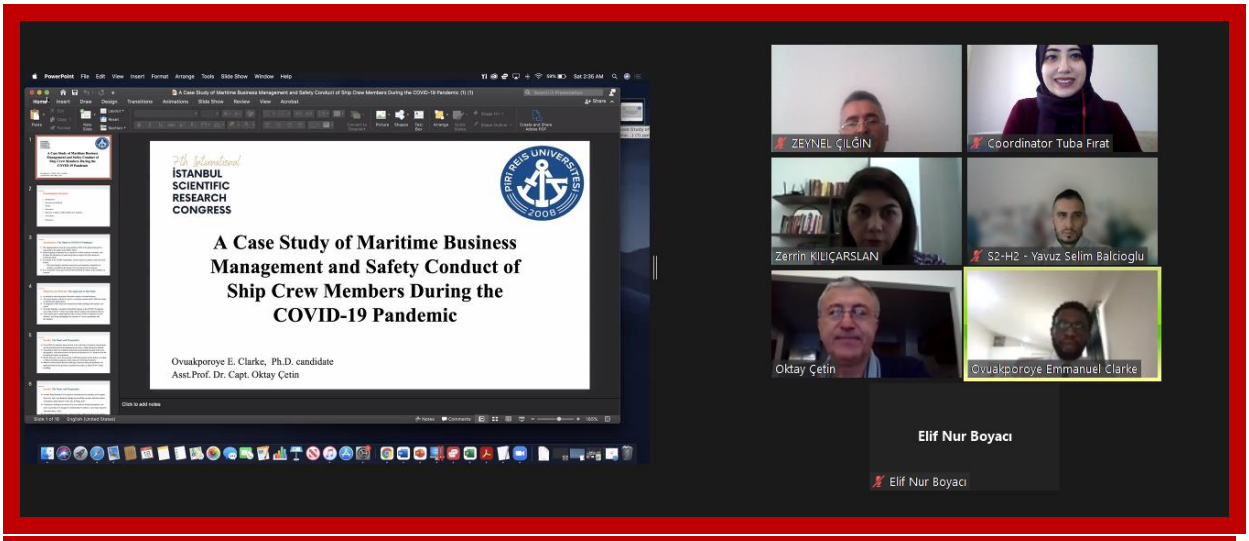
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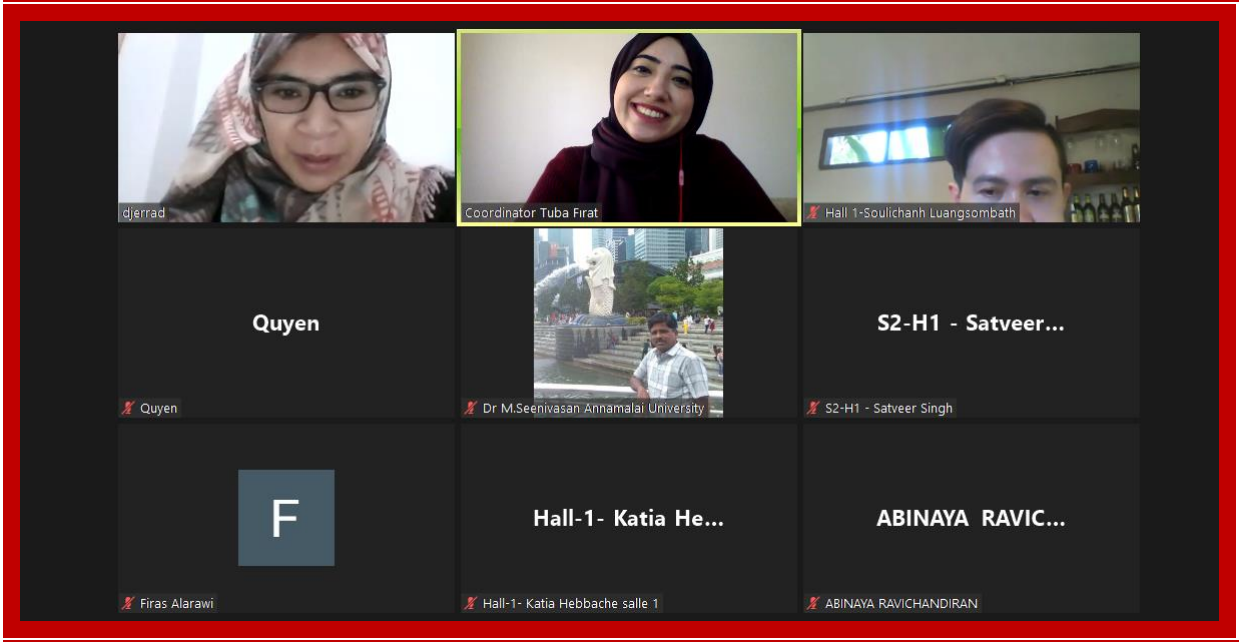






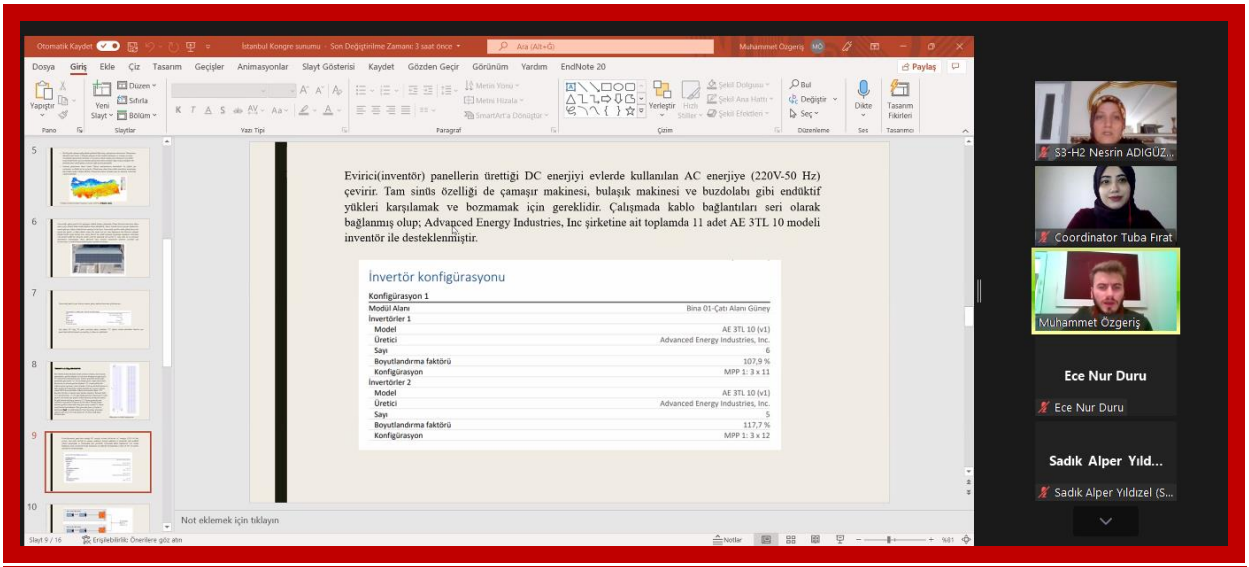
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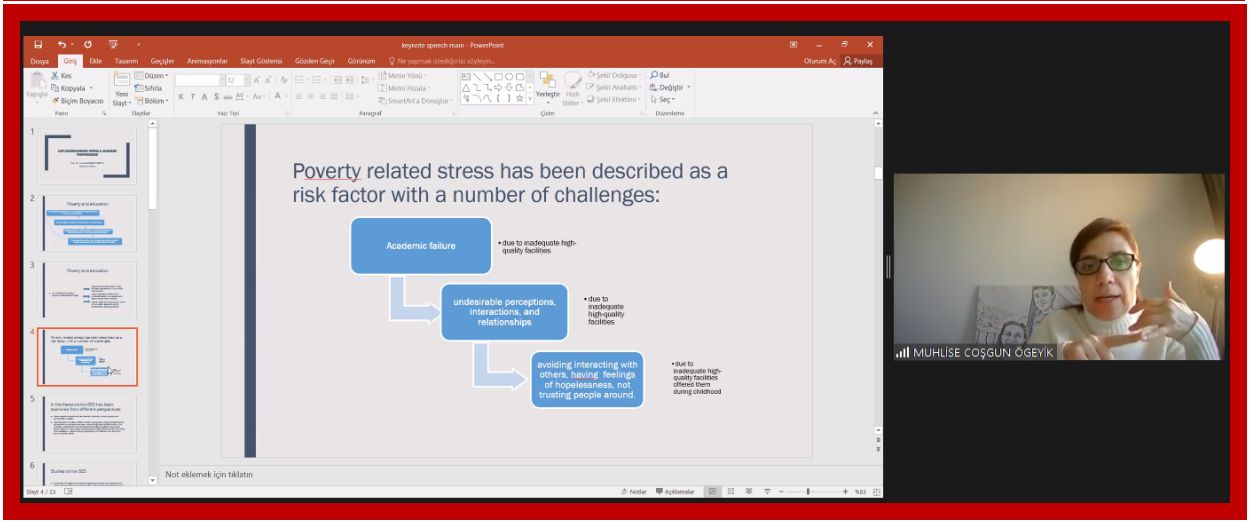




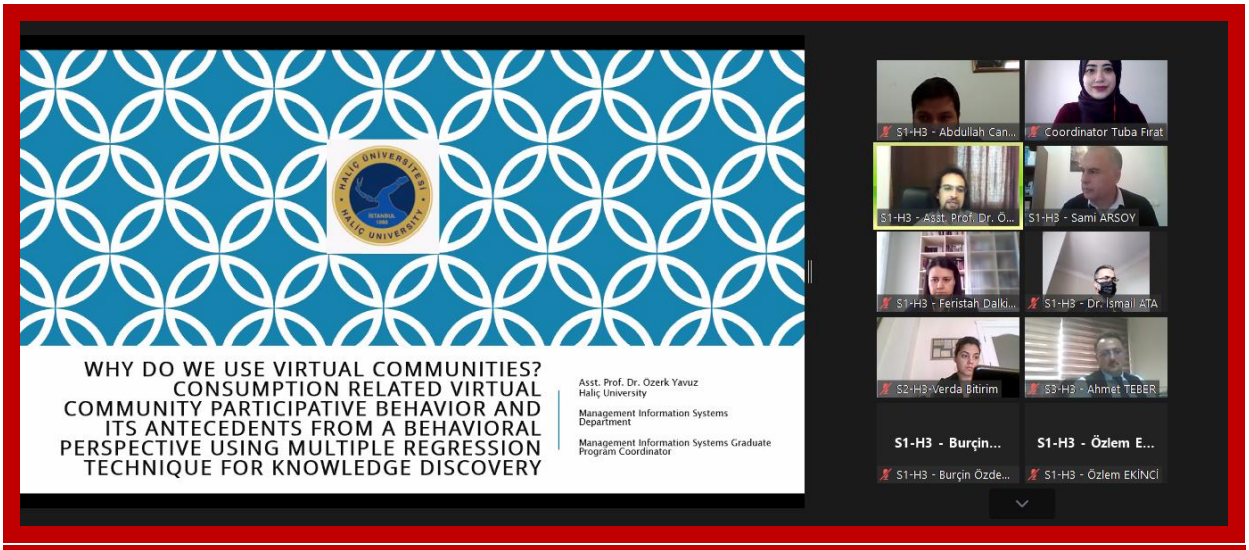


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IMPACT OF GLOBAL SARS-COV-2 PANDEMIC (COVID 19) ON PM10 CONCENTRATIONS FROM CITIES IN VARIOUS GEOGRAPHIC REGIONS OF TURKEY

Doğan Burak Saydam[*1,3], Cemre Polat[2], Mustafa Söyler[1]

*[*1]Department of Energy Systems Engineering, Osmaniye Korkut Ata University, Turkey*
[2]Duzici Vocational School, Department of Motor Vehicles and Transportation Technologies, Osmaniye Korkut Ata University, Turkey
[3]Osmaniye Korkut Ata University, Energy Education-Etude Application and Research Center, Osmaniye, Turkey

ORCID Code: 0000-0001-8453-2917, 0000-0003-4767-5825, 0000-0002-7001-1042

ABSTRACT

The coronavirus, which emerged at the end of 2019 and is considered a pandemic, is rapidly spreading and continuing to spread around the world and in Turkey. Since March 11, 2020, when the first case in Turkey was discovered, various requests have been made to curb the spread of the epidemic. These practices have been practiced in a variety of areas, including school closures, temporary suspension of social activities, temporary closure of many businesses, and restrictions on long-distance travel. These precautions to prevent the epidemic epidemic are known to affect many different areas. In this study, the amount of PM10 contaminants that could enter the lungs and cause inflammation or heart and lung disease was measured from the april month of the previous year to 23-26. It was evaluated in April when the curfew was introduced. In the study, cities from different regions of Turkey were selected and the effect of the measures taken in this way was examined throughout the country.

Keywords: Covid – 19 , Turkey, Pandemic, Gegraphical Regions, PM10

SARS-COV-2 (COVİD-19) KÜRESEL SALGININ TÜRKİYE'NİN FARKLI COĞRAFİ BÖLGELERİNDEN SEÇİLEN ŞEHİRLERİN PM10 KONSANTRASYONLARI ÜZERİNDEKİ ETKİSİ

Doğan Burak Saydam*[1,3], Cemre Polat[2], Mustafa Söyler[1]

*[*1]Enerji Sistemleri Mühendisliği Bölümü, Osmaniye Korkut Ata Üniversitesi, Türkiye*
[2]Düziçi Meslek Yüksekokulu, Motorlu Araçlar ve Ulaştırma Teknolojileri Bölümü, Osmaniye Korkut Ata Üniversitesi, Türkiye
[3]Osmaniye Korkut Ata Üniversitesi, Enerji Eğitim – Etüt Uygulama ve Araştırma Merkezi, Osmaniye, Türkiye

ORCID Code: 0000-0001-8453-2917, 0000-0003-4767-5825, 0000-0002-7001-1042

ÖZET

2019 yılının sonlarında açığa çıkan ve bir pandemi olarak değerlendirilen korona virüs Dünya'da ve Türkiye'de hızlı bir şekilde yayılmış ve yayılamaya da devam etmektedir. Türkiye'de ilk vakanın görüldüğü 11 Mart 2020 tarihinden bugüne kadar salgının yayılmasını kontrol altına alabilmek için farklı birçok uygulama yapılmıştır. Bu uygulamalar okulların kapatılması, sosyal faaliyetlere geçici süre ile ara verilmesi, birçok işletmenin geçici bir süre ile kapatılması, şehirlerarası ulaşımın kısıtlanması gibi birçok farklı alanda hayata geçirilmiştir. Salgının yayılmasını engellemek için alınan bu önleyici tedbirlerin farklı birçok alana etkisinin olacağı bilinmektedir. Bu çalışmada, akciğerlere ulaşarak iltihaplanmaya ya da kalp ve akciğer hastalıklarına neden olabilen PM10 kirletici madde

miktarının, sokağa çıkma yasağı uygulamasının yapıldığı 23-26 Nisan tarihlerinde bir önceki yılın referans ayına göre değerlendirilmesi yapılmıştır. Çalışmada farklı bölgelerden şehirler seçilmiş ve bu sayede alınan önlemlerin ülke çapındaki etkisi incelenmiştir.

Anahtar Kelimeler: Kovid-19, Türkiye, Pandemi, Coğrafi Bölgeler, PM10

GİRİŞ

2019 yılının aralık ayı sonunda Çin Halk Cumhuriyeti'nin Hubei Eyaleti olan Wuhan 'da ortaya çıkan ve solunum yollarına etki eden yeni tür bir virüs vakası ortaya çıktı. Dünya Sağlık Örgütü (WHO) bu virüsü 'COVID-19' olarak adlandırdı. Daha sonrasında bu virüsün, doğada yaygın olan büyük bir virüs ailesi olan β-korona virüs ailesine ait olduğu bildirildi. Şiddetli akut solunum sendromu ve Orta Doğu solunum sendromu korona virüsleri (sırasıyla SARS-CoV ve MERS-CoV) ile karşılaştırıldığında, SARS-CoV-2'nin yüksek bulaşıcılık ve enfektiviteye yol açtığı açığa çıkarılmıştır (L. Wang et al., 2020). Dünyada virüslerin neden olduğu pek çok salgın görülmüş ve bu salgınlar insanlığı ve yaşamı birçok yönde olumsuz olarak etkilemiştir. 1918-1919'da İspanyol gribi, 1957-1958'de Asya gribi, 1968-1969'da Hong Kong gribi, 2009'da Meksika ve Amerika Birleşik Devletleri'nde ortaya çıkan Domuz gribi, 2002-2003'te Çin'de ortaya çıkan SARS-CoV virüsü, 2012-2013'te Suudi Arabistan'da ortaya çıkan MERS-CoV virüslerinden dolayı oluşan salgınlardan insanlık büyük oranda etkilenmiştir. Bu virüslerin, klinik özellikleri ve tedavisinde çeşitli benzerlikler ve farklılıklar görülmüştür (Al Hajjar & McIntosh, 2010; Rodriguez-Morales et al., 2020).

Türkiye'de korona virüs kaynaklı ilk vakanın 11 Mart 2020 tarihinde görüldüğü ve 25.05.2020 tarihine kadar 157.814 vaka ve 4.369 ölüme sebep olduğu bilinmektedir (T.C. Sağlık Bakanlığı, 2020). Korona virüsün yayılımını azaltmak ve salgını kontrol altında tutabilmek için Türkiye ilk vakanın görülmesi ile 16 Mart 2020 tarihinden itibaren ilkokul, ortaokul, lise ve üniversitelerde eğitime ara verilmiş ve 23 Marttan itibaren ilkokul, ortaokul, liselerde uzaktan eğitime geçilmiştir. Birçok üniversitede ise bu süreç içerisinde uzaktan eğitim uygulamaları başlatılmıştır. 16 Mart'ta alınan tedbirler ile sosyal faaliyetlere (kafe, sinema salonları, spor salonları ve eğlence mekanları) geçici süre ile ara verilmiştir. 19 Mart'ta ise futbol, basketbol, voleybol gibi spor faaliyetlerinin ve camilerde toplu namaz kılınmasının geçici bir süre ile durdurulma kararı alınmıştır. 27 Mart'ta Türkiye yurt dışı uçuşları tamamen kaldırmıştır. Şehirlerarası ulaşımın belirli izinler çerçevesince yapılabileceği açıklanmış ve 28 Mart'ta uygulamaya geçilmiştir. 21 Mart'ta alınan 65 yaş üzeri ve kronik rahatsızlığı olan vatandaşların sokağa çıkışlarının yasaklanmasının yanında, 3 Nisan'da da 1 Ocak 2000 üzeri doğumlu genç vatandaşların da sokağa çıkışları engellenmiştir. 11-12 Nisan'da da alınan önlemler çerçevesinde 30 büyük şehre ilaveten Zonguldak (büyük şehir olmamasına rağmen bölgede maden ocaklarının fazla olması ve bölge halkında kronik solunum problemi olması nedeni ile) dâhil toplam 31 şehirde sokağa çıkma yasağı ilan edilmiş ve bu yasağın her hafta sonu uygulanacağı açıklanmıştır. Ek olarak şehirlerarası toplu taşımaya getirilen kısıtlamanın da 15 gün süre ile uzatıldığı açıklanmıştır. Akabinde 23 Nisan Ulusal Egemenlik ve Çocuk Bayramı'nda resmî tatil olması ile 23-26 Nisan tarihlerinde de sokağa çıkma kısıtlaması getirilmiştir. Bu çerçevede Türkiye'nin farklı bölgelerinden seçilen illerdeki PM10 kirletici madde miktarı en uzun sokağa çıkma yasağı uygulamasının yapıldığı 23-26 Nisan tarihlerinde bir önceki yılın referans ayına göre değerlendirilmiştir. Literatürde salgın kaynaklı emisyon değerlerindeki değişimler (Bao & Zhang, 2020; Bontempi, 2020; Chauhan & Singh, 2020; He et al., 2020; Ma et al., 2020; Sharma et al., 2020; Y. Wang et al., 2020) tarafından yapılan çalışmalarda yer almıştır. He vd. Covid-19 süresince salgının yayılımını azaltmak için alınan önlemler sonucu şehirlerdeki tecrit uygulamalarının hava kirliliğine etkisini Çin özelinde incelemişlerdir (He et al., 2020). Bao ve Zhang, salgın sürecindeki kısıtlamalar sonucunda insan hareketliliğindeki düşüş ile üretim ve tüketim faaliyetlerindeki azalmanın hava kalitesi üzerindeki etkisini Çin özelinde incelemişlerdir (Bao & Zhang, 2020). Sharma vd. salgın süresince uygulanan kısıtlamaların, Hindistan'ın farklı bölgelerinden seçilen şehirlerdeki emisyon değerlerine etkisini farklı hava kirleticileri çerçevesinde incelemişlerdir (Sharma et al., 2020). Ma vd., korona virüs salgını kaynaklı ölümleri ve hava parametreleri arasındaki ilişkiyi Çin'in Wuhan şehri özelinde incelemişlerdir (Ma et

al., 2020). Bontempi, korona virüsünün havada bulunan partikül madde (PM) ile yayılma olasılığını Lombardiya (İtalya) özelinde incelemiştir (Bontempi, 2020). Chauhan ve Singh, trafik yoğunluğunun azalması, farklı bir çok işletmenin kapanması ve bunun sonucunda partikül madde (PM) konsantrasyonlarındaki azalmayı dünyadaki farklı şehirler özelinde incelemişlerdir (Chauhan & Singh, 2020). Wang vd., korona virüsün kontrol altına alınması için yapılan kısıtlama çalışmalarının, Çin'de trafik ve endüstriyel emisyonlar bakımından incelemesini yapmışlardır (Y. Wang et al., 2020).

Literatür taramasında da görüldüğü gibi, literatürde Türkiye merkezli bir çalışmaya rastlanmamıştır. Bu yönüyle bu çalışma yapılacak olan bilimsel çalışmalara özgün bir değer katmayı hedeflemektedir.

TÜRKİYE'NİN EMİSYON DEĞERLERİNİN İNCELENMESİ

Türkiye, 2009 yılından sonra yenilenebilir enerji kaynaklarından enerji üretimi konusunda ciddi bir ilerleme kaydetmiş olsa da, yenilenebilir enerjinin elektrik üretimindeki payı yenilenemez enerjiye kıyasla çok daha azdır. Hidroelektrik enerji, Türkiye'nin yenilenebilir enerji portföyünün en büyük payını oluşturmaktadır. Coğrafi konumu nedeniyle, Türkiye yenilenebilir enerjiden elektrik üretimi (güneş, rüzgâr) konusunda büyük bir avantaja sahiptir (Sharif et al., 2020). Türkiye'de nüfus artışı ve sanayileşmenin etkisi ile enerji gereksinimi de her geçen gün artmaya devam etmektedir. Enerji talebindeki bu artış ise fosil yakıt (petrol, doğalgaz, kömür, fuel-oil vb.) kullanımını teşvik etmekte ve bu da CO_2 ve diğer sera gazı emisyonlarının artmasına neden olmaktadır (Ozalp et al., 2019).

Küresel ısınma ve iklim değişikliği son yıllarda en önemli çevre sorunlarından biri olmuştur. Sera etkisinin en büyük etkeni %60'dan fazla oranı ile CO_2 (karbondioksit)'tir (Ozturk & Acaravci, 2010). Genellikle ekonomik kalkınma ile artışını sürdüren karbondioksit emisyonları çevre kirliliğinde en büyük fenomenlerden birisidir. Fosil yakıt tüketimi, ulaşım sektörü, orman alanlarındaki kayıplar vb. birçok faktör karbondioksit ve diğer kirleticilerin atmosferdeki yerini arttırmaktadır. Özellikle ulaşım sektörünün enerji tüketimi toplam küresel enerji kullanımının %20'sini oluşturmuştur ve toplam sera gazı emisyonlarının yaklaşık %27'sinden sorumludur (Dalkic et al., 2017; Uzar & Eyuboglu, 2019). Çevre emisyonlarının bilinen birçok biyolojik ve çevresel etkileri vardır. Bunlar erken ölüm, çeşitli sağlık sorunları (akciğer problemleri vb.), asit yağmurları ve iklim değişiklikleridir. Kirleticiler bir bütün olarak değerlendirilmeli ve incelenmelidir. Özellikle ince partikül maddelere maruz kalmanın Avrupa'da yılda yaklaşık 100.000 erken ölüme yol açtığı bilinmektedir (Deniz & Durmuşoğlu, 2008). Bu doğrultuda ince partikül maddeler içerisinde yer alan PM25 ve PM10 insan ve çevre sağlığı açısından bir risk oluşturmaktadır. PM10 için Dünya Sağlık Örgütünün (WHO) belirlediği maruziyet limit değeri 24 saat için 50 $\mu g/m^3$ olurken yıllık limit değeri ise 20 $\mu g/m^3$ olarak belirlenmiştir ve bu değerlerin aşılmaması önerilmiştir (World Health Organisaton, 2005). Bu çalışmada ise insan sağlığına ve çevreye olumsuz etkileri olan PM10 kirleticisinin seçilen farklı şehirler çerçevesince 2019 ve 2020 yılı Nisan ayındaki değişimi incelenmiştir.

COVİD-19 SALGININ TÜRKİYENİN FARKLI COĞRAFİ BÖLGELERİNİN PM10 KONSANTRASYONLARINA ETKİSİ

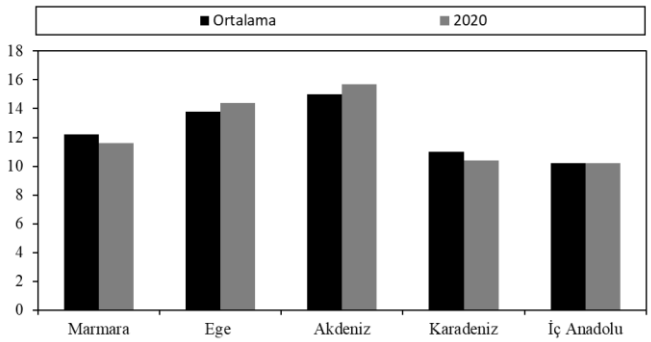
Salgın sürecinde sokağa çıkma kısıtlamalarının Nisan ayı içerisinde uygulanmaya başlanması ve en uzun sokağa çıkma kısıtlamasının 23-26 Nisan tarihlerinde yapıldığı göz önüne alınarak; Nisan ayındaki hava kalitesindeki değişimin (PM10) Türkiye'nin farklı bölgelerinden seçilen illere olan etkisi incelemiştir. Burada Türkiye'nin Ege Bölgesinden Manisa, Karadeniz Bölgesinden Trabzon, Akdeniz Bölgesinden Antalya ve Osmaniye, İç Anadolu Bölgesinden Ankara (Bahçelievler) ve Marmara Bölgesinden İstanbul (Kadıköy) özelinde bir inceleme yapılmıştır. Çalışma da Osmaniye dışındaki seçilen illerin hepsinde sokağa çıkma yasağının uygulanması ve farklı özelliklere sahip şehirler olmaları ile öne çıkmaktadırlar. Antalya Akdeniz bölgesinde turizm kenti, Ankara başkent, Manisa Soma termik santrallerini bünyesinde barındıran ve Trabzon da Karadeniz bölgesinde yüksek nüfuslu bir şehir olmasından dolayı seçilmiştir. 2019 ve 2020 yılları için referans olarak seçilen Nisan

ayında en uzun sokağa çıkma kısıtlaması dönemi (23-26 Nisan) göz önüne alınmıştır. Şekil 1'de Google Earth'dan alınarak oluşturulan ve Türkiye haritası üzerinden seçilen illerin konumları yer almaktadır. Şekil 2'de ise bölgelerin Nisan ayı 2020 ve uzun yıllar sıcaklık ortalamalarını içeren grafik yer almaktadır. Marmara bölgesinin Nisan ayı uzun yıllar ortalama sıcaklığı 12.2°C iken, 2020 Nisan ayı 11.6°C olarak gerçekleşmiştir. Ege bölgesinin Nisan ayı uzun yıllar ortalama sıcaklığı 13.8°C iken, 2020 Nisan ayı 14.4°C olarak gerçekleşmiştir. Akdeniz bölgesinin Nisan ayı uzun yıllar ortalama sıcaklığı 15.0°C iken, 2020 Nisan ayı 15.7°C olarak gerçekleşmiştir. İç Anadolu Bölgesinin Nisan ayı uzun yıllar ortalama sıcaklığı 10.2°C iken, 2020 Nisan ayı 10.2°C olarak gerçekleşmiştir. Karadeniz bölgesinin Nisan ayı uzun yıllar ortalama sıcaklığı 11.0°C iken, 2020 Nisan ayı 10.4°C olarak gerçekleşmiştir (T.C. Tarım ve Orman Bakanlığı Meteoroloji Genel Müdürlüğü, 2020) Şekilden de görüldüğü gibi 2020 yılı Nisan ayında, geçmiş yıllar ortalama nisan ayı sıcaklığına göre fazla bir değişim olmadığı görülmektedir. Bu da Nisan ayındaki ısıtma ve soğutma ihtiyacının bir önceki yılla paralellik gösterebileceğini ve ısıtma/soğutma ihtiyacı kaynaklı PM10 miktarının yine 2019 yılı ile birbirine yakın değerler göstereceğini ifade etmektedir. Alınan önlemler ile birçok farklı hizmet alanında çalışan işletmelerin kapatılması ve sokağa çıkma yasakları sonucunda 2020 yılında PM10 miktarında bir azalmanın meydana geleceği düşünülmektedir.

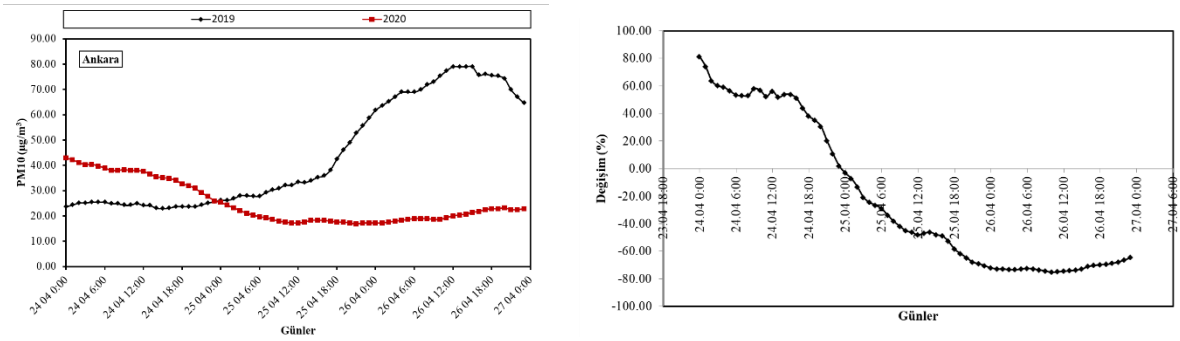
Şekil 3-8 arasında Çevre ve Şehircilik Bakanlığına ait hava kalitesi izleme ağından alınan verilerin işlenmesi ile oluşturulan görseller yer almaktadır (T.C. Çevre ve Şehircilik Bakanlığı, 2020). Şekiller incelendiğinde 2019 yılının Nisan ayının 24. ve 25. günlerinde yüksek olan PM10 yoğunluğunun 2020 yılının Nisan ayının 24. ve 25. günlerinde özellikle sokağa çıkma kısıtlaması getirilen illerde daha düşük seviyelerde seyrettiği görülmektedir. Bunun en büyük etkisi 2020 Nisan ayının 23-26 arasındaki günlerinde sokağa çıkma kısıtlaması uygulamasıdır. Bu uygulama PM10 yoğunluğunun neredeyse bir önceki yılın (2019) değerlerine kıyasla 2020 yılı Nisan ayında referans illerde yaklaşık yarı yarıya azaldığı görülmüştür. Özelikle İstanbul ve Manisa illerinde bir önceki yıla göre PM10 değerinde dört günlük süreçte % 40-70 arasında bir azalma meydana gelmiştir. Şekil 8'de Osmaniye ilinde ise sokağa çıkma kısıtlamasının olmamasına rağmen 25 Nisan'dan sonra PM10 yoğunluğunda bir azalma meydana geldiği görülmüştür.



Şekil 1. Seçilen illerin Türkiye haritası üzerindeki konumları

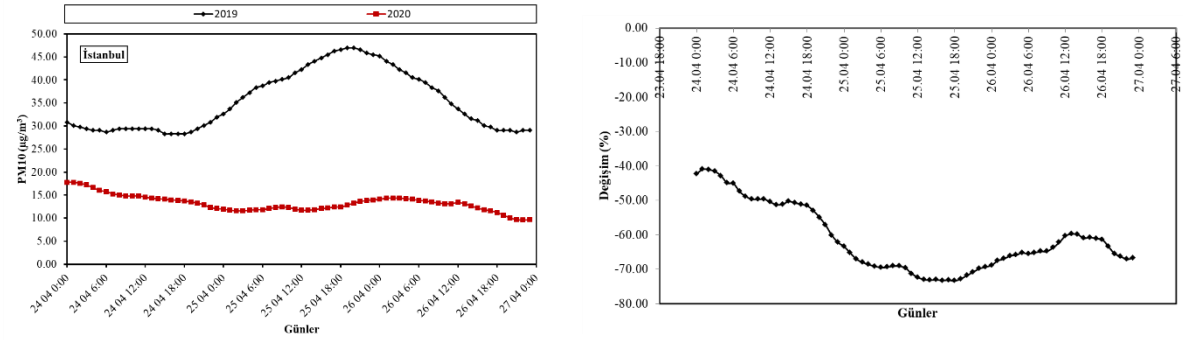


Şekil 2. Bölgelerin Nisan ayı için uzun yıllar ve 2020 yılı için ortalama sıcaklık değerleri



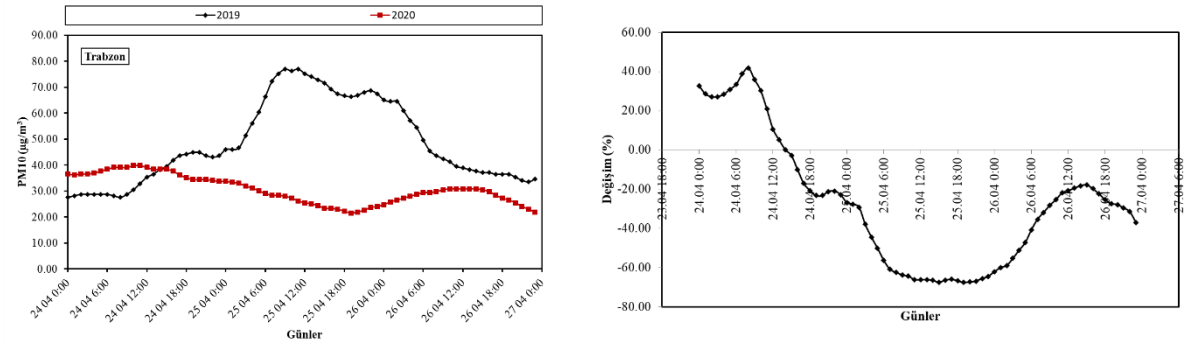
(1) (2)

Şekil 3. Ankara ili için 1) PM10 miktarı ve 2) 2019-2020 yılı % değişim



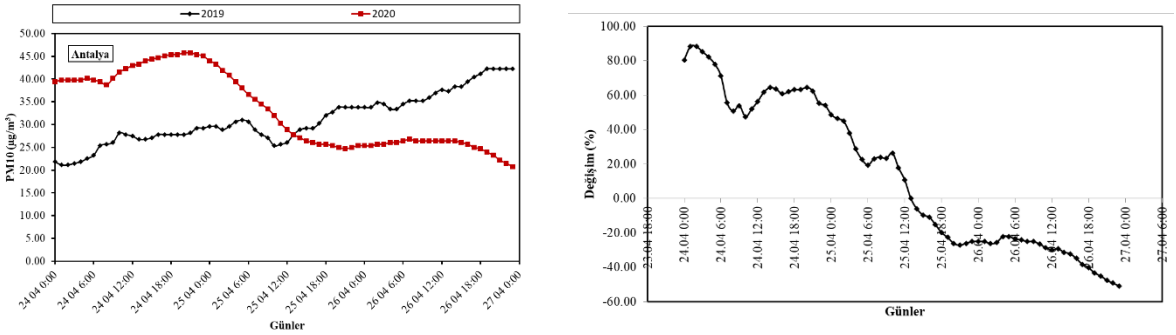
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Şekil 4. İstanbul ili için 1) PM10 miktarı ve 2) 2019- 2020 yılı % değişim



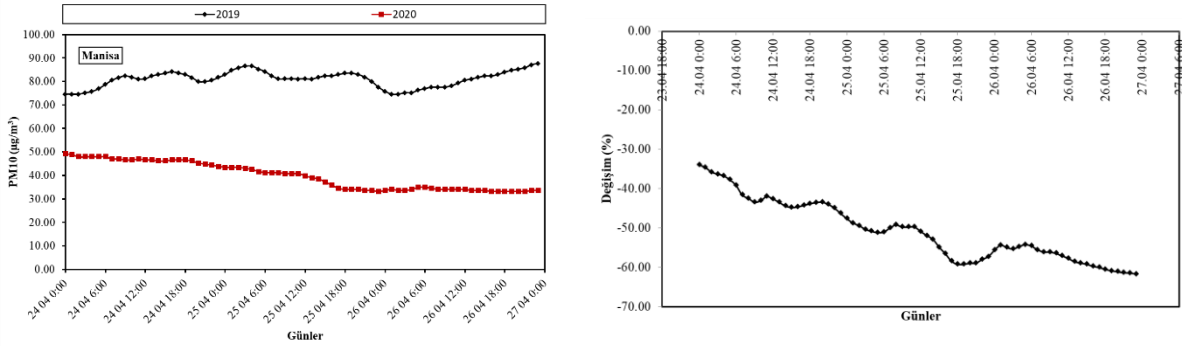
(1) (2)

Şekil 5. Trabzon ili için 1) PM10 miktarı ve 2) 2019-2020 yılı % değişim



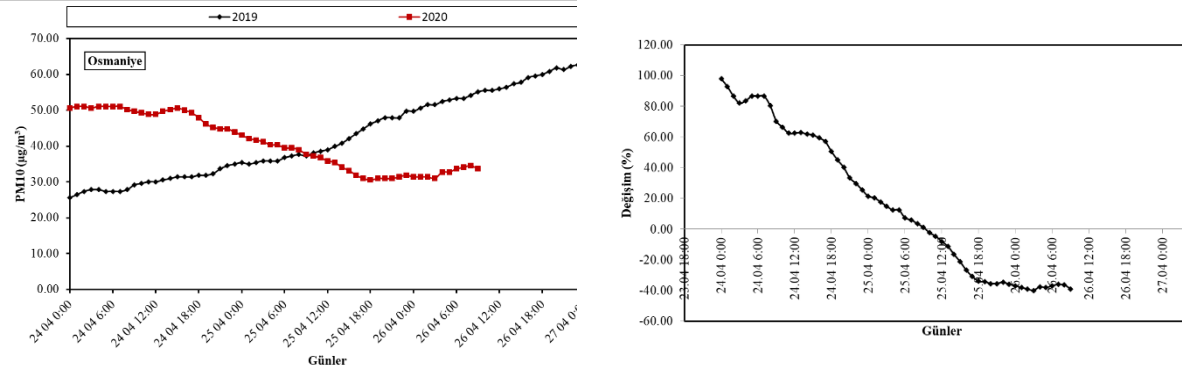
(1) (2)

Şekil 6. Antalya ili için 1) PM10 miktarı ve 2) 2019-2020 yılı % değişim



(1) (2)

Şekil 7. Manisa ili için 1) PM10 miktarı ve 2) 2019-2020 yılı % değişim



(1) (2)

Şekil 8. Osmaniye ili için 1) PM10 miktarı ve 2) 2019-2020 yılı % değişim

TARTIŞMA VE SONUÇ

Korona virüsün Türkiye'nin farklı coğrafi bölgelerinden seçilen iller üzerindeki etkisi farklı zaman dilimlerinde PM10 konsantrasyonları bakımından incelenmiştir. Yapılan çalışma sonucunda;

- Salgın neticesinde Nisan ayı içerisinde alınan sokağa çıkma kısıtlamalarının PM10 konsantrasyonuna etkisi belirgin bir şekilde görülmüştür. 2020 yılı ile 2019 yılı Nisan ayının referans günleri kıyaslandığında 2020 yılının hava kalitesinin 2019 yılı hava kalitesinden daha iyi olduğu görülmektedir.

- Nisan ayının son haftasında (23-26 Nisan) uygulanan sokağa çıkma kısıtlamasının Türkiye'nin farklı bölgelerinden seçilen iller üzerindeki PM10 konsantrasyonlarına etkisi PM10 ($\mu g/m^3$) cinsinden incelenmiştir. PM10 yoğunluğunun neredeyse bir önceki yılın (2019) değerlerine kıyasla 2020 yılı Nisan ayında referans illerde yaklaşık yarı yarıya azaldığı görülmüştür.
- PM10 yoğunluğunda özellikle İstanbul ve Manisa illerinde bir önceki yıla göre, dört günlük sokağa çıkma kısıtlaması sürecinde % 40-70 arasında bir azalma meydana geldiği görülmüştür.

TEŞEKKÜR

Bu zorlu günlerde canı pahasına çalışan Türk ve Dünya sağlık çalışanlarına en derin saygılarımızı ve teşekkürlerimizi sunarız.
Çalışmanın hazırlanması esnasında bilgi birikimlerinden faydalandığımız ve çalışmaya sunmuş olduğu katkılardan dolayı Sayın Prof. Dr. Coşkun ÖZALP ve Doç. Dr. Ertaç HÜRDOĞAN'a teşekkür ederiz.

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PREDICTING OF HEART DISEASE RISK FACTORS WITH R

Yavuz Selim Balcıoğlu[*1], Bulent Sezen[2]

*[*1]Institute of social sciences, Faculty of Social Sciences, Management Information System, Kocaeli, Turkey.*
[2] Institute of social sciences, Faculty of Social Sciences, Department of Management, Kocaeli, Turkey.
ORCID Code: 0000-0001-7138-2972

ABSTRACT

Heart-related diseases or cardiovascular diseases (CVD) are the main reason for a considerable number of death in the world over the last few decades and the number 1 reason for death globally, taking an estimated 17.9 million lives each year. CVDs are a group of heart and blood vessels disorders and include coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other conditions. More than four out of five CVD deaths are due to heart attacks and strokes, and one-third of these deaths occur prematurely in people under 70 years of age. The most important behavioral risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use, and harmful alcohol use. The effects of behavioral risk factors may show up in individuals as raised blood pressure, increased blood glucose, raised blood lipids, and overweight and obesity. The existing dataset of heart disease patients from University of California datasets is used to test and analyze the performance of predicting risk factors with R. The dataset has five heart datasets combined with 11 standard features and 1190 observations. Identifying those at the highest risk of CVDs and ensuring appropriate treatment can prevent premature deaths. This study aims to predict risk factors for heart disease from the existing dataset. We produce an enhanced performance level with an accuracy level of 85,2% through R's prediction model for heart disease risk factors.

Keywords: Health care; classification, prediction, decision making, heart disease

INTRODUCTION

Heart disease refers to many conditions that affect your heart. Today, according to the World Health Organization reports, cardiovascular diseases are one of the leading causes of death worldwide, with 17.9 million deaths annually (Rudnicka et al., 2020). According to this report, significant deaths are common in low- and middle-income countries (Ogbu & Arah, 2016). High heart pressure, high cholesterol, diabetes, obesity, et cetera. Various unhealthy activities such as heart disease cause an increased risk of heart disease (Maas & Appelman, 2010). Apart from the typical symptoms listed by the American Heart Association, different factors (smoking, excessive alcohol, and caffeine use) increase the risk of heart disease (Virani et al., 2020). Correct analysis of all these symptoms will be beneficial at the point of making the necessary diagnosis. Practical, accurate, and early medical diagnosis of heart disease plays a significant role in taking preventive measures to prevent death.

Over time, hospitals can collect large volumes of research data and patient records. There are many open sources for accessing patient forms. In line with the developing technological opportunities, various researches can be carried out to diagnose the patients correctly and prevent this disease from becoming fatal using computer technologies. Today, it is well known that machine learning and deep learning algorithms play a significant role in the medical industry. Deep learning is one of the fastest-growing areas of artificial intelligence.

Different deep learning models can diagnose disease, classify outcomes, or predict disease. Moreover, complete data analysis can be quickly done using deep learning algorithms. As a result, stored medical records can be analyzed for better predictions (Sejnowski, 2020).

Many studies have been done, and various machine learning models are used to classify and predict heart disease diagnosis. These methods are regression, cluster analysis, and decision tree models. In this study, the patient data set of the University of California was used. The R software with the KNN algorithm was used to estimate the risk factors of heart diseases.

RELATED WORKS

This section describes the methods for diagnosing heart disease using deep learning techniques obtained through various research studies.

R.Perumal et al. (Terrada, Hamida, Cherradi, Raihani, & Bouattane, 2020) developed a heart disease prediction model by feature reduction from 303 data samples using the Cleveland dataset. First, they used the Cleveland dataset to predict heart disease.

D. Ananey Obiri et al. (Ananey-Obiri & Sarku, 2020) developed three classification models: LR, DT, and GNB.

N.K. Kum et al. (Kumar, Sindhu, Prashanthi, & Sulthana, 2020) used the UCI dataset consisting of 303 datasets to predict cardiovascular disease and classified them with five different machine learning algorithms: L.R., SVM, D.T., R.F., and KNN.

A. Ed-daoudy et al. (Ed-Daoudy & Maalmi, 2019) evaluated the performance of four main classifiers, namely SVM, D.T., R.F., and L.R., with 303 data samples from the UCI dataset and 14 different variables.

C. Gazeloglu et al. (Gazeloğlu, 2020) tried to diagnose heart disease using the Cleveland data set consisting of 303 data samples and 13 variables. For this, they used 18 different machine learning algorithms.

N. Louidi et al. (Louridi, Amar, & Ouahidi, 2019), using the Cleveland dataset to detect the presence/absence of heart disease, training the dataset in 4 different ways (50:50, 70:30, 75:25, and 80:20) machine learning. They have done.

DATA SOURCES

For this study, the heart patients dataset of the University of California was used. Blood pressure, weight, gender, cholesterol, et cetera. There is a real dataset consisting of 11 different variables and 1190 data samples. Three variable groups were deleted from the original data set, and five other varying groups were added. Table 1 shows these features. R software with the KNN algorithm was used to identify the main risk factors for heart disease in this research.

Table 1. Details of the heart disease dataset

No	Attribute	Presentation icon	Details
1	Age	Age	Patients age
2	Gender	Gn	0= female, 1=male
3	Cholesterol	Chol	mg/dl
4	Weight	Wht	kg

5	Family history	FH	0=false, 1=true
6	ChespainType	Cp	4 types of chest pain (1=typical angina, 2=atypical angina, 3=non-anginal, 4= asymptomatic)
7	RestingBp	RBP	mm Hg
8	FastingBS	FBS	FBS>120 mg/dl (0=false, 1=true)
9	MaxHR	MHR	Maximum heart rate
10	ExerciseAngina	EA	Exercise (0=no, 1=yes)
11	Heart Disease	HD	0=null risk, 1=low risk, 2=potential risk, 3=high risk, 4=very high risk

DATA PRE-PROCESSING

The model we developed for the data processing process is shown in figure 1. 236 missing data were detected and deleted from the data set belonging to the University of California used for analysis. The stage of cleaning the data and filling in the missing data can affect the analysis results. Therefore, data cleaning should be done carefully. While creating our dataset, the data integration process was integrated and ready for analysis using multiple sources, not from a single source. The data is then classified and divided into the dataset and test datasets for working on various machine learning algorithms.

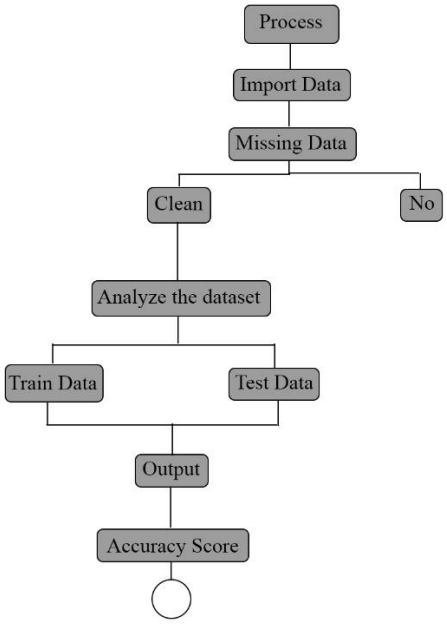


Figure 1. Diagram of the proposed model

ANALYSIS

As a result of our arrangements, data visualizations showing the relationship between the main variables in the data set we finalized were created with R and are shown in figure 2. The highest correlation between the variables is seen between cholesterol level and age, blood pressure and age, and maximum heart rate and cholesterol level.

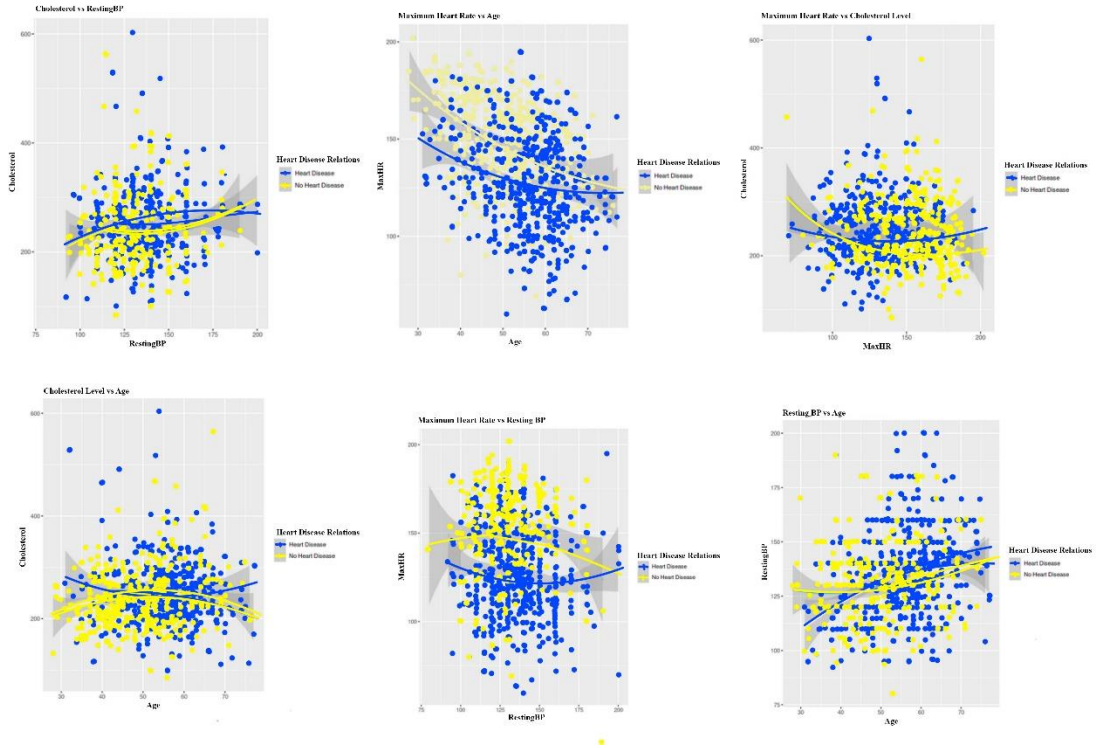


Figure 2. Data visuals to show the relationship between variables

Among the 11 data set variables, five main interacting variables are divided into seven sub-variables. Figure 3 shows the data map for these sub-variables and associated main risk factors.

Table 2. Key risk factors and sub-variables

High Blood Cholesterol	High Blood Pressure	Physical Inactivity	Diabetes	Obesity
Alcohol	Cholesterol	Cholesterol	Blood Pressure	Cholesterol
Smoking	Blood Pressure	Gender	Family History	Blood Pressure
Blood Pressure	Family History	Weight	Blood Sugar	Family History
Blood Sugar	Blood Sugar		Gender	Gender
Weight	Weight		Weight	Weight

As a result of the analysis, the effects of the sub-variables under the main risk factors shown in Table 2 were classified, and five different main risk factors were obtained. For example, if the cholesterol, blood pressure, blood sugar, and weight values are high, respectively, for the formation of high blood pressure, and if there is a genetic predisposition in the family history, it is most likely possible that this main risk factor will emerge. As a result, it is possible to have heart disease. Data visualizations of the analysis results are shown in figure 3. The data map showing the relationships of all variables to each other is shown in figure 4.

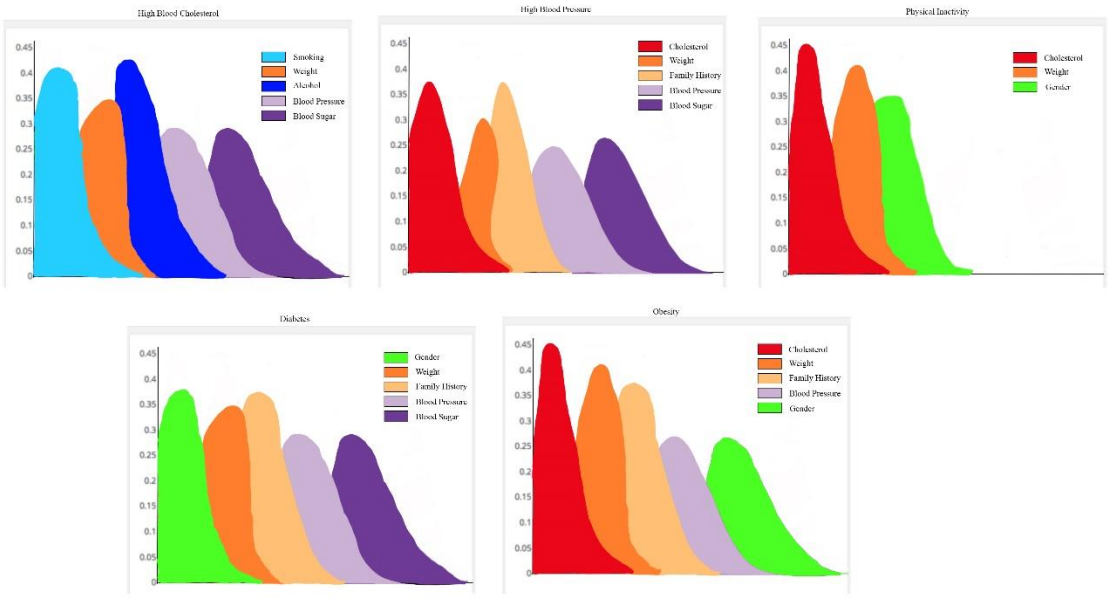


Figure 3. Data visualizations of key risk factors

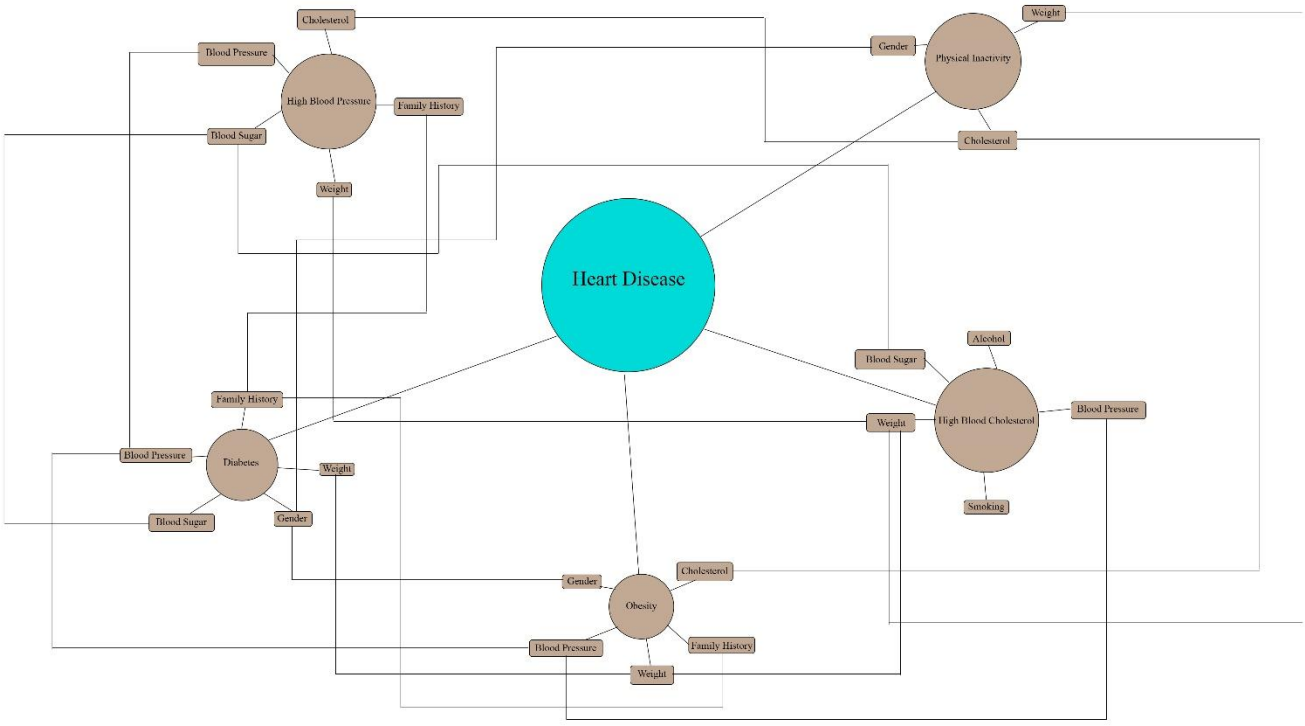


Figure 4. Data map of all variables

RESULTS

KNN algorithm is a supervised classification algorithm method. Classifies objects follow according to their nearest neighbors. The data are clustered according to their similarity, and the missing values of the data can be filled by using KNN. After filling in the missing values, various estimation techniques can be applied to the data set. In this way, better accuracy can be obtained with various combinations

of this algorithm. In this approach, the data set is normalized, and the attributes of the variables are separated. As a result of the analysis, the KNN was obtained as 85.218%. It was calculated as MAE=0.250, sensitivity=0.852, fallout=0.167, F-Measure=0.851 and ROC=0.912, respectively. It is shown in Table 3.

Table 3. Performance table of KNN algorithm from deep learning algorithms.

Classifier	Accuracy	MAE	Sensitivity	Fallout	Precision	F-Measure	ROC Area
KNN	85.218	0.250	0.852	0.167	0.86	0.851	0.912

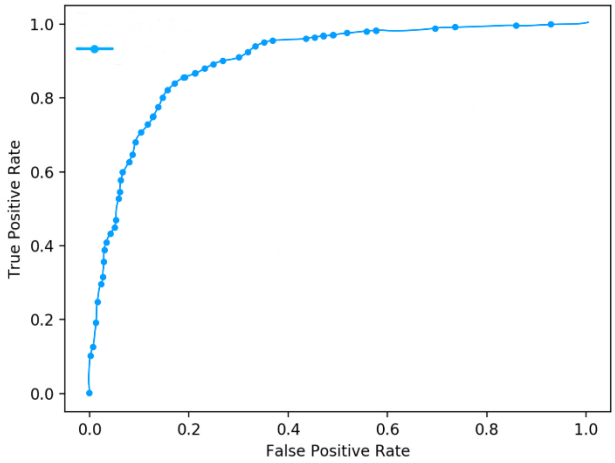


Figure 5. ROC curve of KNN classifier

CONCLUSION

Estimating the risk factors for heart disease is challenging due to the complex variables and associated metavariables, and multiple parameters included in the model. However, this is no longer a problem with adequately selected deep learning algorithms and application settings. This study achieved a high success rate of 85.2% of risk factors causing heart disease with the KNN algorithm using R software. It is shown in Figure 5. Furthermore, we found that the KNN algorithm, one of the deep learning algorithms, performs well in the analysis with R software. As a result of the findings we obtained, the large dataset does not seriously affect the accuracy result at the analysis stage. It is possible to further expand this study by comparing different deep learning algorithms on R for future studies.

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STOCK PRICE FORECASTING METHOD BASED DEEP NEURAL NETWORK OVER 5 STOCKS THAT PERFORMED THE BEST IN DURING COVID19 BETWEEN 2020-2021

Yavuz Selim Balcıoğlu[1*], Gökhan Özer[2]

*[*1]Institute of social sciences, Faculty of Social Sciences, Management Information System, Kocaeli, Turkey.*
[2]Institute of social sciences, Faculty of Social Sciences, Department of Business, Kocaeli, Turkey.
ORCID Code: 0000-0001-7138-2972

ABSTRACT

In the age of big data, deep learning for forecasting stock market prices and movement has become even more trendy than before. We collected two years of data from the NASDAQ and NYSE index and proposed a deep neural network-based model for forecasting prices for five stocks that performed the best during Covid19 between 2020-2021. The proposed solution is comprehensive as it includes pre-processing of the stock market dataset and a customized deep neural network-based system for stock market price forecasting. In this work, Deep Neural Network techniques have been utilized for predicting the next day's closing price for five companies that performed the best during Covid19 between 2020-2021. The financial data; Open, High, Low, and Close stock prices, are used to create variables used as inputs to the model. Also, I used two different indicators. The models are evaluated using standard strategic indicators: RMSE and MAPe. With the detailed design and evaluation of forecasting and data pre-processing methods, this work contributes to the stock analysis research community in the financial and technical domains.

Keywords: stock market, covid19, price prediction, artificial intelligence, neural network.

INTRODUCTION

Due to its working system, the stock market is constantly moving, unpredictable, and non-linear. They predict possible prices of stocks, political conditions, global economies, financial reports and performance of firms, et cetera. But it is challenging as it depends on various factors. Therefore, it is beneficial to analyze future trends to predict stock market movements (Hogenboom, Brojba-Micu, & Frasincar, 2021). There are three different methods for estimating the stock price. The first is to make forecasts using the stock's opening, closing, and trading volume data. The second method is made with an estimation based on variables such as the company structure, the market situation in which the stock is located, and the political and economic factors of the country in which the company is traded. The third and last method is a hybrid model, which mixes the first two methods. In itself, some variables can be added or removed (Song & Lee, 2020). Today, the advantages of technological systems have begun to be used to predict stock prices. This is because the data size required for forecasting increases significantly but does not have a linear trend. Therefore, artificial intelligence-supported models that respond to complex relationships are needed to manage this emerging data dimension. The most commonly used methods in this field are regression analysis (attribution), random forest method, support vector machine.

However, Artificial neural networks (ANN), convolutional neural networks (CNN), and long short-term memory (LSTM) providing output over live data are used (Thormann et al., 2021). Artificial neural networks can complete the self-learning process and give consistent results over other variables with which they are in a relationship. The data in the data set must be consistent and applicable. A

convolutional neural network (CNN) uses quantitative data-based features as a stock forecasting strategy (Lu, Li, Wang, & Qin, 2020). It can be used together with LSTM in the estimation phase. An example of this way of working is proposed a hybrid neural network architecture with bidirectional long short-term memory to predict stock prices of listed firms (Jin, Yang, & Liu, 2020).

RELATED WORKS

This section describes the methods for stock price predicting using deep learning techniques obtained through various research studies.

Kim et al. (Kim & Han, 2000) created a model by decomposing features to make stock price index predictions combined with artificial neural networks (ANN) and traditional algorithms. Based on stock prices traded between 1989 and 1998. Another hybrid model is Qui et al. (Qiu & Song, 2016) was developed as a solution model to predict the decrease and increase the direction of the Japanese stock market. A modified artificial neural network (ANN) model was used in this study. Ni et al. (Ni, Ni, & Gao, 2011) used the support vector machine (SVM) to predict trends in stock prices. Balcıoğlu et al. calculated the probability of customers leaving the bank using ANN over the variables owned by the bank customers. (Balcıoğlu & Sezen, 2020). The data set they use consists of 19 different variables that belong to the Shanghai stock exchange. McNally et al. (McNally, Roche, & Caton, 2018) established a hybrid RNN and LSTM to predict Bitcoin price. Based on bitcoin prices between 2013 and 2016. Kara et al. (Kara, Acar Boyacioglu, & Baykan, 2011), using a 10-year data set between 1997 and 2007, used a hybrid method with ANN and SVM methods. Wen et al. (Wen, Li, Zhang, & Chen, 2019) built a CNN on financial time series using patterns. In deep learning, LSTM is a method for analyzing network structure and time series ((Mehtab & Sen, 2020), (Fischer & Krauss, 2018)). Therefore, it can give better results than traditional neural networks ((Baek & Kim, 2018), (Moghar & Hamiche, 2020)).

DATA SOURCES

All historical data for the five companies were collected from the NYSE and NASDAQ stock exchanges. These companies selected for analysis are the companies that have shown the highest rise since the outbreak of Covid-19. The dataset includes 23 months of data from 01/01/2020 to 01/12/2021 from Moderna, Zoom Video Communications, Taledoc Health, Square, Peloton Interactive. The data set used divided into two as test and training data. Table 1 shows the time intervals used for training and test data.

Table 1. Dataset

	Dataset		Training Dataset			Testing Dataset
Time Range	01/01/2020-01/12/2021		01/01/2020-01/07/2021			02/07/2021-01/12/2021

Four continuous change data and two determining factors were used for the stock price prediction. These variables were used to train the model and get the correct output. These variables are;

- - Stock opening price (Weekly)
- - The highest value reached by the stock
- - The lowest value reached by the stock
- - The closing price of the stock
- - Aroon Oscillator (Decisive factor)

- - Stochastic Momentum Index (Decisive factor)

Aroon Oscillator

It is a trend indicator (Sharma, Bhatnagar, & Bansal, 2020) developed by Tushar Chande. The primary purpose of this trend indicator is to detect a trend while it is still forming. It is shown with two movements, up and down. Its upward movement measures the upward trend of security since the highest price level it has reached within a certain period. Its downward movement measures the downtrend of a deposit since the lowest price level it has achieved within a certain period.

Stochastic Momentum Index

It was developed by William Blau in 1993 (Baek & Kim, 2018). While measuring the distance of the closing price to the highest and lowest prices in a certain period, the SMI indicator shows how much below or above the midpoint of the closing price, which varies between +/- 100 values and is determined by the highest and lowest price in the specified period. If the closing price is above the highest and lowest prices average in the specified period, the SMI value is positive. Otherwise, it is negative.

DEEP NEURAL NETWORK

Deep neural networks, thousands of object-based data and image classifications, object recognition, et cetera. It is a powerful tool for complex tasks such as (attribution). The structure of DNN is a system that produces an output from the interconnected nodes of each other. One of the first applications of DNN was to classify handwritten images (LeCun, Bottou, Bengio, & Haffner, 1998). After that, DNN gained popularity in ImageNet classification on AlexNet (Krizhevsky, Sutskever, & Hinton, 2012). It is an intelligent data mining technique that identifies a fundamental trend and generalizes it. Compared to other machine learning methods, it can simulate and analyze complex patterns in unstructured data. Deep neural networks work as a three-layer structure that primary neural networks have. It consists of the input layer, hidden layers, and output layer. We use the input variables here: opening, closing, and highest and lowest values. The accuracy of the results obtained with our two indicators, the Aroon oscillator and stochastic momentum index, will be verified. Figure 1 shows the schema we set up for DNN.

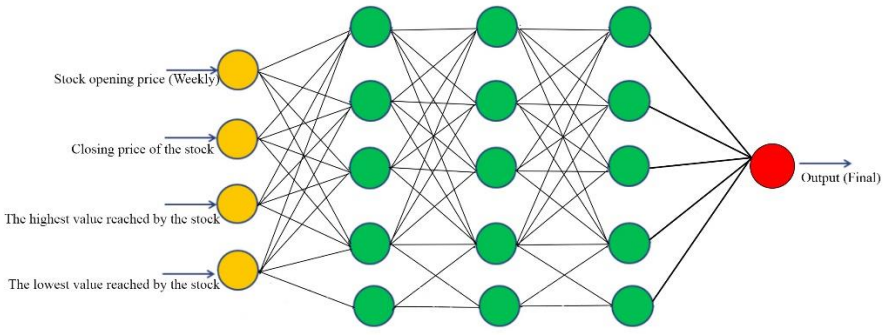


Figure 1. The architecture of DNN model

RESULT AND CONCLUSIONS

We created the DNN model using Moderna, Zoom Video Communications, Taledoc Health, Square, and Peloton Interactive. Mean Deviation Error (MBE), Mean Absolute Percentage Error (MAPE), and Mean Squared Error (RMSE) (Chai & Draxler, 2014) values were calculated to determine the estimated opening prices and minimal errors in the forecast price. Eq.1 shows how RMSE calculates.

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} (Actual_i - Predicted_i)^2}{N}} \quad (1)$$

Predicted = estimated value for the observation. Actual = Observed (actual) value for the observation. N = Total number of observations. How MBE is calculated is shown in Eq.2.

$$MBE = \frac{1}{n} \sum_{i=1}^{n} (Actual_i - Predicted_i) \quad (2)$$

Mean Bias Error (MBE); It is the mean of the difference between the predicted values and the actual values. This evaluation metric measures the overall deviation and captures the average deviation in the forecast. Predicted = estimated value for the observation. Actual = Observed (actual) value for the observation. N = Total number of observations. Eq.3 shows how MAPE calculates.

$$MAPE = \sum_{t=1}^{N} \left| \frac{actual_t - predicted_t}{actual_t} \right| \times \frac{100}{N} \quad (3)$$

Predicted = estimated value for the observation. Actual = Observed (actual) value for the observation. N = Total number of observations. Eq.3 shows how MAPE calculates.

The actual value is the actual opening price, the Predicted is the estimated opening price, and N = the total number of observations. Using DNN, the actual closing prices of 5 different companies and the estimated closing prices of the stocks are shown graphically in figure 2 by visualizing the data. The results obtained using the DNN method are shown in Table 2.

Table 2. RMSE, MBE, and MAPE values were obtained using DNN

	DNN		
Company	**RMSE**	**MBE**	**MAPE**
Moderna	0,81	0,909	0,0126
Peloton Interactive	1,28	0,404	0,0167
Teladoc Health	1,13	1,277	0,0064
Square	1,34	0,491	0,0024
Zoom Video Communications	0,275	0,682	0,018

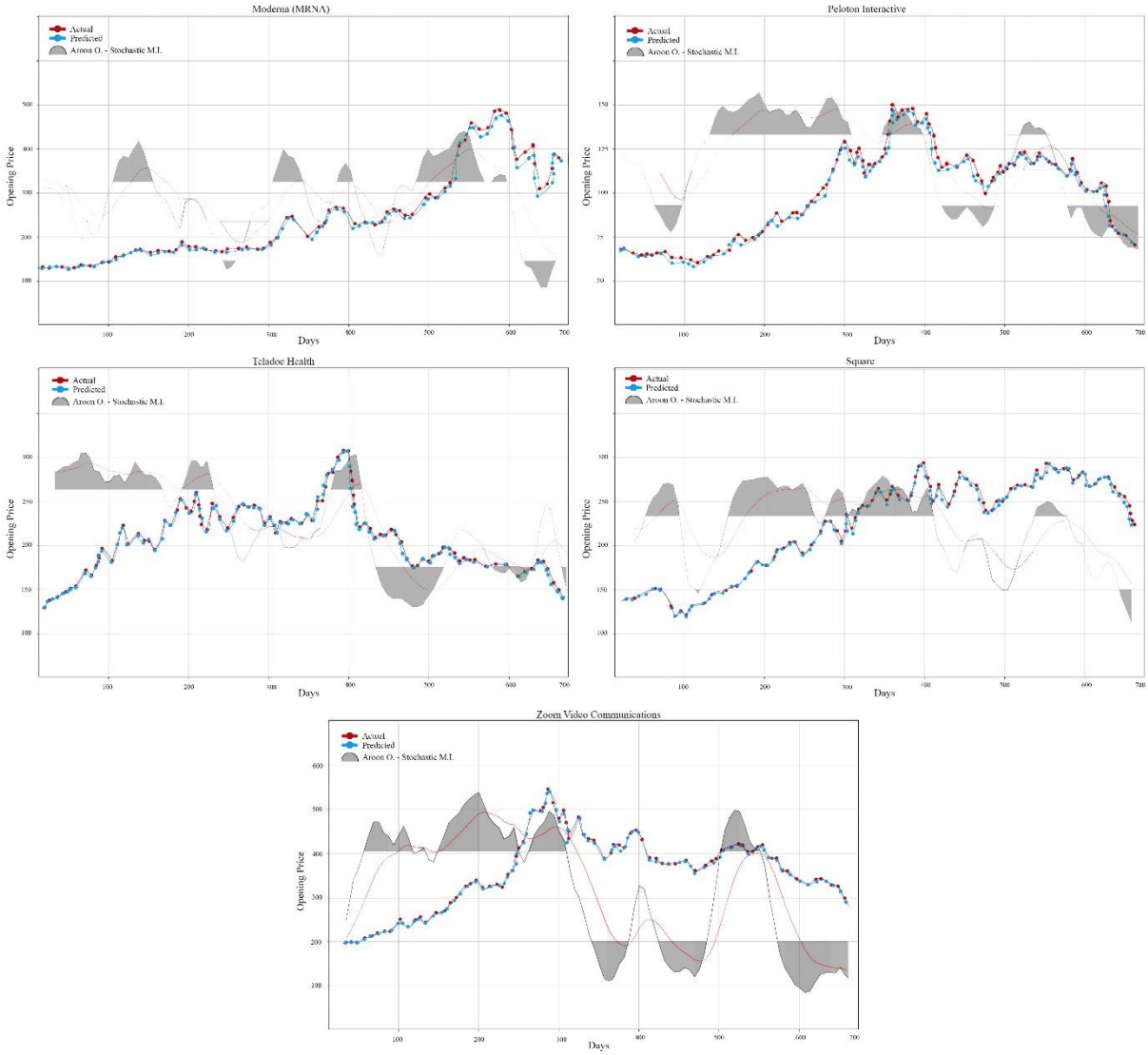


Figure 2. Actual and Predicted opening stock price with DNN

CONCLUSION

Recent studies show that estimating the prices of stocks traded in the stock market is difficult. This is because it depends on many parameters. However, choosing the correct parameters and integrating them into the analysis phase can eliminate this problem. Therefore, we used two different indicators in

our study. These are the "Aroon Oscillator" and the Stochastic Momentum Index. When the analysis data of Moderna is examined, it is seen that our indicator curves with the actual and forecast data between 300-400 days show a parallel decrease, and our indicator curves with the existing and forecast data between 500-600 days show a similar increase. There is a difference between our indicator curves between the actual and forecast data of 100-300 days.

When the analysis data of Pelaton is examined, there is a difference between the actual and forecast data between days 0-100 and our indicator curves. However, with the existing and forecast data between days 100-300, 350-400, it is seen that our indicator curves rise in parallel. On the other hand, it is seen that our indicator curves decrease in parallel with the actual and forecast data between 400-500, 600-700 days. When the analysis data of Teladoc is examined, it is seen that the actual and forecast data between 0-700 days and our indicator curves show the decreases and increases along the entire curve in parallel. When the analysis data of Square is examined, it is seen that the actual and forecast data between 0-700 days and our indicator curves correctly show the decreases and increases along the entire curve in parallel. When the analysis data of Zoom is examined, it is seen that the actual and forecast data between 0-700 days and our indicator curves correctly show the decreases and increases along the entire curve in parallel. Our study shows that it is necessary to use as many accurate indicators as possible to reach actual results in predictive data. In this study, the indicator, two different technical indicators were used to ensure the accuracy of the estimation analysis according to the traditional input data used to estimate the stocks of the companies traded in the stock exchange. In future studies, it is planned to increase the indicators used for analysis.

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A MOLECULAR PHYLOGENETIC STUDY OF SILENE SORDIDA BASED ON THE NUCLEAR EST14 LOCUS

Zeynep Toprak*[1,2]

[1]*University of Dicle, Faculty of Sciences, Department of Molecular Biology & Genetic, Diyarbakır, Turkey.*
[2]*University of Gothenburg, Faculty of Sciences, Department of Biological and Environmental Sciences, Gothenburg, Sweden.*
ORCID Code: 0000–0002–2103–4141

ABSTRACT

Silene sordida is an endemic plant distributed to Southwestern part of Anatolia. In the recent comprehensive molecular phylogenetic studies, it is shown that *S. sordida* has a variable phylogenetic position that is poorly understood. Here, using EST14 sequence data of 69 samples including *S. sordida*, and a wide range of both closely and distantly related *Silene* species, we estimated the gene phylogeny of these taxa under the Bayesian framework. Preliminary results are largely in consensus with the previous molecular studies. *S. sordida was* located as closely related to perennial *S. odontopetala* with considerable support.

Keywords: Endemic species, Odontopetala, Phylogenetic, Sordida.

INTRODUCTION

Caryophyllaceae Juss. is a widely distributed plant family. *Silene* L is the largest genus within the family. Including about 850 species that is mostly distributed to Northern hemisphere, the genus shows a broad range of diversity from the aspects of life form, geographic patterns, genetic composition, ecological adaptations etc. (Chowdhuri 1957, Oxelman and Lidén 1995, Desfeux and Lejeune 1996, Jafari et al., 2020). *Silene* shows two hotspots of diversity, the Mediterranian area, and Southwest Asia. Among the regions in Mediterranian area, Anatolia and Greece are two well known places with their high endemism rate, of 44% for Anatolia, and 31% for Greece (Coode and Cullen 1967, Davis et al., 1988, Greuter 1997, Yıldız 2012, Aydın et al., 2014a, Naciri et al., 2017).

Despite the comprehensive work performed lately, taxonomy of *Silene* yet, till some extent, lacks well understanding (Chowdhuri 1957, Coode and Cullen 1967, Lazkov 2003). Presence of highly homoplasious morphological characters such as life habbit, shape of inflorescences, number of styles, features of calyx, type of indumentum etc. is the main cause for the complexity. Therefore, the use of molecular data is crucial for an accurate estimate of relationships within the genus. Recent molecular studies (Oxelman et al., 2001, Popp and Oxelman 2007, Petri and Oxelman 2011, Aydin et al., 2014a, Jafari et al., 2020) have shown that the phylogenetic relationships observed from the molecular sequence data are higly incompatible with the classifications based on the traditional taxonomic evaluations. In the latest update of the infrageneric classification of *Silene* based on the molecular data by jafari et al. (2020), the placement of some taxa remains uncertain despite the wide sampling effort and advance analysing methods. The case of *Silene sordida* Huber–Morath & Reese is an example of those species that their phylogenetic position is poorly resolved.

Silene sordida is an annual endemic plant that occurs in Southwest of Anatolia. Originally, *S. sordida* was assigned to the Sect. *Atocion* Otth together with some other similar annual Mediterreanean, and Aegean Islands's species (Coode and Cullen 1967) that are belonging to divergent sections. Toprak et al. (2016) reported that this organisation of Sect. *Atocion* is deeply incongruent with the results from

molecular data. Morphologically, *S. sordida* is close to the members of the Sect. *Cryptoneurae* Aydın & Oxelman. Nevertheless, molecular phylogenetic studies has shown that it has a variable position in the phylogenies obtained from alternative molecular markers (Erixon and Oxelman 2008, Aydın et al. 2014a). In the available molecular studies, regardless of the phylogenetic inference method, usually *S. sordida is* either placed as closely related to Sect. *Cryptoneurae* or *S. odontopetala* group with varying degree of support. This observation indicates for the possibility of a past hybridization event throughout the evolution of *S. sordida*. A recent attempt by Toprak and Yıldız (accepted) based on the multi–locus molecular data, morphology, and palynological & seed evidence assign *S. sordida* to a newly described section.

As summarised above, the phylogenetic positions of *S. sordida* varies among different nuclear and chloroplast DNA markers. Here, using DNA sequence data of 69 *Silene* samples from low copy nuclear EST14 locus, the phylogenetic position of *S. sordida is* investigated under the Bayesian phylogenetic approach.

MATERIAL AND METHODS

This study comprises the data of *Silene sordida and* a broad range of closely and distantly related *Silene* species. In total, EST14 sequence data of 69 samples resulted in 86 accesions were analysed. 43% of the samples including those of *S. sordida*, were used here for the first time. The EST14 locus is a potentially

low copy nuclear markers that is developed from the EST libraries of *S. uralensis* (Rupr.) Bocquet and *S. schafta* J.G.Gmel. ex Hohen by Petri et al. (2013). The phylogenetic utility of this marker was already tested by Aydin et al. (2014b) and Toprak et al. (2016).

The related plant material were collected via field trips conducted by the author and the contributers listed in the acknowledgement section. In addition to the field trips, specimens available in the following herbaria E, G, GB, K, W (Thiers 2021) and the cultivars from the Botanical garden of Gothenburg (https://www.botaniska.se/) were examined. All the vouchers are identified according to Flora of Turkey (Coode and Cullen 1967), Greuter, (1995), Flora of Cyprus (Meikle, 1977) and Carlström (1986).

Total genomic DNA was extracted by a modified CTAB protocol (Yoon et al., 1991) from the dried material followed by a purification step made with Glass Milk kit (Q Bio–Gene, Solon, Ohio, U.S.A.) according to manufacturer's guidelines. PCR reactions were made using DNA polymerase kits of Phusion following the instruction of the manufacturer (Thermo Fisher Scientific, Waltham, Massachusetts, USA). Amplified products were purified with a Multiscreen PCR plates in a vacuum manifold (Millipore). Sequencing reactions were performed by the Macrogen Inc. (Seoul, South Korea). Details of the applied protocols and primer pairs can be accessed from BoxTax Database (http://www.sileneae.info/). Generated sequences were edited and subsequently aligned via Geneious v.6.1.8 (Biomatters, http://www.geneious.com). The parsimony informativeness of the data, and the choice of the substitution model were estimated using PAUP* Version 4.0a169 (Swofford, 2002).

The phylogenetic relationships of the 86 accesions were estimated using Beast BEAST v2.6.3 (Bouckaert et al. 2014) provided by CIPRES portal (Miller, 2010). We used Beauti v2. 6.3 (available with BEAST2) to prepare the input file. The input file is specified with a log normal relaxed molecular clock. The HKY model together with the *"4"* as the "*Gamma Category Count*" was set for the substitution model. An exponential prior with the default value selected for the gamma shape, otherwise all the priors were kept unchanged. The input file was run for 70 million of generations as two parallel runs by logging every 1000. Resulting trees were processed with Tree Annotater 2 (available with BEAST2) and visualized in FigTree v1.4.4 (Rambaut, 2007).

RESULTS

The phylogenetic informativeness of the EST14 data set is presented in Tab.1 based on the Parsimony statistics. The two parallel runs of the Bayesian analysis converged well, with the proper effective sample sizes (Ess >200). In the Bayesian gene tree (Fig.1) *S. sordida* was placed as sister to *S. odontopetala* group including *S. odontopetala* and *S. joerstadii* with strong support (Posterior probability (PP)=0.95).

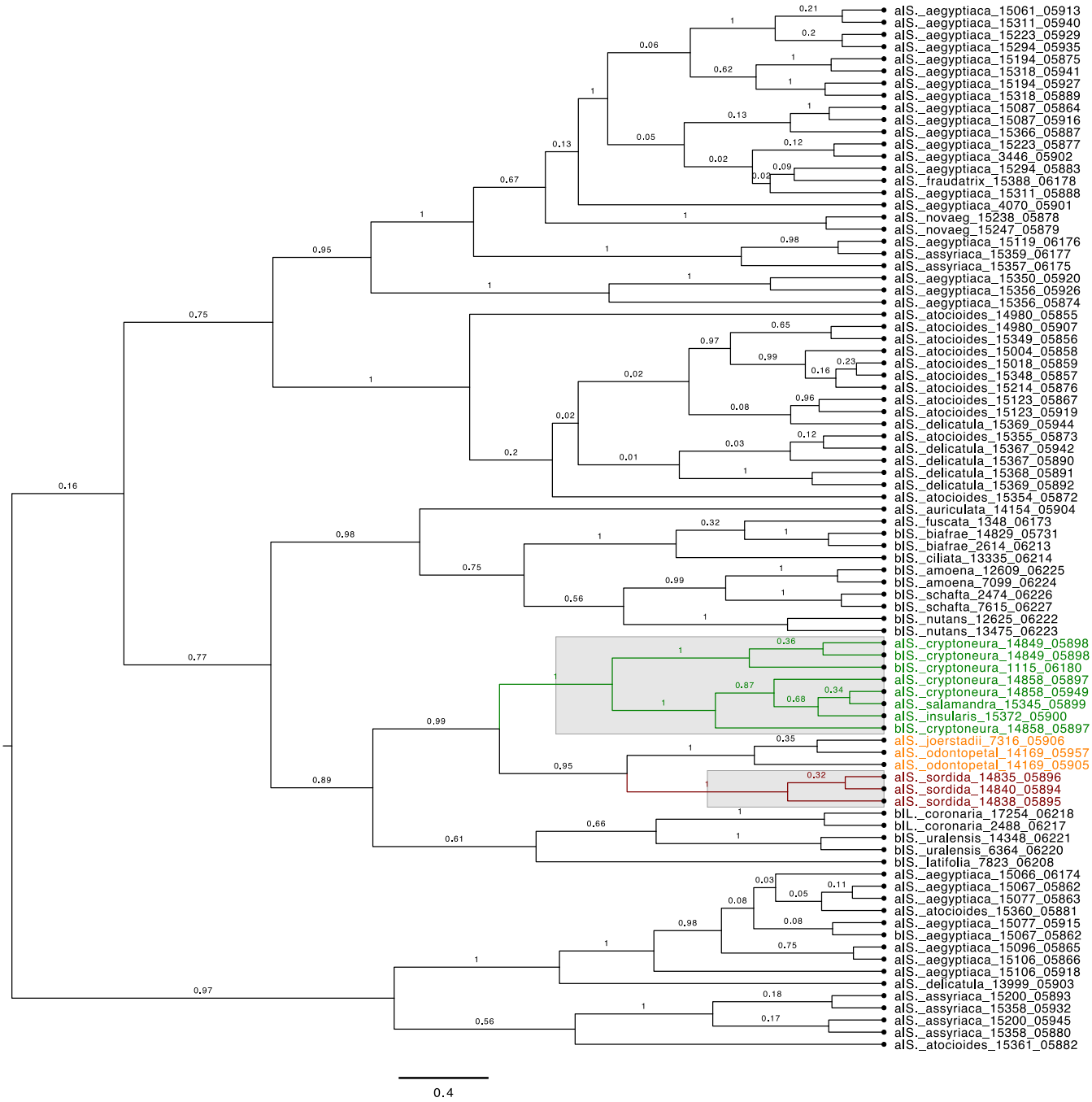


FIGURE 1. Maximum clade credibility tree of the EST14 locus. Numbers on the branch labels show the posterior probabilities (PP). The numbers following the sample names are the specimen and sequence IDs, respectively, as they are stored in the BoxTax Database (http://www.sileneae.info/). *S.*

sordida, Sect. Odontopetala, and *Sect. Cryptoneurae* are highlighted in color (red, orange, green, respectively).

This clade was then located as closely related to Sect. *Cryptoneurae* with very high support (PP=0.99). The samples of Sect. *Atocion (S. aegyptica, S. atocioides, S. fraudatrix, S. delicatula, S. assyriaca)* were shown as the most distantly related to the rest of the samples. The remaining samples *(*all were belonging to *silene* subgenus *Silene)* except than those belonging to Sect. *Atocion,* were displayed as more related to the clade including samples of *S. sordida, S. odontopetala,* and *S. cryptoneura* groups, however without support.

TABLE 1. Statistics of parsimony analysis for the EST14 locus.

Number of samples	46
Aligned matrix length [bp]	720
Constant characters [bp]	442
Variable characters [bp]	67
Parsimony–informative characters [b	211
Consistency index (CI)	0.800
Retention index (RI)	0.944
Homoplasy index (HI)	0.200
Rescaled consistency index (RC)	0.755

DISCUSSION

The Bayesian gene tree of EST14 locus displayed phylogenetic relationships mostly in agreement with the previous molecular studies (Oxelman et al., 2001, Petri and Oxelman 2011, Jafari et al., 2020). Considering the latest subgeneric division of the genus *Silene* by Jafari et al. (2020), Sect. *Atocion* falls outside any of these subgenera which is also the case observed in this study. Although the resolution of the tree is somewhat weak, none of the samples of Sect. *Atocion* were shown as closely related to *S. sordida*. This result is strongly against the organisation of the section proposed by Coode and Cullen (1967).

Silene sordida shares some morphological simmilarities with the *Sect. Cryptoneurae*. However, detailed micro–morphological analysis of the seed and polen structures, as well as the other evidence documented clear divergence of these taxa (Toprak and Yıldız, accepted). Under this circumstance, the expectation for the sister position of *S. sordida* with the Sect. *Cryptoneurae* would be inaccurate. However the case with *S. odontopetala* is even more complicated. *S. odontopetala* grows at an elevation range of 500 – 4000 m., and it has a perennial life form. Further, morphological (makro–micro) and ecological evidence shows no similarities between this taxon and *S. sordida.* On the contrary they are highly diverged (Toprak and Yıldız, accepted). This work based on the EST14 data set is one of the several previous studies (e.g., Erixon and Oxelman 2008, Aydın et al., 2014a, Jafari et al., 2020) that take attention to the relation of *S. sordida* with the *S. odontopetala.* Therefore, the observed strongly supported sister relationships of these taxa should be evaluated very carefully by considering the possibility of a past hybridization event that raised by (Erixon and Oxelman 2008). In any case, species tree estimation methods applying models that take into account the biological phenomena and a better sampling effort may substantially improve understanding of this positioning of *S. sordida. Silene Joerstadii is* a member of the *S. odontopetala* group that distributed to

Afghanistan and Pakistan. In the same way, this taxon is morphologically and ecologically rather different by being perennial besides many other features, but still seems as closely related to *S. sordida.* Although its phylogenetic position within the *Silene* is unclear, former studies have reported the close relation of the *S. auriculata with S. odontopetala* group. Nevertheless, this study locates the *S. auriculata* in the clade including samples belong to *Silene* Subgen. *Silene* with good support (PP=0.98).

CONCLUSION

Overlapping with former molecular studies, *S. sordida* shows conflicting relationships with the species that are most probable to be the close relatives. Thus it has an unclear phylogenetic positions within the genus *Silene*. Apart from providing a doubtless picture of the phylogenetic position of *S. sordida*, the EST 14 data set brings up even more questions to the existing pattern. Here, the well supported sister relationships with *S. odontopetala* indicates the need for further studies of the evolutionary history of S. sordida.

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STEP-TO-STEP IN THE MODERN TREATMENT OF PATIENTS WITH CHRONIC HEMORRHOIDS

Volodymyr Sulyma*, Sergij Malinovskyj, Igor Yuschenko, Dmytro Yudin, Olga Nikitina, Oleg Kalyta, Dmytro Kulchytskyj, Andrij Gaponov, Gennady Yarotskyj

Dnipro State Medical University, Department of Surgery #1, Dnipro, Ukraine
Dnipro City Hospital # 6, Dnipro, Ukraine
Surgical Clinic "Garvis", Dnipro, Ukraine

ABSTRACT

Hemorrhoids are one of the most widespread diseases of the adult population in industrialized countries. It has been established that in people over 40 years of age, the symptoms of hemorrhoids are found in 60-70% of cases. The share of hemorrhoids, in the structure of coloproctological diseases, accounts for about 40%.

In recent years, minimally invasive methods of treating hemorrhoids have already been firmly introduced into the daily practice of coloproctologists. The advantages of these methods over surgical interventions are the possibility of their use on an outpatient basis, without disability; high efficiency in the initial stages of the disease; a small number of complications.

The most commonly used minimally invasive methods are:

hardware ligation of hemorrhoids with latex rings, sclerotherapy, infrared photocoagulation of hemorrhoids,

suture ligation of hemorrhoidal arteries under the control of dopplerometry, electrocoagulation of hemorrhoids.

The indication for minimally invasive surgical interventions is uncomplicated internal hemorrhoids I - III stages.

When choosing a method for treating patients with hemorrhoids, it is advisable to use a classification that divides chronic hemorrhoids into stage IV.

Contraindications include: a combination of hemorrhoids with an anal fissure, rectal fistula, inflammatory diseases of the anal canal and perineum, acute hemorrhoids.

Ligation of hemorrhoids with latex rings is the most frequently used technique (32-82%), and sclerotherapy, due to the frequent development of complications (11-47%), is used less and less. Other methods of minimally invasive treatment are used in less than 5% of cases.

Keywords: Chronic hemorrhoids, treatment, tribenoside + lidocaine

ADMINISTRATIVE PROCESS FOR MODERN POSTGRADUATE TRAINING OF RESIDENTS-SURGEONS

Volodymyr Sulyma*, Yakiv Bereznytskyj, Ruslan Duka, Kateryna Yaroshenko, Sergij Malinovskyj

Department of Surgery #1/Dnipro State Medical University, Ukraine

ABSTRACT

Modern training of interns is impossible without the introduction of new technologies in the educational and pedagogical process, which will not only facilitate learning, but also increase interest in studying the discipline. An electronic information program was created on the basis of the Department of Surgery №1 of Dnipro State Medical University, the purpose of which was to increase the level of qualification training of residents-surgeons by optimizing the reporting documentation for the intern physician training plan using a set of informational, technical, software, mathematical, tools that are designed to collect, process and store information.

The information system is stored in the cloud and is divided into three main blocks with different levels of access:

1. The first block "office of the head".
2. The second block "teacher's office".
3. The third block "resident's office" (electronic intern's diary)

All reporting forms are stored in electronic form with the possibility of automatic generation of the report on paper.

The use of modern information technologies improves the effectiveness of the educational process of residents-surgeons, increases interest in classes, and prepares for electronic reporting (which is mandatory at the current level of medical care). We offer to apply in the postgraduate period the given modern methods of educational work for preparation not only of residents-surgeons, but also residents of other specialties.

Keywords: Training postgraduate, residents-surgeons, administrative process

THE IMPACT AND ENHANCING HAND HYGIENE AMONG HEALTH CARE WORKERS DURING COVID-19 DISEASE PANDEMIC FOR PREVENTION THE INCIDENCE OF MRSA

Lujin A. Alshridey, Samah A. Mahmud, Abdelaziz M. Dwaya, Osama R. Etekbali and Abdulhamid M. Alkout.
Faculty of Medical Technology., University of Tripoli., Tripoli - Libya

ABSTRACT

Background: Methicillin-resistant Staphylococcus aureus (MRSA) is a significant pathogen causing a variety of infections in community and health care workers (HCWs), they are in the front line who frequently exposed to infected patients and contaminated objects they can put themselves and patients at a great risk for acquiring and transmits infection by own hands. During COVID-19 pandemic hand hygiene is considerable is the most important personal measures to prevent disease outbreak for healthcare workers and the community. The aim of this study is to examine the impact of hand hygiene performance by health care workers during COVID-19 pandemic and to determine if there is a reduction in the degree of contamination with staphylococcus aureus and specially the MRSA.
Methods: The study was carried out during 19 June to 11 September in three different health care centers. A Swab samples from hand of HCWs were taken. The samples were inoculated on blood agar and Chromatic detection media, incubated aerobically at 37C◦ for 24 hours. Staphylococcus aureus was identified by it is morphology, color and by Coagulase test. Antimicrobial resistance for the isolated staphylococcus aureus was done by disk diffusion method using Cefatoxin disc.
Result: Among 56 study subjects,15(26.8%) of hand swabs show no bacterium growth whereas 41(73.2%) of hand swabs were positive for bacterium growth and there is insignificant differences between study cases (X^2 = 38, df = 3, P = 0.16). the most prevalent isolated organism 69.6% was coagulase negative staphylococcus spp (CONS), 16.0% staphylococcus aureus strain and 1.8% was MRSA, this finding is lower than the previous study conducted in the pre-COVID-19 period were the isolated of 20.8% staphylococcus aureus and 7.1% MRSA from 265 study cases but statistically was insignificant different between the value (X^2 = 1.19, p = 0.2).
Discussion: It is necessary to detect the staphylococcus aureus and MRSA hands carriage among HCWs because they are represent a risk factor to the patients resulting in spreading of the infections in the health care sitting, this can be controlled by encourage the HCWs and understanding the importance of hand hygiene and the role for decreasing the incidence of nosocomial infection in health care sitting. In this study indicated that, the isolated staphylococcus aureus and MRSA were reduced during COVID-19 pandemic compared with pre COVID-19, although this reduction insignificant results but this reduction could be due to the precautions to protect themselves from the SARS-CoV-2 infection by wearing mask, hand hygiene and social distance, In conclusion this study encourage the HCWs fro hand wash and the collateral benefit from COVID-19 prevention measures on the MRSA and S.aureus prevalence on the hands, therefore more data is required to corroborate these finding

Keywords: COVID-19, Health care workers MRSA and Hand hygiene

Introduction

Nosocomial infection (NIs) is an infections acquired in health care sitting by patient who was admitted for reasons other than that infection. NIs are among the major causes of death and increasing morbidity among hospitalized patients, they are one of the main causes of functional disability, increasing the transmission of multi drug resistant-organisms and prolong staying in hospital (1). NIs occurs worldwide and affects both devolved and poor resource country and is a risk factor to patients, health

care workers (HCWs) and community. Contaminated hospital environment, air and the hands of HCWs are contribute to be the main sources of NIs (2)

They are two categories to classify the bacteria that could be isolated from the hands, namely resident and transient bacteria (3). In general, resident flora is rarely associated to cause infections, but it can cause infections if it entered in a sterile body cavities or in an immunocompromised patient, it can be found under the superficial cells of stratum corneum and also on the skin surface, *Staphylococcus Epidermidis* is the most dominate species and oxacillin resistance species is extraordinarily high, specifically among HCWs(3).

Transient flora is more acquiescent to removal by routine hand hygiene because it colonizes the superficial layer of the skin, it can be acquired by HCWs during their routine work activity from patients and contaminated subject. The transmissibility of transient flora is based on the species present, the number of microorganisms on the contaminated surface, and the skin moisture. The hands of some HCWs may become persistently colonized by pathogenic flora such as *Staph. aureus* (3).

Studies reported high levels of *Staph .aureus* on the hands of female and male HCWs, ranging from 5% to 20%. *Staph. aureus* an aggressive microorganism which can cause a severe and fatal disease, such as severe septicemia, pneumonia, meningitis and toxic shock syndrome (2).

One of the key components to solve the problem of NIs and acquiring infections in health care sitting is the HCWs who frequently exposed to elements that reserve infections such as blood and body fluids, these fluids can transmit aggressive microorganisms like methicillin-resistant *Staphylococcus aureus* (MRSA). In addition to the risk of HCWs to acquire these organisms from their work place, HCWs who already reserve these organisms act as a potential source of infection to patients and other HCWs in the health care setting (4).

Despite of decline in the prevalence of MRSA in healthcare settings worldwide due to the targeted efforts to conduct the infection control prevention measures, MRSA continues to represent a significant burden to healthcare systems and patients because of its property of being resistance to a wide spectrum of antibiotic like fluoroquinolones, macrolides and tetracycline. MRSA is a significant pathogen that causes a variety of infections in both of healthcare and community settings, such as blood stream infections and pneumonia (5).

The sources of infectious agents in the healthcare setting is consist of the patients, HCWs, visitors, textiles, medical equipment and other contaminated surfaces. Furthermore, three fundamental ingredients is required to transmit the infections agent in health care sitting which is a source of infectious agents, a vulnerable host with a receptive port for entry of the agent and a mode of transmission(5).

The Hand hygiene is considered an a vital measure to avoid the transmission of infection agent in health care sittings (6), many researches reflect the necessity for hand washing using a variety of techniques to avoid the spread of infectious agent to patients, and In spite of hand hygiene protocols and policies in healthcare facilities, poor hand washing compliance continues to exist among medical professionals (2). Accordingly, hand hygiene has been suggested as a vital strategy to help in preventing the spread of COVID-19 in hospitals (6).

Material and Methods:

The study was conducted from 19 June to 11 September in three different health care centers located in Tripoli, one of them was private (A) hospital and the others was public (B and C) hospitals. A total of

fifty six volunteers of HCWs were included. 50% from A hospital, 32.1% from B hospital and 17.9% from C hospital. We used the alphabetic (A, B, C) to describe the hospitals for privacy reasons.

Samples were taken from several categories of doctors, nurses, paramedics, lab techniques, administrations, housekeeper and anesthetists working in different wards in hospital including: ophthalmology ward (OW), operation rooms (OR) , pediatric ward (PW), intensive care unit (ICU), gynecological ward (GY), children section (CS), laboratories, orthopedic ward (OW).

Latex gloves were worn before collecting the samples, a sterile cotton swabs moistened with sterile physiological slain were used to obtain the samples from dominant hand of HCWs during their routine work hours, beginning from the flexor aspect of wrist across the palm and up to all the five fingers and the area between them to finger beds and ending in the dorsal aspect, then the swabs replaced in there tube. Each swab were labeled with specific numbers and transported immediately to microbiology lab within less than half an hour for further processing.

The hand swabs were inoculated on blood agar and chromatic detection media then incubated aerobically at 37C° for 24 hours in an inverted position to prevent condensed moisture from dripping onto media or bacterial colony. The bacteria isolated were characterized to confirm the undefined organisms using routine microbiology identification, colony characteristic and biochemical properties such as Coagulase test. The colony color of bacteria on chromatic detection media was identified by using liofilchem® Chromatic Detection reference book.

Antimicrobial resistance for the isolated *Staph.aureus* was done by disk diffusion method; Cefatoxin (FOX) 30µg disc was used as surrogate for the detection of MRSA according to the CLSI guideline, the plates were inoculated with defined *Staph.aureus* then incubated at 37C° for 24 hours. *Staph.aureus* strains which grow with a zone of inhibition ≤ 14 diameters around Cefatoxin were classified as MRSA.

The results before COVID-19 outbreak obtained from previous studies from African oncology intuition in the city of Sabrata (7), Alwahda hospital in Derna (8), and Sabha Medical Center Hospital Fazzan area (9) located in Libya, the results interpretation and analysis of the data were done by using of the SPSS version 16 ANOVA test for the statistic comparison and the quantitative data were expressed as numbers and percentages.

Results

Out of fifty six HCWs who screened for MRSA 75% were females and 25% were males classified as: 12.5% Lab techniques, 58.9% Nurses, 10.7% Doctors, 4.5% Administrations, 1.8% Housekeepers, 8.9% Paramedics, 1.8% Anesthetists constituted to be the majority of the HCWs who were screened [Table /1] .

Table 1; Health care workers screened for Methicillin resistance staphylococcus aureus

HCWs categories/ Hospitals	Private (A) No (%)	Public (B) No (%)	Public (C) No (%)	Total No (%)	Male No (%)	Female No (%)
Lab techniques	3(42.9)	4(57.1)	(0)	**7(12.5)**	5	**2**
Nurses	17 (51.5)	7(21.2)	9(27.3)	**33(58.9)**	3	**30**
Doctors	5(83.3)	1(16.7)	(0)	**6(10.7)**	3	**3**

Administrations	2(66.7)	(0)	1(33.3)	**3(4.5)**	2	**1**
Housekeeper	1(1.8)	(0)	(0)	**1(1.8)**	0	**1**
Paramedics	(0)	5	(0)	**5(8.9)**	1	**4**
Anesthetist	(0)	1(1.8)	(0)	**1(1.8)**	0	**1**
Total	**28(50)**	**18(32.1)**	**10(17.9)**	**56(100)**	**14(25)**	**42(75)**

Among the fifty six study subjects, 26.8% of hand swabs show no bacterium growth whereas 73.2% of hand swabs where positive for bacterium, although the positive samples is higher than the negative samples but statistically was insignificant different (X^2=38, df=3, P=0.16). 16.0% *staph. aureus* strain were isolated from 5.4% lab technicians, 1.8% doctor, 3.6% nurse and 5.4% paramedics, of them 1.8% were MRSA isolated from lab technician. The majority of isolated bacteria 69.6% were nonpathogenic *staphylococcus Epidermidis* (CONS) isolated from 7.1% lab technician, 7.1% doctors, 44.6% nurse, 1.8% housekeeper, 3.6% Administration 5.4% paramedics [Table 2].

Table 2; Hand carriage of micro-organisms in health care workers

Bacteria growth in impression of hand swabs				
Categories of HCWs	***No growth*** **No (%)**	***Normal flora Staph. Epidermidis*** **No (%)**	***Opportunistic Staph. aureus*** **No (%)**	***Pathogenic MRSA*** **No (%)**
Lab technicians	2(3.6)	4(7.1)	3(5.4)	**1(1.8)**
Doctors	2(3.6)	4(7.1)	1(1.8)	**-**
Nurse	7(12.5)	25(44.6)	2(3.6)	**-**
Housekeeper	-	1(1.8)	-	**-**
Administration	1(1.8)	2(3.6)	-	**-**
Paramedics	2(3.6)	3(5.4)	3(5.4)	**-**
Anesthetists	1(1.8)	-	-	**-**
Total	**15(26.8%)**	**39(69.6%)**	**9(16.0%)**	**1(1.8%)**
Mean	**2.1**	**5.5**	**1.2**	**0.14**
ANOVA test	**X^2=38, df=3, P=0.16**			

In the present study the HCWs hand carriage of *Staphylococcus aureus* were 16.0% among them 1.8% was MRSA from 56 study cases, this finding is a lower incidence rate when compared with 20.8% *Staphylococcus aureus* among them 7.1% were MRSA from 265 study cases in previous studies before COVID-19 outbreak but statistically was insignificant differences between the two studies values (X^2=1.19, p = 0.2) [Table; 3].

Table3; Comparison between MRSA and *Staphylococcus aureus* value in pre and post COVID-19 period

Study period/ the isolated pathogenic bacteria	**MRSA No (%)**	***Staph. aureus*** **No (%)**
Pre-covid 19	19(7.1)	55(20.8)

Post-covid19	1(1.8)	9(19)
ANOVA test	X^2=1.19, p=0.2	

Discussion

It is necessary to detect the MRSA carriers among the apparently healthy hospital personnel, particularly those working in the critical care areas, those individuals act as a potential source of infection to their patients, resulting in there extended stay in the hospital, which can be controlled by the regular screening of the HCWs and by taking the appropriate preventing measures (12). In our study, MRSA colonization was found in 1.8% of the HCWs, which was below the agreement with the international reported range of the MRSA carriage from 5.8% to 17.8% among HCWs in the hospital setting (12).

The pre-COVID-19 studies of HCWs hand carriage of bacterial isolated in Nigeria was 23.7% *Staphylococcus aureus*, among them 12.7% were MRSA (10), and 31.7% *Staphylococcus aureus* isolation in India among them 50% was MRSA (11). Our study was carried in three different health care centers in Tripoli - Libya, during the routine practices and pre-COVID-19 disease studies in Sabha, Sabrata and Derna - Libya (7, 8, 9), there were low incidence rate of hand contamination with *Staphylococcus aureus* and MRSA detected in specimens taken from HCWs hand post-COVID-19 when compared with pre-COVID-19 specimens from HCWs, some of the isolated bacteria in the study were more frequently colonized with one HCWs categories than the others such as CONs were most frequently colonized the nurses hand, this may be leading to nosocomial infection due to the nurses are the most HCWs who a have high contact rate with the hospitalized patients who have high susceptibility to receive diseases, while *Staphylococcus aureus* were mostly found in the demonstrated hand, Lab technicians and Paramedics.

Our study was done to assess the knowledge, attitude, and practice of hand hygiene among HCWs as hand hygiene is considered as the corner stone for prevention of Hospital-acquired infections. Poor compliance despite adequate knowledge is a major bottle neck for adequate infection control and prevention, This reduction in the percentage of HCWs hand contamination with this gram positive bacteria demonstrate a visible improvement in the hand hygiene performance among HCWs during COVID-19 pandemic by increasing their uses of alcohol or other disease control resource consumption during there work time, and rising there awareness about the important role of the hands to acquisition and spreads of infections to patients, hospital environment and community.
In COVID-19 outbreak most people have been hyper-aware, especially health care workers about hand hygiene and others infection control activity (13). The hospitals have instigated strategies in response to the COVID-19 pandemic it emphasized personal protection including: enhancing hand hygiene performance and mask wearing, restricting visitors numbers and duration for patient visit, reducing the number of HCWs and their work hours. This strategy was aimed to reduce the cross-contact that leads to COVID-19 transmission and it may also be able to reduce the chance of infectious organism's transmission (6), This explaining the reduction in the degree of HCWs hands contamination with *Staphylococcus aureus* and MRSA in the present study compared to the pre COVID-19 study, although this reductions were statistically insignificant, probably due to the variation in the sample size between the studies.

Conclusion

There is a collateral benefit from COVID-19 prevention measures on the MRSA and *Staphylococcus aureus* prevalence on the hands of HCWs, This study had some limitations such as small sample size

involved in the study, therefore, further research is needed over a long duration to determine if the reduction of these rates are sustainable and more data from hospitals are required to corroborate these findings,

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Ethics approval and consent to participate

All procedure performed in this study were in accordance with the ethical standers of the international and/or institutional research committee. Informed consent was taken from each participant and all the rights were preserved to not mention the HCWs name and there personal information, also the names of the three hospitals in which the research was conducted were not mentioned as their wish.

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PREVENTION OF MACROPHAGE FOAM CELL FORMATION BY A FLAVONOID, FISETIN

Umesh Chand Singh Yadav[1], Johnna Francis Varghese[2]

[1]Special Centre for Molecular Medicine, Jawaharlal Nehru University, New Delhi-110067, India.
[2]Department of Neurology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA 02115 USA

ABSTRACT

Conversion of macrophages into foam cell is an important event in the atherosclerotic plaque formation. Prevention of atherosclerosis using the functional food is one of the best strategies to prevent cardiovascular morbidity and mortality. Fisetin, a bioflavonoid found in many fruits and veggies, is known to possess several medicinal properties including anti-inflammatory, antioxidant and anti-cancerous properties, but the literature is silent about its role in lipid homeostasis, especially in dysregulated lipid metabolism in foam cells. Thus, we have examined preventive efficacy of fisetin in oxidised-low density lipoprotein (oxLDL) -induced foam cells formation. We stimulated U937 cells derived-macrophages (through PMA induction) with oxLDL in the presence or absences of fisetin and assessed cell viability by MTT assay, ROS by DCFDA assay, lipid accumulation by Oil-Red-O staining, and expression of NLRP3, Sterol regulatory element binding protein (SREBP)-1 and associated downstream proteins HMG CoA reductase (HMGCR) and fatty acid synthase (FAS) by RT-qPCR and Western blotting. We demonstrate here that fisetin at 10 μM concentration was non-toxic to monocytes-derived macrophages and prevented the accumulation of lipids and their conversion into foam cells by oxLDL exposure. Fisetin also ameliorated oxLDL-induced upregulation of SREBP-1 and expression of its downstream lipid synthesis genes such as HMGCR and FAS showing anti-lipidemic properties. Fisetin blocked oxLDL-induced ROS formation and NLRP3 inflammasome activation showing its anti-inflammatory effect. Taken together, fisetin exhibited its anti-lipidemic action by inhibiting SREBP-1 and its downstream lipid synthesis genes including FAS and HMGCR and prevented oxLDL-induced foam cell formation by blocking ROS and consequent NLRP3 activation.

EXAMINING THE ADAPTATION PROCESS OF MOVIE THEATERS TO THE NEW NORMAL AFTER THE COVID-19 PANDEMIC

Ece Nur Duru, Tülay Korkusuz Polat
Sakarya University, Industrial Engineering Department, Sakarya-Turkey
ORCID Code: 0000-0001-6693-7873

ABSTRACT

The Covid-19 Pandemic has not only affected the health and production sector, but also the service and entertainment sector, and its impact has even been devastating in some sectors. The closure decisions taken to reduce the disease and death rates caused by the pandemic and the necessity of maintaining social distance have caused quite a negative impact on the entertainment industry. These negativities in the entertainment sector include both companies and employees in the sector, as well as customers. The cinema industry, which is one of the sub-branches of the entertainment industry, has also taken its share from these negativities. In this study, movie theaters in the cinema sector will be examined. Movie theaters remained closed for a long time. After the closures ended, the demand for movie theaters decreased, as people refrained from entering public areas due to the fear of disease brought by the pandemic and accordingly did not prefer public and closed areas. With the pandemic process, people prefer to do nature activities or come together in smaller groups. Therefore, movie theaters have to change the way they work in order to adapt to the pandemic process (the new normal). And movie theater businesses have begun to transform their way of working into private movie theaters rather than large movie theaters. In this study, the demand of university students for private movie theaters is examined. First of all, a survey was conducted with university students and a demand evaluation was made for private movie theaters. Then, different scenarios were developed for the movie theater layout, and a simulation model was created for each scenario, and a cost analysis was made to support the movie theater operators' decision whether to move to private theaters.

Keywords: Covid-19 pandemic, Cinema Industry, Simulation, Cost Analysis

SİNEMA SALONLARININ COVİD-19 PANDEMİSİ SONRASINDA YENİ NORMALE UYUM SAĞLAMA SÜRECİNİN İNCELENMESİ

Ece Nur Duru, Tülay Korkusuz Polat
Sakarya Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü, Sakarya-Turkey
ORCID Code: 0000-0001-6693-7873

ÖZET

Covid-19 Pandemisi sadece sağlık ve üretim sektörünü değil aynı zamanda da hizmet ve eğlence sektörünü de etkilemiş, hatta bazı sektörlerde etkisi yıkıcı olmuştur. Pandeminin sebep olduğu hastalık ve ölüm oranlarını azaltmak için alınan kapanma kararları ve sosyal mesafenin korunması gerekliliği eğlence sektörü üzerinde oldukça büyük olumsuz etkilere sebebiyet vermiştir. Eğlence sektöründeki bu olumsuzluklar hem sektördeki firmaları ve çalışanları hem de müşterileri kapsamaktadır. Eğlence sektörünün alt dallarından olan sinema sektörü de bu olumsuzluklardan nasibini almıştır. Bu çalışmada sinema sektörü içerisinde olan sinema salonları incelenecektir. Sinema salonları uzun süre kapalı kalmıştır. Kapanmalar sona erdikten sonra da pandeminin getirdiği hastalık korkusu ile insanların toplu alanlara girmekten çekinmesi ve buna bağlı olarak toplu ve kapalı alanları tercih etmemesiyle sinema salonlarına olan talep azalmıştır. Pandemi süreci ile birlikte insanlar ya doğa aktiviteleri yapmayı ya da daha küçük gruplar şeklinde bir araya gelmeyi tercih etmektedirler. Dolayısıyla sinema salonları da pandemi sürecine (yeni normale) adapte olabilmek için çalışma şekillerini değiştirmek zorundadırlar. Ve sinema salonu işletmeleri çalışma şekillerini büyük sinema salonlarından ziyade özel sinema salonları şekline dönüştürmeye başlamışlardır. Bu çalışmada üniversite öğrencilerinin özel sinema salonlarına olan talebi incelenmektedir. Öncelikle üniversite öğrencilerine anket yapılarak özel sinema

salonları için talep değerlendirmesi yapılmıştır. Daha sonra sinema salonu düzeni için farklı senaryolar geliştirilerek her bir senaryo için simülasyon modeli oluşturulmuş ve sinema salonu işletmecilerinin özel salonlara geçip geçmeme kararına destek olmak için maliyet analizi yapılmıştır.

Anahtar Kelimeler: Covid-19 pandemisi, Sinema Sektörü, Simülasyon, Maliyet Analizi

PROCESS IMPROVEMENT WORK FOR SUPPLIER-INDUCED PRODUCTION DISRUPTIONS

Ceren Tırtıl, Tülay Korkusuz Polat
Sakarya University, Industrial Engineering Department, Sakarya-Turkey
ORCID Code: 0000-0001-6693-7873

ABSTRACT

In today's competitive business world, the effective functioning of supply chains is a very important criterion for businesses to gain competitive advantage. One of the key factors for supply chains to work effectively is supplier selection. Businesses work with many suppliers while continuing their production activities. With the right supplier selection, businesses can achieve sustainable competitive advantage as well as reach their long-term goals more easily. Supplier selection problems are one of the areas where multi-criteria decision making techniques are frequently used, as there are too many qualitative and/or quantitative criteria (such as quality, cost, timely delivery) to be evaluated while making the selection. In this study, the Analytical Network Process (ANP) method, which is one of the multi-criteria decision making techniques, will be used. In the study, the delivery problems of a company that produces water booster and pumps related to cast material are discussed. Due to the problems experienced with the supplier, the raw material of the product cannot be in operation on time. The business also observed that some of the raw materials from the supplier were not of the desired quality. The products cannot be delivered to the customer on time because the raw material does not arrive on time and at the desired quality, and this causes customer dissatisfaction. In the study, first of all, the supply process of the enterprise will be analyzed in detail and the problems experienced in the supply process of the casting material and the cost of these problems to the enterprise will be determined. Then, a new supplier will be selected with the Analytical Network Process method in order to eliminate these problems and improve the supply process.

Keywords: Supply Chain Management, Supplier Selection, Multi-Criteria Decision Making Techniques, Process Improvement

TEDARİKÇİ KAYNAKLI ÜRETİM AKSAMALARI İÇİN SÜREÇ İYİLEŞTİRME ÇALIŞMASI

Ceren Tırtıl, Tülay Korkusuz Polat
Sakarya Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü, Sakarya-Turkey
ORCID Code: 0000-0001-6693-7873

ÖZET

Günümüz rekabetçi iş dünyasında, tedarik zincirlerinin etkili çalışabilmesi işletmelerin rekabet avantajı sağlamalarında oldukça önemli bir kriterdir. Tedarik zincirlerinin etkili çalışabilmesi için ise anahtar faktörlerden birisi tedarikçi seçimidir. İşletmeler üretim faaliyetlerine devam ederken pek çok tedarikçi ile birlikte çalışırlar. Doğru tedarikçi seçimi ile işletmeler sürdürülebilir rekabet avantajı sağlayabilmenin yanı sıra uzun vadeli hedeflerine de daha kolay ulaşabilmektedirler. Tedarikçi seçimi problemleri, seçim yapılırken değerlendirilmesi gereken nitel ve/veya nicel çok fazla sayıda kriter (kalite, maliyet, zamanında teslim gibi) olduğundan çok kriterli karar verme tekniklerinin sıklıkla kullanıldığı alanlardan birisidir. Bu çalışmada çok kriterli karar verme tekniklerinden Analitik Ağ Süreci (Analytical Network Process – ANP) yöntemi kullanılacaktır. Çalışmada hidrofor ve pompa üretimi yapan bir işletmenin döküm malzeme ile ilgili yaşadığı teslimat problemleri ele alınmaktadır. Tedarikçi ile yaşanan sıkıntılar nedeni ile ürünün hammaddesi zamanında işletmede olamamaktadır. İşletme aynı zamanda da tedarikçiden gelen hammaddelerin bazılarının istenilen kalitede olmadığını gözlemlemiştir. Hammaddenin hem zamanında gelmemesinden hem de istenilen kalitede gelmemesinden dolayı ürünler müşteriye zamanında teslim edilememektedir ve bu da müşteri memnuniyetsizliği yaşanmasına neden

olmaktadır. Çalışmada öncelikle işletmenin tedarik süreci detaylı bir biçimde analiz edilerek döküm malzemenin tedarik sürecinde yaşanan aksaklıklar ve bu aksaklıkların işletmeye olan maliyeti belirlenecektir. Daha sonra bu aksaklıkların giderilmesi ve tedarik sürecinin iyileştirilmesi için Analitik Ağ Süreci yöntemi ile yeni tedarikçi seçimi yapılacaktır.

Anahtar Kelimeler: Tedarik Zinciri Yönetimi, Tedarikçi Seçimi, Çok Kriterli Karar Verme Teknikleri, Süreç İyileştirme

ENERGY POLICIES AND EMISSION TRADING SYSTEM: REFLECTIONS ON THE ROLE OF CARBON MARKETS IN FACING CLIMATE CHANGE RISKS

Dr. Ahmed Badran
Associate Professor of Public Policy
Department of International Affairs
Qatar University, Qatar

ABSTRACT

Recently, a new trade has been added to the dictionary of financial markets, known as the carbon trade. The emergence of the notion of carbon trading markets has led to interconnected companies and markets. These companies have established a business network in order to develop technologies aimed at reducing carbon emissions to the atmosphere. In addition, these new technologies help countries reduce industrial activities that emit harmful gases. Carbon dioxide is one of the world's most pollutants and one of the most important causes of global warming. The climate problem is one of the biggest challenges facing peoples and countries, and it poses a threat to the globe. The value of reducing pollution resulting from carbon emissions is considered a high value and important to avoid the imbalance between humans and the environment. The paper emphasizes that there is a close relationship between the emission of greenhouse gases and the greenhouse effect, which leads to climate change. Given the gravity of the current environmental situation particularly in the GCC region, the paper suggests all countries should collaborate to address the climate change challenges. In this regard, trading co2 emissions in an international market could be a potential solution and provide an alternative way to tackle the problem of climate change.

Keywords: Energy Policies, carbon trade, carbon-trading markets, GCC.

INTRODUCTION

Scientific evidence indicates the need to limit global warming to 2°C maximum in order to avoid the dire consequences of climate change. This requires countries to take immediate and significant steps to reduce their emissions. In this case, emissions should start declining between now and 2050 (Babonneau et al. 2021). To address this issue, the idea of exchanging and trading carbon arose in the United States through the Clean Air Act in 1990. The aim was to reduce carbon dioxide emissions via so-called carbon licenses. These carbon licenses were issued that set the upper and permissible limit for carbon dioxide emissions. Carbon market in that sense include three main components. Firstly, the commodity; these are certificates or licenses to reduce carbon. Secondly, carbon seller: the manufacturer or entity that has been able to reduce carbon emissions. Thirdly, carbon buyer: the factory that wants to increase the emissions rate due to its industrial activity, if it does not exceed the global emissions rate. In this context, any institution that did not exceed the permissible limit can sell the surplus carbon licenses to another institution that exceeded its carbon limits. The United States has taken the lead on the introduction of the idea of carbon trading and exchanging carbon emissions in the Kyoto Protocol in order to allow industrialized countries to implement their commitments to reduce emissions in a more flexible manner.

MATERIALS AND METHODS

The study adopts the descriptive analytical approach, as it relies on describing and analysing countries' experiences with carbon trading as one of the new market mechanisms. This approach contributes to identifying the phenomenon of the study, placing it in its correct context, and explaining all the surrounding circumstances. The descriptive analytical approach also helps in reaching the analytical

results related to the research topic. In addition to this, such an approach has the ability to crystallize solutions and formulate recommendations and proposals marketed by the researcher to end the controversy contained in the body of the research. The study also relied on analyzing the content of policy documents issued by international bodies such as the World Bank and the European Union. These documents underline the regulations and procedures needed for governing the carbon markets in addition to the mechanism for setting carbon prices in those markets.

RESULTS

The analysis of carbon markets as a policy tool to reduce carbon emissions and in turn tackle the climate change issues has indicated that, a number of factors can affect the price of carbon. These factors include the expenses incurred by the seller to carry out a project and technology to reduce emissions and therefore the seller wants to sell more than the cost of production, but in the case of being an investor in the carbon markets, his desire to get the lowest price in order to sell. The second factor is the prevailing prices in the carbon markets for cheap credits. The third and final factor is the terms and conditions of the contract, there may be liability and burdens, but acceptance is due to the price.

With regard to the laws and regulations for emissions, trading the paper concluded that there are two main mechanisms to regulate carbon markets: contracts for the sale of pollution shares and carbon credits. Under the contracts for the sale of pollution shares, pollution quotas or carbon quotas provides an agreement between two countries, one of which reduces carbon emissions and the other has a large and polluting industrial activity. Accordingly, the country with low emissions transfers the ownership of the excess shares of carbon to the other country in exchange for a certain amount of money determined by market tools, which is the supply policy and demand in global stock exchanges. As for carbon credits, it is a license equal to one metric ton and it is in the form of a document issued by the United Nations-based Clean Development Mechanism Committee and allows the use of units to develop and finance environmentally friendly projects through three mechanisms: the Clean Environment Mechanism (CDM); Joint Implementation Mechanism (IJ); Emissions Trading (ET) Mechanism.

DISCUSSION

The literature on carbon markets and emission trading system identify two main tools for pricing carbon emissions, namely the Emissions Trading System and the carbon tax system (Badran et al. 2019). In emissions trading system work through supply and demand for carbon credits. The emissions trading system sets a price for greenhouse gas emissions, and putting a cap on emissions. That in turn helps ensure that the emitters reduce greenhouse gases (International Carbon Action Partnership 2021). In carbon tax system, governments are setting a price for carbon by setting a price for the tax on carbon emissions. The carbon tax differs from the emissions trading system in that the tax is not determined in advance, but is determined according to carbon prices, and the choice of tool for carbon pricing depends on the economic and national conditions of each country. In other words, government imposes a Carbon tax on every ton of carbon exported from a power plant, factory or plane. Those taxes on carbon emissions will spur emissions cuts. However, a carbon tax is practically an energy tax it affects the poor mainly because a large part of the expenditure goes to meet energy needs. In comparison to other carbon pricing mechanisms, carbon taxes are flexible. That means the tax varies according to the type of fuel (due to the difference in the percentage of carbon). Added to this carbon tax provides an easy-to-implement policy that can be used to reduce carbon emissions while using the incomes to invest in alternative energy projects. Carbon tax also be extended to cover economic sectors that cap and trade policy cannot cover. The downsides of carbon tax though include uncertainty in terms of to what extent this policy can reduce the level of CO2 emissions. Additionally, it is difficult for governments to

determine the tax needed to reach a certain level of carbon reduction. The difficulty of unifying tax policies between multiple countries and the need for a careful monitoring system to prevent tampering can be added to the shortcomings of carbon taxes (Parry 2019).

In addition to these two methods of carbon pricing, the World Bank (2014) has indicated that there are many other indirect ways to price carbon emissions, which are the removal of government subsidies on fossil fuels or through the cap-and-trade system or the clean development mechanism system. These methods can be used in order to set a stable carbon price. For example, the cap-and-trade system is regarded as a powerful mechanism to reduce emissions Carbon Cap Management (2020). If binding, it leads to a significant reduction in emissions and a considerable reduction in the cost of moving to a green economy. As such, the policy of Cap and trading has many advantages. On the one hand, it reduces emissions systematically and in known and guaranteed quantities. Cap and trade policy also lowers the cost of emissions reduction. It is flexible can contribute to the development of poor countries. On the negative side, the policy of Cap and trading could influence the development of other initiatives in order to reduce emissions. Added to this, such a policy is focusing on reducing corporate emissions, not individuals (Carbon Cap Management 2020).

The European carbon stock exchange is an example pare excellence for emission trading systems that were developed to reduce the CO2 emission (International Carbon Action Partnership 2021). The project is considered the most important and largest carbon exchange in the world. The European Union began implementing the idea of emissions trading in 2005, whereby licenses and permits were distributed per ton in exchange for carbon dioxide or any other pollutant of emissions with a similar effect. As a result of linking permit prices with market prices, companies and factories have an incentive to reduce their carbon emissions in order to sell the surplus in order to make a profit. In this context, the emissions trading included specific sectors, namely the industry sector such as the iron and steel industry or any industry that uses oil, coal or gas for its operation. The first carbon purchase was traded on the carbon stock exchange in Germany, with the number of transactions sold about 499 million metric tons of carbon since the market began in 2005 and 2007. 1849 companies have participated in emissions trading, in addition to London leading the world center, where the statistics of Point Carbon Corporation indicate that 90% of carbon trades take place through London (International Energy Agency 2020).

The aforementioned analysis of carbon markets has indicated that there are a set of steps and procedures followed to conclude and sign contracts for the sale of carbon shares. Firstly, any country that is a signatory to the Kyoto Agreement and is obligated to fulfil its conditions shall reduce the percentage of carbon dioxide emissions below the permissible limit. Secondly, the state presents the surplus of carbon shares in the form of credits called carbon credits in a global market in which all-industrial and polluting countries purchase pollution shares in a number commensurate with their industrial and economic activity. Third, any country wishing to buy would have to accept an offer and pay the price of the carbon shares they wished, and the stake was estimated at one metric ton. Fourth, the seller issues all papers and documents such as the carbon reduction credit certificate called CER, which he issues through the United Nations Clean Environment Foundation through the International Carbon Bank ICEB, where this institution gives a serial number for the carbon quota for the country that reduced its emissions so that it can sell in regulated carbon markets.

In case of non-compliance with the terms of the contract, there is a set of rules and procedures to be followed. Each country has its own civil law for contract substitution, but the laws are similar in terms of judicial ruling. In the event of non-compliance with the terms in the contract or in the event of delay in implementation and delivery of credits at the time specified in the contract, the seller is obligated to

compensate the buyer in several cases. For example, if a judgment is issued for compensation or failure to pay the price in accordance with the Kyoto Protocol, the seller must pay a delay fine of 0.2 US dollars for each license and credit that the seller was late in delivering. Furthermore, in the event that the seller is unable or fails to complete his project to reduce emissions, the buyer has the right to rescind the contract and the seller to pay the expenses incurred by the buyer.

CONCLUSION

Carbon trading is one of the commercial practices in global stock exchanges, in which bonds and contracts are exchanged, sold or invested in exchange for sums of money. There are several ways to invest in carbon trading, namely, buying and selling credits, financing environmentally friendly projects and selling their credits, or increasing the emissions ceiling for factories. As such, Carbon trading contributes to addressing the problem of global warming by creating a balance between industrial activities and preserving the environment by distributing evenly what each country needs in terms of emissions, in addition to determining the amount of emissions for each country.

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TERMS OF TRADE AND ECONOMIC GROWTH IN INDIA: NEW EVIDENCE USING FOURIER CO-INTEGRATION TEST

Assoc.Prof. Yasemin Dumrul[1], Assoc.Prof. Zerrin Kılıçarslan[2]

[1] *Kayseri University, Develi Hüseyin Şahin Vocational School, Office Management and Secretary, Kayseri, Turkey*
ORCID Code: 0000-0001-5961-2931
[2] *Kayseri University, Technical Sciences Vocational School, Marketing and Foreign Trade, Kayseri, Turkey*
ORCID Code: 0000-0002-0905-3067

ABSTRACT

The terms of trade, which is expressed as the ratio of the export price index to the import price index, is an important tool that shows the welfare gain or welfare loss that countries will gain from their trade with each other. An increase in the terms of trade indicates the welfare gain of the country, while a decrease indicates the loss of welfare. Foreign trade has an important share in the economic growth of countries. The terms of trade have two effects on economic growth, originating from supply and demand. If the demand effect is greate than the supply effect, the country's terms of trade will turn against the country and this effect may lead to a decrease in economic growth. On the other hand, if the supplyeffect is greater than the demand effect, the terms of trade will improve in favor of the country and this effect may lead to the emergence of economic growth.

In this study, the effect of terms of trade on economic growth in the Indian economy was analyzed using the Fourier Engle-Granger cointegration test for the period 1980-2019. In the study, it was concluded that there is a long-term relationship between the terms of trade and economic growth. In addition, long-term coefficients were determined by using the FMOLS test in the study. Accordingly, a 1% increase in the terms of trade in the Indian economy increases the economic growth by 3.48%.

Keywords: Terms of Trade, Economic Growth, Fourier Engle-Granger Cointegration Test, India

INTRODUCTION

One of the questions sought to be answered in the economics literature is how the changes in the prices of goods will affect the economic growth in today's world, where international trade relations and therefore the mobility of goods increase. The concept of terms of trade has an important place in answering the aforementioned question and analyzing the effects of trade between countries on their economic growth. The terms of trade are an important tool in determining the gains or losses that a country will gain from foreign trade, and it shows the ratio of the export price index to the import price index. The increase in the terms of trade or the development in favor of the country, the welfare gain of the country, the decrease or the development against the country mean the loss of welfare of the country. An increase or decrease in the terms of trade creates significant changes on income, savings, external balance and economic growth (Erauskin and Gardeazabal, 2017). The terms of trade have supply-side and demand-side effects on economic growth. The supply-side effect arises from the increase in exports, while the demand-side effect arises from the increase in imports. If the demand effect is greater than the supply effect, the terms of trade will turn against the country and this effect may lead to a decrease in economic growth. On the other hand, if the supply effect is greater than the demand effect, the terms of trade will improve in favor of the country and this effect may lead to the emergence of economic growth (Çakır and Utkulu, 2019:92).

The effects of changes in the terms of trade on economic growth, as it is accepted as an important indicator of welfare, is one of the issues that are frequently emphasized in the economics literature. In this study, the relationship between the terms of trade and economic growth was analyzed using the 1980-2019 period data and the Fourier-Engle-Granger cointegration test for the Indian economy.

In the first section of the study, the theoretical basis of the effects of changes in the terms of trade on economic growth is explained. In the second section, studies investigating the relationship between terms of trade and economic growth are summarized. The third section includes data, methodology and results. In the conclusion section, there is a brief evaluation of the findings for India.

THEORETICAL FRAMEWORK

Although the concept of terms of trade emerged with the contributions of D. Ricardo (1821) who touched on the benefits of free trade and specialization and explained how the equilibrium price ratio was formed in this context and J.S. Mill (1909), who proposed the reciprocal demand law, the term "*terms of trade*" was first used by A. Marshall (2003). The reciprocal demand law put forward by J.S. Mill (1909) was explained by A. Marshall with offer curves. Thus, the concept of terms of trade could be revealed in more detail geometrically. An increase or improvement in the terms of trade, which expresses the ratio of the export price index to the import price index, means that the country in question obtains more imported goods in exchange for one unit of exported goods. On the other hand, a decrease or deterioration in the terms of trade indicates that the country imports less goods in exchange for one unit of exported goods, leading to a decrease in the purchasing power and welfare of the country. The terms of trade, which is an important tool affecting capital investment and production, have two positive and negative effects on growth. The negative effect of the terms of trade on growth can be expressed as the decrease in export revenues due to the fact that the increase in the export price is lower than the import price, thus the deterioration of the balance of payments and the decrease in economic growth. The positive effect of the terms of trade on growth can be explained by the fact that the increase in the export price relative to the import price leads to an improvement in the terms of trade (Jebran et al., 2018). In addition, the increase in the terms of trade will lead to an increase in investments and therefore economic growth will increase (Jawaid and Raza, 2013).

The theoretical basis for the effects of changes in the terms of trade on economic growth can be explained within the framework of the *Prebisch-Singer hypothesis*, the *Immiserizing Growth hypothesis*, and the *Harberger-Laursen-Metzler hypothesis*. *The Prebisch-Singer hypothesis* argues that the terms of trade will change in the long run against the developing countries exporting agricultural products and in favor of industrialized countries exporting industrial products. According to the Prebisch-Singer thesis, due to the low income and price elasticity of demand, the terms of trade for countries producing primary products deteriorate gradually over time compared to terms of trade for countries producing finished products. Depending on the deterioration in the terms of trade, the balance of payments and economic growth will be affected (Jebran et al., 2018).

The *Immiserizing Growth Hypothesis* put forward by Bhagwati (1958) states that the growth in a country will lead to the impoverishment of that country due to the deterioration in the terms of trade. According to the immiserizing growth hypothesis, the increase in foreign trade, especially in low-income countries, primarily leads to economic growth. However, later on, the deterioration of the terms of trade leads to a negative effect on economic growth (Sarıdoğan and Çetin, 2016: 924).

According to the *Harberger-Laursen-Metzler Hypothesis* put forward by Harberger (1950) and Laursen and Metzler (1950), the improvement in the terms of trade will positively affect the country's balance of payments and economic growth. On the other hand, the decrease in the terms of trade causes a decrease in the real income, total savings, and investments of the country, leading to the deterioration of the current account balance and a decrease in economic growth (Jebran et al., 2018).

LITERATURE REVIEW

While reviewing the studies in the literature, there are many studies that empirically demonstrate a positive relationship between the terms of trade and economic growth. However, there are also studies that predict a negative relationship between terms of trade and economic growth. There are also studies examining the effect of volatility in terms of trade on economic growth and suggesting that there is a negative relationship between these two variables. Table 1 presents studies investigating the relationship between terms of trade and economic growth.

Table 1. Summary of the Literature on Terms of Trade and Economic Growth

Author(s)	Period/Countries	Method	Result
Mendoza (1997)	1971-1991 40 countries	Panel data analysis	$TOT \xrightarrow{+} GDP$
Hadass and Williamson (2001)	1870-1940 19 countries	Panel OLS	$TOT \xrightarrow{-} GDP$
Bleaney and Greenaway (2001)	1980-1995 14 Sub-Saharan African countries	Panel data analysis	$TOT_{volatility} \xrightarrow{-} GDP$
Wong (2004)	1965-2002 Malaysia	Johansen cointegration test, ECM, Granger causality test	$TOT \xrightarrow{+} GDP$
Cakir (2009)	1990-2004 18 countries	Panel GMM	$TOT \xrightarrow{+} GDP$
Wong (2010)	1996-2003 Japan 1971-2006 Korea	Johansen co-integration test	$TOT_{volatility} \xrightarrow{-} GDP$
Fatima (2010)	1990-2008 Pakistan	Time series analysis	$TOT \xrightarrow{-} GDP$
Jawaid and Waheed (2011)	2004-2008 94 countries	OLS	$TOT \xrightarrow{+} GDP$
Jawaid and Raza (2013)	1980-2010 India	ARDL Granger causality, Toda-Yamamoto test	$TOT \xrightarrow{+} GDP$
Kalumbu and Sheefeni (2014)	1980-2012 Namibya	VAR model, Granger causality test	$TOT \xrightarrow{-} GDP$
Ekinci et al. (2015)	1990-2011 Turkey	Markov regime switching approach	$TOT \xrightarrow{+} GDP$
Jebran et al. (2018)	1980-2013 China	ARDL	$TOT \xrightarrow{-} GDP$
Çakır and Utkulu (2019)	1990-2015 Turkey	ARDL	$TOT \xrightarrow{+} GDP$
Jawaid et al. (2020)	1974-2017 17 countries	Johansen cointegration test	$TOT \xrightarrow{+} GDP$

DATA, METHODOLOGY AND RESULTS

In this study, annual time series data between 1980 and 2019 was used to examine the relationship between economic growth (GDP) and terms of trade (TOT). Real gross domestic product, which is used to express economic growth, and and terms of trade data were taken from the World Bank's World Development Indicators (WDI) database. Both variables were converted to natural logarithms.

In this study, with the Fourier Engle-Granger (2019) approach, the relationship between the terms of trade and economic growth will be tried to be revealed. Before testing the existence of a cointegration relationship, it is necessary to determine the degree of integration of each series. In this study, two versions of the endogenous break model developed by Zivot and Andrews (1992) were used to determine the degree of integration of the variables considered in the model. Model A only allows for a break at the intercept, while Model C allows for a break at both the intercept and trend. The results of Zivot-Andrews unit root test with structural break are given in Table 2.

Table 2. Zivot-Andrews Unit Root Test Results

Variable	Level		1. Difference	
	Model A	Model C	Model A	Model C

	t-stat	Break Date	t-stat	Break Date	t-stat	Break Date	t-stat	Break Date
GDP	-3.6383	1991	-4.2241	1991	-5.1520	1995	-5.1014	2004
TOT	-3.5181	1992	-4.0254	1999	-6.6402	2009	-6.5173	2009

Zivot-Andrews unit root test results show that all variables are not stationary at the 5% significance level, but are stationary after taking the first difference. Since all variables are I(1) according to the Zivot-Andrews unit root test, the existence of a long-term relationship between India's economic growth and terms of trade was tested using the Fourier Engle Granger cointegration approach developed by Yilanci (2019). This test aims to determine whether there is a cointegration relationship between variables using Fourier functions. The results of the Fourier Engle-Granger cointegration test are shown in Table 3.

Table 3. Fourier Engle-Granger Cointegration Test Results

Frequency	Min. SSR	Fourier Engle-Granger Statistics	Critical Values
1	0.201224	-4.727554	1 %-4.906
			5 %-4.302
			10 %-3.988

As can be seen from Table 3, at the 5% significance level, since the Fourier Engle-Granger test statistic is larger than the critical value, there is a cointegration relationship between economic growth and terms of trade. This result shows that the changes in the terms of trade have a long-term effect on the economic growth variable.

After revealing the cointegration relationship between the variables with the Fourier Engle-Granger test, the long-term coefficients were obtained by including trigonometric terms in the FMOLS (Fully Modified Ordinary Least Squares) test developed by Phillips and Hansen (1990). The results of the FMOLS estimator are shown in Table 4.

Table 4. FMOLS Test Results

Dependent Variable: GDP				
Variable	Coefficient	Std. Error	t-stat.	Prob.
TOT	3.483796	0.418683	8.320845	0.0000
C	11.63716	1.902485	6.116822	0.0000
@sin	-0.856962	0.068373	-12.53356	0.0000
@cos	0.315468	0.074814	4.216676	0.0002

Note: @sin (sine) and @cos (cosine) represent trigonometric terms.

As seen in Table 4, a 1% increase in the terms of trade for the Indian economy increases economic growth by 3.48%. As a result of the FMOLS test, both the coefficients and the sine and cosine terms are statistically significant.

CONCLUSION

Economic growth is shown as one of the most important indicators of a country's level of development. The increase in international trade relations and globalization activities significantly affects the economic growth process of countries. The development levels of the countries and the resources they have cause the growth rates of the countries to differ. The factors that determine the economic growth of an economy can be listed as economic factors, demographic factors, technological development, natural resources, geography and climate, political, social, and cultural factors. In this context, one of the most important issues for countries is to determine the factors affecting economic growth. Among the factors affecting economic growth, foreign trade ranks first, as it activates internal dynamics and

provides countries with the opportunity to gain additional income. The terms of trade are an important indicator of the gains that foreign trade provides to countries.

In this study, the relationship between the terms of trade and economic growth was analyzed with the Fourier Engle-Granger (2019) approach using the 1980-2019 period data. The result of the study shows that an increase in the terms of trade for the Indian economy positively affects economic growth. In this context, it can be said that the result obtained is compatible with the literature. In order to improve the terms of trade, policies that will reduce imports and increase exports can be adopted. In addition, the preference of products with high added value such as R&D-intensive and technology-intensive export products will increase the positive effect on economic growth.

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METHYLGLYOXAL STIMULATES STRESS SIGNALING AND GERMINATION OF MAIZE AT SUBOPTIMUM TEMPERATURE

Altafur Rahman[1], Imre Majláth[2], Magda Pál[2]

[1]*Hungarian University of Agriculture and Life Science, Faculty of Horticulture, Department of Plant Physiology Budapest, Hungary.*
[2]*Agricultural Institute, Centre for Agricultural Research, Eötvös Loránd Research Network, Maronvásár, Hungary.*

ABSTRACT

Maize is susceptible to cold injury, particularly during germination. Compounds that enhance the accumulation of free radical forms, such as the reactive aldehyde (RA) methylglyoxal (MG), may be ideal to initiate a systemic defense response since cold triggers oxidative stress. Maize seeds were soaked in MG solution at room temperature for one night before being tested for germination at 13°C in this investigation. At low temperatures, the exogenous MG improved maize germination and photosynthetic activity. MG-induced alterations in photosystem antenna proteins, pigments, late embryogenesis abundant proteins, abscisic acid (ABA) derivatives, chaperons, and specific dihydroflavonols, members of the phenylpropanoid pathway, were discovered using transcriptome analysis, hormone, and flavonoid profiling. The two maize cultivars with contrasting cold tolerance (A654 and Cm174) had slightly varied MG responses, but at least one of the treated genotypes had higher endogenous hydrogen peroxide (H2O2) and reduced nitric oxide (NO) levels. Some of the alterations in hormonal, metabolic, and transcriptomic profiles may have been triggered by these secondary signal molecules. Decreased auxin transport, but enhanced ABA breakdown and cytokinin and jasmonic acid (JA) synthesis, as well as altered carbohydrate metabolism and transport (amylases, invertases, SWEET transporters), could have boosted germination of MG-pretreated seeds. While LEA accumulation may have shielded maize germination from osmotic stress and catalase expression, several antioxidants such as para-hydroxybenzoic acid and anthocyanins may have helped to balance the oxidative environment. Our findings revealed that MG pretreatment could be an effective way to promote cold germination.

Keywords: Cold, flavonoids, germination, hormones, maize, methylglyoxal

UNITY OF LANGUAGE AND CULTURE

Sadigova Afaq
Baku State University, Faculty of Journalism, "Journalism" Research Laboratory Researcher
ORCID Code: 0000-0002-7256-4767

ABSTRACT

The language of a people can be called a mirror of its centuries-old life, a means of transmission between generations, a means of memory, a complete and true history of the people. Since the absence of books and schools, language has been the most important tool in enlightening people, forming national self-consciousness and passing it on to future generations, bridging the gap between people's past, present and future. Language is always a specific artistic, philosophical, scientific and so on. It appears in the texts, is polished and absorbs various elements of the national mentality into the memory of history. Understanding the unifying force of the language, our intellectuals were very sensitive to the language issue and fought for the development of the preservation of a clean, fluent, easy Azerbaijani.

Mankind is on the threshold of the third millennium AD. For its future, along with language unity, it depends on the level of cognition, level of civilization and intellectual potential of people. Each national language enriches the world culture with its achievements. Therefore, the world culture and language cannot be considered the product of the exceptional service of any nation. In this sense, the intelligence and mentality of the century finds its expression in culture. According to the German philosopher Hegel, the only key to learning the wisdom of nations is in the hands of culture. Culture is national in form, international in content and universal in nature. This concept has acquired different meanings and shades in different periods. The culture used in the Islamic East is broader in scope and covers almost all areas of physical and mental activity of people and nations.

Keywords: Language, culture, civilization

MEDIA FORUM OF TURKIC-SPEAKING COUNTRIES AND COMMUNITIES

Agaeva Nigar Ikram gizi

Research Fellow, Research laboratory "Journalism", Faculty of Journalism, Baku State University, Azerbaijan
ORCID Code:0000-0002-9011-927X

ABSTRACT

Throughout its development, journalism in the Kyrgyz Republic has improved under the influence of a number of factors.

At different stages of its history, different forms prevailed, which was mainly due to the technical capabilities for the preparation of materials, as well as their processing and distribution.

III Media Forum of Turkic-speaking countries and communities was held in Bishkek from November 8 to 9, 2013.

The Media Forum of Turkic Speaking Countries is an international event that provides an opportunity to exchange knowledge, experience and create strong communication channels aimed at professional cooperation and solidarity between media representatives.

With the support of the Ministry of Culture, Tourism and Information of the Kyrgyz Republic, together with the Media Platform of Turkic-speaking countries and communities by the General Directorate of Press, Press and Information under the Government of Turkey.

In addition to representatives of the Kyrgyz media, the forum was attended by 70 representatives from Turkey and other Turkic-speaking countries and communities.

Under the patronage of the Deputy Prime Minister of the Republic of Turkey Bulent Arinca, with the participation of the Minister of Foreign Affairs Ahmet Davutoglu, organized by the Department of Press, Press and Information under the Government of the Republic of Turkey in conjunction with the Ministry of Foreign Affairs of Turkey. Republic of Turkey On December 21-22, 2010, the first Media Forum "Media Forum of Turkic-speaking countries" was held in Ankara.

During the forum, an agreement was reached on the preparation of an Agreement on Cooperation between the Ministry of Culture, Information and Tourism of the Kyrgyz Republic and the press bureau of the State Council of the People's Republic of China. Provides interaction in the field of television, radio and print, media tours and practice.

Today, new media platforms are becoming the basis for increasing the efficiency of information and communication processes in society, the development of social institutions, the renewal of journalism. In other words, they can serve as a stepping stone.

Keywords: forum, media, review, information, television

NARINGENIN ALLEVIATES PARAQUAT-INDUCED DOPAMINERGIC NEURONAL LOSS IN SH-SY5Y CELLS AND A RAT MODEL OF PARKINSON'S DISEASE

Dr. Amal Chandra Mondal
School of Life Science, Jawaharlal Nehru University
New Delhi-110067, India

ABSTRACT

Parkinson's disease (PD), a common neurodegenerative disease is characterized by the progressive loss of dopaminergic neurons in the substantia nigra. The cause of dopaminergic loss in PD remains unknown for a long time, however, recent reports suggest oxidative stress plays a key role in the pathogenesis of PD. Paraquat (PQ), a widely used herbicide is an oxidative stress inducer that has been implicated as a potential risk factor for the development of PD. Flavonoids are naturally occurring polyphenolic compounds that display a variety of therapeutic properties against oxidative stress. Naringenin (NAR), a natural flavonoid, exhibits neuroprotection against PD-related pathology. However, studies on its neuroprotective role and the underlying mechanisms are scarce, therefore the present study explored the potential neuroprotective role of NAR in PQ-induced parkinsonism in SH-SY5Y cells and rat model. The effect of NAR on PQ-induced cellular toxicity was determined by measuring cell viability, oxidative stress, ATP levels and the same effect was determined by assessing behavioral, biochemical, immunohistochemical, qRT-PCR and Western blot in rat model. NAR treatment in SH-SY5Y cells resulted in increased cell viability, reduced oxidative stress, elevated mitochondrial membrane potential, and higher cellular ATP levels. In rats, NAR treatment resulted in significant neuroprotection against PQ-induced behavioral deficits, oxidative stress, mitochondrial dysfunction, and astrocytosis. NAR treatment significantly modulated PQ-induced mRNA expressions of DRD2, DAT, LRRK2, SNCA, β-catenin, caspase-3, BDNF genes. NAR treatment increased TH protein expression and modulated its immunoreactivity in rat striatum. Also, GFAP decreased in response to NAR treatment. So, in the present study, NAR exhibits neuroprotection against PQ-induced neurotoxicity and neurodegeneration indicating its novel therapeutic potential against PD.

Keywords: Parkinson’s disease, Naringenin, Therapeutics, Oxidative stress, MMP

CURRENT TREATMENT APPROACHES IN GESTATIONAL DIABETES

Assoc. Prof. Fatma BAŞAR[1]

[1]Kutahya Health Sciences University, Faculty of Health Sciences, Department of Obstetrics and Gynecology Nursing, Kutahya, Turkey,
ORCID Code: 0000-0003-4288-9111

ABSTRACT

Gestational diabetes (GDM) is a pregnancy complication that first appears during pregnancy and increases maternal and neonatal morbidity and mortality. The prevalence of GDM is increasing in the world and in our country. It occurs in approximately 7% of all pregnant women, usually in the second or third trimester. Women with gestational diabetes have a significantly increased risk of developing type 2 diabetes and re-gestational diabetes mellitus in subsequent pregnancies compared to women without gestational diabetes. Maintaining healthy lifestyle behaviors during pregnancy directly affects maternal and fetal health in preconceptional, prenatal and postpartum periods. Pregnant women can be particularly motivated for diabetes treatment with healthy lifestyle changes. Current data show the success of healthy lifestyle practices such as nutrition, physical exercise, coping with stress and smoking cessation in the treatment of gestational diabetes. The most important contribution of healthy lifestyle behaviors will be to reduce the risk of type 2 diabetes in women in the postpartum period and the risk of gestational diabetes in subsequent pregnancies. Health professionals, especially nurses, have a great role in gaining and maintaining healthy lifestyle behaviors in pregnant women. Nurses should motivate the pregnant to adopt healthy lifestyle behaviors such as nutrition, weight control, exercise, sleep, blood glucose level monitoring, and coping with stress in order to prevent the development of GDM and to control GDM. In this review, the current classification for the diagnosis of GDM, healthy lifestyle behaviors for pregnant women and the role of the nurse are discussed.

Keywords: Gestational diabetes mellitus; current treatment approaches; healthy lifestyle behaviors

INTRODUCTION

Gestational diabetes (GDM) is a pregnancy complication that first appears during pregnancy and increases maternal and neonatal morbidity and mortality. It is characterized by different levels of glucose intolerance and its incidence increases in parallel with the increase in maternal obesity. It occurs in approximately 7% of all pregnant women, usually in the second or third trimester. Routine screening test; 24-28 weeks of pregnancy in low-risk pregnant women. It is recommended to be done at the first prenatal visit in high-risk pregnant women. Oral glucose tolerance test (OGTT) is recommended for diagnosis. OGTT can be performed as a single step (75 g glucose) or double step (50 g followed by 100 g glucose). Approximately 70-85% of pregnant women with GDM are treated with lifestyle changes. GDM has adverse effects on maternal and infant health. While it has negative effects on maternal health such as cesarean section, preeclampsia, obesity, increased risk of type 2 Diabetes Mellitus, macrosomia, childhood obesity, hypoglycemia, shoulder dystocia, type 2 Diabetes Mellitus may occur in babies. With the diagnosis of GDM, the protection, maintenance and improvement of maternal and fetal health can be ensured and complications that may occur can be prevented. In order to protect maternal and infant health, as well as to develop a healthy society, GDM should be handled carefully, evidence-based practices should be adopted in this area, and more scientific studies should be conducted in this area. In this review, the current classification for the diagnosis of GDM, healthy lifestyle behaviors for pregnant women and the role of the nurse are discussed.

RESULTS

It is seen that GDM is increasing gradually around the world and its prevalence varies between 1% and 14%. GDM is a public health problem in which the pathology existing on the genetic basis arises with environmental and social factors (2). Maternal obesity, advanced maternal age, ethnicity, history of diabetes in first-degree relatives, history of GDM in previous pregnancies, poor obstetric history defined as large infant or unexplained newborn deaths are shown as risk factors for GDM. The role of screening is of great importance in taking preventive measures and treating GDM . Therefore, GDM screening should be based on risk factors and should be universal. Early diagnosis of GDM is a prerequisite to reduce possible fetal and neonatal complications. Determination of the risk category of pregnants at the first prenatal visit, examination of high-risk pregnants as early as possible, 24-28 if GDM is not detected. It is recommended to be re-evaluated weekly. Diagnosis is made with at least one confirmatory test without the need for an oral glucose tolerance test (OGTT) when fasting plasma glucose (FPG) is ≥ 126 mg/dl and random plasma glucose measured at any time is ≥ 200 mg/dl. Pregnant women with no obvious carbohydrate intolerance, 24-28. evaluated with a one- or two-step approach per week. OGTT (with 75 g or 100 g) is performed on all pregnant women in a one-step approach. In the two-step approach, a screening test with 50 g is recommended first, and diagnostic OGTT is recommended for pregnant women with carbohydrate intolerance. The 50 g screening test is done at any time of the day without the need for fasting. Diagnostic OGTT is recommended for pregnant women with a threshold value of ≥ 140 mg/dl for 1st hour plasma glucose. The ADA recommended a one-step approach, 75 gr OGTT, to all pregnant women in its 2012 and 2013 recommendations.

It is stated that pharmacological methods and lifestyle practices are used in the treatment of GDM, and both methods may be effective on the negative results of diabetes .

It has even been suggested that lifestyle change programs are more effective than pharmacological treatment. Management of GDM includes assessment and regulation of lifestyle, glycemic control, and self-monitoring of blood glucose. Lifestyle, which is associated with eating behaviors and physical activity, has a very important role in the prevention and treatment of diabetes. It is known that behavioral and lifestyle factors as well as genetics have an effect on the development of diabetes (23). There is evidence that healthy lifestyle behaviors such as being at an ideal weight, eating healthy, exercising regularly and not smoking prevent the development of gestational diabetes . It is stated that bad lifestyle behaviors increase the risk of GDM, while healthy lifestyle behaviors reduce the risk of GDM.

Blood glucose monitoring has an important place in the management of GDM, and self-monitoring of blood glucose levels facilitates the treatment of pregnant women so that they can manage the disease and prevent complications. Medical nutrition therapy (TBT), which plays an important role in the management of diabetes, is to individualize treatment by addressing individuals' diets and lifestyle interventions. Pregnant women with GDM can prevent complications by providing glycemic control with a personalized nutrition plan. It recommends an intake of 175 g carbohydrates, 71 g protein and 28 g fiber. According to TBT, diets of pregnant women with GDM should be three main meals and four snacks. The amount of carbohydrates to be taken is specified as 45-55%, protein 20-25%, fat 25-35% (saturated fat 10%, trans fat minimum).

Vitamin D has an undeniable importance in medical nutrition therapy. In many of the studies, it is stated that low vitamin D increases the risk of GDM and that vitamin D supplementation during pregnancy is beneficial in controlling GDM (Zhang et al., 2018). In a systematic review examining the relationship between GDM and vitamin D, it is stated that a daily multivitamin supplement containing 400 IU or 500 IU of Serum 25 (OH) vitamin D is sufficient in the control of GDM (Al- Ajlan et al.,2018; Zhang et al., 2018). Nurses, midwives, physicians and all health personnel involved in the care of the pregnant should ensure that the vitamin D level of pregnant women is checked and, in addition, if the pregnant woman's

vitamin D level is low, it should be replaced. In addition, pregnant women should be informed about external sources of vitamin D and effective use of sunlight.

The World Health Organization (WHO) recommends that healthy pregnant women do at least 150 minutes of moderate-intensity exercise per week (WHO, 2010). Moderate exercise for at least 30-60 minutes 3 times a week for a woman with GDM is beneficial in controlling diabetes.

Effective coping methods with stress also provide benefits for GDM management and protection of pregnant women from possible complications of GDM (Ölçer & Oskay, 2015). Nurses should deal with pregnant women and their relatives together, determine which subjects there is a lack of knowledge and provide training on those subjects.

Pregnant women with gestational diabetes should gain healthy lifestyle behaviors as well as interventions for diabetes treatment. Maintaining healthy lifestyle behaviors in women with GDM both during pregnancy and postpartum periods will also be protective against future gestational diabetes or type 2 diabetes (23,30).

CONCLUSION

GDM is a disease that causes maternal and fetal complications. In addition to the many opinions about the OGTT test used in the diagnosis of GDM, the 75 g single-stage OGTT recommended by ADA and NICE. It has been reported that this test is inexpensive, more effective, and easy to apply to pregnant women. In order to prevent complications, it is important for women with gestational diabetes or at risk to gain coping skills with GDM in maintaining health. Women at risk for GDM can most likely be protected from gestational diabetes by lifestyle changes before and during pregnancy.

Maintaining healthy lifestyle behaviors during pregnancy directly affects maternal and fetal health in preconceptional, prenatal and postpartum periods. Pregnant women can be particularly motivated for diabetes treatment with healthy lifestyle changes. Current data show the success of healthy lifestyle practices such as nutrition, physical exercise, coping with stress and smoking cessation in the treatment of gestational diabetes. The most important contribution of healthy lifestyle behaviors will be to reduce the risk of type 2 diabetes in women in the postpartum period and the risk of gestational diabetes in subsequent pregnancies. Health professionals, especially nurses, have a great role in gaining and maintaining healthy lifestyle behaviors in pregnant women. Nurses should motivate the pregnant to adopt healthy lifestyle behaviors such as nutrition, weight control, exercise, sleep, blood glucose level monitoring, and coping with stress in order to prevent the development of GDM and to control GDM.

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ULTRA-THIN ENG METAMATERIAL ABSORBER USING LUMPED RESISTOR FOR C-BAND

Ahmet TEBER[1*]
[*1]*Bayburt University, Department of Electricity and Energy, Bayburt, Turkey.*
ORCID Code: 0000-0002-7361-2302

ABSTRACT

Metamaterials (MAs) are sequences of structured sub-wavelength elements that can exhibit exotic electromagnetic effects. In metamaterial designs, the usage of lumped elements and the resistive screen is an advantage to enhance a metamaterial absorber's band-width. Despite the fact that metamaterial absorbers (MAs) for C-band applications have been successfully achieved, there exist relatively few publications in the available literature. In this study, an ultra-thin epsilon-negative (ENG) metamaterial absorber on an FR-4 substrate using identical lumped resistors for the C-band is suggested and numerically investigated. All simulations for the suggested MA is performed by CST-microwave studio software (CST 2020), investigating the absorption performance (%) with respect to polarization and incidence angles, effective input impedance, the electromagnetic constitutive parameters, and the distributions of both electric field and surface currents. The single unit cell is configured as three layers of metal-dielectric substrate-metal. In the design configuration, the top surface consists of three metallic surface elements: a double-sided axe, two C-shaped structures, and two lumped resistors with a 0.6 kohm, connected between the apertures of the C-shapes. The suggested MA with a thickness of 0.089λ captured a very good absorption response in the frequency range of 3.839-8.116 (covering the entire C-band) above 94% under normal incidence with a relative absorption bandwidth (RAB) of 71.55%. The absorption mechanism is then explained by the distributions of electric fields and surface currents. Based on the incidence angles, the absorbency of the suggested MA, which is insensitive, is achieved above 90% up to 20 degrees for TE polarization, where the absorption is insensitive above the same level of absorption up to 30 degrees for TM polarization. This proposed work makes a significant contribution to the literature as a feasible candidate MA for the C-band.

Keywords: absorber, C-band, epsilon-negative (ENG), low-frequency, metamaterial.

INTRODUCTION

Metamaterials can be made by embedding chemically fabricated inclusions, metallic surface components, and other materials in or on a host medium. This is an excellent opportunity to give designers more individual criteria to deal with, such as the properties of the host material, the size/shape, density, structure, and alignment of these inclusions (Peebles, 1998). That approach is able to design a metamaterial with specific electromagnetic (EM) responses that are not found in each individual constituent. As EM waves interfere with a medium, electric and magnetic moments are excited, affecting the medium's efficient permittivity and permeability so that negative real values of permittivity and permeability (or both) as a function of frequency have been under considerable attention in metamaterials (Veselago V.G., 1968). Alternative terminologies have been proposed based on negative permittivity and permeability of metamaterials, such as single-negative (SNG), double-negative (DNG), a doublepositive (DPS) media, and media with negative refractive index (Caloz et al., 2001; Caloz & Itoh, 2004; Iyer & Eleftheriades, 2002).

To the best of our knowledge in the literature, it is found that there are relatively less number of publications on the C-band in metamaterial applications even though there exist successfully achieved metamaterial absorbers (MAs) for the C-band. Due to the C-band being less susceptible to rainfall than the Ku-band (because of these and similar advantages) (Almutairi et al., 2019), in this sense, it is anticipated that designing absorbers for the C-band and increasing the number in this field will contribute to the literature. Let's take a look at the accessible literature for C-band. To achieve

broadband absorbency, an MA applying a symmetrical defected resonant patch on the MA surface structure is designed. This results in their method being available for the designation of co-polarization broadband absorbers in frequencies such as infrared, optical, and terahertz (Tran Sy Tuan and Nguyen Thi Quynh Hoa, 2019). A multi-layered absorber based on magnetic material is being investigated in the low frequency field, especially in the S- and C-band, providing useful design guidance for broadband absorbers (Zhang et al., 2020). A complementary split-ring resonator (CSRR) is proposed as a metamaterial with an effective medium ratio, implying that expanding square SRR can improve the electrical length and impact of coupling for C-band(Almutairi et al., 2019). A DNG metamaterial with a frequency range of 0.5 to 7 GHz (covers C-band) is designed and analyzed, claiming that the interconnected array structure causes a higher surface current by connecting the array components, which leads to the resonance frequencies migrating to lower frequencies (M. I. Hossain et al., 2015). A double C-shaped structure of DNG composite metamaterial with relative negative permeability, permittivity, and negative refractive index is designed in a multi-band microwave frequency band (M. J. Hossain et al., 2017). An MA operating in the C-band to improve both bandwidth and angular stability is designed and characterized (Álvarez et al., 2015). An ultra-thin broadband metamaterial absorber (MA) for the C-band by using a double-sided axe (DSA) and two circular patches is reported. The MA entirely responds over the C-band with an absorbency above 90% and a relative absorption bandwidth (RAB) of 66.67% under normal incidence (Hoa et al., 2019). Here, an ultra-thin MA (with a substrate height of 0.102λ) above 94% absorption for the C-band inspired by the study of Hao et al.(Hoa et al., 2019) is reported, considering various design parameters on a different geometry except for a double-sided axe.

Based on the extracted constitutive parameters, the proposed MA is defined as an example of an epsilon-negative (ENG) medium. Due to the small number of metamaterial designs for the C-band in the literature, this proposed work makes a significant contribution to the literature in order to assess its suitability as MA for C-band applications. The simulation for the suggested MA was performed by CST-microwave studio software (CST 2020) investigating the absorption performance (%) with respect to polarization and incidence angles, effective input impedance, the electromagnetic constitutive parameters, and the distributions of both electric field and surface current at the C-band corresponding four resonant peaks. It is also explained the physical phenomena behind the absorption mechanism.

UNIT CELL DESIGN AND THEORY

The properties of a host matrix, the size, shape, density, structure, and alignment are crucial parameters for designing an MA. The important part of the designation of an MA is mainly the top layer surface elements by utilizing these parameters mentioned above. First of all, three elements are used to generate various resonance frequencies that have a coupling effect on the absorption response. Then, the geometry in one direction has been extended, resulting in the absorption being directed towards lower frequencies (Ghobadi et al., 2017). At the beginning of the designation, apertures of two C-shapes are diagonally located face-to-face, like looking the middle point O(0.0) of the top surface. Then the C-shaped structures were rotated to obtain the best absorption at normal incidence according to combinations of clockwise, anti-clockwise (and both) directions with 15-degree angle steps. The best absorption is obtained when the C-shape on the upper side is rotated at an angle of 135 degrees in anti-clockwise direction, while the C-shape on the lower side is rotated at the same angle with the C-shape on the upper side in the clockwise direction. The rest of the analysis process is continued for that configuration shown in Figure 1(a) through (c).

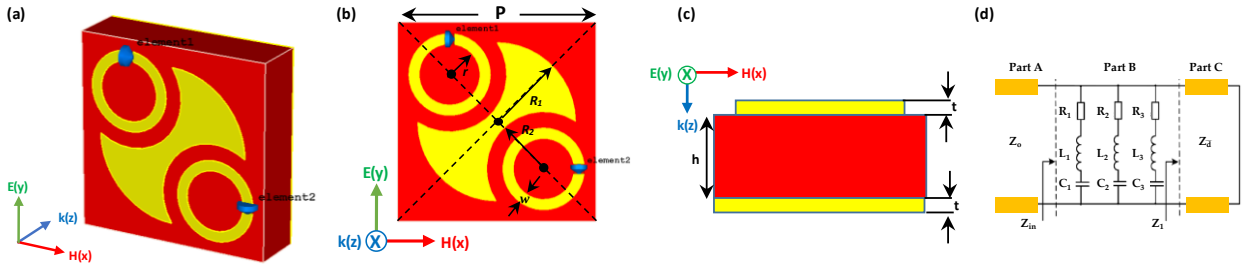


Figure 1. The unit cell structure: (a) 3-D view. (b) Top view with dimension parameters. (c) Side view. (d) Equivalent circuit

Copper is used as a metallic layer with a thickness (t) of 0.035 mm and a conductivity (σ) value of $5.96x10^{-7}$ S/m. The substrate material is fire retardant 4 (FR-4) with a thickness of 0.089λ including a relative dielectric constant of 4.3 and a loss tangent of 0.025. The bottom layer is entirely covered by a Copper layer with the same thickness as the structure layer on top to block the transmission of EM waves. The resonant shapes of the top layer are an axe structure in the center of the substrate, O1(0 mm,0 mm) and two elliptical structures that are diagonally symmetrical at the center points of O2(3.7mm, -3.7 mm) and O3(-3.7 mm, 3.7mm). The axe structure is created by subtracting circular shapes with the radius of R_2 from circular shapes with the radius of R_1. The geometric dimension parameters are reported in Table 1.

Table 1. Design Parameters (mm)

R_1	R_2	r	w	h	P
6.2	4.5	2.4	0.8	4.3	15.6

To examine the physics behind the absorbency mechanism, the schematic of an equivalent circuit model for the simulation is shown in Figure 1(d). For the best absorbency, the impedance matching should be between the free space and the media of an MA. The absorbency of a metamaterial can be expressed as A(w) = 1-R(w)-T(w), where A, R, and T represent absorbance, reflectance, and transmittance as functions of frequency, respectively. In the transmission line theory, when the bottom part of the substrate is entirely blocked by a metallic surface, T(w) becomes zero, so that the metamaterial absorbency has become A(w)=1-R(w). Here, the reflectance can be obtained as the absolute square value of the frequency-dependent S-parameter of $A(\omega)_{S_{11}} = 1 - |S_{11}(\omega)|^2$. The absorption can be written in terms of input impedance and free space impedance as follows:

$$A(\omega) = 1 - R(\omega) = \left| \frac{(Z_{in}(\omega) - Z_0)}{(Z_{in}(\omega) + Z_0)} \right|^2 \quad (1)$$

where Z_{in} is the frequency dependent characteristic input impedance and Z_0 is the frequency dependent free space characteristic impedance. Part A is the transmission line of air with Z_0, where Part C is the shorted transmission line including a substrate with a length of h and the Z_d impedance. Part B is the MA structure with the impedance of Z_m. It consists of an RLC circuit, which demonstrates the components of the top layer and a lumped resistor. The input impedance can be calculated for the parallel configuration impedance of the sectors and the shorted transmission line.

$$\frac{1}{Z_{in}(\omega)} = \frac{1}{Z_m(\omega)} + \frac{1}{Z_d(\omega)} \quad (2)$$

$$\frac{1}{Z_m(\omega)} = \frac{1}{R_1 + j\omega L_1 + \frac{1}{j\omega C_1}} + \frac{1}{R_2 + j\omega L_2 + \frac{1}{j\omega C_2}} + \frac{1}{R_3 + j\omega L_3 + \frac{1}{j\omega C_3}} \quad (3)$$

$$\frac{1}{Z_d(\omega)} = j\sqrt{\frac{\omega_r \omega_0}{\varepsilon_r \varepsilon_0}}\tan(kh) \tag{4}$$

$$k = k_0 \Big/ \sqrt{\varepsilon_r \omega_r} \tag{5}$$

where ε_0 and ε_r are the relative permittivities, ω_0 and ω_r are the relative permeabilities, and k_0 and k_r are the wave numbers of the free space and the dielectric substrate, respectively. The results, depending on design parameters, are shown in Figure 2(a) through (f). During the simulation, depending on the frequency domain solver in CST, the suggested MA is performed in the x-y plane where the waves go through in the z-direction. Here, x, y, and z directions indicate the magnetic field (H), electric field (E), and propagation direction (k), respectively.

RESULTS AND DISCUSSION

Figure 2 shows the different steps of the suggested MA designation. At the beginning, absorbency spectra were investigated for various lumped resistor values (R_x) in the range of 0.2kΩ-1kΩ with an increment of 0.2kΩ (Figure 2(a)). Even though the absorbency has good results for R_x=0.4kΩ and R_x=0.6kΩ, R_x is selected as 0.6k during all simulations because it is commercially easy to find in the market. The other initial design parameters of the unit cell are R_1, R_2, r, *w*, h, and P in mm scale.

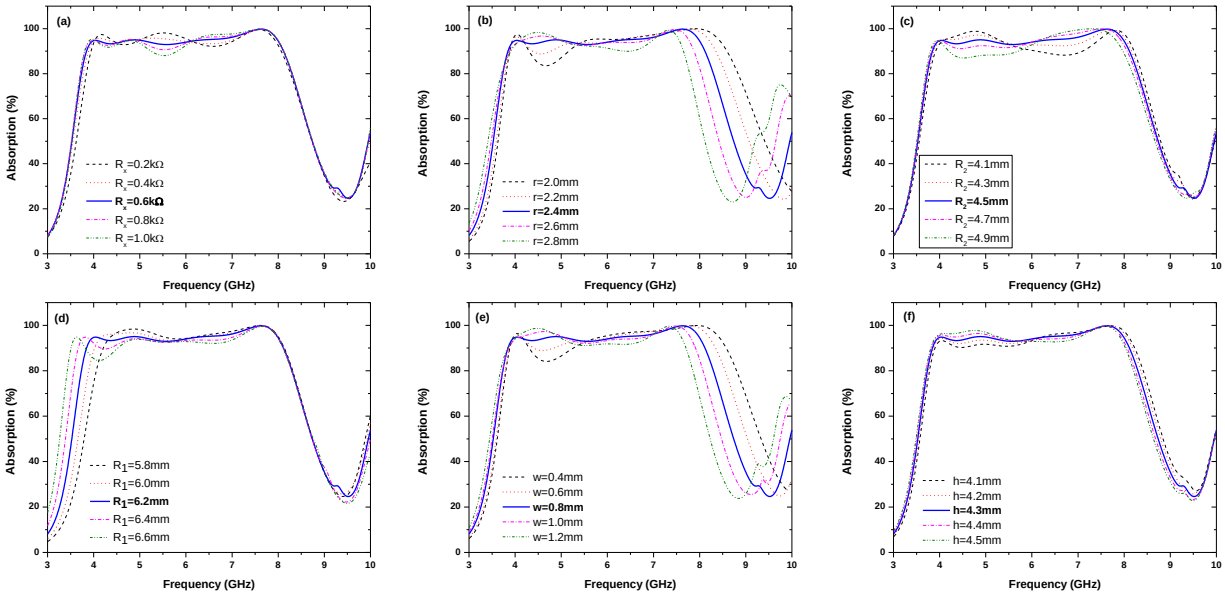


Figure 2. Absorption of the suggested MA for different structural parameters under normal incidence for TE polarization. The parameters are (a) R_x, (b) r, (c) R_2, (d) R_1, (e) *w*, and (f) h.

The absorbency efficiencies of the suggested MA under normal incidence both TE an TM polarizations are illustrated in Figure 3(a) where the investigation of how a lumped resistor contributes absorbency efficiency is shown in Figure 3(b). It is obvious that a lumped resistor responds in a good way to obtain better absorbency covering entire C-band frequency range at normal incidence under TE polarization. Moreover, the absorbency of the suggested MA is identical for both TE and TM polarizations. The suggested MA has four different resonance peaks to couple with at 4.04, 4.9, 6.54, and 7.63 GHz corresponding to the peak absorption values of 94.78%, 95.03%, 95.2%, and 99.78%, respectively.

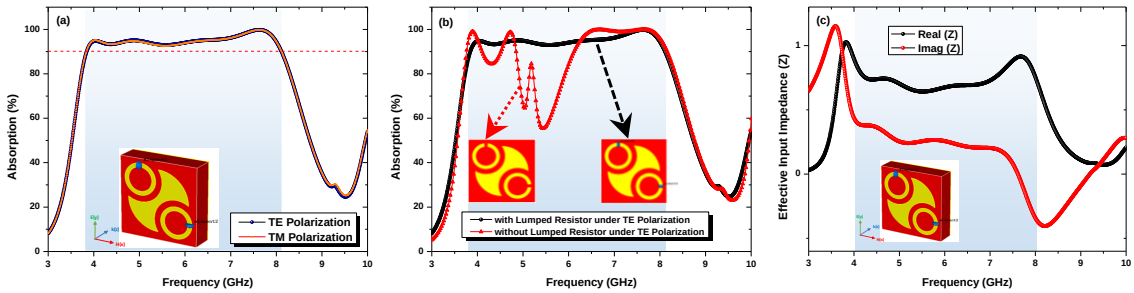


Figure 3. Absorption of the suggested MA at normal incidence: (a) For TE and TM polarizations. (b) with/without using lumped resistors under TE and TM polarizations. (c) Effective input impedance (Z) of the MA with lumped resistors.

The absorbency above 90% is obtained in the frequency range of 3.839 GHz-8.116 GHz with a relative absorption bandwidth of 71.55%, which is calculated by using the formula of

$$RAB = 2 \times \frac{f_U - f_L}{f_U + f_L} \tag{6}$$

where f_L and f_U are the lower and upper frequencies, respectively, corresponding to the absorption of 90%. According to Figure 3(c), the real and imaginary parts of normalized input impedance oscillating around 1 and 0, respectively, as a function of frequency. It means that the impedance matching between our MA and free space has occurred. The computation of the normalized input impedance is obtained using the equation below:

$$Z = \sqrt{\frac{(1+S_{11})^2 - S_{21}^2}{(1-S_{11})^2 - S_{21}^2}} = \frac{1+S_{11}}{1-S_{11}} \tag{7}$$

Figure 4a represents the co-polarized and cross-polarized reflection of the suggested MA at normal incidence for TE polarization. The co-polarized reflection is smaller than 0.265, while the cross-polarized reflection is higher than 0.636 in the frequency range from 3.839 GHz to 8.116 GHz.

$$PCR = \frac{r_{xy}^2}{r_{xy}^2 + r_{yy}^2} \tag{8}$$

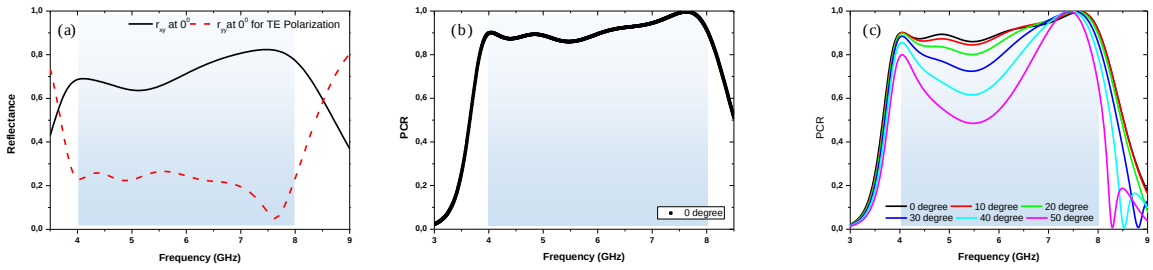


Figure 4. (a) Co-polarization (r_{yy}) and cross-polarization (r_{xy}) reflectance under normal incidence. (b) Polarization conversion ratio (PCR) under normal incidence. (c) Polarization conversion ratio (PCR) depending on incident angles.

The results indicate that the cross-polarized reflection is much higher than the co-polarized reflection for the suggested MA in the mentioned frequency range. It can be said that co-polarized absorbivity is much higher than cross-polarized absorbivity, which is interpreted as the incident wave being cross-polarized after reflection. The polarization conversion ratio (PCR) calculated using Equation 8 as shown in Figure 4(b) is above 85% from 3.839 GHz to 8.116 GHz, indicating that the structure

can serve as a broadband high-efficiency polarization converter. The PCR values are calculated and plotted in Figure 4(c) based on the incident angle.

To investigate the polarization behavior of the suggested MA, the polarization angle is changed with a 10 degree increment until 90 degrees. The suggested MA is polarization dependent above 20 degrees, even though the absorbency goes up to 99.99% for the polarization angle of 10^0-80^0 where the bandwidth decreases. Yet, the absorbency under normal incidence for TE and TM polarization is achieved above (at least) 94% (Figure 5).

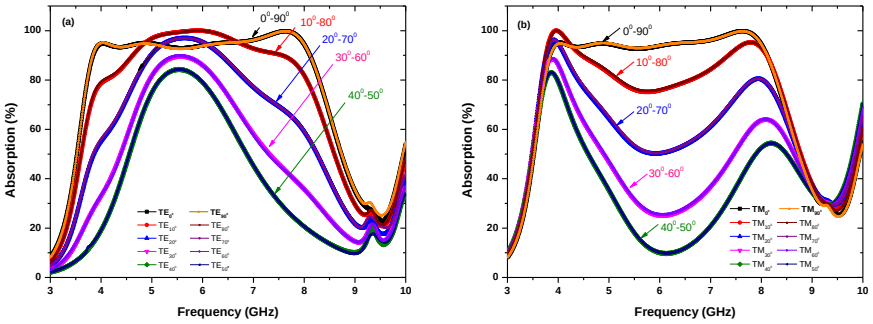


Figure 5. Absorption of the suggested MA based on polarization angles: (a) for TE polarization. (b) for TM polarizations.

Based on the incident angle, Figure 6 shows that the absorption of the suggested MA under TE polarization is insensitive above 90% until 20^0. Then, it is dependent at the higher incidence angles for TE polarization. The absorbency relationship with incident angle for TM polarization is independent above 90% until 30^0.

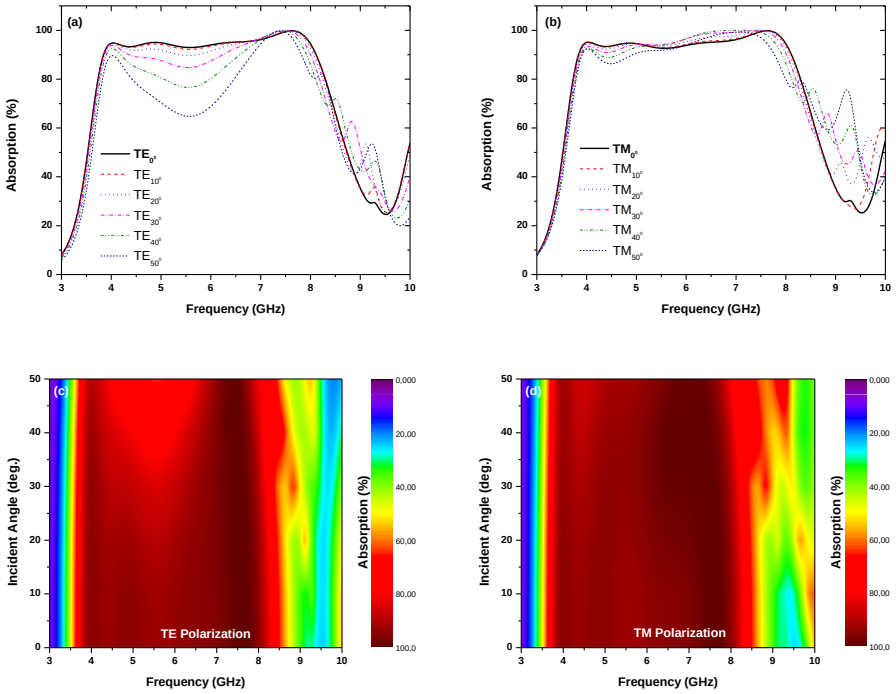


Figure 6. Absorption of the suggested MA based on incident angles: (a) for TE polarization. (b) for TM polarizations. (c) the contour plots for TE polarization. (d) TM polarization contour plots.

The absorption mechanism is explained using the distributions of electric fields and surface currents (Figure 7). Both distributions are illustrated depending on four resonant peaks of 4.04 GHz, 4.9 GHz, 6.54 GHz, and 7.63 GHz, respectively. According to Figure 7(a) through (d), including these resonant peaks, the electric field is concentrated around the axe's edge and the C-shape on its upper side. Furthermore, the electric field is harvested not only from the edges of the DSA but also from the outer edges of the C-shape structure. Then, the electric field turns in a clockwise direction throughout from (a) to (d). Therefore, it can be said that the electric field is strongly created and it reverses to the incident electric field. It confirms that the excited electric field is stronger than the incident electric field.

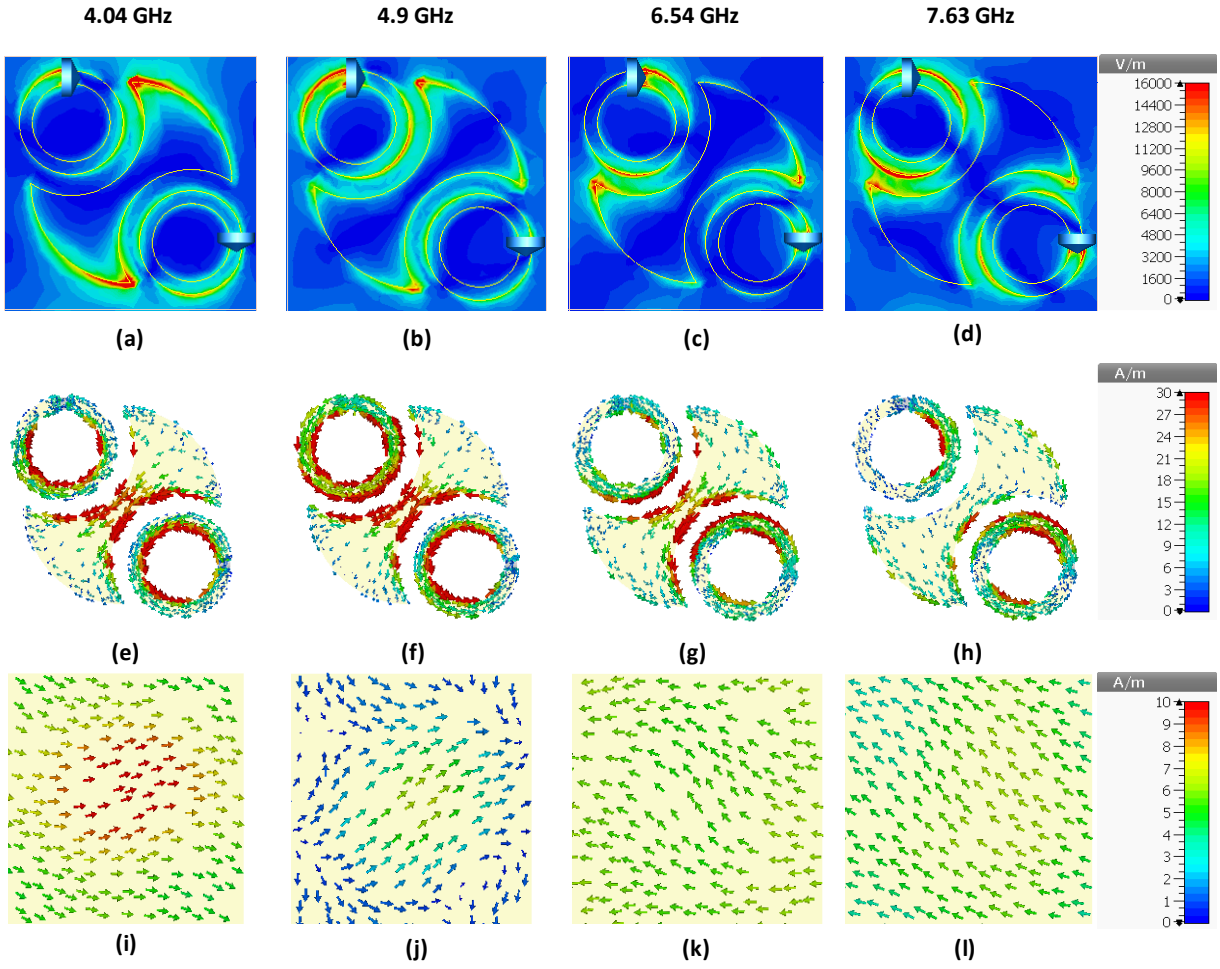


Figure 7. (a-d) Electric filed distributions. (e-h) Surface current distributions on the top layer of the suggested MA. (i-l) Surface current distributions on the bottom layer of the suggested MA at normal incidence for the resonant peak values.

Figures 7(e)-(h) and 7(i)-(l) show the surface current distributions of the suggested MA for the top and bottom layers, respectively. For the top layer, as the resonance frequency increases, the current density on the C structures occurs in the opposite direction, while the direction of the current density on the ax structure does not change. It is seen that the current density decreases as the resonant frequency increases. For the bottom layer, the intensity of surface current distribution decreases along all resonant frequencies where the surface current turns in an anticlockwise direction. It means that the surface current on the bottom layer is circulating and forming the induced magnetic field so that the strong magnetic resonance contributes to these resonant frequencies.

The physics mechanism is clarified by obtaining electromagnetic constitutive parameters (permittivity and permeability) using s11 parameters by the following equations (coskun et al., 2021; watts et al., 2012):

$$\varepsilon_{eff} = 1 + \frac{2j}{k_0 d}\frac{S_{11}-1}{S_{11}+1} \tag{9}$$

$$\mu_{eff} = 1 + \frac{2j}{k_0 d}\frac{S_{11}+1}{S_{11}-1} \tag{10}$$

where k_0 is the wave number and where d is the distance travelled by the incident wave. These constitutive parameters are an answer to whether the absorption occurs due to electrical or magnetic resonance (or both). Based on the effective medium theory, metamaterials can be considered by using the electromagnetic constitutive parameters. Most studies in the accessible literature have concentrated on Re(ε) and Re(μ), while imag(ε) and imag(μ) are possibly obtained with the smallest values to minimize the losses and create a perfect absorber with high absorbency. Even negative permeability mediums are obtained, including negative permeability values. To explain the absorption mechanism, excited electric and magnetic resonances are in control for absorbency with too small reflections. Extracted electromagnetic constitutive parameters' values are obtained to provide an idea behind the physical absorption mechanism (Figure 8). According to the Figure 8, Re(ε) is less than under 0 at the operating frequency range for C-band, whereas Re(μ) is greater than zero. It means that the suggested MA can be classified as epsilon-negative (ENG). Also, it can be said that the suggested MA responds to an external applied field because of negative real effective permittivity values.

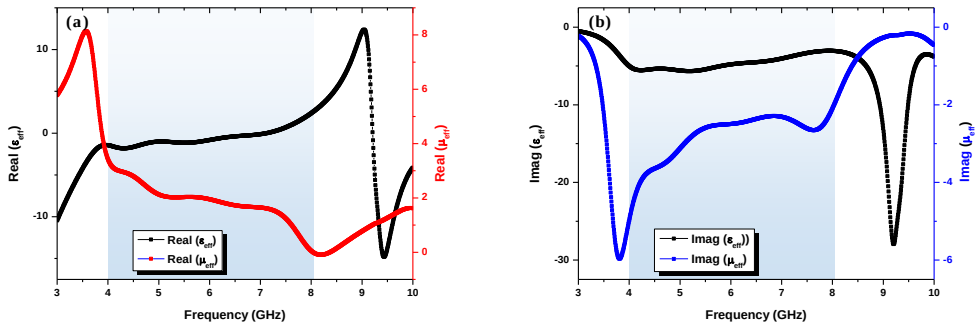


Figure 8. Extracted electromagnetic constitutive parameters: (a) The real part of the permittivity and permeability. (b) The imaginary part of the permittivity and permeability.

CONCLUSION

We suggested a design of an ultra-thin ENG metamaterial using the DSA axe and two C-shaped elements with a lumped resistor of 0.6kΩ for C-band applications. In this paper, we also observed how the usage of a lumped element can affect absorbency performance in a good way. Namely, the bandwidth is increased by using lumped resistors. The absorption along the C-band is obtained higher than 94% with a RAB of 71.55% under normal incidence. Based on the incidence angles, the absorption of the suggested MA (which is insensitive) is achieved above 90% up to 20 degrees for TE polarization, where the absorption is insensitive above the same level of absorption up to 30 degrees. This paper offers a feasible candidate for C-band applications.

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ÖZEL YETENEKLİ ÖĞRENCİLERİN İNTERNET BAĞIMLILIĞININ İNCELENMESİ

Serpil SEVİMLİ DENİZ[1*], Helin YARCEL[2]

*[*1]Van Yüzüncü Yıl Üniversitesi, Gevaş Meslek Yüksekokulu, Bilgisayar Teknolojileri, Van, Türkiye.*
[2]MEB, Uzman PDR, Van, Türkiye.
ORCID[1]:0000-0002-8559-1107: ORCID[2] :0000-0002-4974-1307

ÖZET

Bu çalışmanın amacı; özel yetenekli öğrencilerin pandemi sürecinde internet bağımlılık düzeylerinin çeşitli parametrelerle incelenmesidir. Çalışma grubunu 2020-2021 eğitim öğretim yılında Van Yusuf Gökçenay Bilim Sanat Merkezi'nde (BİLSEM) öğrenimlerine devam eden 165 özel yetenekli öğrenci oluşturmaktadır. Çalışmada, "İnternet Bağımlılığı Ölçeği" ve kişisel bilgilerin bulunduğu bir form kullanılmıştır. Çalışmada; özel yetenekli öğrencilerin internet bağımlılık puanları cinsiyete göre önemli ölçüde farklılaşmakta mıdır?, özel yetenekli öğrencilerin günlük internet kullanımlarına göre internet bağımlılık düzeyleri arasında anlamlı bir farklılık var mıdır?, özel yetenekli öğrencilerin internet bağımlılık düzeylerinde internet kullanım amaçlarına göre anlamlı bir farklılık var mıdır?, özel yetenekli öğrencilerin en çok zaman geçirdikleri platform ile internet bağımlılık düzeyleri arasında anlamlı bir fark var mıdır?, özel yetenekli öğrencilerin interneti en çok kullandıkları araçlar ile internet bağımlılık düzeyleri arasında anlamlı bir fark var mıdır?, özel yetenekli öğrencilerin aile ekonomik durumları ile internet bağımlılık düzeyleri arasında anlamlı bir farklılık var mıdır?, özel yetenekli öğrencilerin boş zaman aktiviteleri ile internet bağımlılık düzeyleri arasında anlamlı bir fark var mıdır? sorularına yanıt aranmıştır. Bu çalışmada; Dağılım normal olmadığı için dağılım ölçülerinden ortanca ve çeyrek sapma değerleri kullanılmıştır. Burada ortanca değer eşik değeri olarak kabul edilir. Bu eşik değerinin altı ve üstü bağımlı olmayan ve bağımlı olarak kabul edilir. İnternet Bağımlılığı Ölçeğinden alınan toplam puanlar bağımlıdır; Cinsiyet, yaş aralığı, boş zaman aktivitesi, gün içinde internet kullanım sıklığı, internet kullanım amacı, en çok zaman geçirilen platform, kullanılan araç, ailenin ekonomik düzeyi parametreleri de bağımsız değişkenler olarak değerlendirilmiştir. Elde edilen bulgulara göre cinsiyet, yaş aralığı, boş zaman aktivitesi, gün içinde internet kullanım sıklığı, internet kullanım amacı, bağımlılık düzeyi açısından anlamlı farklılıklar bulunmaktadır. Nicel verilerin analizinde betimsel istatistikler ile birlikte non-parametrik test analizleri kullanılmıştır. İnternet Bağımlılığı Ölçeğinden elde edilen toplam puanlar bağımlı; diğerleri bağımsız değişkenler olarak değerlendirilmiştir. Elde edilen bulgulara göre cinsiyet, yaş aralığı, boş zaman aktivitesi, gün içerisinde ne sıklıkla internet kullandığı, internet kulanım amacı bağımlılık düzeyi için anlamlı farklılıklar göstermektedir. Bu çalışmadan elde edilen bulgular kapsamında Bilim ve Sanat Merkezlerinde yürütülen öğretim programlarına yönelik öneriler sunulmuştur.

Anahtar Kelimeler: İnternet Bağımlılığı, Bilim ve sanat merkezi, Özel yetenekli öğrenci.

EXAMINATION OF INTERNET ADDICTION OF GIFTED STUDENTS

ABSTRACT

The purpose of this study; gifted students are examined by various parameters of internet dependence levels in the process of pandemia. The study group, 2020-2021 training in Education in Van Yusuf Gökçenay Bilem, constitutes 165 special skilled students. In the study, a form of "Internet Addiction Scale" and the personal information is used. Non-parametric test analyzes and data visualization were used in the analysis of quantitative data. The total scores obtained from the internet addiction scale are dependent; Gender, Age Range, Leisure Activity, how often uses internet in the day, the purpose of internet, the purpose of internet, the most important platform, the vehicle used, the economic level parameters of the family are evaluated as independent variables. According to the findings obtained, the gender, age range, leisure activity uses internet in the day, shows significant differences to the dependence level of internet. In the scope of the findings obtained from this study, recommendations for the curriculum conducted in science and art centers are presented.

Keywords: Internet Addiction, Science and Art Center, Gifted students.

GİRİŞ

Covid-19 pandemisi, 2019 ve 2020'nin en yaygın hastalığı olarak görülmüştür (Wang, Horby, Hayden ve Gao, 2020). Sokağa çıkma yasakları, tecrit, sosyal mesafe, sosyal izolasyon ve karantina, insanları yaşam biçimlerini değiştirmeye ve ilişkilerini etkilemeye yöneltmiştir (Okunlola, Lamptey, Senkyire,

Dorcas ve Dooshima, 2020). İşten eğitime, sağlık hizmetlerine ve ötesine kadar pek çok günlük aktivite kamusal alanlardan evlere taşındıkça, teknoloji ve internet kullanımı önemli ölçüde artmıştır (Ahorsu ve diğerleri, 2020). Bazı insanlar teknolojiyi depresyon, anksiyete veya çaresizlikten kaçmanın bir yolu olarak görse de (Hinić, Mihajlović, Špirić, Dukić-Dejanović ve Jovanović, 2008)), çevrimiçi olarak harcanan zamanın artması, sosyal etkileşim ve entegrasyonda da artışa neden olabilir. Bu faktörler de teknoloji kullanma ihtiyacını artırabilir ve nihayetinde onu bağımlılık seviyesine yükseltebilir. COVID-19 salgını sırasında teknolojik araçların aşırı kullanımının, özellikle kullanım süresi arttıkça bağımlılık için bir risk faktörü olma olasılığını iki veya daha fazla kat arttırdığı bulunmuştur (Aliyev, 2020; Winther & Byrne, 2020).

Anju, COVID kısıtlamaları sırasında üniversite öğrencileri arasında cinsiyetin ve dönemin İnternet bağımlılığı ve ruh sağlığı üzerindeki etkisini incelemek amacıyla 166 öğrenciden oluşan bir örneklemle çevrimiçi olarak görüşmüş ve İnternet bağımlılığı testi ile depresyon, anksiyete ve stres ölçeği ile değerlendirmiştir. Bu çalışmada hazırlık dönemi öğrencilerinin COVID-19 salgını sırasında İnternet bağımlılığı ve zihinsel sağlık sorunları konusunda yüksek puan aldıkları görülmüştür. Sonuçlar, erkek katılımcıların İnternet bağımlılığı ve zihinsel sorunlar konusunda yüksek skorlara sahip olduğunu göstermiştir.

Özel yetenekli öğrenciler, aynı yaşta, deneyimde veya çevredeki akranlarına kıyasla yüksek skorlarda başarı sağlayan çocuklar ve gençlerdir. Bu bireylerin sanatsal ve akademik alanda ön plana çıkmalarının nedenleri; entelektüellik, yaratıcılık ve olağanüstü bir liderlik kapasitesine sahip olmalarıdır. Bu özellikleri olan bireyler genel olarak devam ettikleri eğitim kurumlarınca sunulamayan eğitimlere ya da etkinliklere gereksinim hissederler. Özel yetenekli bireyler tüm kültürel gruplarda ve tüm ekonomik katmanlarda bulunabilir (Passow ve Rudnitski, 1993).

Bu öğrencilerin devam ettiği ilköğretim okullarından özel yetenekli öğrencilerin ve normal seviyeli öğrencilerin seçildiği bir çalışmada elde edilen sonuçlardan bazıları aşağıdaki gibidir. Üstün zekalı ve yetenekli öğrencilerin %97,9'unun evde kullanabilecekleri bir bilgisayarı var; hepsinin e-posta adresi var; bilgisayarları normal öğrencilerden daha uzun süre kullanıyorlar; normal öğrencilere göre bilgisayar oyunlarının önemli bir boş zaman etkinliği olarak görüldüğünü ortaya çıkarmıştır (Üstünel, 2008).

Bağımlılık, istekli veya daha önce istekli olunan davranışlarda aşırılık olarak tanımlanabilir (Bradley, 1990). İletişimi artırmak ve bilgi paylaşımını kolaylaştırmak amacıyla kullanılan internetin hızla yaygınlaşması, internet bağımlılığının ortaya çıkmasına neden olmuştur. İnternet bağımlılığı çağımızın karşı karşıya olduğu önemli sorunlardan biridir ve toplum sağlığını olumsuz etkilemektedir.

Özel yetenekli öğrencilerin internet bağımlılık düzeyinin tespit edilmesi, erken müdahale ve alınacak önlemlerin ehemmiyeti açısından son derece önemlidir. İnternet bağımlılığının cinsiyet ve yaş üzerindeki etkilerinin anlaşılması, kritik yaş dönemleri ve cinsiyet faktörüne göre çözüm yolları üretilmesine ve rehberlik çalışmalarının geliştirilmesine yardımcı olacaktır. Bireylerin aile ilişkileri açısından internet bağımlılığının; anne ve babanın öz veya üvey olma durumu, anne ve baba birliktelik durumu, ailenin eğitim durumu, ailenin sosyo-ekonomik düzeyleri gibi değişkenlere göre farklılaşması aile ile iş birliği yaparak çözüm yolları uygulama noktasında yardımcı olacaktır. Bu nedenle internet bağımlılık ölçeği ile değişkenler arasındaki ilişkiyi belirlemek amacıyla yapılan bu çalışmanın, öğretmenlere, program geliştiricilerine ve eğitiminde yer alan araştırmacılara deneysel kanıtlar sunması açısından literatüre katkı sağlayacağı düşünülmektedir. Bu nedenlerle yapılan çalışmada aşağıda belirtilen sorulara yanıt aranmıştır:

1.Özel yetenekli öğrencilerin cinsiyetlerine göre internet bağımlılık skoru anlamlı farklılık göstermekte midir?

1. Yaşa göre özel yetenekli öğrencilerin internet bağımlılık skoru anlamlı farklılık göstermekte midir?
2. İnternet günlük kullanım süresine göre özel yetenekli öğrencilerin internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?
3. Özel yetenekli öğrencilerin interneti kullanım amaçlarına göre internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?
4. Özel yetenekli öğrencilerin en fazla vakit geçirdikleri platform ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?
5. Özel yetenekli öğrencilerin en fazla internete girdikleri araç ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?
6. Özel yetenekli öğrencilerin aile ekonomik durumu ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?
7. Özel yetenekli öğrencilerin boş zaman aktivitesi ile internet bağımlılık düzeylerindeki fark anlamlı mıdır?

YÖNTEM

Araştırma Modeli

Nicel araştırma yöntemlerinin işleyiş aşamasında bir araştırma grubu incelenir ve yorumlanır. Nicel araştırmada amaç, bireylerin toplum içindeki davranışlarını gözlemlemek ve deney yolu ile objektif bir şekilde ölçmek ve sayılarla açıklamaktır. Gerçekler arasında oluşan bağları yorumlayabilmek için istatiksel veriler dikkate alınır ve ortaya çıkan sonuçlar rakamsal ifade edilir.Nicel bir araştırma olan bu çalışmanın yöntemi ilişkisel tarama modelidir. Bu model, birçok öğeden oluşan bir ana kütleden, anakütle hakkında genel bir yargıya varmak için ana kütlenin tamamından veya alınacak örnek üzerinde yapılacak inceleme olarak tanımlanır (Karasar, 2004).

Araştırma Evreni ve Örneklem

Çalışma Van Yusuf Gökçenay Bilim Sanat Merkezi'nde yürütülmüştür. 2020-2021 yılı için 210 öğrencisi vardır. Araştırmanın örneklemini 2020-2021 eğitim öğretim yılında öğrenim gören 165 öğrenci oluşturmaktadır.

Veri Toplama Araçları

Bu çalışmada, İnternet Bağımlılık Ölçeği ve Kişisel Bilgi Formu kullanılmıştır.

İnternet Bağımlılığı Ölçeği

İnternet bağımlılığı üzerinde uzlaşılmış tanı ölçütleri yoktur. Çalışmada kullanılan İnternet Bağımlılık Ölçeği, Günüç ve Kayri (2010) tarafından geliştirilmiştir. Dört alt boyuta sahiptir ve 35 maddeden oluşmaktadır. Ölçeğin maddeleri 5'li "Likert" olup, 1- Tamamen katılıyorum, 2-Katılıyorum, 3-Kararsızım, 4-Katılmıyorum ve 5- Kesinlikle katılıyorum şeklindedir. Ölçek maddeleri 5'ten 1'e doğru puanlanmış olup, "Tamamen katılıyorum" derecesine 5 karşılık gelirken, "Kesinlikle katılmıyorum" derecesine 1 karşılık gelmektedir. Ölçekteki bütün maddeler bağımlılığa yönelik olup, herhangi bir puan dönüşümüne (transpose) gerek yoktur.

Bu çalışmada bağımlılık skorunun dağılımı normal dağılım göstermemektedir. Bu nedenle dağılım ölçülerinden ortanca ve çeyrek sapma değerleri kullanılmıştır. Burada ortanca değer eşik değer olarak kabul edilmiştir. Bu eşik değerin altı ve üstü, bağımlı değil ve bağımlı olarak nitelendirilmiştir.

Kişisel Bilgi Formu

Cinsiyet, yaş aralığı, boş zaman aktivitesi, gün içerisinde ne sıklıkla internet kullandığı, internet kulanım amacı, öğrenim görülen program, en fazla vakit geçirilen platform, kullanılan araç, ailenin ekonomik düzeyi parametreleri çalışmada kullanılan kişisel bilgi formunda sorulmuştur.

Veri Toplama Süreci

Anket çalışması pandemi dolayısıyla yüz yüze yapılamamıştır. Elektronik ortamda hazırlanan form öğrencilere link gönderilerek doldurulmuş ve analiz yapılacak veri seti oluşturulmuştur.

Verilerin Analizi

Analizlerin yapılmasında SPSS-18 programı kullanılmıştır.

Etik Onay

Etik Onay; T.C. Van Yüzüncü Yıl Üniversitesi Sosyal ve Beşerî Bilimler Yayın Etik kurulu tarafından, 11.01.2021 tarih, 117 sayılı etik kurul onayı verilmiştir.

BULGULAR

Veri setindeki Bağımlı değişken Bağımlılık skoru olup, 165 bireyden elde edildi. Ortalaması 68.34; medyan 64; mod 52; standart sapması 27.99; varyansı 783.77; minimum 35; maksimum 175 değerleri bulundu. İnternet bağımlılığı ölçeği 1-5 arasında değerler alarak; en yüksek 175, en düşük 35 değerlerini alır.

Tablo 1. Örneklemin Betimsel İstatistik Verileri

N	A.Ort.	Std.Sapma	varyans	Min.	Max.	Std.hata
165	68.34	27.99	783.77	35	175	2.179

Veri setinde yer alan bağımlı değişkenin normal dağılım sergileme durumunu analiz edildi. Tablo 2'de Kolmogorov-Smirnov, curtosis (basıklık) ve skewness (diklik) ölçüleri verildi.

Tablo 2. Kolmogorov-Smirnov, Curtosis (Basıklık) ve Skewness (Diklik) Ölçüleri

Kolmogorov-Smirnov	Basıklık	Diklik
0.117	2.472	1.457

Verilerin dağılımı incelendiğinde, Tablo 2'ye göre basıklık ve çarpıklık değerleri 0'dan çok büyüktür. 0 olması istenir. -1 ve 1 aralığında yine Kolmogrov Simirnow değeri 0.05'in altında olduğundan normal dağılıma uymadığı görülmektedir. Non- parametrik istatistiksel yöntemlerin kullanılması gerekir. Bağımlılık skoru bağımlı değişken alınarak aşağıdaki sorular incelenmiştir.

1. *Özel Yetenekli Öğrencilerin İnternet Bağımlılığı skorlarının Cinsiyet Açısından İncelenmesi*

Bağımsız değişkenlerden biri olan cinsiyet ile bağımlılık skoru bağımlı değişken olarak değerlendirildi. Veriler normal dağılmamaktadır ve non-parametrik testlerden Mann Whitney U testi uygulandı ve sig. değerinin 0.05'ten küçük olduğu belirlendi. H_0 hipotezi red edilir. Yani cinsiyetler arasında bağımlılık skoru farklılık gösterir.

2. *Özel yetenekli öğrencilerin internet bağımlılığı skoru yaşa göre anlamlı farklılık göstermekte midir?*

Bağımsız değişkenlerden biri olan yaş ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden no Mann Whitney U testi uygulandı ve sig. değerinin 0.05'ten küçük olduğu belirlendi. H_0 hipotezi red edilir. n-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten küçük olduğu belirlenmiştir. H_0 hipotezi red edilir. Yani yaş ile bağımlılık skoru farklılık göstermektedir. Yapılan post-hoc testi sonucu 10-12 yaş grubu ile 16-18 yaş grubu arasında istatistiksel açıdan önemli fark olduğu belirlenmiştir.

3. Özel yetenekli öğrencilerin interneti günlük kullanım süresine göre internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan internette geçirilen zaman ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten küçük olduğu belirlenmiştir. H_0 hipotezi red edilir. Yani internette geçirilen zaman ile bağımlılık skoru farklılık göstermektedir. Yapılan post-hoc testi sonucu kitap okumak ile bilgisayar oyunu oynamak ve resim-müzik faaliyetleri ile internette zaman geçirmek arasında istatistiksel açıdan önemli fark olduğu belirlenmiştir. Kitap okumak ile bilgisayar oyunu oynamak ve resim müzik faaliyetleri ile internette zaman geçirmek arasında önemli farklar olduğu görülmektedir. 0-30 dak. arası internette zaman geçiren bireyler ile diğerleri önemli ölçüde farklılaşmaktadır.

4. Özel yetenekli öğrencilerin interneti kullanım amaçlarına göre internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan internet kullanım amacı ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten küçük olduğu belirlenmiştir. H_0 hipotezi red edilir. Yani internet kullanım amacı ile bağımlılık skoru farklılık göstermektedir. Yapılan post-hoc testi sonucu araştırma yapmak ile film-dizi ve müzik faaliyetleri ile araştırma yapmak le oyun oynamak arasında istatistiksel açıdan önemli fark olduğu belirlenmiştir. Film-dizi ve müzik faaliyetleri ile araştırma yapmak ile oyun oynamak ile araştırma yapmak arasında istatistiksel açıdan fark olduğu belirlenmiştir.

5. Özel yetenekli öğrencilerin en fazla vakit geçirdikleri platform ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan en fazla vakit geçirilen platform ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'den büyük olduğu belirlenmiştir. H_0 hipotezi kabul edilir. Yani en fazla vakit geçirilen platform ile bağımlılık skoru farklılık göstermemektedir.

6. Özel yetenekli öğrencilerin en fazla internete girdikleri araç ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan en fazla internete girilen araç ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten büyük olduğu belirlenmiştir. H_0 hipotezi kabul edilir. Yani en fazla kullanılan araç ile bağımlılık skoru farklılık göstermemektedir. Kullanılan araç bağımlılık skoru açısından önemli bulunmamıştır. Telefon ile en fazla internete girildiği görülmektedir.

7. Özel yetenekli öğrencilerin aile ekonomik durumu ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan ekonomik durum ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten büyük olduğu belirlenmiştir. H_0 hipotezi kabul edilir. Yani

ailelerin ekonomik durumu ile bağımlılık skoru farklılık göstermemektedir. Ekonomik durum bağımlılık skoru açısından önemli bulunmamıştır.

8. Özel yetenekli öğrencilerin boş zaman aktivitesi ile internet bağımlılık düzeylerinde anlamlı bir farklılık var mıdır?

Bağımsız değişkenlerden biri olan boş zaman aktivitesi ile bağımlılık skoru bağımlı değişken olarak değerlendirilmiştir. Veriler normal dağılım göstermediğinden non-parametrik testlerden Kruskal Walis testi yapılmış, sig. değerinin 0.05'ten küçük olduğu belirlenmiştir. H_0 hipotezi red edilir. Yani boş zaman aktivitesi ile bağımlılık skoru farklılık göstermektedir. Yapılan post-hoc testi sonucu internette zaman geçirmek ve bilgisayar oyunu oynamak ile resim- müzik çalışmaları ile kitap okumak arasında istatistiksel açıdan önemli fark olduğu belirlenmiştir. boş zamanlarında internette zaman geçirenler ile bilgisayar oyunu oynayanların bağımlılık düzeyi yüksektir. Kitap okuma ve resim-müzik çalışmaları yapma durumlarında bağımlılık düzeylerinin düşük olduğu gözlemlenmektedir.

TARTIŞMA

Bu araştırmada pandemi döneminde özel yetenekli öğrencilerin internet bağımlılık düzeylerinin incelenmesi amaçlandı. Bu kapsamda Van Yusuf Gökçenay BİLSEM'de farklı programlarda öğrenim gören 165 özel yetenekli öğrenci ile çalışma yürütüldü. Özel yetenekli öğrencilerin internet bağımlılığı ölçeğinden elde ettikleri toplam puanların ortalaması 68.34, medyanı 64 olarak bulundu. Veriler normal dağılmadığından medyan dikkate alınarak öğrencilerin %51'i bağımlı; %49'u bağımlı değil olarak sınıflandırıldı. Pandemi döneminde özel yetenekli öğrencilerin internet bağımlılığı eğiliminin yüksek olduğu söylenebilir. 2016 yılında yine BİLSEM öğrencileri ile yürütülen benzer bir çalışmada Araştırmaya katılan özel yetenekli 421 öğrencinin %46,79'u muhtemel bağımlı iken, %12,11'i bağımlı olan grup kategorisinde belirlenmiştir (Usta, 2016).

Özel yetenekli erkek öğrenciler kız öğrencilere göre internete daha çok bağımlıdır. Morahan-Martin ve Schumacher (2000), Wang (2001), Günüç (2009) ve Bölükbaş‟ı (2003) çalışmalarında erkek kullanıcıların kız kullanıcılara oranla bağımlılık düzeylerinin daha yüksek olduğunu tespit etmişlerdir.

Özel yetenekli öğrencilerden 10-12 yaş grubu, 16-18 yaş aralığındaki öğrencilere göre internete daha çok bağımlıdırlar. Usta 2016'ya göre özel yetenekli 12-17 yaş aralığındaki öğrenciler, 7-11 yaş aralığındaki öğrencilere göre internete daha çok bağımlıdır. Fakat Ha ve diğer. (2007), araştırmalarında internet bağımlılığı ile yaş farklılıkları arasında anlamlı bir fark bulamamıştır. Özgün de (2011) çalışmasında katılımcıların yaşlarına göre internet bağımlılığında anlamlı bir fark bulamamıştır. Pandemi döneminde bilgisayarla tanışma yaşı düştüğünden, internet bağımlılığı yaş düzeyi de düşmüştür.

Bu araştırma sonucuna göre ailelerin sosyo-ekonomik düzeyi özel yetenekli öğrencilerin internet bağımlılık düzeylerini etkilememektedir. Usta 2016'da aynı durumu belirlemiştir. Çakır-Balta ve Horzum (2008) araştırmalarında öğrencilerin sosyo-ekonomik seviyeleri ile internet bağımlılığı seviyeleri arasında anlamlı bir ilişki olmadığını belirtmiştir. Fakat Şahin (2011) araştırmasında ailenin gelir düzeyi arttıkça öğrencilerin internet bağımlılığına yatkınlığının da arttığını belirtmiştir. Günümüzde internete erişim olanaklarının artması, internet erişim fiyatlarının düşmesi fertlerin sosyo-ekonomik olarak internete erişimleri arasındaki farklılığı kaldırmıştır.

Usta 2016'ya göre bilgisayar ve internet kullanım imkânı bulan çocuklar daha bağımlıdır derken, bu araştırma sonucuna göre öğrencinin internete bağlandığı araç ile bağımlılık skoru değişmemektedir. Pandemi sürecinde aileler tüm imkanlarını öğrenciye sunduklarından, kullanılan araç artık önemli olmamaktadır.

Bu çalışmaya göre internet kullanım süresi ile bağımlılık düzeyi artmaktadır. Usta 2016'ya göre özel yetenekli öğrencilerin interneti günlük kullanım saati ve sıklığı arttıkça bağımlılık düzeyleri

artmaktadır. Young (1996) çalışmasında internet bağımlısı bireyler haftada 38,5 saat internet kullanırken, bağımlı olmayan bireyler haftada 4,9 saat internet kullanmaktadır. Lübnan' da Hawi (2012) araştırmasında, yüksek oranda internet kullananların günlük internette zaman geçirme saatinin hafta içi günlük 6,5 saat, tatil günlerinde ise 10 saat olabildiğini ve bireylerin zamanı kötü yönetmesine, uykusuz kalmalarına neden olabildiğini belirtmiştir.

Özel yetenekli öğrenciler interneti kullanım amaçları açısından değerlendirildiğinde; İnterneti film-dizi- müzik faaliyetleri ve oyun oynamak amaçlı kullanan öğrencilerin bağımlılık düzeyinin daha yüksek olduğu görülmektedir. Usta 2016'ya göre interneti ödev, sınavlara hazırlanmak amacıyla kullanmayan öğrenciler, kullanan öğrencilere göre internete daha çok bağımlıdır. İnterneti video, film seyretmek, müzik dinlemek amacıyla kullanan öğrenciler daha fazla bağımlıdır. Hawi (2012) araştırmasında, katılımcıların %84,2'sinin iletişim amaçlı, %65,7'sinin bilgi, araştırma ve mesajlaşma için, %51,2' sinin eğlence, müzik, film ve oyun amacıyla ve %4,6' sının ise diğer amaçlar için interneti kullandıklarını bildirmiştir. Young (1996) çalışmasında internet bağımlılarının büyük bir kısmının interneti iki yönlü iletişim ve oyun amaçlı kullandığı; bunun yanında bağımlı olmayanların genelde bilgilenme amaçlı kullanıma ağırlık verdiklerini tespit etmiştir.

Usta (2016)'ya göre, interneti sosyal paylaşım sitelerine bağlanmak amacıyla kullananlar daha bağımlıdır. Bu çalışmada bağımlı ve bağımlı olmayan grupların her ikisinin de Youtube platformunu çok fazla kullandığı, vakit geçirilen platformun bağımlılık skoru üzerinde önemli bir etkisinin olmadığı görülmüştür.

Bu çalışmaya göre boş zamanlarında internette zaman geçirenler ile bilgisayar oyunu oynayanların bağımlılık düzeyi yüksektir. Kitap okuma ve resim-müzik çalışmaları yapma durumlarında bağımlılık düzeylerinin düşük olduğu gözlemlenmektedir. Usta (2016) çalışmasında, interneti oyun oynamak için kullanan öğrencilerin daha bağımlı olduğunu belirtmiştir.

SONUÇ VE ÖNERİLER

Pandemi döneminde üstün yetenekli öğrencilerin internet bağımlılık eğilimlerinin yüksek olduğu gözlemlenmiştir. Üstün yetenekli erkek öğrenciler, kız öğrencilere göre internete daha bağımlıdır. Üstün yetenekli öğrenciler arasında 10-12 yaş grubu internete 16-18 yaş grubuna göre daha bağımlıdır. Ailelerin sosyo-ekonomik düzeyi üstün yetenekli öğrencilerin internet bağımlılık düzeylerini etkilememektedir. Öğrencinin internete bağlandığı cihaza göre bağımlılık puanı değişmez. İnternet kullanım süresi arttıkça bağımlılık düzeyi de artmaktadır. İnterneti film-dizi-müzik etkinlikleri ve oyun oynamak için kullanan öğrencilerin bağımlılık düzeylerinin daha yüksek olduğu görülmektedir. Hem bağımlı hem de bağımlı olmayan grupların Youtube platformunu çok kullandıkları, vakit geçirdikleri platformun bağımlılık skoru üzerinde anlamlı bir etkisinin olmadığı görülmüştür. İnternette boş zamanlarını geçirenler ve bilgisayar oyunları oynayanlarda bağımlılık düzeyi yüksektir. Kitap okuma, resim ve müzik çalışmaları yapma durumlarında bağımlılık düzeyinin düşük olduğu görülmektedir. Öneriler;

1. Rehberlik çalışmalarında erkek öğrencilere yönelik farkındalık etkinlikleri düzenlenmelidir.
2. İnterneti bilinçli kullanma hususunda bireylerin erken yaşlarda bilgilendirilmelerinin önemli olduğu vurgulanmalıdır.
3. İnternete giriş ve çıkış saatleri için zaman çizelgesi oluşturulması ve bu kurallara uyulmalıdır
4. Öğrencilere internetten nasıl faydalanmaları gerektiği öğretilmeli, bunula ilgili okullarda bilgilendirici eğitimler işin uzmanları tarafından verilmelidir
5. Özel yetenekli bireyin eğitim öğretim süreçlerinde teknolojinin kullanımı ve bireylerin teknoloji üretimine yönlendirilmesi teknolojinin kontrollü kullanımı bağımlılık riskini azaltır.
6. 10-12 yaş grubundaki öğrenciler özel olarak izlenmelidir.

7. Ebeveynler, maruz kaldıkları dijital eşitsizlikler nedeniyle güçlendirilmelidir. Bu amaçla BİLSEM velilerine dijital okuryazarlık eğitimleri verilmelidir.

Araştırmacıların Katkı Oranı Beyanı: Birinci yazar araştırma fikrini oluşturma, analizlerin yapılması ve literatür taramasında görev almıştır. İkinci yazar bulguların yorumlanması ve makalenin rapor haline getirilmesinde görev almıştır. Bu çalışmada herhangi bir potansiyel çıkar çatışması bulunmamaktadır.

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USE OF GEOTECHNICAL SOFTWARE IN TURKEY

Sami Arsoy[1*], Hafzullah Yıldırım[2]

*[1]Kocaeli Univ., Dept. of Civil Eng., Kocaeli, Turkey. [2]Hafzullah Ltd., Kocaeli, Turkey.
ORCID Code: 0000-0003-0125-8612

ABSTRACT

Demand for faster and economic solutions in providing civil engineering problems continuously increase along with the use of technology. Geotechnical engineering is one of the specialty areas within Civil Engineering, where the demand for economical solutions stand out. As a result, geotechnical engineering has become more integrated, although gradually, with technology and software, and one can see the use of Geotechnical Software is becoming widespread along with the use of technology in the world.

This paper briefly evaluates the use of geotechnical software in Turkey over time. Analysis include data obtained from the leading data mining, virtual intelligence, marketing and artificial intelligence companies from their official websites of SEMRush, Alexa, SimilarWeb and Ahrefs. Data collected from these sites has been interpreted to demonstrate the usage based on the demographic, geographic, behavioral and others statistical evaluations. The popularity of the software use was defined through the interpreting of the results.

Keywords: geotechnic, software, web data.

ÖZET

Teknoloji kullanımı arttıkça inşaat mühendisliği problemlerine hızlı ve ekonomik çözümlere olan talep de artmaktadır. İnşaat mühendisliğinin bir alt disiplini olan Geoteknik mühendisliğinde bu talep daha belirgin olmaktadır. Bunun sonucu olarak yavaş da olsa geoteknik mühendisliği yazılım ve teknolojiyle daha fazla bütünleşmiş duruma geldi. Geoteknik mühendisliğindeki yazılım kullanımının dünyadaki teknoloji kullanımındaki artışla beraber oldukça yaygınlaştığı kolayca gözlemlenmektedir.

Bu çalışma ile geoteknik mühendisliği yazılımlarının Türkiye' deki kullanımı kısaca değerlendirilmektedir. Analizlerde kullanılan veriler veri madenciliği, sanal istihbarat, pazarlama ve yapay zeka alanında faaliyet gösteren önde gelen firmalar olan SEMRush, Alexa, SimilarWeb and Ahrefs web sitelerinden temin edilmiştir. Bu sitelerden derlenen veriler yorumlanarak istatistikî değerlendirmeler yapılmıştır.

Anahtar kelimeler: geoteknik, yazılım, web data.

GİRİŞ

Bilgisayarların ve mühendislik yazılımlarının eşzamanlı gelişimi ile birlikte karmaşık mühendislik yapılarının davranışını tahmin etmede etkili olan genel amaçlı mühendislik yazılımlarının geliştirilmesi mümkün olmuştur (Esper, 2006). Geoteknik mühendisliği diğer mühendislik disiplinlerine benzer olarak sayısal hesaplamalar yapan yazılımları uzunca süredir kullanmaktadır (Carter vd., 2000). Yazılımlar zaman içerisinde olasılık temelli güvenilirlik ve risk analizleri yapabilen unsurlara kavuştukça geoteknik mühendisliği uygulamalarında daha büyük yer edinmiştir (Kulhawy ve Phoon 1996; Bea 1990, 2006; Wu 1974; Meyerhof 1976; Whitman 1984, 2000; Baecher 1979; Lacasse 2004; Christian 2004, Harr 1987; Wu vd. 1989; Vanmarcke 1977; Christian vd. 1994; Lacasse ve Nadim 1995; Ronold ve Bjerager 1992; Morgenstern 1995; Duncan 2000; ve Vick 2002).

Günümüze kadar gelen bu süreçte modüler haldeki geliştirilmiş çokça geoteknik program, yerini sektörel bazda kompleks programlara bırakmıştır. Coşkan ve Durdu (2014) Türkiye'deki yazılım geliştiren organizasyonların yazılım projelerinde kullandıkları yaşam döngüsü modellerini incelemek, kullanılabilirliğin nasıl uygulandığını araştırmak, yazılım geliştiricilerin kullanılabilirlik, yöntemlerine yönelik farkındalık ve algılarını belirlemek amacıyla 33 kadın ve 40 erkek olmak üzere toplam 73

katılımcı ile bir anket hazırlamışlardır. Elde edilen sonuçlara göre, Türkiye'de yazılımın kullanılabilirliğinin yazılımın başarısı için önemli bir ihtiyaç olduğu raporlanmıştır. Buna rağmen kullanılabilirlik yöntemleri hakkında bilgi sahibi olma oranının oldukça düşük olduğu görülmüştür.

Zaman içerisinden bazı yazılımlar yeni gelişmelere ayak uydurup gelişirken bazıları ise geride kalmış ve kullanılamaz duruma dönüşmektedir. Bu çalışma kapsamında, günümüz teknoloji ve yönetmeliklerine ayak uydurabilmiş ve buna bağlı olarak kullanıcı kitlesi artan geoteknik yazılımlara odaklanılmıştır. Yazılımlarla ilgili bir veri havuzu oluşturularak kullanıcıların seçilen parametrelere göre değişen bilgilere ait sonuçlar sunulup tartışılmıştır.

ÇALIŞMADA KULLANILAN YÖNTEM

Geoteknik yazılımlara ait web siteleri çeşitli arama motorları kullanılarak öncelikle taranmış ve bir veri havuzu oluşturulmuştur. Yazılımların lisans türünün ücretsiz, kamu ve ticari olanları belirlenerek oransal dağılımları elde edilmiştir. Daha sonra ise geoteknik alanında faaliyet gösteren, internet üzerinde en çok izlenilebilir verilere sahip olan ve aynı zamanda günümüz mühendislik uygulamalarında daha fazla oranda ihtiyaç duyulan sayısal analiz yazılımlar belirlenmiştir.

Geoteknik alanında faaliyet gösteren, internet üzerinde en çok izlenilebilir verilere sahip olan ve sayısal analiz yazılımlarına ait resmî web siteleri ile yapılmıştır. Çalışmaya dahil olan yazılımlar Tablo 1 de verilmiş olup analizlerde kullanılacak veriler yazılımların resmi sitelerinden elde edilmiştir.

Tablo 1. Analizlerde Kullanılan Sayısal Yazılımlar

Şirket	**Web Sitesi**	**Kuruluş Yeri / Yılı**
DC-Software	www.dc-software.de	Almanya / 1989
GGU Software	www.ggu-software.com	Almanya / 2000
Rocscience	www.rocscience.com	Kanada / 1987
Midas Geotech	www.midasgeotech.com	Güney Kore / 1989
Itascacg	www.itascacg.com	ABD / 1981
Bentley	www.bentley.com	ABD / 1984
Finesoftware	www.finesoftware.eu	Çek Cumhuriyeti / 1987
Geostru	www.geostru.eu	Romanya / -
Geoslope	www.geoslope.com	Kanada / 1977

Geoteknik yazılımları kullanan kullanıcılar, gerek program kurulumu ve gerekse kullanım dokümantasyonuna ulaşmak için veya benzeri başka sebeplerle, kullanacakları programa ait resmî web sitesini ziyaret ederler veya etmeleri beklenebilir. İnternet kullanıcıları ziyaret ettiği web siteleri, tarayıcı eklentileri, internet sağlayıcıları veya ziyaret edilen web siteleri tarafından kullanıcının dijital ayak izlerini oluşturan eylemleri kayıt altına alınabilmektedir. Bu tür verileri elde etmek için, sanal dünyada faaliyet gösteren ve ilgili yazılımın resmî web sitesinin ziyaret trafiğini zamana bağlı olarak değişen pek çok parametreyi dikkate alarak izleyen önde gelen veri işleme şirketleri mevcut olup bu çalışma kapsamında SEMrush, Alexa, SimilarWeb ve Ahrefs kaynaklarından yaralanılmıştır.

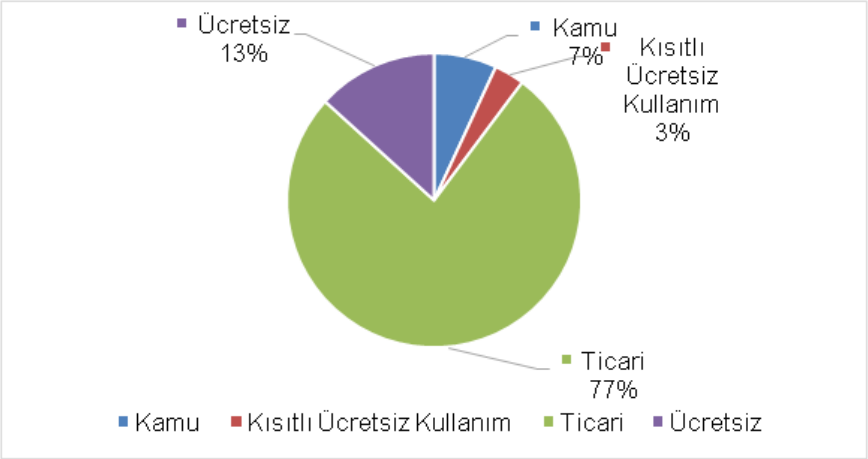
SEMrush; Boston, ABD merkezli bir hizmet şirketi olarak çevrimiçi görünürlük ve pazarlama analitiği yazılımı abonelikleri satan bir yazılımdır. Alexa; ABD merkezli ve Amazon tarafından yönetilen ve web sitelerinin trafikleriyle ilgili bilgi üretimi yapar. Trafik tahminleri, Alexa'ya ait birçok farklı tarayıcı uzantısından birini kullanan milyonlarca İnternet kullanıcısının bıraktığı izlerden oluşan küresel trafik havuzundaki verilere dayanmaktadır. SimilarWeb; Londra, İngiltere merkezli Web analizi, veri madenciliği ve piyasa bilgileri alanlarında uluslararası şirketler için hizmetler sunmaktadır. Ahrefs ise Singapur menşeli pazarlama profesyonelleri için çevrimiçi SEO araçları ve ücretsiz eğitim materyalleri geliştiren bir yazılım şirketidir.

Çalışma kapsamında değerlendirilen ve Tablo 1' de verilen yazılımların kullanımının zaman içerisindeki değişimini, kullanıcılarının yaş, cinsiyet ve ülkelere göre dağılımını ise veri işleme şirketleri web sitelerinden elde edilerek kullanılmıştır. Ziyaret eden kullanıcı kitleleri üzerinde, yaş gruplarına göre dağılım oranlarına, ziyaretlerin ülkelere göre dağılımı ve bu ziyaretlerdeki Türkiye'nin payına ait çıkarımlar yapılmıştır.

ÇALIŞMA BULGULARI

Geoteknik Yazılımlar Genel Değerlendirme ve Lisans Türlerine Göre Dağılım

Geçmişten günümüze kadar geoteknik alanında yapılmış ve internet ortamına bir iz bırakabilmiş 784 yazılıma ulaşılmıştır. İlk geoteknik yazılımlar, sade ara yüzlere sahip olup modüler hesaplamalar ve basit işlemler yapabilme kapasitesine sahip olduğu gözlemlenmiştir. Günümüz şartlarında yazılım üreticileri arasındaki artan rekabet ve yazılım geliştirme teknolojilerinin ilerlemesi sebebiyle, kullanımı kolay ve gelişmiş ara yüzlerde birçok komplike ve birbirini tamamlayıcı hesaplamalar yapılabilen, hesaplama sonrasında elde edilen verilerle görselleştirmeler ve animasyonlar elde edilebilen yazılımlar ortaya çıkmaktadır. Geliştirilen yazılımların birçoğu bir sebeple kendini güncel tutamayarak gelişen teknolojiye uyum sağlayamamış ve günümüz ihtiyaçlarına cevap veremez ve program kullanıcılarına hitap edemez hale gelmiştir. Yazılımların lisans türü de kullanılabilirliği etkileyen önemkli bir parametre olup derlenen tüm yazılımlarla ilgili lisans türüne göre bir kategorileştirme çalışması yapılmıştır ve Şekil 1 de sunulmuştur.

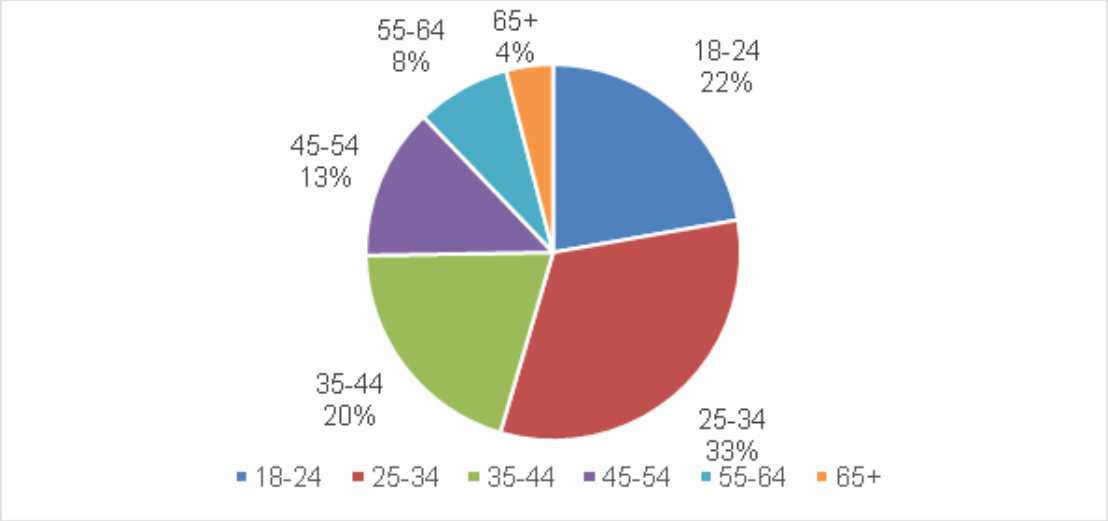


Şekil 1. Lisans türlerine göre yazılımların dağılımı

Kullanıcıların Yaş Gruplarına Göre Dağılımı

Geoteknik yazılım kullanıcısı olması beklenen ziyaretçilerin yaş gurupları, çalışmaya konu olan yazılımlara ait web sitelerinin SimilarWeb üzerinde "Kitleler" altında "Demografik Bilgiler" ve "Genel

Bakış" altında "Web Sitesi Performansı" analizine tabi tutularak elde edilmiştir. Her bir web sitesi için 18-24, 25-34, 35-44, 45-54, 55-64 ve 65+ yaş gruplarına göre trafik oranına ulaşılmıştır. Tüm web sitelerindeki yaş gruplarına göre trafikler kendi içerisinde toplanıp, yaş grupları içerisindeki toplam trafik bulunmuştur. Buradan da yaş gruplarına ait trafiklerin sayısı toplam trafiğe bölünerek ilgili grup trafiğinin tüm trafiğe oranına ulaşılmıştır. Tüm sitelere ait trafiklerin yaş gruplarına göre toplam dağılım yüzdeleri ise Şekil 2 de gösterilmiştir.



Şekil 2. Yaş gruplarına göre kullanıcıların dağılımı

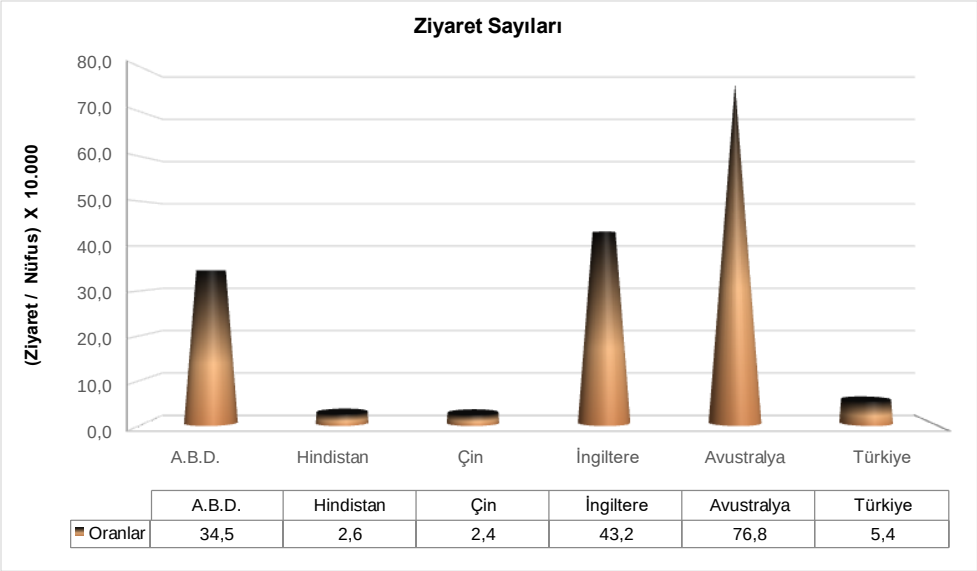
Bu grafiğe göre geoteknik alanında yazılımlarla ilgilenen kullanıcı kitlesi en yüksek %33 ile 25-34 yaş aralığında olup, 65 yaş üzerindeki kullanıcıların yazılıma olan ilgileri %4'lük oran ile diğer yaş gruplarına kıyasla düşük olduğu görülmektedir. 18-24 yaş aralığındaki %22'lik kitlenin çoğunluğunun öğrenci olduğu düşünüldüğünde, bu ilginin eğitim amacıyla yüksek olduğu düşünülmektedir. Buda günümüzde üniversitelerde bilgisayar destekli eğitimin eskiye göre daha fazla yer edindiğini düşündürmektedir. Yazılımların sunduğu kolaylıklar ve yapılan hesaplardaki yüksek hassasiyetli doğruluk oranları sebebiyle bu ilginin, sektör içi mesleki deneyimler ile 25-34 yaş aralığında daha da arttığı düşünülmektedir. Özellikle 55 yaş üzeri kullanıcı oranının düşük olmasının bir nedeni, gelişen teknoloji ile daha kompleks yazılımların geliştirilmesi ile birlikte bu yaş grubundaki kullanıcıların bilgisayar ve yazılım deneyimlerinin yetersiz kalmasından kaynaklandığı düşünülebilir. İlaveten en büyük nedenin ileri deneyimli mühendislerin mesleki yorgunluk, yönetimsel görevler veya emeklilik yaşının gelmesi ile meslekten ayrılmalarından dolayı, sektör içerisinde sayılarının azalmasından kaynaklanabileceği de düşünülebilir.

Ülkelere Göre Dağılımlar ve Türkiye' nin Payı

Yapılan ziyaretlerin ülkelere göre dağılımları, çalışmaya konu olan yazılımlara ait web sitelerinin SimilarWeb üzerinde "Genel Bakış" altında "Web Sitesi Performansı" analizine tabi tutularak elde edilmiştir. Analiz sonucunda ilgili web sitesinin son 3 ayda aldığı trafik değeri ile en çok trafik aldığı 5 ülkenin toplam trafiğe oranı ile çarpılarak en çok trafik alan 5 ülkenin trafik verilerine ulaşılmıştır. Bu veriler ülkelere göre gruplanarak toplanmıştır. Bu şekilde derlenen verileriler baz alınarak yapılan hesaplamalar sonucunda ülkelere göre geoteknik yazılım kullanımına olan toplam ilginin en yüksek olduğu 5 ülke belirlenmiştir. Gerçekleşen ziyaret trafiklerinin ülkelere ait nüfuslar ile doğrudan ilgili ve orantılı olduğu düşünülmektedir. Bu veriler ile en çok ilginin olduğu 5 ülke ve Türkiye nüfusu

kullanılarak elde edilen veriler tablolaştırılmış olup toplam nüfusun içinde geoteknik yazılıma olan ilgi sayısallaştırılarak özetlenip sonuçlar Şekil 3 de gösterilerek karşılaştırılmıştır.

Ziyaret / nüfus oranı baz alınarak oluşturulan Şekil 3 e göre ülkeler bazında geoteknik yazılıma olan ilgi en çok Avustralya'dır. Daha sonra ise sırayı İngiltere ve A.B.D. takip etmektedir. Türkiye bu ülkeler arasında 4. Sırada yer almıştır. Hindistan bu ülkeler arasında geoteknik yazılıma ilgisi en düşük olan ülke olarak görülmektedir. Genel bir gözlem yapılacak olursa gelişmiş ülkelerde geoteknik yazılım kullanma eğilimi daha yüksek olurken gelişen ülkelerde daha düşük olarak belirmektedir.



Şekil 3. En çok ilginin olduğu 5 ülke ve Türkiye kullanıcıların dağılımı

SONUÇLAR VE ÖNERİLER

Yapılan bu çalışmadan çıkarılan sonuçlar özetle aşağıdaki gibidir.

- Bugüne kadar geoteknik alanında sırasıyla en çok kazıklar, laboratuvar testleri, sayısal analiz ve istinat duvarı alanlarında yazılımlar geliştirilmiştir.
- Derlenen yazılımların %77'si ticari, %13'si ücretsiz, %7'si kamu ve %3'ü ise kısıtlı veya ücretsiz kullanım lisanslı olarak kullanıcıya sunulmuştur.
- İncelenen yazılımlara ait web sitelerini ziyaret eden kullanıcıların %33'ü 25-34 yaş aralığında, %22'si 18-24 yaş aralığında, %20'si 35-44 yaş aralığında, %13'ü 45-54 yaş aralığında, %8'i 55-64 yaş aralığında olup, 65 yaş üzerindeki ziyaretçilerin ise %4'lük oran ile diğer yaş gruplarına kıyasla en düşük oranda olduğu görülmüştür.
- Çalışmaya konu olan yazılımların web siteleri incelendiğinde geoteknik yazılıma en çok ilginin olduğu beş ülke sırasıyla Avustralya, İngiltere, ABD, Çin ve Hindistan olmuştur. En çok trafik gönderen 5 ülkenin öne çıkan özelliklerine bakıldığında, teknoloji ile erken tanış ve dijital ürünlere olan üretimin ve ilginin yüksek olduğu, mühendislik uygulamalarında bilgisayar kullanımına en hızlı uyum sağlamış veya diğer ülkelere göre daha fazla nüfusa sahip ülkelerin yer aldığı görülmüştür.

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GRAHAM SWIFT'S WATERLAND; A NEW WAY OF HISTORICAL UNDERSTANDING

Dr. Serdar TAKVA, Arş. Gör. Abdullatif UYUMAZ
Department of Foreign Language Education, Trabzon University, Trabzon

ABSTRACT

Understanding history has been one of the controversial issues ever since human beings started to deal with the true nature of past events. The question of; *whose history* and the distinction between *a*

history and *the history* is still interrogated by handling the close relationship between history and personal interpretation. As the important figures, studying the past events and their effects on writing, theorists try to scrutinize how individuals create their own histories referring to the idea that power creates its history. As a practice which deals with the truthfulness of history, historiographic metafiction displays self-reflectivity. Historiographic metafiction as Hutcheon states is; "intensely self-reflexive and yet paradoxically also lay claim to historical events and personages, […and to] the theoretical self-awareness of history and fiction as human constructs (historiographic metafiction) is made the grounds for its rethinking and reworking of the forms and contents of the past'' (Hutcheon *A Poetics of Postmodernism* 5).

Characteristics of history and its relation to storytelling attract both novelists and historians from different literary circles and they both deal with history writing and similarly its narration. Graham Swift -a successful novelist- employs historiographic metafiction in his novel in order to reconstruct history through his own narration and his novel blurs the boundary between history and fiction emphasizing the existence of story to understand the present and past. Graham Swift, combining both history and personal interpretation- considers history to be a "yarn" (Swift 47) and presents the efficacy of different points of view in the flow of history. His *Waterland* as a historiographic metafiction analyzes storytelling and questioning of history.

His work is also important since it creates a close connection between a novelist and historian during the process of producing literary and historical works. Both a novelist and a historian tend to reflect the features of a certain period of time in their products through their own interpretations. That is to say, they both give meaning to the past and select sources compatible with their ideas in mind. In *Waterland*, the fictionalization of Tom Crick is to highlight the interpretative power of an individual as a history teacher. The novel is full of flashbacks taking the readers to different periods of time and then bringing them to the current life of Tom Crick. Instead of teaching history, Tom goes back to the 18th and 19th centuries about which he has limited knowledge. Despite the restricted data he has, he narrates his ancestral history and interprets his ancestors' first arrival to Fens and the reason for his forefathers' advent to the region.

Waterland, privileging stories, underlines the fact that history is the construct of narrative and stories are the means through which one can make sense of his own past. The novel opens with a "fairy tale'' setting called Fens which is chosen by the writer for its appropriateness for fiction. Fens, where the protagonist-Tom Crick's- ancestral and individual stories took place, is consciously created to point out the aptitude for storytelling as Hutcheon considers all kinds of stories, believable or not, as "a fitting description of *Waterland*''. (Hutcheon *The Politics of Postmodernism* 55)

Waterland centres upon Tom Crick- a fifty-two-year-old history teacher's teaching profession in a secondary school in Greenwich, according to which clocks are set and time begins. Tom as the leading character is married to Mary who experienced pregnancy and had to undergo an abortion during her school years in Fens. Through the characterization of Prince- one of Tom's clever students, Swift handles the relevance of historical events such as the French Revolution and World Wars. Prince's skepticism causes Tom to change his teaching methodology from merely teaching historical facts to the one that includes stories from his own life. Not only does he fictionalize his past but also goes beyond his childhood and youth by providing the students with his predecessors' lives. Although the new method of depicting history is not tolerated by the headmaster of the school, Tom makes himself a part of the history he is teaching, and Swift defines this new educative process as; history is a kind of yarn. Despite the increasing interest of the pupils towards history, the headmaster forces Tom to take early retirement because Mary is arrested for kidnapping a baby which leaves no alternative for him but to retire.

Conclusion

As a result, Graham Swift's Waterland exemplifies how self-reflexivity is combined with historical events through Tom Crick's family saga. The novel is a good representation of Historiographic Metafiction developed by Linda Hutcheon since it attributes to personal interpretation and its power on the past events. The reader travels in time in the novel and witnesses how the narrator interprets history from his own lenses which connotes the idea that history is also a produce of individuality.

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OPTIMIZING THE PERMUTATION FLOWSHOP SCHEDULING PROBLEM USING THE SCATTER SEARCH METHOD

Uğur Sinan Eren[1*], Ezgi Güler[2], Yıldız Şahin[3]

*[*1]Kocaeli University, Institute of Natural and Applied Sciences, Industrial Engineering, Kocaeli, Turkey.*
ORCID Code: 0000-0003-4514-7375

[2]*Bilecik Şeyh Edebali University, Institute of Natural and Applied Sciences, Industrial Engineering, Bilecik, Turkey.*
ORCID Code: 0000-0001-8789-8244

[3]*Kocaeli University, Faculty of Engineering, Industrial Engineering, Kocaeli, Turkey.*
ORCID Code: 0000-0002-6283-5340

ABSTRACT

Scheduling is the process of optimizing limited resources, depending on the objectives. Scheduling problems are one of the decision-making problems that play a critical role in production and service systems. Continuing production regularly and systematically is an important issue for production planners. Permutation flowshop scheduling, which is a sub-branch of production scheduling, is defined as "n" jobs being processed simultaneously on "m" machines. Permutation flowshop scheduling problems are in the complex and difficult problem class. Many metaheuristic methods have been proposed to solve such problems. In this study, a synthesis of the Scatter Search algorithm, which is one of the population-based evolutionary methods in metaheuristic methods, was used to solve the permutation flowshop scheduling problem. Scatter search algorithm consists of five fundamental methods: diversification, improvement, reference set update, subset generation and solution combination. The proposed algorithm incorporates various popular and promising approaches into these steps. "Improvement method" is also moved after "combination method" to be repeated each iteration. A parameter analysis is also made aimed to find the best values for population size, reference set sizes and the number of iterations. The algorithm is written in JavaScript programming language and an interface's prepared using Angular2+ framework. With the scatter search, the total completion time of the jobs was minimized and the effectiveness of the method was tested on the Taillard's benchmark problems that are frequently used in the literature. Results acquired with the proposed algorithm are found within the 2% range of best-known values on average.

Keywords: Scheduling Problem, Flowshop Scheduling, Metaheuristic Method, Scatter Search.

SOME TECHNOLOGICAL PROPERTIES OF LACTIC ACID BACTERIA ISOLATED FROM PASTIRMA

Kübra Çinar Topçu[1], Güzin Kaban[2*]

[1]*Bayburt University, Aydıntepe Vocational School, Department of Food Processing, Bayburt, Turkey.*

*[2]Atatürk University, Faculty of Agriculture, Department of Food Engineering, Erzurum, Turkey.
ORCID Code: 0000-0001-6720-7231

ABSTRACT

In the study, it was aimed to determine technological properties of lactic acid bacteria strains identified genotypically and isolated from pastırma (a traditional Turkish dry-cured meat product). For this purpose, 80 autochthonous lactic acid bacteria strains were investigated for proteolytic activity, acid production, growth at different pH values and different temperatures, thermotolerant capacity and biofilm formation, sensitivity to antibiotic. Most of the 80 strains investigated showed no proteolytic activity against sarcoplasmic or myofibrillar proteins. *Lactobacillus plantarum* K73 had the highest acid production, followed by *Pediococcus pentosaceus* K66B, *P. pentosaceus* K55, *P. pentosaceus* K56 and *L. sakei* K103, respectively. The 65 of 80 strains grew at pH 4, and all strains grew at pH 8. All of the strains grew very well at 25 °C. None of the strains showed thermotolerant properties. Biofilm formation was only observed in 3 strains. The strains were generally found to be resistant to vancomycin, kanamycin, gentamicin, and streptomycin. In addition, only two strains (K22 and K66B) showed resistant to cephalotin.

Keywords: Pastırma, *Pediococcus*, *Lactobacillus*, proteolytic activity, antibiotic sensitivity

PASTIRMADAN İZOLE EDİLEN LAKTİK ASİT BAKTERİLERİNİN BAZI TEKNOLOJİK ÖZELLİKLERİ

Kübra Çinar Topçu[1], Güzin Kaban[2*]

[1]Bayburt Üniversitesi, Aydıntepe Meslek Yüksekokulu, Gıda İşleme Bölümü, Bayburt, Türkiye.
*[*2]Atatürk Üniversitesi, Ziraat Fakültesi, Gıda Mühendisliği Bölümü, Erzurum, Türkiye.*
ORCID Code: 0000-0001-6720-7231

ÖZET

Bu çalışmada, pastırmadan (geleneksel kuru kür edilmiş Türk et ürünü) izole edilen ve genotipik olarak tanımlanan laktik asit bakteri suşlarının bazı teknolojik özelliklerinin belirlenmesi amaçlanmıştır. Bu amaçla 80 yerel laktik asit bakteri suşu, proteolitik aktivite, asit üretimi, farklı pH değerleri ve farklı sıcaklıklarda gelişme, termotolerant kapasite, biyofilm oluşumu ve antibiyotiğe duyarlılık yönünden incelenmiştir. İncelenen 80 suşun çoğu sarkoplazmik veya myofibriler proteinlere karşı proteolitik aktivite göstermemiştir. En yüksek asit üretimi *Lactobacillus plantarum* K73 suşunda belirlenirken, onu sırasıyla *Pediococcus pentosaceus* K66B, *P. pentosaceus* K55, *P. pentosaceus* K56 ve *L. sakei* K103 takip etmiştir. 80 suşun 65'i pH 4'te gelişme göstermiş ve tüm suşlar pH 8'de gelişmiştir. Ayrıca suşların tümü 25 °C'de çok iyi gelişme göstermiştir. Suşların hiçbiri termotolerant özellik sergilememiştir. Biyofilm oluşumu ise sadece 3 suşta gözlenmiştir. Suşların genel olarak vankomisin, kanamisin, gentamisin ve streptomisine dirençli olduğu tespit edilmiştir. Ayrıca, sadece iki suş (K22 ve K66B) sefalotine karşı direnç göstermiştir.

Anahtar Kelimeler: Pastırma, *Pediococcus*, *Lactobacillus*, proteolitik aktivite, antibiyotik hassasiyeti

GİRİŞ

Fermentasyon ve kurutma, gıdaların muhafazası ve raf ömrünü uzatmak için kullanılan en eski yöntemlerdendir. Fermente gıdalar, dünyanın birçok ülkesinde insan diyetine büyük katkı sağlamaktadır (Owusu-Kwarteng, 2013). Bu gıdalar içerisinde fermente et ürünleri de önemli bir paya sahiptir. Laktik asit bakterileri ve Gram(+) katalaz pozitif koklar, fermente et ürünlerinin üretiminde teknolojik açıdan önem arz eden iki önemli mikroorganizma grubudur (Kaya and Kaban, 2010). Et endüstrisinde homofermentatif laktobasiller ve/veya pediokoklar ile koagülaz-negatif stafilokoklar ve/veya *Kocuria*'nın seçilmiş suşları starter kültür olarak kullanılmaktadır (Rzepkowska et al., 2017). Starter kültür olarak kullanılacak suşların seçiminde, suşların teknolojik karakterizasyonu, özellikle farklı koşullarda gelişim, asidifikasyon ve proteolitik aktivite açısından incelenmesi büyük önem arz etmektedir (Nespolo and Brandelli, 2010). Proteolitik aktivite, laktik asit bakterilerinin peptitleri ve proteinleri parçalaması ile lezzet, antimikrobiyal aktivite ve farklı metabolitlerin üretmesine imkân vermektedir (Salvucci et al., 2016). Laktik asit bakterilerinin karbonhidrat metabolizmasının son ürünleri olan asetik asit ve laktik asit gibi organik asitler, Gram-negatif bakterileri ve bu bakterilerin bağırsak hücrelerine invazyon kabiliyetlerini inhibe etmektedir (Tabasco et al., 2014). Asidifikasyon, hızlı fermantasyona neden olmakta ve organoleptik nitelikler gibi fermente ürünün çeşitli kalite özelliklerini de etkileyebilmektedir (Owusu-Kwarteng, 2013; Rzepkowska et al., 2017). Starter kültür seçiminde suşların farklı sıcaklık derecelerinde gelişme durumları da önemli bir teknolojik özellik olarak değerlendirilmektedir (Leroy et al., 2006). Ayrıca laktik asit bakterilerinin biyofilm oluşturma yeteneği hem gıda işleme teknolojisi hem de probiyotik olarak kullanımları açısından önemli bir özelliktir (Kubota et al., 2008).

Antibiyotik direnci, dünya çapında gün geçtikçe önem arz eden bir halk sağlığı problemidir. Antibiyotik direnç genlerinin ilişkisiz patojen veya fırsatçı bakterilere geçişini sınırlandırmak önemlidir. Bu nedenle, starter kültür veya probiyotik kültür olarak kullanılacak bakteri suşlarının aktarılabilir direnç genleri içermediğini doğrulamak büyük önem arz etmektedir (Ammor and Mayo, 2007).

Geleneksel kuru kür edilmiş bir Türk et ürünü olan pastırmada laktik asit bakterileri mikrobiyotanın önemli bir kısmını oluşturmaktadır. Bu çalışmada pastırmadan izole edilen ve genetik olarak tanımlanan laktik asit bakteri suşlarının (Çınar et al., 2019) bazı teknolojik özellikleri incelenmiştir.

MATERYAL VE METOT

Materyal

Araştırmada farklı kürleme ajanları ve kürleme sıcaklıkları uygulanarak üretilen pastırma örneklerinden izole edilen ve genetik olarak identifiye edilen 80 laktik asit bakteri suşu kullanılmıştır (Çınar et al., 2019).

Metot

Suşların sarkoplazmik ve miyofibriler proteinler üzerindeki proteolitik aktivitesinin belirlenmesinde Bonomo et al. (2008) tarafından verilen metot kullanılmıştır.

Suşların asit üretimi, %10'luk yağsız süt tozunda (Oxoid) belirlenmiştir. Ortama suşların 18-24 saatlik kültürlerinden %2 oranında inoküle edilmiş ve 35°C'de 42 saatlik inkübasyondan sonra yüzde asit üretimi 0,1 N NaOH ile titrasyon yapılarak belirlenmiştir. Ayrıca örneklerin pH değerleri de pH metre (Mettler-Toledo AG, 8603 Schwerzenbach, Switzerland) kullanılarak saptanmıştır (Arıcı et al., 2004).

Suşların farklı pH'larda gelişiminin incelenmesi için farklı pH değerlerine (4, 5, ve 8) sahip MRS sıvı besiyeri hazırlanmış ve 30°C'de 24 saat inkübasyona bırakılmıştır. İnkübasyon sonunda spektrofotometrede (Aquamate 9423 AQA 2000E, Thermo Scientific, England) 600 nm'de köre karşı absorbans ölçümü ile gelişim üzerine pH'nın etkisi belirlenmiştir (Sifeeldein et al., 2018).

Suşların farklı sıcaklıklarda gelişme durumunu belirlemek için 4°C'de 7 gün, 15°C'de 3 gün, 25°C'de 2 gün ve 45°C'de 3 gün süre ile inkübasyon uygulanmıştır. İnkübasyon sonunda spektrofotometrede 600 nm'de köre karşı absorbans ölçümü ile gelişim üzerine sıcaklığın etkisi belirlenmiştir (Drosinos et al., 2005).

Suşlarının her biri Pérez-Chabela et al. (2008) tarafından belirlenen metoda göre termotolerant kapasitesi açısından incelenmiştir.
Biyofilm oluşumunun belirlenmesinde Congo red agar (CRA) kullanılmış ve Landeta et al. (2013) tarafından verilen yöntem uygulanmıştır.
Ampisillin (AMP, 10µg), penisilin (P, 10U), vankomisin (VA, 30µg), kanamisin (K, 30µg), gentamisin (CN, 10µg), tetrasiklin (TE, 30 µg), streptomisin (S, 10µg), klindamisin (DA, 2 µg), sefalotin (KF, 30 µg), eritromisin (E, 15 µg) (Oxoid)'e karşı suşların hassasiyeti belirlenmiştir. İnkübasyondan sonra zon oluşumlarına bakılarak antibiyotik hassasiyetleri CLSI (Clinical and Laboratory Standards Institute) standartlarına göre değerlendirilmiştir (CLSI, 2015).

BULGULAR

Mevcut çalışmada 80 laktik asit bakteri suşunun (63 *Pediococcus pentasaceus,* 15 *P. acidilactici,* 1 *Lactobacillus sakei ve* 1 *L. plantarum)* proteolitik aktivitesini belirlemek için substrat olarak pastırma örneklerinden ekstrakte edilen sarkoplazmik ve myofibriler proteinler kullanılmıştır. *P. pentasaceus* suşları içerisinde sadece 5 suş (K38, K45, K86, K124 ve K127) sarkoplazmik proteinler üzerinde çok zayıf bir proteolitik aktivite göstermiştir. Ancak söz konusu bu suşların miyofibriler proteinler üzerinde aktivitesi gözlenmemiştir. Miyofibriler proteinler üzerinde ise bu türe ait K4, K6, K10, K13, K23, K39, K66B, K76, K102, K104, K107, K112, K115, K117, K118 ve K128 suşları yine çok zayıf bir aktivite sergilemiştir. Myofibriler proteinler üzerinde çok zayıf etki gösteren bu suşlar sarkoplazmik protein fraksiyonu üzerinde etkili olmamıştır. Diğer taraftan *Pediococcus acidilactici* suşlarından sadece ikisi (K58 ve K62) myofibriler proteinler üzerinde çok zayıf proteolitik aktivite göstermiştir. Myofibriler proteinler üzerinde proteolitik aktivite gösteren diğer bir suş *Lactobacillus sakei* K103'tür. *L. plantarum* K73 suşu ise ne sarkoplazmik ne de miyofibriler protein franksiyonlarında proteolitik aktivite göstermiştir. İncelenen suşlar arasında en yüksek asit üretimi sırasıyla *L. plantarum* K73 (4,23), *P. pentosaceus* K66B (4,29), *P. pentosaceus* K55 (4,31), *P. pentosaceus* K56 (4,59) ve *L. sakei* K103 (4,61) izolatlarında belirlenmiştir.
Mikroorganizmaların gelişebildiği minimum, optimum ve maksimum pH aralığı değişebilmektedir. Ortam pH'sı sadece mikroorganizmaların gelişimi değil canlılığı üzerine de oldukça etkilidir (Temiz 1999). Bu çalışmada, tüm suşlar zayıf da olsa düşük ve yüksek pH aralığında (pH 4-8) gelişim göstermiştir. Bununla beraber araştırmada test edilen 15 *P. acidilactici* suşundan 13'ü pH 4'de çok iyi bir gelişme göstermiştir. Buna karşın aynı pH değerinde 63 *P. pentosaceus* suşundan sadece 10'u çok iyi bir gelişme sergilemiştir. *L. sakei* K103 suşu, pH 4, 5 ve 8'de sırasıyla zayıf, iyi ve çok iyi bir gelişme gösterirken, *L. plantarum* K73 suşu her üç pH değerinde de çok iyi bir gelişme sergilemiştir. Diğer taraftan *P. pentosaceus* K15 dışındaki tüm suşlarda pH 5'de iyi veya çok iyi bir gelişme tespit edilmiştir. Araştırmada laktik asit bakteri suşlarının 4°C, 15°C, 25°C ve 45°C'de canlılık gösterdiği ancak bu sıcaklıklar içerisinde en iyi gelişimin 25°C'de gerçekleştiği tespit edilmiştir. İncelenen suşlar arasında 4°C'de *P. pentosaceus*'un 4 suşu (K4, K7, K51 ve K55) sadece çok iyi bir gelişme, 15°C'de ise *P. pentosaceus'*un 4 suşu (K67, K82, K121 ve K124) ve *P. acidilactici*'nin 6 suşu (K60, K63, K64, K83, K98 ve K119) hariç diğer tüm suşlar çok iyi bir gelişme göstermiştir. Tüm suşlar 25°C'de çok iyi gelişirken, 45°C'lik sıcaklık uygulamasında suşa bağlı olarak farklılıklar gözlenmiştir. 45°C'lik sıcaklıkta 15 *P. acidilactici* suşundan yanlızca bir suş iyi gelişme, diğer 14 suş ise çok iyi gelişme göstermiştir.
Araştırmada, laktik asit bakteri suşları termotolerant kapasitesi açısından incelenmiş ve MRS agar plaklarına yapılan ekim sonucunda canlı hücre sayısı <2 log kob/mL olarak belirlenmiştir. Bu sonuca göre suşlar "termotolerant" karakter göstermemektedir. Biyofilm oluşumu açısından ise sadece 3 suş (*P. pentosaceus* K15, *P. pentosaceus* K55 suşu ve *L. sakei* K103) pozitif özellik göstermiştir. Suşların antibiyotik direnci Klinik ve Laboratuvar Standartları Enstitüsü (CLSI) tarafından belirtilen kriterler [penisilin (R(direnç)≤14; S(hassasiyet)≥15), ampisilin (R≤16; S≥17), vankomisin (R≤14; S≥17; I=15-16), tetrasiklin (R≤14; S≥19; I=15-18) ve eritromisin (R≤13; S≥23; I=14-22) dikkate alınarak değerlendirilmiştir. Neticede incelenen suşların çoğunun vankomisin, kanamisin, gentamisin ve streptomisine karşı dirençli olduğu belirlenmiştir. Ampisilin, penisilin G ve klindamisine karşı ise tüm suşlar hassasiyet göstermiştir. Tetrasikline karşı dokuz suşun (K4, K5, K14, K64, K102, K107, K115,

K124, K129) orta derecede hassas, bir suşun (K9) dirençli ve diğer suşların hassas olduğu belirlenmiştir. Sefalotine ise iki suşun (K22, K66B) dirençli olduğu belirlenmiştir.

TARTIŞMA

Pastırmadan izole edilen ve genetik olarak tanımlanan 80 laktik asit bakteri suşunun önemli bir kısmı proteolitk aktivite göstermemiştir. Zayıf proteolitik aktivite sergileyen suşların ise pastırma üretim koşullarında kayda değer bir aktivite gösteremeyeceği düşünülmektedir. Et endüstrisinde yaygın olarak kullanılan laktik starter kültürler ile geleneksel et ürünlerinden izole edilen suşların proteolitik aktivitelerinin ürün kalitesini etkileyecek derecede olmadığı diğer araştırmalarda da ortaya konulmuştur (Landeta et al., 2013; Ammor and Mayo, 2007).

Et endüstrisinde laktik asit bakterilerinden beklenen en önemli etki, fermentasyon ortamında asit üretimi ve buna bağlı olarak ürün güvenliği ile duyusal özelliklere katkısıdır. Bu çalışmada, diğer çalışmalarda olduğu gibi suşlar arasında asit oluşum derecesi açısından farklılıklar söz konusudur. Diğer taraftan suşlar, farklı pH değerlerinde gelişim açısından da önemli farklılıklar göstermiştir. Bu sonuç, pastırmadan izole edilen suşların üretim koşullarında gelişebileceği veya canlılığını sürdürebileceğini göstermektedir.

Laktik asit bakterileri geniş bir sıcaklık aralığında gelişebilmektedir (Axelsson, 1998; Kaya ve Kaban, 2010). Genellikle termofil ve mezofil özellik gösteren laktik asit bakterilerinin gelişme sıcaklıkları 10-45°C arasında değişmektedir. Bu çalışmada elde edilen sonuçlara göre 4°C, 15°C ve 45°C'lik sıcaklıklarda suşa göre farklılıklar söz konusu olmakla birlikte, 25°C'de tüm suşlar çok iyi bir gelişme göstermektedir. Ayrıca bazı suşların 4°C gibi düşük sıcaklıklarda gelişmesi, bu suşların pastırma gibi et ürünlerinin kürleme aşamasında da etkin olabileceğini göstermektedir.

Laktik asit bakterileri GRAS statüsüne sahip olmasına rağmen suşların antibiyotik direnci ve zararlı metabolitlerin üretimi açısından dikkatli bir şekilde incelenmesi gerekmektedir (Rzepkowska et al., 2017). İncelenen suşlar içerisinde birkaç suşun antibiyotik direncinin yüksek olduğu belirlenmiştir.

SONUÇ

Pastırmadan izole edilen suşlar, genellikle proteolitik aktivite göstermemektedir. Ticari starter kültür preparatlarında bulunan laktik asit bakteri suşları da genellikle ya proteolitik aktiviteye sahip değil ya da bu aktiviteleri oldukça zayıftır. Diğer taraftan incelenen suşlar arasında hem asit üretimi hem de farklı pH ve sıcaklıklarda gelişebilme açısından önem arz eden suşlar bulunmaktadır. İzolatlar içerisinde biyofilm oluşturan izolat sayısı ise oldukça azdır. Ayrıca ampisilin, penisilin G ve klindamisine karşı suşların tümü, tetrasikline karşı ise suşların çoğu hassasiyet göstermektedir.

TEŞEKKÜR

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SPOR SAKATLIKLARININ ALTINDA YATAN PSİKO-SOSYAL NEDENLERİN RETROSPEKTİF ARAŞTIRILMASI

Aylin ZEKİOĞLU[1], Şule ÖZGÜNEŞ[2]

[1]Manisa Celal Bayar Ünv.,Spor Bilimleri Fakültesi Beden Eğitimi ve Spor Bölümü
ORCID Code: 0000-0002-7455-4845
[2]Manisa Celal Bayar Ünv.,Spor Bilimleri Fakültesi Antrenörlük Eğitimi Bölümü,
ORCID Code: 0000-0003-3600-8875

ÖZET

Günümüzde sporcuya ve sporcu sağlığına daha fazla önem verilmeye başlanmıştır. Sakatlanmış sporcunun ne hissettiğinin bilinmesi ve tedavi sonrasındaki psikolojik durumlarında ne türlü değişmeler olduğunun saptanması, sporcunun yeniden spor yaşantısına dönmesi için gerekli olan rehabilitasyonun niteliği konusunda bilgi sahibi olunabilmesi önem taşımaktadır.

Sporcuların sakatlanma sonrası tam iyileşme gerçekleşmeden spor aktivitelerine geri dönmeleri, sporcularda endişe ve stres tepkisine yol açarak tekrar sakatlanma riskini artırabilmektedir. Kaygı, stres ve bunlarla bağlantılı fizyolojik tepkiler veya aşırı antrenman yüklenmesi gibi bazı durumlar karşısında sakatlık riski oluşabilir. Çalışmamızda, spor sakatlıklarının altında yatan psiko-sosyal ve psiko-fizyolojik nedenleri araştırmayı hedeflemekteyiz. Bu konuya yönelik literatür taraması yapılarak, retrospektif olarak değerlendirilmesi amaçlanmıştır. Bulgularımıza göre spor sakatlıklarının altında yatan nedenler incelendiğinde, sporcunun fiziksel, psikolojik ve fizyolojik durumu öne çıkmakta ve önemini korumaktadır.

Anahtar Kelimeler: Sporcu, sakatlık, psikolojik etmenler

RETROSPECTIVE INVESTIGATION OF THE PSYCHO-SOCIAL CAUSES OF SPORTS INJURIES

ABSTRACT

More importance has been given to athletes and their health in our present day. It is important to know how injured athletes feel, determine what kind of changes occur in their psychological states after treatments, and have information about the nature of the rehabilitation that is necessary for athletes to return to sports life.

The return of athletes to sports activities before full recovery after injuries may cause anxiety and stress response, and increase the risk of re-injury. There is a risk of injury in certain situations such as anxiety, stress, and related physiological responses, or overtraining. In the present study, the purpose is to investigate the psycho-social and psycho-physiological causes of sports injuries. It was also aimed to review the literature on this subject retrospectively. According to the findings, when the underlying causes of sports injuries are examined, physical, psychological, and physiological state of athletes stands out and maintains its importance.

Keywords: Athlete, injure, psychological factors

GİRİŞ

Performans sporcuları, gerçekte büyük stres altında yarışırlar. Önemli olan stresle başa çıkma yollarının iyi olmasıdır. Konsantrasyon yeteneği, riski kabullenme, riske meyil ve motivasyon yoğunluğu sporcunun psikolojisinde belirleyicidir. Sporcu stres karşısında yorgunluk, gayretsizlik, isteksizlik, katılmayı reddetme şeklinde davranışlar sergiler. Hataları artar, koordinasyonu bozulur ve performansı istikrarsızdır. Kronik stresler durumu iyice ağırlaştırır ve sürantrenmana kadar gidebilir. Stresle baş edemeyen sporcularda performans bozulması ve sakatlıklar meydana gelebilir.

Kişilik Özellikleri ve Sakatlık

Cesaret, sürekli kaygı, başarı motivasyonu ve heyecan arama gibi kişilik özelikleri, spor sakatlıklarının görülme sıklığı ile bağlantılıdır (Andreson,Williams,1988). Ayrıca olumsuz benlik imajı yada konsantrasyon zorluğu olan hatta yüksek oranda sempati ve dikkate ihtiyacı olan sporcuların, sakatlıkla daha sık karşılaştıkları iler sürmektedir. (Bergandi,1985)

Sakatlık ve kişilik değişkenleri arasında ilişki olmadığını gösteren bazı çalışmalara rağmen, diğer araştırmacılar, buna zıt deliller vermektedirler. Jackson ve ark. (1978), 110 futbol oyuncusunun katıldığı bir çalışmada, sakat ve sakat olmayan futbolcular arasında anlamlı farklılık olduğunu bulmuşlardır. Bu boyut, bireyleri ya dayanıklı ve kendine güvenen yada hassas ve bağımlı olarak sınıflanmaktadır. Hassas, duyarlı oyuncuların, kendine daha çok güvenenlere göre sakatlanmaları daha fazla olasıdır. (Cox, 1990)

Erkek mesafe koşucularına kapsayan bir başka çalışmadan Valiant ve ark. (1981), sakatlanan koşucuların sakatlanmayanlara göre daha az dayanıklı ve daha az samimi oldukları bulmuştur. Lavarda (1975) İtalyan milli sporcularla yaptığı çalışmada, belli kişilik özelliklerine dayalı olarak sakatlıkla karşılaşmayı tanımlamaya çalışmıştır. Çalışmanın sonucunda, spor aktivitesinden bağımsız, sakatlık insi dansı ile ilgili olarak suç, saldırganlık ve takıntı (inpulsif) özelliklerini bulmuştur (Bergandi, 1985).

Kişiliklerine göre sporcular içe kapalı ve dışa dönük yapıdadırlar.

İntrovert Sporcu: İçine kapalı kişiliktir. Ağrı eşikleri düşüktür. Genellikle sağlık sorunları ve ağrı duygusu anlattığından daha azdır. Temas olmayan spor branşlarında daha fazla görünen kişilik yapısıdır.

Ekstrovert Sporcu: Dışa dönük yapıdadırlar. Ağrı eşikleri yüksektir. Aceleci ve sabırsız tavırlıdırlar. Yakınmaları anlattıklarından fazla olabilir.

Psikososyal açıdan sorunlu olan sporcular bazı kategorik özellikler gösterirler.

a) Antrenöre karşı gelen tipler
b) Antrenöre direnen sporcular
c) Bencil tip
d) Aşırı kaygılı sporcular
e) Başarıdan korkan sporcular
f) Sık sık sakatlanan sporcular
g) Temarüz eden sporcular
h) Depresyonlu sporcular

Bireyin stres oluşturucuların hikayesi (önemli yaşam olayları, kronik günlük problemler ve önceki sakatlıklar), stres tepkisi üzerinde önemli bir etkiye sahiptir. Sporcunun yaşamdaki stres oluşturucuların tam bir değerlendirmesi, sporcunun ne kadar sakatlık riski altında olduğunun iyi bir tahminini verebilir. (Anderson Williams, 1988)

Sporcular tarafından ne kadar fazla yaşam stresi yaşanırsa spor sakatlığının şiddeti ve görülme sıklığı o kadar fazla olmaktadır. (Cox 1990) Pozitif yaşam stresi, sınav için çalışma, sosyal ilişkileri geliştirme ve bir aile oluşturma gibi olaylar içermektedir. Negatif yaşam stresi, boşanma, ailede ölüm ve iş kaybı gibi olayların kapsamaktadır.

Sporda sakatlanmalar motivasyonun yetersiz yada aşırı olmasından da kaynaklanabilir. Motivasyon eksikliğinde sporcunun gevşek, isteksiz, vurdum duymaz hali gözlenir. Buna start tembelliği denir. Koruma güdüleri de uyuşmuş gibidir. Aşırı motivasyon ise start telaşı olarak

tanımlanır. İstenilenin ötesinde uyarı vardır. Sporcu risklere aldırmaz rakibini yada kendisini sakatlayabilir.

Sakatlanmış Sporcular

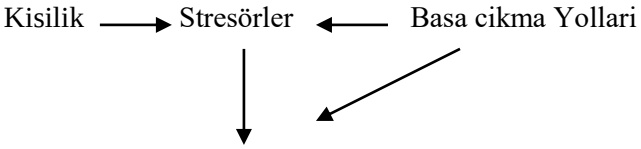
Sporcuların performansını olumsuz yönde etkileyen ve istenmeyen durumların meydana gelmesine sebep olan spor yaralanmaları, sporcuların aktivite yaptığı sırada olabileceği gibi, yarışma ve dinlenme dönemlerinde de sık sık karşılaşabilecekleri problemlerdir (Atay ve ark., 2017; Ülkar ve ark., 2002). Sakatlık; stres tepkisi modeline göre önceki sakatlık, stres tepkisine yol açabilen bir faktördür. Eğer sporcu bir sakatlık sonrası spora dönmek için yeterince toparlanamamışsa, fakat buna rağmen dönmüşse tekrar sakatlanma olasılığı yüksektir. Sporcu müsabakaya dönmek için psikolojik olarak hazırlıklı değilse olumsuz bilişsel değerlendirmeye neden olabilir. Eğer sporcu müsabakaya dönmek için fiziksel olarak hazırlıklı değilse olumsuz bilişsel değerlendirme meydana gelebilir. Tekrar sakatlanma korkusu, önemli bir stres tepkisine yol açabilir ve tekrar sakatlanma olasılığı artabilir. Tekrar sakatlanmada modeldeki diğer faktörler daha üste çıktıklarında, önceki sakatlık hikayesi ve sporcunun fiziksel,psikolojik rehabilitasyonu önem kazanmaktadır(Anderson, Williams,1988)

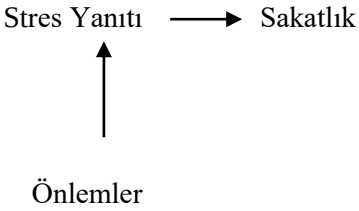
Sporcular karşılaştıkları sakatlanmalarla ilgili kaygı düzeyi, yapılan sportif aktivitenin amacı ile doğru orantılıdır. Örnek olarak söyleyecek olursak, sağlıklı yaşam için spor yapan birinin kaygısı ile yarışma amaçlı spor yapan kişilerin kaygıları arasında da fark bulunmaktadır (Çakır ve Kısa,2021).

Sakatlanmış sporcuda, sakatlanmamışa göre hem müsabaka kaygısı hem de diğer tüm yaşamsal stres faktörleri daha yüksek düzeyler ortaya koyarken stresle başa çıkma yetenekleri düşüktür (Blackwell & McCullagh, 1990; Journal of Athletic Training).

Yüksek müsabaka kaygısı ve gerginlik sakatlanma oranıyla ile ilişkiliyken, Yüksek kaygı, hırs, ve toplam negatif duygusal durum sakatlığın şiddeti ile ilişkilidir (Lavallee & Flint, 1996; Journal of Athletic Training)

Stres ve Spor Sakatlıkları

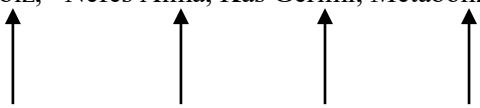




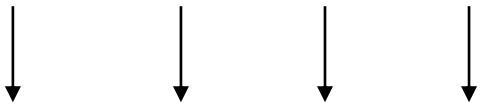
(Anderson & Williams, 1988)

Strese Yanıt

- Nabız, Nefes Alma, Kas Gerimi, Metabolizma, Kan Basıncı, Kan Şekeri



- Duyma yeteneği artar fakat görüş alanı daralır



- Digestion, Growth, Tissue Repair, Immune System

Stres ve sakatlık;

- Stres ve/veya olumsuz ruh hali → kas geriliminin artması ve fiziksel – mental yorgunluk → azalan esneklik → sakatlık

- Stres → dikkat alanının azalması → sakatlıktan korunmak için gerekli olan önemli çevresel ipuçlarını yakalamada yetersizlik → sakatlık

Stresle Başa çıkma Davranışları

Stres oluşturucu durumu dağıtmada bireye yardım eden herhangi bir davranış başa çıkma davranışı olarak ele alınır. Başa çıkma davranışları yüksek oranda bireye özgüdür ve çeşitlidir (Cox, 1990). İyi genel başa çıkma davranışlarının eksikliği kolaylıkla daha büyük strese ve bu nedenle de daha büyük sakatlık riskine yol açabilir. Spor sakatlığı alanında,Williams, Tonymon ve Vadsvvorth (1986), genel başa çıkma davranışlarının sakatlıkla doğrudan ilişkili olduğunu bulmuşlardır. Düşük başa çıkma kaynaklarına sahip olan sporcuların, daha iyi başa çıkma kaynağına sahip olanlara göre sakatlanmaları daha olasıdır (Anderson, Williams, 1988).

Davis (1991) tarafından rapor edilen verilerde, aşamalı gevşeme ve hayal etmenin, yüzücü ve futbol oyunlarında sakatlıkların görülme sıklığını azaltmada etkili olduğunu ileri sürmektedirler. Yüzücüler arasında sakatlıklarda % 52, futbol oyuncularında büyük sakatlıklarda % 33 azalma olduğu rapor edilmiştir (Cox, 1990).

Tıbbi Tedavi: İlaçlar, yasal ya da yasal olmayan nedenlerle çeşitli şekillerde sporcular tarafından kullanılmaktadır. Bu nedenler, performansı artırma, rekreasyon, sakatlık tedavisi ve ağrıyla başa çıkma gibi nedenlerdir. Birçok ilaç stres tepkisini etkileyebilme ve böylece sakatlık olasılığını etkiyebilme özelliğine sahiptirler. Örneğin; hayvan ve insan araştırmaları, anabolik steroidlerin (performans artırıcı ilaç) saldırganlık, depresyon, kaygı ve sosyal çekilme gibi yan etkilerinin olduğunu ileri sürmektedirler. Tüm bu psikolojik etkiler, sporcunun başa çıkma kaynaklarını azaltmada potansiyele sahiptirler (Anderson, Williams, 1988).

Müdahaleler:

Spor performansını kolaylaştırmak için bilişsel müdahaleler ve canlılığı kontrol teknikleri, stres tepkisinin gelişmesini baskılamak için uygulanabilir. Bilişsel müdahele stratejileri; tekrar bilişsel yapılanma, düşünce durdurma (thought stopping), merkezle-me, güven eğitimi, hedef belirleme, hayal etme ve takım birlikteliğini geliştirmeyi kapsamaktadır. Canlılık kontrol teknikleri ise, aşamalı gevşeme, meditasyon, otojenik antrenman, biyofeedback ve otohipnozu içermektedir. Örneğin; takım birlikteliğini sağlama (sosyal desteği manüple etme yolu), antrenör, spor psikoloğu ve spor hekiminin sorumluluğu altındadır. Sporcu takımı arkasında hissederse ve kendisinden ne beklendiğini bilirse, o zaman sporcunun stres oluşturucu olaylara bilişsel tepkileri hafifletilebilir (Anderson, Williams, 1988).

Stres faktörlerinin sakatlığa yol açmasındaki fizyolojik etkileşimler

Kortizol önemli stress hormonlarından biridir. Glikoneojenez amaçlı yağ ve protein yıkımına neden olur. Özellikle bağ proteinler önemli miktarda yıkılır. Dolayısıyla kas ve tendonların dış dirence karşı koyabilme yeteneği azalır. Sürekli psikolojik gerginlikle birlikte azalır. Kas gerginliğide arttığından kasların birbirleriyle uyumlu çalışma ihtimalide azalır. Birbirleriyle koordineli çalışamayan kaslar uygun teknik sergileyemez. Tekniğin bozulmasıda en önemli sakatlık nedenlerinden biridir.

Örneğin futbolda şut atma esnasında son 20 dereceye kadar kasılmayıp gevşek kalması gereken hamstring kası stres altında iken etkin gevşeyemez ve kasılır. Bu durumda hızla kasılmakta olan guadriceps kası bir tarafa doğru çekerken diğer taraftan hamstring kası da diğer tarafa doğru çekmeye çalışmaktadır. Her iki taraftan oluşan bu gerimden dolayı kas-tendon bütünlüğünün bozulma ihtimali çok yüksektir.

Stres bağışıklık sisteminide zayıflatır. Sürekli stres sürantrenmana neden olabileceği gibi başka nedenlerden kaynaklanan sürantrenman da psikolojik stabiliteyi bozar. Bilindiği üzere bu ilişkilerden dolayı sakatlık ve hastalığa eğilim artar. Enfeksiyona açık durumda iken özellikle oksidatif stres arttığından sakatlıklarla yüzyüze gelme ihtimalide artar, lipid peroksidasyonu hücre membranında harabiyete neden olur. Kas hücrelerinin zarar görmesi nedeniylede sakatlık riski artar.

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PHYSICAL EDUCATION TEACHERS' PERSPECTIVES "TEACHER" METAPHORS

Aysel KIZILKAYA NAMLI[1], Seçkin DOĞANER[2]

[1]Fırat University, Faculty of Sports Sciences, Elazığ, Turkey.
ORCID Code: 0000-0001-7980-421X

[2]*Ankara University, Faculty of Sports Sciences, Ankara, Turkey.*
ORCID Code: 0000-0002-1303-2429

ABSTRACT

Metaphors are mental images, meanings attributed to words by an individual about a concept. The individual makes various analogies by attributing meanings to the words. With these analogies, he expresses his own feelings and thoughts in a sense. In this study, it is aimed to reveal the perceptions of "teacher" from the point of view of physical education teachers through metaphors. Phenomenology design, one of the qualitative research methods, was used in the research. The sample consists of physical education teachers working in the province of Elazig. Research data were collected in the fall semester of the 2021-2022 academic year. Physical education teachers were asked open-ended questions. The open-ended question is like "Teacher……. Because……..." With this question, physical education teachers were enabled to produce metaphors about the concept of "teacher". Content analysis was used in the analysis of the research data. As a result of the study, twenty-three metaphors were produced from 28 physical education teachers participating in the research. It was determined that the metaphors produced in the analysis of the obtained data were gathered under four categories as "animal, illuminating, shaping and guiding". In addition, when these metaphors were evaluated within themselves, it was determined that seventeen of the twenty-three metaphors produced consisted of positive analogies and six of them consisted of negative analogies.

Keywords: Physical education teacher, teacher, metaphor

INTRODUCTION

The word metaphor comes from the ancient Greek word metapherein, which means to carry beyond, to convey. Latin rhetoric writers have transformed metaphor into translatio or transferentia, both of which include the ideas of movement and transport (Yılmaz, 2007). According to Borba and Lucena (2007), studies on metaphor have increased in the past 30 years. Since the pragmatic change began in the 1980s, metaphor has been explained as a language embellishment under a rhetorical perspective and has begun to be seen as a cognitive tool. In other words, it is described as a tool that deeply describes our way of thinking.

Based on these expressions, metaphor can be defined as the attribution of meaning to the concept or the transformation of the concept into another concept with expression. Similes are the first stage of metaphors. In metaphors, as in similes, a concept that is wanted to be explained is tried to be explained with another concept that is similar to it (Çelikten, 2006). Just saying this for metaphor may not be enough. Because when making this analogy, another similar concept is not always used. An analogy can also be made with a concept that has opposite meanings or has no connection.

According to Çelikten (2006), although metaphors are generally thought of as the art of embellishing the discourse, their importance is much more than that. Of course, metaphor shouldn't be just to make a presentation by embellishing words. The art of self-expression of the individual, the images in the world of thought, the meanings ascribed to these images reflect the way of explaining his point of view and thinking in different ways. Saban (2009), on the other hand, expresses the metaphor as "it is formed by expressing or implicitly explaining that the phenomenon X is like the phenomenon Y". Metaphors can be animate, inanimate, intangible, or they can be positive or negative. Metaphors can be used both as an information gathering tool and as a questioning tool. At the same time, metaphors

provide easier understanding of incomprehensible issues, revealing problems more clearly, and most importantly, summarizing thoughts (Semerci, 2007).

It is a very complex structure for the human mind to comprehend, interpret and verbalize the environment in which it lives. In order to embody and add meaning to this complex structure, human beings try to reconcile the events and various phenomena around them. At this point, the importance of metaphor in human life is understood (Aydın & Pehlivan, 2010).

People evaluate the events around them in their inner world and make various meanings by associating them with what they know. With these inferences, he reaches a number of conclusions, evaluates, tells a lot with a single word. He fills a single word with many words that express his thoughts. A single word has different meanings for different individuals. While some metaphors have a positive meaning for some individuals, they have a negative meaning for others. In metaphors, everyone may look at the same thing, but what they see is not the same thing. This meaning differs from person to person because not every individual is the same. Therefore, they cannot think the same thing and see the same thing.

Metaphor can be used by ordinary people without special abilities in daily life without great mental effort. Because metaphor is a way of thinking that is processed in the human mind (Çalışkan, 2009). Metaphor is present in every aspect of our lives today. The books we read, poems, songs we listen to, movies we watch and are used especially in advertisements to influence people. We attribute a meaning to words, lived situations, events and phenomena that we are affected by, and evaluate them all by ourselves. Even if we are not aware of it, “metaphor” appears in almost every aspect of our daily life.

Today, metaphor is often used in many areas. Recently, there are many studies that include metaphor in different sciences (Akkaya, 2012; Bahadır & Özdemir, 2012; Boydak Özan & Demir, 2011; Cerit, 2008a; Cerit, 2008b; Öztürk 2007; Saban, 2009; Semerci, 2007; Yıldırım, Ünal & Çelik 2011, Nalçacı & Bektaş, 2012; Namlı, Temel, Güllü, 2017). The goal of education is to contribute to the development of teaching. The education system determines whether educational organizations are living in accordance with their goals, with the supervision system, which is a sub-system of the education system. In the education system, supervision is seen as an integral element of the system (Döş, Sağır & Göksoy 2012).

Metaphors in education are primarily preferred tools for explaining complex concepts and phenomena (Semerci, 2007). Explaining some of the concepts and phenomena we use in education with the help of metaphors makes things easier to comprehend. Metaphors explain the concepts that we care about in our lives. With the help of metaphors, concepts are filled in, they are better understood and how they are seen by the society can be determined. One of the concepts we attach importance to in our lives is the concept of "teacher".

The teacher is the most important element of the teaching process with many features such as designer, guide and leader. Improving teaching is the primary task of schools. In the process of fulfilling this primary duty, great responsibilities fall on the teacher. There are many studies on the concept of metaphor in the literature (Namlı, Temel, & Güllü, 2017; Karabatak, Namlı & Karabatak, 2018; Temel, Doğaner, Namlı & Balcı, 2015; Erul & Günay, 2020; Kurtipek & Güngör, 2019; Temel , Namlı, Doğaner and Balcı, 2015). By making an analogy, emotions and thoughts are preferred a lot because they have a

different way of expression. In this study, it is aimed to evaluate the concept of "teacher" from the point of view of physical education teachers.

METHOD

Among qualitative research approaches, the use of metaphors, or in other words, metaphors, is important in terms of getting deeper views from individuals and understanding their feelings, thoughts and feelings (İnam, 2008). This research is a qualitative study in the phenomenology pattern that examines the perceptions of physical education teachers about teachers through metaphors. The phenomenology design focuses on phenomena that we are aware of but do not have an in-depth and detailed understanding of (Yıldırım & Şimşek, 2005). Phenomenology studies provide an approach to a certain event or phenomenon from different perspectives.

Study group

The study group of the research consists of physical education teachers working in the province of Elazig. The study group was determined by simple random sampling method. In this sampling method, the units in the research universe have an equal and independent chance to be selected for the sample. Random sampling is the valid and best way to select a representative sample (Büyüköztürk et al., 2018).

Table 1. Characteristics of the Study Group

Variables		**f**	**%**
Gender	Female	12	42
	Male	16	48
Age	20-30 years	10	36
	31-40 years	11	39
	41 years and older	7	25
Years of service	1-5 years	5	18
	5-10 years	8	28
	11 years and above	15	54

There are 28 physical education teachers participating in the research. 48% of these teachers are male physical education teachers. 39% of the teachers are between the ages of 31-40, and 54% of them have 11 years or more of service.

Data collection tool and Collection of data

An interview form consisting of two parts was developed in order to determine the perceptions of the physical education teachers in the study group of the research. In the first part, information about the characteristics of the participants was included. In the second part, research data were collected through a semi-structured open-ended question form. Semi-structured interview technique provides convenience to researchers as it provides systematic and comparable data (Yıldırım & Şimşek, 2005).

In order to reveal the perceptions of the physical education teachers participating in the research about the teacher with metaphors, “Teacher is like……. Because……..” were asked to complete the sentence. The concept of "because" was included in order to provide a justification for the metaphors

produced by the participants in the research. The research data were collected by the researchers through face-to-face interviews with physical education teachers in the 2021-2022 academic year.

Analysis of Data

Metaphors that reflect physical education teachers' perceptions of teachers were taken into account in the literature before categorizing them. Accordingly, the data analysis was carried out in three stages in the examination of the metaphors produced by the physical education teachers in the research group about the "teacher". In the first stage, the metaphors developed by the physical education teachers in the study group were examined. According to this review, metaphors that did not contain metaphors or were not intended for the purpose of the study were eliminated. Later, the developed metaphors were described according to their sources and frequency of use, and they were also tabulated. In the tables created, the source of the metaphor written by the physical education teachers about the metaphor they use and the frequency of using the metaphors were examined.

The metaphors developed in the second stage were subjected to an in-depth examination in terms of the relationship between their subject and source. At this stage, no logical justification was presented for the metaphors, and no metaphors that could contribute to the examination of physical education teachers' perceptions of teachers were encountered.

In the third stage, after the elimination and in-depth relationship analysis mentioned above, content analysis was conducted. With the content analysis, metaphors that have certain aspects in common were gathered under a conceptual category. The source of the metaphor was taken into account while dividing these categories. For example; The “shaper” category was created. In this category, the teacher is likened to a shaper. “The teacher is like a sculptor. Because it shapes the students in front of it.” Metaphors in which such similes are used are grouped under the same category. In this context, four were formed by considering the metaphors used by physical education teachers and the source of the metaphor. These categories were created regardless of whether the metaphor used was positive or not. The vast majority of metaphors consisted of positive expressions. After the categorization process, the negative ones were removed from the metaphors. The positive and negative categories of metaphors are also included.

In qualitative research, reporting the collected data in detail and explaining in detail how the researcher reached the results are among the important criteria of validity (Yıldırım & Şimşek, 2005). For this reason, how these conceptual categories used in the research were reached are given in detail for the validity of the study. In addition, some of the opinions written by physical education teachers were added to the study by quoting. In addition, to ensure reliability, the metaphors were divided into conceptual categories by two researchers after the elimination process. This separation process was read by one of the researchers, then discussed with the other researcher about which category it should be placed under and a consensus was reached. In addition, a researcher who is an expert in the field was asked to place these metaphors in the determined categories so that no metaphors are left out. Then, the matches made by the field expert and the matches made by the researchers were compared. As a result of this comparison, the numbers of consensus and disagreement regarding the comparison process were determined. The reliability of the study was calculated by using Miles & Huberman's (1994) Reliability=consensus/consensus + disagreement formula. Considering that reliability will be ensured in cases where the agreement between experts and researchers is 70% or more, the fact that a consensus of 92% was achieved in the reliability study, which was carried out specifically for the study, can be seen as sufficient for the reliability of the study.

FINDINGS

In this study, which was conducted to determine the perceptions of physical education teachers about the concept of "teacher", metaphors developed by physical education teachers were determined. The metaphors produced by physical education teachers regarding the concept of "teacher" are given in Table 2.

Table 2. Metaphors Developed by Participants Regarding the Concept of Teacher

MO	Developed Metaphor	f	MO	Developed Metaphor	f	MO	Developed Metaphor	f
1	Mom	3	9	Directory	1	17	Flashlight	1
2	Light	2	10	Patience stone	1	18	Bee	1
3	Candle	2	11	Sun	1	19	Medicine	1
4	Guide	2	12	Baker	1	20	Stone	1
5	Sculptor	1	13	Ant	1	21	Soulless	1
6	Gardener	1	14	Friend	1	22	Callous	1
7	Water	1	15	Cat	1	23	Dictator	1
8	Artist	1	16	Flower	1			

MO: Metaphor Order; **f:** Frequency

There are 23 metaphors developed by physical education teachers. The most repeated metaphors by physical education teachers are mother (3), light (2), candle (2), guide (2), sculptor (2). In these metaphors, taking into account the metaphor sources, they are classified according to their common characteristics and divided into conceptual categories. These categories are shown in Table 3.

Table 3. Categories of Metaphors Developed by Participants Regarding the Concept of Teacher

Kategoriler	Metaforlar	f	%
Illuminating	Light (2), Candle (2), Water, Sun, Flower, Flashlight, Spiritless, Emotionless	10	36
Guiding	Mother (3), Guide (2), Guide, Friend, Medicine, Stone	9	32
Shaper	Sculptor, Gardener, Artist, Patience Stone, Baker, Dictator	6	21
Animal	Ant, Cat, Bee	3	11

Table 3 includes the categories of metaphors developed by physical education teachers for the concept of "teacher". Accordingly, the rate of physical education teachers who identified the concept of teacher as enlightening with its various positive and negative aspects is 36%. Physical education teachers likened teachers to the concept of "light" and emphasized that they illuminate the environment.

"The teacher is like the light. Because it illuminates all the environments it enters, leaving no dark side." K21

32% of physical education teachers mentioned the guiding feature of teachers. The participants emphasized the guiding characteristics of the teachers by being with the students in various ways.

"The teacher is like a mother. Because it is always with us. It warns us of all dangers. It guides our lives." K13

21% of physical education teachers made analogies by emphasizing the shaping features of the concept of teacher. By identifying the concept of teacher with the baker, the feature of shaping was emphasized.

"The teacher is like a baker. Because in a sense, it shapes the child and the future, just as the baker shapes the dough." K14

11% of physical education teachers compared teachers to various animals. Talking about the unique characteristics of animals, they identified the teachers with these features.

"The teacher is like a bee. Because it both makes honey for food and makes honey for someone else." K28

Negative metaphors developed by physical education teachers are shown in Table 4.

Table 4. Negative Metaphors Developed by Participants About Teachers

Metaphor order	Negative Metaphors Developed	f
1	Soulless	1
2	Callous	1
3	Stone	1
4	Dictator	1
5	Ant	1
6	Candle	1

Physical education teachers emphasized some of their characteristics by making various negative analogies about teachers. Some excerpts from participant views are given below.

"The teacher is like soulless. Because it shines light everywhere, but it does not benefit from its own light." K3

"The teacher is like a candle. Because it illuminates every place, but does not give light to the bottom." K7

"The teacher is like an ant. Because he cannot live his own life by working all the time." K5

DISCUSSION AND CONCLUSION

In recent years, metaphor has been used frequently in expressing emotions. The social realities that the individual contains within himself emerge through metaphors. Emotions and thoughts about events or people show themselves through metaphors. The purpose of this research is to explain the

"teacher" perceptions of physical education teachers through metaphor. No study has been found in this direction for physical education teachers. In this respect, it is thought that the research is important.

In the study, the metaphors that make up the "enlightening" category were analyzed in categorizing the perceptions of physical education teachers about teachers. Considering the assumptions of this category, physical education teachers have integrated teachers with the roles of enlightening the society, guiding by enlightening and besieging. Emphasis was placed on the enlightening role of the teacher. The great leader M. Kemal Atatürk emphasized this role of the teacher with the following words: “A teacher is like an oil lamp, he gives light to others by consuming himself.” The same metaphors produced in some studies were gathered under different themes. In these studies, there are definitions as the person who enlightens the teacher's environment, the person providing information, the guiding and guiding person, the enlightening person (Cerit, 2008a; Saban, 2004; Kalyoncu, 2012; Ocak & Gündüz, 2006; Yıldırım et al., 2011).

In the study, the category of "animal" was used to categorize the perceptions of physical education teachers about teachers. When these metaphors were analyzed, it was seen that a comparison was made between various characteristics of teachers and some unique characteristics of animals. Physical education teachers emphasized that teachers make effort and effort, distribute knowledge and work hard. In different studies on teachers, the same metaphors produced emphasized the industriousness of teachers and their role as carriers (Yıldırım et al., 2011; Ocak & Gündüz, 2006).

The “shaper” category was used to categorize the perceptions of physical education teachers about teachers. When these metaphors used were analyzed, it was seen that physical education teachers compared the shaping characteristics of various professions with the characteristics of the teacher. Teachers play an important role in the preparation and shaping of individuals and societies for the future. Physical education teachers also mentioned the characteristics of giving effort and shaping while defining the roles of teachers. In different studies involving teacher metaphor, teachers' formative and formative characteristics were also mentioned (Yıldırım et al., 2011; Ocak and Gündüz, 2006; Saban, 2004; Çelikten, 2006; Yılmaz, Göçen, & Yılmaz, 2013).

In the study, the category of "guidance" was used to categorize the perceptions of physical education teachers about teachers. There are studies that are similar to the results of the research (Kıral, 2015; Ertürk, 2017; Yılmaz, Göçen, & Yılmaz, 2013; Tortop, 2013). There are studies that emphasize individual development, self-sacrifice, guidance and compassion (Yıldırım et al., 2011; Ocak and Gündüz, 2006; Saban, 2004; Çelikten, 2006; Kalyoncu, 2012).

In the study, it can be said that the teacher perceptions of physical education teachers are generally positive. The number of negative metaphors is few. As a result of the research conducted by Kıral (2015), according to the perceptions of the pre-service teachers, the teacher was themed as an undesirable being, a source of information, a pleasant and valuable being, a mechanical being, a guiding and guiding being, a comforting and calming being. In addition to positive metaphors about the teacher, pre-service teachers also revealed negative metaphors.

In a similar study, Yıldırım et al. (2011) analyzed the opinions of inspectors, administrators and teachers regarding the concept of teacher in their research. As a result of their research, it has been determined that teachers are perceived as people who behave in a positive way (altruistic, hardworking, enlightening, formative and leader). It has been revealed that teachers are perceived as people who behave in a negative way (incompetent, inefficient, cheap labor, monotonous, inconsistent, lazy,

aggressive and lame). In the study conducted by Yılmaz, Göçen, and Yılmaz (2013) on teacher candidates, it was seen that teacher candidates explained the concept of teacher with metaphors such as mother-father, family, gardener, guide, light, shepherd. The metaphors created by the pre-service teachers were grouped under the categories of formative, guiding, source of information, statusless, flexible, model and teacher who does a sacred work. Based on the metaphors created by the pre-service teachers, it is also among the results that the concept of teacher is explained with more than one and different metaphors.

When the researches are evaluated, it is observed that although there are negative perceptions about teachers, teacher metaphors are generally positive. Special emphasis was placed on teachers' qualities such as guiding, shaping and showing compassion. Teachers constitute the basic building block of society. After the individual receives his first education from the family, he is in the hands of a teacher in all processes of his life. At these stages, the teacher assumes the role of family, friend and brother-sister to his students. While taking on these roles, they have adopted the primary duty of educating their students and being beneficial to them. More value should be given to the teacher who stands by the individual in every field and stage of life.

SUGGESTIONS

- The reasons for teachers' negative perceptions should be investigated in depth.
- Environments that will increase teacher-teacher, teacher-manager and teacher-student communication can be increased.
- Various in-service trainings can be organized for teachers.
- Developments can be observed in similar researches in line with the studies implemented in line with the suggestions made.

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THE EFFECT OF PLAY-ASSISTED BALANCE EDUCATION ON GROSSMOTOR SKILLS IN CHILDREN AGED 4-6

Aysel KIZILKAYA NAMLI[1*], Şadan TOĞAÇAR[2]

*[*1]Fırat University, Faculty of Sports Sciences, Elazığ, Turkey.*
ORCID Code: 0000-0001-7980-421X

[2] *Munzur University, Graduate Education Institute, Tunceli, Turkey.*
ORCID Code: 0000-0002-8729-9943

ABSTRACT

This research was conducted to investigate the effect of game-supported balance training on grossmotor skills of children aged 4-6 years. Experimental model was used in the research. In the study, a single group pre-test-post-test model was applied before the experiment. The study group consists of 20 children aged 4-6, who attend a kindergarten affiliated to the Ministry of National Education in the province of Elazig. In order to collect the data, the pre-test Grossmotor Development Test- (TGMD 2) was applied to measure the development of grossmotor skills of 20 children included in the study. Afterwards, the children in the 4-6 age group in the study were given balance exercises supported by various play activities for 7 weeks, 3 days a week, 3 hours a day. The data of the research were analyzed with the SPSS package program. As a result of the research, it was concluded that game-supported balance education had a significant effect on the development of grossmotor skills of children. Grossmotor preliminary and final scores of the children in the study group were compared according to their gender, and it was determined that there was improvement in both gender groups. Grossmotor preliminary and final scores of the children in the study group were compared according to the age variable. Accordingly, it was determined that there was an increase in the grossmotor scores of each age group after the game-supported balance training. In addition, in the post-test, it was observed that the grossmotor score increased in parallel with the increase in age. Grossmotor pre-test and post-test scores of the children in the study group were compared according to the number of siblings. According to this comparison result, it was determined that the number of siblings alone was not effective in the increase of grossmotor scores of the groups.

Keywords: 4-6 years, Kindergarten, Game supported balance education, Grossmotor skills

INTRODUCTION

Motor development is the ability of people to move in a controlled manner with the development of the brain and spinal cord as well as physical growth and development. Grossmotor development; Head control with the development of head and neck muscles in the body, and sitting with the development of trunk muscles. Crawling with the development of trunk-lower and upper extremity muscles allows to stand with the development of head-trunk and lower extremity muscles. It includes the formation of skills such as walking and running with the development of head-body-lower and upper extremity muscles, rolling, jumping and standing in balance with the development of whole body muscles. Large muscle groups are used in the body for grossmotor skills. The pre-school period, in which basic grossmotor skills are acquired, is of great importance for living without being dependent (Durualp & Aral, 2018).

Grossmotor development stages in the preschool period vary according to age. Gallahue (1995) made detailed studies on the development of coarse gestures according to age. He created a movement development prototype that revealed that development begins in the stage before birth and consists of four developmental stages that continue in the later stages of life. In this prototype; 'Reflexive Movements Circuit' for 0-1 years old, and 'Primitive Movements Period' for 0-2 years old. He has grouped the 2-7 years old as 'Basic Movements' and 7 years and later as 'Sportive Movements'. reflexive movements circuit; The first gains made in this period were accepted as the baby's first movement skills and learning ways. Primitive movements circuit; The movements made were counted as the first movements made consciously. The movements seen in this period emerge by performing the movements that are expected to develop in the prescribed order within the grossmotor development stages. It follows

the skills of sitting, crawling and standing in order. Basic movements circuit; It is the period when the main gains are obtained. During this period, children develop rapidly and these developments are noticed day by day. Their development in this period affects the development of sportive movement abilities in childhood and youth. When the child blends these abilities, sportive abilities occur. Sports movements circuit; It is a continuation of the basic movements. In this time period, which shows the age of seven and above, movements are performed voluntarily and properly at a high level (Ulutaş, Demir & Yayan, 2017).

When we look at the stages of Gallahue's motor development model, it includes children aged 4-6 who are in the period of basic movements, which is one of the stages of motor development. Grossmotor skills of children in this age group include: Movements are harmonious as motor control and coordination increase in children aged three to four years. He walks on tiptoe. It can walk backwards. He rolls forward with support. As the sudden turning and stopping develops, the running ability increases. Having a rich imagination, the child's interest in pretend games and household chores increases. Climb the stairs by changing feet. He can kick a moving ball. It slides off the slide, swings on the swing. He catches the ball from the air with both hands. He can put on his shoes and ride a bike with support. It is very active in games. It goes from one place to another quickly. A five-year-old can perform movements such as running, jumping, bouncing, jumping, pedaling a bicycle, and somersaulting. Climb up stairs alone unaided. Able to descend stairs by changing feet with assistance. He/she can perform the skills of jumping from one foot to the other, jumping rope, walking in balance and properly, changing his/her stance, standing on one leg, jumping. The six-year-old has smooth coordination in his movements. The child has too much energy to stand still. It is mobile even when sitting. Jumps rope. It makes the ball bounce by giving direction. Holds the ball with one hand. He hits the ball with the stick. She skates. Ride a bike unassisted. It slides with a sled. He stands on one leg for ten seconds. It picks up the object on the ground while running (Aral & Baran, 2001).

The game; It is defined as “any kind of competition based on agility, made to improve skills and intelligence, having certain rules, providing entertainment, physical and mental skills” (TDK, 2017). Playing games for the development of children is one of their basic needs, such as nutrition and sleep. The abilities of the child playing games increase, his skills develop. Play develops children physically, mentally and spiritually. A child learns, sometimes consciously, sometimes unconsciously, while playing. Colwell and Lindsey divided the games into four categories as exercise games, rough-rolling games, simulation games and other games (Ayan & Memiş, 2012).

Plato and Aristotle gave opinions for children's games. Plato emphasized that it is very important to play games in children, especially in the 3-6 age period. He mentioned the importance of games and physical activities in children's education in Aristotle (Halmatov, 2016).

Preferred games for children should be suitable for their age, interests, developmental level and to develop children's skills. The stages of play change according to the ages and developmental stages of children. At first, children play alone at first, then they watch other children's games, even if they are with them, they do not play together, they play alone. At the last stage, they begin to play with other children. In children aged 3-6; At the age of 2-3, the Parallel Play Stage, at the age of 4-5 years, the Cooperative Play Stage, and at the age of 6, the Ruled Play Stage are observed. The games to be chosen to increase motor skills in children should be compatible with these stages (Ulutaş, 2011).

Equilibrium is the state of being able to maintain a certain position in a certain position. It shows the presence of balance from the movements against gravity with the normal development of the child.

At the heart of every movement is balance. Balance begins to develop from birth. The development of balance, which is based on vision, continues until the age of two, when the effect of vision decreases and the vestibular system reaches a level that can respond to inputs from deep body senses (AÇSH, 2014).

Sitting and standing are the first balance movements to appear. In parallel with the development of the child, turning, bending forward, reaching, standing on one foot are other balance movements. Balance is very important in all movements. Especially when changing positions, the balance should not be disturbed. For this reason, balance forms the basis of all movements. When the balance is good while moving, the movement is done effectively (Tepeli, 2007).

In our country, a wide variety of tests are used to measure the motor development levels of children. Bayley Infant Development Scale (BBDI), Denver Developmental Screening Test, Portage Early Childhood Education Program Checklist, Motor Performance Test, Bruininks-Oseretsky Motor Proficiency Test, Grossmotor Skills Test, Child Body Coordination Test, Lincoln Oseretzky Motor Development Test (LOS) KF 18), Physical Fitness Tests, Ankara Developmental Screening Inventory (AGTE), Gazi Early Childhood Development Assessment Tool (GEÇTA) and Test of Grossmotor Development-2 (Grossmotor Development Test-2) are among these tests administered to children (Tepeli, 2007) .

The TGMD-2 test is a test that measures the grossmotor skill development of children aged 3-10. Tepeli (2007) in his doctoral thesis; By applying the TGMD-2 test on 1600 children in our country, it has adapted the BÜKBÖT test by investigating whether TGMD-2 is suitable for children in our country with the Turkish Standardization. As a result of his research, he concluded that the test is safe and valid for children in the 3-7 age group, and that there are parameters that need to be developed for children in the 7-10 age group.

In the study of Şirinkan and Şirinkan (2011); He investigated the effect of educational games on the development of large muscle skills in preschoolers aged 5-6 years. 36 students (13 girls, 23 boys) from 3 private kindergarten children in Erzurum city center participated in the study. Before proceeding to the research studies, the children's grossmotor skills scores were evaluated by applying the test of grossmotor development. As a result of the study, it was observed that there was a significant improvement in the locomotor and object control skills of the children.

In the study of Boz and Aytar (2012); (TGMD-2) conducted a reliability and validity study on 480 children aged 5-10 years in order to determine how valid and reliable the Grossmotor Development Test-2 is for the children of our country. They analyzed it in two parts as locomotor abilities and object control abilities. As a result of this research, it has been determined that Grossmotor Development Test-2 has sufficient validity and reliability value in terms of applying it to the children of our country.

In the study of Boz and Aytar (2012a); (TGMD-2) conducted a reliability and validity study on 480 children aged 5-10 years in order to determine how valid and reliable the Grossmotor Development Test-2 is for the children of our country. They analyzed it in two parts as locomotor abilities and object control abilities. As a result of this research, it has been determined that Grossmotor Development Test-2 has sufficient validity and reliability value in terms of applying it to the children of our country.

In the study of Boz and Aytar (2012b); investigated the effect of the basic movement education plan applied to kindergarten children on the development of movement ability in children. To examine the effect of the Basic Movement Education (THE) plan, they continued to work with 120 children (60

experimental and 60 control) in the 5-6 age range. They used the TGMD -2 test in their studies. As a result of the pre-test, they applied the THE program to the children in the study group for 12 weeks. The children in the control group were applied the daily program of the kindergarten. As a result, it was seen that the effect of THE plan on children's basic movement abilities, namely locomotor abilities and object control abilities, was significant.

In his doctoral thesis in Kerkez (2013); The effect of the 12-week game and exercise plan on the physical and motor development levels of children under state protection and 47 female and 105 male students aged 5-6 years who are in a family home and receiving pre-school education. Although the average of the children staying in institutional care in all of the motor tests was found to be lower than the children staying with their families, it was found that the difference was not statistically significant. It was found that the averages of the experimental group were significantly higher than the control group in some physical evaluations and in all motor tests.

Keskin (2019) in his master's thesis; The aim of this study was to examine the basic motoric characteristics of selected primary school students (7-9 years old) according to the TGMD 2 test. A total of 433 children, 199 boys and 234 girls, were used as subjects in their research. The highly reliable TGMD-2 test was used to measure basic motor features. According to the results obtained in this research; While there was no significant difference in displacement skills according to gender, it was found that girls were better in object control and grossmotor skills ($t(431)= -2.40$, $p< .05$). When considered as rural and central, a significant difference was found in children studying in the center in object control, displacement and grossmotor skills ($t(431)=5.61$, $p< 0.001$). When analyzed according to age, a noticeable change was observed in object control and grossmotor skills ($F(2, 430)= 4.22$, $p<0.05$), while no change was observed in displacement skills.

As a result of the literature review; It has been concluded that it is extremely important to determine the motor development of children and to support the child in terms of their deficiencies. For this reason, in this study, it was aimed to determine the grossmotor skills of pre-school children aged 4-6, and to examine the effectiveness of these activities in the development of grossmotor skills of children by performing appropriate game-supported balance training in line with their interests and needs.

METHOD

In this section, information about the model used in the research, the study group in the research, the information collection tools used in the research, and the analysis of the data as a result of the gathering of the obtained data are given.

Model of the Research

Experimental model was used in the research. Experimental model; It is the field of study where the data desired to be seen is created in order to determine the cause-effect relationships depending on the variables under the control of the person performing the study. There is definitely a comparison in every study with this model. This comparison can be in the form of changes within a situation or comparing the differences between these situations. Influence of the experimental dependent variable by the independent variables occurs with the formation of systemic changes in the conditions kept under control and observing the results (Karasar, 2005).

In the study, a single group pre-test-post-test model was applied before the experiment. In the single-group pre-test-post-test model before the experiment, parameters that are not dependent on each other are applied to a selected group. The results are obtained by analyzing the data obtained as a result of these applications.

Study group

The group studied in the research consists of 20 children aged 4-6, who attend a kindergarten affiliated to the Ministry of National Education in the province of Elazığ. While choosing the group to work with, care was taken to have a kindergarten with easy access and high participation in education. For this purpose, convenient sampling method, one of the purposeful sampling methods, was used. In order to ensure the internal reliability of the test while performing the experimental procedure, the close age of the children in the group prevented a high degree of difference in the study. Some demographic information about the participating children in the study are given in Table 1.

Table 1. Characteristics of the Study Group

Variables		**f**	**%**
Gender	Female	9	45
	Male	11	55
Age	4 years	2	10
	5 years	14	70
	6 years	4	20
Mother's Education Status	High school	6	30
	Licence	14	70
Father's Education Status	High school	2	10
	Licence	18	90
Number of siblings	0-1	14	70
	2	2	10
	3+	4	20

45% of the participant children are girls and 55% are boys. 10% of children are 4 years old, 70% are 5 years old, 20% are 6 years old. The mothers of 30% of the children are high school graduates, and the mothers of 70% of them are undergraduates. The fathers of 10% of the children in the study group are high school graduates, and the fathers of 90% of them are undergraduates. 70% of the children participating in the study are an only child or have a sibling, 10% have two siblings and 20% have 3 or more siblings.

Data Collection Tools

In order to collect the research data, the "General Information Form" consisting of two parts, containing information about the child, and the "Grossmotor Development Test- (TGMD 2)" were used. The information in the General Information Form was filled in by learning from the child's parents.

There are two subtest groups in the Test of Grossmotor Development (TGMD). These two subtests; Locomotor Subtest and Object Control Subtest. The locomotor subtest assesses 7 skills that measure running, gait, bounce, one-leg jumping, jumping, horizontal jumping, and sideshifting. The

object control subtest evaluates 5 skills that measure hitting a stationary ball, bouncing a ball, catching a thrown ball, hitting a stationary ball with the foot, and throwing a ball over the hand. In Turkey; Tepeli (2007) and Boz, Aytar (2012a) conducted studies on the safety and validity of the TGMD-2 test in Turkish children in their research. As a result of both studies, it was concluded that the TGMD 2 test is appropriate to be used for children in our country.

Table 2. Grossmotor Development Test (TGMD II) Reliability Scores

	Reliability Criteria		
	Internal Similarity Test	Retest	Observer Similarity
Locomotor	.85	.88	.98
Object Control	.88	.93	.98
Total TGMD II	.91	.96	.98

When the information in Table 2 is examined, it is understood that the TGDM II test has a high reliability. Validity analyzes for this test show that TGMD II is a valid test evaluating gross muscle skills and researchers can safely use this test (Keskin,2019).

Data Collection

In order to collect the data, the pre-test TGMD 2 test was applied to measure the development of grossmotor skills of 20 children included in the study. Afterwards, the children in the 4-6 age group in the study were given balance exercises supported by various play activities for 7 weeks, 3 days a week, 3 hours a day.

Game Activities; In order to develop grossmotor skills to the children in the study group, exercises that increase balance and coordination were applied in combination with the game, taking into account the education programs of kindergartens. Considering the subtest evaluations of the TGMD-2 test applied to children, play activities were organized and implemented by taking into account the motor movements that the children could not get enough points and had difficulty in doing (Durualp & Aral, 2018).

There are 19 child-oriented games that aim to increase balance-coordination and grossmotor skills in these game activities. While preparing the play activities, the areas where children are seen as inadequate and need to be supported were taken into consideration in the evaluation. In the play activities, it will attract the attention of children, increase their motor skills, and use materials suitable for age ranges (various sizes of plastic balls, plastic obstacles, rope, baseball bat, hula hoop, colored glass bands, balloons, balance board, rope, box, For the production of balance-coordination enhancing material, it is preferred to use rope, pet bottles with a small amount of water, aluminum foil, glass tape, etc.).

The game activities were organized by following the order of the sub-skills in the TGMD 2 test. In the locomotor skill subtests, heel-toe walking on the rope, walking in different directions on the hula hoop, walking with wedges that are put on the feet with the help of a rope, handkerchief snatching game were included in order to improve the running skill. In order to improve the jumping skill on one foot, jumping in different directions on the hula hoop, hitting the high balloons, and hopscotch were included. In order to improve jumping skills, the movement of jumping without hitting obstacles while running is

included. In order to improve the horizontal jumping skill, frog jumping and fly catching are included. In order to improve the ability to slide sideways, game-supported balance training was carried out to convey the hula hoop to a friend on the side, walk sideways on the roller, cross the street without touching the plastic bottles swinging left and right.

In order to improve the skill of hitting the stationary ball in the Object Control skill subtests, the movement of throwing a ball to the wall with a baseball bat was included. The basketball game is included to improve the ball bouncing skill. In order to improve the catching skill, the movement of holding the ball thrown from the opposite side is included while on the roller. In order to improve the skill of hitting the ball with the feet, the movement of throwing the ball with the feet to the target is included. In order to improve the skill of throwing the ball over the hand, the movement of throwing the ball by hand to the opposite target is included. A plastic bowling game was played to improve the ball rolling skill underhand.

Analysis of Data

The obtained research data were analyzed with the SPSS package program. It was examined whether the statistical results were suitable for the normal distribution and the Shapiro-Wilk values were examined since N<30 in the normality test. The distribution of values was normal and parametric tests were used. While analyzing the data, t-test was used for in-group comparisons. Whether there was a significant difference in locomotor skills, object control skills and grossmotor skills total scores according to age, gender and number of siblings was analyzed using one-way analysis of variance ANOVA. The significance level was accepted as p<.05 in all statistical analyzes.

FINDINGS

In this section, the findings obtained in order to determine the effect of game-supported balance training on gross motor skills in children aged 4-6 are given below.

Table 3. Comparison of Grossmotor Pre-Test Score and Grossmotor Post-Test Score by Gender

	Gender	**N**	**X±sd**	**Test Değeri**	**p**
Grossmotor Pretest Score	Female	9	91,33±8,544	1,542	0,000
	Male	11	84,18±11,548		
Grossmotor Posttest Score	Female	9	119,66±10,828	0,493	
	Male	11	117,72±6,634		

According to Table 3, gros motor preliminary and final scores of the children in the study group were compared according to their gender. Grossmotor development test was applied before the game-supported balance training applied to the children, and it was determined that the mean score of girls was 91.33±8.544, and the mean score of boys was 84.18±11.548. After the game-supported balance training applied to the children, the same test was applied again and it was determined that the mean score of girls was 119.66±10,828, and the mean score of boys was 117.72±6,634. According to this result, improvement was observed in both gender groups.

Table 4: ANOVA results according to the age variable of the participants

Age	N	X ±sd	Source of Variance	Sum of Squares	Sd	Mean Square	F	p

	4 years	2	91,00±8,485	Between Groups	184,371	2	92,186	,789	,470
Grossmotor Pretest Score	5 years	14	85,42±10,382	Within Groups	1986,429	17	116,849		
	6 years	4	92,50±13,076	Total	2170,800	19			
	4 years	2	113,50±14,849	Between Groups	92,121	2	46,061	,600	,560
Grossmotor Posttest Score	5 years	14	118,42±6,744	Within Groups	1304,679	17	76,746		
	6 years	4	121,75±12,816	Total	1396,800	19			

According to Table 4, grossmotor preliminary and final scores of the children in the study group were compared according to the age variable. Grossmotor Development Test was applied before the game-supported balance training applied to the children. It was determined that the mean score of the children in the 4-year-old group was 91.00±8.485, the mean score of the children in the 5-year-old group was 85.42±10.382, and the mean score of the children in the 6-year-old group was 92.50±13.076. After the game-supported balance training applied to the children, the same test was applied again. It was determined that the mean score of the children in the 4-year-old group was 113.50±14.849, the mean score of the children in the 5-year-old group was 118.42±6.744, and the mean score of the children in the 6-year-old group was 121.75±12.816. According to this result, an increase was observed in the grossmotor scores of each age group after the game-supported balance training. In addition, in the post-test, it was observed that the grossmotor score increased in parallel with the increase in age.

Table 5: ANOVA results according to the variable of the number of siblings of the participants

	Number of siblings	**N**	**X ±sd**	**Source of Variance**	**Sum of Squares**	**Mean Square**	**F**	**p**
	0	3	75,00±9,643	Between Groups	1029,164	257,291	3,381	,087
	1	11	88,81±9,683	Within Groups	1141,636	76,109		
Grossmotor Pretest Score	2	2	82,00±4,242	Total	2170,800			
	3	2	88,00± ,000					
	4	2	103,00± ,000					
	0	3	114,00±4,582	Between Groups	521,073	130,268	2,231	,114
Grossmotor Posttest Score	1	11	117,45±8,358	Within Groups	875,727	58,382		
	2	2	124,00±4,242	Total	1396,800			
	3	2	113,50±2,121					

4	2	131,50±10,606

According to Table 5, grossmotor pre-test and post-test scores of the children in the study group were compared according to the number of siblings. Grossmotor Development Test was applied before the game-supported balance training applied to the children. The mean score of those with only one child is 75.00±9.643, the mean score of children with one sibling is 88.81±9.683, the mean score of children with two siblings is 82.00±4.242, the mean score of those with three siblings is 88.00± .000 and those with four siblings it was determined that the mean score was 103.00± .000. After the game-supported balance training applied to the children, the same test was applied again. The mean score of those with an only child is 114.00±4.582, the mean score of children with one sibling is 117.45±8.358, the mean score of children with two siblings is 124.00±4.242, those with three siblings mean score is 113.50±2.121, and those with four siblings mean score mean of 131.50±10,606 was determined. According to this result, it was concluded that the number of siblings alone was not effective in increasing the grossmotor scores of the groups.

Table 6: Comparison of Grossmotor Skills Pretest Score and Grossmotor Posttest Score

	N	**X ±sd**		**p**
Grossmotor Pretest Score	20	87,40±10,688	14,601	0,000
Grossmotor Posttest Score	20	118,60±8,574		

According to Table 6, the grossmotor preliminary and final scores obtained as a result of the evaluation applied before and after the game-supported balance training applied to the study group were compared. Before the game-supported balance training applied to the children, a grossmotor development test was applied and the average score of the children was found to be 87.40±10,688. After the game-supported balance training applied to the children, the same test was re-applied and it was observed that the score increased by 118.60±8.574, and according to the t-test analysis, this increase was found to be statistically significant ($p < .05$). According to this result, it can be said that game-supported balance education has a significant effect on the development of grossmotor skills of children.

DISCUSSION AND CONCLUSION

Most of the children in the preschool group are active. Many educators say that they learn the basic movements exhibited by children in the preschool period spontaneously and that their basic movement skills develop as they get older. In order to develop basic movement skills, it is necessary to give children the opportunity to practice, to help them overcome their deficiencies and to offer the necessary opportunities in this regard (Ulutaş, Demir, & Yayan, 2017).

It is important to focus on activity activities in the preschool period and to ensure the participation of children in these activities (Gray 2003). In this study, the effectiveness of the game-supported balance education program applied to pre-school children aged 4-6 was compared as pre-test and post-test in line with the variables of gender, age, number of siblings. In the pre-test and post-test results, there was a significant difference according to the variables of gender, age and number of siblings. The importance of physical activity programs in early childhood was realized as a result of the

application. This situation reveals the importance of developing and applying activities that support the development of grossmotor skills of children in the preschool period.

In the study examining the effect of game-supported balance training on grossmotor skills in children aged 4-6 years, it was found that there was a significant difference ($p<0.05$) between the pretest and posttest of the children in the study group in favor of the posttest. After the training applied to contribute to the motor development of the children, significant improvements were observed in the children in the study group. It is seen that programmed and long-term activity activities increase the mobility of children and affect their motor development (Altınkök 2017).

Dursun (2004), in his study, determined that children in the six-year-old group improved their balance, speed, fast running, ball throwing, ball catching and long jump skills with physical activity practices. Özdenk (2007) investigated the contribution of play activities to the motor development of children in the preschool group and found that play activities positively affected the balance, catching and running abilities of the children in the experimental group.

SUGGESTIONS

In line with these results, the following recommendations can be made:

- For children in the pre-school period, their grossmotor development can be tested and activities supported by games can be carried out in the presence of experts.
- By turning the examples of the activities into brochures, it can be ensured that the child's parents also contribute to this development.
- Various game materials can be prepared with children to make purpose-oriented activities more fun.
- Computer games prepared for this purpose can be developed in order to keep the grossmotor skills that children need to be able to do in their minds alive.

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IN VITRO PRODUCTION OF DIOSGENIN FROM HAIRY ROOT CULTURES OF *COSTUS PICTUS*

Ammana Sabitha Rani
Dept. of Botany, Osmania University, Hyderabad-500007
Telangana State, India

ABSTRACT

Recently, there is a growing demand for plant based drugs, causing a heavy pressure on existing resources resulting in depletion and extinction of many plants from their natural habitat. Plant cell and tissue culture has emerged as a powerful tool for conservation, large-scale multiplication and *in vitro* production of wide range of secondary metabolites.

Costus pictus D.Don (Family: *Costaceae*), commonly known as insulin plant, is one of the important medicinal plants of India. *Costus* species possess many medicinal properties and used in treatment of diabetes, jaundice, asthma, blood pressure, skin care etc. Rhizome is the major source of diosgenin, which acts as anti-diabetic.

Hairy roots, induced by genetic transformation with *Agrobacterium rhizogenes* are gaining importance for *in vitro* production of plant bioactive metabolites. When bacterium infects, the T-DNA is transferred and integrated into host plant, resulting in hairy root production. Hairy roots are negatively geotropic, branched, grow rapidly on phytohormone free medium and accumulate lot of secondary metabolites.

In the present study, hairy roots were induced from different explants of *C.pictus* by infecting with *A. rhizogenes*. Different time intervals of co-cultivation (24, 48, 72 hrs.) and concentrations of bacterium (0.2-1.0 Optical Density) was standardized. PCR analysis of hairy roots was done to confirm genetic transformation of *A.rhizogenes.* Hairy roots were multiplied in large number by sub-culturing onto hormone free media. These were harvested, dried and extracted with the solvents. The diosgenin content in hairy roots was quantified by HPLC analysis. This study is useful in production of Diosgenin from *C.pictus*, an important product of industrial and pharmaceutical applications.

THE SLUGGISH WAVE OF DEMOCRATIC TRANSITION IN ETHIOPIA

Awol Ali
College of Law and Governance Studies, Hawassa University, Ethiopia

ABSTRACT

The transition to a more democratic political system, also known as democratization, entails substantive political reforms that move in a democratic direction. It could be a transition from an authoritarian government to a full democracy, a shift from an authoritarian to a semi-democratic political system, or a transition from a semi-authoritarian to a democratic political system. The outcome may be stable as in the United Kingdom, or democratization may experience numerous reversals as happened in Chile. Different democratization patterns are also used to explain other political occurrences, such as whether a country enters a war or thrives economically. Various factors, including economic development, historical legacies, civil society, and international processes, have been blamed for whether or not democratization occurs. Some interpretations of democratization place a premium on elite-driven processes, while others place a premium on grassroots bottom-up processes. There is considerable debate about the factors which exactly affect democratization. Economic, cultural, and historical factors have been cited as impacting on the process. The overall goal of this study is to discover the structural hurdles that obstruct a smooth "democratic" transition in the post-1991 political age. The study uses political economy methodologies to achieve this goal, shedding insight on the complex interplay between political processes and the economic sphere. As the finding of this study apparently depicts, Ethiopia's democratic transition has been hampered by structural problems. Despite the incumbent's efforts to put legal and institutional frameworks in place, the small middle class, education, the increasing trend of the EPRDF's conglomerates monopolizing the economy, and manipulating development assistance to maintain regime security have all had an impact on the flourishing of the public sphere in which political actors could engage in expanding the political terrain's horizon. Authoritarian political culture, the incompatibility of centralized party and decentralized state, the lack of a culture of consensus and trust, has hampered the democratic transition process in many countries. Thus, this study also suggested the possible mechanisms that help to remove the structural and key factors that negatively affect the pace of democratic transition in Ethiopia for the last thirty years.

Keywords*:* Democratic-transition, Wave of democracy, Centralized-party, decentralized-state, Ethiopia, EPRDF

Introduction

The term “waves of democratization” can be conceptualized in at least three ways: as rises in the global level of democracy, as periods of positive net transitions to democracy, and as linked sets of transitions to democracy[1]. Each of these approaches to the concept carries distinct theoretical implications and generates somewhat different historical patterns. This wind of change has positively impacted on the political system in Ethiopia to gear towards the liberalization of the public sphere hitherto dominated by the state. As a result, the Ethiopian state and society has undergone rapid changes in the post-Derg period that are illustrated by economic liberalization and political ‘pluralism’. A distorted form of political transition has been in place in Ethiopia in the wake of the demise of the military regime by the combined forces of insurgents, particularly the Ethiopian People’s Revolutionary Democratic Front (EPRDF). he decolonization of Africa took place in the mid-to-late 1950s to 1975, with sudden and radical regime changes on the continent as colonial governments made the transition to independent states; this was often quite unorganized and marred with violence and political turmoil. By 1905, control of almost all African soil was claimed by Western European governments, with the only exceptions of *Ethiopia* [2].
In the beginning of the 1980s a new social movement manifested itself as a “second independence way” so as to realize democracy across most parts of Africa, particularly in the streets of Algeria, Chad, Uganda and Zaire (the current Democratic Republic of Congo).[3] The increasing dissatisfaction with the status quo ante resulted from the dysfunctional nature of most African states to provide their citizens with social and economic development. This marked the failure of the raison d’être of the state in effecting its duties. The demise of communist regimes across the Eastern European states and the fall of Apartheid system in South Africa provided impetus for the increasing tide of social movements

across the continent aimed at installing and consolidating democracy in lieu of authoritarianism at the end of the 1980s and early 1990s.

Structural Factors Impeding Democratization in Ethiopia

The Transitional Government of Ethiopia (TGE) adopted a new economic policy in agreementwith Breton Woods' Institutions. The economic reforms aimed at reducing the role of the state in the economy, promoting domestic and foreign investments, and encouraging the establishment of private sector. Nevertheless, the state is in full control of land and "strategically" significant state- owned enterprises, such as telecommunication, railway, major financial institutions, electricity, etc. The formulation of Economic Recovery and Reconstruction Project (ERRP), upon the agreement between the TGE and the World Bank, marked major development in the post-1991 political dispensation.[4] The ERRP is a precursor to the Structural Adjustment Program that envisaged manifold reforms in the economic domain. These economic reforms cannot be conceived in a political vacuum. The TGE took these radical economic trajectories because of the following factors: the declining importance of socialist- oriented economy at domestic and international levels; to crush the bases of the opposition by reducing bureaucracy expenditure; to garner Westerns' legitimacy; to implement decentralization as part of the liberalization scheme and the expediency of revitalizing the economy [5]. Another major development in the post-1991 is political reforms taken by the incumbent. These include institutionalizations of "decentralization, multi-partism, press freedom, election and unionism". Notwithstanding radical measures taken by the incumbent to open the political space, the notion of democracy and pertinent values are curtailed thereby making the course to democratization perilous.[6]

Narrow Economic Spaces of Civic Actors

The current debacle to transform the political system on the course of democratization should be viewed from the prism of socio-political exclusion and poverty. Although the country needs the active role of the civic sector to address the daunting crisis it is facing, the ruling party's role is directed at excluding the civic sector from the public domain. This is mainly because of its cardinal principles underpinning the organization, the Revolutionary Democracy creed.[7] As stated the "EPRDF's policy in this regard is to deliberately exclude independent non-state actors or make them party affiliates and follow the party diktat." The authoritarian policy of the EPRDF, although it officially proclaims the necessity of the civic sector, is practically limiting the space in which civil society can play minimal roles [8].

It is also imperative to lend attention to the economic base of the political parties that are mushrooming in the post-Derg era so as to address the tortuous path to the consolidation of democracy for the last two decades. This could be viewed from the vantage point of the legal framework which stipulates the manner by which political parties can generate revenue. In this case, Article 28 of Proclamation No. 46/93 obliges political parties to garner their revenues only through the following means: membership dues, subsidies and grants from the government, and special events such as organizing bazaars. Other possible sources of income, such as foreign governments and political parties, welfare and religious organizations, are prohibited. Furthermore, they are also barred from engaging in profit-generating activities [9]. The paucity of resource base for most opposition groups has continued to jeopardize their endeavors to put pressure on the incumbent, thereby crippled the hopes of liberalizing the political space. As a result of this condition, the EPRDF entrenched itself by blocking any possible means of resources to opposition political parties by using the legal infrastructure. Paradoxically, the incumbent party has run a number of conglomerates on the pretext that they are inherited from the time of struggle against the Derg regime.[10]

The role of the ruling party in the economic sector should also be given emphasis as far as the place of private sector in the economy is concerned, since it gives a degree of independence to the private sector in relation to the state and the ruling party. It is increasingly documented that the TPLF-affiliated companies are engaged in agriculture, cement production, textiles and garmenting, livestock and leather, mining and exploration, transport and finance sectors, pharmaceuticals, engineering, construction and consultancy.[11] The TPLF's 50 companies are worth approximately half a billion dollar.[12] In a similar vein, the TPLF's conglomerates, the Endowment Fund for the Rehabilitation of Tigray (EFFORT), as by far the largest company in terms of its assets, geographical coverage and branches in the country.[13] The Amhara National Democratic Movement's (ANDM) five companies under the name of Endeavor (Tiret) is estimated to be worth 44.7 million dollar. Business companies (Tumsa Endowment) under the custody of Oromo People's Democratic Organization (OPDO) and Wondo group controlled by Southern Ethiopia People Democratic Movement (SEPDM) are worth 19.5 and 16.8 million dollar respectively. This trend has weakened a movement towards market economy whereby independent business sectors and middle class could flourish as preferential treatment is given to the incumbent's conglomerates. Although the government claimed that the establishment of EFFORT is for a sole purpose of supporting war veterans and victims of civil war, its executive committee is largely filled by members of the central committee of the TPLF.[14]

The economy is increasingly monopolized by the incumbent. There is no vibrant private sector unless we talk about conglomerates owned by foreign companies. This tendency has further blurred the distinction between party and state. Although the government claims it is engaged in building market economy, private sectors that are bidding party-led conglomerates and state- owned enterprises are facing discrimination with regard to access to credit facilities, foreign currency, letter of credit and discriminatory tax system.

> *The government's fiscal policies have favored state enterprises and companies allied with the Front. Tax breaks are extended to party approved businesses, and using its power to control the banks of the country, the Front has extended credit at very low rates or given direct start-up capital to its affiliated companies.*[15]

As a result of covert and overt preferential treatment to party-affiliated conglomerates in the forms of access to loans, policymakers and government as a market, the emergence of bona fide private sector is stifled. The problem gets worse due to the ruling party's ideological conviction that "the private sector is not always seen as the natural ally of 'revolutionary democracy'.[16] The EPRDF justifies its position on the ground that Ethiopia is in pre-capitalist mode of production so that the party should play a vanguard role in managing the economy in the interests of the majority until the economy is fully transformed into an inclusive capitalist economic system.[17] This marked the incumbent's aspiration to control the commanding height by expanding and consolidating the party- conglomerates at the expense of the private sector.

Furthermore, the incumbent has had a tradition of marshaling economic resources under the state's custody to marginalize the perceived and real threats during the time of election. It is possible to look at the strategy employed by the ruling party in Hadiya in 2000 pre-election period. As Tronvoll (2001) succinctly noted by interviewing the local inhabitants of the Hadiya zone, the EPRDF proposed carrot and stick strategy to the electorate.[18] The carrot illustrated by promising to peasants to provide them with seeds, fertilizers, money and grains, if they voted for the incumbent. This proves the economic approaches pursued by the incumbent to win the hearts and minds of the citizens. In fact, at worst, it manipulated the state bureaucracy to manage the state resources aimed at rewarding and punishing

electorates. This has proven how far the local attempt to transform their political course towards democratization is responded by harsh policy of the government to the extent of using food aid to revenge peoples voted for change. Furthermore, it signifies the situation incapacitated to the electorate to ensure their "sovereign choice" in that they were deprived to employ election as the ultimate political instrument to choose their governors.[19]

Politicization of Development

As a report confirmed, the EPRDF-led government has used various techniques to repress the opposition sympathizers and members.[20] To this end, it is accustomed to use the education, agriculture, the safety net public works program, food aid distribution, the civil service, and training programs for civil servants as carrot and stick vis-à- vis the society to monopolize the public space. As a result of its monopoly of these sectors, it is difficult to be free from the control and supervision of the incumbent. The monopoly of the commanding heights by the incumbent enabled the regime to put pressures on the opposition members to renounce their independent political membership so as to get access to agricultural inputs, food relief, and employment in public services, and further education.

Furthermore, the EPRDF used 30,000 community health workers to undertake political activities in support of the incumbent.[21] This discriminatory practice unleashed against the perceived or real members of the opposition group in rural parts of the country by withholding fertilizers and improved seeds to scale up production and productivity is aimed at monopolizing the political arena, hence it has crippled to the flourishing of political pluralism. This action is also supported by using the micro-credit services to punish the member of opposition political parties in various parts of the country by withholding credit services, despite the fact that the institutions are the properties of the public. The safety net program is also another political tool managed by the incumbent to buy loyalty from the victims of drought. Manipulating humanitarian assistance to reinforce political control has proven that the ruling party is also hinging on foreign assistance to use as a reprimand tool against the opposition groups.This state of affairs has proven how far the incumbent manipulates its advantages over the monopoly of distributing inputs of agriculture, land, public service and food aid to ensure its hegemony at the expense of ensuring fundamental freedoms and liberties that are the bedrock of democracy. The EPRDF's action also attests to the inseparable relationship between the state and the ruling party. As Lipset (1994) argued the possibility of having a free political community is hinged on the fewer resources marshaled and controlled by the state.[22] In view of this, the monopolization of state resources by the incumbent would stifle the birth of an independent polity that can mediate divergent interests amicably without favoring a given party through patron-clientelism as it is being observed.

Meager Size of the Middle Class and Lower Rate of Urbanization

Empirical evidence shows that there is an increasing interdependence between the size of the middle class and the propensity to good governance.[23] This is mainly attributed to the thinking that people in the category of middle class have the capacity to put leverage on the political system to move towards the rule of law, transparency, accountability and protection and promotion of human rights. In fact, the emergence of a sizeable middle class is the result of economic growth. As African Development Bank's report confirmed 21.5 per cent Ethiopian population is deemed as middle class. Out of this, 8.2 per cent is middle class without floating and 13.3 per cent is middle class with floating class.[24] This data has proven there is a tendency on the part of middle class with floating class to slip back into poverty trap if there are economic shocks illustrated by inflation and declining of real wages. This is mainly because of they are spending $2-$4 on consumption per day. As a result of this condition, it is

difficult to have a sizeable stable middle class. The meager size of the middle class in Ethiopia, compared to 39.04 per cent of the people living on less than $1.25 a day (ADfB, 2011), is making it difficult to conceive the structure of the society a hospitable environment to the democratization process. This corroborates the argument in the sense that if a society resembles an elongated pyramid, having large segments poor people at base, it is unable to mitigate anti-democratic trends that jeopardize the democratization process.[25]

Given the small size of the private sector and that the economy of the country is heavily dependent on agriculture the increasing in size of the middle class is not possible in the foreseeable future. The process is further stifled when the ruling party's recruitment strategy is directed at those civil servants and professionals who are affiliated with the party. However, the expansion of tertiary education at the current movement, despite with its limitation, would increase the size of the middle class. Currently, the existing middle class is not in a position to bid for further political liberalization and reform of the political system. Despite the changing patterns of the social and economic structures propitious to the emergence of middle class, its capacity to challenge the mounting political repression is crippled by the increased rate of poverty and skyrocketing inflation.[26]

As far as urbanization is concerned, not more than 17% of the total populations inhabited in urban areas. Viewing this small size of urban segments of population against the theoretical assumption of the country lacks a structural factor that could facilitate the transition to democracy. In fact, it should be noted that the leaders of most opposition political African Development Bank, in its market brief, defined middle class in terms of income and daily consumption. Accordingly, persons who earn more than 3,900 US dollar annually and spend between 2 and 20 dollar on consumption daily are categorized within middle class. It further classified the group into three categories depending upon their daily consumption: Floating middle class ($2-$4 per day), lower-middle class ($4-$10 per day) and upper-middle class ($10-$20 per day).[27] Mushroomed in the wake of the Derg period reside in urban areas, exposed to elements of modernity and most of them are ex-civil servants, business people and educated.[28] This state of affairs has proven the modernization theory in the sense that elements subscribed to modernity can contribute to democracy. However, it still needs large scale urbanization, middle class, industrialization and wealth to support the transition to democracy in Ethiopia. The manipulation of urban dwellers associations (UDA) by the incumbent has crippled the creation public sphere that could countervail the authoritarian tendency of the regime to independent outlooks. EPRDF has benefited from maintaining the UDA as the local structure to distribute social services to the inhabitants so that it enables to construct effective party machinery.[29] Furthermore, the existence of close contact between the urban dwellers and Kebelles with regard to renting government- owned houses; people living in rented houses could be subjected to any actions of Kebelle's official as a result of electoral affairs. Indeed, the issues of middle class and the trend of urbanization cannot be seen separately from the school life expectancy of any society, which will be covered in the following sub-section.

Education

It is increasingly recognized that there is a positive correlation between culture of democracy and education. This is mainly because education presumably broadens one's outlook, thereby increasing the need for norms of tolerance and pluralism. It "restrains men from adhering to extremists and monistic doctrines, and increases their capacity to make rational choices." Although an increasing rate of literacy has been achieved in Ethiopia, it is still only 39% of adults are literate. 45% of youths are still illiterate.[30] The 2011 Ethiopian school life expectancy, according to the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics is 9 years. This

shows Ethiopia is categorized under authoritarian regime category as per school life expectancy and democracy index is concerned.

The recent expansion of tertiary education is in an embryonic stage to nourish civic culture by making individuals less fatalistic and less parochial. It is, however, paralyzed to be the lynchpin of democracy because of high level of state control on education in the sense that it is being observed the increasing political recruitments of students by the incumbent. Given the highest rate of unemployment in the country, becoming a member of the ruling party in order to get employment opportunity in public services up on their graduation is viewed favorably by students. In such circumstance, the theoretical nexus between democracy and education, "higher education ... may act to rationalize the capacity of the state and the competence of its personnel. In such systems, education may operate to support state-sponsored change or revolution from above." As a result of political 'capture' of tertiary education in Ethiopia, it has continued to adversely impact on the role of academic institutions to entrench political democracy.[31]

The politicization of educational facilities is a strategy employed by the EPRDF to curb the political space. This was manifested when days approached the 2010 federal and regional election by exploiting the resources of higher institutions to train cadres. The civil servants in each bureaucracy are required to attend 'trainings' under the pretext of capacity building. In actual fact, as Human Rights Watch stated, its intention is recruiting members for the EPRDF and to indoctrinate them the ideology of Revolutionary Democracy.[32] It is also reported that partisan political activities are undertaking on school premises to indoctrinate the ideology of EPRDF among high school students. This is against the principle of separation between schools and politics. Teachers, who are not members of the incumbent party, are subjected to pressure to sign to party membership. At worst, they may be dismissed if they are found to be members or sympathizers of opposition parties. As a result of these precarious conditions as well as to secure salary increment and scholarship, they join the ruling party.[33] This endeavor to recruit students for the ruling party membership is part of an attempt to manufacture consent among the youth.

In such an authoritarian educational tradition, it is difficult to conceive critical thinking on the parts of students thereby failing to perceive the socio-economic and political contradictions within the Ethiopian society and to take action against the oppressive political system. Education should expose the oppressive nature of the political system and human sufferings. Students are instrumental in uprooting these oppressive systems accordingly. Against this view, the Ethiopian educational system is not in a position to transform state society relationships that geared towards democratization unless it breaks itself from authoritarian political tradition.[34]

Authoritarian Political Culture

It is believed that political culture and political socialization are indispensable to build and sustain a democratic system. The political culture can take the forms of participant, subject, parochial and a mix of the three what is called a civic culture. Ethiopian has experiencing subject and parochial political culture. The former one expressed in the inability of the public to impact on the political system, although they participate in regular election since the demise of the military regime. The latter one often manifest itself in rural Ethiopia and particularly in places of Southern part were "people feel helpless in the face of intimidation and denial of rights meted out by Kebele officials and security personnel".[35]

In a similar vein, Ethiopia's hierarchical political culture is not nourishing a democratic-republican political culture whereby its fundamental aspects, such as public debates and discourses on national affairs, are primarily discouraged and prohibited. Rather, the current political dispensation has inherited

from its predecessors, the military and the imperial regimes, political traditions illustrated by hierarchy, obedience and forceful authority.[36]

"The autocratic mentality bequeathed by past rigid political culture and the tendencies that uphold the politics of command are very much alive today, as they were during imperial and revolutionary times".[37] These authoritative assertions contend the institutionalization of democracy in the post-1991 period cannot be conceived without deeply looking into the political culture of the country. As a result, intimidation, suspicion, division, violence and suppression have continued to dominate the political terrain of the country for the last couple of decades. This state of affairs manifests itself in crisis ensued elections, armed insurgency, interethnic conflicts, harassment and intimidation of perceived members or sympathizers of opposition groups. The political tradition of the country is still unable to break itself from the logic of 'winner-takes-all' approach whereby the state is the only source of wealth, prestige and power. Hence, the political struggle among groups is reinforced by such principles, thereby making political activities deadly, a struggle for life. In such circumstances, democratization process is further derailed, leave alone its consolidation.

Elites in any society can be instrumental in influencing their society, thereby shaking the foundation of the old system and replacing it with a new one. Ethiopian history has witnessed the role of the intelligentsia in speeding up the demise of the monarchical system in the February revolution. The contribution of the elite political subculture for today's tortuous political course to political transition which favors political opening should be recognized. Although it is difficult to generalize the Ethiopian political culture in general and the elite in particular, it is fair to say that they can be categorized in an authoritarian political culture rather than democratic one.

As a result, the culture of demonization, the politics of blame and hate as well as conspiracy have continued to stifle the onset of political dialogue and the establishment of democratic institutions.[38]

The problem is further aggravated, given the agents of socialization to transmit democratic values and norms are monopolized by the ruling party. In any democratic system, mass media is deemed as a fourth estate in that it has a capacity to check the power of the state. Furthermore, it takes measure as soon as the rules, regulations and laws of the country are undermined. In Ethiopia, however, national TV and Radio as well as government-owned press are being instrumentalzed for conveying government's information rather than being actors of a two way of communication. As a result, they fail to critically evaluate government's deeds at each level.[39] The purpose of the mass media relegated to the creation of "manufactured consent" whereby political dissent or alternative views do not get any space vis-à-vis the dominant perspective that sanctify the status quo. This has in turn jeopardized the germination of political pluralism within the society. Furthermore, the political climate of the country is dictated by the principle of "winner-takes-all" approach whereby actors in politics has two fates: inclusion or exclusion. If you are a ruler of this country, all privileges and powers are monopolized under your control. On the contrary, other parties are excluded from taking part in the direction of the political process. As a result, the persistent nature of authoritarian political culture is inability to nurture democratic system.

The lingering authoritarian political tradition is also reinforced by EPRDF's understanding of democracy, which is antithetical to the entrenchment of political pluralism. It is engaged in molding the republic on the line of "Revolutionary Democracy." The ruling party has viewed democracy as popular participation at the grass root's level so that it is able to mobilize the public to meet the party's program. It is not aimed at entertaining debates and votes between different political opinions.

Democracy for the EPRDF implies public participation through the channels of the ruling party and the government machineries. Without the domain of these, any participation is perceived as a threat to the status quo in that it is being perceived as challenging the hegemonic dominance of the incumbent.[40] This kind of understanding of democracy coupled by the persistent nature of authoritarian political culture was reinforced in the wake of the 2005 federal and local election. Since then, people perceived as sympathizer or member of the opposition groups have been subjected to harassment, intimidation and exclusion from social services. This is a sign of "a firm authoritarian hand trying to intimidate critical voices and dissidents and to reinforce power from above".[41] Therefore, the EPRDF's conviction of having the "right" policy does not give opportunity to the opposition political parties, civic groups and the public to have discussion on national issues. This trend of monopolization of the public space by the ruling party shows its relentless effort to play a vanguard role within the society.

In short, the prevailing structural factors that are exemplified by the increasing involvement of the ruling party in the economy, the strangulation of peasants by the cadre system, marshaling state resources for political ends by the incumbent, meager size of the middle class, the existence of a sizeable size of illiterates, as well as lower rate of urbanization are hindering the possible political transformation geared towards democratization. Furthermore, authoritarian political tradition inherited from the past has adversely impacted on the flourishing of political pluralism.

The Violent Marriage of Centralized Party with Decentralized State

Constitutionally, Ethiopia is a federal polity, but its federal entities are controlled by the strongly centralized EPRDF that predetermines decisions from the prime minister's palace in the capital to remote rural kebelles. A dual dynamic is at work: a more visible, formally decentralized state structure and a more discreet but effective capture of the state by the EPRDF and its affiliated regional parties.[42] In spite of formal policy and rhetoric, Ethiopia has only nominally devolved decision-making armed conflicts is common in the western and south-eastern lowlands power to local levels. All important political decisions must be taken at the centre or be in line with central policies.[43] The EPRDF relies on total control of the state bureaucracy, not only because it wants to cling to power, but because public resources are the main patronage it can provide to its followers. A well-organised party network extends from the federal to the regional, fromn the regional to the *woreda*, and from the *woreda* to the *kebelle* and sub-*kebelle* levels.[44]

Vanguard Party Monopoly: Elections without Competition

Recent history illustrates the EPRDF's overwhelming dominance at the ballot box. The first multiparty regional and district (*woreda*) elections, held on 21 June 1992, failed to offer an alternative. The OLF, the All Amhara Peoples' Organisation Party and other ethno-national parties from the transitional government withdrew at the last minute, because their candidates faced intimidation, violence and fraud. The EPRDF received 96.6 per cent of the vote, and international observers qualified the election as "sterile, surreal and wholly formalistic".[45]

The next election occurred on 5 June 1994, when a 547- member assembly was chosen to revise and ratify the draft constitution, whose clauses on state land ownership and the right of ethnic groups to self-determination "up to and including secession" was particularly disputed. Although some public discussion of the draft took place, a climate of political polarization and distrust prevailed, the major opposition parties continued their election boycott, and the EPRDF and its affiliate parties won 484 seats.[46]

The first federal and regional parliamentary elections, on 7 May 1995, continued the pattern of non-participation by the main opposition parties. Rural residents were mostly apathetic, though their registration and voting numbers were high, because many feared that displaying anti-government attitudes or sympathy for the opposition would provoke repercussions.65 Harassment and intimidation of opposition supporters occurred throughout Amhara, Oromiya and the Southern Nations, Nationalities and People's Region (SNNPR). In Tigray the TPLF recruited "independent" candidates to avoid the impression of a non-competitive election. The EPRDF claimed a sweeping victory in an election that became the "final act in a four-year process of political closure".[47]

Conclusion

The above discussion showed that various structural factors have impeded Ethiopia's political transition to democracy. The incumbent party, since its assumption of power in May 1991, has monopolized the public sphere, which is detrimental of fundamental values and principles underpinning democracy. In its endeavor to preside over the helm of power without any contestant, it has marshaled state's resources under its custody. Furthermore, it has employed politico-legal frameworks, which are the advantages of its incumbency, to further entrench its influence within the society. Although the EPRDF's commitment to stay in power can provide an essential explanation to look at the derailed path to democratization in the post-Derg periods, the structural obstacles are by far the most potent force that impeded the political transformation. These are the narrowing economic bases of the civic sectors, strangulation of the peasants by the cadre system, the politicization of development assistances, meager size of the middle class, slow rate of urbanization, lower rate of school life expectancy coupled by large sections of illiteracy. These further reinforced by lingering authoritarian political tradition that we have inherited from the past. The incumbent's endeavor to monopolize the commanding height has had a detrimental effect on the emergent of vibrant private sector. This state of affairs has continued to erode the economic bases of the civic sector, thereby narrowing the political space. Furthermore, managing local administrative apparatuses to ensure regime security by the incumbent has further impeded the democratization process. Another obstacle to the democratization process is the meager size of the middle class while looking back to two decades. The current states of inflation and aggressive political recruitment strategy by the EPRDF further stifled the existing middle class so as not to play a potent role against the authoritarian orientation of the regime. The current conditions of urbanization lower school life expectancy and sizeable sections of illiterate population are also hindering factors as far as democratization is concerned.

The 'winner-takes-all' approach, that has been the hallmark of the political formulae of the country, has continued unabated and reinforced by the predominant political culture, a culture of monopolizing the political space by actor in power, thereby excluding the rest. In this case, the EPRDF has unleashed the politics of exclusion against perceived and real political threats to the incumbent. The paucity of negotiation and compromise as parts of political language has further impeded the political transition to democracy. Indeed, we have seen some developments that may provide impetus to the opening of political space that could entertain political pluralism. The expansions of tertiary education accompanied by the youth bulge as well as the emergence of middle class are particular examples. Nevertheless, the constraint factors outweigh the opportunities. As a result, political transformation geared towards democracy is unlikely to prevail in the foreseeable future. Consequently, the state remains the appendage of the ruling party so as to entrench itself intact.

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CREATING A FINANCIAL LITERACY EDUCATION MODELS FOR CHILDREN IN THE 10-YEAR AGE GROUP

Prof. Dr. Salim ŞENGEL, Prof. Dr. Serpil ALTINIRMAK, Prof. Dr. Hüseyin YOLCU, Doç. Dr. Şirin ŞENGEL, Dr. Taylan AKGÜL, Basil OKOTH

Institute of Social Sciences, Anadolu University , Eskişehir

ABSTRACT

Financial literacy has been touted as an essential life skill necessary to help navigate the ever-changing economic ecosystem. Children in the technologically driven world are exposed to different aspects of

finance at an early age especially in the form of their online activities which may require some forms of payments. Money use and money management are lessons that need to be taught in schools as soon as the children are deemed capable of understanding the concepts. Given the ever-changing economic and financial ecosystem, the financial literacy education models should be made in such a way that they are easily adaptable to the fast-paced systems. The contents should be made general enough to be able to include aspects of finance while maintaining the flexibility to change as needed.
This study highlights the process of formulating financial literacy models for school children in the fourth grade (10-year-olds) through a mix of classwork and games. Through a project conducted in three schools for more than 10 weeks, the study outlines games that can be used to teach various aspects of finance and the lessons learned from each game model.

Keywords: Financial Literacy, Education Models, Savings, Consumption

Introduction

Humanity, throughout history, has been exposed to changes of various intensity and scale, whether self-created or naturally occurring. The ability of man to adapt to the changes has ensured that we have been able to mitigate these risks and ensure the sustainability of life. Sometimes, be being able to anticipate these changes have we been able to formulate appropriate newer paths to solve or improve the existing ways of doing things business. One of the areas in which change, diversity and innovation has become a constant issue is the financial markets. The most important player in the economic system, who is supposed to be highly affected by the changes in the economic system is the individual, as every economic decision taken affects both individual welfare and social welfare. At this point, the knowledge of individuals in financial terms is important.

With the increasing complexity in financial services, it has become important for individuals to make effective choices and make informed decisions about their own financial situations, to have the necessary skills, knowledge and understanding in financial matters. These knowledge and skills offer individuals with effective protection in financial markets and providing appropriate and standard information about the goings on in the financial ecosystem.

Making financial decisions starts from childhood and is a lifelong process. Financial knowledge in areas like savings, expenditure, budgeting, investing and using credit facilities is vital in determining how a society approaches both plenitude and crises. This implies that the knowledge of finance shouldn't be a preserve of only those identified as professional practitioners in the financial sector. But rather is an issue that concerns all segments of society, including children and young people.

The necessity of financial knowledge at all stages of life calls for the molding of the behavior and attitude of individuals earlier in life to be able to help them later in life. Improving the state of resource use and economic thus depends on the level the financial knowledge level of the young population.

In general, financial literacy, as stated above, is the financial knowledge one has, the ability to use this information, and the ability to make the right financial decisions. There is no certainty determined by the scope and limits of financial knowledge and financial literacy skills. Scope and limits have been presented at different levels in various academic studies. For this reason, it is not possible to make a precise definition for the concept of financial literacy.

Like most other issues in social sciences, financial literacy doesn't have a single agreed upon definition, but some of the definitions that have been use in the literature include: Noctor et al. (1992); the ability to make effective decisions regarding the use and management of money, Alba and Hutchinson (1987); the successful management of one's financial affairs and personal capital as an expert, Remund (2010);

the measure of financial literacy, understanding of basic financial concepts, having the ability and confidence to manage personal finances through appropriate short-term decision-making and sound and long-term financial planning, taking into account life expectancy and changing economic conditions.

Schagen and Lines (1996), on the other hand, defined a financially literate person as someone who understands money management and basic concepts, has knowledge about financial institutions, systems and services, and manages general and financial affairs effectively and responsibly.

Literature Review

Financial literacy, especially in schools, has been considered especially based on the importance assigned to financial knowledge in the current economic system. One of the sited importance of financial literacy is in helping individuals adapt to the economic developments and financial innovations and be able to make the right financial decisions in such dynamic environments.

There are mixed findings of the effectiveness of financial education especially before college. Some of the most referenced studies highlighting financial literacy in schools are given here…

Lührmann et al. (2015) examine the impact of financial education on the attitudes, knowledge and behavior of teenagers on financial matters. They state that whereas improved basic financial knowledge is an expected result of the study, improved interest in financial issues is a confirmation of the importance of financial education at this level.

According to a systematic review of literature performed by Amagir et al (2018) on financial education in children and adolescents, financial education helped improve the students' understanding of most financial concepts and helped develop a positive attitude in them. When it comes to the approach or the method of delivery of the lessons, experimental learning was found to be the most effective method of teaching financial education. Role playing and discussion groups and other forms of activities that entailed participating in simulated economic situation were found to be the most effective methods.

Aim of the study

The aim of this study was to reveal the relationship between financial literacy education and consumption and saving behaviors of 10-year-old primary school students.

To achieve the objective, the study followed an experimental methodology in which one group of students (experimental group) were given financial education over a period of 10 weeks and another designated as a control group.

The following are two of the modules which involved games that were used in the classes.

	MODULE 1: MONEY
Course Content	**Definition**
Lesson description	Students will be introduced to the concept of money and informed about the origin of money, its characteristics, paper and coins.
Concepts	Barter Trade Paper money Coin
Purpose	Students:

	They will be able to explain the birth of money by understanding the concept of money, They'll be able to explain the paper and the coin.
Required Time	30 minutes
Question of the Day	What's the money? Why is it necessary?
Materials	Wallpapers - Money, Swap, Paper Currency, Coins Course slide (ANNEX-1) Picture cards in envelopes given to groups for the swap game

The instructor presents the course with a slide.

A trading game is set up to answer the question of the day after the presentation.

The class is divided into 4 groups. Each is given pictures. In order to complete the game, the bicycle picture is requested to be completed. The goal is to show that shopping without money is very difficult.

What they have	What They Need to Complete the Picture
Fruit Bread Pedal	Steering wheel
Egg Yogurt Steering wheel	Wheel
Cheese Sugar Wheel	Pedal
Juice Meatball Steering wheel	Chain

	SAVINGS
Lesson Description	Students will discover how to deposit and withdraw money into a savings account. A lot of kids have a piggy bank in their homes where they collect all their coins. In this lesson, students will play a game that explains that a bank is like a piggy bank - they deposit money and money can be withdrawn from it. Students will be told why saving money is important.
Concepts	Saving Deposited Money

	Withdrawal Savings Account Savings Objective
Aim	Students: will be able to distinguish between deposits and withdrawals. will be able to explain the importance of saving.
Needed time	30 mins
	Tell students they will play a fun game about depositing and withdrawing money. Divide the class into groups that have no more than four students in each group. Give each group a locked bag filled with materials. Students remove all contents of the locked bag, except for coins. Tell them to shuffle their deposit and withdrawal cards and face them in the middle of the group. Tell students you've given each group a piggy bank to open a savings account. Explain that a savings account is an account where banks can keep the money that people have saved. Show me wallpaper that says "Deposit Account." Tell the students that each group has 50 liras in their savings account. Let the students put 50 liras in the piggy bank. Show them how the game is played. **Each player pulls a card out of a box. The card either has a task and the amount earned from performing the task, or an expenditure item and its cost written on it.** The transaction is written on the savings records. The card is then placed under the card stack and the savings record is passed to the next person to register. It reminds students that they have to work together to play the game and that the team with the most money at the end of the game will win. Each group continues the game until they fill out all the savings records. 1. PHASE Have students review their savings records. Make sure students add and subtract correctly. Reward them if they did it right. 2. PHASE Tell students that they have just learned how to make deposits and withdrawals in a current account in a bank. People who make good savings in real life, plan to save and strive for it benefit. Ask students to share stories about how they have saved money in the past and what they saved for. As a class, discuss why people are saving their money. (Buying something in the future, for an emergency). Ask the students what they want to save their money for. 3. PHASE Discuss the following:

	a) What is the difference between making a deposit and withdrawing money? (When you deposit money, you deposit money into your account; when you withdraw money, you take money from your account.) b) Why is it good to have money in your savings account? c) What is the goal of savings?

Conclusion

The completed parts of the study have revealed no significant differences between the experiment and the control groups based on the tests conducted at the beginning and at the end of the duration. The results echo those by Mandell and Klein (2013) which found no significant advancement in the level of financial knowledge or change in behavior regarding financial practices. There is need for a change in approach on how financial education is offered and how research on the area is handled. Fernandes et al. (2014) for instance suggest controlling certain psychological traits.

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A MORALIST THEORY AND THE PERSISTENCE OF STREET VENDING: THE CASE STUDY OF KAMPALA CITY - UGANDA

[1] **Andrew Gilbert Were,** [2]**Stephen Mukiibi** [3]**Barnabas Nawangwe,** [4] **Bridget Nakangu,** [5]**Paul Isolo Mukwaya,** [6]**Juliana Nambatya,** [7]**Daniel Kisitu**

[1]*Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.*

[2] *Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.*

[3] *Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.*

[4] *Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.*

[5] *Department of Geography Geo-informatics and Climatic Sciences, College of Agricultural and Environmental Sciences, Makerere University, Kampala, Uganda.*

[6] *Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology, Makerere University, Kampala, Uganda.*

[7] *Department of Geography Geo-informatics and Climatic Sciences, College of Agricultural and Environmental Sciences, Makerere University, Kampala, Uganda.*

ABSTRACT

This paper employs the moralist theory to explain: the endurance of street vending practices in Kampala city. It used perceptions of law enforcement officials and street space users towards street vending practices. The concept of saturation was used to determine sample size, whereby 148 respondents that included six law enforcement officers, 34 cyclists, 29 merchants, 34 motorists and 45 pedestrians were interviewed. Respondents were selected from various streets according to time of vending, intensity of street vending, spatial distribution of the streets, types of goods sold, age, gender and purpose on the street. Other key informants interviewed were law enforcement officers, technocrats from the city authority and representatives of street vendors' associations. These were integrated with observations and reviews of grey literature in the urban management, trade and policy reports from Kampala capital city authority. Scholarly literature included the demand side theories of street enterprises such as the formal economy failure theory, the financial gain theory, the social or redistributive rationale theory and the multi-feature theory. Similarly, supply side theories of street vending such as the modernization theory, the post-modern theory, the structuralist theory and neo-liberal theory, concepts such as neoliberal urbanism and right to the city offered frames of data analysis. Findings indicate that it is difficult to enforce laws against street vending, partly because of the moral obligations instinctively felt by those supposed to enforce the laws. We recommend that street vending be included into mainstream city planning and management, because it contributes to urban livelihoods and contributes to the sustenance of the formal and informal economies.

Keywords: Moralist theory, persistence, street vending, Kampala-Uganda.

INTRODUCTION

It is considered that Informal employment contributes almost 85.8% of all employment in Sub-Saharan Africa, thus becoming the main source of employment (ILO, 2018). Yet, harnessing employment opportunities and livelihoods arising from the informal sector activities such as street vending is still a daunting task for most cities in Africa. Street vending is part of the informal sector. Street vending may be defined as "the retail or wholesale trading of goods and services in streets and other related public axes such as alleyways, avenues and boulevards" (Bromley, 2000:1). The street vending practices have been observed elsewhere and a conclusion drawn that "in many cities around the world, these activities

are an integral part of the quotidian urban landscapes and systems of everyday life. Street vendors, for example, appropriate street corners and sidewalks on a daily basis to provide basic and necessary services to the urbanites" (Hou, 2020:117).

The practice has existed within our society, in both urban and rural trading centres and along pathways perceived to generate traffic. The pedestrian and vehicle traffic offers a viable market for the vendors. Thus, street vending is a source of employment and livelihoods that would make many residents in Kampala city to escape extreme poverty (Ismaili, 2020). Similarly, it absorbs the unemployed and underemployed (SIHA, 2018). Street vendors are projected to number over 10000 in Kampala city alone (Gumisiriza, 2021) as the practice attracts people across the demographic spectrum regardless of age, gender, level of education, marital status, income levels, places of residence among others. Indeed, it has been argued that in the absence of street vending, people could opt to engage in unlawful practices for a living. Therefore, street vending is perceived as a social safety net (Nakazi, 2019). Yet, the Kampala City Street Traders Byelaws forbid street trading without a license from the town clerk. There is emphasis on the more planned for, more formalized ways of trade such as in shops and built up markets. There is the notion that the unregulated forms of trade such as street vending should be abolished because they destabilize trade order and distort formal markets.

Yet, in contexts of cities of the developing World such as Kampala city, where street vending exists side by side with formal markets, some scholars have argued that "to say that the market, for instance, is not functioning 'as it should' is to deny the possibility that perhaps the market is working exactly as it should in the African context" (Roitman, 1990:677). Perhaps, that is exactly how the market operates, considering the stage of development in African cities where all forms of capital, labour and entrepreneurship cannot be accommodated in one formal sector, with rules of operation specified by government institutions and neo-liberalism. Thus, the justification in street vending is in the argument that "the labor market, all over Africa, has become highly stratified. Regular, protected wage employment has not totally disappeared, but the proportion of individuals in such jobs has been falling consistently" (Mbembe, 2001:55). However, the role of the state in "fragmentation of public authority and emergence of multiple forms of private indirect government" (Mbembe, 2001:76), in addition to the overlapping layers of power and authority that is derived from both institutional and non-institutional spheres of influence, can also be blamed for the bulging of 'informal' sector practices such as street vending and its entrenchment in Kampala city.

As a result, efforts to evict vendors from streets have failed. Some scholars have carried out studies to offer reasons for persistence of street vendors in Kampala. They include; a comparative synthesis of street vending in selected African cities (Mitullah, 2003), studies on street vendor resistance, politicization of city management and petty corruption (Gumisiriza 2021), the role of politics in all aspects of street vending (Young, 2018), institutional failure to manage street vending (Goodfellow, 2009). However, the studies did not address the moral fabric inherent in Kampala society, whereby general respect for personal property and the instinctive urge to act humanely towards fellow human beings, to follow norms of the society, tends to over-ride the urge to implement institutionally founded laws driven by state expediency. Otherwise, where there is political will, there can be a systematic, institutionally driven programme to design and manage public spaces for the benefit of vulnerable groups (Arias, 2018). Often, the state chooses not to. Therefore, "regulation of space doesn't necessarily entail physical confrontation; prevailing social norms also speak to the "authority" of society" (Arias,

2018:18). It is against this background that this paper provides for the moralist theory, to explain the persistence of street vending practices in Kampala city.

The moralist theory and related literatüre

This paper presents the moralist theory which states that, the instinctive feeling to do good for fellow human beings impairs one's ability to carry out their lawful mandate, if the mandate conflicts with the urge for morality. Similarly, when the majority of public opinion supports a norm, through various ways of patronage as is the case with street vending, it tends to be difficult to enforce laws against that norm. Essentially, the norm is or becomes part of the society and to negate existence of the norm or practice is to deny the very existence of the society or the culture that practice it.

In addition to introducing the moralist theory, this paper alludes to other theories that have been developed in an attempt to explain the street vending practice. The persistence of street enterprises have been explained using four main theories such as the modernization theory, whereby street vending is seen as a 'vestige' of an ebbing ancient practice in the modern world; the structuralist theory, whereby street vending is perceived as a result of failure of systems, structures and institutional processes to offer livelihood options of marginalized populations; the neoliberal theory, that suggests that street vending is chosen as a voluntary option out of many alternatives; and the postmodern theory which suggests that street vending is practiced as part of the modern culture (Williams & Gurtoo, 2012:1). These theories are on the supply side of street vending and provide plausible explanations, yet they do not address the regulatory and moralist side that influence street vending practices.

On the other hand, four demand side theories have been advanced in an attempt to explain persistence of street vending (Igudia, 2019). First, are the formal economy failures where systems such as capitalist driven policy, neoliberalism and financialization of urban space; structures such as the administrative and institutional framework that drive urban management; and processes such as the bureaucracy and interests of agency in the urban space. The preceding forces interfere with the efficiency and convenience of shoppers to obtain goods and services, and consequently provide a basis for shoppers to patronize the informal sector.

Secondly, the financial gain theory that suggests that patrons prefer the informal economy because it is cheaper. Thirdly, the social or redistributive rationale theory which provides that street vending takes place in familiar contexts or people and patrons wish to redistribute wealth by purchasing from 'poor' people. Fourthly, multi-feature theory which provides that individuals' marital status, level of education and perception of street vendors tends to influence their preference for informal sector goods or services (Williams & Martinez-Perez, 2014), (Igudia, 2019).

Application of the Moralist Theory in the study of Street Vending Practices

This paper argues that the preceding theories do not explain street vending practices from the law enforcement and moral perspectives. Ideally, laws and regulations ought to be reflections of the society within which they are formulated. Moral norms that govern a society are as important as institutionalized laws and regulations formulated by the state, and so they require similar attention and adherence. This is because they tend to hold or knit societies together, such that in the absence of state apparatus, the norms could act as codes of conduct and save the society from disintegration. Again, the moralist theory

suggests that in circumstances where regulations are against values and norms of the society they are supposed to regulate, enforcement of such regulations tends to be less effective.

Thus, in situations where incentives and remuneration is high, law enforcement officers may enforce regulations zealously. However, where the insurgent population persistently asserts their demands for example when they appropriate space for survival, and where a section of policy makers, politicians and law enforcement officers empathizes with street vendors, better remuneration of law enforcement officers does not necessarily lead to effective enforcement of regulations. The law of diminishing returns often sets in. Hence, the paper is a contribution to other scholars that have generated theories to explain persistence of the street vending practice in cities.

The moralist theory derives its background from the behavior of law enforcement officials, citizens who patronize street vendors, some technocrats, politicians and citizens that empathize, operate in or share spaces utilized by street vendors in Kampala city. They are either complacent, lukewarm to the practice or beneficiaries of street vending practices. The paper attempts to validate this supposition. Similarly, despite the conflict between law enforcement officials and street vendors, street vending has persisted, defying all forms of disruption and eviction. This observation was made in earlier studies which concluded that, "only the most authoritarian regimes have tried to eliminate it, and they have generally failed" (Bromley, 2000:22).

Moreover, vendors who appropriate street spaces for private enterprises believe that they have a right to utilize the space for their own gain, because they live in the city. They feel that they have not received their fair share of goods and services distributed by the city authority. They feel a sense of entitlement as citizens. This brand of citizens is what Lefebvre envisions in his radical treatise of 'right to the city', where he advocates for citizen control and management of their own affairs in cities. He "sees the right to the city as a struggle to "de-alienate" urban space to reintegrate it into a web of social connections in terms of appropriation. His idea of right to the city involves inhabitants appropriating space in the city" (Lefebvre, 1996:174, as cited in Purcell, 2013:149). Certainly, this creates a conflict with those who own property in the city and would like exclusive rights over their property.

Therefore, the loss of moral obligations of cities to their citizens has also been attributed to the lack of distinction between property rights and use rights of urban space. Accordingly, in neoliberal urbanism and financialization of city spaces, "property rights of owners outweigh the use rights of inhabitants, and the exchange value of property determines how it is used much more so than its use value" (Purcell, 2013:142). The lack of consideration for public spaces by cities compel citizens to appropriate and utilize the only 'available' or negotiated spaces. As "in almost all its forms, the right to the city is understood to be a struggle to augment the rights of urban inhabitants against the property rights of owners" (Purcell, 2013:142). This has been the trend across highly commercialized cities, in relation to management of public spaces whereby ironically, a "city may prioritize creating an amenable shopping district for clients of formal stores, but exclude the informal businesses who may provide goods and services to the same people" (Arias, 2019:9). She avers that the macro-social dimension of the city must reflect its "collective cultural values expressed through public spaces" (Arias, 2019:9) and this would pre-empt the tension between "aesthetic and ethical values in the programming of public space" (Zukin, 2018, as cited in Arias, 2019:9). Being run in a neo-liberalised regime, Kampala city authorities have tended to protect property owners, provided spaces for mega projects and formal businesses against

street vendors. Instead they would promoted both formal and informal businesses since they have proven to be complimentary.

Background of street vending in Kampala City

Street vending in Uganda grew rapidly "during the military regime of Idi Amin that resulted in economic dislocation and mismanagement of the economy" (Mitullah, 2003:4). Indeed, President Iddi Amin's expulsion of Asians was meant to empower black Africans to take up Asian businesses and grow indigenous entrepreneurship. However, the less developed industrial sector in the 1970s and 'frosty' relationship with Kenya and Tanzania made free importation of goods and services difficult. There were fewer goods in shops and this spurred smuggling. The increase of indigenous people in Kampala city brought with them local goods and services of which the street became a source of their market. Similarly, the NRM government played a significant role in encouraging and perpetuating street vending activities in exchange for political support (Young, 2018).

In addition, street vending practices are partly a product of neo-liberal policies that undermined social welfare in developing countries, in favour of the market as the main distributor of goods and services. In Uganda, the policies introduced in the late 1980s and early 1990s in form of structural adjustment programmes (SAPs) were based on World Bank requirements and they involved devaluation of exchange rates, harmonizing tariffs with neighbor states, reduction of domestic tariffs to ease international trade and outright privatization of state enterprises that were perceived uneconomic to manage. The result was that: state welfare reduced; there was widespread unemployment; monopolized marketing of agricultural products such as coffee, cotton through marketing boards was significantly curtailed or died out due to the collapse of cooperatives. However, many actors entered the market and prices paid to farmers for goods significantly increased, although the diversification of the economy may have reduced the production of agro-based goods.

Neo-liberal urbanism and street vending in Kampala city

The liberalized economy gave opportunity to engage in import and export trade. Thus, imported goods offered employment in the distribution value chain, which largely employed street vendors either retailing the goods as their own enterprises or as agents of large stores in the formal sector. Hence, the diminishing role of the state and cooperatives that marketed agricultural products enabled people to find various ways to access markets, of which street vending became an option for marketing goods. Owing to limited space in available built markets in the city, scattered settlement patterns that do not relate to formal/planned commercial land-use, the structure of public transport that follows informal routes and the culture of displaying goods on the street inspired and perpetuated street vending. Similarly, the culture of shopping malls was not an African creation. It is an imported phenomenon that has come with neoliberalism and financialization of city spaces, a shopping strategy that seems unpopular with large populations of low and medium class in cities that perceive shopping in malls as expensive. The spatial location of current malls that have no relation to the pattern of human settlements have also proved inconvenient for shoppers. Although the "neoliberal ideology rests on the belief that open, competitive and unregulated markets, liberated from state interference and the actions of social collectivities, represent the optimal mechanism for socioeconomic development" (Peck, Theodore, Brenner, 2009:49), this has not proved the case for most cities where informal markets thrive.

The philosophy of neoliberal urbanism and the privatization or financialization of public urban spaces that favour "large scale projects have become important instruments for local governments, influencing the form, function and scope of new modes of entrepreneurial urban governance" (Moulaert & Seika, 2003, as cited in Tasan-Kok, 2009:128) present a challenge such that the social functions of the city, that would allow common use of public spaces are no longer given due consideration. This is because the instruments used to promote entrepreneurial urban governance "serve the aim of efficient and effective implementation of strategic projects without taking their social impacts into account, the social gains are limited compared to the economic ones" (Tasan-Kok, 2009:132). Common land or spaces for all are no longer given due consideration in public space allocation. Subsequently, Cities have become 'hostile' to the welfare of low income and vulnerable groups that are not able to afford integration into formal market systems arising from neoliberalism.

Consequently, because they have to fend for themselves, citizens in Kampala city exert their influence and appropriate city spaces in ways that have confounded and overwhelmed law enforcement officers on ground, technocrats and policy makers at the helm of city authority such that some of them empathize with street vendors. Moreover, it is these people that "occupy and appropriate urban spaces in routine and sometimes unexpected ways, bringing new meanings and unforeseen functions to these spaces" (Hou, 2020:117). Therefore, activities of informal sector actors such as street vendors may seem a challenge to urban planning, urban design, urban policy and urban management. However, as disorderly as it may look, street vending "presents opportunities for new epistemology of city and city making; a mode of contestation, collaboration and composition; and as a site for rethinking and untangling the difficult tasks of democracy, justice and resilience" (Chalana & Hou, 2016, as cited in Hou, 2013:120).

The Setting of street vending in Kampala City

Kampala city is both the commercial and administrative capital of Uganda. It is divided into five divisions; Central, Makindye, Nakawa, Kawempe and Rubaga. All the divisions have slum settlements that contribute significant numbers of informal sector workers including street vendors to the central business district, which is in central division.
The city is governed by the political and technical 'wings'. Whereas the political wing is elected by universal adult suffrage and is headed by the Lord Mayor, the technical wing is headed by the Executive Director appointed by the President of Uganda. Both 'wings' of influence; the Executive Director perceived to answer directly to the President and the Lord Mayor, perceived to answer directly to the electorate have often clashed on matters of policy formulation and implementation in Kampala city. They are both interested in the political influence of the voting block from street vendors. As a result, numerous decisions, including the management of street vendors have not been successful partly because of lack of consensus between the technical and political wing. Amidst these differences, enforcement activities against street vending becomes less effective due to lack of unwavering support from the technocrats and politicians.

Amidst the squabbles between the NRM party in government and the opposition in the administration of Kampala city is Buganda kingdom. The semi-autonomous kingdom located at Mengo in Rubaga Division, owns land spread out in all divisions of Kampala city. The Kingdom has power to plan and determine how its land is utilized, and has a separate entity known as Buganda land Board that handles land matters. It is in this land tenure environment that some informal sector activities such as street vending thrive, partly because the city administration does not have full jurisdiction of the land under

Buganda Kingdom administration. This is so in areas such as Mengo, Katwe, Kisenyi and Kasubi suburbs of Kampala.

Meanwhile, the spatial layout of Kampala city was shaped by colonial decisions that segregated British colonialists, Asians and native Africans. The colonialists occupied hills and prime land located around them, where they build churches, education institutions, health centres and markets. The Asians were mainly engaged in business activities and hence purchased most prime land along main streets. There were no specific planning provisions for native Africans in all aspects of life, except perhaps the Naguru and Nakawa housing schemes for African workers. The lack of planning consideration for Africans rendered them 'foreigners' in Kampala city, to the extent that they could not find opportunities or spaces for trade. The native Africans were reduced to consumer status of goods and services provided by Asians and also providing labour to small scale cottage industries and farms set up by the British. Presently, the ownership of buildings in Kampala city is still dominated by Asians. Most of the rent charges are expensive for African merchants to afford. This, in addition to inadequate space in the buildings and built up markets such as Nakasero or St. Balikuddembe, have pushed people to rethink the street as a viable option for vending of various goods and services.

Although street vending without a license is illegal, it is still practiced along almost all roads around the city. The intensity and pattern of vending varies. Some vendors work the whole day, others work in specific durations of the day and night, depending on the goods or services sold. The intensity of vending also depends on the level of surveillance from law enforcement officers against street vending. Goods are mainly obtained from home-based enterprises and the markets for mainly agricultural products. Industrial goods comprised mainly household items are obtained from wholesale shops. Street vending space is mainly acquired through social capital and 'spontaneous location'.

Street vending population is mainly derived from within the boundaries of Kampala city slums. Each division has a large presence of slum settlements which are mainly occupied by low income earners who take a larger percentage of street vendors. The low income groups engage in various home-based informal sector enterprises, others join small sector employment as arts and craftsmen around the slums and the neighbouring centres. Due to lack of markets in the slums as a result of low or lack of purchasing power, products from the slums are then marketed in the city major roads. Inasmuch as street vending is practiced in all the divisions, central division has the highest number of street vendors, owing to the concentration of people in the central business district and the presence of transport terminals that aid the confluence of population. Thus, streets bordering the old taxi park, the new park, the bus parks, traffic lights, shopping malls and markets tend to attract vendors because they attract traffic.

Meanwhile, due to lack of a coherent strategy to manage the street vending challenge, it has become a predicament in Kampala city. This appears to be the case in the management of street vendors across the world as it has been explained that "Official responses are diverse, spasmodic, and often contradictory, and their effectiveness is severely constrained by the highly-visible and constantly fluctuating nature of the population involved, and by the operational limitations of a street-level bureaucracy" (Bromley, 2000:22).

Yet, the quest for strategies to control and confine street vending by Kampala Capital City Authority has posed a great challenge. In an attempt to solve the problem the city authority reserved Sundays for street vending. But, Luwum Street and Namirembe road have been the ones formally accepted by

Kampala capital city authority for street vending on Sunday. A number of civil society organizations such as Platform for Street Vendors in Uganda (PLAVU), Strategic Initiative for Women in the Horn of Africa (SIHA) and Woman in Informal Employment: Globalizing and Organizing (WIEGO) have advocated for better working conditions and protection of especially vulnerable Women street vendors even in the prohibitive working environment.

Finally, the persistence of street vending in Kampala city and the inability of law enforcement to fully control it puzzles city administrations. Therefore, using data from interviews, field observations and reports, this paper attempts to uncover the reason (s) why street vending persists in Kampala city, using the moralist theory.

MATERIALS AND METHODS

Interviews and observations were the main methods used to collect data. Interviews were used to obtain first hand opinions of street users and law enforcement officials. In addition, observations were used to corroborate information obtained from interviews, especially how street vendors related with law enforcement officials. In addition, secondary literature especially reports from Kampala Capital City Authority were used to corroborate data from interviews and observations.

The criteria used to select law enforcement officials were based on their willingness to participate in the study. Therefore, street vendors and other street space users such as pedestrians, cyclists and motorists were selected based on age, gender, purpose on the street and willingness to be interviewed.

Therefore, with respect to the actual numbers from a population to determine a sample size, “the scope of the study, the nature of the topic, the quality of the data, the study design and the use of shadowed data” (Morse, 2000:4, as cited in Mason, 2010:3), were the basic requirements for selecting a sample size for the case studies. The total number of interviews conducted was based on the concept of saturation. It provides that “there is a point of diminishing return to a qualitative sample - as the study goes on, more data does not necessarily lead to more information” (Ritchie, *et al.* 2003:84, as cited in Mason, 2010:2). To attain saturation in research, the sample size can be determined by “the heterogeneity of the population; the number of selection criteria; the extent to which 'nesting' of criteria is needed; groups of special interest that require intensive study; multiple samples within one study; types of data collection methods used; and the budget and resources available" (Ritchie, *et al*. 2003:84 as cited in Mason, 2010:2). In addition, data was triangulated through group discussions and multiple sources of information.

Subsequently, 148 respondents that included six law enforcement officers, 34 cyclists, 29 merchants, 34 motorists and 45 pedestrians were interviewed. Respondents were selected from various streets according to time of interview, intensity of street vending, spatial distribution of the streets, types of goods sold, age, gender and purpose on the street. Other key informants interviewed were law enforcement officers, technocrats from the city authority and representatives of street vendors’ associations. In addition, a pre-sampling survey was carried out for a street space use situation report that informed the selection of respondents. Therefore, the streets were selected based on land uses such as industrial, residential, commercial, civic space, office space and institutional land use.

The selection of pedestrians, cyclists, merchants and motorists from various streets in multiple land use zones was meant to triangulate and corroborate data from various sources related to the subject of study. Six law enforcement officers were selected and interviewed depending on their willingness to participate in the interview, the location and distribution of streets where they were located and the time they were on duty. Meanwhile technocrats that were interviewed were mainly from the physical planning directorate and from Central Division physical planning unit.

Table 1. Selected cases of street space users that were interviewed.

Case study selection criteria	Sampled cases	No. of respondents	Classification of respondents
Busy streets (1st order roads: roads located within traffic and transport terminals and shopping arcades in the central business district)	Allen road	8	2C, 2P, 2MT, 2MC
	Sebaana Kizito road	8	2C, 2P, 2MC, 2MT
	Kafumbe Mukasa road	8	2C, 2P, 2MC, 2MT
	Ben Kiwanuka Street	8	2C, 2P, 2MC, 2MT
	William street	8	2C, 2P, 2MC, 2MT
	Kampala road	8	2C, 2P, 2MC, 2MT
	Kikuubo lane	8	3P, 1C, 1MT, 3MC
Moderate cases (2nd order roads: leading to the central business district and connecting into 1st order roads)	Luwum street	6	1C, 1MT, 2P, 2MC
	Market street	6	1C, 1MT, 2P, 2MC
	Kiyembe Lane	6	1C, 1MT, 2P, 2MC
	Nasser road	5	2P, 1C, 1MT, 1MC
	Nkrumah road	5	2P, 1C, 1MT, 1MC
	Yusuf Lule road	5	2P, 1C, 1MT, 1MC
	Nakasero road	5	2P, 1C, 1MT, 1MC
	Buganda road	5	2P, 1C, 1MT, 1MC
	1st Street	5	2P, 1C, 1MT, 1MC
Less busy cases (3rd order roads: located mainly in residential, institutional, office or industrial areas leading into 2nd order roads)	Gadhafi road	4	1P, 1C, 1MT, 1MC
	Old port Bell road	4	1P, 1C, 1MT, 1MC
	Elizabeth Avenue	3	1P, 1C, 1MT
	Prince Charles Drive	3	1P, 1C, 1MT
	Wampewo Avenue	3	1P, 1C, 1MT
	Nile Avenue	3	1P, 1C, 1MT
	Kimathi Avenue	3	1P, 1C, 1MT
	Lumumba Avenue	3	1P, 1C, 1MT
	Kyadondo road	3	1P, 1C, 1MT
	Bukoto Street	3	1P, 1C, 1MT
	Kololo Hill Drive	3	1P, 1MT, 1C
	Dewinton road	3	1P, 1C,1MT
	Total	142	

Legend: C - cyclists, P- Pedestrians, MC - Merchants, MT –Motorists

RESULTS AND DISCUSSIONS

Perceptions of street space users and law enforcement officers towards street vending practices
Law enforcement officials and other street space users were asked questions to determine how they perceived street vending. Hereunder is a summary of the questions and responses obtained.

Table 2: How law enforcement officials and street space users perceive street vending

Question	Type of responses	Percentage
What is your view on the conduct of street vending in Kampala city?	It is an improper way of trading	8
	It causes congestion on streets	20
	It causes sale of substandard goods	5
	It is a livelihood strategy	60
	It's used by law breakers	2
	Many people have interests in street vendors	5
If yes, how does your personal view of street vending influence your duties?	I am tormented by my actions	50
	I am reluctant to enforce street law, I warn street vendors, I handle street vendors kindly	30
	Street vendors think they have a right to survive in the city	18
	You are responsible for your actions	2
How do you relate with street vendors?	We interact outside normal working hours, we are friends	25
	We cooperate with them , they are also human	55
	We are enemies	20
Is street vending a crime?	Yes	70
	No	30
If yes, why is street vending a crime?	Because they do not have a trading license	70
	we are told by city authorities that it is a crime	20
	Because they cause congestion on the street	10
If No, why is street vending not a crime?	Street vendors are looking for survival	90
	Street vendors are supported by many people	10
Do you like your job?	Yes	50
	No	50
If yes, why do you like your job?	I have no other job	70
	I benefit from the job	30
If no, why don't you like your job?	I am educated, I deserve a better job	40
	It makes me do things I do not like	60
Other Street space users (see table 1) were asked the following questions		
Do you support vendors to use street spaces for their private enterprises?	Yes	54
	No	38
	I neither support nor disagree	8
How should vendors use street spaces without disrupting your right to use the street?	They should be given space on streets	28.5
	They should be given specific time within which to operate	71.5

Field investigations showed that 60% of respondents thought that street vending is a livelihood strategy. This is a significant perception especially in relation to enforcing laws and regulations governing street vending. In circumstances where law enforcement officers are almost in the same income bracket and living conditions as street vendors, they empathised with them and therefore were less strict. In addition, other street space users patronised them in support of their livelihoods. This is in agreement with the social redistributive theory that provides that street vending takes place in familiar contexts or people and patrons wish to redistribute wealth by purchasing from 'poor' people (Igudia, 2019). However, this could also be attributed to the convenience with which street vendors strategically locate their goods and services especially along transport routes for ease of access by street space users. This is also because, the potential profitability or a location depends on how easy it is to be accessed. Thus, time and convenience become important elements of access (Jordaan, *et al*. 2004) (Alonso, 1960).

Meanwhile, 20% of respondents said that street vending results in congestion. The congestion was more evident during peak hours where capacity of roads to accommodate the traffic was limited. The peak hour inadequacy of streets in Kampala city is not only a management problem, but also a design problem. This is because the roads were designed during the colonial period and do not meet current demands related to street space uses. Streets are not only channels connecting destinations, but have also evolved into social spaces and opportunities for entrepreneurship. Indeed, streets in cities serve many purposes besides carrying vehicles and pedestrians (Jacobs, 1992:29). In-fact, "beyond its architectural identity, every street has an economic and social significance" (Kostof, 1992:189). Therefore, the aspect of congestion can be managed, if the city authorities accept the need to accommodate new street space demands through street space redesign or management measures. Even then, the congestion that respondents alluded to as caused by street vendors, did not negatively influence their view regarding the practice of street vending, considering it as part of the city life activities.

Although 8% of street space users said street vending is an improper way of trading due to exposure to harsh weather conditions and limited space, it was due to the empathy they had towards fellow countrymen practising street vending and the improper working conditions they were exposed to, and not necessarily that they were against the practice. However, 5% of respondents mentioned that street vending thrives due to availability of various interested actors. Indeed, as an industry, it thrives on other sectors such as manufacturing, wholesale trading, service sector, agriculture, import and export, security and they contribute significantly to the distribution value chain of various goods and services. Even when 5% of respondents said that street vendors sold sub-standard goods, they captured a niche of clients who could afford the goods. Often, the vendors were seen with a variety of goods that were distinguished according to quality and price, therefore, in most cases, it was an individual's personal choice for the goods they bought.

Conversely, 2% of respondents said that street vending was an activity carried out by law breakers. Even when they perceived them as law breakers, they did not express a dislike for the vendors. Thus, we concluded that generally, a majority of the respondents had a favourable opinion of street

vendors and therefore it reflected their moral obligations and support for street vendors. This is a reflection of the society's norms to respect other peoples' livelihoods, as long as they do not significantly affect other people's daily lives. The views provided by the officers such as congestion, improper trading or sale of substandard goods did not indicate that they were strongly against street vending as a practice. The reasons reflected occupational opinion and not necessarily their attitude against street vending. Moreover, street vendors are the reasons law enforcement officers are employed, so, it may not have been in their interest that street vending is eradicated. This invariably affects how they enforce regulations against street vending, such that they seek compromise and the status quo that suites their interests.

Subsequently, 80% of law enforcement officers were affected by their views in the conduct of their lawful duties. Only 20% said their view did not affect the way they carried out their duties. These findings could be a pointer towards moral inclination and restraint from law enforcement when handling street vendors. This also explains why street vending has persisted in Kampala city. The restraining behaviour where vendors were 'cautioned', 'threatened', had their goods confiscated and sometimes returned to them makes the enforcement process seem like a 'game that vendors and law enforcement officials love to play'. In-fact, investigations revealed that some 50% of law enforcement officials were tormented by their actions against street vendors. In their line of duty, enforcement officers disrupted street vendors' activities by arresting them, confiscating their property, causing physical and emotional harm and extortion. However, the extortion issue is two sided. On one hand, vendors and law enforcement officers entered into an informal agreement in cash and kind that benefited both parties. On the other hand, inasmuch as the moral imperative restrains law enforcement officials, it is perhaps the monetary and non-monetary incentives directly or indirectly derived from street vendors that has similarly led to its persistence. The incentives or bribes were obtained by coercion and sometimes on 'voluntary' bases. However, the fact that it is in the interest of street vendors to trade undisturbed, and the interest of law enforcement officials to appear effective at their work, a mutual informal agreement works for both. In any case, law enforcement officers have occasionally been reprimanded for taking extreme measures against street vendors, hence they are compelled to exercise self-restraint in the course of executing their duties.

Specifically, 30% of law enforcement officers were emphatic that their views made them reluctant to enforce regulations against street vending. This provides additional evidence of the moral responsibility of an individual that over-rides institutional duties they are employed to perform. Otherwise, 18% said that street vendors think they have a right to survive in the city spaces because their housing is in the city and that as citizens, they pay taxes. Hence, street vendors' actions and beliefs which align with some of the law enforcement officials interfere with their enforcement duties. It therefore makes it harder to evict people who have a sense of entitlement to derive a living in the urban space. This is consistent with similar observations about space takeover stating that the "appropriation is thus a way to rethink the concept of rightful ownership, to radically transform our notions about who rightfully owns the city. Not only does it refuse a property rights conception of ownership, it affirms a radical alternative: the city belongs to those who inhabit it." (Hou, 2013:148).

This is consistent with the concept of insurgent citizenship where people become bolder to claim their rights, "as city regions become crowded with marginalized citizens and non-citizens who contest their exclusion" (Holston, 2009:246). And this is especially when "residents legitimate this agenda of rights and participatory practices on the basis of their contribution to the city itself" (Holston, 2009:257). Street vendors have always argued that they pay taxes on goods and services that they sell or buy and that they have a right to use city spaces. Also, that they are entitled to goods and services from the city and to decent working spaces. This sets a stage for conflict between vendors and the city authority. A similar observation was made when studying street vending across six African cities including Kampala, that "while the urban authorities in the cities view street vending as temporary, vendors view them as permanent. It is the urban authorities' perception of street vending as temporary that makes them not see the need to provide vendors with proper market facilities." (Mitullah, 2003:7).

Another factor that strengthens the moralist view is when 2% of law enforcement officers said that their duties were affected especially when they thought that they were answerable for their deeds, when they

lacked full institutional support in case they erred in the course of duty. Thus, they had to restrain themselves in the course of their duties because they risked personal liability which often made them fear to lose their jobs. This made them have the moral duty to work with vendors instead of harassing them.

In addition, street vendors had a relationship with law enforcement officials. Investigations revealed that 25% of law enforcement officials interacted with street vendors outside working hours. This meant that it was possible to make compromises to benefit both parties, on how they could conduct themselves for mutual benefit. Similarly, 55% of law enforcement officers responded that they cooperated with street vendors because they were also 'human'. The humanity aspects attributed to street vendors sent a moral signal to the law enforcers to treat vendors humanely. Areas of cooperation included warning vendors to hide or escape, when superiors from the city authority were present and carry on with street vending in their absence. Even then, 20% of law enforcers said they were enemies with street vendors. However, the enmity was related more to enforcement activities such as 'operations to clean streets' off vendors.

Another moralist question was asked to find out if law enforcement officers considered street vending a crime. In response, 70% replied in the affirmative. However, of those who said that street vending is a crime; 70% said that street vendors did not have a trading license, 20% said that street vending was criminalized by city authorities and 10% said that street vending is a crime because it causes congestion. Conversely, of the law enforcement officials who said street vending is not a crime, 90% gave reasons that street vending is for survival as 10% said that it is not a crime because it is supported by many people such as buyers, politicians and civil society organizations. Therefore, even when their duty is based on criminalizing street vending, their conscience and daily struggles of street vendors in their context enable them to behave otherwise.

When law enforcement officials were asked if they liked their jobs, 50% said Yes as 50% said No. Of those who liked their job, 70% said they did not have any other job while 30% said they benefited from the job through their monthly wages and other benefits. Thus the study revealed that majority (70%) of law enforcement officials were in their current occupation because they did not have an alternative livelihood, otherwise, they would quit.

Similarly, when law street law enforcement officers were asked why they did not like their job, 40% said that they were educated and deserved better jobs. This could have made them work half-heartedly. Even then, 60% replied that the job makes them 'do things they do not like'. Thus, what was expected of law enforcement to eradicate unlicensed street vending was against their values and beliefs. Certainly, law enforcement officials are part of the society and culture within which they work, and some of them shared residential suburbs as well as modes of transport.

Therefore, behaviour such as wanton destruction of another person's livelihood, infringement of one's right to a safe, secure and sustainable working space or impairing one's ability to improve their lives and those of their families, fair treatment before the law are strong values held in society regardless of what people are employed to do. They are silent, inherent values and if not practiced, they destabilize one's conscience regardless of the mandated duties they hold; so this applies to law enforcement officials. The desire for morality was stronger than their mandate to enforce regulations against their conscience. (Zekaria, 2020), (Bregman, 2020), (Golding, 1954).

When street space users were asked if they supported street vendors to use street spaces for their private enterprises, 54% accepted, 38% rejected and 8% were undecided. The results reveal that the population within which street vendors operate supports their activities. Therefore, as long as street vending has a large patronage through moral support/activism or apathy or through buying their goods and services, or as the demand and supply side theories of street vending attest, street vending will thrive. There have been instances where the patrons look for street vendors or agree where to meet or how they can benefit from their transactions. As a result, citizens are complicit in the street vending practice.

Moreover, when street space users were asked how vendors could use street spaces without disrupting traffic, 71.5 % suggested that street vendors should be allocated specific time for their activities. This means that street vendors have support and the public is likely to come up with ways that can perpetuate their trade because of mutual benefit. Furthermore, 28.5% suggested that street vendors should be given spaces on streets to carry out their enterprises. The suggestion is an indicator that people value goods and services provided by street vendors in the spaces that they share with street vendors. Public support to street vending activities could be due to mutual benefits derived from the activity, through sheer apathy or through the moral duty to do good for perceived vulnerable groups.

Conclusions and recommendations

Empirical evidence obtained from the case studies reveal that, law enforcement officials from local governments are restrained from effectively carrying out their duties of street policing because of the moral imperative to do good for fellow human beings. Similarly, street space users such as pedestrians, cyclists, motorists and merchants support street vending through patronizing them or allowing them to form part of the distribution value chain for their products, the symbiotic relations it has and the general respect for peoples' livelihoods. Meanwhile, there was empathy towards street vendors from some technocrats interviewed, lending a moral obligation to their street management activities. As a result, the perceptions above provide a strong basis to advance the moralist theory as a major determinant for the persistence of street vending practices in Kampala city.

We recommend that street vending should be part of daily city planning and management activities, because it is a significant contributor to employment and livelihoods especially among low income groups, it contributes to urban social and economic security, it is one of the leading distribution chain for products from mainstream shops and markets for both agricultural and non-agricultural goods and services. Being an industry in its own right, with interconnected sectors, it should not be entirely stifled or banned, but it should be regulated to thrive alongside the 'formal' enterprises in Kampala city. This can be done through change in policy that would legalize street vending and through provision of spaces and time to maximize its productivity.

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REFLECTIONS ON THE LEARNERS' RESILIENCE TOWARDS EDUCATION CONTINUITY DURING COVID-19 PANDEMIC IN RWANDA

Nzayisenga Marie Louise[1], Kagwesage Anne Marie[1], Habinshuti Patrice[2], Mutambuka Deo[2], Nshimiyimana Patrick[2], Rwibasira Peter[3].

[1] College of Arts and Social Sciences, University of Rwanda, Huye - Rwanda.
[2] Envisage Rwanda, P.O Box 2364 Kigali, Rwanda
[3] College of Science and Technology, University of Rwanda, Kigali - Rwanda.

ABSTRACT

COVID-19 pandemic shocked education systems in most countries around the world, constraining educational opportunities for many learners at all levels especially those from poor and marginalized families and learners with disabilities. Over the last two decades, Rwanda has experienced an admirable transformation and growth of its education system. Notably, the country has achieved one of the highest primary school enrollment rates on the African continent. Raising the level of educational attainment is regarded by the Rwandan government as a crucial area for accelerating economic development. Like other nations around the world, Rwanda has adopted several strategies in response to the COVID-19 crisis, including series of total lockdown and school closures nationwide and forcing learners to embrace unfamiliar remote learning methodologies. The main objective of our study was to analyze the experience of learners with remote learning and their resilience towards education continuity during COVID-19 pandemic in Rwanda.

INTRODUCTION

The COVID-19 pandemic has challenged the education community. In Sub-Saharan Africa Countries, about 89%, 82%, and 11% of learners do not have a computer, home internet access, and not covered by mobile networks respectively (Tadesse & Mwuluye, 2020). This unexpected/ sudden closure of schools brought some challenges to learners. About 56 million learners live in Sub-Saharan Africa where they are not served by mobile networks. This challenges the education continuity during the COVID-19 pandemic in developing countries like Rwanda. UNICEF (2020) stated that the prolonged closure of schools, combined with the economic shock and the health of the population have effects on children's present and future development, particularly those living in more vulnerable households. As a result of the COVID-19 crisis, children are at greater risk of dropping out of school and of lagging behind in their studies, food insecurity, abuse, physical and emotional health problems, and, not least, loss of learning, with potentially devastating consequences for an entire generation (UNICEF, 2020). To curb the spread of the COVID-19 pandemic, Rwanda has adopted several strategies including mandatory total lockdown, school closures, border closures, stringent social distancing policies and mandated home-based work as many other countries worldwide. All primary and secondary learners were out of school from March to November 2020 in Rwanda. In this respect, the education sector has remained one of the most affected sectors in the country. This has had potential long-term impacts on the country's social and economic development. In order to mitigate the effects of COVID-19 crisis, Rwanda like other several countries implemented emergency measures of using distance learning to maintain some continuity in teaching and learning processes while schools remain closed. These include using radio and television channels, use of mobile phones and virtual platforms. In order to make distance learning accessible to all learners, some countries including Rwanda designed a strategy to use educational technology, zero-fee internet educational resources, free online learning resources, broadcasts teaching and virtual class infrastructures. However, distance learning was difficult for learners in developing countries (Mustafa, 2020). Also, it was not equally effective to all learners due to lack of internet

connectivity, information technology, educational materials, and digital technology skill. The learning loss was especially worsened by the existing digital divide in Rwanda (Mugiraneza, 2021).

Before the COVID-19 pandemic, the world was facing educational challenges highlighted by the difficulties in achieving SDG 4. These challenges were constraining the achievement of education mission of being a basic human right. Although there has been tremendous progress in education, according to the World Bank (2020), about 53% of young people in low- and middle-income countries live in learning poverty. As a result, about 800 million are still illiterate. Moreover, effective learning still needs to find its ways since the world counts about fifty six percent of children at school who lack basic reading skills (UNESCO Institute for Statistics, 2018). In Sub-Saharan Africa, more than 20% (of 6-11 year olds), more than 33% (of 12-14 year olds,) and more than 60% (of 15-17 year old adolescents) were already out of school before the outbreak of COVID-19 (UN, 2020).

Within the pandemic-induced situation, the closure of schools, a measure taken everywhere in many countries to facilitate 'physical distancing' and reduce the risk of COVID-19 spread/contamination, is likely to worsen those educational challenges in the future. While the more privileged families can have access to alternative sources of education during confinement and have time to dedicate to the educational continuity, many learners from disadvantaged families, particularly in developing countries, have not had the necessary support to continue their education during the confinement period (Tadesse & Muluye, 2020). Similarly, the pandemic crisis has aggravated pre-existing education disparities by reducing the opportunities for most vulnerable children– especially those living in poor or rural areas, – to continue their learning. In addition, about 23.8 million additional learners may drop out or not have access to school next year due to the pandemic's economic impact alone (UN, 2020). It is therefore necessary to take actions to prevent the educational gaps that existed prior to the pandemic from becoming even wider.

The negative impact of the COVID-19 pandemic is enormous for primary and secondary school learners, especially in developing countries. The COVID-19 global situation has negatively affected learners due to the sudden/ immediate closure of schools and lockdown measures taken by many countries and the global economic recession. It is also worth mentioning that these impacts are greater on learners from vulnerable socio-economic households. In addition, COVID-19 has disrupted the learning and resulted in the learning loss in most of primary and secondary learners due to prolonged school closures. Research has shown that prolonged interruptions of classes may cause significant learning losses especially for learners from vulnerable households who do not have resources to compensate for theses interruptions (Jaramillo, 2020). Evidence from natural disasters and epidemics showed that school closures have negative effects on learning. For instance, in 2005 Pakistan closed schools for about 14 weeks due to earthquake. Consequently, learners lost approximately 1.5 years of schooling. This learning loss was found greater among the most vulnerable learners whose mothers did not complete primary education (Andrabi, Daniels and Das, 2020). The school closure brings difficulties for learners from developing countries. Learners from poor families with lower educational levels and children with poor learning motivation suffer most during coronavirus. To limit the learning loss resulted in the COVID-19, different government encouraged the adoption of distance learning. The quality and access to distance learning were not equal among all learners because they mainly depended on the learning resources available at home. Since these resources are not equally distributed throughout countries, the most vulnerable learners are at high risk of learning losses. An example of this was the case in Sierra Leone during the Ebola epidemic, where learners in rural areas did not have access to television or radio

and were therefore unable to access distance learning (Risso-Gill & Finnegan, 2015). The learning loss, in the short and long term, is expected to be great. The World Bank (2020) identified three possible scenarios for the loss of learning: a) a reduction in average learning levels for all learners, b) a widening of the distribution of learning achievements due to highly unequal effects of the crisis on various populations, or c) significant increase of learners with very low level of achievement due in part to massive dropouts. This suggests 25 per cent more learners may fall below a baseline level of proficiency needed to participate effectively and productively in society, and in future learning, a result of the school closures only.

Another effect of COVID-19 on learners from poor countries is limited support. During the COVID-19 crisis, 40 percent of poor countries failed to support learners. In addition, domestic chores especially for girls limited their participation in online courses. Besides, only 10 percent have access to electricity and a great number of learners are not fluent in the language of instruction which prevents them from understanding the content delivery online as their parents could not help them much (UN, 2020) . In low income and upper-middle income countries alike, children in the poorest households receive significantly less help with their homework (European Commission, 2020). Furthermore, apart from being learning spaces schools are protective environments for many learners/children. School closure, confinement and economic deterioration increased the risk of violence and maltreatment to most children especially those from vulnerable households. School closures, combined with learners being confined to their homes and the pressure of deteriorating economic situation puts on parents, increase the risk of violence and maltreatment (Risso-Gill & Finnegan, 2015). This was the case in Africa during the Ebola epidemic, where rates of child abuse and maltreatment increased significantly. Also, recent evidence from China related to the COVID-19 pandemic showed that reports of domestic violence tripled during quarantine (Lee, 2020). In addition, evidence from previous humanitarian crises indicates that such health crises increased the risk of teenage pregnancy among female adolescents. In Africa, for example, the health crisis caused by the Ebola epidemic increased teenage pregnancy rates. In Sierra Leone and Liberia, for example, pregnancy rates increased as the epidemic spread which limits the use of contraceptives due to mobility restrictions (Rothe, 2015; UNECA, 2015; Denney, Gordon, and Ibrahim, 2015).

To mitigate the above negative impacts of COVID-19 on the country's education system; Rwanda had to encourage the education continuity during lockdown. In April 2020, Rwanda's Ministry of Education developed the Education Sector COVID-19 Response Plan, which is aligned with the Education Sector Strategic Plan (ESSP) 2018/19–2023/24. Specifically, it aims to mitigate the impact of the pandemic and assist progress towards realizing the goal of the ESSP: "to ensure Rwandan citizens have sufficient and appropriate skills, competences, knowledge and attitudes to drive the continued social and economic transformation of the country and to be competitive in the global market" (**Government of Rwanda 2018a, 2020**). The Education Sector COVID-19 Response Plan also aligns with the country's National COVID-19 Preparedness and Response Plan. In support of a cross-sectoral approach, the Ministry of Education has committed to working closely with other ministries, civil society organizations and development partners to ensure the realization of the Education Sector COVID-19 Response Plan. The plan considers immediate, medium- and long-term strategies to combat the pandemic. The immediate responses cover the lockdown period (including school closures), while the medium- and long-term responses take into account the period beyond school closures and aim to sustain the efforts made during the short-term response. The objectives of the Education Sector COVID-19 Response Plan are to ensure (a) continuity of learning for all students; (b) safe and effective reopening of schools; (c) safety and

health of students, teachers and other school personnel; (d) needs of vulnerable students and teachers from disadvantaged communities are met; and (e) resilience against future shocks similar to the COVID-19 pandemic. **(Mugiraneza, 2021).** In Rwanda, like in many other countries, learning support continued during the confinement using distance learning strategies, assigning reading and exercises for home study, radio or television teaching of school subjects, vitual sessions, and developing advanced education strategies. Learners started to learn from home and stay at home as much as possible, to maintain physical distancing, and to save themselves. Also, the government collaborated with telecom companies to enable the learners to access educational websites and applications free of charge; making educational websites, content and other local resources zero-rated when the learner access educational websites and applications don't take data charges. Access to online learning content from free open educational resources provided by non-profit publishers, and private companies (Wajdi et al., 2020). The government also increased the accessibility of educational resources on mobile phones free of charge.

This study was conducted as part of a wider research on analyzing the resilience of Rwanda's primary and secondary education systems to mitigate the impact of COVID-19 pandemic. As per the Government of Rwanda's recommendation, online education should be strengthened to build a resilient education system. Based on experiences with the rollout of online education during COVID-19 lockdowns; the main objective is to investigate the learners' resilience towards education continuity during the COVID-19 pandemic in Rwanda of this particular. The study investigate learners' experiences and looks at the use and effectiveness of various remote learning tools and approaches deployed in teaching and learning during Covid-19 lockdown in Rwanda.

METHODOLOGY

The study is based on primary data collected from selected primary and secondary school teachers across 10 districts in Rwanda, including Gasabo, Nyarugenge and Kicukiro districts in Kigali City Province; Muhanga, Huye and Gisagara districts in the Southern Province; Bugesera and Gatsibo districts in the Eastern Province; Rubavu and Nyabihu districts in the Western Province as well as Rulindo and Musanze districts in the Northern Province of Rwanda. The study featured both public and private schools, with 32 primary and 30 secondary schools respectively; and considering both rural and urban areas in the 10 selected districts. To analyse the learners reflexions and experience towards the online teaching in Rwanda education system during the COVID -19 lockdown period; 5 key indicators for quality education were assessed gradually from the students, parents and other stakeholders such as: (1) Effective curricula delivery and online learning; (2) Assessment and accountability; as well as (3) Parental/family support.

A total of 1333 learners participated in the study; among whom 649 representing 51% were primary school learners; while 641 representing 49% were secondary school learners. Both structured and unstructured interviews were conducted with these 1333 students. Structured quantitative interviews were conducted on selected primary and secondary school students. Descriptive analysis and the qualitative research methods were applied using the Buckley and Chiang model to analyze the learners' resilience towards education continuity during COVID-19 Pandemic in Rwanda. Key indicators for quality education as per the learner's perspective on education continuity were assessed gradually from the learners and their parents. Descriptive analysis and the qualitative research conducted using the **Buckley and Chiang model** to analyze the attitude, and perception of learners towards used online learning efficacy for a resilient education system.

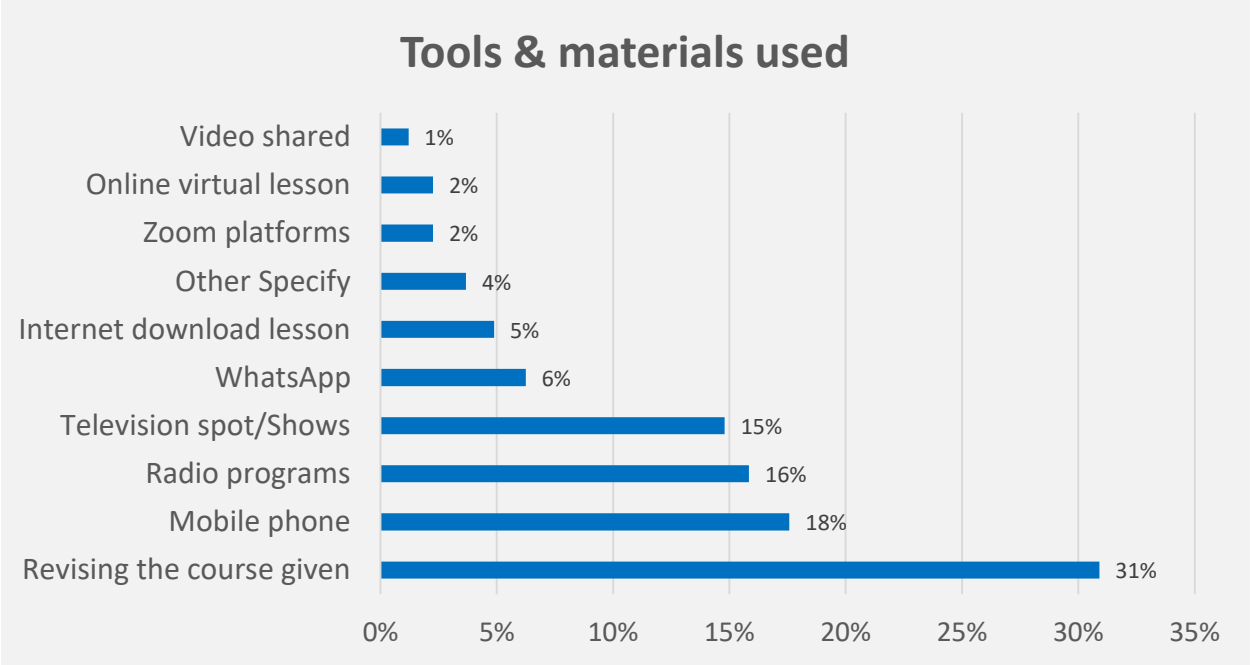
RESULTS AND DISCUSSION

This section presents results of this study and discusses 3 key indicators of consideration for effective learning that were education were assessed gradually from the teachers, and head-teachers including: (1) School type, location and online infrastructure for student online learning (1) Assessment and accountability (3) Parental involvement in education.

- ***Effective curricula delivery and online learning***

Effective curriculum and online learning delivery depends greatly on the school type, location and online infrastructure for student online learning. The results of this study showed that the respondents consisted 44 % of primary and 46% of secondary students. In addition, 63 % were from public schools while 37% were from private. Learners who participated in this research were from both national and international programs and from different schools and also from different areas (rural and urban) as well as those in vulnerable conditions. The study included (73%) learners from the public schools and (27%) from the private schools respectively.

Figure 1. Tools and materials used during remote learning



Source: Primary data

The figure 1 showed that a big share of learners (77%) were at least following one lesson online through different platforms put in place such as: mobile phone, radio programs, television spot/Shows, WhatsApp, Internet download lesson and other (Zoom platform, Online virtual lesson). About 31% agreed to have revised their courses, 18% used mobile phones and 16% learned using the radio programs.

Previous research revealed that in low-income countries, less than 25% were accessing online education using television and radio education to their learners. Most countries provided distance learning via online learning fully and the combination of broadcast and online learning to teach rural area learners. In the North and Middle East and Africa, about 28% of countries provided only radio and television teaching, less than 40% provide only online learning, and 22% are providing a combination of broadcast and online learning. In Sub-Saharan Africa, 11% of countries are providing only online learning, and

23% of countries are providing a combination of broadcast and online learning (Thomas, 2020). However, low-income and middle-income countries that offer broadcast and on- line learning, the learnings `were not reaching most learners (Winthrop, 2020).

Remote learning has taken the form of the implementation of educational technologies which have taken many forms: radio and television broadcast teaching, online teaching using different platforms such as Zoom, Microsoft Teams, Google, use of social media: WhatsApp and emails, etc (World Bank, 2020). Moreover, the distance/remote learning was not effective due to different challenges including lack of network, lack of computers, lack of internet access, etc. In many poor countries, most of the learning was done through radio and television broadcasts. However, learners from the poorest families do not have radios, televisions, and other devices to access the resources and to learn at their home. In addition, remote learning does not serve all learners equally, as they depend on access to unequally distributed resources for studying at home, such as internet connectivity, electronic devices, space and parental support (Jaramillo, 2020). Another way through which the COVID-19 crisis may reinforced social inequality in education is represented by schools. Learners from more advantaged backgrounds may be more likely to attend schools with better digital infrastructure and where teachers have higher levels of digital skills Di Pietro et al. (2020).

Children from more advantaged backgrounds are more likely to study at schools that are well equipped in terms of digital technology resources. Disadvantaged learners are found to be more likely to attend schools with lower ICT resources. In light of the above, one may assume that schools attended by more advantaged children could have found it easier to adapt to online learning following COVID-19. Schools in disadvantaged, rural or deprived areas are especially likely to lack the appropriate digital capacity and infrastructure required to deliver teaching remotely. Significant differences in the provision of online teaching and learning resources may also exist between private and public schools. Private schools are more likely to have an effective Virtual Learning Environment than public ones. Learners from less disadvantaged background also received low quality of online learning because of both learners' and teachers' poor digital skills, inaccessibility to electricity, low proficiency in the language of instruction, the limited access to the hardware and connectivity (Owusu-Fordjour et al., 2015). The introduction of online learning as a strategy to maintain the continuity of learning while schools were closed has brought some learning inequality among learners. Generally speaking, face-to-face classes provide roughly equal benefits to learners from all socio-economic backgrounds (Entwisle, et al. 2001). Research has shown that school closures affect greatly learners from less disadvantaged background as they tend to benefit more from schools (Ready, 2001). Another factor which challenged the remote learning is the limited access to digital technologies which is very important in supporting the continuity of education during short-term school closures.

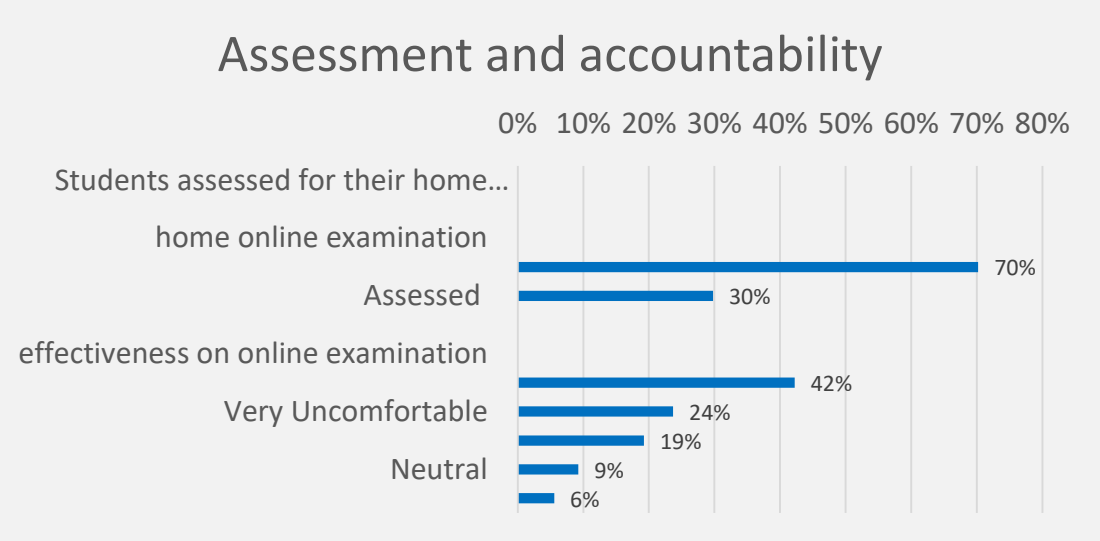
The pandemic of COVID-19 is affecting schools, learners, teachers, and parents differently. Learners from more advantaged parents attend schools with better digital infrastructure and teachers might have higher levels of digital technology skills. Some schools can be well equipped in digital technology and educational resources. Disadvantaged learners are attending schools with lower ICT infrastructure and educational resources (Di Pietro et al., 2020). On the other hand, schools in urban areas continue to teach their learners from a distance by uploading assignments, books, and reading materials through Google Classroom, e-mail, social media, and other applications. In some urban areas, even if distance learning is provided due to a lack of monitoring strategies some learners may not use it properly. Private schools sending learning materials directly to parents through social media platforms. There is a difference between rural and urban schools and the public and private schools to keep their learners learning from home (Tzifo- poulos, 2020).

Following COVID-19 more advantaged learners are attending schools to adopt online learning. Schools in disadvantaged, rural areas lack the appropriate digital infrastructure required to deliver teaching at the remote. Learners in these contexts have fewer options for education at home, with only a certain few of them having access to computers, a stable connection, the means to pay for educational tools. Also, there is a significant difference between private and public schools in technology and educational resources. In most countries, private schools are more effective than public schools. Learners' have not equal access to digital technology and educational materials (Zhang, 2020).

- ***Assessment and accountability***

Assessment and accountability are critical to a resilient education system. However, they were not fully figured out before starting online teaching and learning; and as a result, many of the students who followed online learning were not assessed (70%); and among learners assessed (30%), the majority did not undertake a standardized assessment which would stand at the same caliber as a normal face-to-face assessment, as learners were assessed by various competent and non-competent actors including parents, relatives, relatives, etc.

Figure 2. Assessment and accountability



Source: Primary data

The figure 2 revealed that about 70% who continued to learn during lockdown were not assessed whereas only 30% were not assessed. Looking at the effectiveness of assessment, the results showed that about 45% were uncomfortable with the online examination; 36% were very uncomfortable while only 10% reported to have been comfortable.

On the other hand, accountability during learning is also a matter. Indeed, remote learning is not suitable for younger learners since they are not accountable enough and require close supervision which could not be offered when learning remotely (UNICEF, 2020). Remote learning is beneficial to older learners' especially independent learners. Older learners will be able to take full responsibility and personalize their learning; they take control over their learning, understand what they want to learn, what they like and what kind of support they need (Herold 2017). Online educational platforms also enable these learners to learn at their own pace, and this gives them more flexibility during the day. Younger learners may not be well-organized, self-motivated and have time management skills that allow them to exploit the benefits of distance education (Tzifopoulos, 2020). Furthermore, poor and digitally illiterate families' children are further suffering (Tiruneh, 2020). Younger learners may especially need the

presence of their parents at home as they do not possess the independent learning skills, attention spans or social-emotional maturity to succeed in virtual learning environment for very long (Di Pietro et al., 2020). Lack of dedication and accountability during learning is also associated with learner's involvement in other activities as highlighted in the table below:

Table 1. Learners' involvement in other activities

Activity	Percentage
Doing housework	51%
Just relaxing and watching videos, listening to radio	14%
Playing games	9%
Doing casual work (Aiding in construction)	8%
Working in farm	7%
Working in small business	6%
Selling things (like eggs, envelopes, etc.)	3%
Taking care of younger children	3%

During the lockdown period, some learners reported that they failed to participate in online classes due to doing different activities. 51% revealed that they did not follow online courses because they were doing housework. 14% agreed that they were relaxing or watching videos. 9% stated that they were playing cards while 8% were casual workers. 7% were working in the farm while 6% were involved in different types of businesses.3% revealed that they were taking care of young children while another 3% were making money by selling eggs, envelops etc. We have to note that learners' involvement in other activities decreases concentration time for online learning; and some of the activities can lead to school drop-outs.

- ***Parental support***

Parental involvement is also important for the success of online education environment (Baytiyeh, 2018). Parents should help their children with digital literacy to make the online learning possible. Findings of this research show that only a few parents (20%) supported students during online learning sessions. This is due partly to the fact that all parents possess the digital skills required to help their children deal with the technical challenges of online learning; some of them, especially among those from less advantaged backgrounds, may not have basic digital skills such as sending emails, writing documents using word processor of finding information on the internet (Di Pietro et al. 2020). Zhang and Livingstone (2019) show that higher educated parents tend to be more digitally advanced, i.e. they use a wider array of digital devices and report more digital skills. Also, Vigdor et al. (2014) report that home computer technology is found to improve learners' achievement only in households where parents can serve as more effective instructors in the productive use of online resources.

However, Di Pietro et al. (2020) highlight that low quality of parental support may result in the fact that parents are: a) less able to provide learning support to their off-springs due to their relatively low familiarity with the content of online learning activities, or b) to a limited command of the language of instruction; and c) more likely to be employed in occupations that are less likely to be performed at home. Low quality of parental support resulted in explainations of learning loss. In all contexts, the effectiveness of remote learning depends heavily on learner's access to specific resources that allow them to learn at home: availability of books and educational materials at home, availability of a place to study, access to electronic devices and connectivity, and parental support and involvement in the

learning process (Tadesse & Muluye, 2020). Without parental support, remote learning is difficult especially for younger learners as parents should ensure that learners are focused on the assigned tasks (Baytiyeh, 2018).

The corona virus crisis increased pre-existing inequalities in access to quality education between learners in urban and rural areas, and learners from families with higher and lower socioeconomic status (Owusu-Fordjour et al., 2015). Learners in rural areas and from disadvantaged families lack access to technology, internet access, and educational resources (Di Pietro et al., 2020). According to UN (2020), unequal access to essential learning resources and high-quality distance learning methods led to unequal learning opportunities between learners from high and low socio-economic backgrounds. First, learners from rural areas are likely to have parents with limited financial means, low levels of internet connectivity, limited access to electricity and electronic devices , and therefore have access to less effective distance learning modalities. Second, learners from poor households who struggle to have their basic nutritional needs met, do not necessarily have an adequate study space. Third, some learners who live in areas with internet access yet do not have the electronic devices necessary to access distance learning delivered via digital tools. Fourth, children in single-parent households or households with low parental educational attainment where parents cannot provide support or a favourable environment for studying (UNESCO,2020). The success of online learning requires parental support. Parents from different background provide different financial and non-financial support to their children when learning remotely during the school closure period. As far as non-financial support is concerned, parents should support their children cognitively. They should help their children to handle online courses and assignments. They were supposed to explain their children what they did not understand well (Di Pietro, Biagi, Costa, Karpiński,Mazza, 2020). It was shown that there is a correlation between parents' and children's cognitive ability. Anger and Heineck (2010) find that individuals' cognitive skills are positively associated with their parents' ability and they conclude that parental education plays an important role in explaining the transmission of cognitive abilities between generations. More educated parents spend more time with their children (Sayer el al. 2004) and tend to be more involved in their learning process; they may also be effective at assisting their children with schoolwork. This play a paramount role in motivating their children to study online and participating actively in their online learning.

Another disadvantage suffered by parents from less disadvantaged families is that some parents may not value education enough to encourage their children to study while at home (Anderson and Safar 1967; Hatcher 1998; Nash 2003). Attanasio et al. (2020) agreed that learners who have more educated parents are likely to get more emotional support than those who have less educated parents; stress may make them suffer behavioural and emotional problems and adopt inconsistent parenting practices (Coger et al. 2010). This result can be at least partially attributed to the higher likelihood of parents from less advantaged backgrounds of being under stress because of job insecurity and financial issues. Moroni et al. (2020) argue that COVID-19 is likely to further widen the socio-emotional disparities between children from more and less advantaged backgrounds. Learners' isolation from their friends and teachers may have a detrimental effect on their socio- emotional skills and parents from more privileged backgrounds may be better equipped to support their children in these circumstances. Additionally, children from lower socio- economic status are more likely to spend their quarantine time in a more stressful home environment than those from higher socio-economic status. Less disadvantaged parents are more likely to experience financial problems as well as the stress of sharing a limited space and limited digital devices at home. This also can affect remote learning. In addition to having lower levels

of both cognitive and non-cognitive skills to help their children with distance learning, parents from less advantaged backgrounds may also have less time to dedicate to their children given their inability to work from home. Learners from disadvantaged backgrounds are less likely to have access to digital resource access at home, less likely to have a suitable home learning environment and more likely to have nutrition problems (Di Pietro et al., 2020). The financial support from parents are likely to contribute a lot to the success of online learning of their children. Learners from higher socio-economic status are significantly more likely to have a laptop or a computer at home than those from lower socio-economic status. In addition, there are striking differences in access to broadband internet at home between low and high-income families (Moroni et al., 2020). Given the unavailability of computers at home in many low-income households, children are likely to gain access to online classroom learning only through their mobile phones, which makes any completion of work and uploading it onto an e-platform very difficult. Moreover, using data from a sample of school children in Korea, Moon et al. (2016) show that continuous smartphone use is associated with eye discomfort symptoms. In addition to having access to appropriate digital resources, learners need to be in a home environment that is conducive to learning. However, this might not be the case for a large number of learners from less advantaged families, who often have to do their work in a small space shared with other family members (Di Pietro et al., 2020). During the lockdown, children from more advantaged backgrounds tend to be more engaged in extra school learning activities than those from less advantaged backgrounds. Such activities may considerably improve learner's achievement as they may complement and supplement the e-learning resources provided by schools Andrew et at. (2020).

The school's closure due to COVID-19 may not affect learners equally. Learners from less advantaged backgrounds highly suffered during COVID-19 than advantaged learners (Di Pietro et al., 2020). To control the coronavirus spread, most countries have been working to encourage parents and schools to help learners continue to learn at home through distance learning (UNESCO, 2020a). The governments advised learners to learn from radio and television lessons that can be accessed at home. The radio and television lessons may work for some children and learners in urban areas, but most parents in rural areas have not accessed to radios and television lessons. In addition, parents from rural areas do not have time to help their children to follow online courses as most of them are farmers. For example, in Ethiopia, more than 80% of the population lives in rural areas with limited or no access to electric power, so that it is challenging for learners in rural areas to learn from radio and television lessons (Tiruneh, 2020). They went on saying that attending online classes requires long hours of internet, peaceful space and one device/ phone dedicated to each learner in a family, might not be affordable for every learner. The use of radio and television programmes seemed to be more helpful but not all learners have access to radio and television especially in rural areas. Even those having radios or TV may not have access to electricity (Di Pietro et al., 2020). In a country like India, as all learners do not belong to the same socio-economic background and have to take care of domestic chores, family members and children, managing with limited space in the house, managing with a limited budget and poor connectivity in rural areas etc. may cause them to deal with discomfort, frustration and shame. Thus, according to Sarkar (2020), online classes have added to the already existing feelings of vulnerability among learners.

- ***Learners Perceptions on the Effectiveness of Online Instructions***

Learners interviewed admitted that online instruction facilitated social distancing (31%) in times of the pandemic. On the other hand, it was noted that online session used to be shorter (between 5 and 15 min) than the face to face sessions; and the course frequency was rated to be very low as each course was delivered once a week in a session between 5 and 15 min. Online effectiveness also required ICT skill

and only 3% agreed that they were able to use the new technology model. The results highlighted major challenges faced by learners. These include: lack of motivation, lack of equipment/ facilities (computer, mobile phones, internet, electricity, lack of time due to being busy in the house, limited/ lack of English language proficiency, lack of support (parents and teachers), limited/lack of ICT literacy

CONCLUSION

Traditionally, schools have served as the place for developing academic skills. The experiences of the pandemic, however, highlight the need to understand the importance of schools as the place for students' mental growth, mental care, and mutual support through communication and collaboration with friends and peers. To ensure the continuity of learning during the period of school closure, the Government of Rwanda and its development partners in the education sector devised a remote learning system for primary and secondary students. This involves expanding remote learning opportunities through radio and television broadcasting of lessons, which were built through the curriculum and began from where learning was suspended in the classroom. Other methods of online learning and tools have been utilized by educators countrywide for education continuity. The COVID-19 pandemic has revealed several points of focus to improve our preparedness against any future crisis as we emphasize online learning as worthy to be empowered for quality education continuity. Areas of focus include earning inequalities, accountability in learning; adequate learners' assessment, as well as parental support are still major issues to be solved to buil a resilient primary and secondary education system in Rwanda. Findings of this research inform actors and stakeholders in the education sector to strengthening remote learning mechanisms for improved resilience of Rwanda's primary and secondary education system during COVID-19 and other similar times of crisis.

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TEACHERS' EXPERIENCES DURING COVID-19 LOCKDOWN - TOWARDS BUILDING A RESILIENT PRIMARY AND SECONDARY EDUCATION SYSTEM IN RWANDA

Kagwesage Anne Marie[1], Nzayisenga Marie Louise[1], Habinshuti Patrice[2], Mutambuka Deo[2], Nshimiyimana Patrick[2], Rwibasira Peter[3]

[1] College of Arts and Social Sciences, University of Rwanda, Rwanda.
[2] Envisage Rwanda, P.O Box 2364 Rwanda.
[3] College of Science and Technology, University of Rwanda, Rwanda.

ABSTRACT

In the last two decades, Rwanda has experienced admirable growth in the education system, particularly in ensuring extended access to school. However, the Covid-19 pandemic led to school closures in many countries including Rwanda where nearly 3.6 million students were out of school following the national lockdown and other measures to contain the spread of the virus. This unprecedented crisis threatened to reverse earlier achievements in our education system, with potential negative short, medium, and long-term impacts on the country's knowledge-based developmental vision. During this time, teachers and education professionals were asked to supply students with teaching material and instruct learners directly via remote digital tools. The expectation is that most learners learn from home under the supervision of their parents. In reality, the arrangement came closer to remote learning or distance learning in that teachers and schools remain responsible for the learning content and outcomes. Although, switching from face-to-face education to online was affected by some constraints such as the unpreparedness of teachers, lack of facilities and teaching approaches used, online teaching was a priority to build a resilient education system. The main aim of this paper was to investigate teachers' experiences during COVID-19 lockdown; and evaluating the use of various remote learning tools and approaches in teaching and learning during the lockdown and their associated potential impacts on the student learning experiences.

Keywords: Covid-19, resilience, primary and secondary education, online teaching, student learning, Rwanda.

INTRODUCTION

The Government of Rwanda emphasizes that Education is a fundamental human right and an essential tool to ensure that all Rwandese citizens - women and men, girls and boys - realize their full potential; as the development of human resources is one of the principal factors in achieving sustainable economic and social development. Therefore, education and training has been considered as a critical lynchpin to achieve development and poverty reduction in Rwanda (**MINEDUC, 2003**).

Rwanda's education system consists of both basic education and higher education. Basic education is comprised of early childhood education (ECD), as well as primary and secondary education with a 6+3+3 approach (6 years of primary school, 3 years of junior secondary school (ordinary level) – 3 years of either advanced secondary education or technical/professional education. There are three categories of schools including public, government-aided and private **(Government of Rwanda, 2019).** The Republic of Rwanda is administratively divided into five provinces: the Eastern, Northern, Southern, and Western provinces, as well as Kigali City. The five provinces are further subdivided into 30 districts (Uturere), 416 sectors (Imerenge), 2,148 cells (Utugari), and 14,837 villages (Imudugudu). School education is centrally overseen by the national Ministry of Education (MINEDUC) in Kigali and administered locally by District Education Offices (DEOs). Whereas the MINEDUC sets the overall policies and strategies, DEOs manage and monitor schools at the local level. Overall goals for the

education systems are generally set forth in multi-year strategic education sector development plans. The Rwanda Education Board (REB), an agency of the MINEDUC, is responsible for developing school curricula, examinations in the school system, and standards for teacher training. Higher education, on the other hand, is the sole responsibility of the central government and overseen by the Higher Education Council (HEC), an agency under the MINEDUC established in 2007. The HEC is tasked with setting standards and enhancing and monitoring the quality of education and research at HEIs; it is also responsible for the vetting and recognition of private HEIs and the accreditation of their programs **(Stephan, 2019)**

In sub-Saharan Africa, Rwanda is one of the top-performing countries in basic education, where 98 per cent of children are enrolled in primary school. However, there are still several challenges in education. Although nearly every child enrolls into primary school, only 71 per cent of children complete their primary education. Classrooms are often too crowded, with an average of 62 students for every qualified teacher. The quality of education requires significant attention. Primary students score too low in numeracy and literacy exams. Teachers are also unable to teach in English, the official language of instruction, and rely too heavily on traditional, teacher-centred instruction. (**UNESCO, 2020**). Although there are relatively equal numbers of boys and girls in classrooms, girls are more likely to drop out of school. Boys also outperform girls in 26 of Rwanda's 30 districts. Girls are also significantly under-enrolled in technical, vocational and tertiary education (UNICEF, 2020).

In the beginning of the year 2020, the outbreak of the coronavirus pandemic led to the closure of all primary and secondary schools in different parts of the world to curb the spread of the pandemic. About 87% of the world's learner's population is affected by COVID-19 school closures (UNESCO, 2020b). Before the COVID-19 crisis as per 2019 data, Rwanda's accounted about 3,574,070 students in primary and secondary students and was gradually working well towards inclusive basic education for all. The number of teachers in government schools was (59,556); and (7,907) in private schools as well as (39,151) in government-aided schools (Mugiraneza, 2021). As a result of the measures implemented to reduce new cases, all categories of citizens have been affected including teachers in both public and private schools, whose working conditions changed notably. As noted by Ferdig et al. (2020), the COVID-19 pandemic has prompted a rapid movement to remote schooling. With school closures worldwide; teachers in several countries have continued their work from home (Talidong and Toquero, 2020); and the Government of Rwanda also encouraged schools and teachers to support students remotely, and continue with online teaching where possible. UNICEF (2020) stated that in the case of school support continued access to quality education; which can include the use of distance learning strategies, assigning reading and exercises for home study, radio or television teaching of academic content, assigning teachers to conduct remote follow-up with learners, and using other methods including digital learning management systems such as Google Classroom, and Moodle and Self-directed learning content (UNESCO, 2020a); using web-based class meetings and messaging applications have become useful tools and new ways of communicating with learners (Kim and Asbury, 2020); as well as developing other education strategies for education community (UNICEF, 2020).

Among strategies put in place to support education continuity during the times of crisis like the COVID-19 pandemic pandemics, the country has to scale educational technology, establish zero-rating educational resources on the internet, universal service funds and connecting schools to the internet, prepare online teaching and learning resources, utilizing free online learning resources, practice mobile learning, practice radio and television teaching and grow up ICT infrastructures (Tiruneh, 2020). In addition, the establishment of remote-learning systems for educational continuity indeed requires a certain level of electricity and telecommunication infrastructure, which are in many cases rarely accessible to the majority of population including teachers in poor or even middle- income countries where the crisis has led to rapid impoverishment (UNESCO, 2020).

From the beginning of the pandemic, teachers were immediately tasked to implement distance learning modalities, often without sufficient guidance, training, or resources. This occurred at every

level of education. In many contexts, teacher professional development has moved online or been disseminated via telephone and video applications, but some teachers from rural areas or others from low socioeconomic status may have missed out on such support (Kim and Asbury, 2020). The COVID-19 crisis has highlighted that teachers at all levels need training in online methods of education delivery. Teachers across the globe were largely unprepared to support continuity of learning and adapt to new teaching methodologies. In sub-Saharan Africa, only 64 per cent of primary and 50 per cent of secondary teachers have received minimum training, which often does not include basic digital skills. Even in contexts with adequate infrastructure and connectivity, many teachers lack the most basic ICT skills (Talidong and Toquero, 2020). Teachers had to cope with increased workloads and family responsibilities. This is especially for female teachers who had to continue teaching and bore a great share of family responsibilities.

In addition, COVID-19 has had varying impacts on the employment and salaries of teachers; where many schools failed to pay teacher's salaries and delays disbursing salary payments were more common. In the public sector, teachers on temporary contracts were especially affected, as contracts were not renewed and those paid by the hour were out of work. In low-income countries in particular, where parents stopped paying fees or teachers have been unable to teach remotely, teachers lost their livelihoods (UNESCO, 2020). A great number of teachers on temporary contracts were most affected and were vulnerable to the cessation of salaries and job losses while schools were not in session. This would result in lack of motivation, in high rates of absenteeism, and can even lead some teachers to leave their jobs, thinking that their efforts were under-mined to build school resilience of covid-19 crisis (Zhang et al., 2020).

Regardless of the approaches used, teaching and learning standards and quality education should be considered as a priority to build a resilient education system. In the case of Rwanda like many other nations worldwide, although switching from face-to-face to online education has been affected by some constraints such as the unpreparedness of teachers, lack of facilities and teaching approaches used, online teaching was a priority for education continuity. This study was conducted as part of a wider research on analysing the resilience of Rwanda's primary and secondary education systems to mitigate the impact of the COVID-19 pandemic. The vital importance of quality teachers is indisputable. With the crisis of the pandemic also comes the opportunity to examine the working conditions of teachers, and therefore the main objective of this particular was to investigate teachers' experiences and evaluating the use and effectiveness of various remote learning tools and approaches in teaching and learning during Covid-19 lockdown in Rwanda towards building a Resilient Primary and Secondary Education System in Rwanda.

METHODOLOGY

The study based on primary data collected from selected primary and secondary school teachers across 10 districts in Rwanda, including Gasabo, Nyarugenge and Kicukiro districts in Kigali City Province; Muhanga, Huye and Gisagara districts in the Southern Province; Bugesera and Gatsibo districts in the Eastern Province; Rubavu and Nyabihu districts in the Western Province as well as Musanze district in the Northern Province of Rwanda. The study featured both public and private schools, with 32 primary and 30 secondary schools respectively; and considering both rural and urban areas in the 10 selected districts. A total of 148 teachers participated in the study; among whom 76 were primary school teachers; while 72 were secondary school teachers. Both structured and unstructured interviews were conducted with these 148 teachers. Structured quantitative interviews conducted on some teachers. Descriptive analysis and the qualitative research methods were applied using the Buckley and Chiang model to analyse teachers' experiences, and perception towards online teaching methods and their efficacy for a resilient education system.

To analyze the teachers experience towards the online teaching in Rwanda education system during the pandemic period of Covid-19 when all schools were closed, the following key indicators for

quality education were assessed gradually from the teachers, and head-teachers including: (1) School Readiness with appropriate ICT skills, tools and equipment and internet facilities for teachers (1) Empowering teachers for online course delivery (3) Parental involvement in education, as well as (4) Supporting and motivating teacher's efforts to promote remote learning. Secondary research methods involved review of researches, publications and documents on COVID-19 prevention policies and procedures as implemented in the education system.

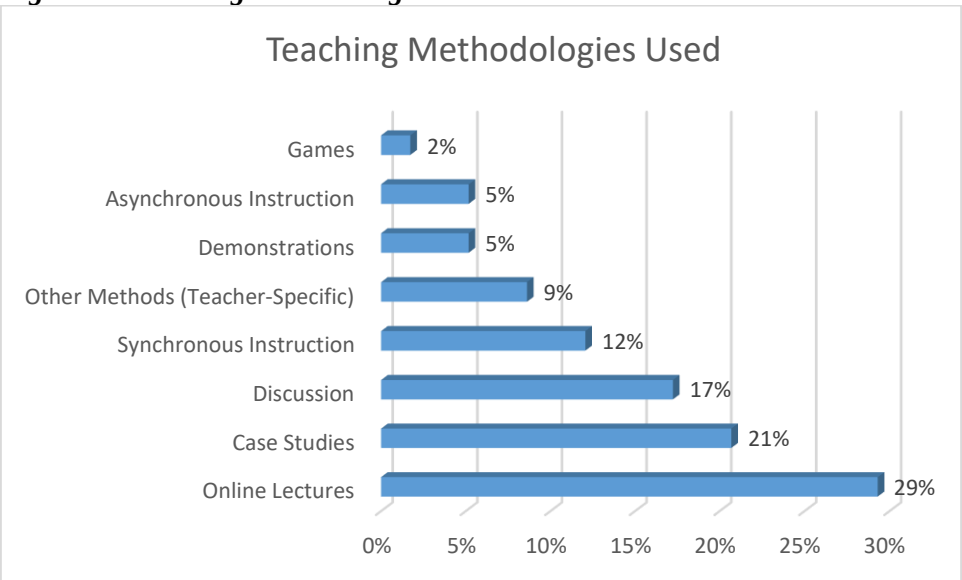
RESULTS AND DISCUSSION

This section presents results of this study and discusses 4 areas of consideration for quality education were assessed gradually from the teachers, and head-teachers including: (1) School Readiness with appropriate ICT skills, tools and equipment and internet facilities for teachers (1) Empowering teachers for online course delivery (3) Parental involvement in education.

School type, location, and infrastructure:
The study included 64% of public and government-aided schools; and 33% private schools respectively. Teachers assessed were composed by 61% of male and 39% of female whereby among them 46% of female reside in urban areas. School type and location are tied to readiness for the quick deployment of online learning readiness a strong explanatory factor given that 51% of the private schools continued to teach while only 11% in public schools kept operating remotely during the lockdown. The teaching staff confirmed that only 37% continued to teach especially in the urban-located schools while it was only 5% in schools located in the rural areas. In conformity to insights to the present study, several researches have revealed that schools in disadvantaged, rural areas lack the appropriate digital infrastructure required to deliver teaching remote remotely. Also, there is a significant difference between private and public schools in technology and educational resources. In most countries, Rwanda included as per the findings of this study, private schools are more effective than public schools. As noted by Zhang (2020), learners' have not equal access to digital technology and educational materials. Online teaching and learning are a good opportunity to continue education during the pandemic but it is challenging for developing countries (Sun et al., 2020). In accordance with UNESCO report (2020b) report, for teachers in countries without reliable ICT infrastructure and internet access, the rapid transition to online learning has been challenging; and this is indeed linked to the limited number of computers, internet access, mobile network access among others (O'Hagan, 2020). The schools in urban areas are teaching their learners from a distance by uploading assignments, books, and reading materials through Google Classroom, e-mail, social media, and other applications. In some urban areas, even if distance learning is provided due to a lack of monitoring strategies some learners may not use it properly. Private schools sending learning materials directly to parents through social media platforms. There is a difference between rural and urban schools and the public and private schools to keep their learners learning from home. Also, public school teachers and learners have limited or no access to the internet (Tzifo- poulos, 2020).

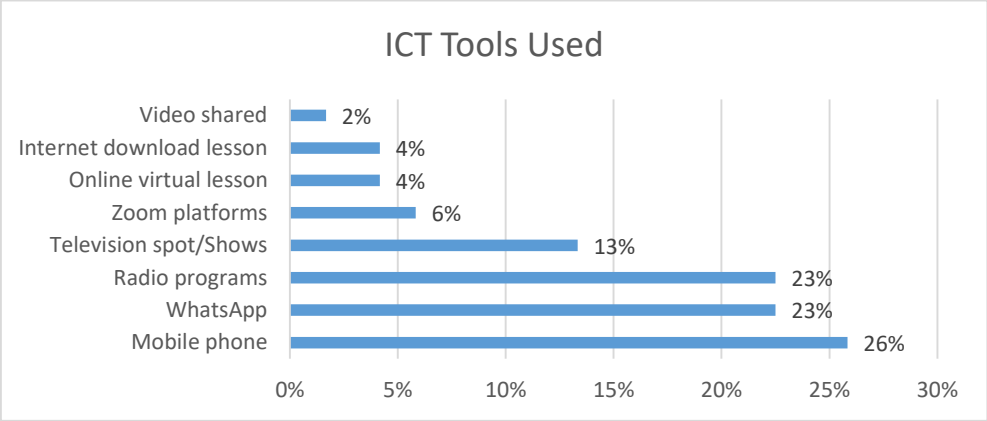
The results of this study revealed that all the teachers interviewed agreed to have been willing to continue their teaching career after lockdown. However, the results also showed that 77% did not teach during lockdown while only 23% revealed that they continued to support learners in one way or another during the lockdown period using different platforms since the school closure situation completely changed the way they were teaching. Of those who continued teaching, the table below highlights the various methodologies and tools used.

Figure 1: Teaching Methodologies Used



Source: Primary data collected by researchers in June 2021

Figure 2. ICT Tools Used



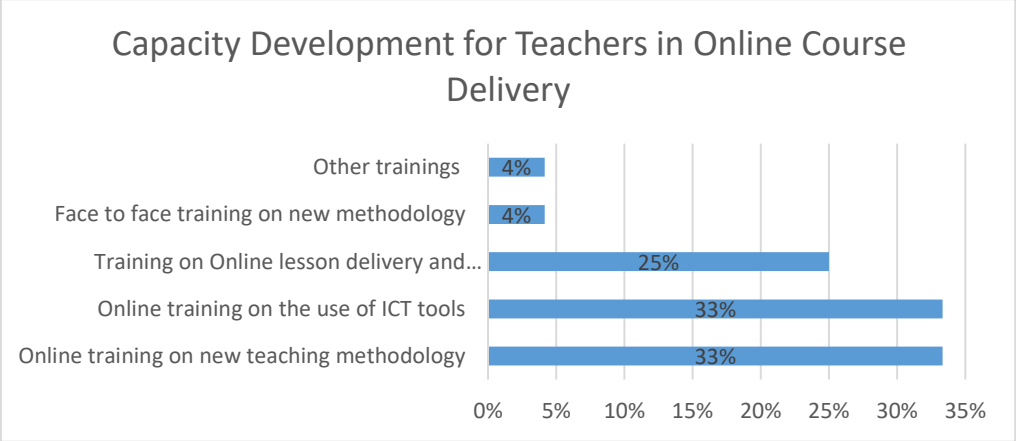
Source: Primary data collected by researchers in June 2021

Empowering Teachers for Online Course Delivery:

Teachers require training to deliver online learning effectively, but such support is particularly limited in developing countries. Teachers' familiarity with using online platforms in delivering the content and more complex functions (setting online quizzes) is critical; and the lack of ICT trained teachers in developing countries as is an impediment to quality online learning; as O'Hagan (2020) emphasizes. Di Pietro et al. (2020) argued that another factor that may contribute to increased inequality in learning outcomes following the switch from offline to online environments lies in teacher's preparedness in digital technologies. Although some teachers continued to teach, they reported that some challenges hindered their teaching effectiveness, limited ICT literacy and equipment, limited knowledge on how to deliver content online, lack of support. This would occur if learners from lower socio-economic status are more likely to attend schools where teachers are less able to fully take advantage of e-learning technologies given their lack of or limited ICT skills. According to Zhang et al., (2020); this is partly because they do not have sufficient training to design and implement remote learning strategies. Certainly, teacher training in online teaching methodologies and the use of the relevant tools is one of critical areas to ensure quality instruction

for a resilient education system in times of crisis. Our study has shown that 62% of teachers not obtain any training before undertaking the online teaching; while only 38% were trained about online teaching. Here below is summarized the type of training received.

Figure 3: Teachers' Capacity Development for Online Teaching

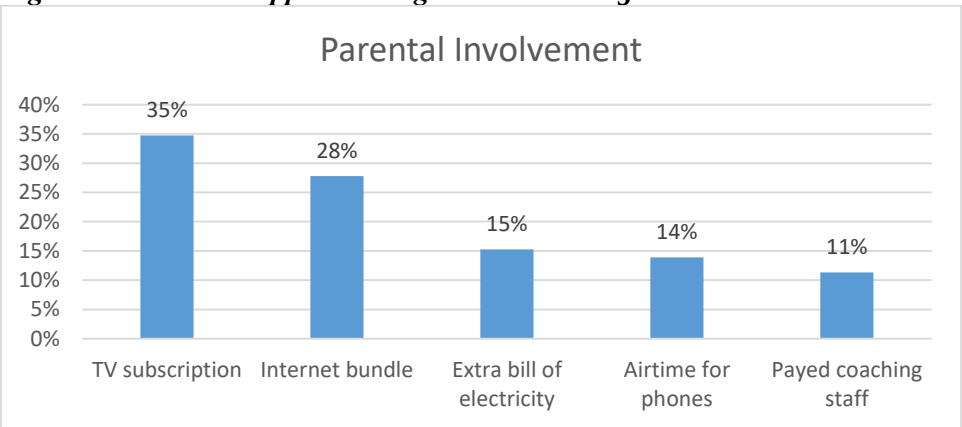


Source: Primary data collected by researchers in June 2021

Parental support in teaching and learning

Support from parents are likely to contribute a lot to the success of online learning of their children. However, only a fraction of the parents are able to provide adequate support to their kids with regard to online learning. Findings of the present study revealed that only a few parents (20%) supported students in one way or another during online learning sessions; and a low number (7%) of households interviewed have been capable of affording adequate online learning tools. Among parents who reported being able to support their children during the lockdown have used many ways including TV subscription (35%), internet bundle purchase (28%), paying extra bills for electricity (15%), buying phone airtime for the learning (14%) and paid specialized coaching for their kids (11%) as shown in the figure below:

Figure 4: Parents' support during online learning



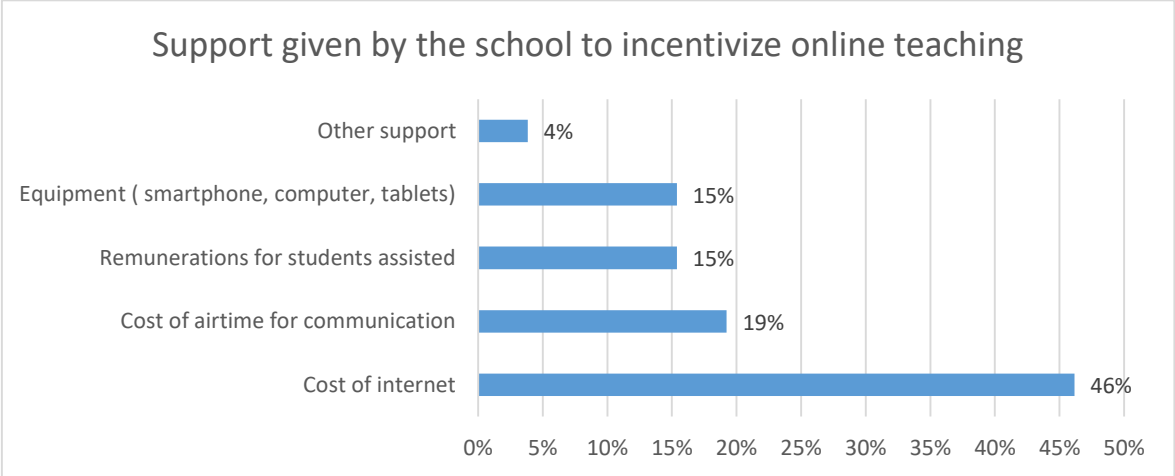
Source: Primary data collected by researchers in June 2021

Other researches have also emphasized that learners from higher socio-economic status are significantly more likely to have a laptop or a computer at home than those from lower socio-economic status; noting striking differences in access to broadband internet at home between low and high-income families (Moroni et al., 2020). Given the unavailability of computers at home in many low-income households, children are likely to gain access to online classroom learning only

through their mobile phones, which makes any completion of work and uploading it onto an e-platform very difficult. Learners in these contexts have fewer options for education at home, with only a certain few of them having access to computers, a stable connection, the means to pay for educational tools. Di Pietro et al. (2020) highlight that low quality of parental support may result in the fact that parents are: a) less able to provide learning support to their off-springs due to their relatively low familiarity with the content of online learning activities, or b) to a limited command of the language of instruction; and c) more likely to be employed in occupations that are less likely to be performed at home. Low quality of parental support especially the main explanations of learning loss where the teachers have dared to move to online teaching.

Financing, Supporting and motivating teachers for online teaching:
The findings from the present study have shown that 71% of the all the teachers interviewed continued receiving their salaries during the lockdown and were mainly those from public and government-aided schools, while 29% were not receiving salaries, mainly from private schools. This is due to the fact that the core source of income in private schools is from parents' contributions in the form of school fees (Mugiraneza, 2021), while teachers from the two types of schools (government-owned, and government-aided) receive government support with payment of teacher's salaries. Research indicates that improving teacher wellbeing also improves student outcomes (Briner & Dewberry, 2007). The covid-19 pandemic has led to failure of some private schools due to economic recession which resulted in failing to pay teachers. This poses a great burden to the public schools in the future because they would have additional number of learners. Besides posing problems on individual, family and community welfare, the non-payment of teacher salaries hindered the delivery of quality education. In the short term, many teachers may need to turn to alternative sources of income and will be unable to support learners adequately in distance learning. In the long term, schools may face teacher shortages due to attrition (Jaramillo, 2020). Apart from salaries, teacher who continued online teaching received various support; however, this was not uniform to all schools as it was predominantly done by private school, in form of school-specific support to its teachers or by parents. Notable incentives included the cost of internet for teachers (46%), cost of airtime for communication (19%), remuneration for students assisted (15%), provision of equipment (smartphone, computers or tablets), and other teacher-specific support (4%). The table below gives an inventory of the main types of support that were offered to teachers:

Figure 5: Support given to incentivize teachers for online teaching



Source: Primary data collected by researchers in June 2021

Perception of Teachers on the Adoption and Acceptance of Online Learning in Primary and Secondary Schools: Regarding the adoption and acceptance of online teaching and learning as an effective and appropriate method, results show that teachers revealed that it was difficult for them

to engage students remotely; and those committed to follow all online teachings and undertake assignments were significantly low (22%). In addition, the flexibility in teaching schedules including the calendar were tight (average of 15-30 minutes) for each lessons on radios and TVs, a time far less than what was usually allocated to a course before the pandemic. Another aspect of the learning was that learning was slow as students took an average of 1 courses per day. Furthermore, many teachers were not prepared to immediately shift from offline to online; some of them also had negative attitude for the success of online learning platforms (Zoom, Microsoft, Google, etc.).

CONCLUSION

Distance learning is a solution to continue the education system, but it is difficult in developing countries like Rwanda. This is because teachers were not prepared, trained and equipped toward a successful online learning; and parents did not have adequate ability to support students at home, as many of them have not themselves been to school and there is a lack of the necessary Information and Communication Technology (ICT) infrastructures, computers, radio, and television to provide distance learning. Access to computers and access to the internet is basic to successful distance teaching. The interaction between learners and teachers are vital for the personal development of each child. It is not so easy to learn remotely and know how to express oneself, how to listen to others, how to respect diversity…, etc. because all of these skills cannot be easily acquired from books. Also, many teachers in Rwanda were not familiar with online teaching platforms; however, some of them were brave to dare shifting to online teaching though they struggled with difficulties in the area of technology and lack of infrastructure availability. Some schools, especially those privately-run were not able pay their teacher's salary when school were closed. Teaching and learning during COVID-19 in Rwanda's primary and secondary schools was marked by inequalities linked to school type, location, infrastructure and support available to teachers to deploy online education; and the socio-economic status of learners as poor families could not have access to the equipment required at home. The physical school closure and the implementation of distance education lead the learner to spend less time learning, increased learning, stress, and lack of learning motivation.

In brief, the COVID-19 pandemic has revealed several points of focus toward building a resilient primary and secondary school education system in Rwanda, which are to be emphasized on to improve our preparedness against any future crisis. Results of this study will inform actors and stakeholders to strengthen relevant mechanisms for post-pandemic recovery strategies. As nobody knows when the virus will end, Rwanda and other countries world-wide should learn from findings of this research and other researches to plan and implement different strategies for effective continuity of the education system through distance learning. We recommend that the following main focus areas be taken into consideration towards building a resilient education system, among others: (1) Empowering teachers for online course delivery, (2) Providing appropriate ICT equipment and internet facilities, (3) Sensitizing for parental involvement in education, (4) Financing and motivating teachers efforts to embrace remote learning, and (5) Long-term planning to mitigate the impacts of any potential future pandemic or crisis.

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THE TOUGHENING OF POLYAMIDE (PA) USING HIGH IMPACT POLYSTYRENE (HIPS) RECYCLED FROM WASTE ELECTRIC AND ELECTRONIC EQUIPMENT

Doukari Amine, Touffik Baouz, Djerrad Nour El Houda,

[1]*University of Bejaia, Faculty of Technology, Department of Process Engineering, Laboratory of Organic Materials (LMO), 06000 Bejaia, Algeria*

ABSTRACT

Polyamides are commercially important polymers amongst crystalline engineering thermoplastics. This is mainly due to their high-performance characteristics such as high melting points, good mechanical strength, and ductility, as well as excellent resistance to solvents, However, Polyamide 66 (PA)was toughened using high impact polystyrene (HIPS) at various weight percentages in this study. The blends were made in the melt state using an internal mixer Brabander and characterized in terms of rheological, thermal, and mechanical properties. according to the rheological properties blends determined by the melt flow index (MFI) technique The addition of HIPS to polyamide PA resulted in an increase in viscosity of the blends, The decrease in the MFI may be traced to two possible factors the formation of intermolecular interactions between the matrix PA and the HIPS or to the difference grade. The mechanical tests results showed that % elongation at break and impact strength increased due to particle size of the dispersed rubbery phase the dispersed rubbery phase. Thermal properties determined by differential scanning calorimetric (**DSC**) and thermogravimetric analysis (**TGA**) both showed that the thermal stability of the PA/HIPS improved after increasing the HIPS content until 25 wt%, showed the highest value of thermal stability. The above results indicated that the high impact polystyrene HIPS influenced the mechanical, rheological, and thermal properties of polymer blends.

Keywords: Nylon66, High Impact Polystyrene, Blends , rubber toughening

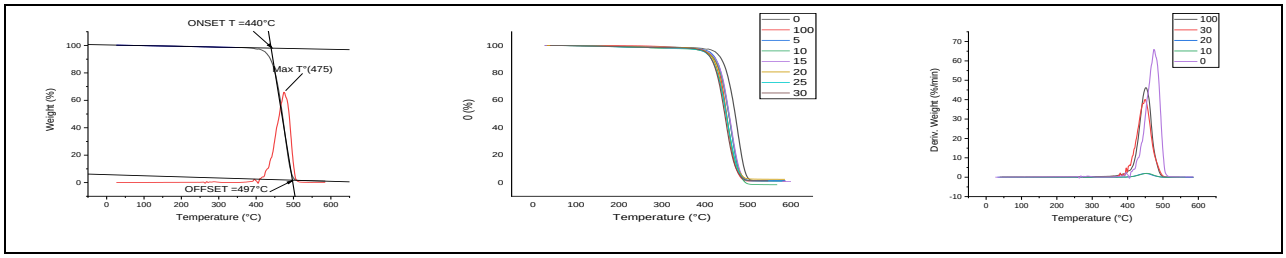


Figure 1: Typical TG-DTG curves of nylon 66/ hips blends**.**

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THE CONCEPT, NATURE AND IMPORTANCE OF GENDER AND SEX EDUCATION IN CONTEMPORARY SOCIETY

Rituraj Basumatary

MPhil Research Scholar
Tata Institute of Social Sciences
Guwahati, India

ABSTRACT

Sex is a phenomenon of life that sustains life forms on the planet earth. The life cycle of every living kind (a sexual population) spreads the advantageous traits in a way that it makes the next generation more capable of meeting the challenges of survival in different conditions. Sexual reproduction involves combining specialized cells (gametes) to form offspring that inherit genetic traits from both parents. Each cell has half the chromosomes of the mother and half of the father.

According to Boccadoro L., Carulli S.(2008), "Human sexuality is not simply imposed by instinct or stereotypical conducts, as it happens in animals, but it is influenced both by superior mental activity and by social, cultural, educational and normative characteristics of those places where the subjects grow up and their personality develops." Human sexuality has many aspects. It involves building up personal identity in a social evolution of individuals in a society. Sociocultural aspect casts human sexuality as a social norm under moral, ethical, philosophical and religious or spiritual framework. Medically, it deals with the physiological or even psychological aspects. Sexuality is also now viewed in the cultural, political and legal context in a society.

The construction of sexual meanings, is an instrument by which social institutions, religion, the educational system, psychiatry, legal system, human rights, etc., control and shape human relationships. Therefore, sexuality is, generally, framed within the context of the institution of marriage. A home is an environment that provides nourishment for the growth of the young ones and guarantees mutual care and safety for all. It instills a moral obligation and individual responsibility for the partner's sexual behaviours. In some countries, sex functions, behaviours and feelings are expressed without any binding relationship among them. Deviant sexual practices are limited by laws in many countries. In some societies, mostly those where religion has a strong influence on social policy, marriage laws serve the purpose of encouraging people to only have sex with one partner within marriage. To underlying factor is that mature individuals engage in actions for which they own the responsibility and work towards a condition where harmony is established in the society.

Laws also ban adults from committing sexual abuse, committing sexual acts with anyone underaged, performing sexual activities in public, and engaging in sexual activities for money (prostitution). Though these laws cover both opposite-sex sexual activities and same-sex, they may differ with regard to punishment.

Sex Education is a very broad topic that covers a widespread of ideas about our sexuality and reproduction. It not only describes sexual reproduction and sexual intercourse, but also covers topic of abstinence, contraception, sexual behaviours, orientation, sexual pleasures, values, decision making, communication, dating/relationships, and/or sexually transmitted diseases. Sex Education has been a major debate for children under eighteen, because there are some parents that want it taught in schools and others that do not because of different reasons.

Difference between Sex and Gender

Gender refers to the socially constructed roles of and relations between men and women. It implies the social qualities and opportunities involved with being male and female. It also refers to the relationship between women and men and girls and boys, as well as the relations between women and those between men. Gender is a cultural term. It refers to the different roles which the society, assigns to men and women. It distinguishes between 'masculine' and 'feminine' stereotypes. The concept of gender was become popular in the early lifes in the field of feminism, sociology and psychology.

Now we must define sex. Sex refers to the biological and physiological differences between men and women. The term sex is a physical differentiation between the biological male and the biological female. The infant is identified as a boy or a girl depending on his or her sex. It refers to biological factors which distinguish man from woman. Judith Butler says "Sex is not just an analytical category. It is a normative category as well. It stipulated what men and women are. It also stipulates what men and women ought to be. It formulates rules to regulate the behaviour of men and women.

Distinguishing between sex and gender is nothing but a debate of nurture our nature. Sex refers to the biological differences between men and women and gender indicates the vast range of cultural meanings attached to that basic difference. The distinction between sex and gender was first emerged in the 1950s and 1960s in the writings of British and American psychiatrists and medical personnel engaged to cure intersex and trans-sexual patients. To distinguish between the two Simon de Beauvoir rightly says "women are made, they are not born". It indicates the cultural aspects of sex.

Some of the distinction between Sex and Gender are:

(I) Sex implies the biological and physiological features which define the difference between men and women.
On the other hand, Gender implies the social and cultural aspects of roles, behaviours, activities and attributes of a society which distinguish between men and women.

(II)Sex is natural, whereas Gender is cultural.

(III) Sex is less social and more scientific. It explains the physical aspect of human being. On the other hand, Gender is social in nature. It stressed on clothing, activities, carrier choices and positions of people in society.

(IV) Sex divides society into male and female.
On the other hand, Gender divides society into masculine and feminine.

(V) Sex is static. There is no variation in the matter of sex in different human societies. On the other hand, Culture varies from society to society according to cultural variance.

(VI) Sex is vested biological identity.

On the other hand, Gender is acquired identity based on social and cultural behaviour.

Thus, sex is a biological concept whereas gender is the socio-cultural elaboration of biological sex. Feminists are of the view that there is no necessary co-relations between the biology of men and women and the qualities that are thought to be masculine and feminine. Rather it is child rearing practices which try to establish and perpetuate certain differences between the sexes. For this, from childhood, boys and girls are trained in appropriate, gender specific forms of behaviour, play dress and so on. Men and Women perform different kinds of work both within the family and outside has little to do with biology. Only the actual process is biological, all other work within the home that women must do cooking, cleaning, looking after children and so on. These works are considered 'domestic work' or 'women's

work.' So sex is fixed while gender can be changed. Gender is based on ascribed role while sex is based on physical role.

Importance of Sex Education

Sexual development begins much earlier than most imagine, long before the obvious physical changes start appearing with puberty. Yet many parents find it difficult to come to terms with this aspect of child's growing up. They are often unable to talk about sex to their children either through embarrassment or simply because they cannot find the right words. But sympathetic and informed understanding from the parents is crucial to healthy sexual development in our children and adolescents.

It is heartening to note that the Third Asian Sexology Conference made recommendations which would shatter the sexual myths prevailing at present. Poor knowledge of sex and total ignorance about the union of man and woman in the process of procreation, with attendant pleasures that such union provides, are responsible for a number of misconceptions thriving even in the best decade of the 21st century. While children are dependent on their parents, government is reluctant to allow sex education to be included as a part of the curriculum. While the movies and the serials shown on the small screen stimulate the younger generation sexually, in the absence of the right attitude and sound knowledge about sex, they commit mistakes which more often result in running their lives as could be seen from the unwanted pregnancies being on the increase and HIV positive cases and STD-related diseases mounting.

Positive steps and introduction of sex education in schools and colleges in a scientific and healthy manner are necessary to stop all the misconception. Though science has advanced so much, we seem to go on making sex a mystery and an obscenity, which it is not. Discussing sex in public is not considered polite or in good taste. It is being done only by murmurs and whispers or only by using foul four-letter words. Children are discouraged when they try to probe facts about sex and are even punished. This drives them to acquire knowledge of sex through dubious and ill-informed sources like equally ignorant friends or cheap pornographic books. Even many couples feel guilty that they are doing something undesirable by indulging in sex in darkness inside their bedrooms. This sort of attitude and considering sex as taboo are responsible for a number of crimes like unnatural sex, abuse of children, rape of women, homo-sexuality, etc.

If children and youngsters learn about sex in a scientific and objective way from individuals qualified to impart sex education with the help of illustrations, models, slides, etc., they would be more careful before indulging in clandestine sex. At least they would be careful to take precautions so as to avoid unwanted pregnancies or contracting dangerous diseases like AIDS, STD, etc. They would also be alert when strangers approach them with evil designs.

It is high time that sex education should be introduced in our schools and colleges without any sense of reservation. It would be a step in the right direction, as this would save many youngmen and women from embarrassing situations, in which they find themselves due to poor knowledge about sex.

But one word of caution. The quality and content of sex education to be imparted and the individuals who would be most qualified to teach and explain the highly sensitive subject will have to be very carefully decided. Another important aspect to be kept in mind is whether it is safe to allow both boys and girls in the same classrooms while sex education is being imparted It would be prudent if classes are held separately, so that they would feel free to get their doubts cleared from the persons teaching such education.

As it is an explosive subject, even if due care is taken, the results may sometimes be disastrous. Introduction of sex education is, no doubt, of paramount importance, but the manner in which it is done needs to be decided by a team of doctors and psychologists working side by side.

Should there be Sex Education in Schools

For the last nearly two decades the children in India are increasingly being exposed to the world through the expansion of the electronic media. In this process, particularly with the growth of foreign satellite channels, they are exposed to cruder versions of sex along with violence and crimes related to it. In view of these emerging trends, sex education in its psychic and social bearings is of such importance that it can hardly be ignored. But, paradoxically, children are still brought up in ignorance of facts that are vital to them or, worse still, adopt the faulty attitudes of the adults who sorround them. Undoubtedly, the refusal to incorporate sex education will result in further damage to the spirit of inquiry. Considering that the foundation of a child's character is laid during his or her school days, a faulty upbringing may be responsible for the development of various forms of sexual deviations later.

Although AIDS in India began relatively late, its spread is alarming. Moreover, despite the nonavailability of comprehensive data on the spread of sexually transmitted diseases (STDs) among the country's youth, there is evidence that a substantial number of young people in India are having unprotected sex. There is no denying that the ongoing AIDS awareness campaign in the country has been successful to a certain extent. The basic goal should be to produce the next generation of children fully informed about these diseases through sex education.

In a situation where a vast majority of the country's population continues to be ignorant of the ethics of responsible behaviour in human reproduction, it is only natural that various social taboos such as child marriage, preference for sons and large families have been encouraged and have come to contribute to the perpetuation of birth rates which continue to be very high.
Youngsters, in particular, who constitute almost 40 per cent of the country's total population, suffer from inaccurate information and misconception regarding sexuality. A recent study conducted in Bhubaneswar suggests that out of 256 post-graduate students surveyed, a majority were not fully aware of the concept of family planning and different birth control measures.

To undermine the importance of sex education, a fallacy has been created by its opponents that the biology course in school can serve the purpose of instruction in sex. It is a misleading approach since in most cases teachers have been found to linger too long with the reproduction of plants and lowly organisms before taking up provocation methods in animals. By that time teachers feel awkward and children sense this. This is not surprising since most teachers themselves were brought up avoiding open references to the sexual process.

It has also been argued that at the present stage of socio-economic development, population education may be an appropriate alternative to sex education. In some schools initiatives have already been taken in this direction. Nevertheless, population education primarily deals with size, distribution and composition of population. It does not aim at giving any insight into the totality of issues connected with sexual behaviour. Treating it as an alternative to sex education would, therefore, be incorrect.

A child's desire to know where babies come from is not a sign of perverted sexuality, but a desire to discover an important fact. It is as natural as his desire to know where the sun goes when it drops below the horizon. And the answer should be given as simply and as ready as possible. The child will then learn and assimilate, what he wants to know and what he needs to understand, long before he has reached adulthood.

Given the opposition that sex education is facing in the country, the main challenge lies in advocating it as a discipline integrated with other school subjects. It must be drawn into some general philosophy of education and learning. For this, we have to get rid of all the ridiculous ideas which surround it. The government is especially expected to play an active role by doing away with the prejudice against sex education.

Here it is important to mention that a recent International Conference on Population and Development held in Cairo, while recognising equal rights for women and men in the family and at all levels, set before all governments three immediate goals: education, specially for girls; reduction in infant and maternal mortality and universal access to family planning and health services for women. However, during the deliberations on these issues it was made clear that in the coming years sexual health, reproductive rights, responsible sexual behaviour and family planning are going to be the major themes of discussion on population and sustainable development.

The world is changing at a fast pace and so is the new generation. The youth today is smart, confident and liberal. They get exposure to the world outside at a very early age. Therefore, it is significant to prepare the youth to face the world and its challenges in every possible way. Hence, it is necessary to provide them the sex education at the right time. Educating them about sex and safer sex practices can begin at home as well as in school. Sex education would teach that sexuality is a natural, normal part of life. The youth needs comprehensive sex education so that they are empowered to make informed decisions relating to their bodies without fear, shame or guilt.

The youth, and the young children are much exposed to the media and television and media provides enough libidinous titillation to evoke curious questions about every possible aspect of carnal wisdom. To get the answers of all these curiosities that the youth has, they sometimes fall in the trap and get themselves involved in the unhealthy practices. Teenagers are very curious, and curious minds will experiment. It is well said that ‘the half knowledge is always dangerous’. Comprehensive sex education may not corrupt young minds, but that the lack of information may lead young people to access false, incomplete and harmful information.

Thus, here the role of sex education to the youth becomes important. The primary goal of sex education in the schools should be to help young people to build a foundation before they are physically and psychologically ready and so they mature into sexually healthy adults.

In our country, sex is still considered as taboo and people, especially parents do not talk freely to their children on this topic. Due to the ignorance and hesitation, many children fall victims of sex abuse and sexually transmitted diseases.

Sex education in schools constitute a valuable source of information for young people. Sex education is a process of building a strong foundation for sexual health. It includes sexual development, reproduction, intimacy, gender roles and relationships. It also focuses on important topics such as puberty, sexual health and hygiene, reproductive systems, pregnancy and contraception, etc. This provides proper information about human sexuality, protection, along with the values and attitudes about sex, and cultivates interpersonal skills that will enable students to counter the pressures of sexual involvement. Sex education in schools also counteracts the misinformation about sex from media and peers. Sex education should be mandated in schools as it provides accurate information to students; decreases risky sexual behaviour; minimizes the adverse consequences of risky sexual behaviour; and ensures social equality.

The children of 12-20 years of age undergo various physical and mental changes and providing sex lessons will enable the juveniles to understand why and how their bodies develop. Many children find it difficult to cope up with these changes. In addition, they will realize some strange feelings that emerge

such as affection or passion towards the opposite gender. It is also the only saviour for children whose parents are always away from them and that is why sex education is needed. Through sex education, students will be able to learn the truth about sex and they will be able to refrain and control themselves. If children and youngsters learn about sex in scientific and objective way, they would be more careful before indulging in sex secretly. At least they would be careful to take precautions so as to avoid pregnancies and diseases.

School life remains an integral part of every child's development. School is an institution which takes care of the overall development and thus, providing sex education is equally significant. School-based sexuality education complements and supplements the sexuality education children receive from their families, religious and community groups. Along with the academic subjects, sex-education should be given equal importance in schools. Trained teachers, psychologists and medical consultants should deal with the subject. There are various reasons of why this needs to be taught in the school.

Sex education can supply our young people with the tools to report and resist abusive behaviours, and provide them with a forum for expressing their fears and feelings honestly and openly. In a world, full of exploitation, children are the most vulnerable section of our society. They need to be taught the difference between gentle touch and bad touch in order to protect themselves from various forms of child abuse.

The most important objective of sex education is to make students aware of Sexually Transmitted Diseases (STDs) and to prevent them from occurring. In our country, largely new HIV infections being contributed by unsafe sex practices, some more education on that front would certainly curb some of those HIV infections.

Teenage pregnancy is becoming a popular phenomenon. Now a days, teenagers are sexually active and think nothing could ever happen to them. However, many of them are misinformed about the risks that are involved in sex. Teens also don't always know the best ways to protect themselves. Sex education given by teachers at school is the most reliable way to give kids the right information about sex. In schools sex education information is given by professional and has been proven by many reports all over the country and world. If these students were educated from their entrance into the high school program with a sexual education class, the outcome might have been different.

It is important to teach about abstinence, which is a better way and to inform the students about sexual orientation and homosexuality. These programs of sex education should help young people to develop relationships and interpersonal skills and help them to exercise and take responsibility regarding sexual relationships which includes addressing abstinence, pressures to become prematurely involved in sexual intercourse and the use of contraception and other sexual health measures.

The generation today just keeps on getting too much of of exposure of everything. The media and technology played a big role on this. Students can now access any site on the internet that contains adult content or pornographic materials. That is why sex education should be implemented in schools. It is better for children to be informed earlier because they will still know about it when they grow up as they will be more exposed to it through their peers and the media.

Students have to be encouraged to accept the shared responsibility of pregnancy prevention by teachers explaining the consequences of premature and unprotected sexual activity, urging responsible decisions about sexual intercourse and encouraging healthy, respectful and safe male and female relationships.

The sex education in the schools should assist young people in understanding a positive view of sexuality and provide them with appropriate information and skills about taking care of their sexual health. The education given to them in school over sex should also help them to make decisions about solving

problems now and in the future. Sex education should provide an opportunity for the young people to develop and understand their values, attitudes and beliefs about sexuality.

Sex education is essential in avoiding social problems from emerging among those ages of children. Such problems are early marriage, pregnancy and rape crimes are triggered from casual sex. By allocating these lessons, the children will know how to deal with their affection safely so that they can continue their life normally.

It is of great importance for parents and teachers to change with time and understand the call of the time. Apart from the sex education to be imparted to the youth and teenagers in the friendly way, it is equally significant to understand their psychology and maintaining healthy relations with the child. The objective of sex education is for the child's benefit and this needs to be communicated effectively. Counselling done by parents and teachers are of great help and taken in correct manner by the children.

Conclusion

Sex education should be taught in schools as it is better to consider health than beliefs and we should consider reality. Since immorality cannot be eliminated and teenagers cannot be stopped from becoming sexually active, we should implement sex education in schools. The objective of sex education are to help children understand the body structures of men and women and acquire the knowledge about birth. Teach children to establish and accept the role and responsibility of their own gender by acquiring the knowledge of sex. Understanding to differences and similarities between two genders in terms of body and mind will set up a foundation for the future development in their acquaintance with friends and lovers and their interpersonal relationship. Sex education is a kind of holistic education. It teaches an individual about selfacceptance and the attitude and skills of interpersonal relationship. It also helps an individual to cultivate a sense of responsibility towards others as well as oneself.

There are about 190 million adolescents in India- a demographic in which over 30% of people are illiterate. Disparities in gender at this age can often be explained by relatively poor access to reproductive health care and the fact that girls often have less access to food, which adversely affects their growth patterns. Additionally, adolescent girls often work long hours in the home with no opportunity for employment.

Adolescents, both both males and females, tend to not be informed about sexuality. This is often caused by lack of education in general (but sex education in particular) and conservative attitude towards sex.

Parents are often reluctant to teach accurate and relevant information about sex to adolescents because of the stigma associated with the topic. More than taboo, mothers especially feel like talking about sex is embarrassing and dirty.

This same attitude is held by teachers. When the National Council of Education Research and Training (NCERT) initiated sex education, they structured it as a part of existing studies, rather than a separate subject. However, teachers tried to avoid teaching the topic.

Therefore, as a part of their commitments under the International Conference on Population and Development (ICPD) agenda, governments are obliged to provide for free and compulsory comprehensive sexuality education for adolescents and young people.

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USE OF ELECTROCHEMICAL METHODS TO ELABORATE ON TITANIUM SURFACE NANOSTRUTURED LAYER COUPLED WITH A COMPACT OXIDE FILM FOR MEDICAL APPLICATIONS

A. Djendel (a,b,) , N. Ait Ahmed(a), P. Knauth(b) and M. Eyraud(b)

(a) Laboratoire D'Electrochimie, de Corrosion Et de Valorisation Energétique, Département de chimie , Université de Bejaia, Bejaïa, Algeria (b) Aix Marseille Univ, CNRS, MADIREL UMR 7246, 13013 Marseille, France

ABSTRACT

In orthopedic and dental implants titanium and its alloys are used due to their excellent corrosion resistance and biological compatibility [1]. The native oxide layers are usually 2–5 nm thick, depending on the redox potential of the surrounding environment [2]. Increase in life expectancy being higher that the corrosion resistance of such thin layer, the thickness of oxide layer has to be increase [1]. Electrochemical oxidation is one of the techniques that can be used for that.

Physical, mechanical and topographical properties of materials determine whether the surface is adequate or inadequate for the growth of different cells in biological environment [3]. Titanium and its alloys present a bioinert nature that prevents good osseintegration and many surface treatments that lead to a rougher surface have been investigated to overcome this problem [4].

For this communication, titania nanotubes and bulk titania films were produced on pure Ti by anodic oxidation using different electrochemical parameters. Morphological and structural investigation of the films were evaluated using FIB technic for cross section, SEM and X-ray diffraction measurements. Besides that, corrosion tests were investigated potentiodynamic polarization curves in physiological conditions of DPBS at 37 °C.

Keywords: TiCp-grade2, electrochemical surface modifications, compact oxide layers, nanostructuration, corrosion resistance.

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RESEARCH ON THE QUALITY AND SAFETY OF WILD MEAT PRODUCTS

Ainur Zheldybayeva[1], Oshakbai Zhibek[2], Sagynysh Aman[3], Orynbasar Akbota[4]

[1] *Candidate of Chemical Sciences, Associate Professor, Faculty of «Food Technologies», Department of «Food Safety and Quality», Almaty Technological University, Almaty, Republic of Kazakhstan*
[2,3,4] *Master student, Faculty of «Food Technologies», Department of «Food Safety and Quality», Almaty Technological University, Almaty, Republic of Kazakhstan*

ABSTRACT

The article investigates the chemical, amino acid and fatty acid composition of mallard meat, organoleptic evaluation is carried out, and safety indicators of wild poultry meat are determined. And a comparative analysis of the norm for ND and the actual values of wild birds and domestic ducks is given.

Keywords: poultry, meat of wild birds, wild duck meat, mallard duck, domestic duck

Introduction

Currently, special attention is paid to the problem of healthy nutrition of the population in Kazakhstan. Leading scientists of Kazakhstan in the field of rational nutrition solve the problem of finding environmentally safe and cost-effective products. Which allow you to create a new generation of products that contain the right amount of useful components necessary for the human body. One of the promising options for the development of the meat industry can be the production of non-traditional types of meat. It is worth noting the richness of the vast territory of our country in terms of production of such exotic raw materials as meat of wild birds. According to research by Kazakh scientists, the formation of such an industry could bring undeniable benefits, allowing the country to use its competitive advantages.

Wild animal meat is considered a delicacy product, so it is most often recommended for use in the restaurant business. Game is an exclusive and expensive product. Therefore, the prestige of this dish and its dietary qualities (especially the ecological purity of the meat of animals that live in hunting farms far from civilization) contribute to the fact that the demand for game in the world is increasing.

One of the solutions to this problem is the complex use of animal proteins. An effective source of raw meat can be the meat of birds such as mallards that live on the territory of Kazakhstan. The population of various regions of the country widely use meat of non-traditional types of animal raw materials obtained during the extraction of birds such as mallards as food sources. The range of products made from wild animal meat is extremely limited [1]. And in this regard, the study of the biochemical composition, functional properties and safety of wild bird meat is relevant.

The purpose of this work was to conduct a comparative analysis of the chemical composition and safety of wild and domestic duck meat on the territory of the South Kazakhstan region.

For the first time, a comparative analysis of the chemical composition of Mallard meat living in the territory of the South Kazakhstan region was carried out; morphological characteristics of meat raw materials were studied, and the quality of game was studied.

Experimental part

Experimental studies were conducted on the basis of the Almaty technological University of the Department of "Food Safety and quality" in the accredited research laboratory of the University "Food safety".

The objects of research were:

- meat raw materials of birds grown and living on the territory of the South Kazakhstan region:
- Mallard ducks or mallards (Anas platyrhynchos Linnaeus);
- domestic ducks.

In this laboratory, the chemical composition and organoleptic, physical and chemical indicators, as well as safety indicators of the studied objects were studied.

Organoleptic evaluation of game meat showed that the consistency of chilled meat is elastic, and the smell is characteristic of fresh meat. The meat of wild animals and game is characterized by a delicate consistency, juiciness, and a more pronounced flavor compared to control [4].

The broth obtained after cooking is transparent, with a small number of small fat drops on the surface, without foam, not thick, the smell is more pronounced in comparison with chicken broth.

Game broths cause increased secretion of digestive juices and, therefore, contribute to better absorption of food.

The maximum rating of game meat products on a five-point scale was 4.5 points, which corresponds to the regulatory requirements for organoleptic indicators of meat products from traditional types of meat (Table 1).

Table 1 - Organoleptic characteristics of game meat

Indicators	Commodities	
	Mallard meat	House duck meat
Color	4,5	5
Taste	4,5	5
Smell	4,5	5

Cutting of carcasses of wild birds (mallards) was made according to GOST 21784-76-poultry (carcasses of chickens, ducks, geese, turkeys, Guinea fowls).

The assessment of the quality of wild and domestic duck meat was carried out in accordance with GOST 21784-76, and the assessment of the quality of meat safety was carried out in accordance with the requirements of technical regulations TR/TS 021-2011 [5]. The studied objects were classified as carcasses of adult birds.

According to the requirements of GOST 21784-76 for fatness and quality of processing, carcasses of all types of birds are divided into the first and second categories.

The results of the study of the characteristics of fatness and quality of the studied objects are shown in Table 2.

Table 2-Characteristics of fatness and quality of the studied objects

Indicators	Type of bird	
	Domestic duck meat (1st category)	Domestic duck meat (2nd category)
Fatness (presence of muscle tissue and subcuta-neous fat) Bottom	Muscle tissue is well developed. The pectoral muscles and the keel of the pectoral bone form a roundness. The breast keel bone slightly stands out. Deposits of subcutaneous fat on the chest, abdomen and in the form of a solid strip on the back, as well as there are significant deposits of fat in the abdominal area.	Muscle tissue is satisfactorily developed. The keel of the thoracic bone stands out and together with the pectoral muscles forms an angle without depressions on its sides. Minor deposits of subcutaneous fat in the lower back area. There is no fat deposition.
Smell	Characteristic of the smell of fresh meat of this bird	Peculiar smell of game meat
Color: Muscle tissue Skin	Light pink It has a yellow pink tint Light yellow	Dark red It has a dark red hue Yellow

Subcuta-neous fat and fat in the abdo-minal area		
Skin condition	The skin is clean, without gusts, without abrasions, without spots and bruises	Small abrasions and spots are allowed on the skin, as well as small gusts of 3 mm
The condition of the bone tissue	Bone tissue without breakage and curvature	Small wing and finger cavities are allowed
The smell and tran-sparency of the broth	Transparent, peculiar smell, light brown color	

The chemical composition of wild duck meat is not inferior to that of domestic duck. The meat of domestic duck is tender, with a high fat content of meat. According to literature sources, it is known that the composition of each muscle tissue of different places of the bird carcass has a different composition. And so we investigated the chemical composition of the muscle tissue of the chest and thigh.

By examining the chemical composition of the muscle tissue of the chest and thigh parts of wild and domestic ducks, we obtained the following results, which are shown in table 2 and 3.

Table 3 – Chemical composition of the femoral muscle tissue of wild and domestic ducks

№	Object of research	pH	Protein%	Fat, %	Carbo-hydrates, %	Water %	En. value, kg
1	Meat of domestic duck	6,1	15	28,5	0, 88	64,26	372,2
2	The meat of wild ducks	6,4	10,05	4,19	0,79	63,25	82,67

Table 3 shows the pH of domestic and wild ducks that are equal to 6.1 % and 6.4 %, and they correspond to the norm specified in the standards. The humidity of the femoral part of the domestic duck is-64.26 %, and in the wild duck is-63.25 %, relatively the humidity of the wild duck meat is lower than the meat of the domestic duck, which shows the dryness of the wild duck meat, respectively. The protein content is 15% in the meat of domestic duck, and 10.05% in wild duck. The fat content in the meat of domestic duck is 28.5%, and in wild duck 4.19 %, respectively, the energy value of the meat of domestic duck is higher than that of wild duck.

We also studied the chemical composition of the muscle tissue of the thoracic and femoral parts. The chemical composition of the muscle tissues of the pectoral part of the bird carcass is shown in Table 4.

Table 4 – Chemical composition of the pectoral muscle tissue of wild and domestic ducks

№	Object of research	pH	Protein%	Fat, %	Carbo-hydrates, %	Water %	En. value, kg
1	Meat of domestic duck	6,2	19,01	32	0,88	62,26	289,08
2	The meat of wild ducks	6,6	20,5	3,19	0,79	61,25	119,71

Table 4 shows the pH index that is equal to 6.2% and 6.6%, which correspond to the norm specified in the standards. The humidity of the leg of domestic duck is-62.26%, and in wild duck is-61.25%, relatively the humidity of wild duck meat is lower than the meat of domestic duck, which shows the dryness of wild duck meat, respectively. The protein content is 19.01% in the meat of domestic duck, and 20.5% in wild duck. The fat content in the meat of domestic duck is 32 %, and in wild duck 3.19%, respectively, the energy value of the meat of domestic duck is higher than the meat of wild duck.

Studies have shown that game meat has a higher protein content and a lower fat content compared to controls. Game meat, in comparison with domestic duck meat, contains less intermuscular fat, as a result of which it has a lower energy value.

Determination of the amino acid composition was carried out by hydrolysis of the sample to amino acids and subsequent quantitative determination of the formed amino acids on an amino acid analyzer on an amino acid analyzer, determination of the fatty acid composition - by separation of methyl esters of fatty acids obtained from dietary supplement lipids using gas-liquid chromatography.

The paper provides a comparative analysis of the chemical composition of wild and domestic duck meat. Poultry meat is a good source of high-grade protein, has a low content of connective tissue, less than in beef and pork, which contributes to easier digestion and assimilation.

The analysis of the amino acid composition (table 5) showed a higher content of the essential amino acids leucine, isoleucine, and lysine. According to the quantitative ratio of amino acids, the meat of the studied game species compares favorably with the meat of domestic animals and birds. First of all, this is due to the higher content of tryptophan, which is 0.3 and 0.64% more in Mallard meat than in the control.

According to the content of essential amino acids, poultry proteins correspond to the reference protein of chicken eggs, which indicates their high biological value. The total number of interchangeable amino acids in game meat was less than in the control, the amount of essential amino acids did not differ significantly and was within the error of the experiment. The higher the tryptophan/oxyproline ratio, the more complete proteins in the meat and the higher the biological value of the meat.

Table 5 – Amino acid composition of game meat, g/100 g of protein

Indicators	Name of raw materials		FAO/ WHO scale, g / 100 g of protein
	Mallard	Duck meat (1st category) control	
The essential acids:			
Summarily	38,49	37,28	
Valine	5,38	4,85	5
Isoleucine	4,57	4,19	4
Leucine	8,32	8,09	7
Lysine	8,34	8,40	5,5
Methionine	2,68	2,34	3,5
Threonine	4,34	4,46	4
Tryptophan	1,63	1,10	1
Phenylalanine	3,23	3,85	6
Nonessential amino acid:			
Summarily	48,67	49,20	
Alanine	5,67	6,67	-
Arginine	7,45	7,16	-
Aspartic acid	8,65	8,88	-
Histidine	1,76	1,83	-
Glycine	7,34	7,01	-
Glutamic acid	16,88	16,69	-
Oxyproline	0,92	0,96	-
The ratio of tryptophan/hydroxyproline	1,80	1,14	

Protein quality index of game meat is higher than in the control. Meat lipids contain high levels of saturated and polyunsaturated fatty acids. The content of saturated fatty acids exceeds almost two and a half times the amount of unsaturated fatty acids (Table 6).

Table 6 – Fatty acid composition of game meat, g / 100 g

Indicators	Name of raw materials	
	Mallard	Duck meat (1st category) control
Saturated	7,68	10,32
Including: C12:0 (lauric)	<0,001	0,04
C14:0(myristic)	0,3	0,37
C16:0(palmitic)	4,28	7,01
C 18:0 (stearic)	3,1	2,9
Monounsaturated		
C18:1 (oleic)	5	14,04
Polyunsaturated	3,81	6,58
C18:2 (linoleic)	3,49	6,29
C18:3(α- linolenic)	0,32	0,29
Fatty acids (sum)	16,49	30,94
The ratio of acids: Saturated/ Polyunsaturated	2	1,6

Among the saturated fatty acids of game meat, palmitic and stearic acids predominate. The content of palmitic acid in game meat, in comparison with the meat of domestic duck is more than 2-4 times, which indicates a low shelf life of chilled game meat and a tendency to rancidity.

Also, the determination of heavy metal salts was carried out according to standard methods. for the determination of mercury, GOST 26927-86 [6] was used, for arsenic - GOST 26930-86 [7], for tin - MEST 26932-86 [8], for cadmium – MEST 26933-86 [9]. The results of studies of heavy metal indicators are shown in Table 7.

Table 7 - Indicators of toxic elements of wild duck meat

Indicators	ND norm	Actual value
Toxic elements: no more than, mg/kg		
Mercury	0,03	Not detected
Arsenic	0,1	Not detected
Cadmium	0,05	0,02
Tin	0,5	0,04
Radionuclides: no more than, mk / kg		
Caesium-137	200	8,24

According to the results of the study of heavy metal salts such as mercury and arsenic were not found, and the indicators of cadmium and lead salts did not exceed the norm specified in TR CU 021/2011. Of the radionucleids, the amount of cesium-137 also did not exceed the norm specified in the ND.

Also, microbiological indicators were examined [10], [11] research objects, the results of which are shown in Table 8.

Table 8 – Microbiological indicators of wild duck meat

Indicators	ND norm	Actual value
Microbiological indicators:		
QMA&OAMO, CFU/g, cm^3, not more	$1*10^3$	$5*10^2$
CGB (coliforms) in 0.1 g/cm^3	Not permitted	Not detected
Sulfitereducing clostridia to 0.1 g/cm3	Not permitted	Not detected

As a result of research, the QMA&OAMO in wild duck meat is equal to $5 * 10^2$, which does not exceed the norm specified in the regulatory documentation. Indicators sulfitereducing coliforms and clostridia in the meat of wild birds was not detected, which is not allowed according to the normative documentation.

CONCLUSIONS

As a result of the above research, it was found that the meat of the Mallard in terms of energy value and quality is a full-fledged type of meat, and is not inferior in quality to the meat of domestic duck. Therefore, wild duck meat can be used as a valuable raw material in the preparation of dietary dishes or functional products.

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RESEARCH ON THE QUALITY AND SAFETY OF BREAD PRODUCTS USING RAW MATERIALS FROM PLANT ORIGIN

Ainur Zheldybayeva[1], Aigerim Tursynbek[2], Zarina Shakhieva[3], Zhibek Oshakbai[4], Madina Mardenova[5]

[1] Candidate of Chemical Sciences, Associate Professor, Faculty of «Food Technologies», Department of «Food Safety and Quality», Almaty Technological University, Almaty, Republic of Kazakhstan
[2,3,4] Master student, Faculty of «Food Technologies», Department of «Food Safety and Quality», Almaty Technological University, Almaty, Republic of Kazakhstan
[5] Student, Faculty of «Food Technologies», Department of «Food Safety and Quality», Almaty Technological University, Almaty, Republic of Kazakhstan

ABSTRACT

The article found that the introduction of pectin into the dough affects biological, colloidal and microbiological processes. It was studied that when pectins are added to the dough, its initial acidity increases. The fermentation process in the test was more active. It was found that the activation of the fermentation process is associated with the introduction of sugar along with pectin. In addition, it was studied that the amount of pectin in the finished bread decreases compared to the initial amount introduced into the dough.

Keywords: pectin, Jerusalem artichoke, pectin in food production, properties of pectin, bread production, bread and bakery products.

The use of pectins in the food industry is becoming widespread. The main consumer of highly methoxylated pectin (about 80%) is the confectionery industry. The properties of pectin for the formation of marmalade are used in the production of confectionery products of the pastille and marmalade groups (jelly, Wormwood, jelly marmalade) and sweets with the addition of jelly, fruit and sweets. Pectin makes up for the" lack of natural pectins " [1].

The consumption of pectin for the production of jelly confectionery products of various assortment is from 8 kg to 26 kg of citrus, 1 ton of finished products for beet pectin.

The use of pectin in comparison with other gelling agents, which are often used for the preparation of confectionery products, requires strict compliance with the recipe and production parameters. On the other hand, the use of pectin gives a very good texture and a pleasant taste to the product.

Pectins are used in bakeries and as an addition to medicinal varieties of pasta; in bakeries - for baking unripe types of bread [1-3].

Currently, pectin and its derivatives are increasingly used in cooking technology as an anionic, useful substance (surfactant). In cooking technology, such properties of pectin substances as swelling, viscosity, gels formation, regulation of crystal formation, increasing the ability to absorb water, as well as emulsifying are of great importance.

It is established that the introduction of pectin into the dough affects biological, colloidal and microbiological processes. When pectins are added to the dough, its initial acidity increases. The fermentation process in the test will be more active. Activation of the fermentation process is associated with the introduction of sugar along with pectin. In addition, it was found that the amount of pectin in the finished bread decreases compared to the initial amount introduced into the dough. This indicates that the biopolymer is released during the fermentation of the dough, and it can be assumed that it is

carried out by the formation of monosaccharides that contribute to the activity of the fermentation process [2,3].

Moscow State University of food production conducted research on the effect of apple pectin on the quality of whole wheat bread and buckwheat.

The results showed that apple pectin is higher in organoleptic, physico-chemical parameters, as well as in the actual volume of bread and structural and mechanical properties of sawdust than a product without the addition of pectin [3].

It should be noted that as the dose of pectin increases, the actual volume decreases and the quality indicators of the remaining bread decrease, which depends on its ability to bind water and, in turn, affect the moisture content of the dough and the quality of the bread. This should be taken into account when preparing bread with pectin.

The effect of the degree of pectin esterification on the quality of wheat flour bread was also determined. The same amount of pectin was found in bread with the lowest dose (TM) of pectin.

The maximum improvement in the quality of bread with the addition of TM pectin is due to the presence of more free carboxyl groups in its molecule than high-dosed (PT) pectin. These groups actively interact with the reactive and test components, forming many compounds that affect the properties and quality of bread. Thus, in baking, you can use PT and TM Apple pectins, but unlike in confectionery production, it is better to use TM pectin.

The change in the process of preserving the structural and mechanical properties of breadcrumbs with pectin in the amount of 0.05-1.0% by the weight of flour indicates that bread with pectin is 1.04-1.9 times slower than bread without pectin, which is very important for increasing the sales period of bakery products.

The effect of Apple pectins on the quality of buckwheat with a degree of esterification of 59-64, 76 - 78 and 38-44% was studied.

The addition of pectins from GM and TM apples improves the quality of prunes. Gingerbread with the addition of apple pectin TM in the amount of 0.1% of the flour mass has the best quality.

The main direction of application of citrus pectins is dairy products (in particular, yoghurts), where it is necessary to prevent the separation of milk proteins and whey at a low pH value, as well as to ensure different structural properties, smooth texture and freshness of taste.

TM pectins are used in fruit yogurt preparations to create a soft, semi-thixotropic jelly structure, which is sufficient to ensure an even distribution of the fruit, but it allows you to freely use fruit preparation in yogurt. The structure of yogurt can be improved by adding a small amount of methoxylated pectin. However, it should be noted that low-methoxylated pectin does not interfere with the syneresis process [4,5].

The introduction of pectin in dairy products can significantly increase the shelf life.

Pectin is also used in the production of ice cream, cheeses (to increase the ability to absorb moisture) and other products in the dairy industry.

High methoxyl pectin is used in concentrated fruit drinks to stabilize oil emulsions and suspensions of fruit particles.

The property of highly methoxylated pectins to change the consistency (viscosity) of products is used in recombinated juices to restore the feeling of fresh juice. Pectin is also used to create a natural consistency in instant Mors. On the basis of pectins, a wide range of jellies, mousses, and gels has been developed.

An analysis of the literature found that there are very few cooking methods and recipes using vegetable pectins (pumpkin, carrot) and pectin-containing substances (carrot, beet, pumpkin powder) [3].

A wide range of functional properties: thickening, weathering, stabilization of food systems, complex formation determine pectin as a valuable biopolymer in many areas. In some cases, pectin is not effective, it is simply necessary, it can also be a dietary supplement that forms the structure of food products, but, as mentioned earlier, a valuable medical product.

Given that the environment accumulates salts of radioactive elements, heavy metals and pesticides entering the human body, which contain a large amount of pectin, carotene and dietary fiber, the inexpensive Jerusalem artichoke product is of particular interest. The World Health Organization

has recognized pectin as a toxicologically safe product and recommended it as a product that benefits human health.

Among the non-traditional plant species, Jerusalem artichoke is one of the most promising for economic use. The revival of interest in this product is associated with the emergence of new aspects of its use, including the use of pectin as the main raw material for production.

Among the non - traditional plant species, Jerusalem artichoke is one of the most effective plants for domestic use. The revival of interest in this plant is due to the emergence of new aspects of its use, including as the main raw material for the production of pectin.

According to domestic and foreign experts, Jerusalem artichoke is one of the cheapest types of raw materials for the food industry, Jerusalem artichoke is characterized by a complete biochemical composition with a predominance of carbohydrates in tubers, primarily the substances inulin and pectin, which is shown in Table 1 [3].

Table 1-characteristics of wheat flour samples of the first grade

Flour quality indicator	Sample1	Sample2	Sample3
Humidity, %	13,0	12,9	13,1
Acidity, deg	2,2	2,3	2,4
Raw grain composition,%	28.0	28,4	28,8
Grain Property:			
Elastic properties of grain, conditional unit of the IDC device	65	70	65
Number of decreases, H	225	250	215
Cadmium content, mg / DM3	0, 07	0,09	0,03
Lead content, mg / DM3	0, 20	0, 21	0,25
Organoleptic parameters: smell, taste	Characteristic of wheat flour, without foreign taste, not sour and bitter .		

Table 2 shows a description of the dry Jerusalem artichoke pectin we received.

Table 2-Analytical characteristics of Jerusalem artichoke pectin

Name of the indicator	Jerusalem artichoke pectin
Humidity, %	8,0
Number of carboxylic groups, %	
- empty	5,0
- methoxylated	8,39
Degree of methoxylation	37,43
Complex formation capacity, mg RY2+ / G	370 ± 10
Group composition:	
- methoxyl	6,48
- acetyl	0,51

From the table, it can be seen that in terms of the content of free carboxylic groups, Jerusalem artichokeic pectin is 5.0%, the total content of methoxylated carboxylic groups is 8.39, the content of methoxylated components corresponds to 6.48. The complex-forming ability of Jerusalem artichoke pectin was 370 mg RY2+ / G, which indicates its high detoxifying properties and ability to bind and release harmful substances (heavy metal ions, including radionuclides, as well as pesticides) [5].

In this regard, the use of Jerusalem artichoke pectin in the bakery industry contributes to the reduction of environmental problems in human orgasim and the release of heavy metals.

Changes in the rheological properties of the dough due to the content of Jerusalem artichoke pectin are given in Table 3.flour of the 1st grade (without pectin added) was taken as a control. Thus, with an increase in the pectin content to 0.5%, all the indicators of the dough improve, from 0.6%, the strength of the flour decreases, and with 0.75% of the pectin content, the rheological properties of the dough deteriorate sharply: the elasticity increases significantly, it can be recommended for flour with a high content of IFC, while the elasticity decreases sharply.

With an increase in the amount of pectin administered, the amount of gluten decreases, which affects the rheological properties of the dough (Table 3). With an increase in the pectin content by 0.5% or more, the water - sucking capacity increases, which affects the yield of bread.

Laboratory baking of bread containing Jerusalem artichoke pectin from 0.25 to 1.0% was carried out using flour of the 1st grade with a humidity of 13.6%, IDK= 73, the number of drops was 456. Humidity pectin arrival 8,0%. Water in the kneading of the dough was added due to the weighted average moisture content of the raw material. Fire fighting was carried out in a rotary furnace of the MIWE-GR brand at a temperature of 220-2300 C.

Table 3-Changes in the rheological properties of the dough depending on the content of Jerusalem artichoke pectin (Instrument Unit) in the alveolab instrument

Indicators in instrument units	Control	Pectin content, %				
		0,25	0,5	0,6	0,75	1,0
P- elasticity	127	132	149	150	168	167
L- tensile strength	71	69	62	58	38	40
W- flour strength	317	322	346	300	275	331
VPS	6	6	7	8	8	8
Gluten	8	8	7	6	6	5

The recipe composition of the studied bread containing pectin is shown in Table 4. The ratio of all components is adjusted to the flour mass.

Table 4-recipe and quality of pectin-containing bread

Raw materials	Control	Pectin composition, %					
		0,25	0,5	0,6	0,75	0,8	1,0
Flour, G	500	500	500	500	500	500	500
Jerusalem artichoke pectini, G	-	1,25	2,5	3,0	3,75	4,0	5,0
Salt, G	7,5	7,5	7,5	7,5	7,5	7,5	7,5
Yeast, G	6	6	6	6	6	6	6
Water, G	316,0	318	326	328	331	333	339
Bread indicators							

Soft humidity, %	43,0	44,0	44,5	44,5	45,6	46,0	46,5
Proportion volume, cm3 / G	2,2	2,3	2,4	2,3	2,3	2,1	2,1
Soft acidity, deg	2,0	2,1	2,3	2,5	2,7	2,7	3,0
Porosity, %	73	75	78	77	75	75	72

Based on our research, it was found that adding dry tpoinambur pectin in different doses from 0.25 to 1.0% to the prescription composition changes the porosity of bread compared to control: the optimal porosity reached 0.5% at a dose of 78% pectin. (Table 4). A further increase in the pectin content worsened organoleptic indicators, there was a darkening of breadcrumbs, which were dense, not loose, and also decreased by 6% compared to the optimal porosity (at 0.5% pectin). With an increase in the dose of pectin, the moisture content of breadcrumbs increases from 44.0% to 0.25% pectin to 46.5%, with the introduction of 1.0% pectin, the acidity of breadcrumbs increases from 2.1 to 3.0. Hence, this pectin has a high acidity. The proportion of bread increases with a certain amount of pectin introduced, i.e. increases to 0.5% and amounted to 2.4 cm3 / G, and then decreases (Table 4).

The introduction of Jerusalem artichoke pectin into bread gives it a more intense color, since pectin is an additional source of sugar that interacts with amino acids in the bread crust with the formation of dark – colored products - melanoidins.

Table 5-Functional parameters of the studied flour containing Jerusalem artichoke pectin

Pectin content, %	Functional parameters, units of measurement				
	UPU	Gluten	Viscosity	rolling	Retrograde
Control	6	8	7	4	8
0,25	6	8	7	4	8
0,5	7	7	7	5	8
0,6	8	6	7	5	8
0,75	8	6	7	5	8
0,8	8	5	7	4	8

According to Table 6 , the volume yield of bread increases when the pectin content is 0.5% compared to the control of 8.7%, then the yield of bread decreases with an increase in the pectin content. This can be explained by the fact that the porosity of bread decreases and the grain compresses.

Table 6 - Effect of pectin content on the volume

Indicator	Control	Pectin content, %				
		0,25	0,5	0,75	1,0	1,25
Flour volume, cm3	2190	2280	2380	2100	2070	2050

The quality and safety indicators of the tested bread baked in Almaty – Nan LLP were determined. As a control example, wheat bread "Almatinsky “ - manufacturer” Aksai" LLP.

Based on the results of laboratory tests, conclusions were drawn in the form of tables on the obtained products according to organoleptic, physico-chemical, and microbiological parameters.

The organoleptic parameters of bread and bakery products are determined according to GOST 5667-65 [7] (Table 7).

Table 7 -Results of organoleptic evaluation of bread and rolls

Indicators Name	Description according to place 5667-65	Research results	
		Model 1	Model 1
Appearance Form Shaped bread	The bread and bun will fit into the shape, the surface will be raised and ripe	According to The Shape of the bread, the surface is slightly raised and ripe	According to The Shape of the bread, the surface is raised and matured
Soft state of bread, ripeness	Moist to the touch, flexible, well matured	Well matured, wet	Well matured, wet
Mixing the dough	Without nodes	No node	No granules
Porosity	The separation of the surface layer of mature, bread and buns is not allowed	The surface of the bread is not separated. Porosity is well matured	The surface of the bread is not separated. The pores are well matured, the volume is enlarged
Taste	Characteristic of bread and bakery products, without foreign taste	Characteristic taste of bread	Characteristic taste of bread
Smell	Typical for bread and bakery products, without unpleasant odors	There is no unpleasant smell, a characteristic smell of bread	There is no unpleasant smell, a characteristic smell of bread

In the organoleptic assessment of the quality of the resulting sample, the following data were obtained, according to GOST 5667-65, it was found that the samples were manufactured according to all standards, without deviations in organoleptic parameters.

The humidity and acidity and safety indicators of the samples were checked in accordance with the standards specified in the technical regulations (table 8-9).

Table 8-Physico-Chemical and safety indicators

Name of indicators	OD norm	Model 3	Test methods definition of OD
Mycotoxinder, mg / kg:			
Aflotoxin B1	Not more than 0.005	Not found	GOST 30711-2001
GHCG	Not more than 0.2	Not found	MU 2142-80
DDT	Not more than 0.02	Not found	MU 2142-80
General humidity mass fraction, %	42,0-48,0	45,8	GOST 5903-89
Acidity, %	2-7	2,5	GOST 5899-85

According to the results of this table, the humidity and acidity of samples and safety indicators meet the standards specified in the technical regulations. If there is a deviation in the physical and chemical parameters from the standard, it affects the quality of the product, worsens the organoleptic value, that is, the taste and smell, and also leads to mold in storage, if the humidity exceeds the norm.

Table 9-Effect on the content of heavy metals in bread products with pectin added to the plant product (Jerusalem artichoke) (TR CU 021/2011) [8]

Indicators	Plant-based product (Jerusalem artichoke)		Pectin obtained from vegetable products		Bread with pectin	
	OD	real	OD	real	ND	pectin content 0.5%
Lead, mg / kg	0,50	0,02	1,0	т/ж	0,35	т/ж
Cadmium, mg / kg	0,03	0, 01	0,1	т/ж	0,07	т/ж

According to the physical and chemical assessment, the sample indicators correspond to the standards of GOST 21094-75; 5670-51;, and the safety indicators correspond to the standards of TR TS 021/2011. Compliance of these indicators with the norm also affected the organoleptic quality, and the indicators were high.

Conclusion

The state of Ecology in many regions of Kazakhstan is accompanied by pollution of the environment and food products with toxic substances, so this situation requires ensuring the safety of food products and requires the production of products containing pectin and pectin as natural detoxifying agents. In the course of this work, in order to improve the quality and extend the shelf life of bakery products, bakery products were baked with the addition of pectin from vegetable products, bakery products with pectin were examined, a sample of bread with high indicators was obtained, and organoleptic, physico-chemical, as well as safety indicators of the resulting sample were studied.

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TYPES OF CRIMINAL PENALTIES IN THE CRIMINAL-LEGAL LAW SYSTEM OF THE REPUBLIC OF KAZAKHSTAN

Talgat K. Akimzhanov*
Doctor of Law, professor
Aizhan Ye. Ryssaldiyeva*
PhD

**Turan University, Kazakhstan*
International educational corporation, Kazakhstan

ABSTRACT

The problem of crime prevention plays an important role in the activities of the state, the highest values of which are the person, his life, rights and freedoms. To protect the highest values of the state from criminal encroachment it is necessary to combat this phenomenon. And in order to combat crime, it is necessary, first of all, first to prevent crimes, and then only, if this process did not affect the offender, apply criminal punishment.

The growth of crime, recidivism, a large number of people convicted in places of deprivation of liberty pose a threat, an obstacle to the further development of society, the construction of a legal state, and the preservation of the status of a state in international relations.

For each epoch of human development, its own penalties are inherent, and depending on the development of society, it is necessary to either exceed the punitive function of punishment or vice versa weaken it. At present, in the Republic of Kazakhstan, the gradual humanization of criminal law is being carried out. Humanism - humanity, humanity in social activities, in relation to people. And mean now our legal system needs to apply the prophylactic function of punishment in the fight against crime.

In our opinion, in order to combat crime, a comprehensive study of the problems of the realization of preventive functions of criminal penalties is required.

According to the prison index, there are obvious changes - according to the 2018 rating, Kazakhstan ranks 71st in the global table with an indicator of 194 convicts per 100 thousand of the total population of the country. The reduction was achieved thanks to the adoption of amnesties and humanization in criminal law. In 1996, Kazakhstan was in third place on this list after the United States and Russia. For 21 years, our country was able to decline by 70 positions. Of course, a lot has been done. But to hold the position and work to further reduce this indicator is the task of the state and society for the near future. This study aims to reduce the number of convicts through the realization of the preventive functions of criminal penalties. This is precisely our position, to achieve a reduction in the number of convicts through the implementation of the preventive functions of criminal punishments.

The problem of the realization of the preventive functions of criminal punishments is multidimensional, its study requires a comprehensive approach, taking into account the relationship of the results of the fight against crime with the preventive function of criminal penalties, as well as the state's capacity to implement these functions.

The solution of this problem depends on the level of development of the country in various areas of the economy, politics, culture, science and education, including the quality of legislation regulating the fight against crime.

In the Criminal Code of the Republic of Kazakhstan [1] in 2014, which entered into force on January 1, 2015, punishments related to isolation from society again prevail. For example, incarceration occurs 744 times. Penalties without isolation from society take a smaller share: a fine of 471 times, correctional work 468 times, a restriction on service 342 times, confiscation of property 264 times, involvement in public works 152 times, arrest 150 times, death penalty 12 times.

Being a positive factor in influencing a person committing a crime, deprivation of liberty, as one of the types of punishment, in itself creates negative consequences not only for the convicted person, but also for the whole society. In particular, the government spends large financial expenditures annually (over 50 billion tenge per year) on the implementation of the execution of punishment and the elimination of its consequences. By reducing this type of punishment as deprivation of liberty, increasing

the effectiveness of its execution and increasing the use of another type of punishment, not related to isolation from society, these indicators could be changed.

The realization of the preventive functions of criminal penalties depends on many reasons, such as violation of the rights of convicts, the construction of penal systems in criminal law, the absence of a mechanism for the prevention of offenses, all these issues need to be resolved taking into account the principle of humanization of the country's criminal policy.

The problem of the fight against crime at the present stage can be attributed to the world problems of all countries, as it exists in any country. Until the beginning of the twenty-first century, the criminal policy of many countries developed in the direction of strengthening punitive measures. However, this did not bring the expected results. Currently, there is a tendency to weaken the punitive impact on convicts, due to the introduction of elements of humanization into the criminal policy of states. Accordingly, it became necessary to study the preventive role of criminal punishment in new socio-economic, political and legal realities.

Of course, all over the world there is no exact way to solve the problems of combating crime, but it is also impossible not to study this phenomenon and not to pay attention. At the same time, we cannot set ourselves the task of fully disclosing or exploring all the problems of implementing preventive functions of criminal punishments, since they are related to the level of a country's development in the economic sphere, law, culture of society, etc.

The problem of the realization of the preventive functions of criminal penalties was the subject of scientific research of scientists from Kazakhstan, Russia and other countries.

The scientific novelty of the study is determined by the fact that this study is the first research paper devoted to the theoretical analysis of the problems of the realization of the preventive functions of criminal penalties in the fight against crime during the humanization of the criminal policy of the Republic of Kazakhstan[2].

For the first time the investigated problem is considered on the basis of an integrated approach to the preventive function of criminal punishment.

The author introduces into the scientific circulation several new definitions. Also, a new concept is introduced: “implementation of the preventive function of criminal punishment”, “SIC on the problems of realization of the preventive functions of criminal penalties in the fight against crime”.

A number of proposals were developed to improve legislation and the practice of their application in the field of criminal and criminal executive rights. The necessity of creating a special mechanism to implement the preventive functions of criminal penalties in the fight against crime is substantiated.

For the first time, organizational and legal measures for the realization of the preventive functions of criminal penalties in the fight against crime are suggested.

The **purpose** of the study are: to develop an integrated approach to the implementation of criminal punishments and to determine the organizational and legal framework for the implementation of criminal punishments, which ensures high efficiency in the fight against crime.

The achievement of this goal predetermined the formulation and solution of the following tasks:

- determination of general and private prevention of the criminal legislation of the Republic of Kazakhstan in achieving the goal of preventing crimes;
- general theoretical understanding of the preventive functions of criminal penalties;
- identification of the ratio of the preventive functions of criminal penalties with other methods and forms of impact on crime;
- investigation of the punitive nature of criminal punishment;
- research of priorities in the choice of the main and additional types of punishments;
- conducting a systematic analysis of the types of punishments used by the courts and identifying the conditions for ensuring their effectiveness;
- analysis of the impact of the institution of exemption from criminal liability and punishment, as well as probation on the preventive potential of criminal punishment;
- study to ensure the legal regulation of increasing the effectiveness of the realization of the preventive functions of criminal penalties;

- development of proposals in the search for the organizational and legal basis for increasing the effectiveness of the realization of the preventive functions of criminal penalties.

Results

1. To enhance the preventive role of criminal punishments, the Criminal Code of the Republic of Kazakhstan should supplement the punitive aspect of criminal penalties, which will allow the legislator to attract the attention of all law-abiding citizens, as well as persons who have already committed criminal offenses to prevent any antisocial acts under the Criminal Code of the Republic of Kazakhstan. , as in the fixed purposes of punishment his punitive functions are so veiled that, upon reading, they cannot cause the necessary reaction to the aspiration of law-abiding Hania. To do this, it is necessary to more specifically designate preventive functions in the enshrined concept in Part 1 of Art. 39 of the Criminal Code of the Republic of Kazakhstan to add words indicating the punitive essence of criminal penalties. Adding this point to the experience of the Criminal Code of the Kazakh SSR, that punishment is not only a punishment for the crime committed, but also aims at correcting and re-educating convicts in the spirit of honest treatment of labor, exact execution of laws, and preventing the commission of new crimes, both convicted and by other persons. This will allow the media, non-governmental organizations, civil society and other actors to see the true punitive orientation of criminal punishments as a punishment for their deeds and to revise the critical attitude to the execution of punishment that has formed in them, as well as to the penal system. increase the preventive role of criminal punishment in law-abiding population.

2. To implement the preventive functions of criminal penalties, it was proposed to focus on additional penalties when making decisions. For example, increase the frequency of applying this type of punishment as a fine. Moreover, to perceive them not as an alternative to any type of punishment, but as an independent mandatory form of punishment for which to review the procedure for categorizing crimes established in Article 11 (Categories of Crimes) of the Criminal Code of the Republic of Kazakhstan, when only terms of imprisonment are taken as a basis, then the legislator will not have to establish a fine. We propose article 11 as follows:

"1. Crimes depending on the nature and degree of public danger are divided into crimes of minor gravity, crimes of medium gravity, grave crimes and especially grave crimes.

2. Crimes of minor gravity are deliberate acts for the commission of which the maximum penalty prescribed by this Code does not exceed two years of imprisonment or a fine of up to two thousand MCIs, as well as careless acts for which the maximum punishment provided for This Code does not exceed five years of imprisonment or a fine (up to five thousand MCI).

3. The crimes of moderate severity are deliberate acts for which the maximum penalty provided for in this Code does not exceed five years of imprisonment or a fine (up to five thousand MCI), as well as careless actions for which the penalty is imposed for the term of imprisonment over five years or a fine (over five thousand MCI).

4. Deliberate crimes are recognized as intentional acts for which the maximum punishment provided for by this Code does not exceed twelve years of imprisonment or a fine (up to twelve thousand MCI).

5. Particularly grave crimes are premeditated acts for which the present Code provides for punishment in the form of imprisonment for a term exceeding twelve years, life imprisonment or the death penalty".

Then the legislator will not have to fix the fine as an alternative to imprisonment when establishing the sanction of the Special Part of the Criminal Code of the Republic of Kazakhstan. Such a measure will allow not only to systematize the categorization of crimes, but also to eliminate corruption factors in the appointment of criminal penalties. For example, guided by the content of Article 11 of the Criminal Code of the Republic of Kazakhstan, the legislator cannot specify only a penalty as a sanction in a separate article of the Special Part of the Criminal Code of the Republic of Kazakhstan, since this crime, according to the established categorization, will not fit into the system of types of crimes (minor crimes, moderate and especially grave), and may even go into the category of criminal misconduct, punishment for which does not entail even a criminal record.

Conclusion

The theoretical and practical significance of the research results lies in the fact that the provisions, conclusions and proposals contained in the dissertation research can be used: - in the course of further scientific research on crime prevention issues;

- in the process of further improvement of current legislation in order to increase the effectiveness of the preventive function of criminal penalties;

- in the practical activities of law enforcement and special bodies engaged in the prevention and fight against crime;

- in the development and teaching of courses in criminal law, criminology and criminal executive law, in the preparation of textbooks and guidelines on the topic of research.

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İLAÇ SEKTÖRÜNDE İLAÇLARIN TANITIMINDA KULLANILAN DİJİTAL TANITIM ARAÇLARININ HEKİMLERİN İLAÇ BİLİNİRLİĞİ VE İLACI TERCİH ETME DAVRANIŞINA ETKİSİ[1]

Ali KARAMAN
Dr. Öğr. Üyesi, Bingöl Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi Bölümü, Bingöl, Türkiye
ORCID Code: 0000-0001-8738-2918

ÖZET

Bu araştırmada, Türkiye ilaç sektöründe ilaç firmaları tarafından ilaçların tanıtımında kullanılan Dijital Tanıtım Araçları (DTA)'nın ilaçların bilinirliğine ve tercihine olan etkisini belirlemek ve değerlendirmek amaçlanmıştır. Bu amaca uygun olarak nitel araştırma yöntemi tercih edilmiş ve yarı yapılandırılmış görüşme tekniği kullanılarak yüz yüze görüşmeler gerçekleştirilmiştir. Araştırma verilerinin analizinde, Strauss ve Corbin (1990) tarafından önerilen "içerik analizi" tekniği tercih edilmiştir. Araştırmada elde edilen tüm veriler kodlama ve kategorilere ayırma işlemleri yapılarak çözümlenmiş ve "MAXQDA12" programına aktarılarak frekans ve yüzdesel dağılım analizlerine bakılmıştır. Araştırma sorularının geçerliliğinin test edilmesinde, Lawshe'nin (1975) "İçerik Geçerliliği Oranı (content validity ratio)" kullanılmış ve soruların istatistiksel olarak anlamlı olduğu (İçerik Geçerlilik İndeksi=1,00) tespit edilmiştir. Araştırmada oluşturulan kodların tutarlılık oranlarının hesaplanması amacıyla hem araştırmacı hem de nitel araştırma alanında uzman olan bağımsız bir kişi tarafından rasgele seçilen 3 farklı görüşmeye ait metinler ayrı ayrı kodlanmış ve yapılan kodlamalar karşılaştırılarak tutarlılık oranları hesaplanmıştır. Araştırmada kullanılan kodların, kodlar arası tutarlılık (kod uyuşum oranı) oranının hesaplanmasında, Güvenirlik = Görüş Birliği Sayısı / Toplam Görüş Birliği + Görüş Ayrılığı Sayısı, formülü (Miles ve Huberman, 2015) kullanılmış ve kod uyuşum oranı %91 olarak bulunmuştur. Araştırma bulgularında, DTA'ların ilaçların bilinirliğine etkisine ilişkin yapılan kodlamaların oransal ağırlıkları sırasıyla şu şekilde bulunmuştur: İlk sırada e-konferans ve toplantılar (%34,14), ikinci sırada e-posta pazarlama (%25,48), üçüncü sırada ipad vb. araçlarla yapılan tanıtımlar (%25,00), son sırada ise web sitelerinin ilaçların bilinirliğine etkisi (%15,38) gelmektedir. DTA'ların ilaçların tercihine olan etkisine ilişkin yapılan kodlamaların oransal ağırlıkları ise sırasıyla şu şekilde bulunmuştur: E-Konferans ve toplantıların ilaçların tercihine etkisi % 36,96, ipadin ilaç tercihine etkisi % 30,66, e-posta aracılığıyla yapılan tanıtım faaliyetlerinin ilaç tercihine etkisi %18,98, web sitelerinin ilaç tercihine etkisi ise %12,40 olarak tespit edilmiştir. Sonuç olarak ilaçların tanıtımında kullanılan DTA'ların ilaçların bilinirliği ve tercihi üzerinde belirgin bir etkiye sahip olduğu, ilaç firmaları tarafından kullanılan DTA'lar arasında ilaçların bilinirliği ve tercihi üzerinde en yüksek etkiye sahip olan DTA'nın ise e-konferans ve toplantılar olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: Dijital tanıtım, ilaç firmaları, ilaç sektörü, nitel araştırma.

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THE EFFECT OF DIGITAL PROMOTIONAL TOOLS USED IN PROMOTION OF DRUGS IN THE PHARMACEUTICAL INDUSTRY ON DRUG AWARENESS AND DRUG PRESCRIBE BEHAVIOR OF PHYSICIANS*

Ali KARAMAN
Asst. Prof., Bingöl University, Faculty of Health Sciences, Department of Health Management, Bingöl, Turkey
ORCID Code: 0000-0001-8738-2918

ABSTRACT

In this study, it is aimed to determine and evaluate the effect of Digital Promotion Tools (DPT), used by pharmaceutical companies in the Turkish pharmaceutical industry to promote drugs, on the awareness and preference of drugs. For this purpose, qualitative research method was preferred and a semi-structured interview technique used to make face-to-face interviews. In the analysis of the research data, the "content analysis" technique proposed by Strauss and Corbin (1990) was used. All the research data transferred to the "MAXQDA12" program and analyzed for frequency and percentage distribution of the codes and categories used in the research. The validity of the research questions were tested by using Lawshe's (1975) "Content Validity Ratio" and the questions were found significant (Content Validity Index = 1.00) statistically. In order to evaluate the consistency ratios of the codes created in the research, three different interviews were selected by randomly, and coded separately by the researcher and an independent expert on qualitative researchs. The formula Reliability = Number of Consensus / Total Consensus + Number of Disagreements (Miles & Huberman, 2015) was applied to calculate of the consistency ratio of the codes used in the research, and the consistency rate of the codes was found 91%. In the research findings, the percentage of the codings related to the effect of DTAs on the awareness of drugs were found as follows, respectively: E-conference and meetings (34.14%) comes in the first place, e-mail marketing (25.48%) in the second place, promotions made with ipad etc. tools (25.00%) comes in the third place, and the effect of websites (15.38%) comes last. The percentage of the codings related to the effect of DTAs on the prescribing of the drugs were found as follows, respectively: The effect of e-conferences and meetings to prescribe was 36.96%, the effect of ipad etc. tools to prescribe was 30.66%, the effect of e-mail marketing was 18.98%, and the effect of websites to drug prescribe was found as 12.40%. As a result, it was concluded that DTAs used in the promotion of drugs have a significant effect on the awareness and prescribe of drugs, and DTA, which has the highest effect on the awareness and prescribing of drugs among the DTAs used by pharmaceutical companies, is e-conference and meetings.

Keywords: Digital promotion, pharmaceutical companies, pharmaceutical industry, qualitative research.

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JOINT MEDIA PLATFORM BETWEEN AZERBAIJAN AND TURKEY

Assist. Professor Aytekin Zeynalova

Doctor of Philosophy in Political Science Baku State University,
Faculty of Journalism, Department of International Communication and Information Policy
ORCID Code: 0000-0002-9737-1072

ABSTRACT

The research article emphasizes the need to create a Turkish-Azerbaijani media platform, as the common goals and objectives of the two brotherly countries are the same, the direction of the information struggle is the same, the main purpose of the work and negotiations is to create a common strategy to combat black PR. explained. Azerbaijan and Turkey, combining experience in the field of communications and information, the implementation of joint projects is analyzed. The need to create a Unified Turkish Media Platform in the future with the accession of other Turkic-speaking countries, as well as friendly countries to the media platform is discussed, all of which is analyzed in terms of faster and more effective implementation of our common goals. It is substantiated that through joint activities within the framework of this media platform, we will be able to quickly convey information reflecting our rightful position to the local and international community, as well as resolutely prevent evil, slanderous and misinformation against our ancestors. It is concluded that the joint activities of the existing opportunities and experiences of the media of the two countries in a coordinated manner will be an effective way to combat the information war in the modern world. Azerbaijan-Turkey cooperation, which is an example to the whole world and is constantly strengthening, is developing at a high level and is constantly strengthening. Today, the independent states of Azerbaijan and Turkey, which have a common historical past, cultural values and traditions, continue to write a common history for future generations against the background of the Nagorno-Karabakh struggle.

Keywords: media platform, Turkey, interstate relations, politics, disinformation, coordination, information, strong, one nation, two states, purposeful, special, relationship

ENHANCEMENT OF FUNCTIONAL, ELECTROPHYSIOLOGICAL AND CLONING PROPERTIES OF CARDIOSPHERE DERIVED STEM CELLS AND SCA1+ CARDIAC STEM CELLS BY EX VIVO ESTROGEN TREATMENT

Ceylan Verda Bitirim
Ankara University Stem Cell Institute
Ankara,Turkey
ORCID Code: 0000-0002-7979-0679

ABSTRACT

Although transplantation of cardiac progenitor cells (CPC) to the damaged heart has resulted in positive results in phase I/II clinical and preclinical studies, such as improved left ventricular function and reduced infarct size, insufficient stem cell engraftment, delayed cardiac functional recovery are still concerns in this treatment method. For this reason, in vitro treatment transplanted CPCs with of exogenous factors may be an advanced method that can be applied in the ischemic treatment. It is supported by literature that estrogen has an active role in cardiac regeneration at the functional and molecular level. In our study, it was aimed to examine the effect of estrogen administration on cardiosphere-derived stem cells (CDC) and Sca1+ CPCs, which are subpopulations of CPC, on the regenerative capacity of these cells. The positive effects of estrogen on the regenerative responses of CPCs were functionally investigated by cell migration, self-renewal, angiogenesis, and echocardiographic measurements. CDCs isolated from male mouse hearts were used in our study. Sca1+ cells were sorted using the MACS magnetic separation system. It was observed that estrogen incubation significantly increased the migration capacity and tube-forming capacity of CDC and Sca1+ CPCs. Especially in CDCs, potassium (K^+) channel current responses and action potential formation increased after 24 hours of estrogen incubation. In addition, estrogen treatment positively affects the self-renewal and clonogenecity capacity may be due to the increased expression level of Nanog gene in Sca1+ and CDC cells. In the presence of estrogen, CPCs can form dense colonies in a shorter time compared to the environment without estrogen. All these results indicate that a ex vivo preconditioning of CPCs with estrogen before transplantation may propagate the transplantation efficiency.

Keywords: cardiac stem cells, Sca1+, cardiosphere derived stem cell, potassium channels, estrogen

VORTICITY DISTRIBUTION ON A SURFACE MOUNTED CUBE AT RE=10000

Cemre Polat[*1], Mustafa Söyler[2]

*[*1]Duzici Vocational School, Motor Vehicles and Transport Technology, Osmaniye Korkut Ata University, Turkey*
[2]Energy Systems Engineering, Osmaniye Korkut Ata University, Turkey
ORCID Code: 0000-0002-7001-1042 , 0000-0003-4767-5825

ABSTRACT

When objects with sharp angular lines are exposed to a flow, the flow becomes mixed, unstable, and turbulent in the back region of the object. The velocity and direction of the flow and the shape of the object are the determining factors in the velocity zones formed on the surfaces. In this study, the vorticity field formed in the flow structure formed in the back and upper region of a surface-mounted cube body with the Reynolds number 10000 was investigated by PIV technique. Streamwise and spanwise velocity values obtained from the experimental study were used while making the vorticity calculation. It has been observed that the velocity change observed in the lower region on the upper surface of the cube interacts with the acceleration from the top, creating clockwise rotating vortices that shed continuously.

Keywords: PIV, cube, vorticity calculation, flow

INTRODUCTION

Flows acting on bluff objects with sharp edges are of great interest to researchers as they are used in many engineering fields and in many practical applications. Due to the turbulent and unpredictable nature of the flow, it is important to have an idea about the flow around bluff bodies. A Computational Evaluation of Wind Effects on cube-shaped building models was investigated by (Baskaran & Stathopoulos, 1989). Assuming that one half of the flow would be observed symmetrically the same, only the other half is studied. Standard k-ε model results were compared with the measured wind tunnel data and previous numerical studies. A numerical investigation by Constantinescu and Squires conducted in both laminar and turbulent regimes. There is an increase in the vortex shedding frequency as the flow Reynolds number is increased (Constantinescu & Squires, 2004). The wake width diameter decreases at higher Reynolds number. The flow structure around the cube-shaped objects mounted on a surface has also been studied in detail in the experimental and numerical studies by (Bosch & Rodi, 1998; Krajnović & Davidson, 2001; Martinuzzi & Tropea, 1993; Rodi, 1998). In present study, the vorticity structure formed in the flow structure formed in the back and upper region of a surface-mounted cube body with the Reynolds 10000 number was investigated by PIV technique.

MATERIALS AND METHODS

Experiments were carried out in Advanced Fluid Mechanics Laboratory of Osmaniye Korkut Ata University. The channel consists of two frequency controlled centrifugal pumps, a viewing section made from plexiglass material, a honeycomb shaped flow regulation section and two collecting tanks. Desired velocities can be set between 0.05 – 0.5 m/s. The distance between two collecting tanks is 8 meters. The width of tank is 0.75m, water height is 80 centimeters. The PIV system includes a camera, a pulsating line laser unit, a computer, and a synchronization box that syncs the camera and laser. Detailed information about the water channel, PIV system and data acquisition programs is given in the study by the authors (Ozalp et al., 2021). The PIV method was used to analyze the flow regime around a surface-mounted cube in this study's experiment. The Reynolds number was computed as

Re=10000 using the model dimensions, the physical parameters of the water, and the flow velocity. In one second, the PIV system captured 15 snapshots. After running the channel for a specified amount of time, the experiment procedure was launched, and a total of 490 photos of the flow region were recorded. After the experiment is finished, the PIV system produces streamwise and spanwise velocity values for the flow area. However, due to the nature of imaging technology, the system may generate distorted vectors because of minor laser or lens distortions. In this situation, the resulting corrupted vectors are sent through several vector filtering algorithms, and defects are considerably minimized.

Vorticity Calculations

If the vorticity of the flow field can be accurately calculated from the PIV measurements, a lot of information about the flow can be obtained (Dong & Meng, 2001). For two-dimensional flows, the out-of-plane vorticity component follows as:

$$\Omega = \frac{1}{2}\left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y}\right) \tag{1}$$

The most common way to calculate this expression numerically is to approximate the partial derivatives with finite differences. Using the central differences in the interior point, the following equation results

$$\Omega_{ij} = \frac{1}{2}\left(\frac{v(i+1,j) - v(i-1,j)}{2\delta_x} - \frac{u(i,j+1) - u(i,j-1)}{2\delta_y}\right) \tag{2}$$

Since calculations involving the derivative operation are sensitive to noise generation, the first objective is to smooth the velocity field before calculating the vorticity, and the other scalar derivatives. In Figure 1, the raw image obtained with the PIV system, the streamwise and spanwise velocity contour obtained from this image are given. The vectors, the instantaneous vorticity contour as a result of the calculations are shown.

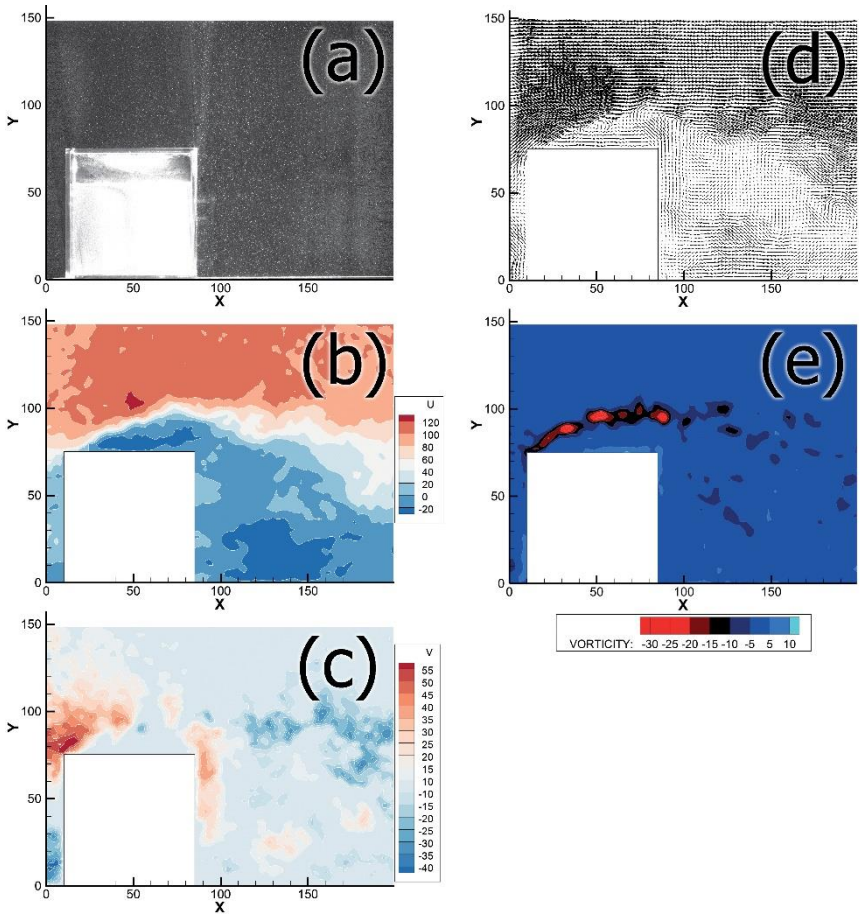


Figure 1. Raw image of PIV snapshot (a), streamwise velocity field (b), spanwise velocity field (c), vectors (d) and vorticity field obtained from these data (e)

RESULTS

In present study, the vorticity component of the flow on a surface-mounted cube-shaped object, measured and calculated by the PIV method, was investigated in the Reynolds number 10000. The time interval between two images is 0.0667 seconds. Red contour indicates clockwise, blue contour indicates counterclockwise vorticity. As shown in figure 2, the vortex formed by separating from the upper corner moves in the flow direction by making random oscillations in the up and down directions. Positive vortex regions are seen near the upper surface of the cube. High vorticity regions arise from the flow formed upwards from the upstream region of the cube, resulting from the negative vorticity region below, and progress in the direction of the flow as dense, small-diameter regions. The vortices formed in the upper corner, while moving on the upper surface of the cube, combine with each other in the back region of the cube and slightly lose their quantity after leaving the cube.

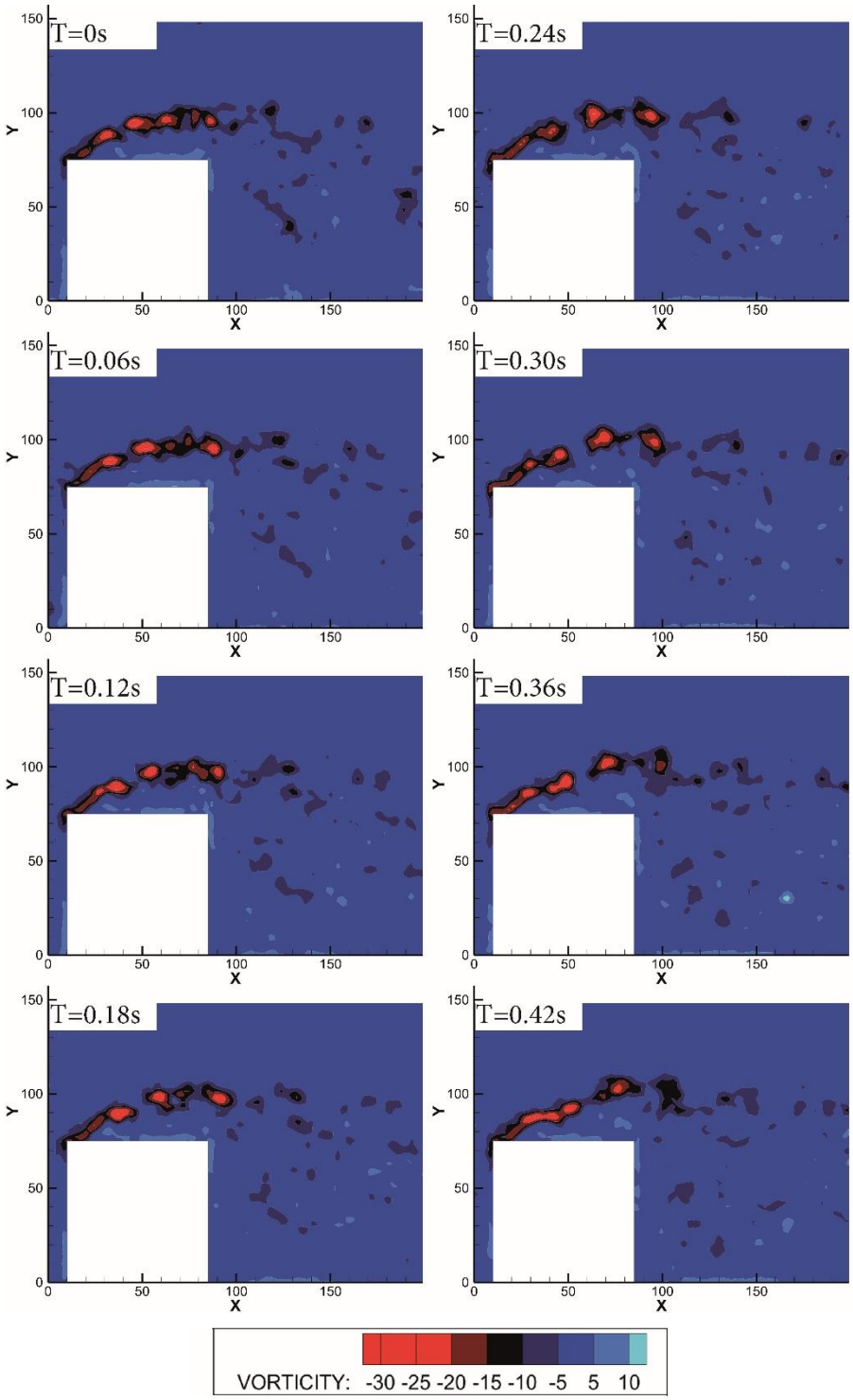


Figure 2. Instantaneous vorticity structure formed behind the surface mounted cube at Re = 10000 between T=0.00 and 0.42s

DISCUSSION

As a result of present study, the vorticity calculation was made from the PIV data and the flow over a surface-mounted cube was analyzed for a specific Reynolds number 10000. The vorticity regions shown in red in the figures lose their quantity as they move towards the rear area on the cube. The

region with the most intense vorticity around the cube-shaped object was observed at (X=40mm, Y=90mm) position.

CONCLUSION

The movements of the vorticity structures on the object, which are formed by the instability of two different velocity zones on the object, were observed. This study is expected to be a reference for future studies on PIV, CFD and other fluid mechanics studies.

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A POLITICAL ECOLOGY- FOCUSED LOOK AT CLIMATE REFUGEES [2]

Doç. Dr. Fulya MEMİŞOĞLU
Department of Political Science and International Relations,
Yıldız Technical University, Turkey
ORCID Code: 0000-0001-8113-813X

Ayşe ALTUNDİŞ
M.A., Department of Political Science and International Relations,
Yıldız Technical University, Turkey
ORCID Code:0000-0001-5628-5189

ABSTRACT

Today, environmental problems due to climate change will reach a point where humanity can no longer cope in the near future. However, the mechanisms of countries to deal with these problems will be interrupted. According to the political ecology approach, which argues that the source of climate change and fundamentally environmental problems are developed/developing countries, these countries refuse to be a part of the solution while being a part of the problem. However, the poor countries will be the most affected by the mentioned climate crisis. In such a case, it is inevitable to experience mass migration movements. However, the absence of an internationally accepted definition of climate refugee indicates that there is no structural capacity to support such a mass migration. Countries that are the source of environmental problems and are on the migration route of climate refugees have to create an action plan, taking into account basic human rights. It is necessary for developed/ developing countries to take concrete steps to seek solutions to environmental problems on a political basis and to include people who will have to leave their place of residence in the near future within the scope of the refugee definition. In this study, it will be underlined that environmental problems are actually political problems with the political ecology approach, then the legal status of climate refugees will be discussed and it will be underlined what kind of problems await humanity in the near future. In addition, suggestions will be presented in terms of preventing climate change and coping with the mass migration wave.

Keywords: Climate Change, Climate Refugees, Political Ecology, Migration

İKLİM MÜLTECİLİĞİNE POLİTİK EKOLOJİ ODAKLI BİR BAKIŞ

ÖZET

Günümüzde iklim değişikliğine bağlı yaşanan çevresel sorunlar yakın bir gelecekte insanlığın artık baş edemediği bir noktaya gelecektir. Bununla birlikte ülkelerin bu sorunlarla başa çıkma mekanizmaları sekteye uğrayacaktır. İklim değişikliğinin ve temelde çevresel sorunların kaynağının gelişmiş/ gelişmekte olan ülkeler olduğunu savunan politik ekoloji yaklaşımına göre bu ülkeler sorunun bir parçası olurken çözümün bir parçası olmayı reddetmektedir. Ancak bahsedilen iklim krizinde en çok etkilenenler yoksul ülkeler olacaktır. Böyle bir durumda da kitlesel göç hareketlerinin yaşanması kaçınılmazdır. Bununla birlikte uluslararası arenada kabul görmüş bir iklim mültecisi tanımının olmaması böyle bir kitlesel göçü destekleyecek yapısal bir kapasitenin olmadığını göstermektedir. Çevresel sorunlara kaynaklık eden ve iklim mültecilerinin göç güzergahında yer alan ülkeler temel insan haklarını da göz önüne alarak bir eylem planı oluşturmak zorundadır. Çevresel sorunlara siyasal bir zeminde çözüm aranması ve yakın gelecekte yaşadıkları yeri terk etmek zorunda kalacak insanların mülteci tanımı kapsamına alınması yönünde gelişmiş/gelişmekte olan ülkelerin somut adımlar atması gerekmektedir. Bu çalışma ile politik ekoloji yaklaşımı ile çevresel sorunların aslında siyasal sorunlar

[2] This study is derived from the thesis prepared to be submitted to Yıldız Technical University, Institute of Social Sciences, Department of Political Science and İnternational Relations.

olduğunun altı çizilecek ardından iklim mültecilerinin hukuki statüsü tartışılacak ve yakın gelecekte insanlığı ne gibi sorunların beklediğinin altı çizilecektir. Bununla birlikte iklim değişikliğinin önlenmesi ve kitlesel göç dalgası ile baş etme anlamında öneriler sunulacaktır.

Anahtar Kelimeler: İklim Değişikliği, İklim Mültecileri, Politik Ekoloji, Göç

THE EVALUATION OF KIA MOTORS ALGERIA'S PERFORMANCE BETWEEN 2016 AND 2021.

Chems Eddine BOUKHEDIMI
University of Tizi Ouzou, Department of commerce. Management Marketing Algeria
Ph.D. degree
ORCID Code: 0000-0003-1728-1809

ABSTRACT

The evaluation of any enterprise's activities is the most important action to do by marketing specialists to ensure the existence of companies in their market, especially with the influence of several variables on the economic activities such as taxes policy, Economic growth, inflation rate, etc.,

This paper's research aims to evaluate the performance of KIA Motors Algeria in the recent five years with the use of a strategic tool which is PESTEL analysis, by emphasizing the Political, Economic, social, technological, ecological, and legal factors.

As result, the major disadvantages of KIA Motors Algeria functions are the political, legal, and ecological levels.

Keywords: Strategic analysis – PESTEL- KIA Motors Algeria-Algerian car market.

THE STUDY OF THE ELECTRONIC, STRUCTURAL, AND ELASTIC PROPERTIES OF TACOBI HALF-HEUSLER COMPOUND IN A, B, AND Γ STRUCTURAL PHASES

Cihan Kürkçü[1*], Abdullah Candan[2]

*[*1]Kırşehir Ahi Evran University,*
Department of Electronics and Automation,
Kırşehir, Turkey.
ORCID Code: 0000-0003-3597-1950

[2]Kırşehir Ahi Evran University, Department
of Machinery and Metal Technology,
Kırşehir, Turkey.
ORCID Code: 0000-0003-4807-3017

ABSTRACT

This investigation reports the structural, elastic, and electronic characteristics of the TaCoBi ternary compound having a face-centered cubic crystalline structure, conforming space group F-43m that are investigated under the Generalized Gradient Approach (GGA) within the method of the Density Functional Theory (DFT). To find out the most stable phase of the TaCoBi ternary compound, the total energies as a function of volume in the unit cell for three possible phases which are called α, β, and γ phases have been calculated. The γ-phase was determined as the most stable phase because it has a lower minimum total energy than the other phases. The lattice constant, bulk modulus, and first pressure derivative of bulk modulus for γ-TaCoBi half-Heusler compound have been reported as 6.114 Å, 129.2 GPa, and 5.34, respectively. The obtained electronic band structure and the total electronic density of states of the title compound have indicated metallic behavior. TaCoBi compound is stable elastically in the γ phase by the Born-Huang criteria. The other two phases (α and β) are elastically unstable as they have negative elastic constants. In connection with its elastic constants, the Bulk, Young, Shear modulus (G), B/G ratio, and Poisson's ratio (ν) have been obtained.

Keywords: Half-Heusler compounds, Bulk modulus, Electronic properties, Elastic constants.

INTRODUCTION

Half-heusler compounds crystallize in cubic MgAgAs-type structure with space group F-43m. In the literature, these compounds have the chemical formula XYZ and the atomic arrangement of 1:1:1. In the periodic table, transition elements correspond to X and Y, while P-group elements correspond to Z. According to the arrangement of atoms, half-heusler compounds are found in the literature as α, β, and γ or type-1, type-2, and type-3 [1-3]. It was first discovered by Heusler in 1903 [4]. Due to its remarkable magnetic properties, it has been the subject of many studies. Today, more than 1000 compounds are in this family. However, there are not enough studies on newly emerging Bi-based half-heusler compounds. Therefore, theoretical simulation studies on these compounds still maintain their popularity.

In addition, half-heusler compounds, which are a large member of the Heusler compounds family, are widely used in many technological fields such as topological insulators, spintronics, optoelectronics, and photovoltaic applications [1-3].

MATERIALS AND METHODS

In this study, all calculations were made using the Quantum Espresso package program [5, 6] within the framework of density functional theory (DFT) to study the structural, electronic, and elastic properties of TaCoBi. As the exchange-correlation energy, generalized gradient approximation (GGA) with Perdew-Burke-Ernzerhof (PBE) was used [7]. As a result of the geometry optimizations, we obtained that the cut-off value was 500 eV and the k-point Monkhorst-Pack value was 12x12x12 [8]. The stress-strain method was used to obtain elastic constant values.

RESULTS AND DISCUSSION

In this study, the structural electronic and elastic properties of TaCoBi were calculated using the Quantum Espresso package program within the framework of density functional theory. TaCoBi crystallizes in a cubic structure with space group F-43m. It is found in three different structures in the literature. These structures are α, β, and γ. Wyckoff positions for all structures of TaCoBi are given in Table 1.

Table 1. The Wyckoff positions of the atoms for TaCoBi half-Heusler compound with α, β, and γ phases.

Phase	Ta	Co	Bi
$\boldsymbol{\alpha}$	(0.5, 0.5, 0.5)	(0, 0, 0)	(0.25, 0.25, 0.25)
$\boldsymbol{\beta}$	(0.25, 0.25, 0.25)	(0.5, 0.5, 0.5)	(0, 0, 0)
$\boldsymbol{\gamma}$	(0, 0, 0)	(0.25, 0.25, 0.25)	(0.5, 0.5, 0.5)

Before starting the calculations, geometric optimization was made for all phases of TaCoBi and lattice parameters (a_0), bulk modulus, the derivative of bulk modulus according to pressure, cell volume, and density values were computed. The results obtained are compared with the literature and given in Table 2. The calculated lattice constant values of TaCoBi for all phases are in good agreement with the available literature.

Table 2. The calculated equilibrium lattice parameter a_0, Bulk Modulus B_0, the derivative of Bulk Modulus B_0', cell volume V_0, and density ρ values for TaCoBi half-Heusler compound with α, β, and γ phases.

F-43m	Type	a_0 (Å)	B_0 (GPa)	B_0'	V_0 (Å^3)	ρ (g/cm^3)	References
TaCoBi	$\boldsymbol{\alpha}$	6.333	101.4	4.82	254.029	11.736	Present
		6.335	-	-	-	-	[9]
	$\boldsymbol{\beta}$	6.371	104.1	5.13	258.553	11.531	Present
		6.353	-	-	-	-	[9]
	$\boldsymbol{\gamma}$	6.114	129.2	5.34	228.525	13.046	Present
		6.096	-	-	-	-	[9]

In the next step, the energy values as a function of volume were calculated for three different structures (α, β, and γ) of TaCoBi. The energy values obtained were fitted to the Murnaghan equation of states given by equation 1.

$$E(V) = E_0 + \frac{B_0 V}{B_0'}\left[\left(\frac{V_0}{V}\right)^{B_0'}\frac{1}{B_0'-1}+1\right] - \frac{B_0 V_0}{B_0'-1} \quad (1)$$

The energy-volume curves calculated for the α, β, and γ-type structures of TaCoBi are given in Figure 1.

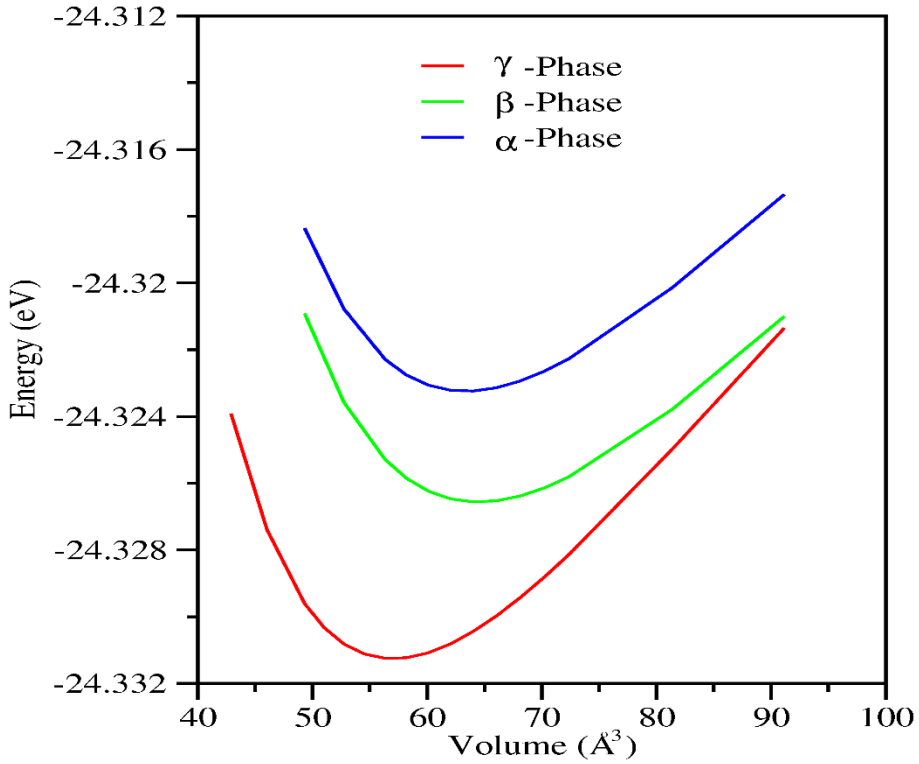


Figure 1: The energy-volume curves for TaCoBi half-Heusler compound with α, β, and γ phases.

The purpose of the energy volume calculations is as follows. It is to decide which of the three different structures studied is the most stable structure for TaCoBi. As a result of the calculations, the structure with the minimum energy value is the most stable. As seen in Figure 1, the most stable structure for TaCoBi is the γ phase. After determining the most structurally stable structure of TaCoBi, we calculated the electronic band structure and density of state curves for this γ phase. The electronic properties of a compound tell us about the type of compound (conductor, semiconductor, or insulator). For the γ phase of TaCoBi, we calculated the electronic band structure along the high symmetry directions. The Fermi energy level was set to 0 eV in all calculations. The calculated band structure graph is given in Figure 2.

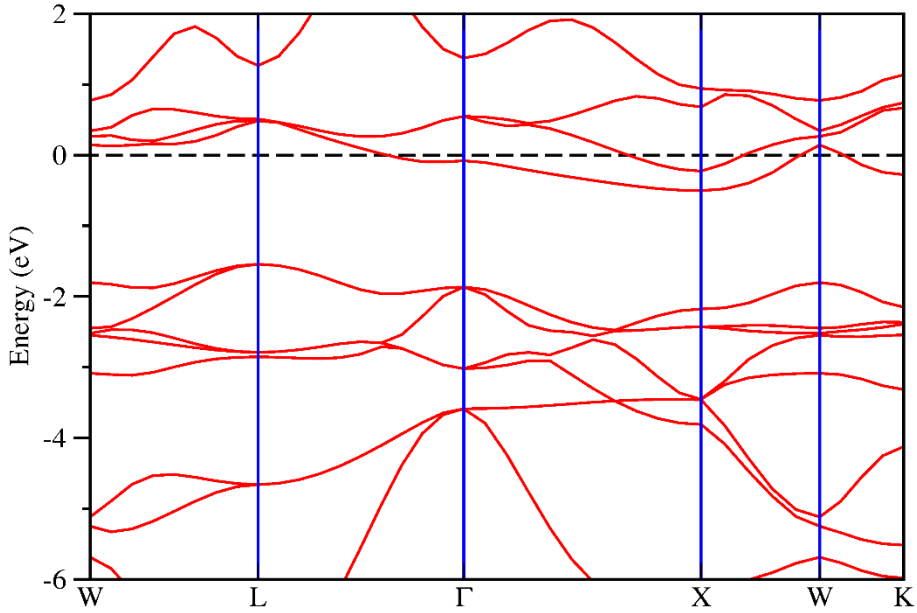


Figure 2. The electronic band structure for γ phase of TaCoBi compound along the high symmetry directions in the Brillouin zone.

In Figure 2, the Fermi energy level is given by the black dashed line. The valence band is below the Fermi energy level. Above the Fermi energy level is the conduction band. These two bands overlap at the Fermi level. Also, these two bands are not separated by a gap called a bandgap. Therefore, TaCoBi has metallic properties in the γ phase. If there was a gap between the valence band and conduction band around the Fermi energy level, then we could call the compound a semiconductor or insulator. In order to obtain more comprehensive information about the electronic properties of the studied compound, the DOS graph for the γ phase of TaCoBi was drawn and given in Figure 3.

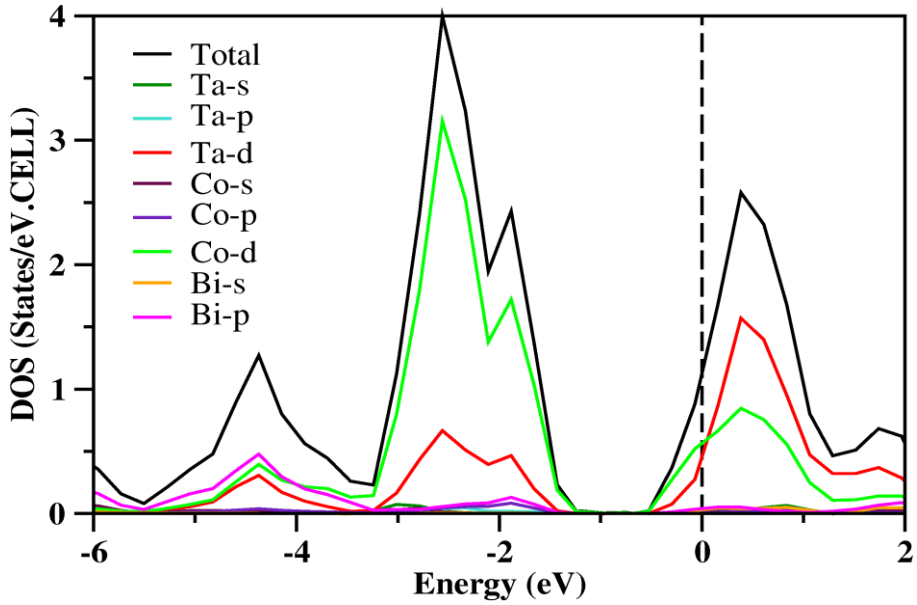


Figure 3. The calculated total and partial density of states curves for γ phase of TaCoBi compound.

As it can be seen in Figure 3, the largest contribution between (0)-(-3) eV below the Fermi energy level came from the Co-d states, while this contribution between (-3)-(-6) eV came from Bi-p states. Above the Fermi energy level, the largest contribution came from the Ta-d states.

Elastic constants are significant parameters of solid material and also provide valuable information on structural stability. A cubic system has three independent elastic constants (C_{11}, C_{12}, C_{44}). Mechanical stability for this alloy has been analyzed in terms of its elastic constants. For cubic crystals, the conditions for mechanical stability are given by:

$$C_{11} > 0, \quad C_{11} - C_{12} > 0, \quad B > 0, \quad C_{44} > 0 \qquad (2)$$

The calculated elastic constants of the TaCoBi compound have been tabulated in Table 3. The obtained elastic constants satisfy these mechanical stability criterions, thus showing that this compound is mechanically stable.

Table 3. The calculated elastic constants (C_{11}, C_{12}, C_{44}, in GPa) for all phases of the TaCoBi compound with space group F-43m.

F-43m	Type	C_{11} (GPa)	C_{12} (GPa)	C_{44} (GPa)	Stable
TaCoBi	α	49.29	119.30	-14.44	X
	β	94.76	113.64	-37.64	X
	γ	221.10	91.42	28.79	√

Moreover, mechanical parameters such as Bulk modulus (B), Shear modulus (G), Voigt (G_V), and Reuss (G_R) polycrystalline elastic modulus, B/G ratio, Young's modulus, and Poisson's ratio are given in Table 4. The ratio of B/G has been calculated to investigate the ductility and brittleness properties of the TaCoBi compound. If the ratio of B/G is higher than 1.75, the material has ductile properties. If it is less than 1.75, the material has brittle properties. The B/G value is 3.36 for this compound. This indicates the ductile nature of the γ phase of the TaCoBi compound. The next parameter, the Poisson ratio (σ), gives information about the bonding (covalent bonding) properties of the materials. If this ratio is around 0.1, the material has made a covalent bond. If this ratio is around 0.25, it is said to have made an ionic bond. If this ratio is around 0.3 and above, the material has made a metallic bond. Poisson ratio values given in Table 4 were obtained as 0.364 for the γ-TaCoBi. Therefore, the metallic character of TaCoBi is more dominant in the γ phase.

Table 4. The calculated bulk modulus (B, in GPa), shear modulus (G, in GPa), B/G ratio, Young's Modulus (E, in GPa), and Poisson's ratio (ν) for γ-TaCoBi compound.

γ-Phase	B (GPa)	G (GPa)	G_V (GPa)	G_R (GPa)	B/G	E (GPa)	ν
TaCoBi	134.65	40.12	43.21	37.02	3.36	109.48	0.364

CONCLUSION

First-principles calculations were applied to study the structural, electronic, and elastic properties for α, β, and γ type phases of the TaCoBi compound. The most stable structure of TaCoBi was found to be γ. Electronic properties were calculated for the γ structure of TaCoBi and it was seen that TaCoBi had metallic properties in this structure. In addition, elastic constant values were calculated in order to obtain information about the hardness and mechanical stability of the studied material. According to this calculation, the γ phase of TaCoBi is mechanically stable. It has also been observed that there is metallic bonding between atoms.

ACKNOWLEDGEMENTS

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FIRST-PRINCIPLES STUDY OF STRUCTURAL, DYNAMIC, ELASTIC, AND ELECTRONIC PROPERTIES OF C15-TYPE LAVES PHASE $NDIR_2$

Cihan Kürkçü[1*], Abdullah Candan[2]

*[*1]Kırşehir Ahi Evran University,*
Department of Electronics and Automation,
Kırşehir, Turkey.
ORCID Code: 0000-0003-3597-1950

[2]Kırşehir Ahi Evran University, Department
of Machinery and Metal Technology,
Kırşehir, Turkey.
ORCID Code: 0000-0003-4807-3017

ABSTRACT

By utilizing the first-principles simulations, the structural, dynamic, elastic, and electronic properties of Laves phase $NdIr_2$ intermetallic compound were investigated. The optimized lattice constant and formation energy of the $NdIr_2$ intermetallic compound was reported as 7.691 Å and -0.693 eV/atom, respectively. These lattice constant and formation energy values are in good agreement with available experimental and theoretical consequences. The electron band curves of this compound along the high symmetry directions of the Brillouin zone were depicted. To have a better understanding of the electronic states, the total and partial density of states were computed, too. From the electronic band structure calculations, the valance and conduction bands were overlapped at the Fermi level, which showed that the studied compound has a metallic characteristic. Thanks to three independent elastic constants (C_{11}, C_{12}, and C_{44}), the polycrystalline elastic parameters: Bulk modulus (B), Young's modulus (E), Shear modulus (G), and Poisson's ratio (v) were derived from Voigt-Reuss-Hill approximation. Finally, the phonon dispersion curves were shown along several high-symmetry lines in the Brillouin Zone. The plotted phonon spectra showed that this material is dynamically stable without any imaginary phonon modes.

Keywords: Density functional theory, Laves phase compound, Elastic constants, Phonons.

INTRODUCTION

$NdIr_2$ crystallizes in the cubic Laves phase with the space group Fd-3m. Laves phases are one of the oldest known crystal families. There are many studies in the literature on the physical, chemical, and magnetic properties of these structures. Laves phases are intermetallic compounds with corrosion and creep resistance. Due to this feature, they can be used as magnetic materials, magneto-optical materials, and most importantly, as hydrogen storage materials [1-6]. In recent years, Ir-based Laves phases have attracted much attention and been the subject of study due to their excellent physical and mechanical properties. Also, these materials are superior to ordinary metals, such as good ductility, high strength, and thermal stability. There are three different types of Laves phases in the literature according to the arrangement of atoms. The first of these is the C14 ($MgZn_2$) structure that crystallizes in the hexagonal type. The second is the C15 ($MgCu_2$) structure that crystallizes in the cubic structure and finally the C36 ($MgNi_2$) structure that crystallizes in the double-hexagonal structure [1-6].

Despite all these excellent features, there are still incomplete studies on this subject in the literature. In this context, it is aimed to contribute to the literature by calculating the structural electronic, elastic, and vibrational properties of the $NdIr_2$ compound in this study.

MATERIALS AND METHODS

In this study, all calculations were made using the Vienna Ab initio Simulation Package (VASP) [7, 8] within the framework of density functional theory (DFT) to study the structural, electronic, elastic, and vibrational properties of $NdIr_2$. As the exchange-correlation energy, generalized gradient approximation (GGA) with Perdew-Burke-Ernzerhof (PBE) was used [9]. As a result of the geometry optimizations, we obtained that the cut-off energy value was 500 eV and the k-point Monkhorst-Pack value was 18x18x18 [10]. The stress-strain method was used to obtain elastic constant values.

RESULTS AND DISCUSSION

In this study, the structural electronic, elastic, and vibrational properties of $NdIr_2$ were calculated using the VASP package program within the framework of density functional theory. $NdIr_2$ crystallizes in a cubic lave phases structure with space group Fd-3m. It is found in three different lave phases structures in the literature. These structures are as follows:

- The hexagonal C14 ($MgZn_2$),
- Face centered cubic C15 ($MgCu_2$),
- Double-hexagonal C36 ($MgNi_2$)

In this study, the cubic C15 type structure of $NdIr_2$ was studied and a view of the crystal structure of this compound is given in Figure 1.

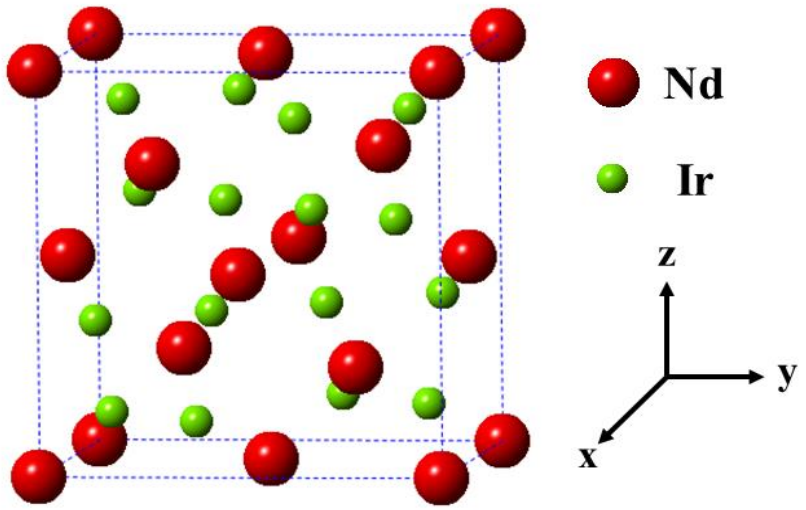


Figure 1. The crystal structure of the $NdIr_2$ compound in the Fd-3m phase.

Firstly, before starting the calculations, geometric optimization was made for C15 type structure of $NdIr_2$ intermetallic compound and lattice parameters (a_0), volume, density, and formation enthalpy values were calculated. The results obtained are compared with the literature and given in Table 1. Calculated lattice parameter values for the C15 type structure of $NdIr_2$ are in good agreement with the theoretical and experimental results. In addition, negative formation enthalpy tells us that the studied material can be synthesized experimentally.

Table 1. The calculated equilibrium lattice constant a_0, volume V, density ρ, and formation enthalpy values for C15 type structure of $NdIr_2$ intermetallic compound.

	Ref.	a_0 (Å)	V (Å³/f.u.)	ρ (g/cm³)	ΔH_f (eV/atom)
$NdIr_2$	Present	7.691	454.989	15.436	-0.693
	[11]	7.698	-	15.40	-0.709
	[Exp.-12]	-	-	-	-0.701

We also calculated the electronic band structure and density of state curves for the C15 type structure of $NdIr_2$. The electronic properties of a compound tell us about the type (conductor, semiconductor, or insulator). The calculated electronic band structure graph is given in Fig. 2. Fermi energy level was set to 0 eV in all electronic calculations.

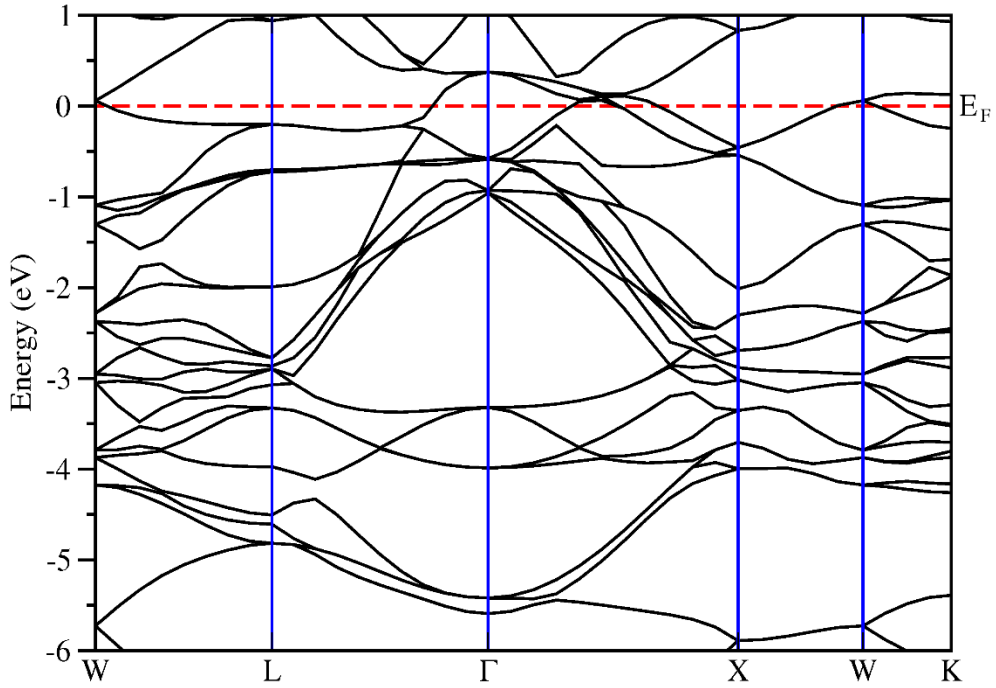


Figure 2. The electronic band structure for the C15 type structure of $NdIr_2$ intermetallic compound along the high symmetry directions in the Brillouin zone.

In Figure 2, the Fermi energy level is given by the red dashed line. The valence band is below the Fermi energy level. Above the Fermi energy level is the conduction band. These two bands overlap at the Fermi level. Also, these two bands are not separated by a gap called a bandgap. Therefore, $NdIr_2$ has metallic properties in the C15 type structure. If there was a gap between the valence band and conduction band around the Fermi Energy level, then we could call the compound a semiconductor or insulator. To obtain more comprehensive information about the electronic properties of the studied compound, the DOS graph for the C15 type structure of the $NdIr_2$ intermetallic compound was drawn and given in Fig. 3.

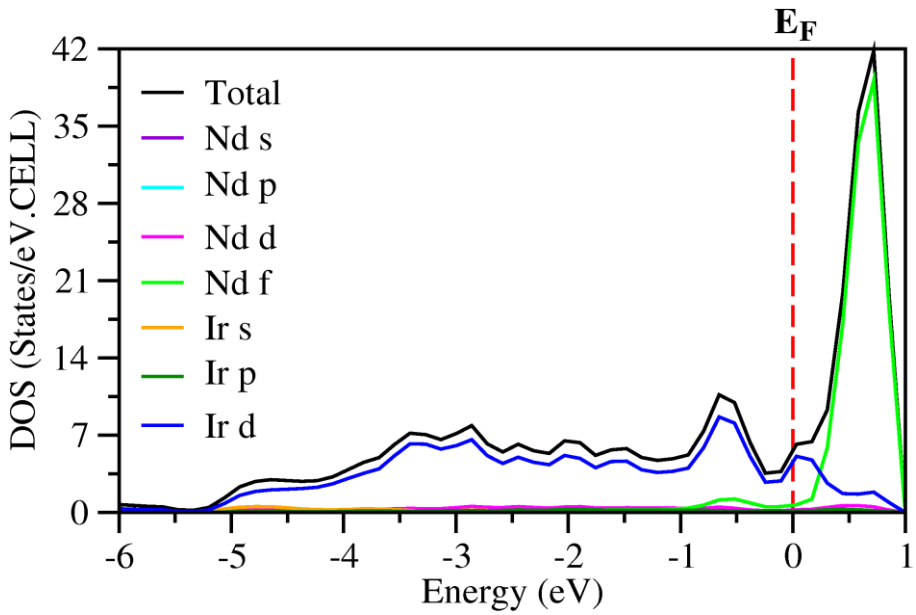


Figure 3. Calculated total and partial density of states curves for the C15 type structure of $NdIr_2$.

As it can be seen in Figure 3, the largest contribution between (0)-(-6) eV below the Fermi energy level came from the Ir-d states. Above the Fermi energy level, the largest contribution came from the Nd-f states.

Elastic constants are significant parameters of solid material and also provide valuable information on structural stability. A cubic system has three independent elastic constants (C_{11}, C_{12}, C_{44}). Mechanical stability for this alloy has been analyzed in terms of its elastic constants. For cubic crystals, the conditions for mechanical stability are given by:

$$C_{11} > 0, \quad C_{11} - C_{12} > 0, \quad B > 0, \quad C_{44} > 0 \tag{1}$$

The calculated elastic constants of the $NdIr_2$ intermetallic compound have been tabulated in Table 2. The obtained elastic constants satisfy these mechanical stability criteria, thus showing that this compound is mechanically stable.

Table 2. The calculated elastic constants (C_{11}, C_{12}, C_{44}, in GPa) for the C15 type structure of $NdIr_2$ compound with space group Fd-3m.

Fd-3m	Type	C_{11} (GPa)	C_{12} (GPa)	C_{44} (GPa)	Stable
$NdIr_2$	***C15***	266.54	142.86	85.52	√

Moreover, mechanical parameters such as Bulk modulus (B), Shear modulus (G), Voigt (G_V), Reuss (G_R), and Hill (G_H) polycrystalline elastic modulus, B/G ratio, Young's modulus, and Poisson's ratio are given in Table 3. The ratio of B/G has been calculated to investigate the ductility and brittleness properties of the $NdIr_2$ compound. If the ratio of B/G is higher than 1.75, the material has ductile properties. If it is less than 1.75, the material has brittle properties. The B/G value is 2.45 for this compound. This indicates the ductile nature of the C15 structure of the $NdIr_2$ compound. The next parameter, the Poisson ratio (σ), gives information about the bonding (covalent bonding) properties of the materials. If this ratio is around 0.1, the material has made a covalent bond. If this ratio is around 0.25, it is said to have made an ionic bond. If this ratio is around 0.3 and above, the material has made a metallic bond. Poisson ratio value given in Table 3 were obtained as 0.32 for $NdIr_2$. Therefore, the metallic character of $NdIr_2$ is more dominant in the C15 crystal structure.

Table 3. The calculated bulk modulus (B, in GPa), shear modulus (G, in GPa), B/G ratio, Young's Modulus (E, in GPa), and Poisson's ratio (**ν**) for C15 structure of $NdIr_2$ compound.

	B (GPa)	**G_V (GPa)**	**G_R (GPa)**	**G_H (GPa)**	**B/G**	**E (GPa)**	**ν**
$NdIr_2$	184.09	76.05	74.16	75.10	2.45	198.34	0.320

Fig. 4 shows the calculated phonon dispersion curves of $NdIr_2$. As expected for the $MgCu_2$-type cubic crystal structure (space group Fd-3m) with six atoms in the primitive cell, the phonon dispersion curve exhibits 18 branches, three acoustic, and fifteen optical branches. All phonon modes exhibit positive frequencies, suggesting that $NdIr_2$ is dynamically stable.

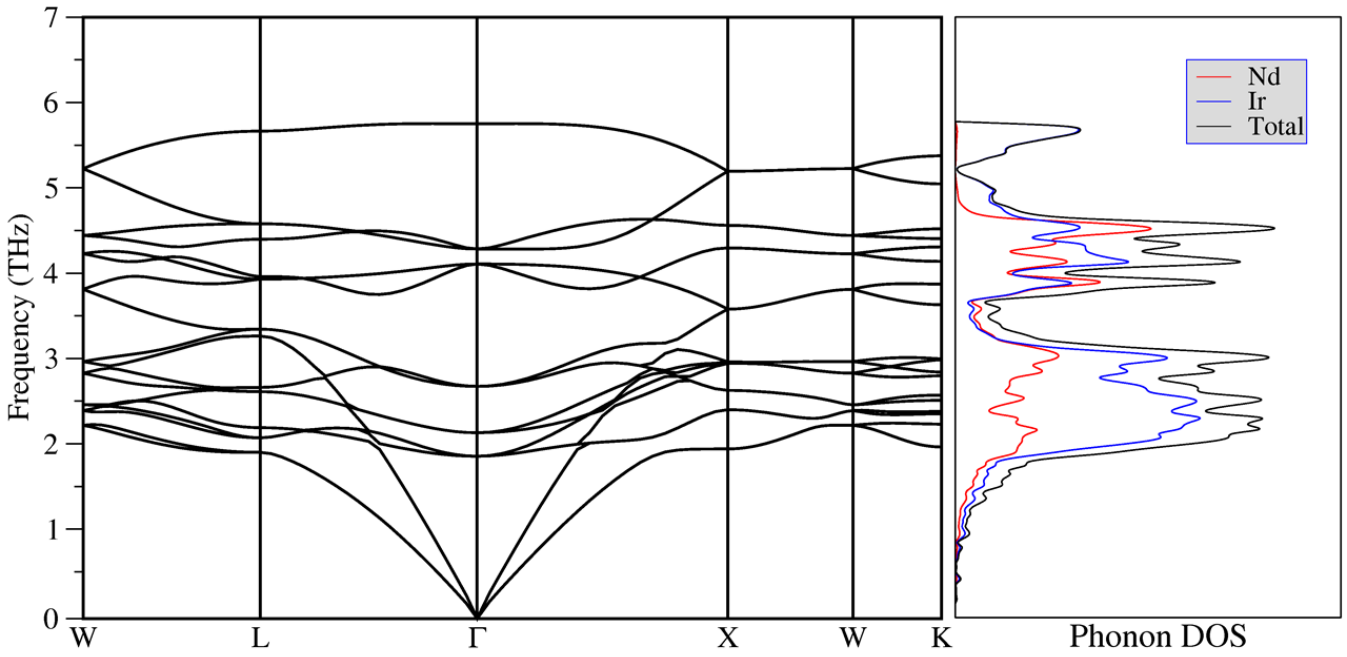


Figure 4. Calculated phonon dispersion curve of $NdIr_2$ compound along several lines of high symmetry in the Brillouin zone.

CONCLUSION

First-principles calculations are applied to study the structural, electronic, elastic, and vibrational properties for the C15 structure of the cubic $NdIr_2$ compound. Electronic properties were calculated for the C15 structure of $NdIr_2$ and it was seen that $NdIr_2$ had metallic properties in this C15 structure. In addition, elastic constant values were calculated to obtain information about the hardness and mechanical stability of the studied material. According to elastic calculations, the C15 structure of $NdIr_2$ is mechanically stable. From the phonon calculations, it was seen that the C15 structure of cubic $NdIr_2$ is also dynamically stable.

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NATION-BUILDING PROCESS IN KYRGYZTAN AFTER INDEPENDENCE

Dr. Khan NAVEED
Department of Social & Humanity Sciences, Vistula University, Poland

ABSTRACT

The Kyrgyz, one of the oldest Turkish tribes, has an important position among the Central Asian states. The first written sources we come across about Kyrgyz in the period of BC are valid in Chinese sources, except that Kyrgyzs were first mentioned in Kutadgu Bilig. The Kyrgyzs, who ruled under Russian rule for a certain period of time, first existed in the historical scene as the Kyrgyz Autonomous Soviet Socialist Republic in 1926, gained autonomy with the dissolution of the Soviet Union in 1990, and as the Republic of Kyrgyzstan, they could complete their independence with the concept of nation-state, which is also included in the international relations literature. With the collapse of the Soviet Union, many new nation-states have emerged. The formation process, economic situation and social and cultural developments of the Kyrgyz state, which gained full independence on 31 August 1991, should be discussed. In this study, by addressing the concept of "nation-state" based on the subject of our subject, the concepts of nation, nationalism and nation-state and its effects in Central Asia are examined, and then general information is given about the history of Kyrgyzstan, after its independence, common language and common culture understanding. policies and developments with the understanding of nation-state based on

Keywords: Kyrgyzstan, Central Asia, History of Kyrgyz, Kyrgyzstan after Independence, Nation-State Building, Soviet Russia

TSARIST RUSSIA AND CENTRAL ASIAN POLICIES

Dr. Khan NAVEED
Department of Social & Humanity Sciences, Vistula University, Poland

ABSTRACT

Central Asia region is one of the places that powerful states wanted to reach in the past, as it is today. Tsarist Russia wanted to take advantage of the trade routes and geopolitical advantage of this region. Tsarist Russia followed a politics of Russification in Central Asia and this situation had a great effect on Central Asia. Tsarist Russia occupied this region for its national interest. After the occupation, Russia developed its economy by establishing military administrative structures in the region. In addition, Tsarist Russia aimed to be more influential by placing Russian immigrants in these regions. Tsarist Russia, which effectively carried out its expansionist policies, became an important power in Central Asia.

Keywords: Tsarist Russia, Central Asia

PROSPECT AND CHALLENGES OF OFF SEASONAL TOMATO PRODUCTION: A CASE STUDY OF POKHARA, KASKI, NEPAL

Neesha Rajkarnikar[1], Deepanjal Shrestha [*2]

[1] Pokhara University, Faculty of Humanities and Social Science, School of Development and Social Engineering, Pokhara, Nepal.
*[*2] Pokhara University, Faculty of Management Studies, School of Business, Pokhara, Nepal.*

ABSTRACT

Agriculture is the main industry of Nepal, which contributes around 31.7% of GDP, employing about 65% of the total population. The geography of Nepal consists of three principal regions, the mountainous region, the hilly region, and the plains. The diverse geography and variation of temperature make the country a suitable land for agriculture and cultivation. The Nepalese agricultural sector is primarily subsistence-based where 82 percent of cultivated land is used for planting cereal crops (paddy, maize, wheat, millets, buckwheat, and barley). The country has to depend mainly on China and India to supplement the deficient cereals and for the supply of other agricultural products like vegetables and fruits. Tomato is a major vegetable that has a very high demand in Nepal. The production and export figures of 2017/18 for tomatoes depict that 21.8% was produced in the country while 78.2% was purchased from the neighboring countries. Further, it was noted that the production falls to 13.1% during the off-season and more export is enforced to meet the demands. Cultivating off-season tomatoes can greatly benefit the farmers, the customers and help the economy of Nepal to sustain better. This study brings out the prospects of production of off-season tomatoes and elaborates on how the supply chain (demand, supply, and production) is impacted. It brings out the benefits that are gained by producing off-season tomatoes and discusses the challenges that are encountered during the planting, production, and marketing of it. This paper also provides an insight into the requirements of off-season tomato production and resolutions for it. The paper is highly important for farmers, small-scale suppliers, government agencies, and people of Nepal, specially Pokhara, Kaski to learn about the production of off-season tomatoes and the overall benefits gained.

Keywords: Agriculture, Off-Season Cultivation, Tomato, Pokhara, Nepal.

1. INTRODUCTION

The Nepalese agricultural sector is primarily based on making a livelihood and supporting the income generation of Nepalese. The report published by the Ministry of Industry, Commerce, and Supplies, Government of Nepal states that 82 percent of the land is cultivated with cereal crops like paddy, maize, wheat, millets, buckwheat, and barley. Basic staple grains contribute only about 30 percent of Agricultural Gross Domestic Product (AGDP), while export crops contribute about 50 percent of GDP. Since the share of high-value crops in the total cultivated area is still small, the desired process of agricultural commercialization and diversification is hardly noticeable. The subsistence-based agricultural production does not provide good returns to the farmers, as the return to labor in cereals is poor or not sufficient. Trade through the Terai belt is subject to strikes and conflict due to continuing political and social tensions. Further, it is seen that the agriculture sector is also subject to

intermediaries that play a vital role in the commercialization of agriculture products leading to the poor price provided to the farmers for their agricultural products. The competition from India and China and the deficiency of Nepalese farmer to meet the national demand has also added pressure to the Nepalese agriculture industry. Agriculture is a vital industry that has extensive and viable scope for the commercialization of agricultural products. It is important to proceed in a planned manner to increase the attraction and overall production of agricultural products in Nepal. The different studies carried out by the Nepal government regarding the upliftment of the agriculture industry have found that the production and commercialization of high-value crops and off-seasonal agriculture products can provide a greater return on investment and a high return to labor and farmers. Tomatoes are one such high-yielding crop that has a regular demand in the Nepalese market throughout the year. It is observed that the demand for tomatoes only in Pokhara is around 9% to 13% and during the off-season, the scarcity of this vegetable leads to market deficiency and high price. Considering this fact a study for production and marketing of off-seasonal tomatoes was carried out in the Tutunga area of Pokhara, Kaski. This work discusses the various aspects of off-seasonal tomato production and issues related to the commercialization of this crop in Pokhara, Kaski of Nepal.

2. BACKGROUND AND LITERATURE REVIEW

Nepal is an agricultural country where more than 66% of the total population is involved in agriculture as their means of livelihood (ILO report, 2019). The percentage contribution to GDP by agriculture is 27% with a growth of 5.3% in 2017 as shown in figure 1, which indicates that Nepal has a prodigious scope in uplifting the national economy through agriculture (ILO report, 2019). Despite this fact, Nepal imported Rs 220 billion worth of agricultural goods in the last fiscal year (Kathmandu post, 2019). Nepalese agricultural industry faces challenges from the marketplace, climate change, land destruction, and workforce migration leading to the aging and declining of this industry (Shrestha et. al, 2020) Further, the government prioritizes this sector and has allocated a special budget and schemes but these schemes have not any practical improvement (Chaudhary, 2018). The government is inefficient to reach every section of a farmer (Thapa, 2010). There is a decreasing interest of modern Nepali youth in this industry as the gain in income is less compared to working in other sectors (Deshar, 2013). Paddy crops mainly rule Nepal's agricultural sector and these crops are inefficient to provide an optimal profit to the farmers and laborers. This has also significantly contributed to the declining interest of farmers in this sector.

The studies in the agriculture sector have shown that Nepal has strong potential in the production of a variety of commodities in the off-season. These off-season commodities have a high return on investment and can be a promising area for agriculture. To mention a few, orthodox tea, ginger, cardamom, specialty coffees, honey, non-timber products including essential oils and aromatherapy products, mandarin oranges, and off-season vegetables and citrus are promising and have acquired a foothold in some strategic regional and international markets(Ministry of Agriculture, 2018). On analyzing the agricultural content of trade between Nepal and its main trading partner, India, it is seen that the main import from India is rice (around a third of total agricultural imports excluding agricultural equipment and parts). Whereas, Nepal’s main exports are higher-value crops such as ginger, pulses, and cardamom, etc. that provide an immense opportunity for value chain enhancement in the agriculture sector of Nepal (JICA report, 2014). The studies carried out by different scholars at different times have stressed the need for investment of Nepali farmers in the production and proper marketing of high-value crops. The reports published by the Ministry of Industry, Commerce, and Supplies show that Nepal is slowly depending on the neighboring countries for the supply of fruits and vegetables. This demand rises extremely during the off-season and festival periods leading to major export in this area and loss of national capital in this regard (Pokhrel, 2010). Scholars have identified that the production of high-value crops and off-season vegetables can provide greater support to the economy of the country and well-planned strategy and investments in the agriculture sector must be

exercised. The first thing that is required is to promote the Nepalese agriculture industry towards high-value crops that provide six to seven times higher income incentives to the producers and laborers (Timsina et.al, 2018). Another important aspect to notice is that Nepal has a wide ecological and diverse landmass, which has immense potential to produce a variety of agricultural commodities. The most important and final understanding is to promote the production of off-seasonal high-value crops so that the export of crops with the high price during the off-season can be balanced (ILO, 2019)

Tomato is a very important crop that is in high demand all through the year in Nepal. Studies show that tomatoes hold % of the total vegetable market. In the Kaski district, tomatoes share about 9 to 13 percent of total vegetables (Ghimire et al, 2019). The urbanization of the city and the high demand for different vegetables around the year has motivated the local and regional populations to adopt agriculture as a primary profession. It is also noticed that people have started acquiring knowledge about off-season and high-value crops (Shrestha, 2008). More interesting is the fact that the production of vegetables in the off-season is gaining popularity in the district because within two years area under off-season vegetables have almost doubled in the district. People plant various off-season vegetables but off-season tomatoes have the largest share of about 30 percent of the total area under off-season vegetable production. This indicates that off-season tomato production is gaining popularity in the district (Gurung, 2016).

3. RESEARCH METHODOLOGY

The work was carried out in a place called Tutunga of Pokhara, Kaski, Nepal for a group of farmers working in the area of off-season tomato production. A close group interview with semi semi-structured questionnaire was used to interview the farmers working in the area of off-season tomato production. A total number of 30 farmers consisting of both males and females was considered. A group consisted of 3 to 5 respondents who were asked to fill in the provided questionnaire followed by small interviews. The interview was conducted to have an elaborate understanding of the work under consideration. Besides the farmers, 4 technical officers and 5 market suppliers were also interviewed to find the knowledge in the area of off-seasonal tomato production. The agriculture officers interviewed were from the agriculture office, Kaski. The study was further analyzed using Microsoft office tools to deduce results and findings.

4. DATA ANALYSIS AND FINDINGS

Data analysis and findings elaborate the study and provide important insight into the subject under study. The data analysis considered both demographical data and other findings to draw the necessary conclusion of the study.

4.1 Demographic Analysis of the Farmers

The demographic data depicted that in the total number of farmers interviewed, males formed the majority with 61.8% as shown in table 1. The interviewed farmers belong to three major age groups <= 30, 30 to 60, and above 60. The frequency distribution of the age groups shows that majority of the respondents fall in the then middle age group of 30 to 60 with 17 in number out of the total population as shown in figure 1.

Table 1. Representing the gender participation of the farmers

S.No.	Gender	Frequency	Percent
1	Male	21	61.8
2	Female	13	38.2
Total		**34**	**100.0**

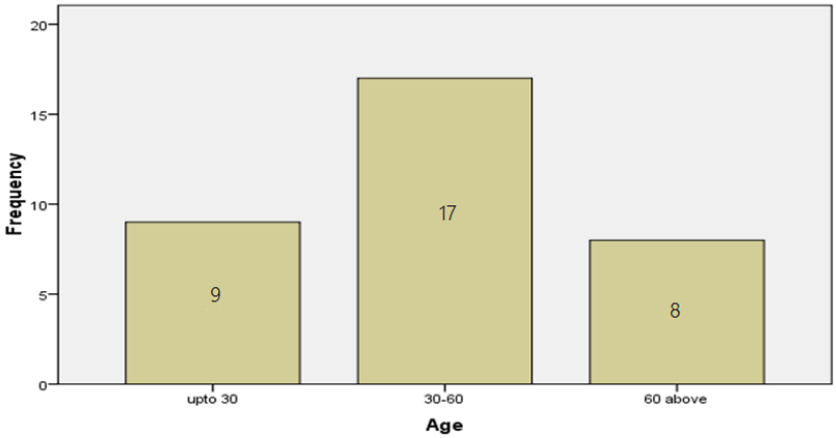


Figure 1. Representing the age group of the participating farmers

Education is a vital attribute to study for any population under investigation. The role of education is an important component required for the agriculture domain. The data depicted that 61.76 % of the farmers had primary school education, followed by secondary school and above with 14.71% as the next group as shown in figure 2.

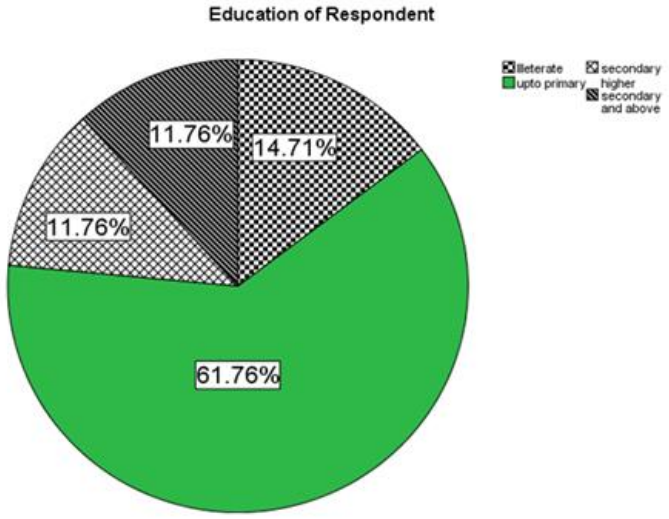


Figure 2. Representing the education status of the participating farmers

The land is an important aspect to consider for the farmer and agriculture activities. It was noted that all farmers had their land and minimum land acquired by the farmer of Tutunga with the majority of

the farmers having around 2 Ropani (where 1 Ropani = 508.74 square meters). The farmers with less land were mostly engaged in the production of high-profit crops and vegetables like tomato, which was cultivated all around the year. The next group of farmers with the land around 3-4 Ropani used half of their land for tomato production and the other half for seasonal vegetables. The land share of each farmer in Ropani is shown in table 2. The respondents were also inquired about their skill and training aspects in the agricultural sector. It was noted that only 5% of the farmers had training in the agriculture sector, the rest of the population was carrying the activity on a traditional basis. The data of training is shown in table 3.

Table 2. Representing the land acquired by the farmer

S. No	Land	Frequency	Percent
1	Around 2 Ropani	17	50.0
2	3 - 4 Ropani	8	23.5
3	4 to 5 Ropani	6	17.6
4	5 to 6 Ropani	1	2.9
5	Above 6 Ropani	2	5.9
Total		**34**	**100.0**

Table 3. Representing the training received by the farmer

S. No.	Training	Frequency	Percent
1	Yes	2	5.9
2	No	32	94.1
Total		**34**	**100.0**

The other aspect included the monthly income of the farmers, the use of income from the agriculture sector, and the level of satisfaction gained from the agriculture business as shown in table 4, table 5, and table 6. It is seen that 52.9% of respondents were satisfied with their occupation with only 23.5% people were planning to expand their occupation in agriculture. The monthly income of the household is at least 20000 for all participating farmers and most of the savings from income were used to purchase fixed assets.

Table 4. Representing the monthly income of the farmer

S. No.	Monthly Income	Frequency	Percent
1	Below 20000	20	58.8
2	20000-40000	13	38.2
3	40000 above	1	2.9
Total		**34**	**100.0**

Table 5. Representing the use of income by the farmer

S. No.	Use of saving	Frequency	Percent
1	Expansion of occupation	3	8.8
2	Purchase of fixed assets	5	14.7
3	Saving only	18	52.9
4	Others	8	23.5
Total		**34**	**100.0**

Table 6. Representing the satisfaction level of the farmer

S. No.	Satisfaction	Frequency	Percent
1	Yes	18	52.9
2	No	16	47.1
Total		**34**	**100.0**

Satisfaction and income sufficiency is important component to study in the business sector. It was discovered that the majority of the farmers were satisfied and almost 79.4% of the farmers felt that their income is sufficient for them at the current time. It was noted in the interview that young, male farmers were not satisfied in the agriculture business and they attributed their dissatisfaction in the field of market discovery, return on investment, government policy, long and short term of the local and federal government. They were of the view that besides so much effort and time dedicated to the agriculture business, the return is not satisfactory. They were of the view that this sector can be highly attractive if the government and local agencies pay equal attention to this sector and prioritize it.

Table 6. Representing the income sufficiency number of the farmer

S. No.	Sufficiency	Frequency	Percent
1	Yes	27	79.4
2	No	7	20.6
Total		**34**	**100.0**

4.2 Problem Analysis and Specification

The interview with farmers, technical resource persons, and market suppliers depicted that tomato is one of the major commercial vegetable crops and is widely grown both in the plains and hills of Nepal. Off-season tomato which is produced in the hills from July to November is one of the cash-generating crops suitable for small and poor farmers. From July to November (rainy season) tomato has huge export potential for the plains of Nepal, India & Bangladesh. In a nutshell, offseason season tomato is quite a remunerative enterprise to the hill farmers as the supply from Tarai is constrained by high temperature, low fruit set, flowering, bacterial wilt, and similar conditions.

The stakeholder of the tomato business stated that to overcome the unfavorable conditions in the off-season, plastic houses or greenhouses were constructed, and off-season tomatoes were grown inside them. It was seen that the area under plastic house tomato crop is increasing very rapidly in Nepal.

However, due to the non-scientific approach to building plastic houses, the production, productivity, and income of the farmers were declining. The reasons attributed were high temperature (flower & fruit dropping) and low light intensity (cell elongation). The off-season tomato under the open field was constrained mainly by high rainfall, bacterial wilt, late blight, Alternaria, and septoria leaf spot. The technical experts were of the view that standardization of polyhouse structure may help Nepalese tomato growers and knowledgeable technicians can solve the new generation problem i.e. cell elongation, flower & fruit dropping. The suppliers stated that the demand for tomatoes has been increasing all year round in the country and also in the neighboring countries. For enhancing the production and productivity of tomatoes and ensuring year-round supply in the market, rainy season tomato production in the plastic house at the farm level should be promoted.

Labor comprises the largest cost component (50% of the total cost) indicating that tomato production in the Hills is indeed labor-intensive. The only mechanized operation is spraying insecticides and occasional sprinkler or drip irrigation. The next largest cost component is indicated as costs for spraying insecticides and for staking the plants. Each tomato plant is staked with bamboo strips or sticks collected from the forests. As the plant population is 800 to 1000 per ropani, an equal number of stakes is also required. The next highest share of the cost goes for organic manure (13%). The cost of chemical fertilizers is only 3% of the total cost whereas pesticides consume 6%. Eight percent of the total cost goes for seeds because hybrid seeds are very costly.

4.3 Prospect of the Off-Season Tomatoes

The data analysis of the study represented that among the different vegetable crops, the tomato has a significant contribution on the contribution of vegetables to Agriculture Gross Domestic Product (AGDP). Analysis of costs of production of tomatoes in the Hill and Terai districts showed that the cost of cultivation is higher in the Hills than in Terai, but the benefits are also higher in the Hills. Similarly, the financial analysis of tomato cultivation shows benefit-cost ratios (BCR) of 2.66 for Hills and 2.07 for Terai (FBC, 2017). The BCR values for both Hills and Terai indicate fairly good profitability from tomato cultivation, but as the yields obtained at the farm level are still very low in comparison to the potential yields, there is ample room for improvement in raising the production and competitiveness in the market system from the intervention of new technology like off-season production of tomato in a plastic house with proper management practices and methods. The demand for tomatoes is seen all through the year and is mostly used by business enterprises like hotels and restaurants. It is seen that the biggest consumer of tomatoes in Pokhara, Nepal are the hotels and restaurants, followed by individual houses. The offseason gives an added advantage to the hilly regions as they have to manage the rain and plant diseases unlike the plain areas of Nepal where they have to deal with the flood, added temperature, and plant diseases. The demand for tomatoes also rises in neighboring countries like Bangladesh and India, which can be a good place for Nepalese off-season tomatoes to find another bunch of markets. It is further noted that the current status of tomato production and commercialization has proven profitable for farmers and laborers besides a limited investment in terms of cost, knowledge, and effort. Thus the prospect for Off-Seasonal tomato is quite promising and an area of a good return on investment.

4.4 Challenges of Off-Season Tomato Production

In general, the Nepalese agricultural industry faces challenges from the marketplace, climate change, land destruction, and workforce migration leading to the aging and declining of this industry [1]. The government policies give a lot of attention to the agriculture sector but the implementation aspects are very weak or do not reach the desired population properly. The budget and schemes provided by the government go either to waste or do not reach the right population in demand, leading to the declining status of this industry [3]. The government is inefficient to reach every section of the farmer [4]. There is a decreasing interest of modern Nepali youth in this industry as the gain in income is not optimal as compared to working in other sectors [5]. Further, this industry is badly influenced by many actors

who work on the supply and demand side of the agricultural industry and decide every aspect of this business, providing very little profit to the producers and laborers. The rural areas suffer from slow growth, rising poverty, food insecurity, and subsistence-level agriculture. Trade often occurs in local markets that are subject to gluts and price crashes. Storage and transport facilities are inadequately developed, and quality and value enhancement through grading and processing are rare. In the absence of adequate marketing channels and opportunities, the incentive and financial capacity to invest in improved farm and water management or modern inputs is limited. Furthermore, the challenges the sector faces in this era of globalization are related to market orientation, trade promotion, and increased investment in the agricultural sector to secure broad-based growth in rural incomes. Besides these challenges some other specific challenges for off-season tomato production are:

1. Initial Cost and Running Cost
2. Lack of Technical Knowledge
3. Environmental conditions during the offseason
4. Seasonal bacterial attack on plants
5. Inadequate knowledge
6. Lack of Support from the government
7. Lack of Agriculture commercialization
8. Lack of Proper Supply Chain
9. Lack of Proper Policy for Off-season tomatoes

5. DISCUSSION

It is noted that the demand for tomatoes is determined by many factors like population growth, prices of tomatoes and their major substitutes, and general income level of consumers, vegetables are consumed daily by all strata of people including the non-vegetarian, child, and aged population. The demands for tomatoes in the major market centers remain stable all around the year for the given size of the population. If total sales are taken as an indirect indicator of demand, the daily demand for tomatoes in the Pokhara market during the off-season (June/July-Sept/October) is estimated at 4 Mt. However, as indicated above, these are the supply-constrained sales. Therefore, real demand could be as high as the main season sales, which are at least 1 or 2 fold more in the market. Further, the demand for tomatoes is high in Nepal all through the year. Despite the challenges at different levels, it is seen that tomato farmers have always gained profit in this business. The rise in demand and deficiency of this vegetable in the off-season provides a lot of scope for the production, commercialization, and proper market for it. Although accurate and authoritative information is lacking, the production and consumption of tomatoes are said to be increasing annually in the Kaski district. This increase in consumption is brought about by a general increase in the income of the people; increased tourism activities in the recent years in the Pokhara, especially after the restoration of peace following a long period of unrest; migration to the cities from the rural areas; and a general increase in the level of awareness amongst the local population. The need at the current moment is to devise proper policies (short term and long term) and implement proper plans to increase the production of off-season tomatoes. The section below highlights the short-term and long-term policies and plans for proper production, management, and commercialization of off-seasonal tomatoes.

5.1 Short Term Policy Requirements

The short term policies that need to be enforced include:

1. Technical support should be provided by the government institution to the farmer and laborers.
2. Farmer should be provided with grants, soft loans, and financial assistance.
3. Single-owned enterprises should be stimulated and brought into mainstream markets.
4. Commercialization of Offseason tomato should be done.
5. Market management for the local product like vegetables and local cash crops must be channelized.

6. Training on optimal use of local resources and tools must be enforced.
7. Training should be provided for skill development to the local people, farmers, and laborers working in this field.

5.2 Long Term Policy Requirements

The long term policies that need to be enforced include:

1. Well access to means of transportation for distribution and channelization of the agriculture products.
2. Private, government and community sectors work for creating employment opportunity
3. Agriculture-based Co-operatives must be enhanced and provide necessary support by the government.
4. Proper marketing and online agricultural activities are required for a better market approach
5. Self-help groups, income-generating schemes of various NGOs, should be promoted.
6. The design and implementation of a promotional policy for agricultural entrepreneurship must be initiated.

CONCLUSION

At present, profitability from tomato cultivation appears much higher compared to field crops. So, to develop rainy season tomato production as a remunerative enterprise, plastic house technology is a successful solution in Pokhara where there is market access. The need is to increase market chain efficiency through increased efficient production, income generation, employment generation, and value addition of tomato through its offseason production as a main priority. The secondary issue is to assure the supply of the quality/modern agriculture inputs; add value to tomatoes through off-season production; create employment in the local areas; increase the income of the farm communities. As tomato is a very important crop that is in high demand all through the year in Nepal, the government must enforce proper policies and plans with real implementation. Technical knowledge and proper input must be provided to standardize the poly-house structure. More sound technicians must be employed with new research for a new generation of a chain of diseases. The production and commercialization of Off-seasonal crops like a tomato can provide better income to farmers and contribute to National Economy. If the tomato production is channelized properly, it can be a major crop for export

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THE EFFECTS OF DIFFERENT SALT AND FAT LEVELS ON VOLATILE COMPOUNDS OF KAVURMA

Derya Bayrak Kul[1], Zeynep Feyza Yılmaz Oral[2], Güzin Kaban[1*]

*[*1]Atatürk University, Faculty of Agriculture, Department of Food Engineering, Erzurum, Turkey.*
[2]Atatürk University, Erzurum Vocational School, Department of Food Technology, Erzurum, Turkey.
ORCID Code: 0000-0001-6720-7231

ABSTRACT

In this study, it was aimed to determine the effects of different salt (1%, 1,5% and 2%) and fat (10%, 15% and 20%) levels on the volatile compounds of kavurma (an uncured-cooked meat product). The cooking process was carried out in a steam jacketed couldron. After cooking, the kavurma samples filled in the casings were cooled to 4°C and then sliced samples were vacuum packaged. In the samples taken from final product, the volatile compounds were analyzed by gas chromatography/mass spectrometry (GC/MS) using solid-phase microextraction (SPME). A total 40 compounds were identified. The volatile compounds were consisted of 5 ketones,11 aldeyhdes, 5 alcohols, 2 sulphur compounds,1 lactone, 4 aliphatic hydrocarbons, 5 esters, 4 aromatic hydrocarbons, 1 furan, 1 terpene and 1 brached hydrocarbon. The fat and salt levels had a limited effect on the volatile compound profile of kavurma. The fat level had a very significant effect on ethanol, acetone, carbon disulfide, ethylacetate and toluene ($P<0.01$). On the other hand, the salt level showed an effect at $P<0.05$ level on ethanol and at $P<0.01$ level on carbon disulfide and toluene. A significant ($P<0.01$) or very significant ($P<0.05$) effects of the interaction of factors on these three compounds (ethanol, carbon disulfide and toluene) was also determined.

Keywords: Kavurma, volatile compounds, GC/MS, SPME

KAVURMANIN UÇUCU BİLEŞİKLERİ ÜZERİNE FARKLI TUZ VE YAĞ SEVİLERİNİN ETKİLERİ

Derya Bayrak Kul[1], Zeynep Feyza Yılmaz Oral[2], Güzin Kaban[1*]

*[*1]Atatürk Üniversitesi, Ziraat Fakültesi, Gıda Mühendisliği Bölümü, Erzurum, Türkiye.*
[2] Atatürk Üniversitesi, Erzurum Teknik Bilimler Meslek Yüksekokulu, Gıda Teknolojsi Bölümü, Erzurum, Türkiye.
ORCID Code: 0000-0001-6720-7231

ÖZET

Bu çalışmada farklı tuz (%1, %1,5 ve %2) ve yağ (%10, %15 ve %20) seviyelerinin kavurmanın uçucu bileşikleri üzerine etkilerinin belirlenmesi amaçlanmıştır. Pişirme işlemi, buhar ceketli bir kazanda gerçekleştirilmiştir. Pişirme işleminden sonra kılıflara doldurulan kavurma örnekleri 4°C'ye soğutulmuş ve daha sonra dilimlenerek vakum ambalajlanmıştır. Nihai üründen alınan örneklerde uçucu bileşikler, katı faz- mikroekstraksiyon (SPME) yöntemi kullanılarak gaz kromatografisi/kütle

spektrometrisi (GC/MS) ile analiz edilmiştir. Toplam 40 bileşik tanımlanmıştır. Uçucu bileşikler, 5 keton, 11 aldehit, 5 alkol, 2 kükürt bileşiği, 1 lakton, 4 alifatik hidrokarbon, 5 ester, 4 aromatik hidrokarbon, 1 furan, 1 terpen ve 1 dallanmış hidrokarbondan oluşmaktadır. Kavurmanın uçucu bileşik profile üzerine yağ ve tuz seviyesinin etkisi sınırlı bulunmuştur. Yağ seviyesi etanol, aseton, karbon disülfür, etilasetat ve toluen üzerinde çok önemli bir etkiye sahiptir ($P<0.01$). Tuz seviyesi ise etanol üzerinde $P<0.05$ seviyesinde ve karbon disülfür ve toluen üzerinde $P<0.01$ seviyesinde bir etki göstermiştir. Ayrıca faktörlerin bu üç bileşik (etanol, karbon disülfür ve toluen) üzerinde önemli ($P<0.01$) veya çok önemli ($P<0.05$) etkileri de tespit edilmiştir.

Anahtar Kelimeler: Kavurma, uçucu bileşik, GC/MS, SPME

GİRİŞ

Kavurma, parça halde işlenen, kür edilmemiş-pişirilmiş geleneksel bir et ürünüdür. Kavurma, soğutma teknolojisinin bilinmediği dönemlerde etin kavrularak dayanıklı hale getirilmesi ve yağ içerisinde muhafaza edilmesi sonucu ortaya çıkan bir ürünüdür (Vural and Öztan, 1989). Kavurma üretiminde kullanılan yegane katkı maddesi tuzdur. Tuzun antimikrobiyal etkisinin yanı sıra en önemli özelliği ürüne tipik tat ve lezzet vermesidir (Gökalp et al., 2004). Kavurma üretiminde kullanılacak etler, kaba yağ ve bağ dokuları uzaklaştırıldıktan sonra küçük parçalar halinde doğranır. Buhar ceketli kapalı kazanlarda yapılan üretimde kazana ilk önce tuzlanmış et ve kullanılacak yağın belirli bir kısmı konur ve sıcaklık kademeli olarak artırılır. Pişirme esnasında etler belirli aralıklarla etin yapısına zarar vermeden dikkatli bir şekilde karıştırılır. Kavurma işlemi tamamlandığında yağ, boşaltma musluğundan alınır. Kavrulmuş et ise yağı ayrıldıktan sonra boşaltılır (Gökalp et al., 2004; Kaya and Kaban, 2010). Pişirme süresi kullanılan hammaddeye ve uygulanan sıcaklığa bağlı olarak değişmektedir (Vural and Öztan, 1989; Aksu and Kaya, 2005). Pişirme işleminin kontrolü duyusal olarak yapılmakla birlikte objektif kriter olarak nem içeriğinin %45'e düşmüş olması gerekmektedir (Anon, 2012).

Pişirilmiş et ürünlerinde aroma gelişiminde, pişirme yönteminin yanı sıra kullanılan et ve yağın çeşidi, formülasyona giren katkı maddeleri de önemli rol oynamaktadır. Et bileşenleri arasında pişirme sırasında gerçekleşen kompleks reaksiyonlar sonucu gelişen lezzet, bu ürünlerin en önemli kalite kriterlerinden biridir. Bu reaksiyonlarda indirgen şekerler, amino asitler ve lipitler önemli rol oynamaktadır. Pişirilmiş et ürünlerinde lezzete etki eden en önemli iki reaksiyon Maillard reaksiyonu ve lipit oksidasyonudur (Roldan et al., 2015). Maillard reaksiyonunda N– glikozidlerin oluşumu ve çok sayıda son ürün reaksiyonlarının yanında ürünün aroması üzerinde etkili bileşikler de oluşmaktadır. Bu nedenle kızartma, kavurma, fırında pişirme gibi ısıl işlem uygulamalarında Maillard reaksiyonu oldukça önemlidir (Belitz et al., 2009). Maillard reaksiyon ürünleri genellikle düşük molekül ağırlıklı hidrokarbonlar, alkoller, ketonlar, aldehitler, esterler, eterler ve heterosiklik bileşikler gibi uçucu bileşikleri içermektedir (Lee and Shibamoto, 2002).

Kavurmada uçucu bileşiklerin belirlenmesine yönelik olarak sadece iki araştırma mevcuttur (Uzun and Bozkurt, 2010; Şişik Oğraş et al., 2018). Uzun and Bozkurt (2010) tarafından kavurmada uçucu bileşiklerin belirlendiği araştırmada, pişirme işlemi sırasında örnekleme yapılmıştır. Şişik Oğraş et al. (2018) ise farklı yağlar (sığır et yağı, böbrek yağı ve kuyruk yağı) kullanılarak kapalı kazanda üretilen kavurmaların uçucu bileşiklerini belirlemişlerdir. Bu araştırmada, farklı tuz (%1, 1,5 ve 2) ve yağ (%10, 15 ve 20) seviyelerinin kavurmanın uçucu bileşikleri üzerine etkilerinin belirlenmesi amaçlanmıştır.

MATERYAL VE METOT

Materyal

Araştırmada, Et ve Süt Kurumu Erzurum Et Kombinasından kesimden sonra 24 saat dinlendirilmiş sığır karkasının but bölgesinden çıkarılan etler ve sığır böbrek yağı hammadde olarak kullanılmıştır. Etler kaba yağ ve bağ dokularından uzaklaştırıldıktan sonra yaklaşık olarak 4 x 5 cm olacak şekilde doğranmıştır. Böbrek yağı, sıcaklığı 60°C olan su banyosunda eritilip süzüldükten sonra soğukta muhafaza edilmiştir.

Metot

Kavurma üretimi

Araştırmada üç farklı yağ oranı (%10, %15 ve %20) ve üç farklı tuz oranı (%1, %1,5 ve %2) esas alınarak 9 grup kavurma üretilmiştir. Denemeler tam şansa bağlı deneme planına göre iki tekerrürlü olarak gerçekleştirilmiştir. Üretim, sıcaklığı ayarlanabilen buhar ceketli kapalı kazanda gerçekleştirilmiştir. Pişirme işleminin tüm aşamalarında 10 dakika aralıklarla kazan kapağı açılmak suretiyle karıştırma işlemi uygulanmıştır. Pişirme işleminden sonra kavurmalar kılıflara doldurularak 4°C'ye kadar soğutulmuş ve dilimlendikten sonra (3cm kalınlığında) poliamid/polietilen ((15×25 cm, PA/PE) (3-seal bags GB 70) material (O_2 geçirgenliği 40 cm^3/m^2/day. atm. 23°C; N_2 geçirgenliği 24 cm^3/m^2/day. atm. 23°C; CO_2 geçirgenliği 1454 cm^3/ m^2/day. atm. 23°C; ve su buharı geçirgenliği <3 g/m^2/day. atm. 23°C, Sudpack Verpackungen GmbH Co, Germany) ambalajlama materyali kullanılarak vakum ambalajlamaya (Multivac A300/16, Sepp Haggenmüller, Germany) tabi tutulmuştur.

Uçucu bileşik profilinin belirlenmesi

Homojen hale getirilen kavurma örneklerinden 40ml'lik viallere 5'er g (Supelco, Bellefonte PA, USA) örnek tartılmış ve uçucu bileşiklerin ekstraksiyonu için vialler termal blok içerisinde 30°C'de bir saat bekletilerek uçucu bileşiklerin tepe boşluğunda toplanması sağlanmıştır. Bu aşamadan sonra bileşiklerin adsorbsiyonu için CAR/PDMS fibre viallere yerleştirilerek 2 saat süreyle bekletilmiştir. Bu sürenin sonunda fibre sisteme enjekte edilmiş ve gaz kromatografisi (GC, Agilent 6890N)/kütle spektrometrisi (MS, Agilent 5973) ile uçucu bileşikler belirlenmiştir. Sistemde kolon olarak DB-624 (J&W Scientific, 60 m x 0.25 mm x 1.4 µm), taşıyıcı gaz olarak ise helyum kullanılmıştır. Bileşiklerin tanımlanmasında, kütle spektrometrisinin kütüphanesi (NIST, WILEY, FLAVOR) ve standart miks (Supelco 44585-U, Bellefonte PA USA) kullanılmıştır (Kaban 2009).

İstatistiki analizler

Araştırmada farklı tuz (%1, %1,5 ve %2) ve yağ (%10, %15 ve %20) oranları faktör olarak seçilmiş ve denemeler 3x3 faktöriyel düzende tam şansa bağlı deneme planına göre iki tekerrürlü olarak yürütülmüştür. Elde edilen sonuçlar varyans analizine tabi tutulmuş ve önemli bulunan ana varyasyon kaynakları Duncan çoklu karşılaştırma testiyle değerlendirilmiştir (SPSS 20.0).

BULGULAR

Farklı yağ ve tuz oranları kullanılarak üretilen kavurma örneklerinde 5'i keton, 11'i aldehit, 5'i alkol, 2'si sülfürlü bileşik, 1'i lakton, 4'ü alifatik hidrokarbon, 5'i ester, 4'ü aromatik hidrokarbon, 1'i furan, 1'i terpen ve 1'i dallanmış hidrokabon olarak üzere toplam 40 bileşik tanımlanmıştır. Bu bileşiklerden aseton, etanol, karbondisülfür, etil asetat ve toluen üzerine yağ oranının $P<0.01$ düzeyinde etkili olduğu tespit edilmiştir. Tuz oranı ise etanol üzerinde $P<0.05$, karbondisülfür ve toluen üzerinde $P<0.01$ düzeyinde etki göstermiştir. Diğer taraftan farklı yağ ve tuz oranı interaksiyonun bu üç bileşik üzerinde önemli ($P<0.05$) veya çok önemli ($P<0.01$) etkisinin olduğu belirlenmiştir.

Tuz seviyesi ve yağ seviyesi değişkenlerine ait ortalamaların Duncan çoklu karşılaştırma test sonuçları Tablo 1'de verilmiştir. Tablo 1'den de görüleceği üzere yağ oranının artması aseton miktarında artışa neden olmuştur. En yüksek aseton seviyesi %20 yağ oranında belirlenmiş, %10 ve %15 yağ oranlarına ait ortalamalar arasında ise istatistiki açıdan bir farklılık belirlenmemiştir. Benzer şekilde etanol miktarı da yağ seviyesine bağlı olarak artmış ancak %10 ve %15 yağ oranlarına ait ortalamalar istatistiki olarak bir farklılık göstermemiştir. Tuz seviyesi açısından ise en yüksek ortalama etanol içeriği %1,5 tuz kullanılan grupta tespit edilmiştir (Tablo 1).

Kavurma örneklerinde karbondisülfür içeriği %10 yağ içeren grupta daha yüksek bulunurken, yağ içeriğinin artması ile %15 ve %20 yağ içeren gruplarda düşüş göstermiştir. Tuz ilavesi de benzer şekilde etki göstermiş ve artan tuz oranı ile birlikte karbondisülfür içeriğinde azalma ortaya çıkmıştır(Tablo 1). Tuz oranı, etil asetat üzerinde etkili olmazken, yağ oranı açısından en yüksek ortalama değer %10 seviyesinde tespit edilmiştir. Aromatik hidrokarbonlar içerisinde sadece toluen incelenen faktörlerden etkilenmiştir. Bu bileşik için en yüksek ortalama değerler %10 yağ içeren grup ile %1 tuz içeren grupta belirlenmiştir(Tablo 1).

TARTIŞMA

Et ürünlerinin üretiminde hammaddeden başlayarak pek çok faktör ürünün uçucu profili üzerinde etki göstermektedir. Üretim sırasında uygulanan teknolojiye bağlı olarak gerçekleşen proteolitik parçalanma sonucu açığa çıkan peptitler ve serbest amino asitler gibi protein yapısında olmayan azotlu bileşiklerin miktarı ve çeşidi doğrudan tat üzerinde etkili olabildikleri gibi uçucu bileşiklerin oluşumunda öncül madde olarak da rol oynayabilmektedir. Ayrıca lipolisiz sonucu oluşan serbest yağ asitleri, aldehitler, ketonlar, alkoller ve esterler gibi aroma üzerinde etkili olan uçucu bileşiklerin oluşumuna katkı sağlamaktadır (Kaya and Kaban, 2010).

Kavurma örneklerinde 40 uçucu bileşik tanımlanmıştır. Şişik Oğraş et al., (2018) tarafından farklı hayvansal yağlar kullanılarak üretilen kavurma örneklerinde dokuz farklı kimyasal gruba giren 44 uçucu bileşik belirlenmiştir. Araştırmada farklı yağ veya yağ kombinasyonlarının bu çalışmada da olduğu gibi sınırlı sayıda uçucu bileşik (benzaldehit, nonanal, 3-metil-2-butanon, 2,5-oktadien, undekan ve etanol) üzerinde etkili olduğunu rapor edilmiştir.

Uçucu bileşikler içerisinde $P<0.05$ düzeyinde önemli bulunan etanol, karbonhidrat metabolizmasının bir ürünüdür. Diğer taraftan alkollerin oluşumunda amino asit metabolizması ve lipit oksidasyonu gibi farklı yollar da bulunmaktadır (Sidira et al., 2015). Araştırmada önemli bulunan bir başka bileşik karbondisülfürdür. Düşük aroma ve tat duyum eşiklerinden dolayı uçucu sülfürlü bileşikler, düşük konsantrasyonlarda dahi duyusal özelliklere katkı sağlayabilmektedir. Nitekim pek çok gıdada sülfürlü bileşiklerin, düşük konsantrasyonlarda (<1 µg/kg) lezzet karakteristiklerine katkıda bulundukları bildirilmektedir (McGorrin, 2011). Diğer taraftan aromatik hidrokarbonlar içerisinde yer alan toluenin, lipit degradasyonu (Çakır et al., 2013) ve amino asit katabolizması sonucu oluşabileceği bildirilmektedir (Marco et al., 2008).

Tablo 1. Kavurmada farklı yağ ve tuz oranı değişkenlerinin uçucu bileşik değerlerine ait ortalamaların Duncan çoklu karşılaştırma test sonuçları ($AUx10^6$)

	Yağ oranı			Tuz Oranı		
Bileşik adı	**%10**	**%15**	**%20**	**%1**	**%1,5**	**%2**
Propan	0,28±0,12	0,36±0,17	0,2±0,24	0,28±0,17	0,23±0,18	0,33±0,23
Aseton	5,63±1,48b	4,25±2,49b	7,06±2,13a	5,05±3,04	5,64±1,94	6,24±1,88
2,3-Butandion	5,10±3,87	4,57±4,07	5,04±4,32	5,12±4,06	4,84±3,93	4,77±4,30
Asetoin	1,34±0,74	0,74±0,70	1,40±0,89	1,04±0,80	1,27±0,83	1,18±0,87
2-Okten	0,99±0,64	0,79±0,57	0,67±0,62	0,89±0,68	0,83±0,71	0,74±0,44
Asetaldehit	2,21±0,41	1,99±0,72	2,24±0,44	2,16±0,43	2,02±0,42	2,26±0,73
3-Metilbutiraldehit	0,91±0,58	1,24±1,07	1,04±1,21	1,08±1,17	1,11±0,88	1,00±0,92
Pentanal	7,63±6,16	7,57±7,63	7,41±5,07	7,33±3,62	6,99±5,90	8,29±8,55
Hekzanal	46,36±17,68	43,51±18,25	43,93±21,16	50,98±18,67	41,39±16,78	41,44±20,05
Heptanal	1,49±0,66	2,18±1,17	1,68±0,74	1,85±0,82	1,51±0,69	1,98±1,16
Benzaldehit	0,91±0,73	1,21±1,19	1,01±1,13	1,18±1,04	0,81±0,98	1,14±1,06
Oktanal	0,89±0,66	1,84±1,77	0,87±0,62	1,59±1,73	0,77±0,56	1,25±0,98
Nonanal	0,79±0,41	1,02±0,46	0,63±0,42	0,80±0,49	0,69±0,37	0,95±0,48
Dekanal	0,30±0,40	0,37±0,40	0,13±0,18	0,28±0,35	0,25±0,28	0,27±0,42
4-(1-metiletil)-benzaldehit	1,32±2,71	1,67±2,53	2,41±3,94	1,87±2,94	1,68±3,49	1,85±3,01
1-Butanal	0,19±0,13	0,14±0,13	0,11±0,07	0,11±0,10	0,14±010	0,19±0,13
Etanol	35,57±13,73b	34,29±10,72b	47,68±10,09a	32,95±11,83b	44,25±10,18a	40,33±14,45b
1-Penten-3-ol	0,71±0,61	0,71±0,91	0,71±0,69	0,74±0,58	0,61±0,67	0,78±0,94
1-Hekzanol	0,43±0,41	0,64±0,78	0,55±0,69	0,61±0,74	0,41±0,50	0,60±0,68
1-Okten-3-ol	0,70±0,60	2,73±2,59	1,84±1,92	1,70±1,93	1,29±1,45	2,28±2,58
2-etil-1-hekzanol	3,21±0,75	3,44±1,17	3,23±1,23	3,41±1,32	2,96±0,66	3,51±1,06
Karbondisülfür	35,68±14,32a	19,55±13,92b	17,47±7,51b	33,09±16,73a	21,29±13,54b	18,32±8,67b
2-Merkapto-4-feniltiyazol	0,53±0,61	0,71±0,73	0,24±0,16	0,79±0,81	0,23±0,12	0,46±0,45
Butirolakton	0,98±0,78	1,68±3,05	0,99±1,41	0,76±1,09	1,08±1,91	1,81±2,60
Hekzan	2,38±1,65	2,45±2,52	2,87±3,36	2,05±1,72	2,75±3,18	2,89±2,66
Heptan	3,07±1,6	2,3±1,88	2,12±1,61	2,38±1,68	2,58±1,67	2,53±1,89
Oktan	3,01±1,8	1,76±0,68	1,89±1,34	1,89±1,10	2,41±1,68	2,36±1,53

Dekan	0,79±0,70	0,84±0,62	0,35±0,40	0,83±0,79	0,51±0,43	0,64±0,57
Etil asetat	7,63±3,48a	3,25±2,25b	4,48±2,02b	6,35±4,10a	4,35±2,66a	4,66±2,44a
Butilpropiyonat	1,85±1,48	2,34±2,90	1,47±2,13	2,06±2,07	1,33±1,52	2,27±2,90
Propil hekzanoat	0,94±0,39	1,54±1,03	0,80±0,61	1,25±1,04	1,04±0,60	0,99±0,66
Hekzil bütanoat	1,21±0,63	1,26±0,89	0,80±0,51	1,32±0,90	0,84±0,37	1,12±0,71
Propanoik asit, 2-metil-butil ester	0,16±0,21	0,30±0,45	0,54±0,63	0,24±0,29	0,25±0,26	0,50±0,72
Toluen	3,88±3,34a	1,74±1,01b	2,27±1,22b	4,03±3,19a	1,72±0,94b	2,15±1,44b
Etil benzen	0,38±0,46	0,79±1,46	0,55±0,59	0,96±1,40	0,31±0,34	0,45±0,66
p-Ksilen	0,30±0,28	0,76±0,71	0,86±0,87	0,53±0,61	0,67±0,67	0,72±0,83
Stiren	0,55±0,70	0,69±0,87	0,52±0,69	0,81±0,98	0,42±0,58	0,53±0,59
2,2,4,6,6-pentametil-heptan	1,89±1,01	1,91±1,45	1,27±1,12	1,78±1,21	1,38±0,85	1,92±1,51
2-pentil-furan	0,31±0,54	0,48±0,93	0,3±0,48	0,50±0,97	0,22±0,43	0,36±0,49
Limonen	0,45±0,60	0,18±0,19	0,36±0,65	0,24±0,55	0,32±0,47	0,43±0,57
Her bir değişken için aynı satırda farklı harfle işaretlenmiş ortalamalar istatistiki olarak birbirinden farklıdır (P<0.05)						

SONUÇ

Et ürünlerinin üretiminde hammadde başta olmak üzere üretim prosesinde gerçekleştirilen işlemler neticesinde aroma üzerinde etkili pek çok uçucu bileşik oluşmaktadır. Özellikle üretim sırasında protein ve lipitlerde gerçekleşen reaksiyonlar sonucunda uçucu bileşiklerin oluşumunda rol oynayan öncül maddeler oluşabildiği gibi doğrudan aroma üzerinde etkili uçucu bileşikler de oluşabilmektedir. Farklı yağ ve farklı tuz oranları kullanımı kavurmada sınırlı sayıda uçucu bileşik üzerinde etkili olmuştur. Ayrıca bu iki faktörün interaksiyonu da sadece 3 bileşik üzerinde etki göstermiştir. Bu bileşikler üzerinde hem yağ hem de tuz oranının artması genellikle düşüşe neden olmuştur.

TEŞEKKÜR

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ANALYSIS OF ENERGY EFFICIENCY USING EC AND AC MOTOR FANS IN 100% FRESH AIR TYPE AIR HANDLING UNIT

Burçin Özdemir[1*], Aytaç Gültekin[2]

*[*1] Graduate School of Natural and Applied Sciences, Engineering Faculty, Energy Systems Engineer, Ankara, Turkey.*
ORCID Code: 0000-0002-5890-0621
[2] Karamanoglu Mehmetbey University, Engineering Faculty, Doç.Dr.Aytaç Gültekin, Karaman, Turkey.
ORCID Code: 0000-0002-1639-1128

ABSTRACT

The ventilation unit we have determined is designed to provide fresh air to the space in a school or library. The selected ventilation plant is calculated on the basis of Istanbul city temperature values.
The device selection that will meet the fresh air needs of the library has been chosen as 100% fresh air, and the performance values in the use of both AC motor fan and EC motor fan use are integrated into automation to increase energy efficiency and reduce the mount of energy consumed. In this way, energy savings were achieved by increasing the air quality of the environment. In the study, while maintaining the indoor air quality, the energy used was saved. With the selection of the 100% fresh air device, which we determined in the selection program, as AC motor fan and EC motor fan separately, in addition to the data received, the automation system is integrated into the ventilation device. The annual average energy efficiency gain has been calculated. It has been determined as a result of the data received that it is more efficient to control with automation in case of using EC motor fan in 100% fresh air ventilation plant. In this way, while increasing the air quality of the environment, the amount of energy consumed annually is reduced by a minimum of 9.80% in case the fan and motor are EC.

Keywords: HVAC, BMS, automation, Air handling unit, EC motor, AC motor

%100 TAZE HAVALI HAVALANDIRMA SANTRALİNDE EC VE AC MOTORLU FAN KULLANIMINDAKİ ENERJİ VERİMLİLİĞİNİN ANALİZİ

Burçin Özdemir[1*], Aytaç Gültekin[2]

*[*1]Fen Bilimleri Enstitüsü, Mühendislik Fakültesi, Enerji Sistemleri Mühendisi, Ankara, Türkiye.*
ORCID Code: 0000-0002-5890-0621
[2]Karamanoğlu Mehmetbey Üniversitesi, Mühendislik Fakültesi, Doç.Dr.Aytaç Gültekin, Karaman, Türkiye.
ORCID Code: 0000-0002-1639-1128

ÖZET

Belirlediğimiz havalandırma santrali bir okul veya kütüphanede mahale taze hava sağlayacak şekilde dizayn edilmiştir. Seçilen havalandırma santrali İstanbul il sıcaklık değerleri baz alınarak hesaplanmıştır.
Kütüphanenin taze hava ihtiyacını karşılayacak olan cihaz seçimi %100 taze havalı olarak seçilmiş olup, hem AC motorlu fan kullanımındaki performans değerleri hem de EC motorlu fan kullanımındaki performans değerlerine otomasyon entegre edilerek enerji verimliliğini arttırmak ve tüketilen enerji

miktarının azaltılmasıdır. Bu sayede ortamın hava kalitesini arttırarak aynı zamanda enerji tasarrufu elde edilmiştir. Çalışmada iç hava kalitesi korunurken, kullanılan enerjiden tasarruf edilmiştir. Seçim programında belirlediğimiz %100 taze havalı cihazın AC motorlu fan ve EC motorlu fan olarak ayrı ayrı seçimlerin yapılmasıyla birlikte alınan verilere ek aynı zamanda otomasyon sistemi havalandırma cihazına entegre edilmiştir. Yıllık ortalama ne kadar enerji verimi kazancı olacağı hesaplanmıştır. %100 taze havalı havalandırma santralinde EC motorlu fan kullanımı durumunda otomasyon ile kontrol edilmesi daha verimli olduğunu alınan veriler neticesinde belirlenmiştir. Bu sayede ortamın hava kalitesini arttırırken yıllık tüketilen enerji miktarı fan ve motorun EC olması durumunda minimum %9,80 oranında düşürülmüştür.

Keywords: HVAC, BMS, otomasyon, havalandırma santrali, EC motor, AC motor

1.GİRİŞ

Havalandırma ekipmanlarında en fazla enerji tüketimi olan ürün klima santralleridir. Klima santralleri ortamdaki havanın koşullandırılmasını; ısıtma, nemlendirme, nem alma, soğutma, içerideki havayı egzoz etme vb. işlemleri gerçekleştirirler. Havalandırma santrallerinin içerisindeki fanlar hem kanal basıncını hem de cihaz içerisindeki basıncı karşılayacak kapasitede olmalıdır. Fanlarda enerji tüketiminin azaltılması için havalandırma santralinin prosesine önem gösterilmelidir [1].

Eğitim alanlarında ortamın taze hava şartlarının koşullandırılması günümüzde önemli bir konuma gelmiştir. Özellikle içerisinde bulunduğumuz pandemi döneminde ortama %100 taze hava sağlanması, içeriden egzoz edilen havanın kullanılan cihazda karışım oranı yapılmadan dışarıya egzoz edilmesi ve ortama %100 taze hava sağlanması öncelikle sağlık için oldukça önemlidir. Kütüphane ve eğitim alanlarında kullanılan iklimlendirme cihazları, yaz-kış sürekli olarak çalışması sebebiyle enerji tüketimini minimum seviyeye indirerek kullanılan enerjiden tasarruf sağlanması ve işletim maliyetinin düşürülmesi önemlidir [2]. Eğitim alanları yaz okulları dahil olmak üzere neredeyse yıl boyunca kullanıma açık alanlar olmaktadır. Bu sebeple kullanılan iklimlendirme cihazını iki farklı motor tipi kullanarak seçildiğinde, EC motorlu fan kullanımı sonucunda yıllık olarak enerji tüketiminde tasarruf sağladığı söyleyebiliriz. Tasarlanacak olan cihaz seçimleri özellikle ISO 9001:2000 kalite güvence sistemi ile çalışan bir fabrikada üretilmesi istenilmektedir. Ayrıca havalandırma santrallerinin EUROVENT sertifikasının olması ve CE işaretinin olması istenilmektedir. Üretilecek olan cihaz için paneller sökülebilir yapıda ve EN1886 standardına uyulması istenilmektedir [3].

Bu şartları sağlayan öncelikle Dünya'da klima santrali üretimi denilince aklımıza ilk gelen üretici firma Systemair olmaktadır. Systemair arge ekibinin geliştirmiş olduğu aircalc pro programı havalandırma cihazında kullanılan batarya, fan, motor, nemlendirici, eşanjör, plaka, rotor, run a round vs. ana ekipmanları olmakla birlikte cihazda kullanılacak olan komponentlerine kadar tüm maliyetler programa entegre edilmiştir. Bu program sayesinde ortamda kullanılacak olan cihazlar tasarlanır ve üretime aktarılır.

2.YÖNTEM

Aircalc programını kullanarak İstanbul il sıcaklık, bağıl nem, ortam sıcaklığı değerleri referans alınarak kütüphane veya okulda kullanılmak üzere %100 taze havalı klima santrali seçilmiştir. Seçilen klima santrali hem AC motorlu fan hem de EC motorlu fan olmak üzere iki farklı şekilde cihaz seçimleri yapılmıştır. Seçilen iki cihazda da filtreler ve bataryalar aynı seçilmiştir. Seçilen klima santrali boyutları aynıdır. AC motorlu seçilen klima santralinde referans alınan debiyi tek fan karşılayabiliyorken EC motorlu klima santralinde aynı debi ve basıncı çift fan seçilmesi durumunda karşılayabilmektedir. Seçilen iki konfigürasyonlarda aynı zamanda günün tamamında çalışmaması adına otomasyon entegre

edilmiştir. Otomasyon sayesinde bir gün için istenilen zaman-saat aralığında cihazların çalışması sayesinde enerjiden tasarruf sağlanmıştır. Klima santrallerinin hafta içi olmak üzere günlük 10 saat olmak üzere bir senede 260 gün çalıştığı kabul edilmiştir. Dış hava sıcaklıkları için meteoroloji sayfasından İstanbul'un aylık ortalama sıcaklıkları alınmış ve mahal ısı kayıp-kazanç kapasitelerine göre mahali istenilen şartlara getirmek için gereken ısıtma-soğutma kapasiteleri hesaplanmıştır. Hesaplamalar sonucunda EC motorlu havalandırma cihazların enerji verimliliği AC motorlu havalandırma cihazlarına istinaden daha verimlidir.

3.BULGULAR

Havalandırma santrali günlük 10 saat sadece hafta içi (Pazartesi-Cuma) olmak üzere, bir senede 260 gün çalıştığını kabul ettiğimizde AC motorlu fan kullanımı durumunda günlük enerji kazancı 0,86 kWh, senelik enerji kazancı 223,6 kWh olduğu hesaplanmıştır. EC motorlu fan kullanımı durumunda günlük enerji kazancı 11,17 kWh, senelik enerji kazancı 2904,2 kWh olduğu hesaplanmıştır. Bu durumda toplamdaki kazanca baktığımızda EC motorlu fan kullanımı sonucunda 9,80% enerji kazancı olduğu hesaplanmıştır. Detaylı olarak hesaplamalar Tablo 1'de gösterilmiştir.

Tablo 1: EC ve AC Motorlu Fan Kullanımındaki Enerji Verimliliği

	Hav. Santrali	Günlük 10 Saat Toplam Enerji Tüketimi	Hav. Santrali	Günlük 10 Saat Toplam Enerji Tüketimi	Günlük Enerji Kazancı (kw)	Senelik Enerji Kazancı (kw)	Kazanç (%)
AC Motorlu Fan (kWh)	11	110	10,91	109,14	0,86	223,6	0,78%
EC Motorlu Fan (kWh)	2X5,7	114	5,1415 X2	102,83	11,17	2904,2	9,80%

4.TARTIŞMA VE SONUÇ

Yapılan hesaplamalar sonucunda EC motorlu fan kullanımı durumunda yıllık enerji kazancı 9,80% olmaktadır. EC motorlu fan kullanımı yıllık olarak enerji kazancı sağlarken aynı zamanda AC motorlu fan kullanımına göre daha verimlidir. EC motorlu fanların uzun ömürlü, düşük ses seviyesine sahip olması, ısı kayıplarının daha az olması, fan eğrisine göre istenilen değerlerde çalışabilmesi, değişken hızlarda verim kaybı ve ses seviyesi artmaması sebebiyle tercih edilmelidir.

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RELEASE KINETICS OF VITAMIN E FROM CHITOSAN/GUM ARABIC MICROCAPSULES

Deniz AKIN SAHBAZ[1*]

[*1]*Pamukkale University, Faculty of Engineering, Department of Chemical Engineering, Denizli, Turkey.*
ORCID Code: 0000-0002-8667-2451

ABSTRACT

Vitamin E is widely used in many medical and cosmetic applications as a strong antioxidant/radical scavenging ability. However, vitamin E degrades when exposed to unfavorable environmental conditions (light, heat and oxygen). Due to the rapid degradation characteristics, microencapsulation of Vitamin E is promising technique to protect it before use. Potential benefit of microencapsulation is its ability to targeted and/or controlled release and protect incorporated ingredients such as vitamins, enzymes, antioxidants, drugs. This paper focuses on microencapsulation of Vitamin E by chitosan and gum Arabic polymers and understanding release kinetics of vitamin E through chitosan/gum Arabic microcapsules for time-dependent release. Chitosan/gum Arabic microcapsules were synthesized by complex coacervation method and characterized by Fourier-transform infrared spectroscopy (F-TIR), scanning electron microscopy (SEM). Vitamin E was used as the release agent to observe the release kinetics from chitosan/gum Arabic beads at pH 7.4. Release kinetics and mechanism of vitamin E from microcapsules were studied using various mathematical models such as, zero order, first order, Higuchi's model and Korsmeyer-Peppas model. The constants and the coefficient of determination (R^2) of each model was used to evaluate the release behavior of the vitamin E. Concerning the R^2 values, the Korsmeyer-Peppas model was the most appropriate for explaining the vitamin E release kinetics with an R^2 over 0.98.

Keywords: Kinetics, microcapsules, release mechanism, vitamin E

INTRODUCTION

Microencapsulation is a process of surrounding micron-sized materials in a polymeric shell. The active agent to be encapsulated may be referred to as the internal phase, core material or fill, while the encapsulating material may be referred to as carrier material, coating, shell, external phase or wall material (Dhakal and He, 2020). The technique aiming to protect sensitive compounds from environmental factors extensively used in many industrial applications including metal coating (Wazarkar et al. 2016), pharmaceuticals (Liu et al. 2021), cosmetics (Martins et al. 2014) and textiles (Nelson 2002).

Vitamin E is a lipophilic bioactive compound and presents different natural isoforms, being tocopherols (α, β, γ and δ) and tocotrienols (α, β, γ and δ) the two most common groups (Ribeiro et al. 2021). Among them, α-tocopherol is the most abundant, highly active and bioavailable vitamin E homologue in nature and has shown to have potential health benefits as antioxidant (Chaiyasat et al. 2013; Parthasarathi and Anandharamakrishnan 2016). However, the direct utilization is quite limit because of degradation when exposed light, heat, humidity and oxygen. To prevent degradation, the encapsulation is a most promising technique in protect Vitamin E against adverse environmental conditions.

Microcapsules can be prepared by various approaches such as solvent evaporation (Chaiyasat et al. 2013), complex coacervation (Budincic et al. 2021; Butstraen and Salaün, 2014), spray drying and spray freeze drying techniques (Parthasarathi and Anandharamakrishnan 2016; Rutz et al. 2017). Among these methods, complex coacervation is quite promising technique due to the excellent safety,

great shell integrity, high encapsulation efficiency, controlled-release possibility, and minimum requirements on equipment investment (Du et al. 2018).

The scope of this study is to demonstrate the applicability of complex coaservation technique for the microencapsulation of vitamin E and to evaluate release mechanism of vitamin E from the chitosan/gum Arabic microcapsules. Microcapsules were prepared by the complex coacervation method and subsequently characterized by Fourier-transform infrared spectroscopy (F-TIR) and scanning electron microscopy (SEM). In order to investigate the kinetics and release mechanism of the microcapsules various mathematical models (zero order, first order, Higuchi's and Krosmeyer-Peppas model) were applied.

MATERIALS AND METHODS

Materials

Vitamin E (Alfasol) was used as the core material. Chitosan (Medium Molecular Weight, Sigma Aldrich) and gum Arabic (Alfasol) were used as wall materials. Emulgin 286 as surfactant to form emulsion and glutaraldehyde (Fluka) as crosslinker were used in the synthesis process. pH was adjusted using acetic acid (CH_3COOH, Merck) and sodium hydroxide (NaOH, Meck). All the chemicals used in the study were of analytical grade.

Preparation of Microcapsules by Complex Coacervation

Chitosan/gum Arabic microcapsules containing vitamin E were synthesized by complex coacervation method (Akin Sahbaz and Ozturk, 2018). Gum Arabic solution (8%, w/v, 100 mL, pH 3.6) was prepared and vitamin E was dropwise added to the coating solution. The mixture was dispersed by a homogenizer (WiseTis Homogenizer HG-15D) at room temperature (25°C) at 11000 rpm during 15 min to create an oil in water emulsion.1.6 mL of emulsifier (Emulgin 286) was used to stabilize the emulsion. Chitosan solution (% 1 w/v, 100 mL) was prepared in acedic acid solution (2% v/v). Gum Arabic-chitosan coacervation was obtained by the dropwise addition of chitosan solution at 1400 rpm for 15 min. The microcapsules need to be cross-linked to increase the thermo-mechanical properties of the microcapsules. Glutaraldehyde solution (50%, w/v, 5 mL, pH 9-10) was then adding to crosslink the formed microcapsules. Afterwards the resulted microcapsules were separated by decantation, washed and dried at room temperature.

Characterization of Microcapsules

The morphology of microcapsules was observed by Scanning Electron Microscopy (SEM, Bruker, Germany). The microcapsules were previously placed on the adhesive tape and sputter coated by a thin layer of gold, than viewed at an acceleration voltage of 15 kV. The chemical structure of the microcapsules and shell polymers were analyzed by FT-IR instrument (4000-400 cm^{-1}) (Agilent Technologies, Cary 630).

In Vitro Release Study

The release of vitamin E from the microcapsules was investigated in ethanol solution (50 %, v/v) under continuous stirring. Accurately weighted amounts of microcapsules (around 0.5 g) were immersed in 25 mL 50 % ethanol solution and incubated at 37°C in a shaking water bath (Uniterm, TT104) at 100 rpm. The supernatant containing released vitamin E was analyzed by UV– Visible spectrophotometer (Shimadzu, UVmini-1240) during 20 hours. All experiments were conducted in triplicate.

In an ideal system, the release profile of the core material should fit zero order or first order kinetic model. If the core of the microcapsules is a pure compound, zero order kinetic model, which has a constant release, is observed. First order kinetic model is observed, if the core of the microcapsules is a solution. Also, in practice, the release profile is examined by more complex mathematical models such as Higuchi's and Korsmeyer-Peppas equations (Ribeiro et al., 2020). To evaluate the mechanism

of vitamin E release, the release data were fitted by mathematical models describing zero order, first order, Higuchi's and Korsmeyer-Peppas kinetics.

Zero Order:

$$Q_t = Q_0 + k_0\, t \quad (1)$$

First Order:

$$Q_t = Q_0 e^{-k_1 t} \quad (2)$$

$$ln\frac{Q_t}{Q_0} = k_1\, t \quad (3)$$

Higuchi's Model:

$$Q_t = k_H\, t^{0.5} \quad (4)$$

Korsmeyer-Peppas Model:

$$\frac{Q_t}{Q_\infty} = k_k\, t^n \quad (5)$$

$$ln\frac{Q_t}{Q_\infty} = \ln k_k + n\ \ln t \quad (6)$$

where Q_t is the cumulative amount of the active compound released at the time t, Q_0 is the initial amount of the active compound in solution (most times, $Q_0 = 0$), k_0 is the zero order release constant and k_1 is the first order release constant, k_H is the Higuchi constant of dissolution, k_k is the Korsmeyer-Peppas constant, Qt/Q∞ is the fraction of released vitamin E until time t, n is the release diffusional exponent.

RESULTS AND DISCUSSION

Powder Morphology and FT-IR Analyses

The formation of chitosan/gum Arabic microcapsules was proved by SEM observation. As shown in Fig. 1, the microcapsules have nearly spherical morphologies and most microcapsules are not uniform in size.

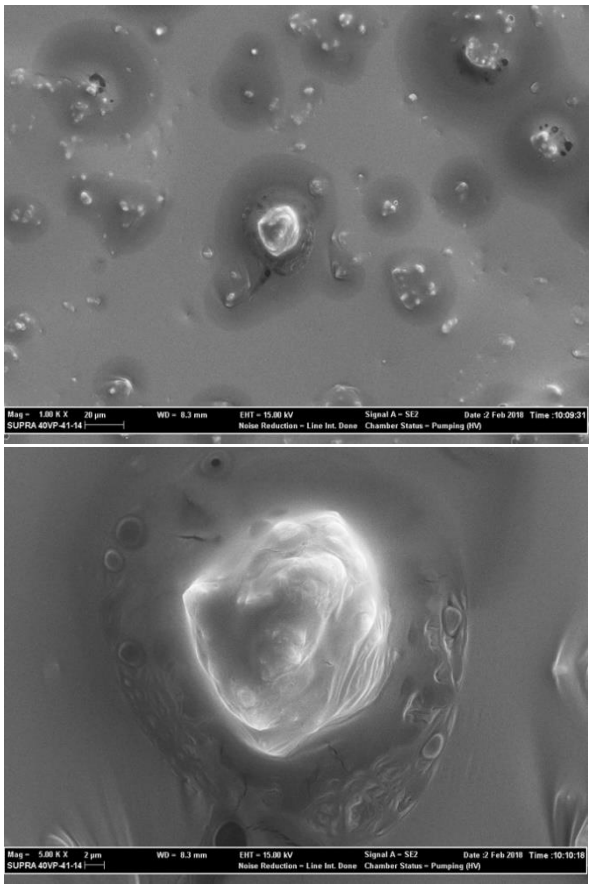


Figure 1. SEM micrographs of
chitosan/gum Arabic microcapsules.

The obtained FT-IR spectra from chitosan/gum Arabic microcapsules are presented in Fig. 2. In the spectrum of chitosan, gum Arabic and the microcapsules, there is a very broad band around 3200 cm^{-1}. This is related to the hydroxyl group (stretching vibrations of O-H group) of chitosan, gum Arabic as well as the presence of water molecules absorbed by polymeric structure (Mehran et al., 2020). In the spectrum of microcapsules, the characteristic peaks at 2918 cm^{-1} and 1248 cm^{-1} can be associated with C-H and C-O-C stretching, respectively.

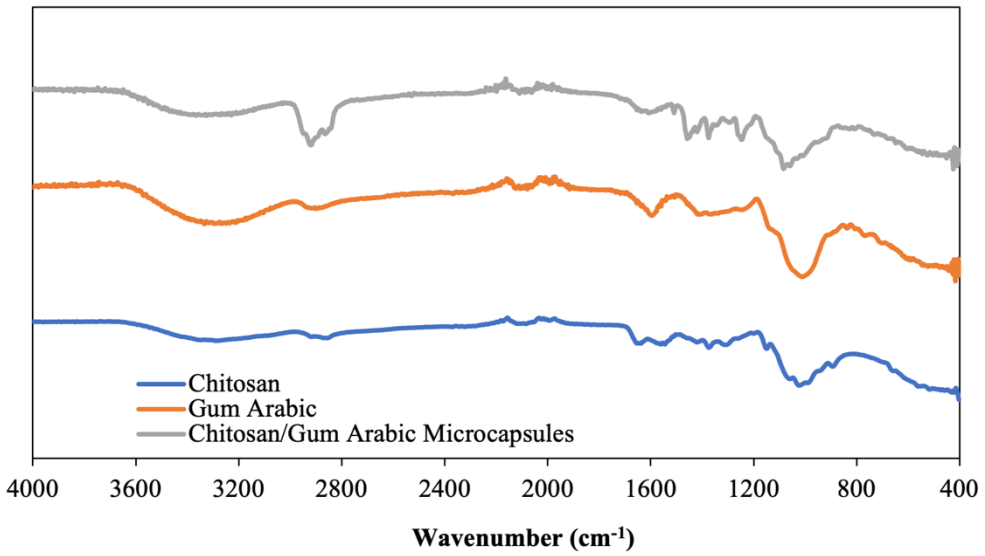


Figure 2. FTIR spectra of chitosan, gum Arabic, and chitosan/gum Arabic microcapsules.

Vitamin E Release Kinetics

Release kinetics of vitamin E encapsulated with chitosan and gum Arabic were carried out at 37 °C and shown in Fig. 3. About 20 % of the entrapped vitamin E was released in the first ten minutes. The microcapsules presented controlled release of α-tocopherol for the first 3.5 hours. The release of vitamin E remained at equilibrium between 3.5-6 hours, and after 6 hours there was an increase in release rate due to structural degradation of the microcapsules.

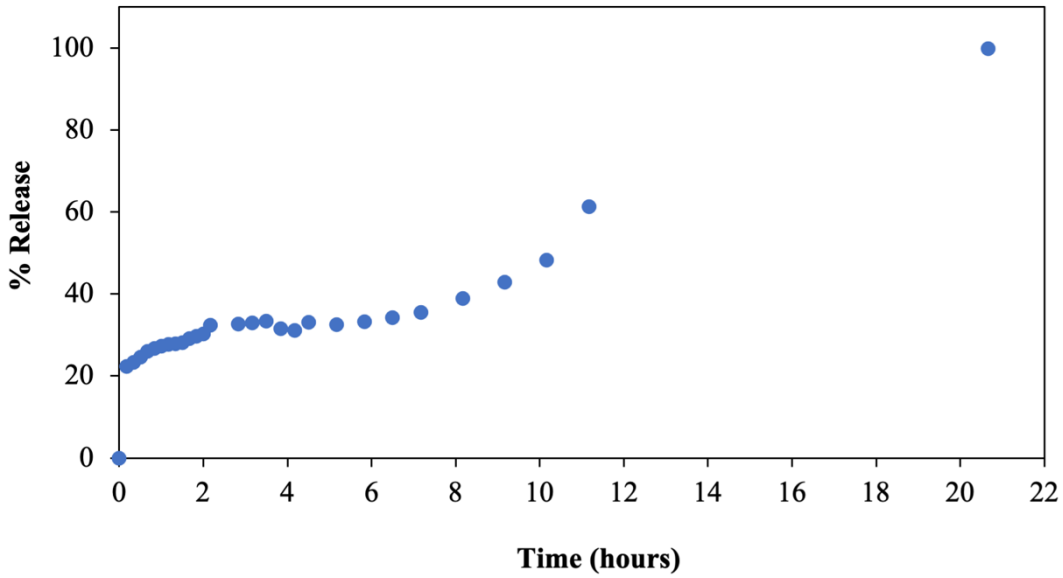
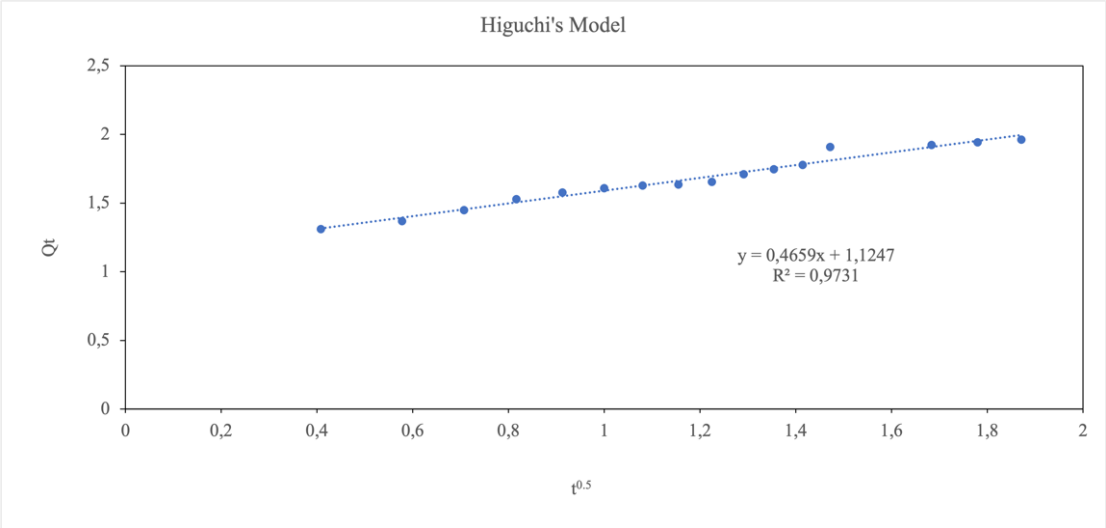


Figure 3. Release profile of vitamin E from the chitosan/gum Arabic microcapsules.

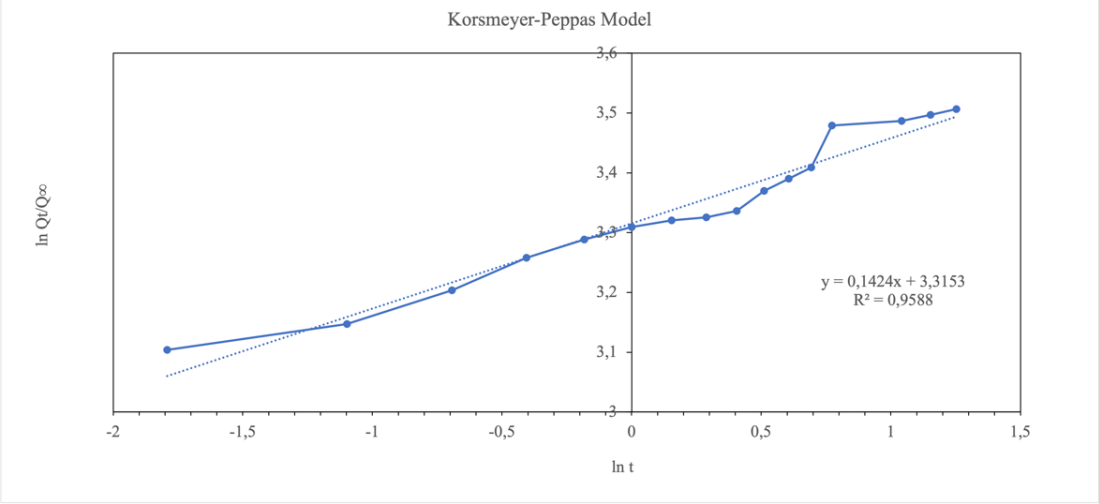
The vitamin E release kinetics data were tested using zero order, first order, Higuchi and Korsmeyer-Peppas models and kinetic release parameters are given in Table 1. The model that gave higher the regression coefficient 'R^2' value is considered as best fit model. The regression coefficient 'R^2' value was found to be higher in the Higuchi's model (Fig. 4 (a)) than those in the zero order, first order and

Korsmeyer-Peppas models. The microcapsules followed Higuchi matrix suggesting the vitamin E release by diffusion (AppaRao et al., 2010). This model is based on the hypotheses that vitamin E diffusivity is constant and matrix swelling and dissolution are negligible (Dash et al., 2010).

First 60 % release data are used in the Korsmeyer-Peppas model to realize the mechanism of vitamin E release. The R^2 of the Korsmeyer-Peppas model (Fig. 4 (b)) for release of Vitamin E from chitosan/gum Arabic microcapsules is above 0.95 and also has acceptable fitting degree. The value of n plays an important role in its release mechanism and is less than 0.45 represents a Fickian mechanism, value $0.45 < n < 0.89$ indicates non-Fickian transport (or anomalous diffusion) which is the co-existence of fick diffusion and corrosion diffusion, and $n>0.89$ represents erosion mechanism (Mehran et al., 2020; Wang et al., 2020). As can be seen from Table 1, the value of n is 0.1424, which is less than 0.45 represents. It indicates that the release kinetics of Vitamin E from the microcapsule system conforms to fick diffusion mechanism.



(a)



(b)

Figure 4. Higuchi's and Korsmeyer – Peppas model for mechanism of vitamin E from the chitosan/gum Arabic microcapsules.

Table 1. Kinetics data of the Vitamin E release profile from the chitosan/gum Arabic microcapsules

Zero Order	First Order	Higuchi's Model		Korsmeyer-Peppas Model		
R^2	R^2	R^2	k_H	R^2	n	k_K
0.9277	0.9028	0.9731	0.4659	0.9588	0.1424	0.2753

CONCLUSION

The aim of this study was to investigate the release of vitamin E from the chitosan/gum Arabic microcapsules in a controlled way. The performed analyzes yielded worthwhile results, proved the success of the vitamin E microencapsulation by complex coacervation and gave important information about the release kinetics of vitamin E from the microcapsules.

From SEM images, it can be observed that the microcapsules have nearly spherical and round shape and most microcapsules are not uniform in size. The evaluation vitamin E release from the chitosan/gum Arabic microcapsules under continuous stirring at 37°C (simulating human body temperature) was carried out through a spectrophotometric method. Four release models containing zero order kinetic, first order kinetic, Higuchi model and Korsmeyer-Peppas model were used to fit the release experimental data in order to further explore the release mechanism of vitamin E from the microcapsules. Results show that Higuchi's model was most suitable for representing the release kinetics of vitamin E from the microcapsules.

ACKNOWLEDGEMENTS

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QOS-BASED ADMISSION CONTROL USING MODIFIED MULTI-CRITERIA DECISION MAKING AND MODIFIED SIMILARITY MEASURE IN FOG INTEGRATED CLOUD ENVIRONMENT

Eht E Sham[1*], D.P.Vidyarthi[2]

*[*1]Jawaharlal Nehru University, Research*
[2] Jawaharlal Nehru University, Professor,
School of Computer and Systems Sciences,
New Delhi, India.

ABSTRACT

Fog computing has emerged as a solution to such a problem by placing the devices near requesting nodes. IoT applications on fog resources improve performance such as in-time service delivery, reduced network load optimal energy usage, etc. Fog integrated cloud computing supplements cloud computing by providing an additional layer between Cloud and IoT Edge devices for processing storage. Together Fog and Cloud can serve the IoT Application requests better.

This paper aims to select different application provider nodes in Fog integrated Cloud Computing. A fuzzy similarity decision-making approach deals with the service provider computing nodes based on QoE and QoS features. The proposed work used modified multi-criteria decision making and proposed a new method of similarity measure to rank the service provider computing nodes. A new system is offered that permits the intuitive inclusion of approximation fuzziness in the analysis and ranking of nodes. The scheme signifies imprecision with Fuzzy numbers and uses them to rank computing nodes with novel similarity measure-based fuzzy modifications of the familiar TOPSIS method. The fuzzy based TOPSIS technique improved by introducing modified similarity fuzzy measures instead of fuzzy distance measures with three different criteria for the FPIS and FNIS needed in the proposed method. An overall ranking was performed using the five new fuzzy TOPSIS variants with three different ideal solutions. We have compared 15 combinations of ideal solutions and similarity measures for the modified TOPSIS method. The investigation suggests that the individual rankings differ, depending on ideal solution and similarity measure combinations.

Keywords: QoS, Fog integrated Cloud Architecture, Fuzzy TOPSIS, Fog Computing, and Fuzzy Similarity Measure.

Introduction: The ever-increasing demand for cloud services significantly impacts the network bandwidth, leading to service degradation mostly in terms of latency. This has resulted in the inception of a new paradigm called Fog computing. Similar to Cloud computing, Fog computing is also a highly distributed, heterogeneous, and virtualized environment that offers its customers compute, network, and storage services on a reduced scale. The services in Fog computing are available close to the edge of the network. Fog and Cloud, together, can serve the IoT application requests in a better manner. Fog-integrated Cloud architecture is comprised of three layers as shown in Fig. 1 [1–3]. The first layer consists of IoT devices, sensors, and other intelligent devices, generating data and seeking computation. The second layer is a micro data center, a highly virtualized platform, which provides computation, storage, and networking services between the end devices in IoT and traditional Cloud. The last layer, a Cloud computing node, is highly virtualized and equipped with ample storage and computing capacity. The applications that generally need a Cloud for the processing can also be processed at the Fog layer. These tasks may include processing, temporary storage, data security [4,5], privacy, etc.

Efficient application tasks scheduling is challenging due to constrained resource capabilities, resource heterogeneity, network hierarchy, IoT mobility, and the environment's stochastic behavior [6–9]. Adopting the new architecture of Fog-integrated Cloud for job placement, has received considerable attention among the researchers to address issues such as latency, energy, costs, etc. Fog and Cloud providers can exploit the temporal variations by routing IoT

applications to a suitable Fog or Aggregated fog node to reduce the cost and latency besides utilizing the local compute facility.

The highlights of the proposed model are as follows.

- Both, applications and computing instances are prioritized on the basis of their dependent metrics using Modified TOPSIS.
- Modified TOPSIS have less computational complexity, assigns different Priority to non-similar applications and computing instances
- An improved approach is introduced to measure the similarity of two TZFNs that considers the geometrical distance, area, perimeter, and weight.
- The proposed method is verified using standard metric methods such as symmetricity, identity, non-negativity, and zero property.
- An experimental study is provided, proving that the proposed policy performs similar to the state of artwork.

2. Literature Survey

The challenges and goals in Fog-integrated Cloud have been analyzed and its architectural design is presented with future perspectives [2,11,12]. With huge computation, storage, and networking capacity, Cloud computing can address these challenges very well. However, researchers identified several open challenges [1,9] to adopt and utilize Cloud computing technologies for IoT applications. Some authors briefed on QoS (Quality of Service) in Fog computing and dynamic provisioning in Fog-integrated Cloud. [2] Suggested that QoS aware dynamic service provisioning in Fog computing must be lightweight suiting to its architectural requirements. Many researchers have applied soft computing techniques to cater to Fog-integrated Cloud challenges such as latency minimization [8], improved transmission time, better energy consumption [13], etc. [14] have applied fuzzy inference to improve transmission time and latency. In [15], a fuzzy approach is used for searching appropriate nodes in a large grid network. [9] proposed an application placement policy considering two constraints; Fog node availability and users' expectations on QoS. The policy applies fuzzy models for applications' placement on metrics such as processing time, service access time, expected resources, and expected processing time. [16] discussed few metrics, e.g., responsiveness and error rate, which eventually helps the system to auto-scale the fog node and reschedule the traffic to balance the load factor. A fuzzy mathematical model is used for auto-scaling, which reduces the overall cost of the operating expenses.Many authors have applied evolutionary techniques to address some open challenges in Fog-integrated Cloud. [17,18] proposes task scheduling to optimize operating cost and execution time in a Cloud–Fog environment. A work in [19] applies a heuristic for task execution in Fog computing.

The similarity measure is the key to handling the fuzzy risk analysis problems. Therefore, numerous researchers have absorbed the similarity of TZFNs and have developed various methods to measure the degree of similarity. Various authors have applied Fuzzy similarity measures in mental workload assessment and human health risk analysis [20–28]. Tang and chi [29] apply the risk assessment method in multilateral trade credit risk analysis. They have worked on similarity measures and presented improved techniques to handle specific cases of trapezoidal fuzzy membership number (TZFN). McCulloch et al. [30] have used the application to perform at clustering words of similar meaning. Some other [31] have been used to measure similarity to deal with pattern recognition problems, whereas Zuo et al. [32] applied it in fault diagnosis.

Fuzzy set (FS) theory, offered by Zadeh [33], has been extensively used as an effective tool to organize fuzziness and vagueness. Meanwhile, it has revealed prosperous applications in various management, economy, and industry fields. Schmucker et al. [2] introduced a fuzzy risk analysis [20][38]in solving real-world problems. A multi-criteria decision-making (MCDM) of cellular mobile telephone service providers using intuitionistic fuzzy with similarity measures was proposed by Mishra et al. [34]. Manna et al. [35] discussed the trapezoidal interval type-2 fuzzy set and its applications in stochastic MCDM. Then, Liu and Li [36] explored emergency decision-making

combining cumulative prospect theory and group decision-making. Kaur et al. [37] defined intuitionistic trapezoidal MCDM with incomplete weight information. Liang and Wang [38] applied a linguistic intuitionistic cloud decision support model. Yoshida [23] proposed asset management with coherent risk measures derived from decision-makers and also proposed dynamic risk-sensitive fuzzy asset management.

4. The Proposed Work

4.1. Extended Three Layer Architecture

In this work, the Fog-integrated Cloud architecture has further been extended based on the node characteristics of the supporting infrastructure, as shown in Fig. 6. Fog nodes are divided into two sub-categories: Fog nodes and Aggregated Fog nodes. This enhanced model is introduced due to varied computing capacity as a heterogeneous environment can have various computing nodes besides the nature of the requests. Each type of node has a specific design. The selection of any of the three types of a computing node is based on the input parameters provided by the users directly (physical requests) or indirectly (delay sensitivity, Priority). The ACM segregates the incoming requests and maps them to the classes of computing nodes according to their resource requirements. These requests are prioritized and categorized as follows.

- Time-sensitive and highest scheduling class requests get Priority. Such requests are processed on the nearest fog node.
- Application with some tolerance is given next Priority and forwarded to the aggregated fog node for analysis and visualization. However, this node's request size is somewhat larger than the request made at the fog node.
- Delay tolerant application or application that requires long-term Storage has the lowest Priority and is sent to the Cloud for historical and big data analytic or even for long-term Storage.

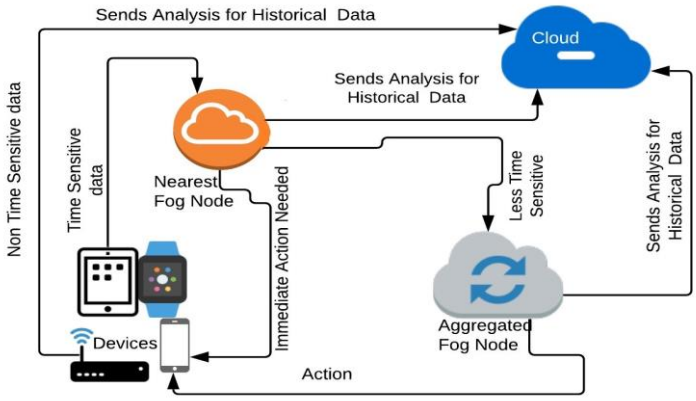


Figure 1: Extended Three Layered Architecture of ACM

Similarity Measure:

This section briefly reviews the concept of TZFNs and explains some related terms in fuzzy similarity measures, including the operational laws. The understanding of operation will be used in the application section in three different case studies of fuzzy risk analysis, including risk analysis of SLA violations in Fog-integrated Cloud. A TZFN $\tilde{A}(a_1, a_2, a_3, a_4; w_A)$ is defined as in (1) where, $a_1 \leq a_2 \leq a_3 \leq a_4; w_A \epsilon [0,1]$.

$$\mu_{\tilde{A}}(x) = \begin{cases} 0, & if -\infty < x \le a \\ \dfrac{x-a}{x-b}, & if\ a < x \le b \\ w, & if\ b < x \le d \\ \dfrac{d-x}{d-c}, & if\ d < x \le c \\ 0, & if\ c < x < \infty \end{cases} \quad (1)$$

Let two TZFNs $\tilde{A}(a_1, a_2, a_3, a_4; w_A)$ & $\tilde{B}(b_1, b_2, b_3, b_4; w_B)$, where $a_1 \le a_2 \le a_3 \le a_4$ and $b_1 \le b_2 \le b_3 \le b_4$. The arithmetic operations between $\tilde{A}$ and $\tilde{B}$ are addition, multiplication and division as defined in equations (2-5). TZFNs under additive law ($\oplus$) is defined as in (2).

$$\tilde{A} \oplus \tilde{B} = (a_1, a_2, a_3, a_4; w_A) \oplus (b_1, b_2, b_3, b_4; w_B) \quad (2)$$
$$= (a_1 + b_1 - a_1 b_1, a_2 + b_2 - a_2 b_2, a_3 + b_3 - a_3 b_3, a_4 + b_4 - a_4 b_4; min(w_A, w_B))$$

TZFNs under multiplicative law ($\otimes$) is defined as in (3).

$$\tilde{A} \otimes \tilde{B} = (a_1, a_2, a_3, a_4; w_A) \otimes (b_1, b_2, b_3, b_4; w_B)\ (a_1 b_1, a_2 b_2, a_3 b_3, a_4\, b_4;\ min(w_A, w_B)) \quad (3)$$

TZFNs under division law ($\oslash$) is as in (4). Where $a \oslash b$ is defined in (5).

$$\tilde{A} \oslash \tilde{B} = (a_1, a_2, a_3, a_4; w_A \oslash (b_1, b_2, b_3, b_4; w_B) = \left(\frac{a_1}{b_1}, \frac{a_2}{b_2}, \frac{a_3}{b_3}, \frac{a_4}{b_4};\ min(w_A, w_B)\right) \quad (4)$$

$$\text{Where,}\quad a \oslash b = \begin{cases} \frac{a}{b}, & if\ a \ge 1 \\ 0, & otherwise \end{cases} \quad (5)$$

Theorem 1: For $\forall \tilde{A}, \tilde{B} \epsilon$ TZFN, Addition ($\oplus$), Multiplication ($\otimes$), and Division ($\oslash$) also belong to TZFN

Proof:

$Let\ \tilde{A}(a_1, a_2, a_3, a_4, ; w_A)$ & $\tilde{B}(b_1, b_2, b_3, b_4; w_B) \epsilon\ TZFN$ [0,1] such that: $0 \le a_1 \le a_2 \le a_3 \le a_4 \le 1$ & $0 \le b_1 \le b_2 \le b_3 \le b_4 \le 1$.

$$\tilde{A} \oplus \tilde{B} = (a_1 + b_1 - a_1 b_1, a_2 + b_2 - a_2 b_2, a_3 + b_3 - a_3 b_3, a_4 + b_4 - a4\ b4, min(w_A, w_B)) \quad (6)$$

The first tuple in equation (6):

$$(a_1 + b_1 - a_1 b_1) \ge (a_1 + b_1 - a_1) = b_1 \epsilon [0,1] \text{ and hence } (a_1 + b_1 - a_1 b_1) \ge 0$$
$$= a_2 + b_2 - a_2 b_2 - (a_1 + b_1 - a_1 b_1)$$
$$= (a_2 - a_1 + b_2 - b_1 + (a_2\, b_2 - a_1 b_1))$$
$$\ge\ (a_2 - a_1 + b_2 - b_1 + (a_1 b_1 - a_2 b_2)) \quad (7)$$
$$\ge\ ((a_2 - a_1)(1 - b_1 + b_2 - b_1)) \ge\ 0$$

Hence Addition ($\oplus$) belongs to TZFN; similarly, for the rest of the tuples, we follow the same procedure to prove the Addition, multiplication, and division belonging to TZFN [0, 1].

Chen et al. [21] proposed similarity measure between two TZFNs $\tilde{A}(a_1, a_2, a_3, a_4; w_A)$ & $\tilde{B}(b_1, b_2, b_3, b_4; w_B)$ as shown in equation (8).

$$S(\tilde{A}, \tilde{B}) = 1 - \frac{1}{4}\sum_{i=1}^{4} |a_i - b_i| \quad (8)$$

$S(\tilde{A},\tilde{B})$ range lies between 0 and 1. The larger is the value of $S(\tilde{A},\tilde{B})$, the higher is the similarity and vice-versa.

Hsieh et al. [39] used graded mean integration and presented a similarity measure between two TZFNs, as shown in equation (9).

$$S(\tilde{A},\tilde{B}) = \frac{1}{1+d(\tilde{A},\tilde{B})} \tag{9}$$

Where $d(\tilde{A},\tilde{B}) = |P(\tilde{A}) - P(\tilde{B})|$, graded mean integration is denoted by $P(\tilde{A})$ and $P(\tilde{B})$ of two TZFNs as given in equations (10-11).

$$P(\tilde{A}) = \frac{a_1 + 2a_2 + 2a_3 + a_4}{6} \tag{10}$$

$$P(\tilde{B}) = \frac{b_1 + 2b_2 + 2b_3 + b_4}{6} \tag{11}$$

Chen et al. [25] introduced the similarity measure using CoG as shown in equation (12).

$$S(\tilde{A},\tilde{B}) = \left(1 - \tfrac{1}{4}\textstyle\sum_{i=1}^{4}|a_i - b_i|\right)\left((1 - |\hat{x}_A - \hat{x}_B|)\left(\frac{S_{\tilde{A}}}{S_{\tilde{B}}}\right)\left(\frac{\min(\hat{y}_A,\hat{y}_B)}{\max(\hat{y}_A,\hat{y}_B)}\right)\right) \tag{12}$$

Where $S_{\tilde{A}} = a_4 - a_1, S_{\tilde{B}} = b_4 - b_1$ and $CoG(\hat{x}_A, \hat{y}_A)$ of two TZFNs are calculated using equations (13-14).

$$\hat{y}_A = \begin{cases} \frac{w_A}{6}\left(\frac{a_3 - a_2}{a_4 - a_1} + 2\right), if\ a_4 \neq a_1, 0 \leq w_A \leq 1 \\ \frac{w_A}{2}, \qquad if\ a_4 = a_1, 0 \leq w_A \leq 1 \end{cases} \tag{13}$$

$$\hat{x}_A = \frac{\hat{y}_A + (a_3 + a_2) + (a_4 + a_1) * (w_A - \hat{y}_A)}{2w_A} \tag{14}$$

Wei Chen et al. [40] introduced a similar method to calculate the similarity measure between TZFN using (15). In this, the second expression returns zero when height and perimeter return zero.

$$S(\tilde{A},\tilde{B}) = \left(1 - \tfrac{1}{4}\textstyle\sum_{i=1}^{4}|a_i - b_i|\right)\left(\frac{\min(P(A),P(B)) + \min(W_A,W_B)}{\max(P(A),P(B)) + \max(W_A,W_B)}\right) \tag{15}$$

Modified TOPSIS:

We use our own technique; instead of ranking methodology, we use similarity measurement technique instead of closeness criteria. We also have other similarity techniques for ranking and a proposed average of those methods and our proposed method for similarity measurement criteria. Instead of using the vertex distance method between two fuzzy ratings, we use similarity measurement techniques. The weights of various criteria is used and rating of qualitative criteria as linguistic variables. Because linguistic assessments merely approximate the subjective judgment of decision-makers, we are using linear trapezoidal membership functions to capture the vagueness of these linguistic assessments.

The Service selection for application placement is considered to be a group multiple-criteria decision-making (GMCDM) problem, which may be described by the following sets:

(i) a set of K admission controller decision makers called E = {D1, D2, ... , DK};

(ii) a set of m possible Nodes called A = {A1,A2, ... , Am};

(iii) a set on n QoE and QoS based criteria, C = {C1,C2, ... ,Cn}, with which Nodes performance is measured;

(iv) a set of performance ratings of Ai (i = 1, 2, ... ,m) w.r.t. criteria Cj (j = 1, 2, ... , n) called X = {xij, i = 1, 2, ... ,m, j = 1, 2, ... , n}.

Assume that the admission controller has k admission decision-makers, and each of the controllers (decision) provides the fuzzy-based rating D_i where $(i = 1,2,3, \dots \dots, k)$. The raging is represented in the form of fuzzy-based trapezoidal number noted by $\hat{x}_i$, where $i = 1,2,3, \dots . k$, with membership function $\mu_{\hat{x}}(x)$. The fuzzy trapezoidal number takes four values in the tuple denoted by $TZFN_k = (a_k, b_k, c_k, \quad DK; w_k)$. The aggregated fuzzy rating is defined as. $Agg_{TZFN} = (a, b, c, d)$, a=min$\{a_k\}$,b=$\frac{1}{k}\sum_{k=1} b_k, c = \frac{1}{k}\sum^k c_k \; and \; d = \max\{d_k\}$. In this we are going to use the weight factor also corresponding to the fuzzy rating which is denoted by $\hat{w} = w_{jk1}, w_{jk2}, w_{jk3}, w_{jk4})$ with ranking $\hat{x}_{ijk} = (a_{ijk}, b_{ijk}, c_{ijk}, d_{ijk})$where a_{ijk} is corresponding to ranking for the $ith\ row$ with $j_{\wedge th}$ Qos and QoE $parameter\ of\ k_th$ decision-maker. As shown in equation the QoS and QoE ranking parameter is denoted by

CONCLUSION

This work proposes an improved similarity measure of TZFNs. We first analyze the arithmetic operations used in the proposed TZFN. Various drawbacks from existing methodologies have been pointed out, and to overcome the associated drawbacks, a new similarity measure technique is proposed. The fuzzy based TOPSIS technique improved by introducing modified similarity fuzzy measures instead of fuzzy distance measures with three different criteria for the FPIS and FNIS needed in the proposed method. An overall ranking was performed using the five new fuzzy TOPSIS variants with three different ideal solutions. We have compared 15 combinations of ideal solutions and similarity measures for the modified TOPSIS method. The investigation suggests that the individual rankings differ, depending on ideal solution and similarity measure combinations. For comparative study, our proposed methodology outperforms recent literature in terms of similarity measure accuracy and the ranking of nodes under various circumstances.

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HEMŞİRELİK SÜRECİ ÖĞRETİMİNDE KAVRAM HARİTASI KULLANIMININ ÖĞRENCİLERİN HEMŞİRELİK TANILARINI KULLANMA DÜZEYİNE ETKİSİ

Gülengün TÜRK[1], Emel BAYRAKTAR[2], Elem KOCAÇAL[3*]

[1] Adnan Menderes University, Faculty of Nursing, Fundamentals of Nursing Department, Aydın, Turkey
ORCID Code: 0000-0001-8649-0204
[2] Bingöl University, Faculty of Health Sciences, Department of Nursing, Bingöl, Turkey
ORCID Code: 0000-0002-2993-7134
[3] İzmir Demokrasi University, Faculty of Health Sciences, Department of Nursing, İzmir, Turkey*
ORCID Code: 0000-0001-8771-5786

ÖZET

Hemşirelik süreci ve hemşirelik tanılarının belirlenmesinde kavram haritaları etkili olarak kullanılabilen popüler eğitim stratejilerinden biridir. Bu bağlamda bu araştırmada; hemşirelik süreci öğretiminde kavram haritası kullanımının öğrencilerin hemşirelik tanılarını kullanım düzeyine etkisini belirlemek amaçlanmıştır. Araştırmanın örneklemini bir üniversitesinin 2019-2020 eğitim-öğretim yılında "Hemşirelik Esasları" dersine kayıtlı 51 hemşirelik 1.sınıf öğrencisi oluşturmuştur. Verilerin toplanmasında "Öğrenci Tanıtım Formu" ve ders kapsamında hazırladıkları Bakım Planları kullanılmıştır. Etik kurul izni alındıktan sonra araştırma kapsamına alınan gönüllü öğrencilerden kontrol grubundakilere hemşirelik sürecinin öğretiminde kullanılan standart eğitim uygulanırken; uygulama grubundakilere kavram haritası kullanılarak anlatılmıştır. Öğrencilerin belirlediği hemşirelik tanıları NANDA-I Taksonomi II alanları altında gruplanmış hemşirelik tanılarına göre sınıflandırılmıştır. Verilerin analizinde tanımlayıcı istatistikler kullanılmıştır. Araştırma kapsamına alınan öğrencilerin yaş ortalaması 19.63±1.64 olup, %73.5'inin kadın olduğu belirlenmiştir. Öğrencilerin toplam 41 farklı hemşirelik tanısı kullandıkları, deney grubunun 32 farklı tanı, kontrol gurubunun ise 31 farklı tanı kullandığı belirlenmiştir. Deney grubundaki öğrencilerin en çok kullandığı tanıların enfeksiyon riski ve uyku örüntüsünde rahatsızlık; kontrol grubundaki öğrencilerin ise en çok kullandıkları tanıların enfeksiyon riski ve düşme riski olduğu saptanmıştır. Bu araştırmanın sonucunda; hemşirelik süreci eğitiminde kavram haritası kullanımı ve klasik eğitim yapılan gruptaki öğrencilerin kullandığı tanı etiketi ve sayısının benzer olduğu ve benzer alanlarda tanı saptadıkları ortaya konmuştur. Buna rağmen avantajları düşünüldüğünde kavram haritalarının kullanımı; hemşirelik süreci öğretiminde iyi bir alternatif olarak önerilebilir.

Anahtar Kelimeler: Kavram Haritası, Hemşirelik, Hemşirelik Süreci, Hemşirelik Tanısı

THE EFFECT OF CONCEPT MAP USE IN NURSING PROCESS TEACHING ON STUDENTS' USE OF NURSING DIAGNOSES

Gülengün TÜRK[1], Emel BAYRAKTAR[2], Elem KOCAÇAL[3*]

[1] Adnan Menderes University, Faculty of Nursing, Fundamentals of Nursing Department, Aydın, Turkey
ORCID Code: 0000-0001-8649-0204
[2] Bingöl University, Faculty of Health Sciences, Department of Nursing, Bingöl, Turkey
ORCID Code: 0000-0002-2993-7134
[3] İzmir Demokrasi University, Faculty of Health Sciences, Department of Nursing, İzmir, Turkey*
ORCID Code: 0000-0001-8771-5786

ABSTRACT

Concept maps are one of the popular educational strategies that can be used effectively in determining the nursing process and nursing diagnoses. In this context, in this research; It was aimed to determine the effect of using concept maps in nursing process teaching on the level of students' use of nursing diagnoses. The sample of the research consisted of 51 nursing first year students enrolled in the "Basics of Nursing" course in a university in the 2019-2020 academic year. The "Student Introduction Form" and the Care Plans they prepared within the scope of the course were used to collect the data. While the standard education used in the teaching of the nursing process was applied to the volunteer students included in the study after obtaining the ethics committee permission, to the control group; It was explained to the students in the application group using a concept map. The nursing diagnoses determined by the students were classified according to the nursing diagnoses grouped under the NANDA-I Taxonomy II fields. Descriptive statistics were used in the analysis of the data. The mean age of the students included in the study was 19.63±1.64, and it was determined that 73.5% of them were women. It was determined that the students used a total of 41 different nursing diagnoses, the experimental group used 32 different diagnoses, and the control group used 31 different diagnoses. The most common diagnoses used by the students in the experimental group were the risk of infection and disturbance in sleep patterns; It was determined that the most used diagnoses by the students in the control group were the risk of infection and the risk of falling. As a result of this research; It was revealed that the use of concept maps in the nursing process education and the diagnosis label and number used by the students in the classical education group were similar and they found diagnoses in similar fields. However, considering the advantages, the use of concept maps; It can be recommended as a good alternative in nursing process teaching.

Keywords: Concept Mapping, Nursing, Nursing Process, Nursing Diagnosis

İKİNCİ DÜNYA SAVAŞI'NIN SON YILLARINDA SOVYETLER BİRLİĞİ'NİN BOĞAZLAR POLİTİKASININ İNGİLİZ LORDLAR KAMARASI'NDAKİ YANSIMALARI

Çağdaş YÜKSEL
Arş. Gör. Dr. Pamukkale Üniversitesi Fen-Edebiyat Fakültesi Tarih Bölümü
ORCID Code: 0000-0002-2230-3702

ÖZET

Çarlık Rusya'sının boğazları ele geçirme isteği ve İngiltere'nin Rusya'ya karşı Osmanlı İmparatorluğu'nun yanında yer alması boğazlar konusunu uluslararası bir mesele haline dönüştürmüştür. Sovyetler Birliği'nin kurulması ve Bolşevik Hükümet'in Millî Mücadele ile iyi ilişkiler tesis etmesi üzerine boğazlar konusu bir süre için günden konusu olmamıştır. Montrö Sözleşmesi ile boğazlar üzerinde Türkiye'nin arzu ettiği bir rejim kurulmuştur. Ancak İkinci Dünya Savaşı'nın sonuna doğru Türkiye ile Sovyetler Birliği arasında fikir ayrılıkları başlamıştır. Boğazlar konusu iki ülke arasındaki sorunların temelini teşkil etmiştir. Sovyetler Birliği'nin boğazlarda üs ve ortak savunma talepleri Türkiye'yi ciddi ölçüde rahatsız etmiştir. Tarihsel olarak boğazlara ilgi duyan İngiltere'de de bu konu gündemi bir süre meşgul etmiştir. İngiltere kriz sırasında Türkiye'yi desteklemiş ve Amerika Birleşik Devletleri'ni Türkiye'ye destek olmaya ikna etmiştir. Bu nedenle İngiltere'nin politikasını anlamak büyük önem taşımaktadır. Bu çalışmada boğazlar hakkında yaşanan sorunun İngiltere Lordlar Kamarası'nda tartışılması analiz edilmiştir. Böylece İngiliz Parlamentosu'nun üst kanadının Türkiye ile Sovyetler Birliği arasındaki boğazlar anlaşmazlığını nasıl değerlendirdiği gösterilmiştir. Bu sayede İkinci Dünya Savaşı'nın sonlarında İngiltere'nin boğazlar meselesine nasıl baktığının daha iyi anlaşılmasına katkı yapmak hedeflenmiştir.

Anahtar Kelimeler: Boğazlar, Türkiye, Sovyetler Birliği

REFLECTIONS OF SOVIET STRAITS POLICY IN THE BRITISH HOUSE OF LORDS IN THE FINAL YEARS OF THE SECOND WORLD WAR

ABSTRACT

The desire of Tsarist Russia to seize the Straits and Britain's siding with the Ottoman Empire against Russia turned the issue of the Straits into an international issue. After the establishment of the Soviet Union and the Bolshevik Government's good relations with the National Struggle, the issue of the Straits did not become a topic for a while. With the Montreux Convention, a regime desired by Turkey was established on the Straits. However, towards the end of the Second World War, differences of opinion started between Turkey and the Soviet Union. The issue of the Straits formed the basis of the problems between the two countries. The Soviet Union's demands for a base and joint defense in the Straits seriously disturbed Turkey. In Britain, which has historically been interested in the Straits, this issue occupied the agenda for a while. Britain supported Turkey during the crisis and persuaded the United States to support Turkey. It is therefore of paramount importance to understand British policy. In this study, the discussion of the issue about the Straits in the British House of Lords was analyzed. Thus, it is shown how the upper house of the British Parliament evaluated the Straits conflict between Turkey and the Soviet Union. In this way, it is aimed to contribute to a better understanding of how Britain looked at the Straits issue at the end of the Second World War.

Keywords: the Straits, Turkey, the Soviet Union

Giriş

Lozan Antlaşması sırasında Türkiye boğazlar konusunda İngiltere'nin savunduğu rejimi kabul etmek zorunda kalmıştır. Bu rejimi kendi çıkarlarına uygun bulmayan Sovyetler Birliği bu gelişmeden rahatsız olsa da Türkiye ile iyi ilişkilerini sürdürmüştür. Montrö Boğazlar Sözleşmesi ile boğazlar

üzerinde Türk hakimiyeti sağlanmıştır. Ancak Sovyetler Birliği yine boğazlarda kurulan rejimden pek memnun olmamıştır. İkinci Dünya Savaşı'ndan itibaren Sovyetler Birliği boğazlar üzerinde hakimiyet kurabilmek için harekete geçmiştir. Almanya ile saldırmazlık paktı imzalayan Sovyet Hükümeti boğazlar konusunda pazarlıklara girmeye çalışmıştır. Almanya'nın saldırısı sonrasında Batı devletleri ile müttefik haline gelen Sovyetler Birliği savaşın sonlarına doğru boğazlar konusundaki isteklerini müttefiklerine hissettirmeye başlamıştır. Sovyetler Birliği boğazlara yönelik isteklerini makul gösterebilmek için Türkiye'nin savaş sırasında Alman savaş gemilerini Montrö Sözleşmesi hilafına boğazlardan geçirdiğini ileri sürmüştür. Sovyet istekleri Türkiye'nin yanı sıra boğazlara ilgi duyan İngiltere'de de büyük yankılar uyandırmıştır. İngiltere'de bazı kimseler Sovyetler Birliği'nin yönelttiği suçlamalara katılarak İngiliz Hükümeti'ni Türkiye'ye yeteri kadar baskı yapmamakla suçlamışlardır. İngiliz Hükümeti ise boğazlardan Alman gemilerinin geçmesine engel olmak için yeterli girişimde bulunduğunu savunmuştur.

Bu çalışmada Sovyetler Birliği'nin boğazlar konusunda yaptığı suçlamanın İngiliz politik gündemine yansımaları analiz edilmiştir. İngiliz Parlamentosu tutanakları vasıtasıyla İkinci Dünya Savaşı'nın sonlarında Sovyet iddialarının Lordlar Kamarası'nda nasıl yankı uyandırdığı incelenmiştir. Böylece Sovyetler Birliği'nin girişimlerinin İngiliz siyasetinde ne şekilde değerlendirildiği gösterilmeye çalışılmıştır. Bu sayede İngiltere'nin boğazlar konusunda izlediği politikanın temellerinin İngiliz kaynakları vasıtasıyla gösterilmesi amaçlanmaktadır.

Tarihsel Arka Plan

Boğazlar meselesinin geçmişi oldukça eski tarihlere uzanmaktadır (Pithon, 2010: 75). Osmanlı İmparatorluğu'nun İstanbul'u fethetmesi ve Karadeniz kıyılarına hâkim olması sonrasında boğazlar tamamen Türk kontrolüne girmiştir (Acar, 2019: 108). Rusya'nın güçlenerek sıcak denizlere inme politikasını hayata geçirmesi buna mukabil Osmanlı İmparatorluğu'nun gittikçe zayıflaması boğazların geleceği hakkında çeşitli tartışmalara neden olmuştur (Kurat, 1990: 11). Akdeniz'deki hakimiyeti için Rusya'yı tehdit olarak gören İngiltere boğazlar konusunda Osmanlı İmparatorluğu'nu destekleme politikası izlemiştir (Armaoğlu, 1999: 55). Mısır meselesinin ortaya çıkması ve bunun boğazlar konusuna dahil olması boğazlar sorununu uluslararası bir hale getirmiştir (Uçarol, 1985: 66). İngiltere Rusya'yı Akdeniz'den uzak tutabilmek için boğazların kapalı kalması gerektiğini savunmuş ve bu isteğini uluslararası sahada kabul ettirmeye çabalamıştır. Fakat Mısır meselesi nedeniyle zor durumda kalan Osmanlı İmparatorluğu Rusya ile Hünkâr İskelesi Antlaşması'nı imzalamıştır. Bu antlaşma ile Rusya boğazlar rejimini kendi çıkarlarına uygun şekilde dizayn etmiş ve boğazlar üzerinde nüfuz sahibi olmuştur (Acar, 2019: 117). Hünkâr İskelesi Antlaşması Batı devletlerini ve özellikle İngiltere'yi hiç memnun etmemiştir. Antlaşmanın sekiz yıl olan süresi dolmak üzereyken harekete geçen İngiltere boğazlar konusunu çözümlemek için Londra'da bir konferans düzenlemiştir. Konferans sonucunda 13 Temmuz 1841 tarihinde İngiltere, Fransa, Rusya, Prusya, Avusturya ve Osmanlı İmparatorluğu arasında Boğazlar Sözleşmesi imzalanmıştır (Beydilli, 1992: 267; İnan, 1995: 14). Bu sözleşme ile boğazlar rejimi uluslararası hale gelmiş ve tek taraflı bir düzenleme yapma olanağı ortadan kalkmıştır (Erdaş, 2000: 32; Ökten, 2008: 25). Londra Boğazlar Sözleşmesi ile Rusya'nın boğazlara yönelik kazanımları ortadan kaldırılmıştır. Bu sözleşme ile en çok İngiltere kazanım elde etmiştir.

Rusya boğazlara hâkim olma düşüncesinden vazgeçmediği için uygun fırsat kollamaya başlamıştır. Birinci Dünya Savaşı'nın başlaması Rusya'ya aradığı fırsatı vermiştir. Osmanlı İmparatorluğu'nun savaşa Almanya'nın yanında girmesi Rusya'ya harekete geçme imkânı sağlamıştır. İngiltere ve Fransa üzerinde baskı kurarak yapılan gizli antlaşma ile boğazlar üzerindeki hedeflerini müttefiklerine kabul ettirmiştir. Almanya karşısında Rus askerlerinden faydalanmak isteyen İngiltere ve Fransa gönülsüz olarak boğazları Rusya'ya bırakacaklarını vaat etmişlerdir (İnan, 1995: 21). Ancak 1917 yılında Rusya'da yaşanan devrim sonrasında Bolşevikler savaştan çekilmişler ve yapılan gizli antlaşmaları ifşa etmişlerdir.

Çanakkale Savaşı sırasında yaşadığı sıkıntıyı unutmayan İngiltere Birinci Dünya Savaşı sonrasında boğazlar rejimini kendisi için avantajlı şekilde tesis etmeyi temel amaçlarından birisi haline getirmiştir. Osmanlı İmparatorluğu'nun savaşı mağlubiyetle tamamlaması İngiltere'ye planını uygulama fırsatı tanımıştır. Sevr Antlaşması ile Boğazların savaş ve barışta tüm gemilere açık olmasına

hükmedilmiştir. Boğazlar askerden arındırılmış ve uluslararası bir komisyonun yönetimine verilmiştir (Kayra, 2011: 136). Fakat Anadolu'da başlayan Millî Mücadele Sevr Antlaşması'nı tanımamıştır. Millî Mücadele'nin zaferi sonrasında Türkiye ile İtilaf Devletleri arasında barışı tesis etmek için Lozan Konferansı toplanmıştır. Konferansta Sovyetler Birliği Türkiye'nin boğazlar konusundaki tezini desteklemiş fakat İngiltere kendi tezini ısrarla savunmuştur. Barışı sağlayabilmek için Türkiye İngiltere'nin önerdiği rejimi kabul etmek zorunda kalmıştır (Acar, 2019: 126; Gönlübol, 1996: 120). Bu durum Sovyetler Birliği ile fikir ayrılığına neden olmuştur.

Lozan Antlaşması ile getirilen boğazlar rejiminde boğazlar ve Marmara Denizi'ndeki adalar silahlardan arındırılmıştır. Boğazlar tüm ticaret ve savaş gemilerine açık hale getirilmiş, boğazların güvenliğini Milletler Cemiyeti'nin sağlamasına karar verilmiştir (Soysal, 2005: 274). İngiltere bu şekilde güçlü donanması ile Sovyetler Birliği üzerinde baskı oluşturmayı ve Türkiye'nin Boğazları kapatarak kendisini sınırlamasını engellemeyi hedeflemiştir. Türkiye uluslararası sahada itibar kazandıktan sonra yaşanan uluslararası krizleri çözmede Milletler Cemiyeti'nin etkisiz kaldığını belirterek boğazlar rejimini kendi lehine değiştirmek için harekete geçmiştir (Atabey, 2014: 3). 1936 yılında imzalanan Montrö Boğazlar Sözleşmesi ile Türkiye arzu ettiği düzene kavuşmuştur (Gönlübol, 1996: 126). Bu konuda yine İngiltere ile uzlaşı sağlanırken Sovyetler Birliği ile çıkar çatışması yaşanmıştır. Bu olaylar Sovyetler Birliği'nin boğazlar rejimini kendi çıkarına uygun olarak şekillendirmek için fırsat kolladığını göstermektedir.

İkinci Dünya Savaşı başlamadan hemen önce Sovyetler Birliği Almanya ile saldırmazlık paktı imzalamıştır. Bu pakt sonrasında Stalin Türkiye'den Montrö Boğazlar Sözleşmesi'nin değiştirilmesini istemeye başlamıştır (Kırkpınar, 2017: 249). Türkiye bundan sonra savaş boyunca Sovyetler Birliği'nden fazlasıyla endişe etmiştir (Ertem, 2013: 164). Stalin Türkiye ile iyi ilişkilere sahip olmasına rağmen Almanlarla boğazlarda Sovyetler Birliği lehine değişiklikler yapılması için pazarlıklara girişmekten çekinmemiştir (Tamkin, 2009: 175). Bu girişimler Almanya Sovyetler Birliği'ne saldırana kadar devam etmiştir. İkinci Dünya Savaşı'nın son yıllarında Sovyet yönetimi bu kez müttefikleri İngiltere ve Amerika Birleşik Devletleri'ne boğazlar konusundaki isteklerinden bahsetmiştir (Köse, 2015: 248). Savaş sonrasını planlamak için düzenlenen konferanslardan ilki olan Yalta Konferansı'nda Sovyetler Birliği ortamın müsait olduğunu düşünerek İngiltere ve Amerika Birleşik Devletleri'ne boğazlar rejiminde değişiklik yapılmasını istediğini bildirmiştir (Uzman, 2018: 119). Ancak İngiltere ve Amerika bu talebe mesafeli yaklaşmışlardır. Sovyetler Birliği konferans ertesinde Türkiye ile 1925 yılından beri sürdürdüğü dostluk antlaşmasını da feshetmiştir. Yalta Konferansı'nda boğazlara yönelik dış işleri bakanları arasında görüşmeler yapılması kararlaştırılmış olmasına rağmen Sovyet Hükümeti Türkiye üzerinde baskı kurarak sonuca gitmeye çalışmıştır.

Yalta Konferansı sonrasında Potsdam'da düzenlenen konferansta Sovyetler Birliği Türkiye ile sınır düzenlemesi yaparak Kars ve Ardahan'ı, boğazların güvenliğini sağlamak içinde boğazlarda üs istediğini İngiltere ve Amerika Birleşik Devletleri'ne bildirmiştir (Hasanlı, 2011: 65; Köse, 2019: 1128). Potsdam Konferansı'nda Sovyetler Birliği boğazların yanı sıra Akdeniz'e yönelik bazı taleplerde bulununca İngiltere ve Amerika Sovyetlerin yayılma isteğinden çekinmeye başlamışlardır. Sovyetler Birliği boğazlar konusunda konferansta bir karar alınmasından ziyade Türkiye ile yapacağı ikili görüşmelerle sonuca gitmek istemiştir. Bu nedenle konferansta konuyu pek fazla tartışmaya açmamıştır (Hale, 2003: 113). Amerikan yönetimi bu konuda net bir politikaya sahip olmadığı için öncelikle Sovyet isteklerine karşı kesin bir pozisyon almamıştır. Boğazlara yönelik uzun süreli bir politikası olan İngiltere ise ilk andan itibaren Rus isteklerine karşı çıkmış, Türkiye'yi bu isteklere direnmeye teşvik etmiş ve Amerika Birleşik Devletleri'ni Türkiye'ye destek olması için ikna etmeye çalışmıştır. İkinci Dünya Savaşı'nın son yıllarında boğazlar konusunda yaşanan çıkmazda Rus karşıtı cephe oluşmasında İngiltere anahtar rol oynamıştır. Bu politika Türkiye'nin kararlı tutumu ile birleşerek Sovyetler Birliği'nin istediğini almasına engel olacaktır. Yine Sovyetlerin baskısı Türkiye'nin Batı eksenli politika izlemeye başlamasının da en önemli nedeni olmuştur.

Bulgular

Sovyetler Birliği'nin Boğazlardan Alman savaş gemilerinin geçirildiği iddiası hakkında Lordlar Kamarası'nda 14 Haziran 1944 tarihinde düzenlenen oturumda ilk konuşmacı Lord Vansittart olmuştur.

Konuşmasının başında gündemi Türk Hükümeti'nin Alman savaş gemilerini Boğazlardan geçirip geçirmediğine dair süren tartışmanın oluşturduğunu ifade etmiştir. Bu konuda İngiliz Hükümeti'nin Türk Hükümeti'nden bilgi talep edip etmediğinin gündemde olan önemli bir diğer konu olduğunu dile getirmiştir. Lord Vansittart İngiltere'nin sıkıntılı yıllarda Türkiye'ye her türlü desteği verdiğini, Türkiye üzerinde baskı kurmadığını, Türkiye'nin mali nedenlerden ötürü savaşa girmek istememesini anlayışla karşıladığını ileri sürmüştür. İngiliz Hükümeti'nin bu politikasını akıllıca olduğunu kabul eden Lord Vansittart, Türkiye'nin politika değiştirerek İngiltere'yi oyuna getirdiğini ileri sürmüştür. İngiltere'nin Türkiye'ye çok önemli miktarda silah verdiğini ancak Türkiye'yi savaşa davet ettiğinde Türk Hükümeti'nin buna yanaşmadığını ifade etmiştir. Ayrıca Türkiye'nin Almanya'ya krom sattığını ve İngiltere'nin düşmanlarıyla çeşitli entrikalar çevirdiğini ileri sürmüştür. Bütün bunlara rağmen İngiltere'nin bu durumu anlayışla karşıladığını savunmuştur. İngiltere'nin Türkiye'ye yönelik politikasını sertleştirmesi gerektiğini ifade etmiştir. İngiltere Başbakanı'nın Türkiye'nin barış masasına oturtulmayacağı ifadesini olumlu değerlendiren Lord Vansittart, bunun yeterli olmadığını savunarak Türkiye'ye davranışının bedelini ödetecek adımlar atılmasını istemiştir (İngiltere Parlamento Tutanakları, 1944: 245-246).

Bu konuşmada görüldüğü üzere Sovyetler Birliği'nin Türkiye'ye yönelik suçlamaları İngiliz politikacıların bazıları tarafından isabetli bulunmuştur. Türkiye'nin boğazlardan Alman savaş gemileri geçirdiği ve İngiliz Hükümeti'nin buna engel olma konusunda başarılı olamadığı savunulmuştur. Böyle düşünenler İngiltere'nin Türkiye'ye yönelik tutumunu sertleştirmesi gerektiğini savunmuşlardır. Ancak bu kişiler arasında bile Sovyetler Birliği'nin boğazlara yönelik isteklerine destek veren olmamıştır.

Bir sonraki konuşmacı Viscount Cranborne Doğu Cephesi'nde Rus zaferi sonrasında Almanya'nın Karadeniz vasıtasıyla bölgeden malzeme tahliye ettiğini, boğazlardan geçen gemilerin ticaret gemilerini olduğunu ve bu durumun Montrö Sözleşmesi'ne uygun düştüğünü ifade etmiştir. Ancak bu gemiler dışında silahlı bazı gemilerin de Karadeniz'e girdiklerini ve bu gemilerin bazılarının denizaltı tarama gemileri olduğunu kalanların ise bölgeden silah ve mühimmat tahliye etmekte kullanılan silahlı gemiler olduğunu dile getirmiştir. Sözü edilen gemilerin Akdeniz ve Karadeniz'de askeri operasyonlar için kullanıldığını söyleyen Viscount Cranborne, bu gemilerin İngiliz Hükümeti tarafından savaş gemisi olarak tanımlandığını ve bu gemilerin Ege Denizi'nde İngilizler aleyhine faaliyette bulunabileceklerini ifade etmiştir. Savaşan tarafların gemilerinin boğazlardan geçişinin Montrö Sözleşmesi'nin 19. maddesiyle yasaklandığını hatırlatarak, Almanların bunu bilmelerine rağmen boğazları kullandıklarını ileri sürmüştür. Türkiye'nin bu gemileri durdurma yükümlülüğünde olmasına rağmen harekete geçmediğini savunmuştur. Almanya'nın ticari gemi süsü vererek çıkarma gemilerini Boğazlardan geçirdiğin savunan Viscount Cranborne, İngiliz Büyükelçisinin uyarılarına rağmen Türkiye'nin bunu kabul etmediğini ve bu geçişlerin devam ettiğini belirtmiştir. İngiltere'nin bir nota vererek Türkiye'yi protesto ettiğini ancak Türk Hükümeti'nin boğazlardan Montrö Sözleşmesi'ne aykırı geçişler yapıldığı iddialarını ısrarla reddettiğini ifade etmiştir. Viscount Cranborne Türkiye'nin bazı gemileri durdurduğunu kabul ederek Boğazda bir Alman savaş gemisinin bekletildiğini dile getirmiştir (İngiltere Parlamento Tutanakları, 1944: 246-248).

Bu konuşma İngiliz Hükümeti'nin tezini yansıtmaktadır. İngiliz Hükümeti bazı kamufle edilmiş Alman savaş gemilerinin boğazlardan geçtiğini kabul etmekle beraber Türkiye'nin bu duruma Alman baskısı nedeniyle razı olduğunu ifade etmiştir. Ancak Almanya'nın gücü azalınca Türkiye'nin Alman savaş gemilerini durdurmaya başladığı savunulmuştur. Bununla birlikte Sovyetler Birliği'nin iddia ettiğinin aksine boğazlardan geçen gemilerin pek çoğunun ticaret gemileri olduğu da vurgulanmıştır. Bu konuşma üzerinden İngiliz Hükümeti'nin Sovyetler Birliği'nin şikayetine tamamıyla katılmadığı, Sovyetlerin boğazlara yönelik isteklerine sıcak bakmadığı ve Türkiye'nin durumunu anlayışla karşıladığı anlaşılmaktadır. Türkiye'nin savaşa girmemesinin İngiliz Hükümeti'nde hayal kırıklığı yarattığı da açıkça görülmektedir.

Tekrar söz alan Lord Vansittart Türkiye'nin Alman baskısına maruz kaldığını ve Alman savaş gemilerinin boğazlardan geçmelerine göz yumduğunu bir kez daha ileri sürmüştür. Bu durum karşısında İngiliz Hükümeti'nin Türkiye'yi protesto ettiğini ve Türkiye üzerinde baskı kurmaya çalıştığını hatırlatarak, bu politikanın son derece yetersiz olduğunu savunmuştur. Kamufle edilmiş Alman savaş gemilerinin boğazlardan geçmeye devam ettiğini iddia eden Lord Vansittart İngiliz Hükümeti'nin bu

meseleyi bir an önce çözmesini isteyerek aksi durumda İngiliz dış politikasının etkisini kaybedeceğini dile getirmiştir (İngiltere Parlamento Tutanakları, 1944: 249).

Bu ifadelerden İngiliz politikacılar arasında Türkiye'nin savaşa girmemesinden rahatsız olanların Türkiye'nin cezalandırılmasını istedikleri anlaşılmaktadır. Bu tezi savunanlar İngiliz Hükümeti'ni etkisiz dış politika izlemekle de suçlamışlardır.

Viscount Cranborne cevap olarak meseleyi hükümete tekrar ileteceğini söyleyerek şu ana kadar yapılan açıklamaların parlamento için yeterli olduğunu savunmuştur. İngiliz Hükümeti'nin çekingen davranmadığını, sorunun çözümü için elinden geleni yaptığını ifade etmiştir. Lord Vansittart hükümeti çekingenlikle suçlamadığını ancak Türklere çok fazla sabır gösterdiğini savunarak, önerisinin hükümete sunulacağını umduğunu dile getirmiştir (İngiltere Parlamento Tutanakları, 1944: 250).

Sonuç ve Değerlendirme

Sovyetler Birliği Çarlık Rusya'sının izlediği politikaya dönerek İstanbul ve Çanakkale Boğazları üzerinde hakimiyet kurmak istemiştir. İkinci Dünya Savaşı'nın başında Almanya ile yakınlaşarak isteklerini kabul ettirmeyi denemiştir. Almanya'nın saldırısı sonrasında Batı devletleri ile müttefik olan Sovyetler Birliği savaşın son yılından itibaren boğazlar konusunda isteklerini belli etmeye başlamıştır. Sovyetler Birliği Türkiye'nin savaş sırasında Alman savaş gemilerinin boğazlardan geçmesine göz yumduğunu ve bu gemilerin Rus topraklarına saldırı düzenlediklerini ileri sürmüştür. Bu nedenle savaş sonrasında boğazlarda yeni bir rejim tesis edilmesi gerektiğini savunmuştur. Sovyet Hükümeti'nin bu iddiaları İngiltere'de çeşitli tartışmalara yol açmıştır. Bir kanat Sovyet iddialarının doğru olduğunu, Türklerin Alman savaş gemilerini boğazlardan geçirdiklerini dile getirerek bu durumun İngiltere'ye zarar verdiğini ve İngiliz Hükümeti'nin bunu önlemede yetersiz kaldığını savunmuştur. Hükümet ise boğazlardan bazı Alman savaş gemilerinin geçtiğini kabul ederek İngiltere'nin Türkiye nezdinde girişimde bulunduğunu ifade etmiştir. Türkiye'nin Alman baskısına maruz kaldığı için böyle hareket ettiğini savunan İngiliz Hükümeti, izlenen sabırlı politika ile sorunun çözülmeye çalışıldığını dile getirmiştir. İngiliz Hükümeti Türkiye'nin Almanya karşısındaki politikasının mevcut durumdan kaynaklandığını kabul ederek son derece gerçekçi davranmıştır.

İngiliz Hükümeti Sovyetler Birliği'nin Alman savaş gemilerini bahane ederek Boğazlarda söz sahibi olmaya çalıştığını fark etmiş olmalıdır. Yalta ve Potsdam Konferanslarında Sovyetleri Birliği Boğazlar konusundaki isteğini belli edince Amerika Birleşik Devletleri'nin aksine İngiltere Sovyet isteklerine karşı çıkmıştır. Bu durum İngiliz Hükümeti'nin meseleyi doğru değerlendirdiğini göstermektedir.

Sovyetler Birliği'nin istekleri İkinci Dünya Savaşı sonrasında da devam etmiştir. Savaş sonrasında elde ettiği avantajlı konumdan yararlanmak isteyen Sovyet yönetimi Türkiye'nin üzerindeki baskısını gittikçe şiddetlendirmiştir. Amerika Birleşik Devletleri'nin karasız tutumu Stalin'i oldukça cesaretlendirmiştir. Türkiye ise yalnız olduğu noktada bile bu isteklere direnme konusunda kararlı davranmıştır. İngiltere Sovyet suçlamaları ve istekleri ortaya çıktığı andan itibaren Sovyet politikasına olumsuz yaklaşmış ve Türk politikasını desteklemiştir. Amerika Birleşik Devletleri'nin Sovyetler Birliği'nin isteklerine karşı tavır almasında İngiliz etkisi önemli rol oynamıştır.

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EĞİTİM MÜZİĞİ BESTELEME TEKNİKLERİ DERSİNE ESİN KAYNAĞI OLARAK RESİM

Esin Uçal Canakay[1]

[1]Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi
Güzel Sanatlar Eğitimi Bölümü
Müzik Eğitimi Anabilim Dalı İzmir, Türkiye.
ORCID Code: 0000-0003-2476-8287

ÖZET

Müzik ve resim sanatı arasında karşılıklı bir etkileşim vardır. Bu etkileşimden esinlenerek eserler oluşturan besteciler ve ressamlar olduğu bilinmektedir. Sanat eğitiminde de resim-müzik etkileşimden yola çıkarak gerçekleştirilen eğitim uygulamalarına yer verilmektedir. Bu çalışmada 2020-2021 bahar yarıyılında Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Müzik Eğitimi Anabilim Dalı'nda o dönemde lisans programındaki adıyla "Eğitim Müziği Besteleme" dersinde yapılmış olan '*resimden müziğe' (resimden esinlenerek söz ve ezgi yazma çalışmaları)* etkinliğinde yaratıcılığı harekete geçirmesi için öğrencilere sunulan resimler verilmiş, öğrencilerin bu resimleri esin kaynağı olarak kullanıp söz ve ezgi yazma çalışmalarını nasıl gerçekleştirdikleri tüm aşamalarıyla anlatılmıştır. Etkinlik kapsamında öğrencilerin besteleme çalışmaları arasından üç öğrencinin çalışması belirlenmiş, söz ve müziği öğrencilere ait olan üç şarkıya çalışmada yer verilmiştir. Çalışmanın sunumunda öğrencilerin resimden yola çıkarak oluşturdukları şarkılar dinletilerek bu alanda çalışmalar yapan eğitimcilere katkı sağlanması umulmaktadır.

Anahtar sözcükler: Eğitim Müziği Besteleme Teknikleri dersi, besteleme çalışmaları, resim-müzik ilişkisi.

PAINTING ART AS A SOURCE OF INSPIRATION FOR COMPOSING EDUCATIONAL MUSIC CLASS

ABSTRACT

There is mutual interaction between music and painting art. It is known that there are musicians and painters that create works inspirated by this interaction. Also arts education utilizes practices that use the relationship between music and paint. This study gives a detailed description of all the stages of the practices given to the students during the *'from picture to music' (composing music inspirated by painted artworks)* event, as part of the "Composing Educational Music" class taught during the 2020-2021 Spring Semester at the Dokuz Eylül University Buca Faculty of Education, Department of Music Education; in which the students were presented with paintings in order to activate their imagination, and they were asked to do composition and lyric writing excersizes inspirated by these paintings. The works of three students were chosen and these works that were written and composed by these three students are given in this study. When presenting the work we hope that sharing these songs that have been created from paintings, will be beneficial for educators who conduct research in this area.

Keywords: Composing Educational Music class, composing studies, paint-music interaction.

GİRİŞ

Gelişmiş toplumların oluşmasında bireylerin yeniliklere açık olması, sorgulayıcı olması, problem çözme becerilerinin güçlü olması, yaratıcı çözümler üretebilmesi önemlidir. Bireylerin bu gereksinim doğrultusunda yetiştirilmeleri nitelikli eğitim ile mümkün olabilmektedir. Sanat eğitimi; toplumların ihtiyacı olan yeniliklere açık, yaratıcı ve estetik bakış açısı gelişmiş bireylerin yetiştirilmesi için çok etkili bir yoldur.

Eğitim tarihine bakıldığında, sanat eğitiminin her dönemde varlığını koruduğu görülmektedir. Toplumların değişimine uyumlanan eğitim sistemleri içinde bireylerin yetişmesine büyük katkı sunan sanat eğitimi, geçmişten bugüne hep var olmuştur.

Resim ve müzik eğitimi, sanat eğitiminin iki önemli boyutunu oluşturur. Bu iki sanat dalı arasında karşılıklı bir etkileşim vardır. Sanat eğitiminde resim-müzik etkileşiminden yola çıkarak hazırlanan eğitim uygulamalarının gerçekleştirilmesi mümkündür. Eğitim-öğretim sürecinde disiplinlerarası uygulamaların kullanılması belirli bir kavram üzerinde çeşitli bakış açılarını bir araya getirme ve çok boyutlu düşünmeyi sağlaması yönüyle çağımızda ihtiyaç duyulan bireylerin yetişmesinde çok fazla olanak sunar.

Öğrenme sürecinde disiplinlerarası uygulamalar öğrencileri grup çalışmaları için teşvik eder, çalışmaların niteliğini arttırır, yaratıcılığı geliştirir, sınıf içi iletişimi sağlar, sınıf yönetimini kolaylaştırır ve öğretim sürecini zenginleştirir (The National Association of Secondary School Principals-NASSP, 1998, Aktaran: Youm, 2007, s. 42). Disiplinlerarası uygulamalar özellikle sanat eğitiminde, sanatın alt dallarının birlikte kullanılması biçiminde kullanılabilir.

Sanatçıların diğer sanat dallarındaki yapıtlardan esinlenmesi ve o esin ile yeni eserler üretmesi mümkündür. İpşiroğlu (1995, s. 37), müzik ve resim arasındaki etkileşimin 20. yüzyılın başlarında yoğunlaşmaya başladığını ifade etmektedir. Resimden esinlenerek yapılan besteler, bu yıllarda çoğalmaya başlamıştır.

Akengin'e göre bir şairin bir tablodan esinlenerek şiirler yazması, bir ressamın bir şiirin imgelerinden etkilenerek resim yapması, bir müzisyenin yazılı bir eserden yola çıkarak yeni bir eser vücuda getirmesi gibi durumlar hep olagelmiştir (2012, s. 140). Önal, "Müziğin farklı disiplinlerle olan etkileşimine göstergelerarası bir bakış" isimli çalışmasında müzik ve diğer sanatlar arasındaki disiplinlerarası alışverişi, alıntılama tekniklerini anlatarak ve örnekleri sunarak gözler önüne sermiştir. Önal'a göre iki farklı disiplin arasındaki alışveriş ile, yeni bir anlam ve değerle donatılmış olarak yeni bir eser sunulabilmektedir (2021, s. 675).

Ülkemizde üniversitelerin Eğitim Fakülteleri Güzel Sanatlar Eğitimi Bölümleri, resim ve müzik öğrencilerini öğretmenlik mesleğine hazırlayan kurumlardır. Öğretmenlerin öğrencilerini hızla değişen çağa uygun olarak yetiştirebilmeleri, Eğitim Fakülteleri'nin eğitim programları ile doğrudan bağlantılıdır. Değişen toplumlar, değişen gereksinimlere bağlı olarak eğitim programlarının da zaman zaman güncellenmesi kaçınılmazdır.

Eğitim Fakültesi Lisans Programlarında son olarak yapılan güncelleme 2018 yılında yapılmış ve uygulamaya geçilmiştir. Bu güncelleme kapsamında yeni müzik öğretmenliği lisans programında Meslek Bilgisi (MB) dersleri %32 oranında, Genel Kültür (GK) dersleri %17 oranında ve Alan Eğitimi (AE) dersleri de %51 oranında yer almıştır (YÖK, 2018, s. 16).

Müzik öğretmeni adaylarının müziksel yaratıcılıklarını geliştirmeye yönelik eğitim müziği besteleme çalışmaları, Müzik Öğretmenliği Lisans Programı'nda Eğitim Müziği Besteleme Teknikleri adı ile alan eğitimi seçmeli dersler grubunda yer almaktadır. Bu ders, diğer tüm seçmeli dersler gibi haftalık 2 saat olarak sürdürülmektedir.[3]

Dersin içeriği Yükseköğretim Kurulu tarafından şu şekilde açıklanmaktadır: Motif ve cümle yazma, bir dönemli şarkı formunda ezgiler yazma, prozodi kuralları, çocuk şarkısı yazma, okul şarkılarında iki seslilik (koşut 3'lü, koşut 6'lı, korno beşlisi vb.), kanon, çalgı eğitimine yönelik alıştırma, etüt ve ezgi yazma çalışmaları (YÖK, 2018).

Yükseköğretim Kurulu'nun çizmiş olduğu genel çerçeve doğrultusunda Eğitim Müziği Besteleme Teknikleri dersi çerçevesinde gerçekleştirilen çalışmalar; temel müzik bilgilerinin, ton ve makam

[3]Bu ders, bir önceki lisans programında zorunlu dersler grubunda "Eğitim Müziği Besteleme" adı ile haftada 4 saat olarak yer almakta idi.

bilgisinin, armoni ve form bilgisinin, eşlik yazma, eşlik çalma ve eşlikle söyleme becerisinin harmanlanarak kullanılmasını gerektirmektedir. Bu bilgi ve becerilerin üzerine, yaratıcılığı tetikleyen materyallerin eklenmesi ile müziksel yaratma becerilerinin kendini göstermeye başlayacağı düşünülmektedir.

Eğitim Müziği Besteleme Teknikleri dersinin en temel hedefi, okul şarkıları üzerine incelemeler yapmak ve edinilen tüm müzik bilgilerini kullanarak okul şarkısı besteleme çalışmaları yapmaktır. Şimşek (2019, s. 1- 2) okul şarkıları ile ilgili görüşlerini şu şekilde ifade etmiştir. Müzik eğitiminin temel araçlarından olan okul şarkıları, çocukların müziği deneyimlemeleri, müziğin içinde dinleyen, söyleyen, çalan konumunda aktif olarak hem bireysel hem de topluluk halinde yer almaları ve müzik kültürü ile tanıştırılmaları için vazgeçilmez yardımcılardır. Şarkılar aracılığı ile çocukların seslerini doğru ve etkili kullanmaları, müzikal duyma yetilerinin geliştirilmesi ve toplulukla uyum içinde iş yapmaları olanaklı olur. Bu nedenle, sanatsal değeri yüksek ve nitelikli okul şarkılarına gereksinim duyulur.

Türk Eğitim Müziği alanında geniş bir dağar mevcuttur. Ayrıca değişen toplumsal, kültürel, eğitsel, iklimsel, teknolojik ve psikolojik süreçler, günümüz eğitim müziği bestecilerini yeni şarkılar yazmaya yönlendirmekte ve böylece mevcut dağar yenilenmekte, güncellenmekte ve zenginleşmektedir. Müzik öğretmeni adaylarının lisans eğitimlerinde aldıkları Eğitim Müziği Besteleme Teknikleri dersi bu bağlamda büyük önem taşımaktadır.

Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Müzik Eğitimi Anabilim Dalı'nda Eğitim Müziği Besteleme derslerinin teorik boyutunu aşağıda verilen çalışma konuları oluşturmaktadır:

- Müzik formlarına ilişkin önceden öğrenilmiş konuların genel tekrarı
- Eğitim Müziği kavramı ve eğitim müziği dağarında içerik ve konu analizi
- Türk eğitim müziği bestecileri
- Çocuk ve ergenlerin seslerinin özellikleri ve ses sağlığı
- Prozodi
- Piyanoda eşlik stilleri
- Çocuk şarkılarında iki seslilik
- Kanon

Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Müzik Eğitimi Anabilim Dalı'nda Eğitim Müziği Besteleme derslerinde genel olarak şu uygulamalı çalışmalar gerçekleştirilmektedir:

- Eğitim müziği dağarından örnekler inceleme ve seslendirme çalışmaları (her hafta farklı biçimlerde ve farklı konularda yazılmış örneklere yer verilmektedir. Bu yol ile müzik öğretmeni adaylarının geniş bir eğitim müziği repertuvarı oluşturmalarına katkı sağlanmaktadır)
- Çalınan iki ölçülük bir motifi dört ölçülük cümleye tamamlamak üzere vokal doğaçlama çalışmaları
- Verilen iki ölçülük bir motifi dört ölçülük cümleye tamamlamak üzere yazarak yaratma çalışmaları (cümle sonunda tonun ya da makamın pes ve tiz temel sesine ulaşacak biçimde iki farklı bitiriş)
- Çocuk şiirlerini ezgilendirme çalışmaları (şiirin hitap ettiği yaş grubunun ses sınırı ve söyleyebilecekleri melodik-ritmik yapılar gözetilerek)
- Verilen bir melodiye şarkı sözü oluşturma çalışmaları
- Çocuk şarkısına piyano eşliği oluşturma, eşliklendirilmiş şarkıyı eşzamanlı olarak çalma ve söyleme çalışmaları
- Marş formunda besteleme çalışmaları (marş formunda bestelemeye uygun olarak verilmiş bir şiir üzerine)
- Kanon yazma ve kanon seslendiren müzik toplulukları için yönetme çalışmaları
- Resimden esinlenerek söz ve ezgi yazma çalışmaları
- Çizgi filmden esinlenerek çizgi filmin konusuna uygun söz ve ezgi yazma çalışmaları

- Eğitim müziği dağarında var olan konulardan birini belirleyip özgün bir çocuk şarkısı yazma, piyano eşliğini oluşturma, bu şarkının içinde yer aldığı bir müzik dersi planlama ve bu çalışmaların sınıf içerisinde sunulması

Bu çalışma ile ilgili olarak alanyazın taraması yapıldığında disiplinlerarası eğitim ve sanat eğitiminde disiplinlerarası yaklaşımların öneminin vurgulandığı yayınlar olduğu görülmüştür (Edeer, 2005; Özdemir, Bölükoğlu ve Şentürk, 2015; Sungurtekin ve Bilhan, 2017; Sağdıç, 2019; Başbuğ, 2020). Sungurtekin ve Bilhan'ın (2017) 14 öğretmen adayı ile yürüttüğü çalışmada çağdaş sanatı anlamaya yönelik müzik, dans/devinim ve resim alanlarını kapsayan disiplinlerarası bir sanat eğitimi uygulaması gerçekleştirilmiştir. Eğitim uygulaması sonrasında öğretmen adaylarının sürece ilişkin görüşlerini değerlendirebilmek için görüşmeler yapılmıştır. Bu araştırmada okullardaki sanat eğitimi sürecinde sanatın çeşitli alanları arasındaki etkileşimin sağlanmasının önemine vurgu yapılmıştır. Araştırmanın sonuçları, öğretmen adaylarının çağdaş sanatı günümüzün sanatı olarak algıladıklarını, ancak içinde yaşadıkları çağın sanatını, sanatçılarını ve eserlerini yeterince tanımadıklarını göstermektedir. Araştırma kapsamında gereçekleştirilen eğitim uygulaması ile öğretmen adayları çağdaş sanata ve sanatçılarına yönelik yeni bilgiler edindiklerini, farklı sanat alanlarını ilişkilendirebildiklerini ve yeni bir bakış açısı kazandıklarını belirtmişlerdir.

Alanyazın taramasında "eğitim müziği" kavramının anlam ve kapsamının tartışıldığı, eğitim müziğinin geçmişi ve gelişiminin anlatıldığı, sorunlara yönelik çözüm önerilerinin de sunulduğu geniş içerikli bir kitap (Aksu, 2010) ile içeriğinde eğitim müziği çalışmalarının yanı sıra müzik teorisi, müzik formları derslerine de ışık tutacak bilgiler ve eğitim müziği dağarından örnekler olan bir başka kitap (Demir, 2012) dikkati çekmektedir. Ayrıca alanyazında Eğitim Müziği Besteleme dersi konuları üzerinde yapılmış akademik çalışmalara da rastlanmıştır (Göher, 2006; Kalaycıoğlu, 2009; Bilgin ve Şaktanlı, 2010; Şaktanlı ve Özelma, 2014; Barış, 2013; Tuğcular, 2015; Şimşek, 2019; Özgül, 2020). Eğitim Müziği Besteleme dersinde resim-müzik etkileşiminden yola çıkarak tasarlanmış bir etkinliğin anlatıldığı bu çalışmanın, alanyazına katkı sağlaması açısından önemli olduğu düşünülmektedir.

Bu çalışmada Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Müzik Eğitimi Anabilim Dalı 4. Sınıf öğrencileriyle 2020-2021 bahar yarıyılında "Eğitim Müziği Besteleme" dersinde gerçekleştirilen 'resimden müziğe' etkinliği ele alınmıştır. Bilindiği gibi 2020 yılı Mart ayında Covid-19 pandemisi sebebiyle uzaktan eğitime geçiş yapılmıştır. Bu çalışmada yer alan etkinlik uzaktan eğitim sürecinde gerçekleştirilmiştir.

Resimden müziğe -Resimden esinlenerek söz ve ezgi yazma çalışmaları-

Bu etkinlik çerçevesinde Müzik Eğitimi Anabilim Dalı öğrencilerine besteleme çalışmalarına esin kaynağı olması için renk elemanının ön plana çıkarıldığı toplam üç resim sunulmuştur. Öğrenciler kendilerine sunulan üç resmi de inceledikten sonra çalışmaya devam etmek istedikleri resmi kendileri seçmişlerdir. Her öğrenci, resmi incelerken zihninde hangi düşüncelerin belirdiğini, seçtiği resmin kendisine neler hissettirdiğini yazıya dökmüştür. Öğrencilerden yazdıklarını sınıf arkadaşlarıyla paylaşmaları istenmiştir. Bu noktada, aynı resmin öğrenciler üzerinde ne kadar farklı etkileri olduğu gözlemlenmiştir (huzur, karamsarlık, denge, güven, karmaşa gibi).

Bir sonraki aşama; öğrencilerin yazmış oldukları duygu ve düşüncelerden yola çıkarak şarkı sözü oluşturmalarıdır. Burada öğrenciler yazdıkları cümleleri şarkı sözü formuna dönüştürebilir ya da yazdıkları cümlelerin ışığında, yani temelde o duygu ve düşüncelerin olduğu ancak tamamen yeniden yazılmış bir şarkı sözü de oluşturabilirler.

Öğrenciler herhangi bir konu olmadan ya da onlara esin veren bir materyal sunmadan şarkı sözü oluşturmakta zorlanabilirler. Bunun için onlara konu ile ilgili bir genel çerçeve sunulabilir ya da onların yaratıcılıklarını harekete geçirecek resim, obje, durum, hikaye gibi bir esin kaynağından faydalanılabilir. Öğrenciler, söz yazma ile ilgili olarak her hafta ilerleme gösterirler. Bu çalışma, eğitim-öğretim döneminin yaklaşık 8. haftasında yapılan bir çalışma olduğu için, öğrencilerin bu çalışmayı yapmakta zorlanmadıkları görülmüştür.

Öğrenciler yazdıkları şarkı sözlerini ritmik okuma yaparak prozodik çalışma için hazırlık yapmışlardır. Bu aşamada açık ve kapalı heceler belirlenmiş, varsa uzun söylenmesi gereken heceler saptanmış ve tartımın ana hatları oluşturulmuştur. Ardından vurgulamalar için hazırlık yapılmıştır; sözcük içinde vurgu alması gereken heceler, cümledeki anlam vurguları ve vurgulu olması gereken tek heceli sözcükler saptanmıştır.

Vurgular ve ritmik yapının belirlenmesinden sonra sözlerin ezgilendirilmesine geçilmiştir. Şarkı sözlerinin yansıtmak istediği anlam, tonal ya da makamsal bir ezgi yazmak için belirleyici etken olabilir. Tonal ise hangi majör ya da minör ton olduğu, makamsal ise hangi karar sesi üzerinde hangi makam dizisinin kullanılacağı belirlenir. Ton ya da makamın belirlenmesinde şarkı sözlerinin hitap edeceği yaş grubu ve o yaş grubunun ses sınırı mutlaka dikkate alınmalıdır.

Ezgilendirilecek sözler, şarkının formunun belirlenmesinde de ipucu sunabilir. Şarkının formuna uygun cümleler ve sözler için belirlenen tartım, birlikte ele alınarak ölçü sistemi de belirlenir. Ton ya da makamdaki seslerin fonksiyonel işlevlerine göre (dominant-tonik bağlantısı, yeden ses-karar sesi ilişkisi gibi) ezgilendirme tamamlanır. Bu etkinlikte her bir öğrencinin çalışma hızının farklılık gösterebileceği göz ardı edilmemelidir.

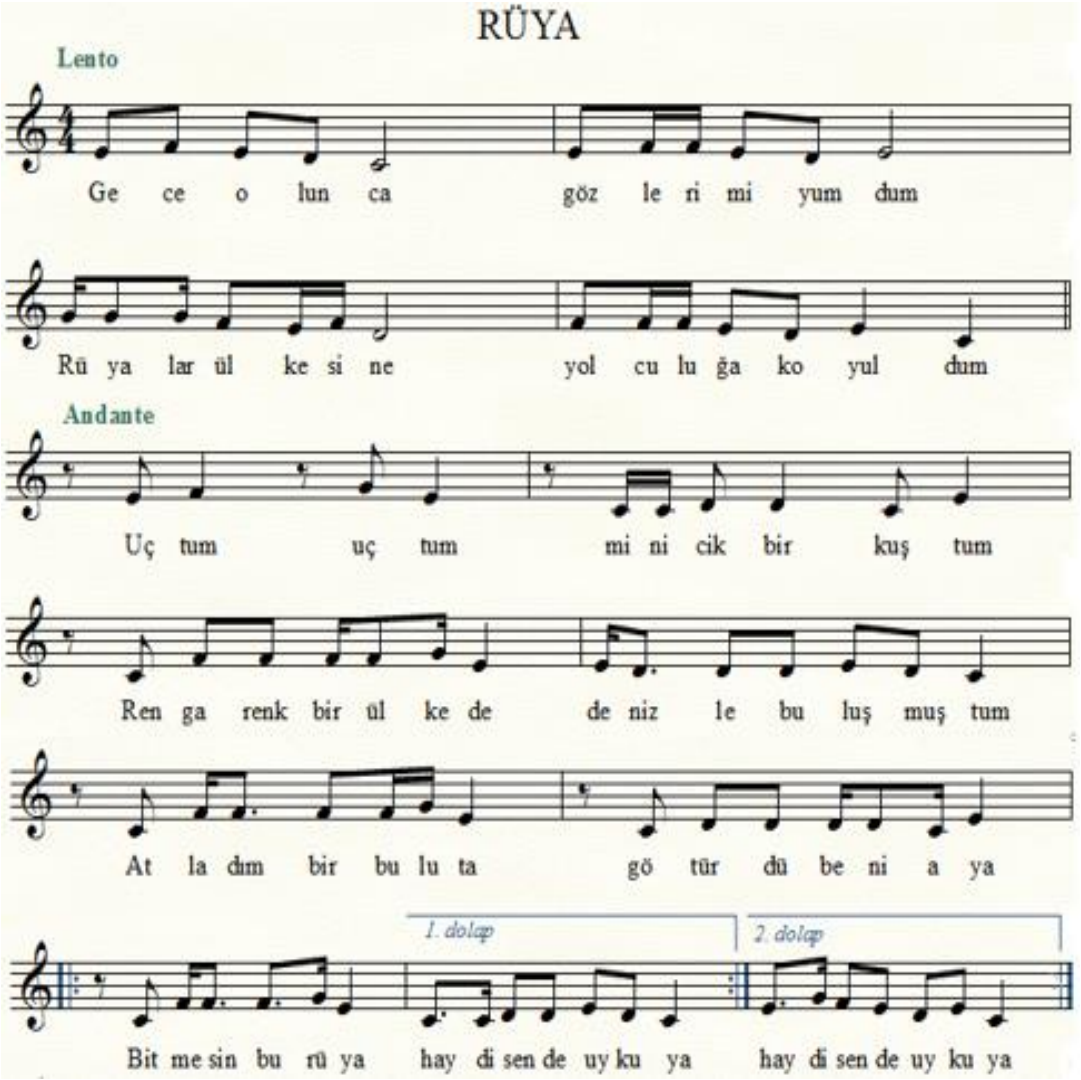
Bu çalışmada sunulan etkinlik, 2018 öncesi Müzik Öğretmenliği Lisans 4. sınıf programının son olarak uygulandığı 2020-2021 akademik yılında gerçekleştirilmiştir. Söz edilen programda Eğitim Müziği Besteleme dersi haftada 4 saat olarak yer aldığından bu etkinlik 2 saatlik bir ders boyunca sürdürülmüş, öğrencilerle aynı haftanın 2 saatlik diğer online dersinde tekrar bir araya gelinmiştir. Bu derste her bir öğrencinin çalışmasında gelmiş olduğu nokta değerlendirilmiş, çalışmalarının devamı için öneriler sunulmuş ve yönlendirmeler yapılmıştır. Bir sonraki hafta öğrenciler besteleme çalışmalarını tamamlamış, şarkılarının bilgisayar programında yazılmış notalarını, sunum videolarını veya ses kayıtlarını uzaktan eğitim platformuna yüklemişlerdir.
Bu çalışma kapsamında öğrenci çalışmalarından üçüne yer verilmiştir[4]. Üç öğrencinin de esinlendiği resim aynı resimdir. Öğrencilerin besteleme çalışmalarına esin kaynağı olarak seçtiği Merve Turan'a ait resim aşağıda görülmektedir (http://www.merveturan.com/).

[4] Çalışmalarının sunulabilmesi için öğrencilerle görüşülerek kendilerinden izin alınmıştır.

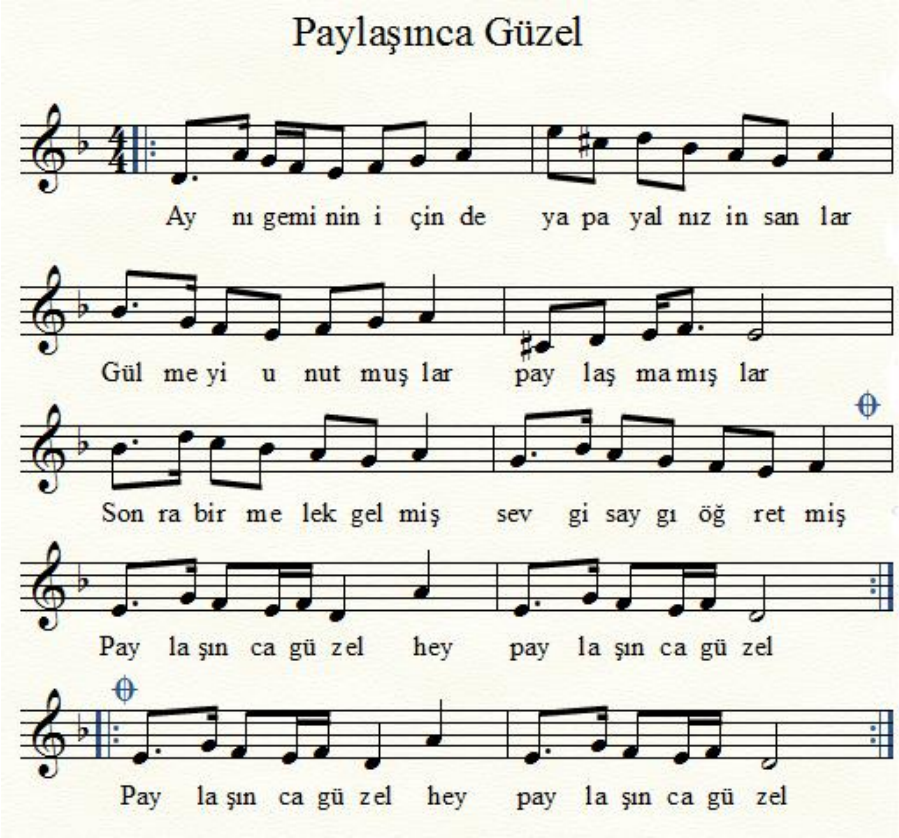


Resim 1. Merve Turan'a ait resim

Öğrenci 1, resmin kendisinde uyandırdığı duyguları şöyle dile getirmiştir: "Bambaşka bir dünya, rüya alemi. İçerisine girince anlaşılır farklılığı. Bazen korkunçtur, bir an önce ayrılmak istersin ama bilirsin uyanınca her şeyin biteceğini. Kimi zaman da hiç bitmesin istersin… Bir deniz kıyısında ya da gökyüzünde bir kuş kadar özgür olabilirsin. Daha önce hiç görmediğin bir ülkeye gidebilirsin mesela. Belki de en çok gitmek istediğin yerde bulursun kendini. Yeşilliklerin arasında rüzgârda dans eden bir çiçek misali koskoca evrende kaybolup gidersin. İşte rüya alemi." Öğrenci bu duygularından yola çıkarak, aşağıda notaları verilmiş olan şarkıyı bestelemiştir.



Öğrenci 2, aynı resim ile ilgili şunları yazmıştır: “Geminin içinde umutsuz insanlar var, karamsarlıkları gökyüzünü kaplamış, dışarıdaki renklere kör olmuş, yardıma muhtaç insanlar. Bu insanları gören melek onlara geminin kötü duygulardan, düşüncelerden ve davranışlardan ibaret olmadığını, derinlere bakıldığında her şeyin daha iyi, daha güzel ve daha renkli olduğunu gösteriyor.” Öğrencinin ‘Paylaşınca Güzel’ isimli şarkısı aşağıda sunulmaktadır:



Öğrenci 3'ün aynı resim ile ilgili kaleme aldığı cümleler şöyledir: "Bu resime bakınca içimde iki türlü dünya ve iki türlü insan olduğu hissi oluştu, iyilik ve kötülük gibi. Resim, aydınlık ve karanlık taraf olarak ikiye bölünmüş gibi. Dünya üzerinde yaşayan bütün canlılar olarak denizin üstünde ilerleyen bir gemideyiz fakat bu gemide hepimiz bir taraftayız karanlık ya da aydınlık. Hangi tarafı seçeceğimiz elbette bizim elimizde. Aydınlığı izleyip iyiyi güzeli bulabileceğimiz gibi karanlık tarafın kasvetine de kapılabiliriz. Resmi gözlemledikçe iyiyi de kötüyü de ayırt etmek tamamen bizim vicdanımıza kalmış diye hissettim." Öğrenciye ait şarkının notaları aşağıda verilmiştir.



SONUÇ

Bu çalışma, "Eğitim Müziği Besteleme" çalışmalarında esin kaynağı olarak resim sanatından faydalanılabileceğinin vurgulanması amacıyla yapılmıştır. Bu bağlamda farklı disiplinleri bir arada kullanmanın eğitim-öğretim sürecinin niteliğini artıracağı düşüncesi ile 2020-2021 bahar yarıyılında Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Müzik Eğitimi Anabilim Dalı programı 4. sınıf öğrencileri ile Eğitim Müziği Besteleme dersi kapsamında 'resimden müziğe' (resimden esinlenerek söz ve ezgi yazma çalışmaları) etkinliği gerçekleştirilmiştir. Bu çalışmada bu etkinliğin aşamaları anlatılmış ve etkinlik sonunda öğrencilerin bestelediği üç şarkı paylaşılmıştır.

Resim, heykel, mimari ve müzik eserlerinin kendine özgü bir dili vardır, kendi diliyle anlatmak istediklerini anlatır ancak hepsinin ayrıca konuşma ve yazma dillerine ihtiyaç duydukları görülür (Akengin, 2012, s. 140). Bu çalışmada resimlerin anlatmak istediklerini müzik öğretmeni adayları bir de kendi duyumsadıkları biçimde yazı diline dökmüş ve sonra da müziğin dilini kullanarak şarkılara dönüştürmüşlerdir. Bu şekilde resimle başlayan yolculuk müzik ile son bulmuştur.

Bu çalışmada yer verilen örnekler, öğrenci ödevleridir. Öğrenciler kendilerine verilen çalışmanın gereklerini yerine getirmişlerdir. Ancak elbette ki sunulan çalışmalar kusursuz değildir. Covid-19 pandemisi sebebiyle uzaktan eğitimin sürdürüldüğü bir dönemde müzik öğretmeni adaylarının Lisans 4. sınıf öğrencisi olarak diğer dersler, öğretmenlik uygulaması, KPSS hazırlığı gibi tüm çalışmalarının yanında Eğitim Müziği Besteleme dersi ödevlerini uzaktan eğitim sürecinin zorluklarına rağmen yüksek motivasyonla hazırlayıp sunmaları mutluluk vericidir.

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TÜRKİYE'DE İLAÇ TEDARİK ZİNCİRİNDE KULLANILAN İLAÇ TAKİP SİSTEMİ İLE BLOK ZİNCİR TABANLI İLAÇ TEDARİK ZİNCİRİ UYGULAMALARININ KARŞILAŞTIRILMASI

Emine Ayhan[*1] ,Mehmet Aytekin[2], Hakan Güvener[3],

*[*1]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye*
ORCID Code:0000-0002-8101-5479
[2]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye
ORCID Code:0000-0001-5464-0677
[3]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye
ORCID Code:000-0002-9159-7708

ÖZET

Bu çalışmanın amacı; Türkiye'de ilaç tedarik zincirinde kullanılan ilaç takip sistemi ile ilaç tedarik zincirinde kullanılan blok zincir tabanlı teknolojileri karşılaştırmaktır. Bu kapsamda iki sistem arasındaki farklılıklar, avantaj ve dezavantajlar tespit edilerek gelecekteki uygulamalara yönelik bir öngörü oluşturulmaktadır. Çalışmada öncelikle, Türkiye'deki ilaç tedarik zinciri ve ilaç takip sisteminin işleyişi incelenmiş ardından, blok zincir teknolojisi ve sistemin ilaç tedarik zinciri uygulamaları açıklanmıştır. Daha sonra her iki uygulamanın karşılaştırması yapılmış ve çalışma sonucunda Türkiye'de kullanılan ilaç takip sisteminin takip ve izlenebilirlik özelliklerinin yanında, blok zincir tabanlı ilaç tedarik zinciri uygulamalarının daha fazla şeffaflık, güvenlik ve esneklik sağladığı görülmüştür. Ancak blok zincir teknolojilerinin uygulanması için iyi bir altyapı ihtiyacı ve ilgili yasal düzenlemelerin yapılması gerekliliği nedeni ile henüz bu sistemin kullanılabilirliğinin kısıtlı olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: İlaç, Tedarik Zinciri, İlaç Takip sistemi, Blok Zincir.

COMPARISON OF PHARMACEUTICAL TRACKING SYSTEM USED IN PHARMACEUTICAL SUPPLY CHAIN IN TURKEY AND BLOCKCHAIN-BASED PHARMACEUTICAL SUPPLY CHAIN APPLICATIONS

ABSTRACT

The aim of this study; to compare the drug tracking system used in the pharmaceutical supply chain in Turkey with the blockchain-based technologies used in the pharmaceutical supply chain. In this context, the differences, advantages and disadvantages between the two systems are determined and a prediction is made for future applications. In the study, first of all, the drug supply chain and the functioning of the drug tracking system in Turkey were examined, then the blockchain technology and the drug supply chain applications of the system were explained. Then, a comparison of both applications was made and as a result of the study, it was seen that besides the tracking and traceability features of the drug tracking system used in Turkey, blockchain-based drug supply chain applications provide more transparency, security and flexibility. However, it has been concluded that the usability of this system is still limited due to the need for a good infrastructure for the implementation of blockchain technologies and the necessity of making relevant legal regulations.

Keywords: Pharmaceuticals, Supply Chain, Pharmaceutical Tracking system, Blockchain.

GİRİŞ

Sağlık hizmetleri, hastalıkları önleme, teşhis, tanı ve tedaviye yönelik olup, bu amaçla büyük miktarda beşeri tıbbi ilaçlar kullanılmaktadır (Mohana vd., 2019). İlaçların yaşam döngüleri boyunca yani üretiminden nihai tüketici olan hastaya ulaşıncaya kadar gelişmiş bir tedarik zinciri yönetiminin olması, doğru ilaçların doğru yer ve zamanda en uygun maliyetle doğru kişiye ulaşımı açısından son derece önemlidir. İlaç tedarik zinciri, birçok paydaşın ilacı bir noktadan diğerine taşımaya dâhil olduğu oldukça karmaşık ve dallanmış bir zincirdir (Vruddhula, 2018). Aynı zamanda günlük yaşam için hayati önem taşıyan hizmetlere kritik omurga sağlayan, birden fazla kurumsal ve coğrafi sınıra yayılan karmaşık yapılardır. Bu tür sistemlerin doğasında bulunan karmaşıklık; hatalı bilgi, şeffaflık eksikliği ve sınırlı veri kaynağı da dâhil olmak üzere çeşitli sorunlara neden olabilir. Son yıllarda, ilaç tedarik zincirinde dolandırıcılık ve ilaçların kötüye kullanılması konusu giderek daha belirgin hale gelmiştir (Musamih vd., 2021). Bir taraftan insanlar daha sağlıklı olmanın yollarını ararken gün geçtikçe artan hastalıklarla birlikte tedavi amacıyla her geçen gün yeni isim ve etikette ilaçlar piyasaya sürülmektedir. Ancak standart dışı üretilen sahte ilaçlar insan sağlığı üzerinde ciddi olumsuz etkileri olmakla kalmayıp aynı zamanda sağlık sektöründe ciddi ekonomik kayıplara da neden olmaktadır. Sahte ilaçlar farklı karmaşık ağlar aracılığıyla teslim edildiğinden tespit etmek zordur. Bunun yanı sıra yanlış reçete, gereksiz ilaç satın alınması, ilaç intoleransı, alerji veya etkileşimlerle ilgili çeşitli nedenlerden dolayı muazzam miktarda ilaç arzı düzenli olarak boşa harcanmaktadır (Debe vd., 2020). Bu nedenle hem sahte ilaç sorunlarını önlemek hem de diğer tedarik zinciri sorunlarının üstesinden gelmek için, güvenli ve şeffaf ilaç teslimi ve tedarik zinciri süreci gerekmektedir. Eczane, distribütör ve hastane düzeyinde ilaç pazarının kontrolünün ve yönetiminin geliştirilmesi ve en son teknolojilerin kullanımını da içeren tüm ilaçların tedarik zincirinde sürekli izlemesinin gerekliliğini öneren çok sayıda uzman görüşleri bulunmaktadır (Abbas vd., 2020). İlaç tedarik zinciri, çeşitli süreçlerden geçerek son kullanıcıya ulaşıncaya kadar takip edilmesi gereken bir sistemdir.

İlaçların kabul edilebilir koşullara uygun olarak ve güvenli bir şekilde teslim edilmesini sağlamak için ilaçların takibi, hayati bir önem arz etmektedir. İlaç tedarik zincirinde tüm paydaşların; tedarikçi, üretici, dağıtıcı, satıcı, hastane ve hasta olmak üzere her aşamada ilacın etkin bir takip sistemi ile izlenmesi, sorunlara prokatif çözümler geliştirilmesi açısında çok önemlidir. İlaç tedarik zincirinin takibine yönelik dünyada çok çeşitli uygulamalar mevcut olup Türkiye'de bu amaçla kullanılan uygulama İlaç Takip Sistemi (İTS)'dir. Türkiye'deki İTS; tıbbi ürünlerin kare kod kullanılarak tekilleştirilmesini sağlayarak, ürünün geçtiği her noktada üretim, ithalat, ihracat, alış, satış, devir, tüketim, geri ödeme gibi tedarik zincirinde gerçekleşen tüm hareketlerini ya da hareket iptallerini gerçek zamanlı olarak merkezi bir kayıt sistemi ile izleyen bir sistemdir. Bir diğer uygulama ise, ilk olarak finansal uygulamalarda ismini duyduğumuz, zamanla da sağlıktan gıdaya birçok sektörde uygulanan blok zincir teknolojisidir. Bu teknoloji son zamanlarda ilaç takip sisteminde de yaygın olarak kullanılmaktadır. Blok zincir teknolojisi, ilaç tedarik zincirinde tüm katılımcıların işlemleri ayrıntılı olarak kaydedildiği ve sürece ait tüm verilerin merkezi olmayan bir şekilde depolandığı şeffaf bir sistemdir.

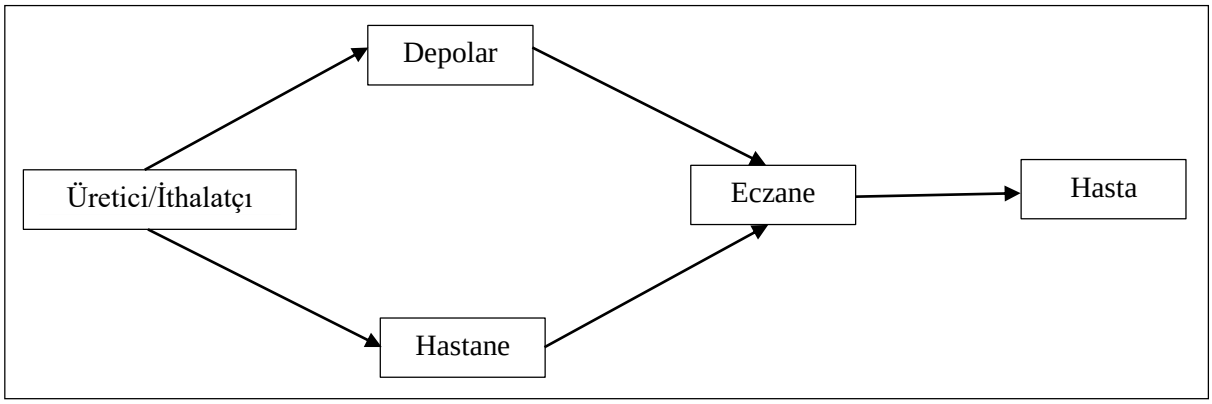
Bu çalışmada, üreticiden tüketiciye tedarik zincirinde olması beklenen, izlenebilirlik, şeffaflık, güvenlik ve ulaşılabilirlik gibi kavramları karşılayan teknolojilerin ilaç tedariğindeki uygulamalarına ilişkin çalışmaları incelenerek, Türkiye'de kullanılan ilaç takip sistemi ve blok zincir tabanlı ilaç tedarik zinciri uygulamaları karşılaştırılmıştır. Çalışmada bu iki uygulamanın işleyiş şekli, uygulamalar arasındaki farklılıklar, güçlü ve zayıf yönler tespit edilmiş ve sonraki çalışmalara ve uygulamalara bir öngörü sunulmuştur.

1. Türkiye'de İlaç Tedarik Zinciri ve İlaç Takip Sistemi

Türkiye'de ilaçların ruhsatlandırılması, üretimi, depolanması, satışı, ithalatı, ihracatı, piyasaya arzı, dağıtımı, hizmete sunulması, toplatılması ve kullanımları ile ilgili kural ve standartları belirlemek, bu faaliyetleri yürütecek kamu ve özel hukuk tüzel kişileri ile gerçek kişilere izin vermek, ruhsatlandırmak, denetlemek ve gerektiğinde yaptırım uygulamak, laboratuvar analizlerini yapmak veya yaptırmakla yetkili kurum, Sağlık Bakanlığına bağlı olan ve özel bütçeli olarak faaliyet gösteren Türkiye İlaç ve Tıbbi Cihaz Kurumu (TİTCK)'dir. Bir tıbbi ürün; Ar-Ge çalışmaları, ön-klinik çalışmalar ve faz (klinik) çalışmaları neticesinde kalite, etkililik ve güvenlik değerlendirmelerine tabi tutularak ruhsatlandırılır.

İlacın piyasaya sunulması için satış izninin verilmesi, ruhsatlandırma sonrası ilaca ilişkin çalışmalar, değişiklikler ve güncellemeler ilacın yaşamı boyunca devam eder. Tıbbi ürünlerin tüketiciye uygun şartlarda ulaşmasını temin etmek için gerekli tedbirlerin alınması ve fiyatların belirlenmesi Sağlık Bakanlığı tarafından yapılır. Türkiye'de ilaç, piyasa koşullarında üretilen endüstriyel bir ürün olmasına rağmen bedelinin büyük bir kısmı devlet tarafından ödenen tek üründür. Aynı zamanda ilaç doğrudan bireyin sağlığı ile ilgili olup talep esneklik katsayısı düşük olan bir endüstriyel üründür. Bunun yanı sıra ilaçlar, sağlığın ertelenemez olması unsuru gereği; istenilen kalitede, ihtiyaç duyulduğu anda teslimi çok önemli olan stratejik bir üründür (Türk, 2019).

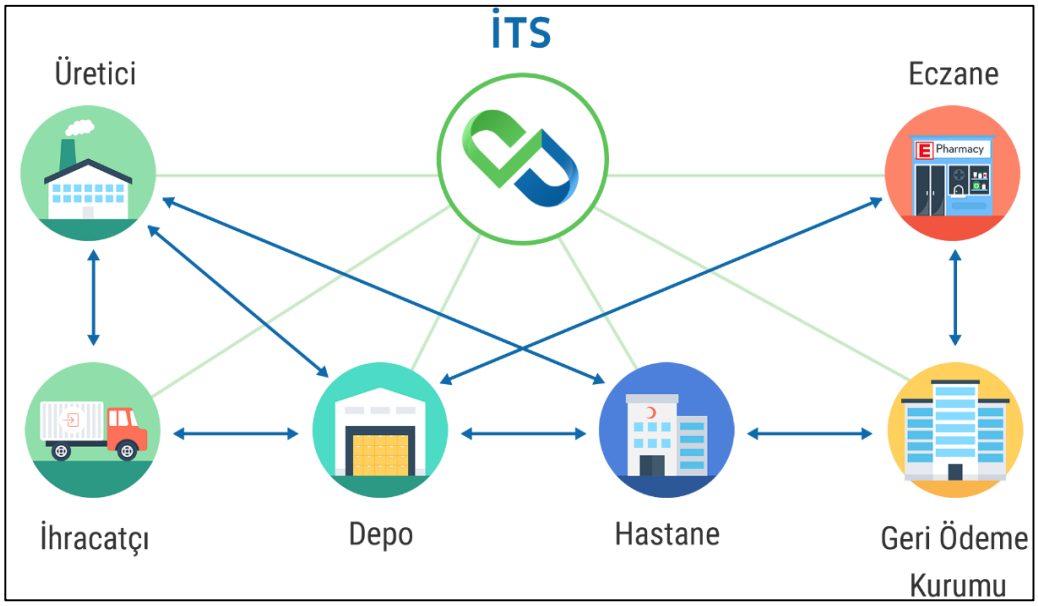
İlaç sektörü tedarik zincirindeki aktörler sırasıyla; "hammadde tedarikçileri, ilaç üreticileri, ana dağıtıcı, bayi depoları, kamu veya özel eczaneler ve son olarak hastalar"dır (Bozaykut vd., 2019).



Şekil 1. Türkiye'de İlaç Tedarik Zinciri

Kaynak: https://vdocuments.mx/saglik-malzemeleriilac-lojistigi-tugay-guenaydin.html

Türkiye'de ilaç tedarik ve takip işlemleri 2008 yılında TİTCK tarafından projelendirilen ve 2012 yılında hayata geçirilen İlaç Takip Sistemi (İTS) ile kontrol edilmektedir. Uçtan uca ilaç izlenebilirliğini tüm ilaç endüstrisini kapsayacak şekilde gerçekleştiren bu ilaç yönetim sisteminde, her bir ilaç kutusunun, tedarik zinciri boyunca uğradığı tüm noktalarda kayıt altına alınması sağlanmaktadır. Bu sayede ilaçta sahteciliğin ve kaçakçılığın önüne geçilmesi hedeflenmektedir. TİTCK tarafından yönetilen ve kredilendirilen İTS, ilacın üretimi veya ithalatı ile başlayan; depolama, transfer ve sevkiyat operasyonları ile devam eden ve eczanede hastaya teslim edilmesi ile son bulan orijinal ve güvenilir ilaç teminini sağlayan bir sistemdir. Tüm paydaşlar (eczane ve eczane depoları, sarf merkezleri, ruhsat sahibi firmalar, ihracata yetkili firmalar, geri ödeme kurumları) İTS'ye kaydolmak ve sistem üzerinde bildirimlerini yapmakla yükümlüdürler.



Şekil 2. İlaç Takip Sistemi (İTS)

Kaynak: https://its.tiga.com.tr/ilac-takip-sistemi/calisma-prensipleri

Elektronik ürün kodu teknolojisi sayesinde sistemde ürünlerin tedarik ve dağıtım süreçlerinde izlenebilirliği sağlanmakta ve konum belirlemek mümkün olmaktadır. Ayrıca bu teknoloji sayesinde ürün giriş ve çıkışları raporlanarak konum, zaman ve durumlarına ilişkin gerçek zamanlı bir veri tabanı oluşturulmaktadır (Türkiye İlaç ve Tıbbi Cihaz Kurumu, 2020).

1.1. İTS İle İlaç Tedarik Zinciri Aşamaları

İTS, kare kod teknolojisinden faydalanarak ilaçların tedarik ve dağıtım süreçlerindeki geçmiş ve güncel durum bilgilerinin belirlenmesi esasına dayanmaktadır. Ürün hareketleri, paydaşların eş zamanlı bildirimleri ile izlenmektedir. Bazı temel bildirim ve servisler şu şekildedir:

Üretim/İthalat bildirimi: Ruhsat/izin sahipleri tarafından ithal/imal ürünler için kullanılan bildirim tipidir. Tedarik zincirine dâhil edilecek bir ürünün üretim bildirimi yapılması zorunludur.

Satış bildirimi: Tedarik zincirindeki belirli tip paydaşlar tarafından kullanılan bildirim tipidir. Satış bildirimi aynı zamanda doğrulama yapılmasını sağlamaktadır. Satış veya mal alım bildirimi esnasında ürünlerin miatları da kontrol edildiğinden miadı geçen bir ürün satılamaz.

Eczane satış bildirimi: Eczacıların, ilaçları hastaya vermeden önce yapmakla yükümlü olduğu bildirimdir. Bu bildirim aynı zamanda bir doğrulama olup gerektiğinde sistem tarafından paydaşa hata mesajı iletilmektedir. Söz konusu satış bildirimleri, geri ödeme kurumlarının yapacağı ödemeler için de esas teşkil etmektedir.

Doğrulama: Paydaşlar tarafından kullanılan, ellerindeki ürünün satılabilir olduğunu doğrulamak için kullanılan servistir.

Mal alım bildirimi: Mal alım bildirimi, paydaşların ürünleri stokuna kabul ederken kullandıkları, doğrulama içeren bildirim tipidir.

Deaktivasyon: Kullanılamaz durumdaki ürünlerin sistemden çıkarılması için yapılan bildirimdir. Örneğin; ürünün imha edilmesi istenmişse bu bildirim kullanılarak sistemdeki kaydı kapatılmaktadır.

Mal İade Bildirimi: Alınan ürünlerin iadesi durumunda o ürünlerin stoktan çıkarılması ve diğer paydaşın stoklarına geçmesi için bu bildirim yapılmalıdır.

Mal Satış İptali: Satılan malın iadesini kabul edilirken kullanılan, doğrulama içeren bildirim tipidir.

Sarf Bildirimi: Sağlık hizmet sunucularında kullanılan, ürünün harcandığını belirten bildirim tipidir.

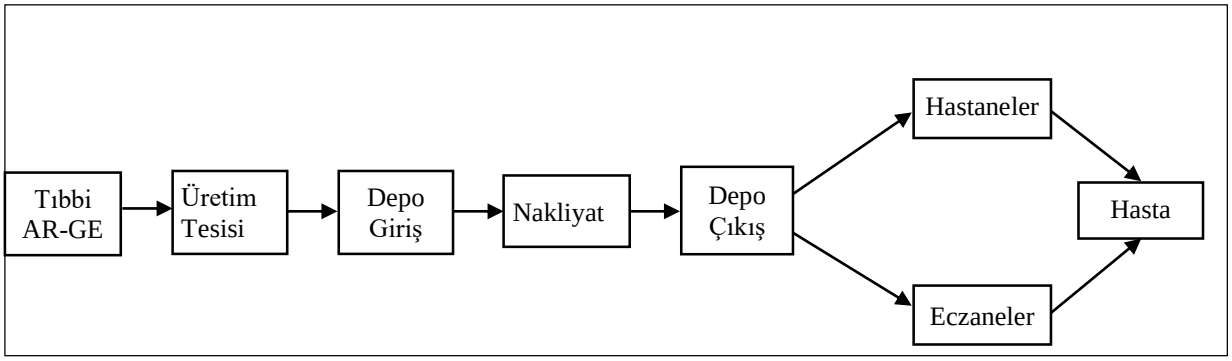
Tüm paydaşların sistemin bir parçası olarak yaptığı bu bildirimler ile tedarik, takip ve izlenebilirlik sağlanarak, hem sahtecilik ve kaçakçılığı önlemek, hem de doğru hastanın doğru ilacı temini mümkün olmaktadır. İTS ile piyasadaki yerli, ithal veya ihraç edilecek tüm ilaçlar kutu bazında kare kod ile kayıt altına alınması sağlanmakta ve daha ilk andan itibaren ilaçlar hastaya ulaşıncaya kadar, ilaca dair her türlü üretim, satış, sarf, iade gibi işlemleri takip edilmektedir. İlaçların geçtiği her konumdan web servisleri aracılığıyla T.C. Sağlık Bakanlığı'na bildirim yapılmakta ve izleme gerçekleşebilmektedir. Hasta sağlığını koruma adına, hastalara güvenilir ve orijinal ilaç ulaşımını sağlama imkânı sunan bir sistem olan İTS aynı zamanda geri ödeme kurumlarına karşı yapılan yolsuzlukların da önüne geçebilmektedir. İTS'nin sağladığı yararlardan bir diğeri de hastaların sağlık ve güvenliği düşünülerek, ruhsatlandırılmış tıbbi ürünlerin raf ömrünü sürekli gözetleme ve denetleme imkânıdır. Tüm bunların dışında İTS ayrıca, ilaçların sebep olduğu herhangi bir yan etki veya rahatsızlık tespit edilmesi durumunda T.C. Sağlık Bakanlığı'nın, hiç vakit kaybetmeden ilaçları piyasadan geri çekerek duruma müdahale etmesine de olanak sağlamaktadır (Türkiye İlaç ve Tıbbi Cihaz Kurumu, 2020).

2. Blok Zincir Teknolojisi ve Blok Zincir Tabanlı İlaç Tedarik Zinciri

Blok zincir; kripto para birimlerini desteklemek için etkinleştirme mekanizması olarak tanıtılan dağıtılmış, değişmez bir defter teknolojisidir (Drosatos ve Kaldoudi, 2019). En iyi bilinen kullanımı genel olarak Bitcoin ve kripto para birimleridir. Bununla birlikte, blok zincirinin faydası, ekonomik faydanın ötesindedir (Roman-Belmonte vd., 2018). Blok zincir teknolojisi, son yıllarda sağlık sektörü de dâhil olmak üzere çok çeşitli alanlarda artan bir ilgi ile uygulama imkânı bulunan ve birçok probleme çözüm önerileri sunan bir teknolojidir. Bu teknoloji, merkezi bir otorite veya yönetici olmadan çalışabilen güvenli, dağıtılmış bir veri tabanı sunmaktadır. Dijital bir defter oluşturmak için blok adı verilen sürekli ve büyüyen bir sıralı kayıt listesi oluşturmak için dağıtılmış, entegre bir ağ kullanılır. Kriptografik olarak imzalanmış bir blokta temsil edilen her işlem, daha sonra ağın kendisi tarafından otomatik olarak doğrulanır (Angraal vd., 2017). Blok zincir teknolojisinde halka açık defterde reddedilemez bir kayıt oluşturarak işlem yapıldığından, zincir içerisinde katılımcıların her işlemden haberdar olmasını sağlayarak ortak bir işlem mekanizması oluşturur (Dutta vd., 2020).

Sağlık tedarik zinciri içerisinde ilaç tedariği, hayati öneme sahip olup sahte ilaçlar, miadı dolmuş ilaçlar ya da yanlış ilaçlar, yalnızca insan sağlığı üzerinde ciddi olumsuz etkilere neden olmakla kalmayıp, sağlık sektöründe ciddi ekonomik kayba da neden olmaktadır. Sağlık tedarik zincirindeki ürünlerin izlenmesi, etkin kontrolü ve takibi, bu problemlerle mücadelede esastır. Bu noktada blok zincir teknolojisi, söz konusu problemlere farklı çözüm önerileri sunabilmektedir (Musamih vd., 2021). Yazılım uygulamaları farklı olmakla birlikte blok zincir tabanlı ilaç tedarik zinciri temelde ilaç tedariğinde merkezi olmayan, şeffaf, güvenilir ve izlenebilir bir tedarik sürecini amaçlamaktadır.

Blok zincir ilaç tedarik zinciri paydaşları; İlaç üretimine izin veren yetkili kurum, üreticiler, distribütörler, eczaneler ve hastalar gibi düzenleyici kurumları içerir. Aşağıdaki şemada genel olarak blok zincir tabanlı teknolojilerle ilaç tedarik zinciri görsel olarak verilmiştir.



Şekil 3. Blok Zincir İlaç Tedarik Zinciri

Kaynak: Khezr, S., Moniruzzaman, M., Yassine, A., & Benlamri, R. (2019). Blockchain technology in healthcare: A comprehensive review and directions for future research. Applied sciences, 9(9), 1736.

Blok zincir ilaç tedarik zinciri paydaşları; akıllı sözleşmenin katılımcıları olarak hareket eder ve tedarik zincirindeki rollerine göre belirli işlevlere atanır. Ayrıca, tedarik zincirindeki işlemleri izlemek için geçmiş ve günlük bilgiler gibi zincir üzerindeki kaynaklara erişim sağlanır. Yine katılımcılar, ilaç lot görüntüleri ve bilgi broşürleri gibi paydaşlar arası merkezi olmayan dosya depolama sisteminde saklanan bilgilere erişme yetkisine sahiptirler**.** Merkezi olmayan depolama sistemi**,** depolanan verilerin güvenilirliğini, erişilebilirliğini ve bütünlüğünü sağlamak için tedarik zinciri işlem verilerini depolamak için düşük maliyetli bir zincir dışı depolama sağlar. Verilerin bütünlüğü, sunucusuna yüklenen her dosya için benzersiz bir karma oluşturularak korunur. Yüklenen farklı dosyalar için farklı karmalar daha sonra blok zincirinde depolanır. Akıllı sözleşmeler aracılığıyla yüklenen dosyalara erişilir ve bunlardan herhangi birinde meydana gelen herhangi bir değişiklik ilişkili karmaya yansıtılır (Steichen vd., 2018).

Blok zincir tabanlı ilaç tedariğinde akıllı sözleşme**,** tedarik zincirinin dağıtımını yönetmek için kullanılır. Akıllı sözleşme, işlemlerin geçmişini izlemek için merkezi ve esastır. Katılımcıların tedarik zinciri bilgilerine erişmesini sağlayan merkezi olmayan depolama sunucusundan gönderilen karmaları yönetir. Ayrıca tedarik zincirindeki farklı paydaşların işlevleri akıllı sözleşme içerisinde tanımlanmakta ve düzenleyiciler kullanılarak bu işlevlere yetkili katılımcılara erişim sağlanmaktadır. Akıllı sözleşme ayrıca ilaç lotları veya kutuları satmak gibi işlemleri de yürütür. Akıllı sözleşmeler bütünlük, izlenebilirlik ve şeffaflık sağlar (Omar vd., 2021).

2.1. Blok Zincir Tabanlı İlaç Tedarik Zinciri Aşamaları

İlaç endüstrisindeki tedarik zinciri karmaşıktır ve ilaçlar müşteriye ulaşmadan önce üreticiden tüketiciye ulaşıncaya kadar birçok el değiştirir. Tedarik zinciri boyunca üreticilerin orijinalliği takip etmeleri için çok az veya hiç görünürlük olmadığından, sonuçta sahte ilaç sorunu, geri çağırma ve iade işlemlerini yürütmek için verimsiz süreçler oluşmaktadır. Bu verimsizlikler finansal kayıplara ve tüketicilere olan güvenin kaybolmasına neden olmaktadır. Blok zincir teknolojisi, müşterilerin tedarik zinciri boyunca ilaçları takip edebilmesi sayesinde güven ve şeffaflığı arttırmaktadır (Schöner vd.,2017). Blok zincir tabanlı ilaç tedarik zinciri;

Üretim: Bir üretici her ilaç lotunun üretim sürecini başlatmak için yetkili kuruma bir onay talebi gönderir. Talep onayladıktan sonra, üretici üretim sürecini başlatır ve tüm katılımcılara bildirim yapılır. Üretici, ilaç lotunun görüntülerini katılımcılar arası merkezi olmayan bir dosyalama sistemine yükler ve bu dosyadaki görüntülere daha sonra katılımcılar tarafından erişilebilmesi için akıllı sözleşmeye bir karma gönderilir. İlaç lotu, imalat süreci tamamlanarak ambalajlanmak üzere distribütöre teslim edilir.

Dağıtım: Bir sonraki adım dağıtım sürecinin başlatılmasıdır, distribütör ilaç lotunu paketler ve paketin bir görüntüsü ortak dosyaya yüklenir. Akıllı sözleşmeye bir karma gönderilir. Bu aşama tamamlandıktan sonra ilaç lot paketleri eczanelere teslim edilerek dağıtım aşaması sona erdirilir.

Satış/Tüketim: Zincirdeki son adım, eczane ve hastalar arasındaki etkileşim ile ilgilidir. Burada eczane, ilaç satışını başlatır ve tedarik zinciri katılımcılarına bildirim yapılır. Ardından, satılan ilaç lotunun bir görüntüsü katılımcıların gördüğü ortak dosyaya yüklenir ve akıllı sözleşmeye gönderilir.

Blok zincir tabanlı ilaç tedarik zinciri; tüm işlemlerin saklanmasını ve ürünlerin gerçekliğini ve geçerliliğini bir dizi olay şeklinde kontrol etme ve ayrıca tedarik zinciri katılımcılarına bu bilgilere daha sonra erişme imkânı sunmaktadır (Musamih vd., 2021). Blok zincir tabanlı ilaç tedarik zinciri; yasadışı bir ilaç bulunması durumunda ilaç tanımlama, izleme, doğrulama ve bildirim sağlar. Bunun yanında, akıllı sözleşmeler ve merkezi olmayan depolama uygulaması sayesinde şeffaf, güvenilir ve izlenebilir ilaç takip sistemi ile üretimden nihai tüketiciye ulaşıncaya kadar karşılaşılabilecek problemlere yerinde ve zamanında çözüm imkânı sunmaktadır.

3. İTS ve Blok Zincir Tabanlı İlaç Tedarik Zinciri Karşılaştırılması

Blok zincir teknolojisi farklı sektörlerde uygulama imkânı bulmasına rağmen Türkiye'de ilaç tedariğinde henüz kullanılmamaktadır. Türkiye'de ilaç tedarik zincirinin takip ve izlenmesi amacıyla

kullanılan sistem ise İTS teknolojisidir. Blok zincir teknolojisi ile İTS uygulamalarının bazı özellikler açısından değerlendirmesine yönelik bilgiler Tablo 3'te sunulmuştur.

3. İTS ve Blok Zincir Tabanlı İlaç Tedarik Tedarik Zinciri Karşılaştırılması

Tablo1. İTS Teknolojisi ile Blok Zincir İlaç Tedarik Teknolojisinin karşılaştırılması

Özellikler	İlaç Takip Sistemi	Blok Zincir İlaç Takip Sistemi
Merkezi Olmama	Hayır	Evet
Şeffaflık	Hayır	Evet
Takip ve İzlenebilirlik	Evet	Evet
Güvenlik	Hayır	Evet
Esneklik	Düşük	Yüksek
Uygulanabilirlik	Yüksek	Düşük
Teknik Alt Yapı İhtiyacı	Düşük	Yüksek

Türkiye'de ilaç takibi amacı ile kullanılan İTS teknolojisi Sağlık Bakanlığı'na bağlı merkezi bir sistemdir. Bu sistemlerde kontrol ve denetim mekanizması merkezidir. Bunun aksine blok zincir teknolojisi âdemi merkeziyetçi bir sistem olup tüm paydaşlar, tedarik zinciri boyunca gerçekleşen her hareketi görebilmekte, dolayısıyla katılımcıların tümü kontrol ve denetimine dâhil olabilmektedir. İTS uygulamasının merkezi olması şeffaflığını da etkilemektedir. Tedarik zincirindeki katılımcılar yalnızca sistemin kendisine yetki verdiği bilgileri görebilmektedir. Merkezi olmayan blok zincir teknolojisi uygulamalarında ise katılımcıların tümü tedarik zincirinin her aşamasını görebildiğinden daha şeffaf bir uygulamadır (Abbas vd., 2020). İlaçlarda sahteciliği engelleyerek toplumsal ve ekonomik fayda sunan takip ve izlenebilirlik özelliği, hem İTS hem de blok zincir teknolojisi uygulamalarında mümkündür. İTS sistemi merkezi ve şeffaf olmayan özellikleri nedeni ile manipülasyona açık olup yeterinde güvenli değildir. Ancak blok zincir teknolojisi uygulamalarında ilacın tedarik zinciri boyunca veriler değiştirilemez bir defterde kayıt edilmesi, sistemin daha şeffaf olmasını sağlamasının yanında daha da güvenilir olmasını sağlamaktadır (Dutta vd., 2020). İTS uygulamasının merkezi olması sorunları görme ve çözüme kavuşturma yetkisinin de çoğunlukla merkezde toplanmasına neden olduğundan esnekliğini azaltmaktadır. İlaç tedariğinde zincir boyunca ve tedarik işlemi sonrasında, karşılaşılabilecek sorunlara cevap verme açısından blok zincir teknolojisi uygulamaları daha esnektir. Çünkü blok zincir teknolojisinde katılımcılar tüm problemleri görebilme yetkisine sahip olduğundan daha kısa sürede bu problemlere çözüm bulma imkânı sunmaktadır (Roman-Belmonte vd., 2018). Türkiye'de İTS tüm katılımcıların entegre olduğu bir uygulama olarak faaliyet göstermektedir. Ancak blok zincir uygulamaları için henüz yeterli alt yapı bulunmamaktadır. Bu durum ilaç tedarik zinciri takibi için İTS'nin daha uygulanabilir olduğunu göstermektedir.

4. SONUÇ

Son yıllarda hizmetin topluma itildiği ve hastalar hakkındaki bilgilere erişimin ürünler kadar önemli hale geleceği yeni sağlık hizmeti sunma biçimleri, ilaçları değerlendirmek, onaylamak ve izlemek için yeni yollar bulunmasını gerekli kılmaktadır. Yükselen pazarların artan önemi, risk ve uyumu yönetme yeteneğini etkileyen daha geniş bir kamu incelemesi ve daha sıkı çevresel kontroller ve düzenlemeler nedeniyle, işletmelerin tedarik zinciri yaklaşımlarını stratejik olarak yeniden değerlendirmesi elzem hale gelmiştir. Çoğu ilaç, üretim hattından çıkan ürünlerle başa çıkmak için yetersiz kullanılan, verimsiz ve donanımlı olmayan karmaşık tedarik zincirlerine sahiptir. Yeni teknolojiler, ilaç firmalarının daha geniş ve çeşitlilikte üretim yapmalarına, ilaçların dağıtımının hızlanmasına ve hastayla olan bağlantının daha yakın hale gelmesini hedeflemektedir. Uygun tedarik zinciri teknolojileri sayesinde tüm paydaşların işin bütününü görmeleri sağlanabilir, şeffaflık, izlenebilirlik ve güvenli veriler ile daha doğru ve uygun maliyet planları yapmak mümkün olabilir.

Bu çalışmada Türkiye'de mevcut ilaç tedarik zincirinde kullanılan İTS ile blok zincir tabanlı ilaç tedarik zinciri uygulamaları incelenmiş ve karşılaştırma yapılmıştır.

Çalışmada ilk olarak İTS uygulamasının merkezi bir sistem olduğu buna karşılık blok zincir teknolojisi kullanılan ilaç tedarik zinciri uygulamalarının âdemi merkeziyetçi olduğu sonucuna ulaşılmıştır. Merkezi sistemler şeffaflıktan uzak ve manipülasyona açıktır. Çünkü paydaşlar yalnızca merkezin verdiği yetkiler dâhilindeki bilgilere erişebilmektedir. Gerek miktar gerek fiyatlandırma ve gerekse ödeme konusunda merkezin yetkisi dışında bilgiye ulaşmak mümkün değildir. Merkezi olmayan blok zincir teknolojisinde ise tüm katılımcıların tedarik zincirindeki tüm bilgilere erişimi mümkündür. Bu da katılımcıların bilgisi olmadan herhangi bir işlem yapılmasını engellemektedir. Örneğin eczaneler firmada bulunan ilaçların miktarları ve maliyetlerine ilişkin bilgileri görebildiğinden paydaşların bilgisi olmadan herhangi bir değişiklik yapmak da söz konusu olmamaktadır.

İlaç tedarik zincirinde merkezi olmayan blok zincir teknolojisi tabanlı uygulamalar, bu özellikleri sayesinde İTS'ye göre daha şeffaftır. İTS uygulamalarında, paydaşların tedarik zincirindeki tüm verileri görememesi sistemin şeffaflığının sorgulanmasına neden olmaktadır. Örneğin, Türkiye'de ilaç fiyatlarındaki artış ve azalışların dönemsel olmasının ve bu tarihlerin firmalar tarafından bilinmesinin diğer paydaşlar için dezavantajları bulunmaktadır. Eğer firma bir ürünün fiyat artışını biliyorsa kar amaçlı ya da miadı dolmadan eşdeğer ürünleri eritmek amaçlı satış yapmayabilir. İTS sisteminde tedarik paydaşları yalnızca kendileri için verilen yetkiler dışında diğer paydaşların bilgilerini göremediğinden, bir eczane firmada ihtiyacı olan ürünün bulunup bulunmadığını kontrol etme imkânına sahip değildir. Blok zincir ilaç tedarik zinciri uygulamalarında, merkezi olmayan yönetimi mümkün kıldığından tüm paydaşların birbirleriyle iş birliği yapmaları sağlanmaktadır. Blok zincir uygulamalarında kullanılan akıllı sözleşmeler ile her paydaş tedarik zincirinde kendisine tanımlanan işi yapmakta ve diğer paydaşlar işleyişi izleyebilmektedir.

İTS'nin yetki dâhilinde izlenebilirliği mümkün kılmasına rağmen şeffaflıktan yoksun olması güveni de azaltmaktadır. Bunun aksine verilerin depolanması ve tüm paydaşların erişimini sağlayan blok zincir uygulamaları, tedarik ve tedarik sonrası stok ve maliyet hesaplarında gerçekçi ve güvenilir bilgiler sunmaktadır (Musamih vd.,2021).

Her iki teknolojinin de takip ve izlenebilirlik açısından avantajları olduğu görülmüştür. Türkiye'de kullanılan İTS'de ilacın tedarik zincirindeki her aşamasında doğrulama uygulaması sayesinde herhangi bir problemle karşılaşıldığında ilacın kontrolü de etkin bir şekilde sağlanmaktadır. Örneğin onaylanmamış ilaçlar geri çekilmekte veya miadı dolmuş ilaçların piyasaya sürümü yerinde engellenmektedir. İTS teknolojisi ile ilaçların hareketleri yetkileri kapsamında tedarik paydaşları tarafından gözlemlene bilmekte, ilaç dağıtımı ve satışı için zaman kaybının önüne geçilmektedir. Bunun yanında İTS'nin takip ve izlenebilirlik uygulaması sayesinde sahte ve yanlış ilaç kullanımı gibi tedarik zinciri problemleri önlenmektedir. Blok zincir ilaç tedarik zinciri uygulamaları, değişmez denetim yolları ile kritik bilgileri kaydetme, depolama ve istedikleri anda katılımcılara ulaşabilme imkânı sunmaktadır. Bu da sistemin her aşamasında etkin bir takip ve izlenebilirliği mümkün kılmaktadır.

Her iki uygulamanın mevcut özellikleri değerlendirildiğinde Türkiye'de ilaç tedariğinde kullanılan İTS teknolojisinin sağlık kurumları ile entegre bir uygulama olduğu görülmektedir. Ancak şeffaflık, güvenlik, esneklik gibi özellikler açısından blok zincir teknolojilerinin İTS sisteminden daha avantajlı olduğu sonucuna ulaşılmıştır. Diğer taraftan blok zincir teknolojilerinin uygulamalarına ilişkin yazılımlar çok farklıdır ve her geçen gün yenilenmektedir. Hangi uygulamayı hangi sisteme entegre etmek gerektiği iyi bir maliyet ve performans değerlendirmesini gerekli kılar. Bunun yanında yeterli teknolojik alt yapı ve yasal düzenlemelerin olmaması blok zincir uygulamaları için bir dezavantaj olarak karşımıza çıkmaktadır. Kripto para ile entegre olan blok zincir teknolojilerinde ayrıca enerji ihtiyacını da göz önünde bulundurmak gerektiğinden bu durum sistemin uygulanabilirliğini kısıtlamaktadır.

Sonuç olarak Türkiye'de İTS'nin ilaç takip ve izlenebilirliğini etkin şekilde sağlayarak sahte, kaçak ya da yanlış ilaç kullanımının önüne geçilmesine rağmen, gerekli yasal düzenlemeler ve alt yapı uygulamaları ile blok zincir teknolojilerinin entegre edildiği bir ilaç takip sisteminin mevcut sistemin

eksiklerinin giderilebileceği ve bu sayede daha fazla toplumsal ve ekonomik fayda sağlanabileceği düşünülmektedir.

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SAĞLIK ÇALIŞANLARININ DEMOGRAFİK ÖZELLİKLERE GÖRE HASTA GÜVENLİĞİ KÜLTÜRÜNE YÖNELİK ALGILARI

Hakan Güvener[*1], Mehmet Aytekin[2], Emine Ayhan[3]

*[*1]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye*
ORCID Code: 000-0002-9159-7708
[2]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye
ORCID Code: 0000-0001-5464-0677
[3]Gaziantep University, Department of Business Administration, Gaziantep, Türkiye
ORCID Code: 0000-0002-8101-5479

ÖZET

Bu araştırmada sağlık çalışanlarının demografik özelliklere göre hasta güvenliği kültürüne yönelik algıları incelenmiştir. Çalışmada sağlık çalışanlarının hasta güvenliği kültürü ve alt boyutları olan takım iklimi, güvenlik iklimi, iş tatmini, stres algısı, yönetim algıları ve çalışma koşullarına yönelik algı düzeylerinin belirlenmesi amaçlanmıştır. Araştırmaya Türkiye genelinde kamu ve özel sağlık kuruluşlarında görev yapan 718 sağlık çalışanı katılım sağlamıştır. Çalışmada elde edilen veriler SPSS programı kullanılarak analiz edilmiştir. Araştırma sonucunda, sağlık çalışanlarının hasta güvenliği kültürüne ait algı düzeylerinde; cinsiyet, coğrafi bölge, çalışma sektörü (kamu-özel), meslek, çalışılan pozisyon (ekip üyesi-sorumlusu) ve mesleki kıdem değişkenlerine göre istatistiksel olarak anlamlı farklılık görülmüştür.

Anahtar Kelimeler: Hasta Güvenliği Kültürü, Sağlık Çalışanları, Demografik Özellikler

PERCEPTIONS OF HEALTHCARE PROFESSIONALS ON PATIENT SAFETY CULTURE BY DEMOGRAPHIC CHARACTERISTICS

ABSTRACT

In this study, the perceptions of healthcare professionals regarding patient safety culture according to demographic characteristics were examined. In the study, it was aimed to determine the perception levels of healthcare professionals regarding patient safety culture and its sub-dimensions, team climate, safety climate, job satisfaction, stress perception, management perceptions and working conditions. 718 healthcare professionals working in public and private healthcare institutions throughout Turkey participated in the research. The data obtained in the study were analyzed using the SPSS program. As a result of the research, the perception levels of healthcare professionals regarding patient safety culture; there was a statistically significant difference according to gender, geographical region, working sector (public-private), profession, position (team member-team leader) and professional seniority.

Keywords: Patient Safety Culture, Healthcare Professionals, Demographic Characteristics

GİRİŞ

Maslow'un ihtiyaçlar hiyerarşisinin temelini oluşturan unsurlarından ilki fizyolojik ihtiyaçlar, ikincisi ise güvenlik gereksinimidir (Maslov, 1954). Aynı şekilde sağlık hizmeti sunumunun da temel unsurlarından birisi, hasta güvenliğidir. Sağlık hizmeti alan hasta, kendini güvende hissetmiyorsa veya çeşitli sebeplerden ötürü hasta güvenliği risk altında ise sağlık kuruluşu tarafından ne kadar nitelikli sağlık hizmeti verilirse verilsin başarı şansı çok düşük olacaktır. Sağlık sistemi son derece karmaşık

bir yapıya sahiptir ve bu yapıda hasta güvenliğini sağlamak, sağlık çalışanlarının her bir üyesinin sürekli çabasını gerektirmektedir (Ulrich ve Kear, 2014).

Sağlık hizmetlerinin doğası gereği hasta güvenliği konusu sadece günümüzün değil eski çağlardan bu yana var olan bir kavramdır. Tarihte ilk yazılı kanun olma özelliğine sahip Hammurabi Kanunlarında "Eğer hekim, ağır yaralı bir adamın bronz neşterle üzerinde çalışıp adamın ölümüne sebep olursa ya da adamın göz bölgesini bronz neşterle açıp, adamın gözünü kör ederse, cerrahın bilekleri kesilecektir" hükmü hasta güvenliğinin ihlaline yönelik çok açık ve güçlü bir yaptırımın göstergesini oluşturmaktadır (Güneş vd.,2015; Ovalı, 2010).

Hasta güvenliğini sağlamak küresel bir zorunluluktur. Bu zorunluluk Dünya Sağlık Örgütü (DSÖ) üye ülkelerini, tüm sağlık çalışanlarını ve hasta olduğumuzda hepimizi kapsamlı olarak etkiler. DSÖ hasta güvenliği kültürünü, sağlık hizmetlerinde riskleri tutarlı ve sürdürülebilir bir şekilde azaltan, tıbbi hata oluşumunu ve hatayı daha az olası kılan veya gerçekleştiğinde etkisini azaltan kültürler, süreçler, prosedürler, davranışlar, teknolojiler ve ortamlar yaratan organize faaliyetler bütünü olarak ifade etmektedir. Hasta güvenliği, Tıp Enstitüsü tarafından "hastalara zararın önlenmesi" olarak tanımlanmakladır. Bu tanım; hataları engelleyen sağlık bakım sisteminin önemine vurgu yaparak, meydana gelen hatalardan ders çıkarılması ve sağlık profesyonellerini, kuruluşları ile hastaları bir bütün olarak kapsayan bir güvenlik kültürünün önemini ifade etmektedir (Donaldson ve Philip, 2004; Mitchell, 2004).

Hasta güvenliği kültürüne yönelik literatürde birçok çalışma yapılmıştır: Zhu ve diğerleri (2021) Çin Cumhuriyeti'ndeki hastanelerde hasta güvenliği iklimini ve bu iklime etki eden faktörleri incelemiş, Pimentel, ve diğerleri (2021) çalışmalarında hasta güvenliği kültürünü etkileyen perioperatif ortamlarda sağlık çalışanları arasında değişkenliği araştırmış, Chin (2021) ise hasta güvenliğini etkileyen sağlık hizmetlerinde taviz ve eşitsizliklerin nasıl azaltılacağı konulu çalışmasında hasta güvenliğinde hakkaniyet kavramını incelemiş, Cantero-López ve diğerleri (2021) çalışmalarında lisans düzeyinde eğitim almış hemşirelerin hasta güvenliği kültürü algılarını belirlemeyi amaçlamış, Mohr ve diğerleri (2018) çalışan güvenliği iklimi ile hasta güvenliği kültürü arasındaki ilişkileri incelemiş ve Rowland ve Kitto (2014) ise farklı uzmanlık alanlarına mensup sağlık profesyonellerinin hasta güvenliği hizmetlerinde birlikte çalışma kültürünün nasıl inşa edilebileceğini araştırmıştır. Bir sağlık kuruluşunda hasta güvenliği kültürünün oluşturulması, varlığını sürdürmesi ve sürekli olarak geliştirilmesinde sağlık çalışanlarının güvenlik kültürü algıları önem arz etmektedir. Bu çalışmanın önemi, alanda yapılmış diğer çalışmalar gibi hasta güvenliği kültürünün en önemli yapı taşını oluşturan sağlık çalışanlarının hasta güvenliği algılarını etkileyen değişkenleri tespit ederek araştırmacılara ve karar vericilere fikir verme ve nihai hedef olan hasta güvenliğini geliştirmeye katkı sağlamaktır.

Bu çalışmada Türkiye genelinde özel ve kamu sektöründe çalışan sağlık profesyonellerinin demografik özelliklere göre hasta güvenliği kültürüne yönelik algıları incelenmiştir. Çalışmada sağlık çalışanlarının hasta güvenliği kültürü ve alt boyutları olan takım iklimi, güvenlik iklimi, iş tatmini, stres algısı, yönetim algısı ve çalışma koşullarına yönelik algı düzeylerinin belirlenmesi amaçlanmıştır.

MATERYAL VE YÖNTEM

Bu araştırmada sağlık çalışanlarının sosyo-demografik değişkenlere göre hasta güvenliği kültürüne yönelik algıları araştırılmıştır. Bu kapsamda çalışmada anket tekniği kullanılarak elde edilen veriler SPSS programı kullanılarak analiz edilmiştir.

Çalışmanın Evreni ve Örneklemi

Bu çalışmanın evrenini, Türkiye'de kamu ve özel sağlık kurumlarında görev yapmakta olan tüm hekim, hemşire, hastane yöneticisi, hastabakıcı ve diğer sağlık çalışanları oluşturmaktadır. Araştırma için hesaplanan optimal örneklem büyüklüğü sayısı 384 kişi olarak belirlenmesine rağmen çok sayıda değişkenin olduğu durumlarda temsil oranının büyük olması değişkenler arasında örnekleme hatasının birikimli etkisini azaltacağı ve güvenilirlik düzeyini artıracağı için örneklem sayısı artırılmıştır. Etik

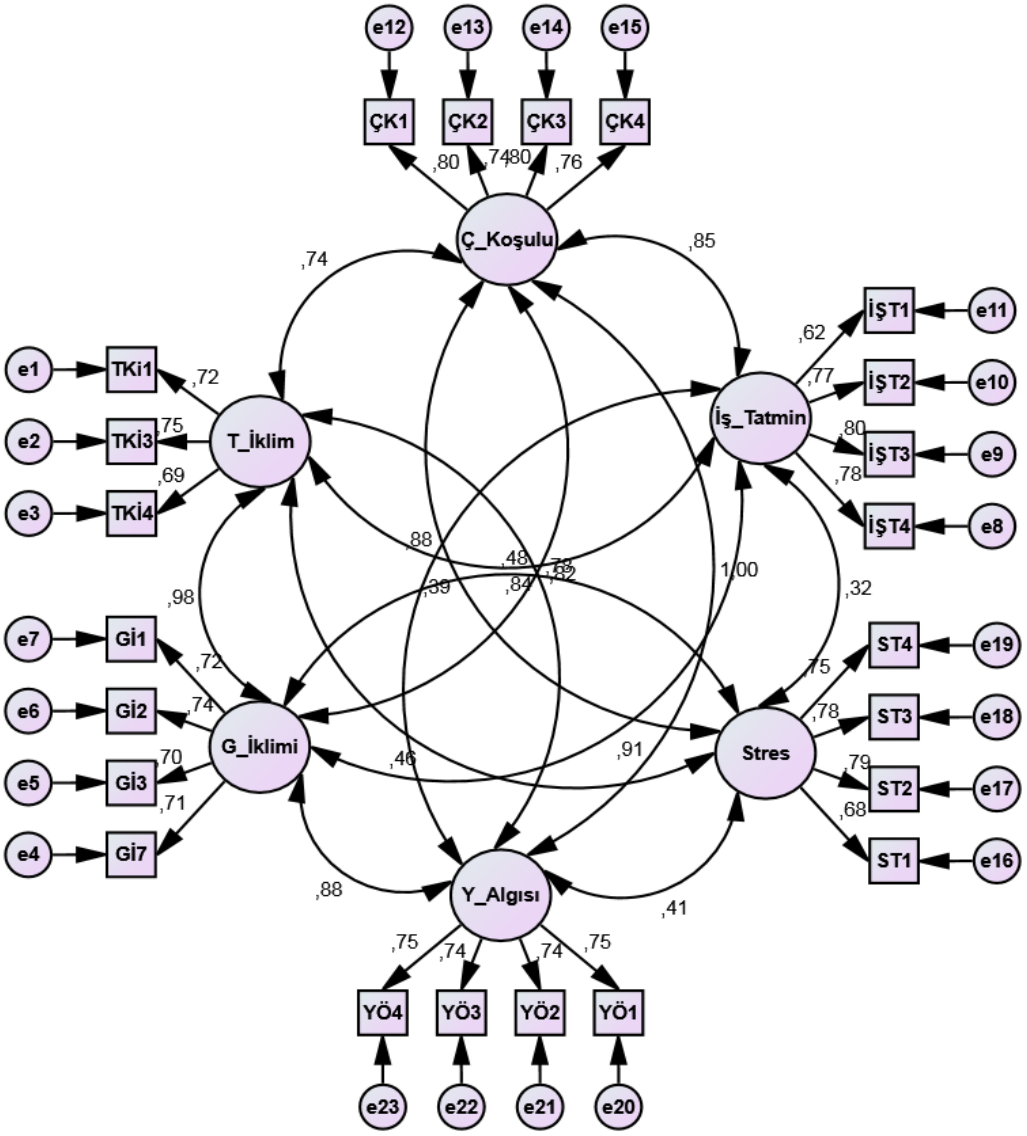
kurul izni alınarak 20.08.2021 – 01.10.2021 tarihleri arasında e-mail, sosyal medya ve sosyal ağlar vasıtasıyla online olarak yapılan ankete 718 sağlık çalışanının katılımı sağlanmıştır. Bu çalışma da tabakalı kolayda örneklem yöntemi kullanılmış, özel ve kamu kurumlarında farklı meslek gruplarını (hekim, hemşire, hastane yöneticisi, hastabakıcı ve diğer sağlık çalışanı) temsil edilmesi için tabakalar oluşturulmuş ve bu grupların temsili için yeterli sayıda veriye ulaşılmıştır.

Veri Toplama Yöntemi

Bu çalışmada veri toplama aracı olarak anket tekniği kullanılmıştır. Araştırmada kullanılan değişkenleri test etmek için Taylor ve Pandian (2013) ile ölçeğin Türkiye uyarlamasını yapan Kaya ve diğerleri (2010) tarafından geliştirilen toplam 30 ifadeden oluşan ölçek kullanılmıştır. Bu ölçeğin Türkçe 'ye çevirisi, geçerlilik ve güvenilirlik analizi yazarlar tarafından yapılmıştır. Araştırmada kullanılan ankette katılımcıların her bir soruya; ne oranda katılıp katılmadıklarını belirlemek için 5'li Likert tipi ölçek kullanılmıştır. Katılımcılardan sorulara; 1=Tamamen Katılmıyorum, 2=Katılmıyorum, 3=Ne Katılıyorum Ne Katılmıyorum 4=Katılıyorum ve 5=Tamamen Katılıyorum şeklinde cevap vermeleri istenmiştir.

Doğrulayıcı Faktör Analizi

Ölçeğe ait keşfedici faktör analizinden sonra yapılan doğrulayıcı faktör analizi Şekil 1'de gösterilmiştir. Hasta güvenliği kültürü ölçeği doğrulayıcı faktör analizine göre boyutlara ait faktör yüklerinin, takım iklimi boyutu için 0.69 – 0.72 aralığında; güvenlik iklimi boyutu için 0.70 – 0.74 aralığında; iş tatmini boyutunda 0.62 – 0.80 aralığında; stres algısı boyutu için 0.68 – 0.79; yönetim algıları boyutunda 0.74 – 0.75 aralığında ve çalışma koşulları boyutunda 0.74 – 0.80 aralığında olduğu tespit edilmiştir. Analizde model iyileştirme için maddelerin hata terimleri arasında modifikasyon yapılmamıştır.



CMIN=428,554;DF=215;CMIN/DF=1,993;p=,000;RMSEA=,037;CFI=,977;GFI=,951;TLI=,972

Şekil 1. Ölçeğe Ait Doğrulayıcı Faktör Analizi

BULGULAR

Bu araştırmada sağlık çalışanlarının demografik özelliklere göre hasta güvenliği kültürüne yönelik ifadelere katılımlarında istatistiksel olarak anlamlı düzeyde farklılaşma olup olmadığının belirlenmesi amacıyla analizler yapılmıştır. Bu çalışmada veri setinin çarpıklık ve basıklık değerleri incelendiğinde, verilerin normal dağılım gösterdiği görülmüş olup analizlerde parametrik testler kullanılmıştır. Analize katılacak grup sayısı 2 olanlara (cinsiyet, mesleki pozisyon ve çalışılan sektör) bağımsız örneklemler t testi, grup sayısı 2'nin üzerinde olanlara (coğrafi bölge, meslek ve mesleki kıdem) ise tek yönlü varyans analizi yapılmıştır.

Çalışmada demografik özelliklere göre hasta güvenliği kültürüne ait boyutlara katılımcıların algı düzeylerinde istatistiksel olarak anlamlı farklılık gösteren değişkenlerin; cinsiyet, coğrafi bölge, meslek, çalışılan pozisyon ve mesleki tecrübe olduğu tespit edilmiştir. Araştırmada bu değişkenlerden anlamlı düzeyde farklılık gösteren hasta güvenliği boyutları tabloda gösterilmiştir.

Sağlık çalışanlarının hasta güvenliği kültürü ölçeğine katılım düzeyinde cinsiyet değişkenine göre istatistiksel olarak anlamlı bir farklılaşma olup olmadığını belirlemek için bağımsız örneklemler t testi yapılmıştır.

Tablo 1. Cinsiyete Göre Farklılık Düzeyi

Cinsiyet		**N**	**x**	**s.s.**	**s.h.**	**t**	**p**
Stres Algı Düzeyi	Kadın	392	3,44	0,98	0,049	-3,55	0,00
	Erkek	326	3,70	0,93	0,05		

Çalışmaya katılan sağlık çalışanlarının stres algısı boyutuna yönelik ölçek ifadelerine katılım düzeyinde kadın ve erkek çalışanlar arasında istatistiksel olarak anlamlı bir farklılık görülmüştür ($p<0.05$). Kadın ve erkek katılımcılar arasındaki farklılığın yönünü görebilmek için değişkenlerin ortalama değerlerine bakılmıştır. Ortalama değerler, erkek sağlık çalışanlarının (X=3,70) kadınlara (X=3,44) oranla stres algıları boyutuna yönelik ifadelere katılım düzeylerinin yüksek olduğu tespit edilmiştir (Tablo 1). Hasta güvenliği kültürüne ait takım iklimi, güvenlik iklimi, iş tatmini, yönetim algıları ve çalışma şartları boyutlarında anlamlı düzeyde farklılaşma görülmemiştir ($p>0.05$).

Araştırmaya Türkiye'nin 7 coğrafi bölgesinden kamu ve özel sektörde görev yapan sağlık çalışanları katılım sağlanmıştır. Hasta güvenliği kültürü ölçeğine ait ifadelere katılım düzeylerinde farklılaşma olup olmadığının tespiti için tek yönlü varyans analizi yapılmıştır. Analiz neticesinde Tablo 2'de gösterilen boyutlara ait ifadelere katılımda coğrafi bölge düzeylerinde istatistiksel olarak anlamlı farklılıklar tespit edilmiştir. Anlamlı farklılaşmanın hangi coğrafi bölgelerde çalışan katılımcılar arasında olduğunu belirlemek için post/hoc analizlerinden Tukey testi yapılmıştır. Çalışmada coğrafi bölge düzeyine göre hasta güvenliğine ait takım iklimi, güvenlik iklimi, stres algısı, çalışma koşulları ve yönetim algıları boyutlarında anlamlı düzeyde farklılaşma görülmüştür ($p<0.05$). Hasta güvenliğine ait iş tatmini boyutunda ise istatistiksel olarak anlamlı düzeyde bir farklılık tespit edilmemiştir($p>0.05$).

Tablo 2. Coğrafi Bölge Düzeyine Göre Farklılık Düzeyi

Coğrafi Bölge		Kareler T.	Df.	K.Ort.	f	p	Farklılık
Takım İklimi	Gruplar Arası	17,4	6	2,90	3,52	0,002	1 – 5 2 – 5 7 – 5
	Grup İçi	585,5	711	0,82			
	Toplam	602,9	717				
Güvenlik İklimi	Gruplar Arası	18,1	6	3,03	3,99	0,001	3 – 7 4 – 7 5 – 7
	Grup İçi	538,6	711	0,76			
	Toplam	556,8	717				
Stres Algısı	Gruplar Arası	57,7	6	9,61	10,96	0,000	1 – 3, 4, 5 2 – 4, 5 3 – 4, 5, 7
	Grup İçi	623,2	711	0,88			
	Toplam	680,9	717				
Yönetim Algıları	Gruplar Arası	13,8	6	2,31	2,67	0,014	1 – 6,7
	Grup İçi	613,8	711	0,86			
	Toplam	627,6	717				
Çalışma Koşulları	Gruplar Arası	19,2	6	3,21	3,61	0,002	1 – 3, 6, 7
	Grup İçi	631,7	711	0.89			
	Toplam	650,9	717				

1 =Marmara 2 =Ege 3=Akdeniz 4 =İç Anadolu 5=Karadeniz 6=Doğu Anadolu 7= Güneydoğu Anadolu

Sağlık çalışanlarının takım iklimi boyutuna yönelik katılım düzeyleri incelendiğinde Karadeniz Bölgesinde görev yapan sağlık çalışanlarının (x=3,42-s.s.=1,12) Marmara, Ege ve Güneydoğu Anadolu bölgesinde çalışan sağlık çalışanlarından daha düşük düzeyde ifadelere katılım sağladıkları görülmüştür. Güvenlik iklimi boyutunda hangi gruplar arasında farklılık olduğu incelendiğinde, Güneydoğu Anadolu bölgesindeki katılımcıların (x=3,91-s.s.=0,84) Akdeniz, İç Anadolu ve Karadeniz Bölgesindeki katılımcılardan ifadelere daha fazla katıldıkları tespit edilmiştir. Stres algısı boyutunda Marmara Bölgesinde çalışanlar (x=3,88-s.s.=0,71) Akdeniz, İç Anadolu ve Karadeniz Bölgesinde görevli sağlık çalışanlarından daha yüksek düzeyde stres algıladıkları tespit edilmiştir. Ayrıca stres algısı boyutunda Ege Bölgesindeki katılımcılar (x=3,62-s.s.=0,79) İç Anadolu ve Karadeniz bölgesindeki katılımcılardan daha yüksek düzeyde etkilendikleri görülürken Akdeniz Bölgesindeki sağlık çalışanları (x=3,48-s.s.=0,97) İç Anadolu ve Karadeniz bölgesindeki katılımcılardan yüksek, Güneydoğu Anadolu Bölgesinde görevli çalışanlardan daha düşük düzeyde stres algılamakta oldukları tespit edilmiştir. Marmara bölgesi çalışanlarının (x=3,81-s.s.=0,71) yönetim algıları boyutu ifadelerine katılım düzeyi Doğu ve Güneydoğu Anadolu bölgesi çalışanlarından daha yüksektir. Çalışma koşulları boyutuna ait ifadelerine Marmara Bölgesinde (x=3,83-s.s.=0,72) görevli sağlık çalışanlarının katılımları Akdeniz, Doğu ve Güneydoğu Anadolu bölgesinde çalışanlardan daha yüksek olduğu tespit edilmiştir (Tablo 2).

Tablo 3. Çalışma Sektörü Düzeyine Göre Farklılık Düzeyleri

Çalışma Sektörü		N	x	s.s.	s.h.	t	p
Takım İklimi	Kamu	407	3,83	0,89	0,044	4,09	0,000
	Özel	311	3,55	0,92	0,052		
Güvenlik İklimi	Kamu	407	3,78	0,84	0,041	3,54	0,000
	Özel	311	3,55	0,91	0,052		
Stres Algısı	Kamu	407	3,74	0,88	0,044	5,62	0,000
	Özel	311	3,33	1,033	0,059		

Hasta güvenliği kültürü ölçeğine katılım düzeylerinde çalışma sektörü değişkenine göre gruplar arasında istatistiksel olarak anlamlı bir farklılaşma olup olmadığını belirlemek için bağımsız örneklemler t testi yapılmıştır. Tablo 3'te sağlık çalışanlarının çalışma sektörü değişkenine göre hasta güvenliği kültürüne ait ifadelere katılım düzeyleri gösterilmiştir. Buna göre takım iklimi, güvenlik iklimi ve stres algısı boyutlarında farklılık tespit edilmiştir ($p<0.05$). İş tatmini, yönetim algısı ve çalışma koşulları boyutlarında anlamlı düzeyde bir farklılık görülmemiştir($p>0.05$). Kamu ve özel sektörden katılımcılar arasında farklılığın yönünü tespit edebilmek için değişkenlerin ortalama değerlerine bakılmıştır. Buna göre kamu sektöründe görev yapan sağlık çalışanlarının takım iklimi, güvenlik iklimi ve stres algısı boyutlarındaki ifadelere katılım düzeyleri özel sektörde çalışanlardan daha yüksek olduğu görülmüştür (Tablo 3).

Ekip üyesi ve ekip sorumlusu değişkenlerine göre sağlık çalışanlarının hasta güvenliği kültürü ifadelerine katılım düzeylerinde anlamlı bir farklılaşma olup olmadığının belirlenmesi için bağımsız değişkenler t testi yapılmıştır. Çalışılan pozisyon değişkenine göre farklılık düzeyi Tablo 4'te gösterilmiştir. Analiz sonucunda takım iklimi ve stres algısı boyutlarında çalışma pozisyonu değişkenine göre anlamlı bir farklılaşma tespit edilmiştir($p<0.05$). Buna göre ekip sorumlularının takım iklimi ve stres algısı ifadelerine katılım düzeyleri ekip üyelerinden daha yüksektir (Tablo4).

Tablo 4. Çalışılan Pozisyon Değişkenine Göre Farklılık Düzeyi

Çalışma Pozisyonu		N	x	s.s.	s.h.	t	p
Takım İklimi	Ekip Üyesi	532	3,66	0,918	0,0398	-2,30	0,220
	Ekip Sorumlusu	186	3,84	0,904	0,066		
Stres Algısı	Ekip Üyesi	532	3,49	1,002	0,043	-3,53	0,000
	Ekip Sorumlusu	186	3,78	0,858	0,063		

Sağlık kurumlarında farklı meslek gruplarına mensup çalışanların; hasta güvenliği kültürüne ait ifadelere katılım düzeylerinde istatistiksel olarak anlamlı farklılaşma tespit edilmiştir ($p<0.05$). Anlamlı farklılaşmanın hangi meslek gruplarında ve hangi boyutlarda olduğunu belirlemek için post/hoc analizlerinden Tukey testi yapılmıştır. Tablo 5'te meslek değişkenine göre farklılık düzeyi gösterilmiştir. Post/hoc analiz sonucuna göre, güvenlik iklimi boyutundaki ifadelere hastane yöneticilerinin (x=4,02-s.s.=0,90) hekimlerden daha yüksek düzeyde onayladıkları görülmüştür. Hastane yöneticilerinin iş tatmini boyutu ifadelerine katılım düzeyi (x=4,00-s.s.=0.95) hekimlerden daha yüksektir. Yönetim algıları boyutunda ise, hastane yöneticilerinin ifadelere katılım düzeyi (x=3,96-s.s.=0,84) diğer sağlık çalışanlarından daha yüksek olduğu görülmüştür. Ayrıca yönetim algıları boyutu ifadelerine hekimlerin katılımı (x=3,26-s.s.=1,06) hemşire ve hasta bakıcılardan daha az düzeyde gerçekleşmiştir. Çalışma koşullarına yönelik ifadelere katılım düzeyleri incelendiğinde hastane yöneticileri (x=3,89-s.s.=0,93) hekim ve diğer sağlık çalışanlarına göre daha yüksek katılım sağlamıştır (Tablo 5).

Tablo 5. Meslek Değişkenine Göre Farklılık Düzeyi

Meslek		Kareler T.	Df.	K.Ort.	f	p	Farklılık
Güvenlik İklimi	Gruplar Arası	12,01	4	3,00	3,93	0,004	1 - 2
	Grup İçi	544,75	713	0,76			
	Toplam	556,76	717				
İş Tatmini	Gruplar Arası	10,68	4	2,67	3,25	0,012	1 – 2
	Grup İçi	586,49	713	0,82			
	Toplam	597,17	717				
Yönetim Algıları	Gruplar Arası	22,24	4	5,56	6,55	0,000	1 – 5 2 – 3, 4
	Grup İçi	605,39	713	0,85			
	Toplam	627,63	717				
Çalışma Koşulları	Gruplar Arası	14,610	4	3,65	4,09	0,003	1 – 2, 5
	Grup İçi	636,341	713	0,89			
	Toplam	650,952	717				

1=Hastane Yöneticisi 2=Hekim 3=Hemşire 4=Hastabakıcı 5=Diğer Sağlık Çalışanı

Sağlık çalışanlarının mesleki kıdem değişkenine göre hasta bakım kültürü ölçeklerine ait ifadelere katılım düzeylerinde stres algısı, yönetim algıları ve çalışma koşulları boyutlarında istatistiksel olarak anlamlı bir farklılaşma tespit edilmiştir ($p<0.05$). Farklılığın hangi boyutlar arasında olduğunu belirlemek için yapılan analiz neticesinde; Stres algısı boyutunda 0-3 yıl kıdemi olan çalışanların (x=3,38-s.s.=1,09) 16 yıl ve üzeri çalışanlardan daha yüksek düzeyde katılım sağladıkları görülmüştür. Yönetim algıları boyutuna yönelik ifadelere 16 yıl ve üzerinde kıdemi olan sağlık çalışanlarının (x=3,32-s.s.=1,09) 0-3yıl, 4-7 yıl ve 8-11 yıl arasında kıdeme sahip olanlardan daha düşük düzeyde katılım sağladıkları tespit edilmiştir. Çalışma koşulları boyutunda ise 16 yıl ve üzerinde kıdemi olanların (x=3,14-s.s.=1,05) sırasıyla 0-3 yıl, 4-7 yıl ve 8-11 yıl arasında kıdeme sahip olanlardan düşük düzeyde katılım sağlamıştır. Ayrıca yine çalışma koşulları boyutunda 4-7 yıl kıdemi olanların (x=3,67-s.s.=0,85) ifadelere katılım düzeyleri 12-15 yıl kıdemi olan çalışanlardan daha yüksek gerçekleşmiştir (Tablo 6). Analiz neticesinde; katılımcıların ölçek ifadelerine katılım düzeyleri arasında diğer boyutlarda istatistiksel olarak anlamlı bir farklılaşma görülmemiştir ($p>0.05$).

Tablo 6. Mesleki Kıdem Değişkenine Göre Farklılık Düzeyi

Mesleki Kıdem		Kareler T.	Df.	K.Ort.	f	p	Farklılık
Stres Algısı	Gruplar Arası	10,28	4	2,57	2,73	0,028	1 – 5
	Grup İçi	670,65	713	0,94			
	Toplam	680,93	717				
Yönetim Algıları	Gruplar Arası	12,86	4	3,21	3,73	0,005	5 – 1, 2, 3
	Grup İçi	614,78	713	0,86			
	Toplam	627,63	717				
Çalışma Koşulları	Gruplar Arası	17,28	4	4,32	4,86	0,001	5 – 1, 2, 3 2 – 4
	Grup İçi	633,67	713	0,89			
	Toplam	650,95	717				

1=0-3 yıl, 2=4-7 yıl, 3= 8-11 yıl, 4= 12-15 yıl ve 5= 16 yıl ve üzeri deneyim

SONUÇ

Bu çalışmada sağlık çalışanlarının demografik özelliklere göre hasta güvenliği kültürüne yönelik algıları incelenmiştir. Araştırmada sağlık çalışanlarının hasta güvenliği kültürü ve alt boyutları olan takım iklimi, güvenlik iklimi, iş tatmini, stres algısı, yönetim algıları ve çalışma koşullarına yönelik algı düzeylerinin belirlenmesi amaçlanmıştır.

Araştırma sonucunda sağlık çalışanlarının; cinsiyet değişkenine göre stres algısı boyutunda, coğrafi bölge değişkenine göre takım iklimi, güvenlik iklimi, stres algı düzeyi, yönetim algıları ve çalışma şartları boyutlarında, çalışma sektörü değişkenine göre takım iklimi, güvenlik iklimi ve stres algısı boyutlarında, mesleğe göre güvenlik iklimi, iş tatmini, yönetim algıları ve çalışma şartları boyutlarında, çalışılan pozisyon değişkenine göre takım iklimi ve stres algısı boyutlarında ve mesleki deneyim değişkenine göre stres algısı, yönetim algıları ve çalışma koşulları boyutlarında istatistiksel olarak anlamlı düzeyde farklılık tespit edilmiştir. Elde edilen bu bulgular literatürde yapılmış çalışmalarla benzer niteliktedir (Zhu vd., 2021; Pimentel vd., 2021; Chin, 2021: Cantero-López vd., 2021; Mohr vd., 2018; Rowland ve Kitto, 2014). Çalışmada;

- Erkek sağlık çalışanlarının kadınlara oranla stres algısı düzeylerinin yüksek olduğu görülmektedir.
- Sağlık çalışanlarının takım iklimi boyutuna yönelik ifadelere katılım düzeyi incelendiğinde Karadeniz Bölgesinde görev yapan sağlık çalışanlarının, Marmara, Ege ve Güneydoğu Anadolu bölgesinde çalışan sağlık çalışanlarından ekiplerinin iklim düzeyini daha düşük bulmaktadır.
- Güvenlik iklimi boyutunda Güneydoğu Anadolu bölgesindeki sağlık çalışanlarının Akdeniz, İç Anadolu ve Karadeniz Bölgesindeki katılımcılardan kurumlarının güvenlik iklimini daha başarılı bulduğu görülmektedir.
- Stres algısı boyutunda Marmara Bölgesinde çalışanlar Akdeniz, İç Anadolu ve Karadeniz Bölgesinde görevli sağlık çalışanlarından daha yüksek düzeyde etkilendikleri görülmektedir. Ayrıca stres algısı boyutunda Ege Bölgesindeki katılımcılar, İç Anadolu ve Karadeniz bölgesindeki katılımcılardan daha yüksek düzeyde stres algılamakta bununla birlikte Akdeniz Bölgesindeki sağlık çalışanları da İç Anadolu ve Karadeniz bölgesindeki katılımcılardan yüksek, Güneydoğu Anadolu Bölgesinde görevli çalışanlardan daha düşük düzeyde stres algıladıkları görülmektedir.

- Marmara bölgesi çalışanlarının kurumlarının yönetim yaklaşımlarını Doğu ve Güneydoğu Anadolu Bölgesi çalışanlarından daha başarılı bulmaktadır.
- Çalışma koşulları boyutunda Marmara Bölgesinde görevli sağlık çalışanlarının Akdeniz, Doğu ve Güneydoğu Anadolu bölgesinde çalışanlardan kurumlarının çalışma koşullarını daha iyi düzeyde gördükleri tespit edilmiştir.
- Kamu sektöründe görev yapan sağlık çalışanlarının takım iklimi, güvenlik iklimi ve stres algısı boyutlarındaki ifadelere katılım düzeyleri özel sektörde çalışanlardan daha yüksek olduğu görülmüştür. Buna göre kamu çalışanları sağlık kurumunun güvenlik politikalarını ve ekiplerinin iklim düzeyini özel sektöre göre daha başarılı bulurken, algıladıkları stres daha fazladır.
- Güvenlik iklimi boyutundaki ifadelere hastane yöneticilerinin hekimlerden daha yüksek düzeyde onayladıkları görülmüştür. Ayrıca hastane yöneticilerinin iş tatmininin hekimlerden daha yüksek olduğu görülmektedir.
- Hastane yöneticileri sağlık kuruluşunun yönetim düzeyini diğer sağlık çalışanlarından daha başarılı bulmaktadır. Sağlık kuruluşunun yönetsel işleyişini hemşire ve hasta bakıcılar hekimlerden daha başarılı bulmaktadır.
- Hastane yöneticileri hekim ve diğer sağlık çalışanlarına göre çalışma şartlarının daha iyi olduğunu düşünmektedir.
- Ekip sorumluları ekip üyelerine göre takımlarındaki iklim düzeyini yüksek bulurken, daha fazla stres algıladıkları görülmektedir.
- Sağlık kuruluşlarında görev süresi en düşük düzeyde olanlar en kıdemlilere göre daha fazla stres algıladıkları görülmektedir.
- Sağlık kuruluşunun yönetim ve işleyişini en kıdemli çalışanlar diğer kıdemlilere göre daha az başarılı bulmaktadır.

Çalışma sonucuna göre kamu ya da özel sektör sağlık yöneticilerinin ve karar vericilerin, hasta güvenliği kültürüne yönelik sağlık çalışanlarının çeşitli değişkenler dikkate alındığında ortaya çıkan farklılıkları derinlemesine analiz etmesinin, hasta güvenliği odağında sağlık hizmet organizasyonundaki eksikliklerin tespit edilerek, alternatif çözüm yollarının geliştirilmesine yardımcı olacağı, böylelikle sağlık kuruluşunun hasta güvenliği kültürünün gelişimine katkı sağlayacağı ayrıca hasta bakım kalitesini artırılabileceği düşünülmektedir. Ayrıca bu alanda araştırmacıların, sağlık çalışanlarının güvenlik kültürü boyutlarında oluşan anlamlı düzeydeki farklılıkların nedenlerinin tespit edilmesinin sektöre ve alınyazına fayda sağlayacağı düşünülmektedir.

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SINIF ÖĞRETMENİ ADAYLARININ 21. YÜZYIL BECERİLERİNİ MATEMATİK EĞİTİMİ AÇISINDAN DEĞERLENDİRMELERİ

Ferhat ÖZTÜRK
Kirikkale University, Faculty of Education, Department of Mathematics and Science Education, Kirikkale, Türkiye.
ORCID Code: 0000-0003-2849-8325

ÖZET

Bu çalışmanın amacı sınıf öğretmeni adaylarının 21. yüzyıl becerilerinin matematik eğitimiyle ilişkisine yönelik düşüncelerinin belirlenmesidir. Çalışmada nitel araştırma yaklaşımlarından durum çalışması deseni kullanılmıştır. Araştırmanın çalışma grubunu bir devlet üniversitesinin eğitim fakültesi sınıf öğretmenliği lisans programının üçüncü sınıfında öğrenim gören 48 öğretmen adayı oluşturmaktadır. Çalışmada veri toplamak amacıyla öğretmen adaylarına 21. yüzyıl becerilerinin matematik eğitimiyle ilişkisini irdelemelerinin istendiği tek açık uçlu sorudan oluşan bir form kullanılmıştır. Formdan elde edilen verilerin analizinde içerik analizi yöntemi kullanılmıştır. Analizlerden elde edilen bulgular neticesinde sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden eleştirel düşünme, problem çözme, girişimcilik, yaratıcılık, bilgi-medya ve teknoloji okuryazarlığı gibi becerileri matematik eğitimiyle ilişkilendirdikleri belirlenmiştir. Ayrıca öğretmen adaylarının özellikle problem çözme ve eleştirel düşünmeyi öğrencilerin matematik konularını kavramsal olarak öğrenmelerinde ve doğru bilgiye ulaşmalarında önemli olan beceriler olarak vurguladıkları tespit edilmiştir.

Anahtar kelimeler: Sınıf öğretmeni adayları, 21. yüzyıl becerileri, matematik eğitimi.

EVALUATION OF PROSPECTIVE ELEMENTARY TEACHERS ON 21st CENTURY SKILLS IN TERMS OF MATHEMATICS EDUCATION

ABSTRACT

The aim of this study is to determine the thoughts of prospective elementary teachers about the relationship between 21st century skills and mathematics education. In this study, the case study pattern, one of the qualitative research approaches, was used. The study group of the research consists of 48 prospective elementary teachers studying in the third year of elementary teaching undergraduate program of education faculty in a state university. In order to collect data in the study, a form consisting of a single open-ended question was used in which prospective teachers were asked to examine the relationship between 21st century skills and mathematics education. Content analysis method was used in the analysis of the data obtained from the form. As a result of the findings obtained from the analyzes, it was determined that the prospective elementary teachers associated 21st century skills such as critical thinking, problem solving, entrepreneurship, creativity, information-media and technology literacy with mathematics education. In addition, it was determined that prospective teachers especially emphasized problem solving and critical thinking as skills that are important for students to learn mathematical subjects conceptually and to reach correct information.

Keywords: Prospective elementary teachers, 21st century skills, mathematics education.

GİRİŞ

Sürekli gelişen ve değişen dünyayla birlikte, günümüzde bireylerin dünyadaki bu değişikliklere adapte olabilmeleri açısından farklı beceriler kazanmaları zorunlu hale gelmiştir. Artık eğitim-öğretim sürecinde bireylerden onlara aktarılan bilgileri doğrudan alıp kabul etmeleri beklenmemekte, öğrenmeyi öğrenmiş bireyler olarak hayata hazırlanmaları gerektiği vurgulanmaktadır. Dünyanın, toplumların ve en özelde bireylerin ihtiyaçlarının değişmesi paralelinde bireylerin yüklenecekleri görev, sorumluluk ve roller de değişmiştir. Bu değişim esasında bilgiyi üreterek günlük yaşamda

işlevsel olarak kullanabilen, eleştirel düşünebilen, problem çözebilen, kararlı, girişimci, iletişim ve empati becerilerine sahip, topluma ve kültüre katkı sağlayan özelliklerdeki bireyleri tanımlamaktadır (Millî Eğitim Bakanlığı [MEB], 2018a). Bireyin başarılı olabilmesi ve çağa ayak uydurabilmesi adına taşıması gereken özellik ve becerilerinin açıklanmaya çalışıldığı farklı araştırmalar literatürde mevcuttur (Beers, 2012; National Research Council [NRC], 2010). 21. yüzyılda bireylerin sahip olması gereken zihinsel, kişisel ve kişilerarası beceri ve yeterlilikler olarak ifade edilen 21. yüzyıl becerilerinin, genel olarak yenilikçilik, problem çözme ve eleştirel düşünme, yaratıcılık, iletişim, liderlik, işbirliği ve bilgi-medya okuryazarlığı gibi becerileri kapsadığı ifade edilmektedir (Anagün, Atalay, Kılıç & Yaşar, 2016). Diğer taraftan Word Economic Forum'unda, 21. yüzyıl becerilerinin üç ana başlıkta incelendiği ve 16 farklı alt beceriye ayrılarak kapsamlı şekilde ele alındığı dikkat çekmektedir (World Economic Forum [WEF], 2017). Burada ifade edilen 21. yüzyıl becerilerinin kapsamına bakıldığında, ilk ana beceri olan "*temel okuryazarlık becerisi*"; öğrencilerin sahip oldukları yeterliliklerini günlük hayatlarına nasıl uyarladıklarını ele almakta ve *sözel okuryazarlık, matematik okuryazarlığı (sayısal bilgi), bilimsel okuryazarlık, bilgi iletişim teknolojileri (BİT) okuryazarlığı, finansal okuryazarlık* ve *kültürel ve kentsel okuryazarlık* şeklinde altı alt beceriden oluşmaktadır. İkinci ana beceri olan "*yeterlilikler"*; öğrencilerin kompleks problemlerle nasıl baş ettikleriyle ilgilenmekte ve *eleştirel düşünme, iletişim, yaratıcılık* ve *işbirliği* şeklinde dört alt beceriyi içermektedir. Son olarak üçüncü ana beceri olan "*karakter özellikleri"*; öğrencilerin değişen çevre şartlarına nasıl uyum sağlamaları gerektiğini ele almakta ve *meraklı olma, girişimcilik, kararlılık/dayanıklılık, liderlik, uyum sağlama* ve *sosyal ve kültürel farkındalık* şeklinde altı alt beceriden oluşmaktadır.

Bireyin sahip olması gereken 21. yüzyıl becerilerinin bireye kazandırılmasının önemli olduğu görüşü, 21. yüzyıl becerilerinin öğretim programlarının kapsamı içerisinde yer aldığını ve 21. yüzyıl becerilerine ayrı bir önem verildiğini göstermektedir. Nitekim ülkemizdeki öğretim programları irdelendiğinde, programlarda 21. yüzyıl becerilerinin önemle vurgulandığı dikkat çekmektedir (MEB, 2018a, 2018b, 2018c, 2018ç, 2019). Yine programlar incelendiğinde, içeriklerinde 21. yüzyıl becerilerinden özellikle yaratıcı düşünme, eleştirel düşünme, analitik düşünme, girişimcilik, karar verme, problem çözme, iletişim ve işbirliği/takım çalışması becerilerinin ön planda yer aldığı görülmektedir (MEB, 2018a, 2018b, 2018c, 2018ç, 2019). Bu doğrultuda, incelenen öğretim programlarının bir bölümünün uygulayıcısı olacak ve öğrencilere bu becerilerin kazandırılmasında öncelikli sorumluluğu yüklenecek olan geleceğin öğretmenleri, sınıf öğretmeni adaylarının 21. yüzyıl becerilerini matematik eğitimiyle nasıl ilişkilendirdikleri hakkındaki düşünceleri önem arz etmektedir. Bu önemden hareket edilerek araştırmanın amacı, sınıf öğretmeni adaylarının 21. yüzyıl becerilerinin matematik eğitimiyle ilişkisine yönelik düşüncelerinin belirlenmesidir.

YÖNTEM

Araştırma Deseni

Çalışmada nitel araştırma yaklaşımlarından durum çalışması deseni kullanılmıştır. Bir ya da daha fazla durumun, konunun, olayın, grubun veya ortamın derinlemesine incelendiği bir desen olarak tanımlanan durum çalışması (McMillan & Schumacher, 2010; Yıldırım & Şimşek, 2018), bir olayı veya durumu oluşturan ayrıntıları tanımlamak ve değerlendirmek, onlara ilişkin muhtemel açıklamalar geliştirmek için kullanılmaktadır. Bu çalışmada sınıf öğretmeni adaylarının 21. yüzyıl becerilerinin matematik eğitimiyle ilişkisine yönelik düşüncelerinin belirlenmesi amaçlandığından durum çalışması deseni tercih edilmiştir.

Çalışma Grubu

Araştırmanın çalışma grubunu bir devlet üniversitesinin eğitim fakültesi sınıf öğretmenliği lisans programının üçüncü sınıfında öğrenim gören 48 öğretmen adayı oluşturmaktadır. Çalışma grubunun belirlenmesinde gönüllü, mevcut veya kolaylıkla erişilebilen kişilerin (Johnson & Christensen, 2014) araştırmaya dâhil edildiği seçkisiz olmayan örnekleme yöntemlerinden uygun örnekleme yöntemi kullanılmıştır.

Veri Toplama Aracı ve Verilerin Analizi

Çalışmada veri toplamak amacıyla araştırmacı tarafından oluşturulmuş ve öğretmen adaylarının 21. yüzyıl becerilerinin matematik eğitimiyle ilişkisini irdelemelerinin istendiği tek açık uçlu sorudan oluşan bir form kullanılmıştır. Formdan elde edilen verilerin analizinde; verilerin toplanması ile başlayan, kategori ve kodların oluşturulmasıyla son bulan ve verilerin sentezlenmesinin ve anlamlandırılmasının araştırmacı/araştırmacılar tarafından yapıldığı (McMillan & Schumacher, 2010) içerik analizi yöntemi kullanılmıştır.

İçerik analizi sonucunda öncelikle kodlar oluşturulmuştur. Benzer kodlar bir araya getirilerek kategoriler şeklinde yapılandırılmıştır. Doğru ve güvenilir bulgular elde edebilmek amacıyla belirtilen kategori ve kod oluşturma süreci, farklı zamanlarda birkaç kez tekrarlanmıştır. Anlaşılabilir olması açısından oluşturulan kod ve kategoriler tablolar halinde sunularak açıklanmaya çalışılmıştır.

BULGULAR

Bu bölümde veri toplama aracı olarak kullanılan formdan elde edilen bulgular ayrı ayrı tablolar halinde sunulmuş ve açıklanmaya çalışılmıştır.

Sınıf öğretmeni adaylarının matematik eğitimiyle ilişkilendirdikleri 21. yüzyıl becerileri Tablo 1'de yer almaktadır.

Tablo 1. Öğretmen Adaylarının Matematik Eğitimiyle İlişkilendirdikleri 21. Yüzyıl Becerileri

Kod	**f**	**%**
Problem çözme	42	88
Eleştirel düşünme	32	67
Bilgi-medya ve teknoloji okuryazarlığı	29	60
Yaratıcılık	26	54
Girişimcilik	15	31

Tablo 1 incelendiğinde; sınıf öğretmeni adaylarının matematik eğitimiyle ilişkilendirdikleri 21. yüzyıl becerilerinin problem çözme, eleştirel düşünme, bilgi-medya ve teknoloji okuryazarlığı, yaratıcılık ve girişimcilik şeklinde yapılandığı görülmektedir. Öğretmen adaylarının %88'i problem çözmenin, %67'si eleştirel düşünmenin, %60'ı bilgi-medya ve teknoloji okuryazarlığının, %54'ü yaratıcılığın ve %31'i ise girişimciliğin matematik eğitimiyle ilişkili olduğunu ifade etmişlerdir.

Sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden problem çözme becerisini matematik eğitimiyle ilişkilendirme gerekçeleri Tablo 2'de verilmiştir.

Tablo 2. Öğretmen Adaylarının Problem Çözme Becerisini Matematik Eğitimiyle İlişkilendirme Gerekçeleri

Kategori	**f**	**%**	**Kod**	**f**	**%**
Problem çözme	42	88	Anlamlı ve kalıcı öğrenmeyi sağladığı için	12	29
			Yaratıcı düşünmeyi desteklediği için	11	26
			Çok yönlü düşünmeyi desteklediği için	11	26
			Matematiğin doğasında var olduğu için	10	24
			Üst düzey düşünme becerilerini geliştirdiği için	7	17
			Neden-sonuç ilişkisini kurmayı sağladığı için	5	12

Tablo 2 incelendiğinde; problem çözme becerisini matematik eğitimiyle ilişkilendiren sınıf öğretmeni adaylarının %29'unun anlamlı ve kalıcı öğrenmeyi sağladığı, %26'sının yaratıcı ve çok yönlü düşünmeyi desteklediği, %24'ünün matematiğin doğasında var olduğu, %17'sinin üst düzey düşünme becerilerini geliştirdiği ve %12'sinin ise neden-sonuç ilişkisini kurmayı sağladığı için problem çözme becerisinin matematik eğitimiyle ilişkili olduğunu ifade ettikleri görülmektedir.

Sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden eleştirel düşünme becerisini matematik eğitimiyle ilişkilendirme gerekçeleri Tablo 3'de sunulmuştur.

Tablo 3. Öğretmen Adaylarının Eleştirel Düşünme Becerisini Matematik Eğitimiyle İlişkilendirme Gerekçeleri

Kategori	f	%	Kod	f	%
Eleştirel düşünme	32	67	Anlamlı ve kalıcı öğrenmeyi sağladığı için	10	31
			Çok yönlü düşünmeyi desteklediği için	9	28
			Günlük yaşam problemlerini çözmeye katkı sağladığı için	8	25
			Bilinçli kararlar almayı sağladığı için	4	13
			Neden-sonuç ilişkisini kurmayı sağladığı için	4	13
			Üst düzey düşünme becerilerini geliştirdiği için	3	9

Tablo 3 incelendiğinde; eleştirel düşünme becerisini matematik eğitimiyle ilişkilendiren sınıf öğretmeni adaylarının %31'inin anlamlı ve kalıcı öğrenmeyi sağladığı, %28'inin çok yönlü düşünmeyi desteklediği, %25'inin günlük yaşam problemlerini çözmeye katkı sağladığı, %13'ünün bilinçli kararlar almayı ve neden-sonuç ilişkisini kurmayı sağladığı ve %9'unun ise üst düzey düşünme becerilerini geliştirdiği için eleştirel düşünme becerisinin matematik eğitimiyle ilişkili olduğunu belirttikleri görülmektedir.

Sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden bilgi-medya ve teknoloji okuryazarlığı becerisini matematik eğitimiyle ilişkilendirme gerekçeleri Tablo 4'de yer almaktadır.

Tablo 4. Öğretmen Adaylarının Bilgi-Medya ve Teknoloji Okuryazarlığı Becerisini Matematik Eğitimiyle İlişkilendirme Gerekçeleri

Kategori	f	%	Kod	f	%
Bilgi-medya ve teknoloji okuryazarlığı	29	60	Anlamlı ve kalıcı öğrenmeyi sağladığı için	14	48
			Bireyin çağa ayak uydurmasını desteklediği için	7	24
			Birden fazla duyuya yer vermeyi desteklediği için	5	17
			Bilimsel gelişmeleri takip edebilmeyi sağladığı için	5	17
			İlgiyi arttırdığı için	4	14
			Üst düzey düşünme becerilerini geliştirdiği için	3	10

Tablo 4 incelendiğinde; bilgi-medya ve teknoloji okuryazarlığı becerisini matematik eğitimiyle ilişkilendiren sınıf öğretmeni adaylarının %48'inin anlamlı ve kalıcı öğrenmeyi sağladığı, %24'ünün bireyin çağa ayak uydurmasını desteklediği, %17'sinin birden fazla duyuya yer vermeyi desteklediği ve bilimsel gelişmeleri takip edebilmeyi sağladığı, %14'ünün ilgiyi artırdığı ve %10'unun ise üst düzey düşünme becerilerini geliştirdiği için bilgi-medya ve teknoloji okuryazarlığı becerisinin matematik eğitimiyle ilişkili olduğunu dile getirdikleri görülmektedir.

Sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden yaratıcılık becerisini matematik eğitimiyle ilişkilendirme gerekçeleri Tablo 5'de verilmiştir.

Tablo 5. Öğretmen Adaylarının Yaratıcılık Becerisini Matematik Eğitimiyle İlişkilendirme Gerekçeleri

Kategori	f	%	Kod	f	%
Yaratıcılık	26	54	Problem çözme becerisini desteklediği için	12	46
			Çok yönlü düşünmeyi desteklediği için	11	42
			Özgün fikirlerin ortaya çıkmasını sağladığı için	8	31
			Eleştirel düşünmeyi desteklediği için	6	23
			Hayal gücünü geliştirdiği için	3	12

Tablo 5 incelendiğinde; yaratıcılık becerisini matematik eğitimiyle ilişkilendiren sınıf öğretmeni adaylarının %46'sının problem çözme becerisini desteklediği, %42'sinin çok yönlü düşünmeyi desteklediği, %31'inin özgün fikirlerin ortaya çıkmasını sağladığı, %23'ünün eleştirel düşünmeyi desteklediği ve %12'sinin ise hayal gücünü geliştirdiği için yaratıcılık becerisinin matematik eğitimiyle ilişkili olduğunu ifade ettikleri görülmektedir.

Sınıf öğretmeni adaylarının 21. yüzyıl becerilerinden girişimcilik becerisini matematik eğitimiyle ilişkilendirme gerekçeleri Tablo 6'da sunulmuştur.

Tablo 6. Öğretmen Adaylarının Girişimcilik Becerisini Matematik Eğitimiyle İlişkilendirme Gerekçeleri

Kategori	f	%	Kod	f	%
Girişimcilik	15	31	Özgün fikirlerin ortaya çıkmasını sağladığı için	8	53
			Etkili kararlar verebilmeyi sağladığı için	5	33
			Bağımsız çalışmayı desteklediği için	5	33
			Özgüveni geliştirdiği için	5	33
			Bireyin çağa ayak uydurmasını desteklediği için	4	27

Tablo 6 incelendiğinde; girişimcilik becerisini matematik eğitimiyle ilişkilendiren sınıf öğretmeni adaylarının %53'ünün özgün fikirlerin ortaya çıkmasını sağladığı %33'ünün etkili kararlar verebilmeyi sağladığı, bağımsız çalışmayı desteklediği ve özgüveni geliştirdiği ve %27'sinin ise bireyin çağa ayak uydurmasını desteklediği için girişimcilik becerisinin matematik eğitimiyle ilişkili olduğunu belirttikleri görülmektedir.

TARTIŞMA VE SONUÇ

Araştırmadan elde edilen bulgular doğrultusunda sınıf öğretmeni adaylarının problem çözme, eleştirel düşünme, bilgi-medya ve teknoloji okuryazarlığı, yaratıcılık ve girişimcilik gibi becerileri matematik eğitimiyle ilişkilendirdikleri belirlenmiştir (Tablo 1). Öğretmen adaylarının yapmış oldukları bu ilişkilendirmeye dayalı olarak, adayların Matematik Dersi Öğretim Programında ifade edilen ve öğrenme teori ve yaklaşımlarındaki gelişim ve yenikliklerle birlikte bireylerden beklenen rollerin de doğrudan etkilendiğinin vurgulanmasıyla örtüşmektedir (MEB, 2018a). Nitekim öğretim programında bireyden beklenen rollerin problem çözebilen, bilgiyi üreten, hayatta işlevsel olarak kullanabilen, eleştirel düşünen, kararlı, iletişim becerisine sahip, empati yapabilen, topluma ve kültüre katkı sağlayan şeklinde ifade edildiği görülmektedir. Diğer taraftan ülkemizde yürürlükte olan diğer öğretim programları da incelendiğinde, programların içeriklerinde 21. yüzyıl becerilerinden özellikle yaratıcı düşünme, eleştirel düşünme, analitik düşünme, girişimcilik, karar verme, problem çözme, iletişim ve işbirliği/takım çalışması becerilerinin ön planda yer aldığı görülmektedir (MEB, 2018b, 2018c, 2018ç, 2019). Bu doğrultuda öğretmen adaylarının hem Matematik Dersi Öğretim Programında hem de diğer öğretim programlarında ifade edilen bireyin özelliklerinden haberdar oldukları sonucuna varılabilir. Ayrıca WEF (2017) raporu irdelendiğinde, öğretmen adaylarının ilk ana becerilerden biri olan "*temel okuryazarlık becerilerinden" bilgi iletişim teknoloji okuryazarlığını*, ikinci ana beceri olan "*yeterliliklerden eleştirel düşünme* ve *yaratıcılığı* ve son olarak üçüncü ana becerilerden olan "*karakter özelliklerinden" girişimciliği* matematik eğitimiyle ilişkilendirerek ifade etmeye çalışmaları da ilgili literatürden haberdar olduklarını düşündürmesi bakımından sevindiricidir.

Sınıf öğretmeni adayları problem çözme becerisinin anlamlı ve kalıcı öğrenmeyi, neden-sonuç ilişkilerini kurmayı sağladığı; analitik-yaratıcı ve çok yönlü düşünmeyi desteklediği; üst düzey düşünme becerilerini geliştirdiği ve matematiğin doğasında olduğu için matematik eğitimiyle ilişkili olduğunu ifade ettikleri tespit edilmiştir (Tablo 2). Yaşamları boyunca bireyler aktivitelerinde birçok farklı problem durumuyla karşı karşıya gelirler ve bu problemlere çözümler üreterek, problemi ortadan kaldırmaya çalışırlar (Öztürk, 2021). Bu süreçte işe koşulan bir 21. yüzyıl becerisi olarak karşımıza çıkan problem çözme, günlük yaşamda karşılaşılan engellerle başa çıkarak bunlara çözüm üretmeyi kapsamaktadır (Açık, 2013; Korkmaz & Kaptan, 2001). Benzer şekilde problem çözme bir hedefe

ulaşmada bireyin karşısına çıkan engellere uyguladığı bilişsel işlemler kümesi olarak ifade edilmektedir (Smith & Kosslyn, 2014). Bu etkileri göz önüne alındığında problem çözme becerisi bireylerin karşılaştıkları sorunlara etkili ve doğru çözümler üretebilmeleri, kendi gelişimlerine katkı sağlamaları ve hayatları boyunca başarılı olmaları açısından önemli bir beceri olarak açıklanmaktadır (Öztürk, 2021). Buradan öğretmen adaylarının problem çözme ile matematik eğitimi arasında yaptıkları ilişkilendirme gerekçelerinin literatürle uyumlu olduğu sonucuna varılabilir.

Sınıf öğretmeni adaylarının eleştirel düşünmenin matematik eğitimiyle ilişkisini anlamlı ve kalıcı öğrenmeyi ve bilinçli kararlar almayı sağladığını; çok yönlü düşünmeyi ve üst düzey düşünme becerilerini desteklediğini; günlük yaşam problemlerini çözmeye katkı sağladığını ve neden-sonuç ilişkilerini kurmayı sağladığını ifade ederek gerekçelendirdikleri belirlenmiştir (Tablo 3). Genel anlamda belli ölçütlere bağlı kalarak bir sonuca varma durumu olarak tanımlanan eleştirel düşünme (Paul & Elder, 2013) her türlü bilginin değerlendirildiği ve farklı boyutlarının, anlamlarının irdelendiği; akıl yürütmenin ve mantığın kullanıldığı ve süreç sonunda belirli fikirlere, davranışlara ve kuramlara varılan bir düşünme biçimidir (Gürkaynak, Üstel & Gülgöz, 2008). Çok yönlü düşünmeyi ve üst düzey düşünme becerilerini desteklemesi nedeniyle (Moore, 2001) eleştirel düşünme bireylerin neden-sonuç ilişkileri kurmalarına, bilgiyi organize ederek anlamlı ve kalıcı öğrenmelerine de katkı sağlamaktadır. Bu doğrultuda öğretmen adaylarının eleştirel düşünmeyle matematik eğitimi arasındaki ilişkilendirmeyi yaparken sundukları gerekçelerin literatürle örtüştüğü söylenebilir.

Sınıf öğretmeni adayları bilgi-medya ve teknoloji okuryazarlığı becerisinin anlamlı ve kalıcı öğrenmeyi, bilimsel gelişmeleri takip edebilmeyi sağladığı için; bireyin çağa ayak uydurmasını ve birden fazla duyuya yer vermeyi desteklediği için; ilgiyi arttırdığı ve üst düzey düşünme becerilerini geliştirdiği için matematik eğitimiyle ilişkili olduğunu ifade ettikleri belirlenmiştir (Tablo 4). Özellikle içinde bulunduğumuz çağda teknoloji ve bilgi alanındaki hızlı gelişmelerin ve değişmelerin eğitim-öğretim anlayışlarını ve yapılarını değiştirmede etkili olduğu görülmektedir. Bu doğrultuda öğretmen adaylarının ifadelerinin günümüz eğitim anlayışının yapısıyla uyumlu olduğu söylenebilir.

Sınıf öğretmeni adaylarının yaratıcılığın matematik eğitimiyle ilişkisini problem çözmeyi, eleştirel ve çok yönlü düşünmeyi desteklediğini; özgün fikirlerin ortaya çıkmasını sağladığını ve hayal gücünü geliştirdiğini ifade ederek gerekçelendirdikleri tespit edilmiştir (Tablo 5). Burada öğretmen adaylarının yaratıcılık becerisini eleştirel düşünme ve problem çözme becerisiyle ilişkili olduğunu vurgulamaları önemli bir sonuç olarak karşımıza çıkmaktadır. Yaratıcılığı gelişmiş bireylerin problemlere ve problem durumlarına duyarlılık gösterdikleri, çok sayıda işe yarar, alışılagelmemiş, özgün ve işlevsel fikir üretebildikleri, bir düşünceden diğerine rahatlıkla geçebildikleri, sentez ve değerlendirme yapabilme yeteneğine sahip oldukları ve karmaşık ilişkileri kontrol edebildikleri vurgulanmaktadır (Brown, 1984'ten akt. Sünbül, 2011). 21. yüzyılın gerektirdiği ve özellikle WEF (2017) tarafından 2015 ile 2020 yılları içinde önem kazanacak becerilerden biri olarak ifade edilen yaratıcılığın öğretmen adayları tarafından önemli gerekçelere dayandırılarak matematik eğitimiyle ilişkilendirilmesi oldukça değerlidir.

Son olarak sınıf öğretmeni adaylarının girişimcilik becerisinin özgün fikirlerin ortaya çıkmasını ve etkili kararlar almayı sağladığı; bağımsız öğrenmeyi ve bireyin çağa ayak uydurmasını desteklediği ve özgüveni geliştirdiği için matematik eğitimiyle ilişkili olduğunu ifade ettikleri belirlenmiştir (Tablo 6). MEB'e (2018b) göre bireylerin düşüncelerini eyleme dönüştürme becerisini ifade eden girişimcilik, bireylerin yaratıcı, risk alan, fırsatları gören, bağımsız hareket edebilen, farklılıklara/değişime kolay ayak uydurabilen, başarılı olma isteğine sahip olan, yenilikçi, azimli, öz güvenli ve kararlı bireyler (Hisrich, Michael & Dean, 2005) olarak yetişmelerini desteklemektedir. Bu anlamda öğretmen adaylarının bu çalışmada girişimcilikle ilgili ifade ettikleri gerekçelerin literatürle uyumlu olduğu söylenebilir.

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ELECTION OF SEVERAL GENOTYPES OF SOME SYRIAN WILD ALMOND SPECIES SCATTERED AT HOMS PROVINCE IN SYRIA FOR KERNELS BITTERNESS USING SSR TECHNOLOGY

Firas Alarawi(*), Mohamad Mohamad(**) and Nisrin Nakshoo(***)

(*) Ph.D. student at the Hungarian University of Agriculture and Life Sciences MATE (former Szent István University), Doctoral School of Food Sciences, Budapest, Hungary / Teaching Assistant at the Second Faculty of Agriculture, Damascus University, Syria.
(**) Professor, Department of Food Science - Faculty of Agriculture - Damascus University, Syria.
(***) Researcher, National Commission for Biotechnology (NCBT), Damascus, Syria.

ABSTRACT

Wild-type kernels of the *Prunoideae* subfamily are well known for their toxicity and bitterness because of the presence of cyanogenic glucoside amygdalin. Once grinding the kernel in the mouth, the amygdalin content of bitter almonds is hydrolyzed to benzaldehyde, the compound responsible for bitter flavor, and a toxic compound called cyanide. In contrast, cultivated almond (*Prunus dulcis* (Mill.) D. A. Webb) has sweet kernels due to a dominant mutation that existed at the *SK* locus prevents the accumulation of amygdalin. In inbreeding programs, bitterness had elected because of its attribution to the recessive allele of the sweet kernel (*SK*/*sk*) gene. It is necessary to employ molecular markers to determine sweet and bitter genotypes. In this research, four Simple Sequence Repeat (SSR) markers (EPDCU2584, BPPCT037, UDA-045, and CPDCT028), previously identified concerning the locus of the SK gene, to determine its efficacy to an election the characteristic of kernels bitterness in several genotypes of some wild almond species (*Amygdalus Orientalis* & *Amygdalus Korschinskii*) scattered in Homs province, Syria. Results showed that there is a genetic difference between species as well as between genotypes within the same species, where the molecular markers revealed that the genotypes studied were either homozygous (*sk/sk*), so their kernels are severe bitterness or heterozygous (*SK/sk*), so their kernels are moderate bitterness. This study has proved the effectiveness of SSR technology for the election of bitterness traits among genotypes, an aspect of fundamental importance in almond breeding.

Keywords: Amygdalin; bitterness; breeding; heterozygous; homozygous; *SK* gene.

1. Introduction:

The kernels of wild species of the subfamily *Prunoidaeae* are bitter, as they accumulate amygdalin which had believed to play a significant role in defense against herbivores and pathogens (Zagrobelny *et al*., 2004). The sweet taste of the kernels of cultivated almonds (*Prunus dulcis* (Mill.) D.A. Webb) likely originates from a mutation elected during breeding and conservation in modern cultivars (Dicenta *et al*., 2007).

Recent genetic studies have provided proof that more than one gene had involved bitter taste in other almond species such as apricots (*Prunus armeniaca* L.) (Negri *et al*., 2008). By contrast, genetic studies in peaches (*Prunus persica* (L.) Batsch) have suggested monogamous inheritance (Werner and Creller, 1997). Whereas in the case of almonds previous genetic studies had shown that the taste of the kernel depends on the genotype of the parent plant, regardless of the pollinator (Dicenta *et al*., 2000). In addition, this trait is mono-dominant, with the sweet kernel (*SK*) being predominant on the consort responsible for the gallbladder (*sk*) (Dicenta *et al*., 1993; Sánchez-Pérez *et al*., 2007). The molecular nature of the SK loci is still unknown, although it had suggested that the *SK* gene encodes for prunasin hydrolase (PH, which converts prunasin (a precursor of amygdalin), to glucose and mandelonitrile (Sánchez-Pérez *et al*., 2008).

Almond is a woody perennial species that needs a long time to be able to produce. For this reason, the early election of desired kernel traits, based on molecular markers, allows examination of the planter several years before the phenotypic evaluation of the kernel. The development of association maps using molecular markers such as Restriction fragment length polymorphism (RFLPs) and Simple Sequence Repeats (SSRs) has provided a more effective basis for stone fruit genetics and breeding (Dirlewanger *et al*., 2004).

A linkage map of 246 markers had generated in the F2 generation resulting from the crossbreeding of 'Texas' x 'Early Peach' (Joobeur *et al*., 1998). This map (T × E) had been designated as a reference map for Prunus (Dirlewanger *et al*., 2004; Howad *et al*., 2005). Using data from the different correlation maps based on this reference map, it became possible to locate 28 major genes affecting agronomic traits of fruits (kernel taste, flowering time, etc.) in different species (peach, apricot, almond, and plum) (Dirlewanger *et al*., 2004). Locate the *SK* in the fifth linkage group (LG5) (Joobeur, 1998; Sánchez-Pérez *et al*., 2007).

Two RFLPs (FG202 and AG46) had been identified near the *SK* loci (Joobeur *et al*., 1998). However, RFLPs are nonsufficient for habit plant breeding applications because they require large amounts of high-quality DNA (µg). Whereas SSRs require only low amounts of DNA (ng), and a simple and relatively cheap PCR reaction is better suited for the large-scale decisions needed for marker-assisted breeding (Dirlewanger *et al*., 2004; Howad *et al*., 2005).

Molecular markers associated with economically important traits had routinely been used to replace or supplement apparent election for traits in plant breeding programs. SSR markers, which detect multiple lengths of DNA segments, are widely used to investigate genetic diversity in plants (Carneiro *et al*., 2016). To assist in breeding programs, several studies had examined the identification of molecular markers associated with the *SK* gene (Sánchez-Pérez *et al*., 2007; Sánchez-Pérez *et al*., 2010). In one, several SSR markers associated with the group (LG5) in almonds had shown to be associated with the SK locus, and two maps of the *SK* locus had generated, one per parent for the F1 generation map (Sánchez-Pérez *et al*., 2010).

2. Research objective:

In this research, some molecular markers (SSRs) had tested in several genotypes of the *Orientalis* wild almonds. Amygdalus *Orientalis* and Amygdalus *Korschinskii*, which had scattered in different locations in Homs province, Syria, to determine the possibility of using these markers to distinguish the genotypes of *Orientalis* and *Korschinskii* almonds in terms of the bitterness of their kernels. Thus, the possibility of knowing the kernels' bitterness severity for any genotype before planting it.

3. Materials and methods:

The research had carried out in the National Commission for Biotechnology NCBT laboratories (Damascus - Syria) and in the Faculty of Agriculture at Damascus University.

3. 1. Plant matter:

Plant samples had obtained from 12 genotypes of the *Orientalis* and *Korschinskii* wild almonds scattered in different locations in Homs province, Syria (Table 1).

Table (1): Species, genotypes, and collection locations.

Species	Genotype	Collection Location	Longitude	Latitude	Height
Amygdalus Orientalis	1	Hassia, Homs - Syria	36°45`E	34°24`N	784M
	2				
	3				
	4				
	5				
	6				
Amygdalus Korschinskii	7	Abil, Homs - Syria	36°40`E	34°38`N	548M
	8				

	9				
	10				
	11				
	12				

3. 2. DNA isolation:

DNA from each genotype was isolated from about 0.2 g of young leaves, according to the "CTAB" method (Doyle and Doyle, 1987), with modifications (Sonneveld *et al*., 2001).

3. 3. The studied SSR molecular markers:

Four pairs of SSR molecular markers had used: (EPDCU2584, 7BPPCT03, UDA045, and CPDCT028) (Sanchez-Perez *et al*., 2007) (Table 2).

Table (2): SSR molecular markers used to amplify the DNA of the studied plants (Sanchez-Perez *et al*., 2007).

Molecular Marker Code	Nucleotide sequence (5'-3')
UDA-045	FW: CCATCCCAGGCCTTAGTACA REV: GGAGGATGCTATTGGGGTC
EPDCU2584	FW: TTCAGCTCATCTAGTTTCAT REV: CACGGTTCGAACAACATCTG
CPDCT028	FW: TGAACGTTGCACTCCTTCAC REV: ACCACCACCATAACCACCA
BPPCT037	FW: CATGGAAGAGGATCAAGT REV: CTTGAAGGTAGTGCCAAAG

3. 4. Polymerase Chain Reaction (PCR):

DNA had amplified using the SSR primers (Table 2) using PCR technique in a final volume of 25 µl, 50 ng of DNA, and 12.5 µl of PCR Master Mix (which had obtained from Sigma company containing (Taq - Polymerase, dNTPs, MgCl2) and 20 picomoles of the primers. According to the following thermal program:

- The first stage (initial separation stage): for one time at a temperature of 95 degrees Celsius for 3 min.
- Second stage: It is repeated 45 times and includes the following steps:
  1. Separation stage: at a temperature of 95° C for 10-15 sec.
  2. The coalescence stage: at a temperature of 60° C for 10 - 15 sec.
  3. The elongation phase: at a temperature of 72° C for 1-15 sec.
- Third stage (final elongation stage): It is done once at a temperature of 72° C for 1 min.

After the end of this reaction, the samples had kept at a temperature of -20° C.

3. 5. Amplification products separation of the using electrophoresis:

The amplification products had separated in an electrophoresis gel consisting of 4% metaphor agarose in TBE (1X) solution in the presence of Red safe dye.

Electrophoresis had carried out with a molecular index of 100 pairs of nucleotides for an hour and a half at 100 V. Then, the gel images had taken in the presence of ultraviolet radiation (Fig. 1).

3. 6. Statistical Analysis:

The length of the DNA bundles generated by amplification had determined using TotalLab software (Ultra* Lum Inc., Claremont, Calif).

The probability percentage that the kernels of the studied genotypes had either severe or moderate bitterness had calculated using the following equations:

Percentage of probability that the genotype kernels are severe bitterness = number of homozygous molecular markers/number of total molecular markers associated with the genotype × 100

Percentage of probability that the genotype kernels are moderate bitterness = heterozygous molecular markers number / total molecular markers associated with the genotype number × 100

4. Results and Discussion:

There is now a total of 15 SSRs, surrounding the *Sk* loci on the G5 map of R × D, including eight (BPPCT026, UDP97-401, BPPCT017, PceGA025, EPDCU4658, EPDCU5183, BPPCT038 and BPPCT014) preset (Sanchez-Perez *et al*., 2007), and seven (EPDCU9830, UDA-045, EPDCU2584, BPPCT037, CPDCT016, CPDCT028, and EPDCU0004) Sánchez-Pérez *et al*. (2010), to study the almonds kernels bitterness, and to identify appropriate timelines for the effective election of bitterness genotypes.

In this study, 4 of these SSRs had used on the DNA of several genotypes of the *Orientalis* and *Korschinskii* wild almond species spread in Homs province, Syria. To ascertain the presence and location of these SSRs that had linked to the *SK* loci on the DNA, and thus the possibility of using them in electing the kernels bitterness in These genotypes are pre-planted.

The results showed that there is a genetic difference between species, as well as between genotypes within the same species. Where the molecular markers revealed that the studied genotypes are either homozygous (*sk/sk*), their kernels were severe bitterness, or they are heterozygous (*SK/sk*), their kernels are moderate bitterness.

4. 1. Molecular marker EPDCU2584:

All studied genotypes gave amplifications with this molecular marker. Whereas the amplification of genotypes 4, 5, 6, 7, 8, 9, 10, 11, and 12 were homozygous, so genotypes 4, 5, and 6 gave two bands of length 130 bp, and genotypes 7, 8, 9, 10, 11 and 12 gave two bands of length 140 bp. Meaning that these genotypes kernels are severe bitterness according to this marker. While the amplification of genotypes 1, 2, and 3 were heterozygous, giving two bands of length 140 and 165 bp; Therefore, these genotypes kernels are moderate bitterness according to this molecular marker (Table 3).

Table (3): Correlation results of the molecular marker EPDCU2584 with the genotypes of the studied wild almond species.

Species	Genotypes	Band length
Amygdalus Orientalis	1	140, 165
	2	140, 165
	3	140, 165
	4	130, 130
	5	130, 130
	6	130, 130
Amygdalus Korschinskii	7	140, 140
	8	140, 140
	9	140, 140
	10	140, 140
	11	140, 140
	12	140, 140

4. 2. Molecular Marker BPPCT037:

Genotypes 4, 5, 7, 8, 9, 10, 11, and 12 did not produce amplifications with this molecular marker. Therefore, this marker is not appropriate to elect for kernel bitterness in these genotypes. While genotypes 1, 2, 3, and 6 gave amplifications and were homozygous, giving two bands of length 145 bp. Thus, these genotypes kernels are severe bitterness according to this marker (Table 4).

Table (4): Correlation results of the molecular marker BPPCT037 with the genotypes of the studied wild almond species.

Species	Genotypes	Band length
Amygdalus Orientalis	1	145, 145
	2	145, 145
	3	145, 145
	4	-
	5	-
	6	145, 145
Amygdalus Korschinskii	7	-
	8	-
	9	-
	10	-
	11	-
	12	-

4. 3. Molecular Marker UDA-045:

All studied genotypes gave amplifications with this molecular marker. The amplification of genotypes 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, and 12 were homozygous, with phenotypes 7, 8, 9, 10, 11, and 12 giving two bands of length 70 bp. 2, 4, 5, and 6 are 60 bp long bands; This means that these genotypes kernels are severe bitterness according to this marker. While the genotype (3) amplifiers were heterozygous, giving two bands of length 60 and 150 bp. Therefore, this genotype kernels are moderate bitterness according to this marker (Table 5).

Table (5): Correlation results of the molecular marker UDA-045 with the genotypes of the studied wild almond species.

Species	Genotypes	Band length
Amygdalus Orientalis	1	60, 60
	2	60, 60
	3	60, 150
	4	60, 60
	5	60, 60
	6	60, 60
Amygdalus Korschinskii	7	70, 70
	8	70, 70
	9	70, 70
	10	70, 70
	11	70, 70
	12	70, 70

4. 4. Molecular Marker CPDCT028:

All genotypes gave amplifications with this molecular marker, and their amplifications were heterozygous. Whereas genotypes 3, 6, 7, 8, 10, and 12 had given two bands of length 165 and 190, 165 and 175, 185 and 195, 175 and 225, 210 and 225, 190 and 230 bp, respectively, while genotypes 9 and 11 gave bands of length 190 and 200 bp, and both genotypes gave 1, and 2 gave two bands of length 175 and 195 bp, and genotypes 4 and 5 gave two bands of 170 and 190 bp. Thus, these genotypes' kernels are moderate bitterness (Table 6).

Table (6): Correlation results of the molecular marker CPDCT028 with the genotypes of the studied wild almond species.

Species	Genotypes	Band length
Amygdalus Orientalis	1	175, 195
	2	175, 195
	3	165, 190
	4	170, 190
	5	170, 190
	6	165, 175
Amygdalus Korschinskii	7	185, 195
	8	175, 225
	9	190, 200
	10	210, 225
	11	190, 200
	12	190, 230

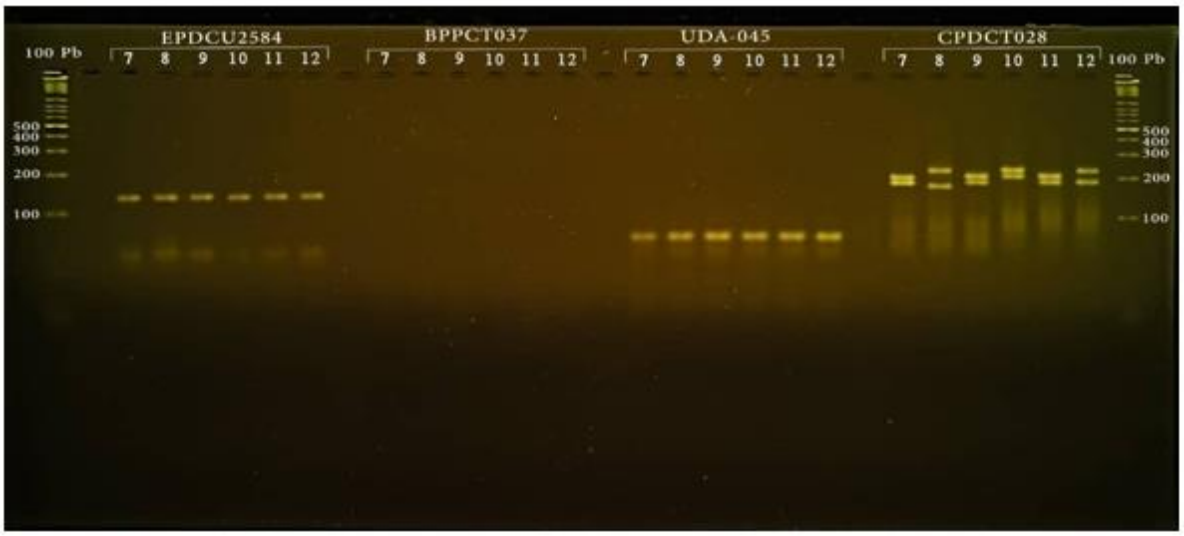


Figure (1): Image of a metaphor-agarose gel after electrophoresis of PCR products. The genotypes (7, 8, 9, 10, 11, and 12) had shown with the studied molecular markers.

As a result, we find that the kernels of these genotypes will be severe or moderate bitterness, depending on their amplification products with the molecular marker, which will be either homozygous, so the kernels are severe bitterness or heterogeneous, so the kernels are moderate bitterness. The percentage probability that these genotypes kernels are either severe or moderate bitterness are as follows (Table 7):

- Kernels of the two genotypes (1 and 2) will be 50% severe bitterness and 50% moderate bitterness.
- Kernels of genotype (3) will be 25% severe bitterness and 75% moderate bitterness.
- Kernels of genotypes (4, 5, 7, 8, 9, 10, 11, and 12) 66.6% will be severe bitterness and 33.3% moderate bitterness.
- Kernels of genotype (6) will be 75% severe bitterness and 25% moderate bitterness.

Sánchez-Pérez *et al*. (2010) showed that 6 SSR markers (UDA-045, EPDCU2584, BPPCT037, CPDCT016, PceGA025, and CPDCT028) were close to the *Sk* locus, in a region extending 6.2 cM around the "R1000" (LG5R) map locus and 11.7 cM of the "Desmayo Largueta" (LG5D) map. Only

(EPDCU2584, BPPCT037, and PceGA025) were heterozygous in both parents, and (UDA-045, CDPCT016, and CPDCT028) were heterozygous in only one of the parents. When we compare the results of this study with the results obtained, we find that they are consistent with them, but the markers studied here (EPDCU2584, BPPCT037, UDA-045, and CPDCT028) were highly homozygous in the following proportions, respectively (75%, 33.3%, 91.7%, and 100%). Also, there was a tiny difference in the marker's bands length (EPDCU2584, BPPCT037, and CPDCT028), while the difference was significant for UDA-045 by more than 100 nucleotides.

In another study by Ricciardi (2016), he had studied the same studied markers in this research. Also, verified for their presence and locus on the LG5 map in the *communis* wild almond (*Amygdalus communis* L.= *Prunus Dulcis* Mill), their existence had demonstrated near the *SK* gene. However, the markers obtained bands length (BPPCT037 and EPDCU2584) are about 20 nucleotides longer than the length of the bands reported by Sánchez-Pérez *et al*. (2010). So, the results obtained were also consistent with this study. But also, slightly different from those in the studied markers bands length, except for the difference in the large extent of UDA-045 marker bands as previously mentioned.

Therefore, the studied markers in this research, which Sánchez-Pérez *et al*. (2010) proved effective in selecting the bitterness trait in sweet and bitter almond species, had also noted that they had effective in electing the bitterness trait in the studied Syrian wild almond species.

Table (7): The association nature of the four molecular markers with each genotype of the studied species.

		Molecular markers and their amplification													
		EPDCU2584			BPPCT037			UDA-045			CPDCT028				
Species	Genotype	Homozygous	Heterozygous	Not suitable for election	Homozygous	Heterozygous	Not suitable for election	Homozygous	Heterozygous	Not suitable for election	Homozygous	Heterozygous	Not suitable for election	percentage of the probability that the genotype's kernels are severe bitterness	percentage of the probability that the genotype's kernels are moderately bitter
Amygdalus Orientalis	1		×		×			×				×		50%	50%
	2		×		×			×				×		50%	50%
	3		×		×				×			×		25%	75%
	4	×					×	×				×		66.6%	33.3%
	5	×					×	×				×		66.6%	33.3%
	6	×			×			×				×		75%	25%
Amygdalus Korschinskii	7	×					×	×				×		66.6%	33.3%
	8	×					×	×				×		66.6%	33.3%
	9	×					×	×				×		66.6%	33.3%
	10	×					×	×				×		66.6%	33.3%
	11	×					×	×				×		66.6%	33.3%
	12	×					×	×				×		66.6%	33.3%

5. Conclusions:

In conclusion, it can say that the four molecular markers (EPDCU2584, BPPCT037, UDA-045, and CPDCT028) that were studied in this research, proved their effectiveness in electing the genotypes of the *Orientalis* and *Korschinskii* wild almonds spread in Homs province, Syria, according to the bitterness of their kernels. Thus, these molecular markers can be used to distinguish the genotypes of the *Orientalis* and *Korschinskii* wild almonds in terms of the bitterness of their kernels before planting.

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FEATURE EXTRACTION FROM TURKISH RESUMES AND JOB POSTINGS AND EFFICIENT JOB-RESUME MATCHING

Feriştah Dalkılıç[1*], Yunus Doğan[2], Alp KUT[3], Kemal Can Kara[4], Uygar Takazoğlu[5]

[1,2,3]Dokuz Eylül University, Computer Engineering Department, Izmir, Turkey.
[4,5]Kariyer.net R&D Centre, Istanbul, Turkey.
ORCID Codes: [1]0000-0001-7528-5109, [2]0000-0002-0353-5014, [3]0000-0002-5781-334X, [4]0000-0001-5938-9899, [5]0000-0002-9276-5339

ABSTRACT

E-recruiting systems have a crucial role for the people who looking for a new job opportunity. Thanks to these systems, it is possible for job seekers to find the most suitable job postings without wasting time. On the other hand, companies/employers can filter employee candidates according to their own staffing policies and requirements. The paper presents a system for the automatic extraction of qualifications and skills from job postings and resumes in the Turkish language. We extract features from the resumes of the applicants and job qualifications that are specified by recruiters for the identification of the best position for the applicants. In this study, we applied clustering algorithms in addition to text-mining and natural language processing techniques. The proposed system converts free-format textual job postings and resumes to a structured format, applies job-resume matching tasks by using a similarity ranking method. The performance and efficiency of the system are presented with a case study.

Keywords: Clustering algorithms, text mining, resume information extraction, job-resume matching.

INTRODUCTION

With the growth of Internet-based recruiting around the globe, services like Kariyer.net are really important to both employees and employers. E-recruiting has a big role for many people. Since there are several services that aim for e-recruiting consisting of thousands of resumes. And since some of the employers are requesting some specific specifications, picking the right employee can take a long time. In the same manner, picking the most relevant job postings is a demanding process for applicants.

Resume Information Extraction is one of the challenging tasks of text mining. It is used for automating the information-gaining process from resumes. Since there exist many resumes and job postings, these can be matched quickly using automated processes. In this process, resumes are analyzed to determine the applicant's abilities and job postings are analyzed to determine the qualifications and skills specified by recruiters. Then, the relevant job postings are matched to the resumes or vice versa.

The goal of resume information extraction is to make staffing more easily and faster than usual. Automating staffing will make staffing faster and HR employees won't be working as hard as they are used to just to find the candidates. Companies/employers can filter employee candidates according to their own staffing policies and requirements. On the other hand, job seekers can find relevant job postings from e-recruiting systems. There are a lot of projects and studies that have been done and currently going on this subject. However, a few of them are designed for Turkish resumes.

In the scope of this study, we used a dataset provided by Kariyer.Net that is the leading e- recruiting system of Turkey. We extracted qualifications and skills specified in resumes and job requirements from the job posting text by using text-mining and natural language processing techniques. We also

employed K-Means algorithm to cluster the features included in resumes and job postings. Then resume-job posting matching was performed by comparing the clustering information.

The rest of the paper is organized as follows: Some important studies that are relevant to this study are exemplified in the related works section. The proposed system, dataset, and techniques we used are explained in the system overview section. We demonstrate our results with a case study in the experimental studies section. Finally, we conclude our study and state our future plans in conclusion and future work section.

RELATED WORKS

There is a considerable amount of research that has been done on resume information extraction and job-resume matching in recent years. Several text-mining and natural language processing techniques have been applied to resumes and job postings. Elimination of the stop words, bag of words model, part of speech tagging (POS), removal of the noisy data, normalization (stemming and lemmatization, n-gram model, TF-IDF technique, and named entity recognition are some of the used text-mining and natural language processing tasks in literature (Singh et al., 2010; Ayishathahira et al., 2018; Duan et al., 2019; Grüger and Schneider, 2019).

Chuang et al. (2008) introduced the study on the processing of semi-structured Chinese resumes. They implemented a parser that includes 3 main modules. The segmentation module is used to split the whole resume text into its elements. The identification module gets all the items iteratively until all of the items are identified. The Feedback module adjusts some parameters until all items are extracted. They conducted an experimental study on 5000 resumes by employing SVM as a classification model and achieved an average accuracy of 87% in basic information extraction, and an average accuracy of 81% in complex information extraction. Singh et al. (2010) proposed a decision support system which is called Prospect, designed by IBM Research Lab. Prospect is developed to help recruiters to ease them in the recruitment process. Prospect works on unstructured data that is provided from the resumes of applicants and the requirements of the job profile. They applied standard ad-hoc retrieval techniques including TF-IDF to rank the candidates. They estimated that Prospect sped up the screening process by a factor of 20 as compared to manual screening.

Some of the studies use ontology concepts while extracting information from resumes and job postings. Çelik (2016) developed a system that converts resumes into ontology form by using an Ontology-Based Resume Parser (ORP) in order to find the most suitable jobs for a related resume. Relational data forms are generated for resumes and jobs in order to make the information presentable. Requested information, which is extracted from Turkish and English resumes, are filled in into those forms. There are different types of ontologies such as personal information Ontology, Education Ontology, Address Ontology, etc. and every field in resumes is related to a corresponding ontology. The system has modules, which are segmenter, converter, parser engine, classification concepts, etc., in order to generate ontology form. The system has its own semantic matching step in order to rank the most suitable jobs for a resume. Darshan (2017) extracted information from semi-structured resumes with RTF format and converted them into a structured document based on ontology. The augmented semantic data model was used in order to provide an ontological model data which are as a set of objects and have constraints over the set. Information is extracted from semi-structured resumes by using 2 different regular expressions. Then extracted content is placed into the designed SQL schema as a structured data source. Finally, data is converted into an XML file which users can search resume information using XML tags.

In literature, there are some studies that are using data mining and machine learning algorithms. Ayishathahira et al. (2018) proposed a system for resume parsing using deep learning models. They built two models: the segmentation model and the sequence labeling model. A Convolutional Neural Network (CNN) was used in the segmentation model and compared with a Bi-LSTM. Conditional

Random Fields (CRF) based model and Bi-LSTM-CNN model were used for sequence labeling. The proposed system is capable of parsing a resume into 3 segments and 23 fields. Duan et al. (2019) used the K-means++ algorithm to cluster the resumes that are matching with the job-resume relationship. After the clustering, weights were assigned to resumes by using TF-IDF and final results were aggregated by using these assigned weights. Chen (2018) indicated the problem with different types of resumes and the time that is needed to prepare those resumes for information extraction. Different formats of resumes have been given as input to Apache Tika in order to obtain the plain text versions of those resumes. Then, a noise cleaning phase has been employed and plain text has been grouped by using machine learning classifiers. Yi et al. (2007) compared the standard approaches to the Structured Relevance Models (SRM). They obtained a semi-structured dataset that is required by SRM and retrieved a set of jobs with a similarity rank using weighted cross-entropy. One relevance model was built per each field of resumes that are related to the retrieved set of jobs. Finally, all resumes were ranked according to their similarity using weighted cross-entropy. They stated that SRM approach predicted better results than typical unstructured relevance models.

A system, which is capable of information extraction from German language job advertisements, was presented by Grüger and Schneider (2019). The system is divided into 4 steps which are Data Acquisition, Language Detection, Section Classification, and Skill Recognition. Random-Forest Classifier, Linear Support Vector Classification and Naive Bayes Classifier for multinomial models, Logistic Regression, Decision Tree Classifier and Naive Bayes Classifier for multivariate Bernoulli models are used for training models. Models are tested with pruned test data which are generated using n-grams and TF-IDF with and without stop words. Job requirements are extracted from classified fields using POS tagging. The Linear Support Vector Classification model performed best with the 0.95 accuracies.

Yu et al. (2005) presented an effective cascaded information extraction approach from resumes. Information extraction is divided into two passes in this cascaded hybrid model. In the first pass, a resume is segmented into blocks with labels that specify information types by using Hidden Markov modeling (HMM). In the second pass, segmented blocks become inputs of the second pass. HMM and Support Vector Machine (SVM) are used in order to extract detailed information from blocks. HMM is better than SVM for educational detailed information extraction and general information extraction although SVM performs much better than HMM for personal detailed information extraction.

The studies for the feature extraction and matching of resumes and job postings in the Turkish language are quite insufficient. Each language has its own characteristics and rules. In this study, we aim to propose a model that can guide similar studies on the Turkish language.

SYSTEM OVERVIEW

The proposed system consists of two main parts. The first one is the Pattern Matching System that implements the main logic of resume-job matching. The Pattern Matching System was implemented using java as a maven project. Zemberek-NLP (2021), which is a library to perform natural language processing for Turkish, was used in the development. We are able to perform morphological analysis for the Turkish language thanks to Zemberek-NLP. After the morphological analysis phase, sentences were compared to specific patterns, which were stored as enumeration, and were determined depending on predefined rules. Chosen sentences were clustered using the Python programming language.

The second part of the proposed system is the web user interface that was developed by using the Angular platform and Spring Boot Framework. Spring Boot is used for the backend partition of the web application. The users are expected to fill the resume form for finding suitable job postings. The form includes the components mainly focused upon getting information about the personal, educational, contact, foreign language, and work experiences of the user. The components of the proposed system will be explained in the following subsections in detail.

Dataset and Text Preprocessing

In this study, the "Kariyer.net" dataset that contains 110.000 job postings, which belong to 6905 different positions, was used. The job postings are semi-structured text data that can include job description fields as education, experience, city, job title, and a text field containing lots of information about job requirements with HTML tags. HTML tags can provide an advantage to extract more information. This original data contained some empty, inconsistent, unavailable data. Some text preprocessing techniques are applied to the dataset.

Dataset was read and parsed by HTML list items and various breakpoints if list items were not present or/and are not sufficient. This was done by using the HtmlAgilityPack utility library using C#. The following steps were applied to the pure job posting text.

- Inner texts of HTML list items and various possible item-like structures were extracted.
- Too long and too short items were deleted.
- Extracted texts features were divided into two categories including “Job Description” and “Company Description/Vision”. Only the features of the job description category were handled in the remaining part of the study.
- Items that were written in all uppercase characters were deleted due to the possibility of a company advertisement or/and a special announcement.
- All HTML tags were removed via using Regex.
- Special characters like “>” were transformed into their original source.

After these preprocessing tasks, we could extract the features from job postings. Feature extraction is the process of finding and identifying qualifications that are consisted in job postings and generating a list of all qualifications. To increase accuracy and remove duplicated items we have continued to analyze and alter our data. We applied a filter that eliminates all the qualifications that are longer than 240 characters long or written in only upper-case characters.

For normalization, removal of stop words and stemming were performed on extracted features. We removed stop words from the text context. In Turkish, stop words can be exemplified as “ben” (I), “ve” (and), “veya” (or), “ancak” (but) etc. The stop word removal process was done to make lemmatization and POS tagging easier. This also helps with the term frequency vectorizing, thus detecting frequent and infrequent words easier. Since there is not an official stop word list for the Turkish language, stop word lists from other projects and research were used (Can et al., 2008).

POS tagging and Pattern Matching

After the stop word removal and stemming, we performed POS tagging and morphological analysis studies. POS tagging (part-of-speech tagging) is the process of marking up a word in a text as corresponding to a particular part of speech, based on both its definition and its context, by considering its relationship with adjacent and related words in a phrase, sentence, or paragraph. Table 1 shows the pos tags and their meanings that were we used in the pattern matching system.

The pos tag type TIME is a special pos tag that analyses two words instead of one. This is done to eliminate numerical pos tags from the matching process, which leads to false matching results. For example, token “iki yıl” (two years) is determined as the TIME pos tag. The other pos tag type SPECIAL means special points of interest in the job advertisements. For example, JavaScript, Python, C, etc. is considered to be SPECIAL for a software development job posting.

Table 1. Used Pos Tags and Their Meanings

POS TAG	MEANING
NOUN	Noun
PROP	Proper noun
ADJ	Adjective
ADV	Adverb
CONJ	Conjunction
VERB	Verb
PRON	Pronoun
PART	Particle / Preposition
NUM	Numerical
PUNC	Punctuation
DUP	Duplication
TIME	Any word that might contain information about time. For example, minute, second, etc.
SPECIAL	Special points of interest in the job postings. This is used for determining sentences that contain job-specific information.

Using Zemberek-NLP API for Java, we could find POS tags that are associated with a word. After POS tagging, we produced the lemmatized forms of each word in the sentence as well, which we used to match patterns given in Table 2. This pattern list was generated manually by analyzing a set of features extracted from job postings of various positions.

Table 2. Lists of patterns

Complete Match	NOUN, VERB
Single Match	NUM, TIME, VERB
	NUM, TIME, NOUN
	SPECIAL, VERB
	SPECIAL, NOUN
	NUM, NOUN, VERB
Multiple Match	NOUN, NOUN, ADJ
	NOUN, NOUN, VERB
	ADJ, NOUN, VERB
	NOUN, VERB, ADJ
	ADJ, VERB, NOUN
	ADJ, VERB, NOUN, NOUN
	NOUN, NOUN, NOUN, VERB
	VERB, VERB, NOUN, NOUN
	NOUN, ADJ, NOUN, ADJ
	ADJ, VERB, NOUN, VERB
	NOUN, VERB, NOUN, NOUN
	ADJ, ADJ, NOUN, VERB
	NOUN, ADJ, NOUN, VERB
	VERB, NOUN, NOUN, VERB
	NOUN, NOUN, NOUN, VERB, VERB
	NOUN, NOUN, NOUN, NOUN, VERB
	ADJ, VERB, NOUN, NOUN, VERB

The pattern matching algorithm checks whether an extracted feature matches at least one of the patterns given in Table 2. Pattern matching consists of 3 different types of matches including complete, single,

and multiple matchings. The complete match list consists of all the patterns that must match exactly. In other words, a pattern must match a token's pos tags in terms of size, type, and order. For example, if a pattern is consisting of two types <NOUN, VERB>, pos tags of a sentence must be NOUN, VERB exactly. Single match lists consist of all the patterns that must match to pos tags of the token once. If any of the single match patterns matches the token, that token is considered to be matched. A token must match multiple patterns in the multiple match list to be considered as a match. After the pattern matching process, we have eliminated the candidate features 7984 to 3864.

Feature Clustering and Job-Resume Matching

After the pattern matching process, the filtered features were given as the dataset to the K-Means clustering algorithm. Pattern matching algorithm was applied to 70,000 job postings in total and at the end of this process, approximately 64,000 of them passed this process and forwarded to the feature clustering phase. After unpacking these job postings, there were approximately 550,000 different qualifications to be clustered.

The clustering algorithm was executed with lemmatized text as input in order to make TF-IDF vectorizing easy and more accurate. We used Python programming language and Scikit-Learn library to run the K-Means clustering algorithm. K-means is an unsupervised machine learning algorithm. It takes a dataset and groups the instances based on their similarity. The number of clusters is given as input by the user. The algorithm determines the chosen number of initial centroids and starts assigning the instances to the closest centroid. Then, the algorithm calculates the new mean for each cluster, which becomes the new centroid. The process ends when there are no changes in clusters.

TF-IDF Vectorizer and Count Vectorizer are used to create feature vectors from feature lists. Both vectors are trained with K-Means with a total of 180 clusters. Different postings with different contents and different professions might have features belonging to the same clusters. This is usually the case in shared aspects of different professions. For example, "Knowledge of MS Office programs" are widely observed among many job postings and they share the cluster.

Cluster matching is performed to identify and rank related job postings compatible with the resume content entered by the user. Resume features are extracted with the same processes applied on job postings. Then, resume features are also clustered by using the same K-Means model to identify which feature clusters are contained in the resume content. Cluster matching is performed by 5 different matching priorities including *none, low, medium, high, highest*. If *none* is selected by the user, no cluster matching will be done, and all the results are retrieved from the database. If *low* priority is preferred, any job advertisement that has an intersection size greater than 0 will be included. *Medium* and *high* priorities include jobs postings that have an intersection size equal to or greater than 40% and 75% of the job's cluster set, respectively. The *highest* priority includes job postings that have the exact same cluster set with the qualifications taken from the user's resume. This priority decreases the count of matched job postings considerably. Cluster matching is the last step for a job matching system. Matched jobs postings are presented to the user using the web user interface.

EXPERIMENTAL STUDIES

We conducted some experimental studies to evaluate the matching performance of the proposed system. After feature extraction, text preprocessing, and clustering steps a sample portion of the job posting dataset is shown as given in Figure 1. Preprocessed job posting contents and clustering results were kept in a relational database table. K-Means clustering was applied with two different approaches based on TF-IDF vectorizer and with count vectorizer. Different clustering results obtained by these two vectorizers were kept in the related columns named *cluster_tfidf* and *cluster_cnt*. The numbers given in these columns represent the cluster identifiers associated with the related job posting.

	id	position	name	text_clear	clusters_tfidf	clusters_cnt
1	2351607	Muhasebe Elemanı	İstanbul(Avr.)	['Üniversitelerin ilgili bölümlerinden mezun,', ...	70,76,74,74,42	39,83,36,36,6
2	2351608	Satış Teknisyeni	İstanbul(Avr.)	["Pazarlama yada satış alanında tecrübe sahibi ...	70,104,36,117,20,4,69,10,54,10	39,49,18,78,58,90,9,69,114,3
3	2351613	Ön Muhasebe Görevlisi	İstanbul(Asya)	['[redacted]'NİN KENDİ İŞLETTİĞİ ...	56,24,69,72,13,3,99,65,4	59,24,45,18,55,32,74,58,90
4	2351613	Ön Muhasebe Görevlisi	İstanbul(Avr.)	['[redacted]'NİN KENDİ İŞLETTİĞİ ...	56,24,69,72,13,3,99,65,4	59,24,45,18,55,32,74,58,90
5	2351614	Restoran Müdürü	İstanbul(Asya)	['Türkiye\'nin önde gelen restoran zincirlerinden ...	27,66,44,20,52,39	52,101,67,86,89,105
6	2351615	Mağaza Müdürü	Bursa	["Tercihen üniversite mezunu,Mağazacılık ...	8,66,44,19,43	106,33,67,9,14
7	2351617	Halkla İlişkiler Sorumlusu	Mersin	[[redacted] Gayrimenkul Emlak bünyesinde Ofis Yönet...	64,96,71,78,31,22,57,32,10	20,42,61,11,46,65,117,70,84
8	2351619	Arşivleme ve Dokümantasyon Elemanı	İstanbul(Avr.)	[[redacted] İlaç bünyesinde Silivri fabrikamızda ...	27,19,118,114	88,9,5,92
9	2351622	Yurtdışı Satış Sorumlusu	İstanbul(Asya)	[[redacted]Holding , liman ekipmanlarına yedek parça ...	70,24,102,63,16,61,33,43	39,24,72,60,47,27,92,14
10	2351623	Planlama Uzmanı	İzmir	['Üniversitelerin Endüstri Mühendisliği ...	17,113,52,10,116,5,103,19,69,61,43	100,114,3,18,84,114,65,9,17,27,14
11	2351624	Satış Danışmanı	İstanbul(Asya)	['En az lise mezunu Tercihen mücevherat ...	14,96,99,80	106,42,74,37
12	2351625	Kariyer Yönetimi Uzmanı	İstanbul(Avr.)	['En az 5 yıl İnsan Kaynakları alanında deneyim ...	24,0,41,36,10,36,32,10,87,32	24,54,40,44,3,80,80,3,44,70
13	2351626	Dijital Pazarlama Yöneticisi	İstanbul(Asya)	['Kuveyt merkezli [redacted] Bank, özellikle kurumsal...	70,15,10,0,39,4	39,95,34,54,45,90
14	2351626	Dijital Pazarlama Yöneticisi	İstanbul(Avr.)	['Kuveyt merkezli [redacted] Bank, özellikle kurumsal...	70,15,10,0,39,4	39,95,34,54,45,90
15	2351628	Üretim Müdürü	İstanbul(Avr.)	['Müşterimiz İhracat alanında sektörün önde gele...	45	10

Figure 1. Example job postings and the feature clusters they include

We handled an example job posting with the id 2451471. The content of the job posting is given in Figure 2 below.

Genel Koşullar
• Güvenlik soruşturması engeli bulunmamak
• Kamu haklarından yasaklanmamış olmak
• Erkek adaylar için askerliğini tamamlamış veya en az 1 yıl tecilli olmak
• Görevini devamlı yapmasına engel olabilecek hastalığı ya da bulaşıcı hastalığı bulunmamak

Lisans mezuniyet derecesi 4'lü sistemde en az 2,40*; 100'lü sistemde ise en az 60* olmak (Yüksek Lisans ve Doktora derecesi almış olanlar ile en az 2 yıl süre mesleğini uygulamış olanlardan Lisans mezuniyet derecesi koşulu aranmaz)

Genel Nitelikler

Üniversitelerin Bilgisayar Mühendisliği, Yazılım Mühendisliği, Elektrik-Elektronik Mühendisliği, Mekatronik Mühendisliği, Kontrol Mühendisliği vb. bölümlerinden mezun,

• Yazılım geliştirme yaşam döngüsüne hâkim,
• Java, C++, Python, Scala programlama dillerinde en az birini iyi derecede bilen,
• Temel Makine Öğrenmesi algoritmaları hakkında bilgi sahibi,
• İleri Makine Öğrenmesi / Derin Öğrenme teknikleri konusunda bilgi sahibi,
• Tercihen Front-end geliştirme konusunda tecrübeli,
• Tercihen MATLAB/Simulink bilgisine sahip,
• Tercihen AB Ufuk 2020 proje süreçleri hakkında bilgi sahibi,
• Çok iyi derecede İngilizce bilen.

Figure 2. An example job posting with the id 2451471

When the job posting given in Figure 2 was processed, we obtained the features given in Table 3. Some of the tokens from the job posing are not included in the feature extraction results. This is due to the token not matching with none of the patterns given in Table 2. Some of the tokens are selected as SPECIAL because it has been detected that, the token has information that is specific to the given profession. In this example, the MATLAB term is the reason why the token was labeled as SPECIAL.

Some of the tokens can have false information since the tokenizing process usually treats terms like "C++" as three different tokens. A technique was designed to detect special tokens to prevent false tokenizing. These types of errors were omitted by providing a special case word list for the lemmatizing process.

Table 3. Tokens and matching POS Tag patterns of the example job posting.

Token	Lemmatized Form	POS Tags
Güvenlik soruşturma engeli bulunmayan	Güvenlik soruştur engel bulun	NOUN-NOUN-VERB
Kamu haklarından yasaklanmamış olmak	Kamu hak yasak ol	ADJ-NOUN-VERB
Erkek adaylar için askerliğini tamamlamış veya en az 1 yıl tecilli olmak.	Erkek aday için asker tamamla veya en az 1 yıl tecil ol	ADJ-NOUN-VERB NOUN-VERB-ADJ NUM-TIME-NOUN NUM-NOUN-VERB
Görevini devamlı yapmasına engel olabilecek hastalığı ya da bulaşıcı hastalığı bulunmamak	Görev devam yap engel ol hastalık ya da bulaşıcı hastalık bulun	NOUN-VERB-ADJ NOUN-NOUN-NOUN-VERB ADJ-NOUN-VERB
Yazılım geliştirme yaşam döngüsüne hâkim.	Yazılım geliştir yaşam döngü hâkim	NOUN-NOUN-ADJ NOUN-VERB-ADJ
Java, C++, Python, Scala programlama dillerinde en az birini iyi derecede bilen	Java, C, Python, Scala programla dil en az biri iyi derece bil	NOUN-NOUN-ADJ ADJ-NOUN-VERB VERB-NOUN-NOUN-VERB NOUN-VERB-NOUN-NOUN
Temel Makine Öğrenmesi algoritmaları hakkında bilgi sahibi	Temel maki öğren algoritma hakkında bilgi sahip	ADJ-NOUN-NOUN
İleri Makine Öğrenmesi / Derin Öğrenme teknikleri konusunda bilgi sahibi	İleri maki öğren derin öğren teknik konu bilgi sahip	ADJ-NOUN-NOUN
Tercihen Front-end geliştirme konusunda tecrübeli	Tercihen Front-end geliştir konu tecrübe	ADV-VERB-NOUN
Tercihen MATLAB Simulink bilgisine sahip	Tercihen MATLAB Simulink bilgi sahip	SPECIAL
Çok iyi derecede İngilizce bilen	Çok iyi derece ingilizce bil	ADJ-NOUN-NOUN

Following list shows which token is allocated to which cluster. Cluster allocation is done by both count vectorizing and TF-IDF vectorizing. However, count vectorizer is done for only comparison purposes and the prediction system uses only TF-IDF vectorizer to predict cluster information.

Once, feature extraction and feature clustering were applied on all job postings, results are stored in the dataset. Then we focused upon finding relative job postings by using the personal, educational, and contact information, foreign language, and work experiences of the user. The user interface of the application was designed to take desired information that can be processed by the matching system. The users were expected to fill the form elements inside the web application for finding suitable job postings.

Resume features were extracted and clustered by using the same K-Means algorithm. Cluster matching was performed according to the matching priority (*none, low, medium, high,* or *highest*) selected by the user. Matched jobs postings were presented to the user using the web user interface.

Table 4. Clustering information with 180 clusters

Token Id	Lemmatized Form	Clustering Information
1	Güvenlik soruştur engel bulun	63
2	Kamu hak yasak ol	63
3	Erkek aday için asker tamamla veya en az 1 yıl tecil ol	4
4	Görev devam yap engel ol hastalık ya da bulaşıcı hastalık bulun	154
5	Yazılım geliştir yaşam döngü hâkim	133
6	Java, C, Python, Scala programla dil en az biri iyi derece bil	150
7	Temel maki öğren algoritma hakkında bilgi sahip	32
8	İleri maki öğren derin öğren teknik konu bilgi sahip	32
9	Tercihen Front-end geliştir konu tecrübe	133
10	Tercihen MATLAB Simulink bilgi sahip	32
11	Çok iyi derece ingilizce bil	66

CONCLUSION AND FUTURE WORK

In the scope of this study, we collected a job posting database from Kariyer.Net and performed some text preprocessing and natural language processing techniques on this text database. After preprocessing tasks, we extracted the features from job postings to identify the qualifications that were consisted in job postings by the POS tagging and Pattern Matching method we developed. Extracted features were clustered by using the K-Means clustering algorithm. Thanks to the web user interface that was developed by using the Angular platform and Spring Boot Framework the users were able to compose their resumes by filling in the necessary information on a web form. The information gathered from the resumes was also extracted into its features and these features were also clustered. Finally, cluster matching was performed to identify and rank related job postings compatible with the content of the resume entered by the users. Cluster matching was performed by 5 different matching priorities including *none, low, medium, high, highest,* and most relevant jobs postings were presented to the user.

Overall, the current system is operating using a clustering configuration that has 180 clusters, but we believe that there is room to improve clustering information and outlier points can be omitted with another clustering algorithm like DBSCAN.

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SOLUTION OF THE PSEUDO-HYPERBOLIC TELEGRAPH EQUATION BY LAPLACE TRANSFORM COLOCATION METHOD

Fatma Şimşek[1*], Mahmut Modanlı[2]

*[*1]Harran University, Faculty of Arts and Sciences, Department of Mathematics, Şanlıurfa, Turkey.*
[2]Harran University, Faculty of Arts and Sciences, Department of Mathematics, Şanlıurfa, Turkey.
ORCID Code: 0000-0002-0573-2820

ABSTRACT

In this study, the Laplace transform collocation method is applied to the pseudo hyperbolic telegraph partial differential equation. Since this equation has many applications in the literature, it is very important to examine its exact and approximate solutions. The Laplace Transform Collocation Method is constructed for the approximate solution of this equation. The exact solution of this equation obtained by the Modified Double Laplace Decomposition Method. The exact and approximate solutions are compared and the results obtained are given in the error analysis table. The fact that the approximate solution indicates that this method is suitable for the pseudo hyperbolic telegraph differential equation and gives good results.

Keywords: Third order partial differential equation, Modified Double Laplace Decomposition Method, Laplace Transform Collocation Method, Pseudo hyperbolic telegraph equation.

ERASMUS+ KA101 MOBILITY PROGRAM (SCHOOL EDUCATION STAFF MOBILITY) EVALUATION ACCORDING TO TEACHERS' OPINIONS

Doç.Dr Bülent ALCI, Esra KAYNAR CEBECİ
Yıldız Technical University, Institute of Social Sciences, Department of Educational Sciences, Curriculum and Instruction Master's Program, Istanbul, Turkey
ORCID Code: 0000-0001-9325-5827

ABSTRACT

This study was carried out in order to contribute to the field by taking the opinions of the teachers who participated in the in-service training activities offered within the scope of the KA101-School Education Staff Mobility program. They were asked about the efficiency of these trainings, the extent to which the objectives can be achieved, and their reflections on the school and the classroom. This is one of the training opportunities offered by the Erasmus+ program which is carried out by the European Union. Many teachers and students have had the chance to study abroad through the Erasmus + program, in which our country is also included, and have been a part of this process. Evaluation of the trainings which the teachers, who want to make a difference by utilizing this professional development opportunity offered to them, have attended is a very important issue to determine the level of contribution to school culture, students and of course their own professional development, how much efficiency they get from these trainings or to determine the missing points.It is a case study, one of the qualitative research designs. The sample consisted of 23 teachers who have participated in the Erasmus + KA101 School Education Staff Mobility program and completed their education as of 2018 and work within the Ministry of National Education, participated in the research. As a data collection tool, a semi-structured interview form consisting of sixteen questions was prepared and online and face-to-face interviews were conducted with the participants. The data was analyzed by content analysis method. The findings obtained from the research were coded and interpreted as themes and categories. The results obtained were evaluated in line with the problem situation of the research and results that would contribute to the field were obtained.

Keywords: Erasmus +, In-Service Training

ERASMUS+ KA101 HAREKETLİLİK PROGRAMININ (OKUL EĞİTİMİ PERSONEL HAREKETLİLİĞİ) ÖĞRETMEN GÖRÜŞLERİNE GÖRE DEĞERLENDİRİLMESİ

Doç.Dr.Bülent ALCI, Esra KAYNAR CEBECİ
Yıldız Teknik Üniversitesi, Sosyal Bilimler Enstitüsü, Eğitim Bilimleri Ana Bilim Dalı, Eğitim Programları Ve Öğretim Yüksek Lisans Programı, İstanbul, Türkiye
ORCID Code: 0000-0001-9325-5827

ÖZET

Avrupa Birliği tarafından yürütülmekte olan Erasmus+ programının sunduğu eğitim imkanlarından biri olan KA101-Okul Eğitimi Personel Hareketliliği programı kapsamında sunulan hizmetiçi eğitim faaliyetlerine katılmış olan öğretmenlerin bu eğitimlerin verimliliği, hedeflerin ne derece gerçekleştirilebildiği, okula ve sınıfa yansımaları konusunda görüşlerinin alınarak alana katkı sunmak amacıyla bu çalışma gerçekleştirilmiştir. Ülkemizin de içinde yer aldığı Erasmus + programı vasıtasıyla birçok öğretmen ve öğrenci yurtdışında eğitim alma şansı yakalamış ve bu sürecin bir parçası olmuştur. Kendilerine sunulan bu mesleki gelişim fırsatını değerlendirerek fark yaratmak isteyen öğretmenler açısından katıldıkları eğitimlerin değerlendirilmesi; okul kültürüne, öğrencilere ve elbette kendi mesleki gelişimlerine katkısının ne düzeyde olduğu, bu eğitimlerden ne kadar verim aldıkları ya da eksik kalan noktaların tespit edilmesi oldukça önemli bir konu olarak karşımıza çıkmıştır. Bu çalışmada nitel araştırma desenlerinden biri olan durum çalışması kullanılmıştır. Araştırmaya Milli Eğitim Bakanlığı bünyesinde görev yapan 2018 yılı itibariyle Erasmus + KA101 Okul Eğitimi Personel Hareketliliği

programına katılmış ve eğitimlerini tamamlamış olan 23 öğretmen katılmıştır. Veri toplama aracı olarak on altı sorudan oluşan yarı yapılandırılmış görüşme formu hazırlanmış ve katılımcılarla online ve yüz yüze görüşmeler yapılmıştır. Veriler içerik analizi yöntemiyle analiz edilmiştir. Araştırmadan elde edilen bulgular kodlanarak temalar ve kategoriler halinde yorumlanmıştır. Elde edilen sonuçlar araştırmanın problem durumu doğrultusunda değerlendirilmiştir ve alana katkı sağlayacak sonuçlar elde edilmiştir.

Anahtar Kelimeler: Erasmus +, Hizmetiçi Eğitim

İLKOKUL 3. SINIF ÖĞRENCİLERİNDE DİKKAT VE SESLİ OKUMA HIZI ARASINDAKİ BAĞLANTI

Elif Nur Boyacı
Sınıf Öğretmenliği Tezsiz Yüksek Lisans Programı, Yıldız Teknik Üniversitesi, İstanbul
ORCID Code: 0000-0002-5734-9719

Tez Danışmanı:
Doç. Dr. Zeynep Doğan

ÖZET

Bu makalede vurgulanmak istenen ilkokul 3. Sınıf öğrencilerinin dikkatlerini ve sesli okuma hızlarını ölçerek bu iki beceri arasındaki bağlantıyı ortaya koymaktır. Araştırmada nicel veri analizlerinden yararlanılmıştır. Bu amaç doğrultusunda Burdon dikkat testi kullanılmıştır. Öğrencilere toplamda beş dakika verilmiştir ve bu beş dakika içinde verilen harfleri bulmaları istenmiştir. Okuma metni ise Curious and Genius Yayınları'na ait Kış Masalları adlı hikâye kitabından bir hikâye seçilmiştir. Metin, öğrencilere yüksek sesle okutularak, öğrencinin bir dakikada kaç kelime okuduğu sayılmıştır. Sonuçlar, SPSS adlı istatistik programı kullanılarak oluşturulmuştur. Pearson korelasyonu kullanılarak bulgular değerlendirilmiştir. 2021-2022 eğitim öğretim yılı, İstanbul ili Beşiktaş ilçesinde bulunan Nimetullah Mahruki İlkokulunda 3. sınıfa devam eden öğrencilerin oluşturduğu çalışma evreninden, 20' si erkek 20' si kız olmak üzere toplam 40 öğrenci örneklem olarak seçilmiştir. Araştırma sonucunda üçüncü sınıf öğrencilerinin dikkat seviyeleri ile okuma hızları arasında anlamlı bir bağlantı olduğu saptanmıştır. Yine yapılan çalışmalar sonucunda okuma hızı ve dikkat arasındaki bağı, öğrencinin kız ya da erkek olmasının etkilemediği sonucuna ulaşılmıştır.

Anahtar kelimeler: Okuma hızı, dikkat, sesli okuma, akıcı okuma

THE CONNECTION BETWEEN ATTENTION AND READ Aloud SPEED IN PRIMARY SCHOOL 3rd GRADE STUDENTS

ABSTRACT

The aim of this article is to reveal the connection between these two skills by measuring the attention and reading aloud speed of primary school 3rd grade students. The aim of this article is to reveal the connection between these two skills by measuring the attention and reading aloud speed of primary school 3rd grade students. Quantitative data analysis was used in the research. For this purpose, the Burdon attention test was used. The students were given a total of five minutes and were asked to find the given letters in these five minutes. The reading text was chosen from the story book Winter Tales of Curious and Genius Publishing. The text was read aloud to the students, counting how many words the student read in a minute. The results were created using a statistical program called SPSS.Findings were evaluated using the Pearson correlation. In the 2021-2022 academic year, a total of 40 students, 20 boys and 20 girls, were selected from the study universe consisting of 3rd grade students at Nimetullah Mahruki Primary School in Beşiktaş district of Istanbul. As a result of the research, it was determined that there was a significant correlation between the attention levels of third grade students and their reading speed. Again, as a result of the studies, it was concluded that the connection between reading speed and attention does not affect whether the student is a girl or a boy.

Keywords: Reading speed, attention, reading aloud, fluent reading

1. GİRİŞ

Teknolojinin gelişmesi ve bilgiye daha hızlı ulaşma, bilgiyi üreten ve yayan araçların değişmesi, toplumların gelişmesi okumaya olan ihtiyacı arttırmıştır. Günümüzde sözlü iletişim yerine daha çok yazılı iletişimin kullanılması, bilgiye ulaşmak için kaynakların sınırlı olduğu dönemin bitmesi okumanın ne denli önemli olduğunu bir kere daha gözler önün sermiştir. Günümüzde okuma toplumun sosyal hayata uyumunun en önemli şartı olmuştur. Günlük hayattaki işlerini kolayca halledebilmek, toplumun diğer fertleriyle iletişimde olabilmenin en önemli koşullarından birisi okuyor olabilmektir.

Eskiden okuma ve bilgi edinme için toplumların elinde belirli kaynaklar vardır. Ansiklopediler, bilgi edinmek istenilen konuyla ilgili yazılmış 15-20 kitap, gazeteler bunların başlıcalarıdır. Şimdi ise bilgi; bilgisayar, telefon, tablet, televizyon aracılığıyla hemen elimizin altında. Bu araçları doğru kullanabiliyor olmamızın da tek yolu okuyor olmak. Her ne kadar bu elektronik aletler aracılığıyla görsel olarak da bazı şeyleri anlıyor olabilsek de konunun tam olarak anlaşılması ve kişi tarafından değerlendirilmesi ancak okuma eyleminin gerçekleştirilmesi ile olabilir. Okuma, hepimizin çocuklukta başlayan eğitim hayatının mihenk taşıdır.

1.1 Okuma Nedir?

Okuma, görme, dikkat, algılama, hatırlama, seslendirme, anlamlandırma, sentezleme, çözümleme ve yorumlama gibi farklı bileşenlerden oluşan, karmaşık bir zihinsel süreçtir (Coşkun, 2002 s.231)

Türkçe Sözlük'te (1998:1675) okumak, "Yazıya geçirilmiş bir metne bakarak bunu sessizce çözümleyip anlamak veya aynı zamanda seslere çevirmek." şeklinde tanımlanmıştır. Harris ve Sipay'e (1990: 10) göre "Okuma, yazı dilinin anlamlı olarak yorumlanması" dır. Tinker ve McCullough'a (1968: 8) göre ise "Okuma, geçmiş yaşantılar aracılığıyla oluşturulan anlamların hatırlanması ve okuyucunun hâlen sahip olduğu kavramları kullanarak yeni anlamlar kurması için uyarıcı olarak görev yapan basılı ve yazılı sembollerin tanınması, algılanmasını içerir.

Göğüş'e (1978: 60) göre "Okuma, bir yazının harflerini, sözcüklerini, imlerini tanımak ve bunların anlamlarını kavramaktır.". Özdemir (1993: 13) okumayı "Basılı sözcükleri duyu organları yoluyla algılayıp bunları anlamlandırma, kavrama ve yorumlamaya dayanan zihinsel bir etkinlik" olarak tanımlamaktadır. Demirel'e (1999: 59) göre ise "Okuma, bilişsel davranışlarla psikomotor becerilerin ortak çalışmasıyla, yazılı sembollerden anlam çıkarma etkinliğidir.". Okumaya ilişkin olarak buraya kadar verilen tanımların hepsinde anlama ve kavrama üzerinde durulmuştur. Bunun yeterli olmadığını savunan Akyol'a (1997: 26-28) göre "... tanımların hepsi de anlamanın karakterinin nasıl olduğu ve hangi unsurların anlam kurma sürecinde tesirli olduğu hususunda yetersiz kalmaktadır. Okuma karşılıklı etkileşim yoluyla gerçekleşmektedir. Bir başka ifadeyle okumanın karakteri karşılıklı etkileşimdir. Hangi unsurlar arası bir etkileşim? Okuma, yazılı ve yazısız kaynaklar, okuyucu ve çevrenin karşılıklı etkileşimi sonucu oluşan anlam kurma sürecidir. Tanımdan da anlaşılacağı üzere, anlam ne yalnızca kitabın kendisinde, ne de içinde bulunulan ortamdadır. Şu hâlde anlam okuyucunun rehberliği ve diğer unsurların da yardımına dayanan bir etkinliğin, etkileşimin sonucu oluşturulmaktadır." Söz konusu etkileşimde, okurun daha önce okudukları, izledikleri, yaşadıkları, kültürel birikimi, inançları ve değer yargıları gibi birçok faktör etkilidir.

Okumanın tanımlanmasında bir başka önemli nokta da "seslendirmedir. Okumayı, Rozan (1982: 19) "yazılı ve basılı işaretleri, belli kurallara uyarak seslendirmek"; Öz (2001:193) "gözün satırlar üzerinde

sıçraması sonucu kelime şekillerini görerek bunların anlamlarını kavrama ve seslendirme"; Akçamete (1989: 735-753) ise "basılı ya da yazılı işaretleri yorumlama ve anlamlandırma amacı ile zihnimizin göz ve ses organlarımızla birlikte ortaklaşa yaptığı etkinlik" olarak tanımlamıştır. Bu tanımlara göre, "sesli okuma"ya göre birçok bakımdan daha üstün sayılan "sessiz okuma" nın "okuma" sayılması mümkün değildir. Oysa seslendirme, okumanın gerçekleşmesi için bulunması şart olan bir bileşen değildir. Yani seslendirme olmadan da okumak mümkündür.

1.2 Dikkat Nedir?

Dikkat, kişinin duyu organları ile ulaşabildiği ve farkında olduğu kişisel çevresindeki uyarıcıya zihinsel olarak alıcılarını yönlendirmesi olarak tanımlanmaktadır (Irak & Karakaş, 2002). Enns (1990) dikkatin, bedensel ve sosyal çevreden gelen bilgilerin beyinde bir araya gelme süreciyle başladığını ifade eder. Budak'a (2005) göre dikkat; duygu, düşünce, bilişsel süreçler ve algısal işlevleri, çevreden gelen uyarıcılardan amaç ve ihtiyacı ölçüsünde seçerek odaklanabilme ve yönlendirebilme yetisidir; öğrenme ve düşünme için önkoşuldur. Dikkat; öğrenme, geri getirme, algılama, problem çözme, kişiler arası iletişim gibi tüm bilişsel alanlarda etkilidir (Karaduman, 2004).

İlkokulun ilk yıllarında öğrencilerin dikkati hala olgunlaşmamıştır. Bu dönemde çocuğun çevredeki uyarıcılardan çok fazla etkilenmesi sebebiyle herhangi bir faaliyete uzun süreli odaklanabilmesi ve dikkatini uzun süre sürdürebilmesi çok zor hale gelir. Eğer bu yıllarda dikkati geliştirme konusunda çalışmalar yapılmazsa akademik başarısızlık ve daha da önemlisi olumsuz benlik algısı oluşması kaçınılmaz olur (Yaycı, 2007). Dikkatin, öğrencilerin temel amacı olan öğrenme üzerinde önemli etkileri vardır. Ratey'e (2001) göre de dikkat, sadece uyaranı fark etmek değil, algılanan uyarıcıyı dengeleyebilmek ve süzgeçten geçirebilmektir (Akt: Tetik, 2015). Dikkatin dağılmasına sebep olan faktörlerle ilgili farklı araştırmacılar farklı görüşler ileri sürmüşlerdir. Kaymak'a (2006) göre öğrencilerin dikkatlerini bir noktaya yeterince yoğunlaştıramamalarının nedenleri arasında yetersiz ilgi, başaramama korkusu, verimli ders çalışma yöntemlerinin bilinmemesi ve sınav korkusu bulunmaktadır. Korkmaz (2000) da, dikkati olumsuz etkileyen nedenlerin, uyarıcı eksikliği, psikolojik durum ve bilgi eksikliği olduğunu belirtmiştir. Aydın'a (2001; 2005) göre de, dikkatin toplanmasını etkileyen faktörler, kişinin zekâ düzeyi, güdülenme, hazırbulunuşluk, ebeveyn ve öğretmenlerin kuralsızlığı ve yanlış eğitim, besin yetersizliği, amaçsızlık, aşırı kaygı, başarı korkusu, yaşanan travmalar, duygudurum bozukluğu, okula erken ya da geç başlama ve öğrenme güçlükleridir. Aşırı kaygı, sinir ve korku halinde bilişsel süreçler (dikkat, doğru düşünme ve karar verme, akıl yürütme algı, çatışma çözme) etkili çalışmaz.

1.3 Problem

Bu araştırma ''3.sınıf öğrencilerinin dikkat ve sesli okuma hızı arasında anlamlı bir ilişki var mıdır?'' sorusuna yanıt aramaktadır.

1.4 Araştırmanın Amacı

Bu araştırmanın amacı okumayı öğreneli çok uzun zaman olmamış öğrenci gruplarında dikkatin ve sesli okuma hızının arasındaki ilişkiyi görmektir.

1.5 Araştırmanın Önemi

Teknolojinin artmasıyla birlikte okumaya eskisi kadar zaman ayırmadığımız bir döneme girmiş bulunmaktayız. Erken çocukluk döneminde karşılaşılan ilk materyaller maalesef telefon ve tablet

ekranları olmaktadır. Çocuklar hem ekrana maruz kaldıkları gibi hem de diğer aile fertlerinin elinde de devamlı telefon ve tablet gibi akıllı cihazlar görmektedirler. Okula geçtikleri dönemde ise bu kötü altyapıları önce, çocuklarda dikkat sorunları buna bağlı olarak da okumada yavaşlık veya zor öğrenme gibi sorunlar ortaya çıkarabilmektedir. İşte bu araştırma dikkatin okuma üzerindeki etkisini bulgularla ortaya koymaktadır.

1.6 Sınırlılıklar

Bu araştırma 2021-2022 eğitim öğretim yılında İstanbul ili Beşiktaş ilçesinde bulunan Nimetullah Mahruki İlkokulunun 3. sınıfında öğrenim gören, iki şubenin oluşturduğu 40 öğrenci ile yapılmıştır.

1.7 Sayıltılar

Bu araştırmanın temel aldığı varsayım "öğrencilerde dikkat ve sesli okuma hızı arasında anlamlı bir bağlantı vardır ve bilimsel olarak değerlendirilebilir" varsayımıdır.

2.YÖNTEM

Bu araştırma, 2021-2022 eğitim-öğretim yılı birinci yarıyılında, toplamda 4 haftalık bir süre içerisinde, İstanbul ili Beşiktaş ilçesinde bulunan Nimetullah Mahruki İlkokulunun 3. sınıf öğrencileri ile birlikte gerçekleştirilmiştir. Araştırmanın çalışma grubu toplamda 40 öğrenciden oluşmaktadır. Bu araştırma betimsel niteliktedir ve nicel bir araştırmadır. Araştırmanın yöntemi ise değişkenlerin bir kez ölçüldüğü ve değişkenlerin arasındaki bağlantının anlamlı olup olmadığına bakıldığı okul içi bir taramadır.

2.1 Verilerin Toplanması

Öncelikle sınıflara Burdon Dikkat Testi dağıtılmıştır. Öğrencilere bir sayfa üzerinde gelişigüzel dizilmiş harfler verilmiştir. Her sayfada 20 satır vardır. Sayfa üzerindeki harfler belli ve düzenli aralıklarla dizilmiştir. Bir yapraktaki bütün harflerin sayısı bilinmektedir. Her bölüm için olmak üzere öğrencilere toplamda 5 dakika süre verilmiştir.

Öğrencilere, sayfada bulunan bütün a, b, d ve g harflerini bulup; altlarını kurşun kalemle işaretlemeleri söylenmiştir. Bir satırı gözden geçirirken yalnızca bir harfi değil o satırdaki bütün harfleri gözden geçirip bulmaları istenmiştir. Öğrencilere ne yapacakları iyice öğretilmiştir. Asıl denemeye başlamadan önce tahtada öğrencilere bir örnek gösterilmiştir. Denemeden sonra çizgiler sayılarak denemenin değerlendirmesi yapılmıştır. Daha sonra öğrencilerin okuyabileceği bir seviyede ve ilk defa gördükleri bir metin kullanılmıştır. Bu metin Curious and Genius Yayınları'na ait Kış Masalları adlı hikâye kitabındaki hikâyelerden biridir. Metin, öğrencilere yüksek sesle okutulmuş daha sonra da öğrencinin bir dakikada kaç kelime okuduğu sayılmıştır.

2.2. Veri Toplama Araçlarındaki Geçerlilik ve Güvenilirlik

Veri toplama için kullanılan Burdon Dikkat Testi geçerliliği ve güvenirliliği kanıtlanmış bir testtir. Okunan metin ise çocuklara uygun seviyede ve içeriği pedagojik kurallara uygun bir kitaptan seçilmiştir.

2.3.Verilerin Analizi

Verilerin analizi için IBM SPSS programı kullanılmıştır.

3. TABLOLAR

3.1 Tablo 1

Frequencies

Statistics

		cinsiyet	okumahizi	dikkat
N	Valid	40	40	40
	Missing	0	0	0

Bu tabloda katılımcı sayısı belirtilmiştir.

3.2 Tablo 2

T – Test

Group Statistics

	cinsiyet	N	Mean	Std. Deviation	Std. Error Mean
Okumahizi	1,00	23	80,4444	20,05686	6,68562
	,00	17	91,0769	17,69869	4,90873
Dikkat	1,00	23	63,6667	13,68393	4,56131
	,00	17	70,3077	13,51779	3,74916

Bu tabloda öğrencilerin cinsiyetlerinin farklı olmasında anlamlı bir sonuç olmadığı ortaya konmuştur.

3.3 Tablo 3

Independent Samples Test

		Levene's Test for Equality of Variances		t-test Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	%95 Confidence Interval of the Difference Lower	Upper
Okumahizi	Equal variances not assumed	,622	,439	-1,313	20	,204	-10,63248	-27,52712	6,26216
	Equal variances not assumed			-1,282	15,875	,218	-10,63248	-28,22662	6,96166
Dikkat	Equal variances not assumed	,016	,902	-1,127	20	,273	-6,64103	-18,92867	5,64662
	Equal variances not assumed			-1,125	17,221	,276	-6,64103	-19,08603	5,80398

3.4. Tablo 4

Correlations

		okumahizi	dikkat
Okumahizi	Pearson Correlation	1	-,340*
	Sig. (2-tailed)		,032
	N	40	40
Dikkat	Pearson Correlation	-,340*	1
	Sig. (2-tailed)	,032	
		40	40

*Correlation is significant at the 0.05 level (2-tailed)

Bu tabloda ise öğrencilerin dikkat seviyeleri ve sesli okuma hızları arasında anlamlı bir ilişki olduğu bilgisine ulaşılmıştır.

4. TARTIŞMA VE SONUÇ

Okuma hem öğrencilik yılları hem de daha sonrası için önemi ve değeri en çok taşıması gereken kavramdır. Okuma küçük yaşlarda kazandırılması gereken bir alışkanlık haline gelmelidir. Bu durumun alışkanlık haline gelmesinin kısa sürede olmayacağını bilerek, öğrencilerimize ve çocuklarımıza sabırla

yaklaşmalıyız. Onlara ilgisini çekecek ve hoşlanacakları metinler sunarsak bu alışkanlığın daha rahat kazandıklarını göreceğiz. Bu minvalde okumayı etkileyen en büyük faktör olan dikkat de çocukluk yaşlarında geliştirilmeye başlanmalıdır. Dikkatin sadece okumaya değil anlamaya, bilgiyi kendiyle ilişkilendirmeye de çok etkili olduğunu unutmamalıyız. Dikkatini sürdürebilir hale getirmeyen çocuklarda yavaş okuma, okuduğunu anlayamama ve bunların sonucunda akademik başarısızlıklar görmekteyiz. Öğrencinin verilen metni anlayıp kendi süzgecinden geçirmesi için dikkatini sürdürülebilir hale getirmesini sağlayacak çalışmalar yapmasını sağlamalıyız. Etkili öğrenme ve öğretme sürecinde öğretmen de sınıf içinde farklı materyaller kullanarak çocukların dikkatini devamlı ve açık tutmaya çalışması gerekmektedir.

Sonuç olarak dikkatin öğrenme hayatındaki etkisini göz önüne aldığımızda okumaya da aynı denli etki ettiğini görmekteyiz. Öğrencilerin dikkat seviyeleri az ise sesli okuma hızları da buna bağlı olarak az; dikkat seviyeleri fazla ise sesli okuma hızları da buna bağlı olarak fazladır. Öğrencilerin cinsiyetlerinin farklı olması dikkat veya okuma hızı seviyelerinde anlamlı bir farklılığa yol açmamaktadır.

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EFFECT OF AUDIT COMMITTEE EXPERIENCE ON AUDIT QUALITY IN TURKEY

Gökhan Özer[1*], Abdulah Kürşat Merter[2]

*[*1]Gebze Technical University, Faculty of Business Administration, Kocaeli, Turkey.*
ORCID Code: 0000-0002-3255-998X
[2]Gebze Technical University, Faculty of Business Administration, Kocaeli, Turkey.
ORCID Code: 0000-0001-6874-1890

ABSTRACT

The audit committee is responsible for the accurate reporting of financial reports and the successful passing of these reports through independent external auditing. Therefore, it is quite possible that the audit committee is related to the selection of the independent auditor and thus to the audit quality. The purpose of this study is to examine the relationship between the audit committee chair and members' experience and audit quality. As such, a regression analysis is conducted using 454 observations obtained from non-financial companies traded on the BIST between 2018-2019 and the relationship of the experience of the audit committee chairman and members with the audit quality is tested. The findings of the study show that the average tenure of the audit committee chair and members are negatively related to audit quality, while the age of the audit committee chair and members are positively related to audit quality. Independent audit committee members who have been working in a company for a long time can have a negative impact on audit quality, as they can become dependent members after a certain period. On the other hand, audit committee members of a certain age can have a positive effect on audit quality because they are more mature and sophisticated. The results of our study contribute to the literature with important and useful empirical results.

Keywords: Audit Committee, Audit Quality, Tenure, External Audit

GİRİŞ

Enron, WorldCom ve HIH gibi dünyanın önde gelen şirketlerinde yaşanan muhasebe skandalları ile birlikte yaşanan denetim zafiyetleri ve finansal başarısızlıklar, denetim kalitesi konusunu gündeme getirmiştir. Denetim kalitesi, güvenilir finansal raporların hazırlanmasında belirleyici rol üstlenir (Akçakanat ve Aksoy, 2021). Kaliteli denetim ile işletmeler finansal tablo kullanıcılarına doğru ve güvenilir bir bilgi sağlayarak piyasada güven ortamının oluşmasını sağlar ve karar alıcılarının daha sağlıklı ve doğru kararlar alabilmelerine yardımcı olur (Yakar, 2015).

Denetim kalitesinin en belirleyici unsuru bağımsız denetim firmasının seçimidir. Bağımsız denetim firmasının işe alımı, işten çıkarılması ve alınacak olan hizmetler denetim komitesi tarafından belirlenir. Denetim komitesi, bağımsız denetim sürecinin her aşamasında yer almak ve yönetim kurulu adına bağımsız denetim sürecini gözetmekle görevlidir (Akçay ve Bilen, 2018). Denetim komitesinin bu görevlerini yerine getirebilmesi için üyelerinin belirli bir deneyim ve tecrübeye sahip olması gerekmektedir (Liu ve Sun, 2010; Sultan vd., 2019; Sharma ve Iselin, 2012). Bu açıklamalardan hareketle bu çalışmanın amacı denetim komitesi başkanı ve üyelerinin deneyiminin denetim kalitesi ile ilişkisini araştırmaktır. Çalışmanın amacı kapsamında iki farklı model oluşturulmuştur. İlk modelde denetim komitesindeki üyelerin deneyiminin denetim kalitesine etkisi araştırılmışken ikinci modelde sadece denetim komitesi başkanının deneyiminin denetim kalitesine etkisi araştırılmıştır. Denetim komitesi başkanı ve üyelerinin deneyimi literatürle uyumlu olarak üç farklı bağımsız değişken aracılığıyla ölçülmüştür: görev süresi, yaş ve üye olunan komite sayısı. Çalışmanı bulguları, denetim komitesi başkanı ve üyelerinin görev süresinin denetim kalitesi ile anlamlı ve negatif bir ilişki içinde

olduğunu gösterirken, denetim komitesi başkanı ve üyelerinin ortalama yaşının denetim kalitesi ile anlamlı ve pozitif bir ilişki içinde olduğunu göstermektedir.

İLGİLİ LİTERATÜR

Bir firmada uzun süre yöneticilik yapan kişilerin firmaya olan bağlılıklarının yüksek olabilmektedir. Daha uzun görev süresine sahip yöneticilerin, firmanın iç ve dış çevresi, finansal raporlama ve risk yönetimi süreçleri ve iç kontrol sistemleri hakkında daha fazla bilgi sahibi olmaları muhtemeldir. Daha uzun süre hizmet veren denetim komitesi üyeleri, firma ile iş ortamı hakkında uzmanlık kazanarak, bağımsız denetim sürecini daha etkin bir şekilde yönetmeleri sağlanabilir. Öte yandan bağımsız üyelerin denetim komitesinde uzun süre görev alması yönetim kurulu ile uzun süreli bir ilişkinin kurulmasına ve bağımsız denetim komitesi üyelerinin bağımlı hale gelmesine neden olabilir. Bu sonuncunda, bağımsız denetim sürecinin olumsuz etkilenmesi kaçınılmaz olacaktır. Literatür incelendiğinde denetim komitesi deneyimi ile ilgili iki zıt görüş bulunmaktadır.

Bedard vd., (2004), bir firmada uzun süre görev alan denetim komitesi üyelerinin, yöneticilerin kar yönetimi uygulamalarına başvurmalarını engellediğine ilişkin önemli bulgular elde etmiştir. Liu ve Sun (2010), uzun süreli görev yapan yöneticilerin daha fazla uzmanlığa ve deneyime sahip olduğu için finansal raporlama kalitesini arttırdığını belirtmiştir. Sultana (2019), deneyimli denetim komitesi üyelerinin denetim kalitesini pozitif etkilediğine dair bulgular elde etmiştir. Ayrıca deneyimli üyelerin bağımsız denetim sürecine daha fazla müdahil olduğunu ve bağımsız denetim firmasından daha fazla denetim çalışması talep ettiklerini göstermişlerdir. Husam Aldamen vd. (2011) 2008 kriz zamanında, firma performansının, denetim komitesi deneyimli üyelerin sayısı ile olumlu ilişkili olduğu sonucunu elde etmişlerdir.

Vafeas (2003), uzun süre görev yapan denetim komitesi üyelerinin, yönetimle daha güçlü bir bağ kuracağı için finansal tablolar ve bağımsız denetim raporları ilgili konularda fikir ayrılıklarını ifade etmekten kaçınabileceklerini belirtmiştir. (Kesner 1988; Boeker ve Goodstein 1993), bir firmada uzun süre görev alan bağımsız yöneticilerin diğer yöneticilerle dostluk veya sosyal bağlarını geliştireceklerini ve bu nedenle, hissedarların çıkarlarını tehlikeye atan yönetim kararlarını onaylamalarının daha olası olacağını ileri sürmektedirler. Canavan vd. (2004) göre uzun süreli görev yapan yöneticilerin şirketin sorunlarıyla ilgili yeni anlayış ve çözümlerden yoksun olduklarını ve finansal işlemler ile iş stratejileri ile ilgili değişiklikleri takip etmekte oldukça zorlandıklarını ileri sürmektedir.

ARAŞTIRMA MODELI

Bu çalışmanın amacı, denetim komitesi başkanı ve üyelerinin deneyimi ile denetim kalitesi arasındaki ilişkiyi araştırmaktır. Bu kapsamda, 2018-2019 yılları arasında BİST'te işlem gören finansal olmayan şirketlerden elde edilmiş 454 adet gözlem kullanılarak lojistik regresyon analizi yapılmış ve başkan ile üyelerin deneyiminin denetim kalitesi ile ilişki araştırılmıştır. Denetim komitesi başkanı ve üyelerinin deneyimi literatürle uyumlu olarak üç farklı bağımsız değişken aracılığıyla ölçülmüştür: görev süresi, yaş ve üye olunan komite sayısı. Araştırma kapsamındaki şirketlere ait veriler, Finnet, BİST web sitesi, Kamuyu Aydınlatma Platformu web sitesi ve şirketlerin kendi web sitelerindeki yatırımcı ilişkileri sayfalarından elde edilmiştir.

Çalışmada kullanılan tüm değişkenlerin tanımları ve ölçümleri Tablo I'de gösterilmiştir. Denetim komitesi başkan ve üyelerin deneyimi ile denetim kalitesi arasındaki ilişkiyi test etmek için aşağıdaki regresyon modeli oluşturulmuştur.

$$KALİTE = \beta_0 + \beta_1 \text{GÖREV} + \beta_2 \text{YAŞ} + \beta_3 \text{KOMİTE} + \beta_4 \text{İKİLİLİK} + \beta_5 \text{ROA} + \beta_6 \text{ŞİRBÜY} + \beta_7 \text{RAPOR} + \varepsilon_{i,t} \quad (1)$$

Tablo I. Değişken Açıklamaları

Değişken Türü	Değişken Adı	Değişken Ölçümü
Bağımlı Değişken	DENKAL	Dört büyük denetim firmalarından (Deloitte, Ernst & Young, KPMG ve PricewaterhouseCoopers) birisi ile çalışılıyorsa 1; aksi taktirde 0 verilmiştir.
Bağımsız Değişken	GÖREV	Denetim komitesi üyelerinin mevcut şirketteki görev süresi
Bağımsız Değişken	YAŞ	Denetim komitesi üyelerinin yaşı
Bağımsız Değişken	KOMİTE	Denetim komitesi üyelerinin üye oldukları komite sayısı
Kontrol Değişken	İKİLİLİK	Yönetim kurulu başkanı ile CEO farklı kişi ise 1; aksi taktirde 0 verilmiştir.
Kontrol Değişken	ROA	Net kar / toplam varlık
Kontrol Değişken	ŞİRBÜY	Toplam Varlıkların doğal logaritması
Kontrol Değişken	RAPOR	Denetim raporu olumlu ise 1; aksi taktirde 0

ANALİZ

Tanımlayıcı İstatistikler

Aşağıda gösterilen Tablo 2'de regresyon modelinde yer alan değişkenlere ait ortalama, standart sapma, medyan, maksimum ve minimum yer verilmiştir. Denetim kalitesi için ortalama değer 0.531'tir, bu da örneklemde yer alan şirketlerin yarısından fazlasının dört büyük denetim firması ile çalıştığını gösterir. Denetim komitesi başkanı ve üyelerinin mevcut şirketteki ortalama görev süresi sırasıyla 2.803 ve 2.946'dir, bu da şirketlerin denetim komitesi başkanı ve üyelerini ortalama 3 yılda bir değiştirdiğini göstermektedir. Denetim komitesi başkanı ve üyelerinin ortalama yaşları sırasıyla 57.062 ve 61.013'tür, bu da şirketlerin daha yaşlı üyelerin daha tecrübeli olacağı düşüncesinden dolayı denetim komitesi başkanını daha yaşlı üyelerden seçtiğini göstermektedir. Son olarak denetim komitesi başkanı ve üyelerin için komite üyelik sayısı sırasıyla 2.362 ve 2.396'dır, bu da hem başkanın hem de üyelerin en az 2 farklı komitede görev aldığını göstermektedir.

Tablo 2: Tanımlayıcı İstatistikler

Değişken adı	Ortalama	Standart sapma	Minimum değer	Maksimum değer
DENKAL	0.531	0.499	0	1
ORTGÖREV	2.803	1.723	1	8
ORTYAŞ	57.062	9.502	23	83
ORTKOMİTE	2.362	0.536	1	3
BAŞGÖREV	2.946	2.074	1	8
BAŞYAŞ	61.013	9.118	44	83
BAŞKOMİTE	2.396	0.674	0	3
İKİLİLİK	0.783	0.412	0	1
ROA	0.032	0.106	-0.328	0.336

ŞİRBÜY	20.210	1.862	15.386	25.712
RAPOR	0.920	0.270	0	1

Korelasyon Analizi

Tablo 3, denetim komitesi üyelerinin deneyiminin ölçüldüğü model 1 için pearson korelasyon matrisi sonuçlarını göstermektedir. Tablo 4 ise denetim komitesi başkanlarının deneyiminin ölçüldüğü model 2 için pearson korelasyon matrisi sonuçlarını göstermektedir. Her iki korelasyon tablosuna göre tüm bağımsız değişkenlerin ve kontrol değişkenlerin denetim kalitesi ile önemli ölçüde ilişkili olduğunu görülmektedir. Ayrıca değişkenlerin hiçbiri 0.80'in üzerinde korelasyon ilişkisi içinde olmadığı için çoklu doğrusallığın çalışmamız için problem oluşturmamaktadır.

Tablo 3: Model 1 için Korelasyon Tablosu

	1	2	3	4	5	6	7	8
DENKAL	1							
ORTGÖREV	-0.16*	1						
ORTYAŞ	0.23*	0.11**	1					
ORTKOMİTE	-0.07***	-0.11**	-0.12*	1				
İKİLİLİK	0.33*	-0.18*	0.00	0.05	1			
ROA	0.15*	-0.12*	-0.04	-0.04*	0.113*	1		
ŞİRBÜY	0.51*	-0.17*	0.19*	0.26*	0.26*	0.13*	1	
RAPOR	0.12*	-0.04	0.08***	-0.00	0.19*	0.15*	0.19*	1
Not: *, **, *** simgeleri sırayla değişkenlerin %1, %5 ve %10 seviyelerinde anlamlı olduğunu göstermektedir.								

Tablo 4: Model 2 için Korelasyon Tablosu

	1	2	3	4	5	6	7	8
DENKAL	1							
BAŞGÖREV	-0.12*	1						
BAŞYAŞ	0.23*	0.18*	1					
BAŞKOMİTE	-0.09**	-0.05	-0.05	1				
İKİLİLİK	0.33*	-0.16*	0.00	0.00	1			
ROA	0.15*	-0.11*	-0.04	-0.03	0.113*	1		
ŞİRBÜY	0.51*	-0.11**	0.19*	0.26*	0.26*	0.13*	1	
RAPOR	0.12*	-0.02	0.08***	-0.00	0.19*	0.15*	0.19*	1
Not: *, **, *** simgeleri sırayla değişkenlerin %1, %5 ve %10 seviyelerinde anlamlı olduğunu göstermektedir.								

Regresyon Analizi

Tablo 5, denetim komitesi üyelerinin deneyimi ile denetim kalitesi arasındaki ilişkisini gösteren model 1'e ilişkin lojistik regresyon sonuçlarını göstermektedir. Analiz sonuçlarına göre denetim komitesi üyelerinin görev süresinin denetim kalitesi ile istatiksel olarak anlamlı ve negatif ilişkiliyken ($z = -1.67$, $p<0.01$) denetim komitesi üyelerinin ortalama yaşının denetim kalitesi ile istatiksel olarak anlamlı ve pozitif ilişkilidir ($z = 4.06$, $p<0.01$). Son olarak denetim komitesi üyelerinin üye oldukları komite sayısının denetim kalitesi ile istatiksel olarak anlamlı bir ilişki içinde olmadığı görülmektedir. Bu sonuçlara göre denetim komitesi üyelerinin mevcut şirkette uzun süre görev alması denetim kalitesini olumsuz etkilediği, öte yandan denetim komitesi üyelerinin ortalama yaşının yüksek olması ise denetim kalitesini olumlu etkilediği söylenebilir.

Tablo 6, denetim komitesi başkanının deneyimi ile denetim kalitesi arasındaki ilişkisini gösteren model 2'ye ilişkin lojistik regresyon sonuçlarını göstermektedir. Analiz sonuçlarına göre denetim komitesi başkanının görev süresinin denetim kalitesi ile istatiksel olarak anlamlı ve negatif ilişkiliyken ($z = -1.89$,

p<0.05) denetim komitesi üyelerinin ortalama yaşının denetim kalitesi ile istatiksel olarak anlamlı ve pozitif ilişkilidir (z = 4.08, p<0.01). Son olarak denetim komitesi başkanının üye olduğu komite sayısının denetim kalitesi ile istatiksel olarak anlamlı bir ilişki içinde olmadığı görülmektedir. Bu sonuçlara göre denetim komitesi başkanının mevcut şirkette uzun süre görev alması denetim kalitesini olumsuz etkilediği, öte yandan denetim komitesi başkanının yaşının yüksek olması ise denetim kalitesini olumlu etkilediği söylenebilir.

Tablo 5: Model 1'e İlişkin Lojistik Regresyon Sonuçları

Değişkenler	**Beklenen işaret**	**Katsayı**	**z değeri**	**p değeri**
Sabit Sayı		1.300	-7.42	0.000
ORTGÖREV	?	-0.880**	-1.67	0.095
ORTYAŞ	?	21.629*	4.06	0.000
ORTKOMİTE	?	1.354	1.24	0.112
İKİLİLİK	+	4.686*	4.70	0.000
ROA	+	30.888*	2.67	0.007
ŞİRBÜY	+	1.977*	7.86	0.000
RAPOR	+	0.692	-0.73	0.466
Gözlem Sayısı	454			
Ki-kare	184.14			
Cox & Snell R^2	0.335			
Nagelkerke R^2	0.448			

Tablo 6: Model 2'ye İlişkin Lojistik Regresyon Sonuçları

Değişkenler	**Beklenen işaret**	**Katsayı**	**z değeri**	**p değeri**
Sabit Sayı		1.610	-7.52	0.000
BAŞGÖREV	?	-0.892**	-1.89	0.049
BAŞYAŞ	?	23.041*	4.08	0.000
BAŞKOMİTE	?	1.123	0.62	0.532
İKİLİLİK	+	4.726*	4.75	0.000
ROA	+	29.788*	2.68	0.007
ŞİRBÜY	+	-1.965*	7.82	0.000
RAPOR	+	0.746	-0.58	0.563
Gözlem Sayısı	454			
Ki-kare	183.28			
Cox & Snell R^2	0.334			
Nagelkerke R^2	0.447			

SONUÇ VE DEĞERLENDİRME

Yöneticilerin şirketlerini olduğundan daha karlı gösterme çabaları ve buna bağlı olarak 2000'li yılların başında gerçekleşen muhasebe skandalları, denetim kalitesinin finansal raporlama süreci açısından ne kadar önemli olduğunu kanıtlamıştır. Denetim kalitesi ile firmalar finansal tablo kullanıcılarına doğru ve güvenilir bir bilgi sağlayarak piyasada güven ortamının oluşmasını yardımcı olmaktadır. Firmalar, kaliteli denetim hizmeti talep ederek kaliteli ve güvenilir finansal raporlama sürecini sağlamaya çalıştıklarını dış paydaşlara göstermek istemektedirler.

Finansal raporların kalitesinden ve bu raporların finansal bilgi kullanıcılarına aktarılmasından sorumlu olan denetim komitesi bağımsız denetim sürecinin ana aktörlerinden birisidir. Denetim komiteleri,

yönetim kurulu ile bağımsız denetim arasında köprü görevi görerek denetim faaliyetinin eksiksiz bir şekilde yapılmasını sağlamakla görevlidir. Araştırmanın amacı denetim komitesi başkanı ve üyelerinin deneyiminin denetim kalitesine etkisini araştırmaktır. Araştırma bulguları, denetim komitesi başkan ve üyelerinin görev süresinin denetim kalitesini negatif etkilediğini, öte yandan denetim komitesi başkan ve üyelerinin yaşının denetim kalitesini pozitif etkilediğin göstermektedir. Elde edilen bulgular literatür ile tutarlılık göstermektedir.

Literatürde denetim komitesi deneyimi ile denetim kalitesi arasındaki ilişkiyi araştıran çalışmalar olsa da bu çalışmaların bulguları tutarlılık göstermemektedir. Çalışmamızın sonuçları, literatüre önemli ve faydalı ampirik sonuçlarla katkı sağlamaktadır. İleride yapılması muhtemel çalışmalarda denetim kalitesine alternatif değişkenler (denetim ücreti, denetçi bağımsızlığı, vb.) kullanılabilir. Ayrıca ilgili literatür ağırlıklı olarak tüm denetim komitesi üyelerinin özelliklerine odaklanmaktadır. Muhtemel çalışmalarda sadece denetim komitesi başkanının özellikleri dikkate alınarak ampirik çalışmalar yapılabilir.

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ASSOCIATION BETWEEN BOARD CHARACTERISTICS AND AUDIT REPORT DELAY: AN APPLICATION TO THE BIST

Gökhan Özer[1*], Abdulah Kürşat Merter[2]

*[*1]Gebze Technical University, Faculty of Business Administration, Kocaeli, Turkey.*
ORCID Code: 0000-0002-3255-998X

[2]Gebze Technical University, Faculty of Business Administration, Kocaeli, Turkey.
ORCID Code: 0000-0001-6874-1890

ABSTRACT

Audit report delay is an important measure around the world and has been a long-standing area of interest for managers, investors, auditors, regulators, and academics. Timely audit reporting, which is one of the most important indicators of financial reporting quality, is quite likely to be related to the board. This study investigates the influence of board size, board independence, board diversity and CEO duality, on the audit report delay. As such, a regression analysis is conducted using 1932 observations obtained from non-financial companies traded on the BIST between 2009-2019 and the relationship of the board features with the audit report delay is tested. The findings of the study show that board size, CEO duality and board race diversity are negative and significantly associated with audit report delay. Larger boards are likely to reduce latency in audit reports as they can make better quality and more effective decisions. The same person in the CEO and chairman role can weaken the monitoring and audit quality, resulting in poor corporate governance practices and prolonging audit time. Race differences in the board can contribute to enhancing the effectiveness and monitoring activities within the company, thereby shortening the delay of the audit reports. This study serves as a guide to policymakers and regulators in formulating policies and strategies with respect to audit report delay and board characteristics.

Keywords: Board, Audit Report Delay, Financial Reporting Timeliness

GİRİŞ

Finansal raporlama kalitesini arttıran önemli faktörlerden birisi finansal raporlama zamanlılığıdır. Denetim raporu gecikmesi olarak da adlandırılan finansal raporlama zamanlılığı, mali yıl sonu ile finansal raporların ve denetim raporunun kamuoyuna açıklandığı tarih arasındaki aralığı ifade etmektedir (Ashton vd., 1987; Knechel ve Payne 2001). Zamanında sunum, finansal raporlardaki bilgilerin güvenilirliğini ve doğruluğunu arttıran ve finansal bilgi kullanıcılarının kararlarını doğrudan etkileyen önemli bir özelliktir. Türkiye Muhasebe Standartları Kurulu (TMSK), faydalı finansal bilginin niteliksel özelliklerinden olan zamanında sunumu, bilginin karar verenler açısından kararlarını etkileyebileceği zamanda mevcut olması olarak ifade ederken, finansal bilgilerin sunumunda yaşanan gecikmeler ile bilginin değeri arasında ters ilişki olduğunu vurgulamaktadır (kgk.gov.tr, 2015). Şirketler ve düzenleyici kurumlar, finansal raporların geç açıklanması sonucunda ortaya çıkabilecek olumsuz durumları engellemek için finansal raporlama zamanlılığına etki etmesi muhtemel unsurların belirlemek ve bu konuda önlemler almakla yükümlüdür (Dwyer ve Wilson, 1989; Sultan, 2015; Abernathy, 2017).

İşletmede hak sahibi olanlar tarafından işletmeyi yönetmek üzere görevlendirilen yönetim kurulu üyelerinin denetim raporu gecikmesini etkilemesi oldukça muhtemeldir (Okan vd., 2015). Nitekim önceki çalışmalar, yönetim kurulu yapısı ile denetim raporu gecikmesi arasındaki ilişkiyi hem teorik hemde ampirik olarak incelemiş ve önemli sonuçlar oraya koymuşlardır. Biz de bu çalışma ile yönetim kurulu özellikleri ile gecikme arasındaki ilişkiye odaklanarak ilgili literatüre katkı sunmayı

hedefliyoruz. Yönetim kurulu özellikleri ile denetim raporu gecikmesi arasındaki ilişkiyi araştıran çalışmalar genellikle üç temel değişkene odaklanmıştır: üye sayısı, bağımsızlık, yönetim ikililiği. Hem bu çalışmaların birbirinden farklı bulgular ortaya koyması hem de bu çalışmalarda yönetim kurulunda çeşitliliğinin (cinsiyet ve ırk) çok fazla dikkate alınmaması çalışmamızın önemli bir motivasyonu olmuştur. Nitekim yapılan çalışmalar (Stewart ve Munro, 2007; Grosvold vd., 2007), çeşitliliğin olduğu grupların çeşitliliğin olmadığı gruplarından daha iyi performans gösterdiği ve daha iyi iletişim yetenekleri ve toplantı hazırlıkları sergilediklerini göstermiştir. Yukarıdaki açıklamalardan yola çıkarak bu çalışmanın amacı, yönetim kurulu özellikleri (üye sayısı, bağımsızlık, yönetim ikililiği, cinsiyet çeşitliliği ve ırk çeşitliliği) ile denetim raporu gecikmesi arasındaki ilişkiyi araştırmaktır. Bu kapsamda, 2009-2019 yılları arasında BİST'te işlem gören finansal olmayan şirketlerden elde edilmiş 1932 adet gözlem kullanılarak regresyon analizi yapılmış ve yönetim kurulu özelliklerinin denetim raporu gecikmesi ile ilişki araştırılmıştır. Araştırma bulguları, yönetim kurulu üye sayısının, yönetim ikililiğinin ve ırk çeşitliliğinin denetim raporu gecikmesini negatif yönde etkilediğini göstermektedir.

İLGİLİ LİTERATÜR

Zamanlılık literatürü, günümüzde devamlı olarak genişlemeyi sürdürmekte ve popülerliğini korumaktadır. Bunun en önemli sebebi, karar vericilerin finansal bilgiye zamanında ulaşma isteğinden gelmektedir (Iyoha, 2012; Vuran, 2013). Karar vericilerin, finansal bilgiye zamanında ulaşabilmeleri için finansal raporların zamanlılığına etki etmesi muhtemel faktörlerin belirlenmesi ve önlemler alınması oldukça önemlidir.

Literatür incelendiğinde, finansal raporlama zamanlılığı ile ilgili çok sayıda çalışmanın yapıldığı görülmektedir. Özellikle (Bkz. Ashton et. al., 1987; Ashton and Wright, 1989; Payne and Jensen, 2002; Ismail and Chandler, 2004) gibi yazarlar, şirkete özgü özelliklerin (şirket büyüklüğü, şirket yaşı, çokulusluluk, sektör türü vb.) ve (Bkz. Dogan vd., 2007; Knechel ve Peyne, 2001) gibi yazarlar ise, firma performansının (RAO, ROE, Kaldıraç düzeyi, toplam satışlar, vb.) denetim raporlarının zamanlılığına etkisini incelemişlerdir. Bu çalışmaların sonucunda, şirkete özgü özelliklerin ve performans düzeyinin denetim raporu gecikmesini etkilediğini ortaya koymaktadır. Ayrıca (Bkz. Lee vd., 2009; Soltani, 2002; Leventis vd., 2005) gibi yazarlar çalışmalarında, denetim raporu gecikmesinin, bağımsız denetim firması seçiminden, denetimçi değişiminden, denetim kalitesinden, denetim raporlarından etkilendiğine dair bulgular elde etmişlerdir. Doğan vd., (2007), 2005 yılında borsada işlem gören şirketler üzerine yaptıkları çalışmada karlılık, şirket büyüklüğü ve finansal risk gibi firma bazlı özelliklerin finansal raporlama zamanlılığını etkilediğini ortaya koymuşlardır. Aktaş ve Kargın (2011), 2005-2008 yılları arasında borsada işlem gören şirketler üzerinde yaptıkları çalışmada, iyi habere sahip olan şirketlerin finansal raporlarını daha erken yayınladıkları sonucuna ulaşmıştır. Erer ve Türel (2014), 211 finansal olmayan sektörlerde faaliyet gösteren şirketler üzerine yaptığı çalışmada, firma bazlı ve denetim bazlı bazı özellikler ile finansal raporlama zamanlılığı arasındaki ilişkiyi araştırmıştır. Çalışmanın sonuçlarına göre net kar ve denetçi görüşü finansal raporlama zamanlılığını negatif etkilerken, denetim kalitesi ve sektör türü finansal raporlama zamanlılığını poziif etkilemektedir.

Literatürde yönetim kurulu özellikleri ile denetim raporu gecikmesi arasındaki ilişkiyi araştıran çalışmalarda mevcuttur. Bu çalışmaların birçoğu üye sayısı, bağımsızlık ve yönetim ikililiği özelliklerine odaklanmıştır. Abdullah (2006), Malezya Borsasında işlem gören şirketlerin yönetim kurulu üyelerinin özellikleri ile denetim raporu gecikmesi arasındaki ilişkiyi incelemiş ve yönetim ikililiğinin ile yönetim kurulu bağımsızlığının denetim raporu gecikmesini azalttığını ortaya koymuştur. Afify (2009), Mısır Borsasında işlem gören şirketlerinin üzerinde gerçekleştirdiği çalışmada, yönetim kurulu bağımsızlığının denetim raporu gecikmesi ile negatif ilişkili olduğunu, yönetim ikililiğinin ise pozitif ilişkili olduğunu göstermiştir. Ahmed ve Che-Ahmad (2016); Daoud vd., (2014); Hassan, (2016), daha büyük yönetim kuruluna sahip şirketlerin daha küçük yönetim kuruluna sahip şirketlere göre

denetim raporlarını daha erken açıkladıklarına dair kanıtlar ortaya koymuşlardır. Güleç ve Aktaş. (2020), BİST'te işlem gören 123 finansal ve finansal olmayan şirket üzerine gerçekleştirdiği çalışmada yönetim ikiliğinin denetim raporu gecikmesini azalttığını ortaya koymuştur. Şamil ve Onur, (2020), çalışmasında 2018 yılında BİST İmalat sektöründe yer alan firmalardan elde edilen verilerle kurumsal yönetim göstergeleri ile denetim raporu gecikmesi arasındaki ilişkiyi incelemiş ve yönetim kurulu büyüklüğünün denetim raporu gecikmesini azalttığını belirtmiştir. Khuong vd., (2017); Alsmady (2018) yönetim kurulunda cinsiyet çeşitliliğin denetim raporundaki gecikmeleri azalttığına dair bulgular elde etmişlerdir. Dobija ve Puławska, (2018); Tee ve Rassiah, (2019), yönetim kurulunda yabancı üyelerin varlığının, yönetim kurulu etkinliğini arttırdığını ve denetim raporu gecikmelerini azaltığını ortaya koymuşlardır.

Yukarıdaki argümanlar dikkate alındığında aşağıdaki hipotezler oluşturulmuştur:

H1: Yönetim kurulu üye sayısı ile finansal raporlama zamanlılığı arasında negatif bir ilişki vardır.

H2: Yönetim kurulu bağımsızlığı ile finansal raporlama zamanlılığı arasında negatif bir ilişki vardır.

H3: Yönetim ikiliği ile finansal raporlama zamanlılığı arasında negatif bir ilişki vardır.

H4: Yönetim kurulu cinsiyet çeşitliliği ile finansal raporlama zamanlılığı arasında negatif bir ilişki vardır.

H5: Yönetim kurulu ırk çeşitliliği ile finansal raporlama zamanlılığı arasında negatif bir ilişki vardır.

ARAŞTIRMA MODELI

Bu çalışmanın amacı, yönetim kurulu özellikleri ile denetim raporları gecikmesi arasındaki ilişkiyi araştırmaktır. Bu kapsamda, 2009-2019 yılları arasında BİST'te işlem gören finansal olmayan şirketlerden elde edilmiş 1932 adet gözlem kullanılarak regresyon analizi yapılmış ve yönetim kurulu özelliklerinin denetim raporu gecikmesi ile ilişki araştırılmıştır. Araştırma kapsamındaki şirketlere ait veriler, Finnet, BİST web sitesi, Kamuyu Aydınlatma Platformu web sitesi ve şirketlerin kendi web sitelerindeki yatırımcı ilişkileri sayfalarından elde edilmiştir.

Çalışmanın amacı kapsamında bir bağımlı, beş bağımsız ve sekiz kontrol değişkeni kullanılmıştır. Bağımsız değişken olarak yönetim kurulu özellikleri kullanılmıştır. Bağımlı değişken olarak ise, denetim raporu gecikmesi kullanılmıştır. Çalışmada kullanılan tüm değişkenlerin tanımları ve ölçümleri Tablo I'de gösterilmiştir. Yönetim kurulu özellikleri ile denetim raporu gecikmesi arasındaki ilişkiyi test etmek için aşağıdaki regresyon modeli oluşturulmuştur.

$$GECİKME = \beta 0 + \beta 1\ \text{YKBOYUT} + \beta 2\ \text{YKBAĞ} + \beta 3\ \text{YKBCEO} + \beta 4\ YKKAD + \beta 5\ \text{YKYAB} + \beta 6\ DENKAL + \beta 7\ \text{DEĞİŞİM} + \beta 8\ \text{RAPOR} + \beta 9\ \text{ŞİRBÜY} + \beta 10\ KALDIRAÇ + \beta 11\ \text{PD / DD} + \beta 12\ \text{ULUS} + \beta 13\ \text{ZARAR} + \Sigma\ \text{Yıl} + \Sigma\ \text{Sektör}\ \varepsilon_(i,t) \quad (1)$$

Tablo I. Değişken Açıklamaları

Değişken Adı	Değişken Tanımı	Değişken Ölçümü
GECİKME	Denetim Raporu Gecikmesi	Hesap döneminin bitişi ile firmanın bağımsız denetim raporlarını yayınladığı tarih arasında geçen toplam gün sayısı
YKBBOYUT	Yönetim Kurulu Üye Sayısı	Yönetim kurulu toplam üye sayısı
YKBBAĞ	Yönetim Kurulunun Bağımsızlığı	Yönetim kurulundaki bağımsız üyelerin yüzdesi
YKBCEO	Yönetim Kurulu Başkanı ile CEO Ayrımı	Yönetim kurulu başkanı ile CEO aynı kişi ise 1; aksi taktirde 0 verilmiştir.

YKBKAD	Yönetim Kurulu Cinsiyet Çeşitliliği	Yönetim kurulunda en az 1 üye kadın ise;1; aksi taktirde 0 verilmiştir.
YKBYAB	Yönetim Kurulu Irk Çeşitliliği	Yönetim kurulunda en az 1 üye yabancı ise;1; aksi taktirde 0 verilmiştir.
DENKAL	Dört büyük denetim firmasından denetim hizmeti alınması	Dört büyük denetim firmalarından birisi ile çalışılıyorsa 1; aksi taktirde 0 verilmiştir.
DEĞİŞİM	Denetçi Değişimi	Dönem içinde denetçi firma değişmişse 1; aksi taktirde 0
RAPOR	Denetim Raporu	Denetim raporu olumlu ise 1; aksi taktirde 0
ŞİRBÜY	Şirket Büyüklüğü	Toplam Varlıkların doğal logaritması
ZARAR	Dönem Net Zararı	Dönem sonunda zarar açıklandıysa 1; aksi taktirde 0
KALDIRAÇ	Kaldıraç oranı	Toplam borçların toplam varlıklara oranı
PD/DD	Piyasa değeri defter değeri oranı	Piyasa değeri ile defter değerinin birbirine oranı
ULUS	Çokulusluluk	Firma uluslararası ise 1; ulusal ise 0

ANALİZ

Tanımlayıcı İstatistikler

Aşağıda gösterilen Tablo 2'de regresyon modelinde yer alan değişkenlere ait ortalama, standart sapma, medyan, maksimum ve minimum değerlerine yer verilmiştir. Denetim raporu gecikmesi için ortalama değer 64 gündür, bu da örneklemde yer alan şirketlerin yaklaşık iki ay içinde denetim raporlarını yayınladığını gösterir. Ayrıca denetim raporu gecikmesinin minimum ve maksimum değerleri sırasıyla 21 gün ve 146 gündür. Bu istatistik, şirketlerin raporlarını açıkladıkları tarihler arasında oldukça fazla farklılıklar olduğunu göstermektedir. SPK'nın 2014 yılındaki düzenlemesine göre yönetim kurulu en az 5 üyeden oluşması ve bu üyelerin en az üçte biri bağımsız üye olması gerekmektedir (SPK, 2014). SPK aynı düzenlemede şirkette hiç kimsenin tek başına sınırsız karar verme yetkisi ile donatılmaması gerektiğini ve bununla birlikte yönetim kurulu başkanı ve icra başkanı/genel müdürün aynı kişi olması halinde, bu durumun gerekçesi ile birlikte Kamuyu Aydınlatma Platformunda (KAP) açıklanması gerektiğini belirtmiştir. Ayrıca SPK, şirketlerin, yönetim kurulunda kadın üye oranı için %25'ten az olmamak kaydıyla bir hedef oran belirlemesi gerektiğini belirtmiş ancak "Uygula Uygulamıyorsan Açıkla" prensibi gereğince uygulamayı zorunlu tutmamıştır. Tablo 2'deki istatistiklere bakıldığında borsada işlem gören şirketlerinde bu düzenlemede belirtilen unsurlara genel itibariyle uyduğu görülmektedir. Sonuçlar, yönetim kurullarının ortalama 7 üyeden oluştuğu, bu üyelerin %26'sının bağımsız olduğunu göstermektedir. Ayrıca, şirketlerin %76'sı yönetim kurulu başkanı ile CEO ayrımına gittiği görülmektedir. Son olarak, şirketlerin %57'si yönetim kurulunda en az bir kadın üye bulundurmakta ve yönetim kurullarında kadın üye sayısı en az 0 ve en fazla 4 olarak değişmektedir. Öte yandan şirketlerin %28'si yönetim kurulunda en az bir yabancı üye bulundurmakta ve yönetim kurullarında yabancı üye sayısı en az 0 ve en fazla 8 olarak değişmektedir.

Tablo 2: Tanımlayıcı İstatistikler

Değişken adı	Ortalama	Standart sapma	Minimum değer	Maksimum değer
GECİKME	64.603	14.972	21	146
YKBBOYUT	6.947	2.055	3	15
YKBBAĞ	0.262	0.139	0	0.666
YKBCEO	0.761	0.426	0	1
YKBKAD	0.571	0.495	0	4

YKBYAB	0.281	0.449	0	8
DENKAL	0.534	0.498	0	1
DEĞİŞİM	0.247	0.431	0	1
RAPOR	0.928	0.258	0	1
ŞİRBÜY	19.699	1.769	14.331	25.712
ZARAR	0.294	0.456	0	1
KALDIRAÇ	0.530	0.380	0.006	8.674
PD/DD	1.944	1.108	1	14.170
ULUS	0.304	0.460	0	1

Korelasyon Analizi

Aşağıda gösterilen Tablo 3, tüm örneklem için pearson korelasyon matrisi sonuçlarını göstermektedir. Değişkenlerin hiçbiri 0.80'in üzerinde korelasyon ilişkisi içinde değildir, bu da çoklu doğrusallığın çalışma için ciddi bir problem olmadığını göstermektedir. Tablo 3, yönetim kurulu cinsiyet çeşitliliği dışında, tüm bağımsız değişkenlerin ve kontrol değişkenlerin denetim raporu gecikmesi ile önemli ölçüde ilişkili olduğunu ortaya koymaktadır.

Tablo 3: Korelasyon Tablosu

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
GECIKME	1													
YKBBOYUT	-0.195*	1												
YKBBAG	-0.262*	-0.165*	1											
YKBCEO	-0.159*	0.245**	0.040**	1										
YKBKAD	-0.021	0.096*	-0.064*	-0.028	1									
YKBYAB	-0.105*	0.260*	-0.121*	0.143*	-0.085*	1								
DENKAL	-0.129*	0.317*	0.108*	0.306*	0.040***	0.339*	1							
DEGIŞIM	0.033	-0.033	-0.040**	-0.018	0.006	0.000	-0.028	1						
RAPOR	-0.131*	0.161*	0.012	0.180*	0.053**	0.064*	0.129*	-0.092*	1					
ŞIRBUY	-0.157*	0.526	-0.002	0.268*	0.042**	0.232*	0.464*	-0.048**	0.195*	1				
ZARAR	0.176*	-0.149*	-0.056*	-0.091*	-0.014	0.111*	-0.126*	0.043**	-0.184*	-0.236*	1			
KALDIRAÇ	0.115*	-0.055*	0.066*	-0.030	-0.004	0.006	-0.003	0.006	0.311*	-0.089*	0.225*	1		
PD/DD	-0.118*	-0.018	-0.057*	-0.007	0.086*	0.129*	0.100	0.003	0.041**	-0.170*	-0.119*	-0.218*	1	
ULUS	0.051**	0.090*	0.045**	0.019	0.027	0.101*	0.291*	-0.015	-0.023	0.435*	-0.094*	0.105*	0.100*	1

Not: *, **, *** simgeleri sırayla değişkenlerin %1, %5 ve %10 seviyelerinde anlamlı olduğunu göstermektedir.

Regresyon Analizi

Tablo 4, denetim raporu gecikmesine etki etmesi beklenen bağımsız değişken ve kontrol değişkenlerinin kullanıldığı regresyon analiz sonuçlarını göstermektedir. Sonuçlar, YKBOYUT, YKBCEO ve YKBYAB katsayılarının beklendiği gibi negatif olduğunu ve bu değişkenlerin

GECİKME ile anlamlı düzeyde ilişkili olduğunu göstermektedir (sırasıyla $t = -4.56$, $p < 0.01$, $t = -4.73$, $p < 0.01$ ve $t = -2.73$, $p < 0.01$). Bu bulgulardan hareketle, H1, H3 ve H4 hipotezleri kabul edilmektedir. Başka bir ifade ile yönetim kurulu üye sayısı, yönetim kurulu başkanı ile CEO ayrımı ve yönetim kurulunda ırk çeşitliliğinin denetim raporu gecikmesini azalttığını söyleyebiliriz. Elde ettiğimiz bu sonuçlar literatür ile tutarlılık göstermektedir. Haniffa ve Hudaib, (2006), büyük yönetim kurullarının, küçük yönetim kurullarına göre gözetim ve denetim faaliyetlerini daha etkin yerine getirdiklerini ve finansal raporlama sürecine daha çok katılım sağladıklarını belirtmektedir. Jensen ve Meckling, (1976), CEO ve yönetim kurulu başkanlığı görevini aynı kişinin yerine getirmesi, gözetim ve denetim kalitesini zayıflatabileceğini, zayıf kurumsal yönetim uygulamalarına ve denetim süresinin uzamasına neden olabileceğini savunmaktadır. Tee ve Rassiah, (2019), çeşitliliğinin şeffaflık ve etik anlayışını geliştirdiği ve finansal raporlama kalitesini olumlu yönde etkilediği ileri sürmektedir.

Öte yandan sonuçlar, YKBBAĞ ve YKBKAD katsayılarının beklendiği gibi negatif olduğunu ancak bu değişkenlerin GECİKME ile anlamlı düzeyde ilişkili olmadığını göstermektedir. Bu bulgulardan hareketle, H2, H3 ve H5 hipotezleri kabul edilmemektedir. Başka bir ifade ile yönetim kurulu bağımsızlığı ve cinsiyet çeşitliliği ile denetim raporu gecikmesi arasında istatiksel olarak anlamlı bir ilişki bulunmamaktadır.

Tablo 4: Regresyon Sonuçları

Değişkenler	Beklenen İşaret	Katsayı	t değeri	p değeri
Sabit Sayı		4.582	61.82	0.000
YKBBOYUT	-	-0.012*	-4.56	0.000
YKBBAĞ	-	-0.033	-0.65	0.516
YKBCEO	-	-0.053*	-4.73	0.000
YKBKAD	-	-0.003	-0.39	0.700
YKBYAB	-	-0.029*	-2.73	0.006
DENKAL	?	-0.008	-0.82	0.412
DEĞİŞİM	+	0.015	1.47	0.141
RAPOR	-	-0.025	-1.24	0.215
ŞİRBÜY		-0.009**	-2.53	0.011
ZARAR		0.049*	4.74	0.000
KALDIRAÇ		0.033*	2.78	0.005
PD/DD		-0.021*	-4.71	0.000
ULUS		0.069*	6.12	0.000
Gözlem Sayısı	1932			
F Değeri	28.76			
R^2	0.3264			
Düzeltilmiş R^2	0.3151			

Not: " * " değeri, değişkenin 0.01 düzeyinde anlamlı olduğunu göstermektedir

SONUÇ VE DEĞERLEMDİRME

Yönetim kurulu, bir firmanın finansal raporlama sürecinde nihai sorumluluğa sahip önemli bir yapıdır. En önemli kurumsal yönetim mekanizmalarından birisi olan yönetim kurulunun denetim raporu gecikmesine etki etmesi oldukça muhtemeldir. Araştırma bulguları yönetim kurulu üye sayısı, yönetim ikiliiliği ve yönetim kurulu ırk çeşitliliğinin denetim raporu gecikmesi ile istatiksel olarak anlamlı ve negatif ilişki içinde olduğunu göstermektedir. Bu sonuçlara göre, büyük yönetim kurulları, yönetim kurulu başkanı ile CEO'nun farklı kişiler olması ve yönetim kurulunda yabancı üyenin bulunması, yönetim kurulunun etkinliğinin artmasına ve denetim raporlarında gecikmenin azalmasına neden olması muhtemeldir.

Literatürde yönetim kurulu özellikleri ile denetim raporu gecikmesi arasındaki ilişkiyi araştıran çok sayıda çalışma mevcuttur. Genel olarak bu çalışmaların yönetim kurulu üye sayısı, bağımsızlığı ve yönetim ikiliiliği özelliklerine odaklandığını görülmektedir. Yönetim kurulunda cinsiyet ve ırk çeşitliliği ile ilgili kısıtlı sayıda çalışma bulunmaktadır. Bu kapsamda çalışmamızın sonuçları, literatüre önemli ve faydalı ampirik sonuçlarla katkı sağlamaktadır. Düzenleyici kurumlar ve uygulayıcılar, yönetim kurulunda çeşitlilik kavramına daha çok odaklanmalı ve bu alanda daha fazla ampirik çalışmalar yapılmalıdır. İleride yapılması muhtemel çalışmalarda yönetim kurulu üyelerinin eğitim durumu, yaş, deneyim, finansal uzmanlık gibi demografik özellikleri modele dahil edilerek daha geniş kapsamlı analizler yapılabilir. Aynı zamanda denetim raporu gecikmesine alternatif olarak sektörel gecikmeler ve firma bazlı gecikmeler de araştırmaya dahil edilebilir.

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EFFECTS OF PH ON CHEMICALLY DEPOSITED CDS THIN FILMS

Hale YILDIZAY[1]*
[1]*Dr.Öğr. Üyesi. Kütahya Dumlupınar Üniversitesi, Kütahya Güzel Sanatlar Meslek Yüksek Okulu, Çini sanatı ve Tasarımı Bölümü, Germiyan Kampüs, 43100 Kütahya, Türkiye
ORCID Code: 0000-0002-3896-9912

ABSTRACT
In this study, cadmium sulfide (CdS) thin films were coated on glass surfaces by chemical bath deposition (CBD) and the effects of pH were investigated. The X-ray diffraction (XRD) of the coated films was used for structural properties. The absorption values were recorded with a UV-Vis spectrophotometer. It was determined that the band gap values of the thin films decreased with increasing pH values and changed between 2.42-2.33eV. The morphological properties of thin films surface were investigated by scanning electron microscope (SEM) device.

Keywords: Materials Science, Chemical Bath Deposition, Thin films, XRD, SEM.

INTRODUCTION
There are several of methods such as electrodeposition (Alam et al., 2019), chemical bath deposition (CBD) (Parvez et al., 2017), thermal evaporation (Dey et al., 2019), spray pyrolysis (Thangaraju and Kaliannan, 2000), anodic oxidation (Zhang et al., 2020), magnetron sputtering (Islam, et al., 2017), ultrasound deposition (Alizadeh, et al., 2019), and pulsed laser deposition (Jinan et al., 2013) are used to produce CdS thin films. Among these methods, the CBD method can be used and preferred for the production of CdS thin films. CdS thin films have a high quality since parameters such as stirring speed, deposition temperature, deposition time and solution pH can be easily controlled (Kariper et al., 2011); (Zhou et al., 2012).
The chemical reaction for chemical bath deposition of CdS thin films are given in following formulas in below (Altiokka et al., 2013):

$$CdCl_2 + 2KOH \rightarrow Cd(OH)_2 + KCl \quad (1)$$

$$Cd(OH)_2 + 3NH_4NO_3 \rightarrow [Cd(NH_3)_4](NO_3)_2 + 2O_2 + H_2O \quad (2)$$

$$[Cd(NH_3)_4](NO_3)_2 \rightarrow Cd(NH_3)_4^{2+} + 2NO_3^- \quad (3)$$

$$Cd(NH_3)_4^{2+} \rightarrow Cd^{2+} + 4NH_3 \quad (4)$$

$$CS(NH_2)_2 + 2H_2O \rightarrow 2NH_3 + CO_2 + H_2S \quad (5)$$

$$H_2S \rightarrow S^{2-} + 2H^+ \quad (6)$$

$$Cd^{2+} + S^{-2} \rightarrow CdS \quad (7)$$

MATERIALS AND METHODS

CdS thin films were produced by chemical bath deposition method in the study, solutions prepared at the ratio of 0.02 M $CdCl_2$, 0.5 M KOH, 1.5 $NH_4NO_3$and 0.2 M $CS(NH_2)_2$ were used in all experiments.

In order to adjust the pH value in the experiments, ammonia (NH_3) was added to the solutions. In the experiment, ammonia was added so that the pH value was 7,5 in experiment I, 8 in experiment II, 8.5 in experiment III, and the solution was started to be heated up to the desired temperature. Glass sheets to be coated in the experiment were first washed with hydrochloric acid and then rinsing with deionized water. After drying glass substrate, placed in the solution medium. The bath temperature used in all experiments was kept at 80 °C and the experiments were completed by keeping it at this temperature for 15 minutes. After the deposition, the CdS films were washed deionized water to remove the loosely adhered CdS particles from the film and finally dried in air.

The structure, phase and microstructural parameters of the films were investigated by using a Rigaku Miniflex XRD diffractometer with Cu-Kα ranging from 5 to 70° at a speed of 2°/ min. The optical transmission spectra of the deposited thin films of CdS were determined with A &E Lab UV–Vis spectro photometer in order to determine the band gap energy, within the range of 350-650 nm. The surface morphology of CdS thin films were determined by using computer controlled digital scanning electron microscope (FEI-NANO SEM 650).

RESULTS AND DISCUSSION

X-ray diffraction studies revealed that the films are polycrystalline in nature with cubic structure Fig.1. The absorbance of samples and Tauc plots were given in Figure 2 and 3 respectively.

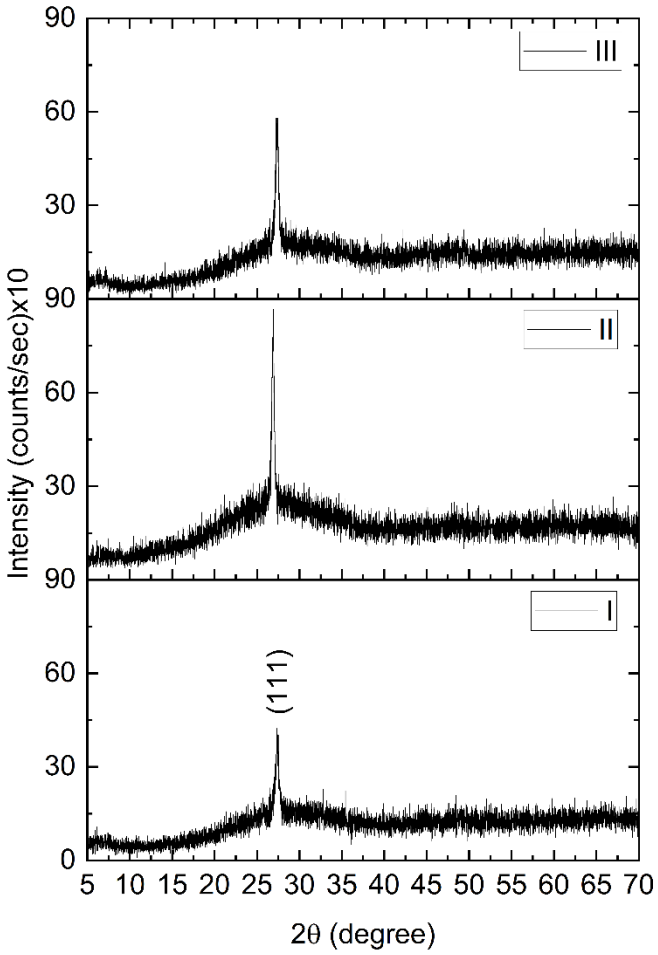


Figure 1. The XRD patterns of the thin films.

In Figure 1, it is seen that the peak intensity increases as the pH value increases. This is thought to be due to the thickness and good crystallization.

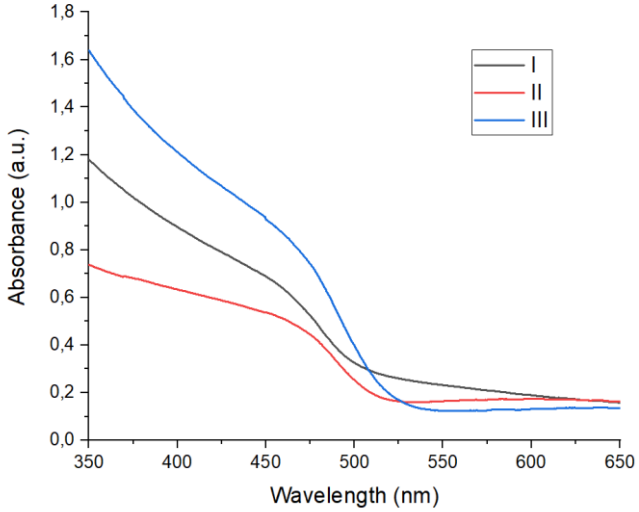


Figure 2. The absorbance plots of the CdS thin films

According to the Fig. 2, the absorbance values of the film obtained in II was low and according to the Fig. 3 the band gap of the films is relatively high of the films obtained in II.

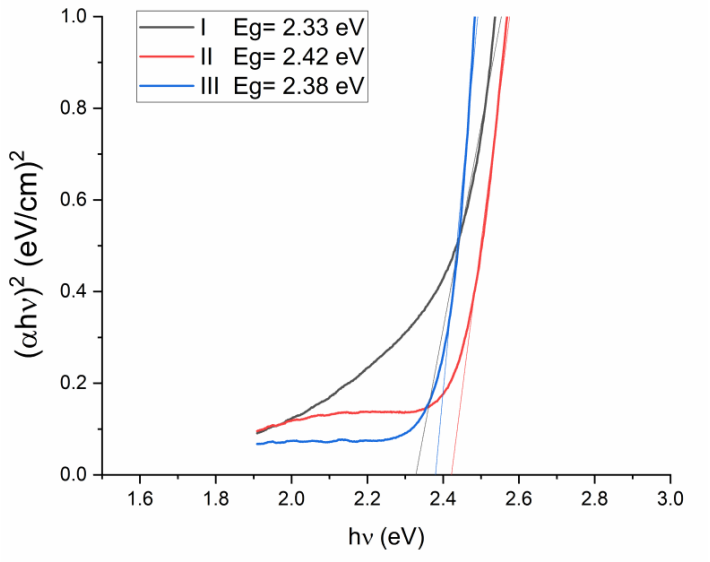


Figure 3. The Tauc plots of the CdS thin films

Fig. 4 shows the micrographs of CdS thin films at different pH values. According to the Fig. 4., there are no any pinhole and voids. All films formed in smooth and homogenous.

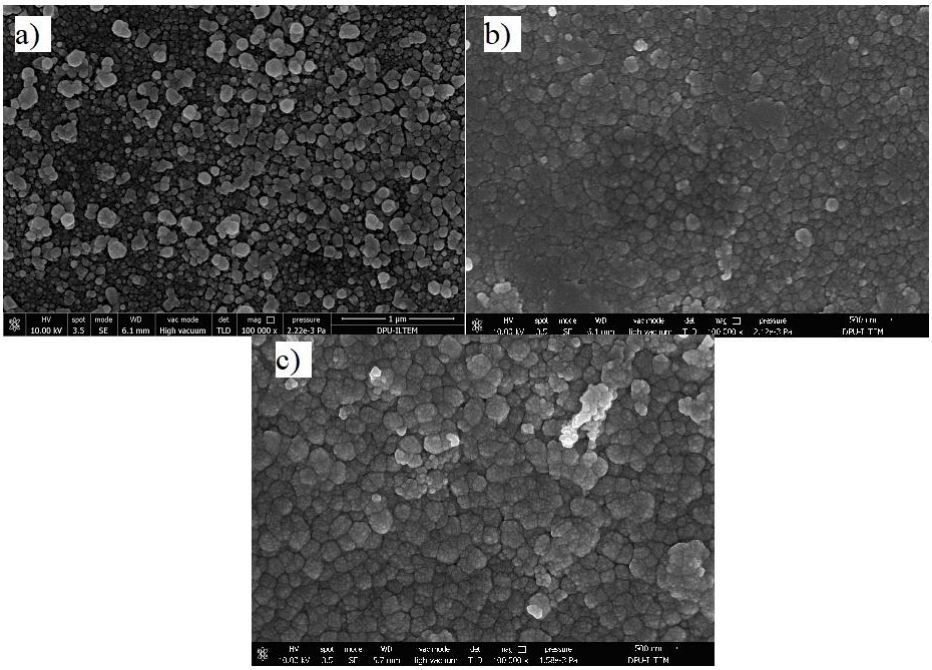


Figure 4. The SEM images of a) I, b) II and c) III Fig.

Conclusions:

In this study that CdS thin films were produced successfully by method of chemical bath deposition. Thin films of Cadmium sulfide were deposited on the glass substrate. Ammonia (NH_3) was added to the solution to adjust different pH ratio and the effects of the were investigated. According to the XRD pattern, the film was formed in cubic phase. The band gaps of the films were estimated from the Tauc plots. It was clear from the plots that when the band gap of the films obtained in II increase, pH increased. According to the SEM images, the surface of the films homogenous and pinhole-free.

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THE CONCEPT OF ARTIFICIAL INTELLIGENCE-BASED SUSTAINABILITY ON BIODIVERSITY

Gizem Aydın[1*], Yasin Kırelli[2], Dr.Şebnem Özdemir[3], Dr.Pınar Gökçin Özuyar[4]

*[*1]ERETEAM, Istanbul, Turkey.*
[2]Sakarya University, Industrial Engineering Department, Istanbul, Turkey.
[3]Istinye University, Faculty of Economics, Administrative and Social Sciences, Istanbul, Turkey.
[4]Istinye University, Faculty of Economics, Administrative and Social Sciences, Istanbul, Turkey.
ORCID Code: 0000-0001-6353-0648, 0000-0002-3605-8621, 0000-0001-6668-6285, 0000-0002-2505-2216

ABSTRACT

The most prominent problem of today's world is to establish a sustainable understanding in different areas such as resources, natural life, climate and social balances while the change in technology and industry continues. The main goal is to obtain and maintain adequate water, food, climate and health conditions for humanity. This main goal; further, climate change, recycling of waste, biodiversity, transportation in different areas such as sustainable policy motivation is mandatory. Various publications state that the understanding of sustainability on the side of biodiversity and climate is effective in the emergence of the COVID-19 virus. COVID-19 has caused economic crises beyond life-threatening compared to all epidemics around the world. This situation is the most obvious indicator that every basic area where sustainability cannot be achieved leads to crises in other areas.

Artificial intelligence (AI), which was defined in 1956, shows itself as an impressive and transforming power in many areas as of the point where technology has reached. This power is actively used in every field where it is difficult to produce solutions/decisions, especially due to heaped data and multiple variables. Artificial intelligence has provided important solutions to the problems that have accumulated recently on the sustainability side in terms of managing environmental impacts and climate change. These notable examples lead to the expectation that artificial intelligence will play a helpful/resolving role in the field of sustainable resource construction, waste reduction, management and recycling. The research, which is based on the expectations in all these different fields, was created in order to compile the potential benefits and problems that artificial intelligence will provide for sustainable development purposes. Within the scope of the research, artificial intelligence-based sustainability understanding will be evaluated through case studies, data application area and possible results.

Keywords: sustainability, artificial intelligence, sustainable development goals, data.

INTRODUCTION

The world's climate crisis and global warming are reaching very dangerous levels. Due to the increase in the number of people, threats such as environmental pollution have started to increase. Researches continue to be carried out to prevent these problems.

Sustainability is one of the most important issues for humanity. Various technologies are used to make human life sustainable. One of these technologies is artificial intelligence. An increase in the use of artificial intelligence is foreseen for a sustainable future (Vinuesa et al., 2020).

AI AND SUSTAINABILITY

Artificial Intelligence Concept

The concept of artificial intelligence, which is one of today's most critical issues, was first introduced by John McCarthy at the Dartmouth Conference in 1956 (Yang & Peng, n.d.). Artificial intelligence, which has many meanings, is the intelligence shown by machines (Shieber & Rapaport, 2005). Artificial intelligence aims to make human life easier by producing intelligent machines that can react, think, solve problems and understand like humans (Yang & Peng, n.d.). It is a broad set covering artificial intelligence, machine learning, and deep learning topics (Alafi, 2017).

Sustainability

Sustainability, in general, is the ability of something to sustain itself (Liu, 2017). Artificial intelligence plays a vital role in achieving sustainable development goals, from protecting environmental impacts and biodiversity to providing sustainable energy. Seventeen sustainable development goals, which can be planned under three main headings as ecological, economic, and social, have been announced by the United Nations. Environmental sustainability encompasses the balance of all ecological systems and the protection of environmental integrity. Economic sustainability means that all people in the world can meet their needs and access resources for this. Social sustainability is a measure of human well-being (Vinuesa et al., 2020).

Artificial Intelligence and Sustainability

Artificial intelligence addresses many environmental issues for sustainability. Many research topics are related to climate change, agricultural activities, water problems, and smart cities. In these subjects, the focus is on analyzing data and applying machine learning models (Nishant et al., 2020). Artificial intelligence has also become an essential tool in agricultural operations. With the used machine learning models, researches have been done in agricultural production, classification of plants, determination of suitable environmental conditions, and detection of weeds (Ozguven & Uygun, 2019). In the following sections, example application areas of artificial intelligence in the field of sustainability are explained.

Biodiversity Protection

The protection of biodiversity is an old debate. In particular, the fact that the damage to biodiversity is among the theories of the emergence of COVID-19 has been brought this issue back to the agenda. It is possible to come across the following examples for the use of artificial intelligence on this subject. Satellite images can help to identify changes in vegetation and invasive animal species can be detected.

- Poaching poses a great danger to the world's creatures and has put the world at risk of extinction of some symbolic species. For example, poachers kill an average of 55 elephants a day. At the same time, an elephant is killed only for its ivory every 15 minutes. Therefore, governments need a cost-effective technology to prevent poaching before it occurs, in other words an individual who intends to poach (Fernando & Dinerstein, 2019).
  At this point, TrailGuard AI - RESOLVE and Intel collaborate to prevent poaching.
  TrailGuard uses a technology to catch and arrest poachers to prevent poaching in national parks. This technology can be limited to this and help develop and to avoid intelligence of illegal wildlife trade.

  This technology, supported by a small camera and artificial intelligence solution, detects poachers and detects these people by sending the photos to the center via long-range networks or satellites (Resolve, 2021).

  PAWS performs related work on machine learning, artificial intelligence, and behavior modeling to contribute to wildlife protection. The algorithm of PAWS is a project that is integrated with game theory and machine learning, and the behavior patterns of poachers are learned through the collected

data (WWF, 2020). At this point, it is foreseen that this study will serve nature in order to detect poachers, prevent poaching and protect some species.
The Wild Me project is a platform where artificial intelligence and the public join forces against extinction to identify and monitor wildlife (Kim, 2019). This project aims to help groups address and solve their complex problems, and it does this by making using artificial intelligence.

MATERIALS AND METHODS

Deep Learning Practice on Sustainability and Biodiversity

Deep learning is a sub-field of artificial intelligence and machine learning that includes artificial neural networks. It is a broad field that enables computers to understand the world with concepts (Kim, 2019). Computer vision is a field of artificial intelligence that develops algorithms for computers to understand visual content (photos or videos) and parse them (Wright et al., 2010). It is an interdisciplinary field that deals with how computers extract information from these digital images (Guo et al., 2021). There are applications for computer vision such as object detection, face recognition, action and activity recognition, and human posture prediction (Voulodimos et al., 2018).

The YOLO algorithm is mainly used for object detection and processes images in real-time at 45 frames per second, working fast. It also resizes the image it takes to 448x448 pixels and processes it at 40-90 FPS At the same time, YOLO directly adapts its detection performance by learning through images (Shinde et al., 2018).

This study aims to provide a tool for identifying endemic plant species in Turkey based on deep learning. The YOLOv4 algorithm has been used in the study, and the YOLO algorithm has been run on Google Colaboratory. Colab provides a free laptop environment that runs entirely in the cloud. It also supports many popular machine learning libraries that can be easily loaded into the notebook (Google, 2021).

Model Building Process

The first stage of the study is the preparation of the data set. The images have been collected from various sites without copyright issues. A total of 2159 images have been obtained from the 19 collected species.

Various problems have been encountered during the data set collection phase. Some of these are the lack of open-source datasets, the creation of inconsistent data, and insufficient images.

The dimensions of the collected images are set to 500X500. Then, the labeling process has been carried out, and the images have been made ready. Before the training phase of the dataset, the visuals are divided into files as training and testing. The training side of the data set is 75%, and the test side is 25%.

Evaluating the results of classification is an essential consideration for a deep learning model. For this, True Positive (TP), True Negative (TN), False Positive (FP), False Negative (FN) values of the model must be calculated (Chicco et al., 2021). In the next step, accuracy, precision, sensitivity (recall), F1 score values of the model are calculated. According to the calculated values, the success rates of the model are as Figure 1.

```
class_id = 0, name = Anadolu_Glayolu, ap = 41.28%        (TP = 32, FP = 13)
class_id = 1, name = Andiz_Otu, ap = 67.82%      (TP = 27, FP = 4)
class_id = 2, name = Antalya_Cigdemi, ap = 45.24%        (TP = 13, FP = 3)
class_id = 3, name = Antalya_Suseni, ap = 44.44%         (TP = 3, FP = 0)
class_id = 4, name = Artvin_Kuduz_Otu, ap = 17.35%       (TP = 2, FP = 4)
class_id = 5, name = Can_Cicegi, ap = 20.97%     (TP = 13, FP = 11)
class_id = 6, name = Eber_Sarisi, ap = 45.80%            (TP = 14, FP = 5)
class_id = 7, name = Istanbul_Kardeleni, ap = 18.85%     (TP = 14, FP = 12)
class_id = 8, name = Istanbul_Nazendesi, ap = 16.98%     (TP = 9, FP = 8)
class_id = 9, name = Istanbul_Sogani, ap = 87.65%        (TP = 7, FP = 1)
class_id = 10, name = Kapadokya_Sogani, ap = 100.00%     (TP = 7, FP = 1)
class_id = 11, name = Kazdagi_Goknari, ap = 25.44%       (TP = 13, FP = 12)
class_id = 12, name = Mus_Lalesi, ap = 42.88%            (TP = 23, FP = 6)
class_id = 13, name = Samsun_Lohusaotu, ap = 100.00%     (TP = 5, FP = 0)
class_id = 14, name = Sevgi_Cicegi, ap = 74.15%          (TP = 35, FP = 5)
class_id = 15, name = Sigir_Kuyrugu, ap = 69.41%         (TP = 18, FP = 4)
class_id = 16, name = Sutlegen, ap = 43.90%      (TP = 14, FP = 5)
class_id = 17, name = Taslik_Cigdemi, ap = 51.55%        (TP = 18, FP = 7)
class_id = 18, name = Van_Ters_Lalesi, ap = 57.86%       (TP = 40, FP = 17)

 for conf_thresh = 0.25, precision = 0.72, recall = 0.47, F1-score = 0.57
 for conf_thresh = 0.25, TP = 307, FP = 118, FN = 352, average IoU = 55.08 %

 IoU threshold = 50 %, used Area-Under-Curve for each unique Recall
 mean average precision (mAP@0.50) = 0.511354, or 51.14 %
```

Figure 2. Results of the Model

The model's success is 51.14%, the precision value is 0.72, the sensitivity value is 0.47, and the F1 score is 0.57. The biggest reason for the low results of the model is the problems in the data set.

As it is known, machine learning models are data-dependent models. As in the problem, the absence of an open-source/accessible/copyright-free data set makes it difficult to achieve the desired performance in the model. The primary source of the low success rate of 51.14% of the model is creating the data set. When researchers tried to collect these data, they realized that there were not enough datasets to learn specifically for this problem. While trying to create this data set, different problems have been encountered: the lack of royalty-free images in some plants, unable to use royalty-free images due to incorrectly labeled images. Since endemic plant species have been studied, the data augmentation method has not increased the current success values.

RESULTS

Many species of living things live on Earth. Due to the changing climatic and natural conditions, many animal and plant species face the danger of extinction every year. Between 1970 and 2016, thousands of mammals, birds, amphibians, reptiles, and fish declined by 68%. The main reasons for this are wildlife trade and land conversions for farming (Wright et al., 2010). Every scenario where biodiversity is damaged ends with social-economic, destructive innovative transformations/viruses such as COVID-19. This makes it necessary to use artificial intelligence, a creative tool, in biodiversity for a sustainable life. This requires the use of artificial intelligence, which is a performance tool in biodiversity for a sustainable life.

However, the efficient use of artificial intelligence on biodiversity, especially plant species, is faced with insufficient data barriers. In this study, which was carried out in Turkey, it has been shown that the expected performance cannot be achieved with artificial intelligence in the sub-title of conservation of biodiversity under the main title of sustainability in every situation where there is no sufficient, open access to organized data source. In this study, which has been carried out in Turkey, it has been observed that there is not an adequate, organized open access data source and it has been shown that the expected success cannot be achieved with artificial intelligence in the sub-title of protection of biodiversity under the main title of sustainability. While the datasets created with the support of the state and private sector in the medical field enable to use of artificial intelligence with a proactive approach to human health, the absence of datasets on the natural balance/biodiversity, which is the most crucial factor in the protection of health, is quite worrying.

As a result, unless a data set specific to this subject is prepared with the open access principle, it will not be possible to develop artificial intelligence-based solutions in the prediction, detection, and improvement studies of potential problems based on local biodiversity that may occur in the near future.

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TROUGH THE EYES OF A TRAVELER: WALTHER VON DIEST'S FINDINGS ON BARTIN AND AMASRA

Handan Bilici Altunkayalıer
Bartın Üniversitesi, Edebiyat Fakültesi, Sanat Tarihi Bölümü, Bartın Türkiye
ORCID Code: 0000-0003-0676-4696

ABSTRACT

Walther von Diest published his notes on the travels he made between Pergamon and Pontus in September-November 1886, with the name "Von Pergamon über Dindymos zum Pontus" in 1889. The part of the said trips, which started on October 7, 1886, is called "from Sakarya to Billaeus"; the determinations of the province of Bartın and the district of Amasra are also included in this section. Suggestions regarding the location of the Parthenios settlement were expressed in the part of the Bartın Province of the tour, which was carried out between October 20 and October 29, 1886, the situation was evaluated about the existing ruins of Ancient Amastris, and new findings were. In this paper, the sections on Bartın and Amasra in this book, which is one of the publications that serve as a guide for archaeological research in the region, were translated and the changes in the situation of ancient finds in the region in approximately 150 years were made by comparing von Diest's findings with the data determined in the archaeological researches carried out in the area today. Thus, conservation proposals were discussed by drawing attention to the destruction of material cultural remains in the region.

Keywords: Bartın, Amasra, Amastris, Parthenios, Travel Notes

BİR GEZGİNİN GÖZÜNDEN BARTIN: WALTHER VON DİEST'İN BARTIN VE AMASRA'YA DAİR TESPİTLERİ

Handan Bilici Altunkayalıer
Bartın Üniversitesi, Edebiyat Fakültesi, Sanat Tarihi Bölümü, Bartın Türkiye
ORCID Code: 0000-0003-0676-4696

ÖZET

Walther von Diest, 1886 yılı Eylül-Kasım aylarında Pergamon-Pontus arasında yapmış olduğu gezilere ait notlarını "Von Pergamon über Dindymos zum Pontus" ismi ile 1889 yılında kitaplaştırmıştır. Söz konusu gezilerin 7 Ekim 1886 tarihinde başlayan bölümü "Sakarya'dan Billaeus'a" olarak isimlendirilmekte; Bartın ili ile Amasra ilçesine ait tespitler de bu bölümde yer almaktadır. 20 Ekim-29 Ekim 1886 tarihleri arasında gerçekleştirilen gezinin Bartın İline ait bölümünde Parthenios yerleşiminin konumuna ilişkin öneriler dile getirilmiş, Antik Amastris'in mevcut kalıntıları hakkında durum değerlendirilmesi yapılmış, yeni tespitler aktarılmıştır. Bu bildiride, bölgeye ilişkin arkeolojik araştırmalarda rehber niteliği taşıyan yayınlardan biri olan bu kitaptaki Bartın ve Amasra'ya ait bölümlerinin çevirisi yapılmış ve von Diest'in tespitleriyle günümüzde alanda yapılan arkeolojik araştırmalarda tespit edilen verilerin karşılaştırılması yapılarak, bölgedeki antik buluntuların durumunun yaklaşık 150 yıl içindeki değişimi anlatılmıştır. Böylece bölgedeki maddi kültür kalıntılarının tahribatına dikkat çekilerek koruma önerileri tartışılmıştır.

Anahtar Kelimeler: Bartın, Amasra, Amastris, Parthenios, Seyahat Notları

EXPERIENCES AND PRODUCT CHOICES OF MOTHERS IN THE COMPLEMENTARY FEEDING PERIOD: A QUALITATIVE RESEARCH

Hilal Ecren İlter Duman[*1], Hilal Hızlı Güldemir[2], Hüseyin Aydın[3]

*[*1]Kütahya Porselen Industry Inc. Design Center, Kütahya, Türkiye.*
[2]Anadolu University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Eskişehir, Türkiye.
[3]Kütahya Porselen Industry Inc. Design Center, Kütahya, Türkiye
ORCID Code: [1] 0000-0002-3164-3514, [2]0000-0002-3951-5023, [3]0000-0002-6361-5745

ABSTRACT

Complementary feeding is defined as feeding the child with healthy and safe foods in addition to breast milk in order to ensure growth and development in the 6-24 month period and to shape healthy eating behavior. The aim of this study is to investigate the experiences of mothers with 6-24 month old babies in the complementary feeding period and their product choices specific to this period. In the study, 14 mothers with an average of 29 years old and 13 months old babies were interviewed. Online interviews were made with the participants who agreed to be interviewed voluntarily, by making an appointment at a suitable time period, and these interviews were then transcribed. These recorded interviews lasted an average of 40-50 minutes. The answers given by the mothers to the questions were coded, and themes related to complementary feeding experiences were determined. The data obtained were evaluated in seven themes: mothers' experiences and feelings, methods and products used in food preparation and cooking, methods and products used in feeding and drinking, methods and products used in storing foods, baby-specific applications, product selection criteria and aesthetic concerns. It has been observed that mothers have a high level of concerns to do the best for their baby. Glass, porcelain and ceramic tools come to the fore in the products they use. The choice of material that is healthy and does not leave chemical residues is at the forefront. Steaming is the main cooking method that mothers trust and practice for their baby. In general, mothers prefer to prepare meals fresh and do not store them for a long time. While mothers give importance to the aesthetic appearance of the products they choose, they prioritize practicality in the usage process. The preparation of foods in accordance with food safety principles and the selection of equipment used for this purpose is an important issue that should be considered for infant health.

Keywords: nutrition, cooking, storage, complementary feeding

TAMAMLAYICI BESLENME DÖNEMİNDE ANNELERİN DENEYİMLERİ VE ÜRÜN SEÇİMLERİ: NİTEL BİR ÇALIŞMA

Hilal Ecren İlter Duman[1], Hilal Hızlı Güldemir[2], Hüseyin Aydın[3]

*[*1]Kütahya Porselen Sanayi A.Ş. Tasarım Merkezi, Kütahya, Türkiye.*
[2]Anadolu Üniversitesi, Sağlık Bilimleri Fakültesi, Beslenme ve Diyetetik Bölümü, Eskişehir, Türkiye.
[3]Kütahya Porselen Sanayi A.Ş. Tasarım Merkezi, Kütahya, Türkiye
ORCID Code: [1] 0000-0002-3164-3514, [2]0000-0002-3951-5023, [3]0000-0002-6361-5745

ÖZET

Tamamlayıcı beslenme, 6-24 aylık dönemde büyüme ve gelişmesinin sağlanması ve sağlıklı beslenme davranışının biçimlendirilmesi için anne sütüne ek olarak, çocuğun sağlıklı ve güvenilir gıdalarla beslenmesi olarak tanımlanmaktadır. Bu çalışmanın amacı tamamlayıcı beslenme döneminde 6-24 aylık bebeği olan annelerin deneyimlerini ve bu döneme özgü ürün seçimlerini araştırmaktır. Çalışmada ortalama 29 yaşında ve 13 aylık bebeği olan 14 anne ile mülakat yapılmıştır. Gönüllü olarak görüşmeyi kabul eden katılımcılar ile uygun oldukları zaman dilimine randevulaşarak online görüşmeler yapılmış, bu görüşmeler daha sonra yazıya geçirilmiştir. Kaydedilen bu görüşmeler ortalama 40-50 dakika sürmüştür. Annelerin yöneltilen sorulara verdikleri yanıtlar kodlanmış, tamamlayıcı beslenme deneyimleri ile ilgili temalar belirlenmiştir. Elde edilen veriler annelerin deneyimleri ve hisleri, besinleri hazırlık aşamasında ve pişirmede kullanılan yöntemler ve ürünler, besinleri yedirme ve içirmede kullanılan yöntemler ve ürünler, besinleri saklamada kullanılan yöntemler ve ürünler, bebeğe özel uygulamalar, ürün seçimindeki kriterler ve estetik kaygılar olmak üzere yedi temada değerlendirilmiştir. Annelerin bebeği için en iyisini yapabilme kaygısının yüksek olduğu, kullandıkları ürünlerde de cam, porselen ve seramik araçların ön plana çıktığı görülmüştür. Materyal olarak sağlıklı ve kimyasal kalıntı bırakmayan materyal seçimi ön plandadır. Buharda pişirme, annelerin güvendiği ve bebeği için uyguladığı başlıca pişirme yöntemidir. Genelde anneler öğünleri taze hazırlamayı tercih etmekte, uzun süreli saklama işlemi yapmamaktadır. Anneler seçtiği ürünlerin estetik görünüşüne önem vermekle birlikte kullanım sürecinde pratikliği daha ön planda tutmaktadır. Besinlerin gıda güvenliği ilkelerine uygun şekilde hazırlanması ve bu amaçla kullanılan araç gereç seçimi bebek sağlığı için göz önünde bulundurulması gereken önemli bir konudur.

Anahtar kelimeler: beslenme, pişirme, saklama, tamamlayıcı beslenme

EĞİTİM FAKÜLTESİ ÖĞRENCİLERİNİN PSİKOLOJİK ESNEKLİK DÜZEYLERİNİN İNCELENMESİ

Dr. Öğr. Üyesi Gülşah TURA
Kocaeli Üniversitesi, Eğitim Bilimleri Bölümü, Rehberlik ve Psikolojik Danışmanlık Ana Bilim Dalı,
ORCID Code:0000-0002-0611-7993

Ali Rıza SUBAŞI
Kocaeli Üniversitesi, Eğitim Bilimleri Bölümü, Rehberlik ve Psikolojik Danışmanlık Ana Bilim Dalı
Yüksek Lisans Öğrencisi
ORCID Code:0000-0003-1705-2969

ÖZET

Bu araştırmada eğitim fakültesi öğrencilerinin psikolojik esneklik düzeylerinin ne düzeyde olduğunun ve psikolojik sağlamlık becerileri arasındaki ilişkinin incelenmesi amaçlanmaktadır. Bu çalışma ilişkisel tarama modelinde betimsel bir araştırmadır. Araştırmanın örneklemini bir üniversitenin eğitim fakültesinde öğrenim gören 190'ı kadın 41'i erkek 231 öğrenci oluşturmaktadır. Araştırmada veri toplama aracı olarak Francis, Dawson ve Golijani-Moghaddam (2016) tarafından geliştirilmiş olan, Türkçe'ye uyarlama çalışması Karakuş ve Akbay (2020) tarafından gerçekleştirilen Psikolojik Esneklik Ölçeği ve Smith ve ark. (2008) tarafından geliştirilmiş olan, Türkçe'ye uyarlaması Doğan (2015) tarafından gerçekleştirilen Kısa Psikolojik Sağlamlık Ölçeği kullanılmıştır. Araştırmada kullanılan verilerin normal dağılması nedeniyle parametrik testler kullanılmıştır. Eğitim fakültesi öğrencilerinin psikolojik esneklik düzeyleri ve psikolojik sağlamlık düzeyleri arasındaki ilişkiyi belirlemek için Pearson korelasyon analizi kullanılmıştır. Anlamlılık düzeyi .05 olarak belirlenmiştir. Elde edilen bulgulara göre eğitim fakültesi öğrencilerinin psikolojik esneklik ve psikolojik sağlamlık düzeylerinin orta seviyenin üzerinde olduğu belirlenmiştir. Eğitim fakültesi öğrencilerinin psikolojik esneklik düzeyleri cinsiyete göre anlamlı bir farklılık göstermektedir. Kadın öğrencilerin psikolojik esneklik düzeyleri erkek öğrencilerden anlamlı düzeyde yüksektir. Öğrencilerin psikolojik sağlamlık düzeylerini ise cinsiyete göre anlamlı düzeyde farklılaşmamaktadır. Eğitim fakültesi öğrencilerinin psikolojik esneklik ve psikolojik sağlamlık düzeylerinin bölümlere göre anlamlı düzeyde farklılaşmadığı görülmektedir. Eğitim fakültesi öğrencilerinin psikolojik esneklik düzeylerinin algılanan gelir düzeylerine göre düşük ve orta gelirli öğrenciler arasında anlamlı düzeyde farklılık gösterdiği ve bu farkın düşük gelir düzeyi aleyhinde olduğu görülmektedir. Eğitim fakültesi öğrencilerinin psikolojik sağlamlık düzeylerinin algılanan gelir düzeylerine göre anlamlı düzeyde farklılaşmadığı görülmektedir. Sonuç olarak eğitim fakültesi öğrencilerinin psikolojik esneklik düzeyleri ve psikolojik sağlamlık düzeyleri arasında orta düzeyde pozitif yönde anlamlı bir ilişki bulunmuştur.

Anahtar Kelimeler: Psikolojik esneklik, Psikolojik sağlamlık, Eğitim fakültesi öğrencileri

ABSTRACT

In this study, it is aimed to examine the level of psychological flexibility of education faculty students and the relationship between psychological resilience skills. This study is a descriptive research in relational screening model. The sample of the study consists of 231 students, 190 female and 41 male, studying at the education faculty of a university. The Psychological Resilience Scale developed by Francis, Dawson and Golijani-Moghaddam (2016) and adapted into Turkish by Karakuş and Akbay (2020) and Smith et al. (2008) and the Short Psychological Resilience Scale was used adapted into Turkish by Doğan (2015). Parametric tests were used because of the normal distribution of the data used in the study. Pearson correlation analysis was used to determine the relationship between the psychological flexibility and resilience levels of education faculty students. The significance level was determined as .05. According to the findings, it was determined that the psychological flexibility and psychological resilience levels of the education faculty students were above the medium level. Psychological flexibility levels of education faculty students show a significant difference according to gender. Psychological flexibility levels of female students are significantly higher than male students.

Psychological resilience levels of students do not differ significantly according to gender. It is seen that the psychological flexibility and psychological resilience levels of the education faculty students do not differ significantly according to the departments. It is seen that the psychological flexibility levels of education faculty students differ significantly between low and middle income students according to their perceived income levels, and this difference is against low income level. It is seen that the psychological resilience levels of the education faculty students do not differ significantly according to their perceived income levels. As a result, a moderately positive and significant relationship was found between the psychological flexibility levels and psychological resilience levels of the education faculty students.

Keywords: Psychological flexibility, Psychological resilience, Education faculty students

THE EVALUATION OF THE ACTIVITIES IN THE HISTORY OF REVOLUTIONS AND ATATURKISM TEXTBOOK OF 8TH GRADES IN TERMS OF HISTORICAL LITERACY

Prof. Dr. Rahmi ÇİÇEK, İsmail DÜZ, Enes KÜÇÜK
Faculty of Education, Trabzon University, Trabzon

ABSTRACT

The purpose of the present study was to evaluate the activities in the 8th Grade History of Revolution and Ataturkism Textbook in terms of historical literacy. The Document Analysis Method, which is one of the Descriptive Research Techniques, was used in the study that uncovered the relations between the activities in the textbook and the sub-dimensions of the historical literacy skill. All the activities in the textbook were associated with the sub-skills of historical literacy, and it was uncovered to what extent the activities for which skills were discussed in the textbook. In the study, the 8th Grade History of Revolutions and Ataturkism Textbook used in the 2020-2021 Academic Year was used as the data source. The data were analyzed with the Content Analysis Technique. It was seen that the historical literacy skills in the textbook activities that were examined in the study were related to historical literacy sub-skills such as chronological thinking, historical research skills, associating the past with the present, establishing cause-effect relations, and knowledge of historical events.

Keywords: History literacy, textbook activities, Turkish Republic History of Revolutions and Ataturkism

8. SINIF T.C. İNKILÂP TARİHİ VE ATATÜRKÇÜLÜK DERS KİTABINDA YER ALAN ETKİNLİKLERİN TARİH OKURYAZARLIĞI AÇISINDAN DEĞERLENDİRİLMESİ

Prof. Dr. Rahmi ÇİÇEK, İsmail DÜZ, Enes KÜÇÜK
Eğitim Fakültesi, Trabzon Üniversitesi, Trabzon

ÖZET

Bu araştırmanın amacı 2018 yılında güncellenen 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük Ders Programı ile Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu'nun 18 Nisan 2019 tarih ve 8 sayılı kararı ile kabul edilmiş olan ve 2019-2020 eğitim-öğretim yılından itibaren okullarda beş yıllık süreyle ders kitabı olarak okutulması kararlaştırılan Gezegen Yayıncılığa ait 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinlikleri tarih okuryazarlığı açısından değerlendirmektir. Araştırmada ''Tarih okuryazarlığı ve tarih okuryazarlığının alt becerileri hangi etkinliklerde sorgulanmıştır?'', Söz konusu etkinlikler tarih okuryazarlığı ve tarih okuryazarlığının alt becerilerini kazandırma noktasında sayısal açıdan yeterli midir?'' ve ''Öğrenme alanlarında tarih okuryazarlığı ve alt becerileri nasıl dağılmıştır?'' sorularına cevap aranmıştır. Bu çerçevede araştırmada nitel bir veri toplama tekniği olan doküman analizi yöntemi kullanılarak söz konusu ders kitabında yer alan etkinliklerin tarih okuryazarlığı ve tarih okuryazarlığının alt becerileriyle olan ilişkileri ortaya koyulmuştur.

Bununla birlikte, elde edilen veriler de içerik analizi tekniği ile çözümlenmiştir. Araştırma sonucunda incelenmiş olan 8. Sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinliklerde tarih okuryazarlığı alt becerilerinden; kronolojik düşünme becerisi, tarihsel araştırma becerisi, geçmişle günümüzü ilişkilendirme becerisi, neden-sonuç ilişkisi kurabilme becerisi, tarihi olaylar bilgisi ve tarihsel empati becerilerini kazandırmaya yönelik etkinliklere yer verilirken, tarihsel olayları anlatı şeklinde ifade etme becerisine ve ahlaki muhakeme yapabilme becerisine hiçbir öğrenme alanında yer verilmediği ve çelişkili yorumları ayırt edebilme becerisine ise sadece Milli Uyanış: Bağımsızlık Yolunda Atılan Adımlar öğrenme alanında yer verildiği tespit edilmiştir.

Anahtar Kelimeler: Tarih okuryazarlığı, ders kitabı etkinlikleri, Türkiye Cumhuriyeti İnkılâp Tarihi ve Atatürkçülük.

1. GİRİŞ

İnsanoğlunun tarihe olan bakış açısı geçmişten günümüze kadar değişikliğe uğramış ve insanoğlu dönem dönem tarihe farklı anlamlar yüklemiştir. İnsanoğlunun tarihe olan bakış açısı ve tarihe yüklediği anlamın farklılaşması yaşadığı dönemin siyasal, sosyal, ekonomik ve dini vb. koşullarının etkisiyle olmuştur. Bu durum toplumların tarih öğretimine bakış açılarını da doğrudan veya dolaylı olarak etkilemiş ve toplumlar tarih öğretimini yaşadıkları dönemin koşulları bağlamında ele alarak düzenlemişlerdir (Demircioğlu, 2012, s. 115). Özellikle ulus devletlerin oluşmaya başladığı 19. Yüzyılda ortaya çıkan ‘‘ülkesine ve milletine bağlı, içinde yaşadığı toplumun kültür ve değerlerini benimseyen ve yücelten bireyler yetiştirmenin’’ önem kazanmasıyla birlikte, tarih derslerinin amaçları da ulusal kimlik oluşturma, kültür aktarımı ve devlete bağlılık çerçevesinde yeniden şekillenmiştir (Demircioğlu, 2014, s.1177).

Kuşkusuz, eğitimdeki bu anlayış üzerinde Fransız İhtilali (1789-1799) sonucunda ortaya çıkan *ulusçuluk, ulusal kimlik* ve *milli kültür* gibi kavramların etkisi olduğu anlaşılmaktadır. Bu doğrultuda ülkemizde de cumhuriyetin kurucu kadrosu ‘‘ulusal kimlik ve cumhuriyete sadakatin oluşmasını sağlamanın en önemli yolunun eğitimden geçtiği’’ anlayışından hareketle ülke genelinde standartlaştırılmış bir eğitim sistemi oluşturmayı amaçlamıştır (Şimşek, Küçük & Topkaya, 2012, s. 2820). Bu çerçevede İnkılâp Tarihi dersleri ulus devlet anlayışını yani yeni devletin yapısını ve kuruluş felsefesini topluma benimsetme ve gelecek kuşaklara öğretme noktasında önemli bir görev üstlenmektedir (Dönmez & Yazıcı, 2008).

Öyle ki, İnkılâp Tarihi dersleri ‘‘ülkenin bütünlüğünü koruma ve yaşatma, Atatürk İlke ve İnkılâplarına yönelik olumlu tutum kazandırma’’ noktasında adeta bir rejim dersi olarak karşımıza çıkmaktadır (Akbaba, 2007). Başka bir ifadeyle, İnkılâp Tarihi Dersleri ülkenin geleceğinin teminatı olarak görülmektedir (Akgün, 2004, s. 23). Bu itibarla İnkılâp Tarihi nedir? Sorusuna cevap vermek faydalı olacaktır.

Atatürk İlkeleri ve İnkılâp Tarihi dersinin kökeni cumhuriyetin ilk yıllarına kadar uzanmaktadır. İlk olarak 1925 yılında Ankara’da Adliye Hukuk Mektebinde “*İhtilaller Tarihi*” adıyla okutulmaya başlanan bu dersin amacı, genç nesillere Türk İnkılâbının özelliklerini anlatmak ve önceki yıllarda yapılan inkılâp hareketleriyle karşılaştırmalarını sağlamaktı (Mumcu, 1997, s. 67-68). Bundan sonra İnkılâp Tarihi dersi 4 Mart 1934’te İstanbul Üniversitesi’nde açılışı yapılan İnkılâp Enstitüsü’nde okutulmaya başlanmış ve ilk ders Maarif Vekili Yusuf Hikmet Bayur tarafından verilmiştir. Bu tarihten iki hafta sonra da (20 Mart 1934) Ankara Üniversitesi Hukuk Fakültesinde bizzat dönemin Başvekili İsmet İnönü tarafından verilen İnkılâp Tarihi dersinin, 1934-1935 eğitim-öğretim yılından itibaren düzenli olarak okutulmasına başlanmıştır (Doyran & Doyran, 2013, s. 165).

1 Ekim 1941’e gelindiğinde ise dönemin Cumhurbaşkanı İsmet İnönü bir meclis konuşmasında: ‘‘Şimdiye kadar konferans biçiminde verilen derslerin yükseköğretim kurumlarında esaslı bir ders şeklinde verilmesi” ve ayrıca bu konularda bilimsel araştırmalar yapmak amacıyla “Türk İnkılâp Tarihi ve Türkiye Cumhuriyeti Enstitüsü ”nün kurulması’’ gereğini dile getirmiştir. Bu konuşma üzerine Milli Eğitim Bakanlığı harekete geçerek TBMM’ye bir tasarı götürmüş ve Türk İnkılâp Tarihi Enstitüsü’nün kurulmasını talep etmiştir. TBMM’de 15 Nisan 1942 tarihli kabul edilen tasarıyla Türk İnkılâp Tarihi Enstitüsü’nün kurulması kararlaştırılmış ve bu tarihe kadar siyasiler tarafından konferans biçiminde verilen İnkılâp Tarihi Dersleri üniversitelerin görevli öğretim üyelerine bırakılmıştır (Bolat, 2017, s. 48-71; İnan, 2012, s. 52-55).

Zaman içerisinde "Türk İnkılâp Tarihi ve Türkiye Cumhuriyet Rejimi" ve "Türk Devrim Tarihi" gibi çeşitli adlarla okutulan bu ders, 6 Kasım 1981 tarih ve 2547 sayılı Yükseköğretim Kanunuyla "Atatürk İlkeleri ve İnkılâp Tarihi" adını almış ve söz konusu kanunun 4. ve 5. maddelerine göre Atatürk İlkeleri ve İnkılâp Tarihi dersinin yükseköğretimin her kademesinde zorunlu hâle getirilmesi kararlaştırılmıştır. 1990 yılına gelindiğinde de kanunun ilgili maddelerinde yapılan bir düzenlemeyle dersin sadece yükseköğretim düzeyinde birinci sınıflarda ve iki dönem şeklinde okutulması kararlaştırılmıştır (Babaoğlu, 2013, s. 593; Erdem, 2010, s. 1074-1078).

Bununla birlikte, Milli Eğitim Bakanlığı 2018 tarihinde yapmış olduğu bir düzenlemeyle T.C. İnkılâp Tarihi ve Atatürkçülük dersinin amaçlarını şu şekilde belirlemiştir;

1. Atatürk'ün askerlik ve devlet adamlığı yetenekleri ile inkılâpçı niteliklerini öğrenerek onun kişilik özelliklerini örnek almaları,

2. Millî Mücadele örneğinden hareketle Türk milletinin millî birlik ve beraberlik anlayışı içerisinde özgürlük, bağımsızlık ve vatanseverlik duyguları ile her türlü zorluğun üstesinden gelebileceğini anlamaları,

3. Türk Millî Mücadelesi ve inkılâbının, millî ve evrensel özelliklerini kavramaları,

4. Dönemin ağır şartlarında büyük güçlüklere rağmen Atatürk'ün önderliğinde gerçekleştirilen Türk İnkılabının tarihî anlamını ve önemini kavramaları,

5. İnsan hakları, ulusal egemenlik, tam bağımsızlık, milliyetçilik, demokrasi, çağdaşlık, laiklik ve cumhuriyet kavramlarının Türk milleti için ifade ettiği anlam ve önemi kavramaları,

6. Atatürk İlke ve İnkılaplarının Türkiye Cumhuriyeti'nin sosyal, kültürel ve ekonomik gelişmesindeki yerini kavrayarak Atatürk İlke ve İnkılaplarının esas aldığı değerleri yaşatmaya istekli olmaları,

7. Türkiye Cumhuriyeti vatandaşı olarak vatanını ve milletini seven, haklarını bilen ve kullanan, sorumluluklarını yerine getiren, millî bilince sahip, millî, manevi ve evrensel değerleri benimseyen birer vatandaş olarak yetişmeleri,

8. Atatürk İlke ve İnkılaplarının, ülkesi ve milleti ile bölünmez bir bütün olan Türkiye Cumhuriyeti'nin dinamik temelini oluşturduğunu kavramaları,

9. Türkiye'nin jeopolitik önemini bölgesel ve küresel etkileri açısından değerlendirerek iç ve dış tehditlere karşı duyarlı olmaları,

10. Bu programda ifade edilen kişisel ve sosyal yeterlik ve becerilerin yanı sıra, tarihe özgü beceri ve yeterlikleri de kazanarak geçmiş, günümüz ve gelecek arasında bağlantılar kurmaya dayalı bir tarih bilinci geliştirmeleri,

11. Türk milletinin bir mensubu ve insanlığın bir parçası olduğu bilincini taşıyarak Türkiye'yi ve dünyayı ilgilendiren konulara duyarlılık göstermeleri,

12. Günümüzün sorunlarına mantıklı bir yaklaşımla çözümler üretmesini sağlayacak ve kendilerini geleceğe hazırlayacak bilgi, beceri, değer ve tutumlar kazanmalarını sağlama şeklinde belirlemiştir (MEB, 2018, s. 8).

Bu amaçlardan da anlaşılacağı gibi Atatürk İlkeleri ve İnkılâp Tarihi dersi ile gençlerde Türk İnkılâbının temel felsefesine, Cumhuriyet rejimine ve Atatürk İlke ve İnkılâplarına karşı olumlu tutum kazandırmak hedeflenmektedir (Safran, 2004, s. 112). Kuşkusuz bu hedefi gerçekleştirmek için İnkılâp Tarihi Ders kitaplarında pek çok etkinlik yer almaktadır. Bu etkinlikler yolu ile tarih okuryazarlığı ve tarih okuryazarlığının alt becerileri öğrencilere kazandırılması amaçlanmaktadır. Bu doğrultuda etkinlik nedir? ve Tarih okuryazarlığı nedir? sorularına cevap vermelidir.

Öğretim programlarının temel kavramlarından biri olan etkinlik, gerek günlük yaşamda gerekse eğitim-öğretim sürecinde sosyal etkinlik, spor etkinliği ve öğretim etkinliği gibi farklı anlam ve uygulama alanlarını kapsayan bir terim olarak karşımıza çıkmaktadır. Türk Dil Kurumu'nun resmi web sitesindeki sözlükte de etkinlik kelimesi; ''Çocukların, kendi amaç ve gereksinmelerine uygun geldiği için isteyerek katıldıkları herhangi bir öğrenme durumu'' şeklinde ifade edilmektedir (Uğurel & Güzel, 2010, s. 334).

Tarih okuryazarlığı kavramı ise ilk defa Scheiber 1978 yılında kullanılmış olup, tüm öğrencilerin bilmesi gereken temel tarihsel bilgileri öğrenmelerini ve gündelik hayatta uygulayabilmelerini ifade etmektedir (Topçu & Kaptan, 2018, s. 156). Tarih okuryazarlığının; Kronolojik Düşünme Becerisi, Tarihsel Anlama (Kavrama) Becerisi, Neden-Sonuç İlişkisi Kurma Becerisi, Tarihsel Analiz ve Yorum Becerisi, Tarihsel Empati, Tarihsel Olayları Anlatı Şeklinde İfade Etme Becerisi, Geçmiş ve Günümüz Olaylarını İlişkilendirebilme Becerisi, Ahlaki Muhakeme Yapabilme Becerisi, Tarihsel Olaylar Bilgisi, Bilgi İletişim Teknolojilerini Kullanma Becerisi, Çelişkili Yorumları Ayırt Edebilme Becerisi ve Tarihsel Araştırma Becerisi gibi alt becerileri bulunmaktadır (Aydın & Tekdal, 2021, s. 7-22).

Bu noktadan hareketle ilgili literatür incelendiğinde Ata ve Keçe (2014)'nin sosyal bilgiler öğretmenlerinin görüşleri doğrultusunda öğrencilerin tarih okuryazarlığı düzeylerine etki eden faktörleri inceledikleri ve bu görüşler zemininde yapılan değerlendirmelerin nedenlerini tartıştıkları görülmektedir. Bununla birlikte, Keçe (2015) tarafından Türkiye'de yürürlükte olan 9, 10, 11 ve 12. sınıf tarih öğretim programlarında tarih okuryazarlığı becerilerinin daha çok hangi boyutuna yer verildiği ve sınıflar bazında nasıl bir dağılımın dikkate alındığını belirlenmeye çalışılmıştır. Keçe (2016) başka bir araştırmasında tarih öğretim programlarına yön veren iki temel beceri olan tarihsel düşünme ve tarih okuryazarlığı becerilerini karşılaştırarak tarihsel düşünme becerilerinin sorgulayıcı ve yorumlayıcı tarih öğretim sürecine odaklandığını ve tarih okuryazarlığının hayatın bütününü kuşatan bir anlayışın ürünü olduğu tespit etmiştir. Mevcut literatürden de anlaşılacağı gibi 8. Sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinliklerin tarih okuryazarlığı açısından değerlendirmesine yönelik bir araştırmaya rastlanmamıştır.

Dolayısıyla bu araştırma ile 8. Sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinlikler tarih okuryazarlığı açısından değerlendirilerek alandaki boşluğun doldurulmasına katkı sağlamak amaçlanmıştır. Belirtilen amaç doğrultusunda aşağıdaki sorulara cevap aranmıştır;

1. Tarih okuryazarlığı ve tarih okuryazarlığının alt becerileri hangi etkinliklerde sorgulanmıştır?
2. Söz konusu etkinlikler tarih okuryazarlığı ve tarih okuryazarlığının alt becerilerini kazandırma noktasında sayısal olarak yeterli midir?
3. Öğrenme alanlarında tarih okuryazarlığı ve alt becerileri nasıl dağılmıştır?

2. YÖNTEM

Bu araştırma nitel[5] yönelimli bir araştırma olup, araştırmayla ilgili olgu ve olgular hakkında bilgi içeren yazılı materyaller doküman incelemesi[6] yoluyla elde edilmiştir.

2.1. Evren ve Örneklem

Bu araştırmanın evrenini 2018 yılında güncellenen 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük Ders Programı ile Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu'nun 18 Nisan 2019 tarih ve 8 sayılı kararı ile kabul edilmiş olan ve 2019-2020 eğitim-öğretim yılından itibaren okullarda beş yıllık süreyle ders kitabı olarak okutulması kararlaştırılan Gezegen Yayıncılığa ait 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabındaki tüm etkinlikler oluşturmaktadır.

Bununla birlikte, araştırmada kullanılan etkinlikler araştırmanın amacına uygun olarak evrenden seçilmiş olup, tarih okuryazarlığı ile tarih okuryazarlığının alt becerileri olan kronolojik düşünme becerisi, tarihsel araştırma becerisi, geçmişle günümüzü ilişkilendirme becerisi, neden-sonuç ilişkisi kurabilme becerisi, tarihi olaylar bilgisi ve tarihsel empati becerisi gibi becerilerle bağlantılı olan etkinlikler de örneklem olarak belirlenmiştir.

2.2. Verilerin Toplanması

Araştırmada doküman analizi yöntemi kullanılarak veri kaynağı olan 2018 basımlı 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük Ders Programı ile Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu'nun 18 Nisan 2019 tarih ve 8 sayılı kararı ile kabul etmiş olduğu ve 2019-2020 eğitim-öğretim yılından itibaren okullarda beş yıllık süreyle ders kitabı olarak okutulması kararlaştırılan Gezegen Yayıncılığa ait 8. sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinlikler tarih okuryazarlığı ve tarih okuryazarlığının alt becerileri bağlamında incelenmiştir. Ders kitabı içerisinde yer alan etkinliklerin tamamı tarih okuryazarlığının alt becerileri ile ilişkilendirilmiş ve ders kitabı içerisinde hangi beceriye ait etkinliklerin ne boyutta ele alındığı ortaya çıkarılmıştır.

2.3. Verilerin Analizi

Araştırmada elde edilen veriler nitel veri çözümleme tekniklerinden birisi olan içerik analizi tekniği[7] ile çözümlenmiştir. Araştırma sonucunda incelenmiş olan 8. Sınıf T.C. İnkılâp Tarihi ve Atatürkçülük ders kitabında yer alan etkinliklerde tarih okuryazarlığı ve tarih okuryazarlığının alt becerileri olan kronolojik düşünme becerisi, tarihsel araştırma becerisi, geçmişle günümüzü ilişkilendirme becerisi, neden-sonuç ilişkisi kurabilme becerisi, tarihi olaylar bilgisi ve tarihsel empati becerisi gibi becerilere yönelik etkinlere yer verildiği tespit edilmiştir.

[5] Bilindiği gibi nitel araştırma anlama odaklanarak veri toplarken ve toplanan verileri yorumlarken anlamı ortaya çıkarmaktadır. Nitel araştırmada veri toplamak gözlem, görüşme ve doküman analizi gibi nitel veri toplama yöntemleri kullanılmaktadır. Ayrıntılı bilgi için bkz. Merriam, S. B. (2015). *Nitel araştırma desen ve uygulama için bir rehber*. (S. Turan, Çev. Ed.). Anakara: Nobel Yayıncılık. s. 1-19.

[6] Döküman incelemesi araştırma kapsamında incelenen konuyla ilgili görüşme ve gözlem yapmaya gerek kalmaksızın verilerin belge incelemesi yoluyla elde edildiği bir yöntemdir. Bu sayede araştırmacılar araştırma konularını göz önünde bulundurarak hangi dökümanın araştırmaları için önemli olduğuna ve hangilerini veri kaynağı olarak kullanabileceklerine karar vererek zaman ve kaynak tasarrufu sağlamış olurlar. Ayrıntılı bilgi için bkz. Yıldırım, A., & Şimşek, H. (2008). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri* (6. Baskı). Ankara: Seçkin Yayıncılık. s. 188.

[7] İçerik analizi verilerin belirli kavramlar ve temalar etrafında bir araya getirilmesi ve bunların anlaşılır biçimde düzenlenmesi sürecidir. Bu bağlamda tümevarımcı analiz olarak da adlandırılmaktadır (Yıldırım & Şimşek, 2008, s. 186-187).

3. Bulgular

3.1. Bir Kahraman Doğuyor Öğrenme Alanı

T. C. İnkılâp Tarihi ve Atatürkçülük ders kitabının ‘‘Bir Kahraman Doğuyor’’ adlı ünitesinde 19. Yüzyılın sonları ile 20. Yüzyılın başlarında Avrupa’da meydana gelen siyasi, sosyal ve ekonomik gelişmelerden, söz konusu dönemde Osmanlı Devleti’nde meydana gelen değişimden, Mustafa Kemal’in çocukluk ve gençlik dönemi ile öğrenim hayatından, 31 Mart Olayı, Trablusgarp Savaşı ve Balkan Savaşları gibi konulardan bahsedilmiştir. Ders kitabında söz konusu konularla ilgili tarih okuryazarlığı ve tarih okuryazarlığının alt becerilerinin öğrencilere kazandırılması amacıyla çeşitli etkinliklere yer verildiği görülmektedir.

Nitekim ‘‘Güçlü Avrupa’nın Doğuşu ve Osmanlı Devleti’’ başlığı altında Coğrafi Keşiflerden, Rönesans ve Reform Hareketlerinden, Aydınlanma Çağından, Fransız İhtilâli, Sanayi İnkılâbı ve Sömürgecilik konularından bahsedildikten sonra ‘‘Sanayi inkılabı sonucu birçok ham madde ihtiyacı ortaya çıktı. Bunlardan üç siyah adı verilen ve sanayi alanında önemli olan ham madde hangileridir?’’ sorusuyla öğrencilerin tarihsel bilgi becerilerini geliştirme amaçlandığı görülmektedir. Yine aynı öğrenme alanı içerisinde baktığımızda ‘’ sömürgecilik hakkında neler biliyorsunuz? Günümüzde sömürgecilik yapan ülkeler var mı? Düşüncelerinizi söyleyiniz’’ soruları geçmişle günümüz arasında ilişki kurma becerisini, ‘‘Sizce devletler hukuk alanında neden yenilikler yapar? ‘’ sorusu neden sonuç ilişkisi kurma becerisini, ‘‘Osmanlı devletinin hangi alanlarda yenilik yapması gerektiğini düşünüyorsunuz’’ sorusu tarihsel analiz ve yorum yapma becerisini, ‘‘Mustafa Kemal’in Minber adında bir gazete çıkardığını ve 52 sayı yayımlanan bu gazetede ilk defa sansür kelimesinin geçtiğini biliyor musunuz? ‘’ etkinliği de yine tarihsel olaylar bilgisi becerisine yönelik etkinliklere örnek olarak verilebilir.

Bununla birlikte, söz konusu öğrenme alanını incelediğimizde toplamda 36 adet etkinliğe yer verildiğini görmekteyiz. Bu etkinliklerde tarihsel araştırma becerisi 4, kronolojik düşünme 2, tarihsel anlama ve kavrama becerisi 2, neden sonuç ilişkisi kurma 2, tarihsel analiz ve yorum becerisi 13, tarihsel olaylar bilgisi 11, geçmişle günümüzü ilişkilendirme becerisine yönelik de 2 adet etkinliğe yer verildiği görülmektedir. Çelişkili yorumları Ayırt Edebilme, Tarihsel olayları anlatı şeklinde ifade etme becerisi, Ahlaki Muhakeme Yapabilme Becerisi ve Bilgi İletişim Teknolojilerini Kullanma Becerisi gibi alt becerilere yönelik doğrudan bir etkinlik örneğine rastlanmamıştır. Öğrenme alanını genel anlamda incelediğimizde bunları biliyor musunuz, soru- yorum, aynı zaman farklı mekân, metin inceleme, görüşünü söyle, ölçme değerlendirme, sıra sizde, unutmayın gibi etkinlik başlıklarına yer verildiği ve etkinliklere bu başlıklar altında yer verildiği görülmektedir.

3.2. Milli Uyanış: Bağımsızlık Yolunda Atılan Adımlar Öğrenme Alanı

Milli uyanış: bağımsızlık yolunda atılan adımlar öğrenme alanı içerisinde I. Dünya Savaşı’nın nedenleri ve sonuçları, Mondros Antlaşması, Kuvayı Milliye’nin oluşum süreci, Misak-ı Milli süreci, Büyük Millet Meclisine karşı çıkan ayaklanmalar, Sevr Antlaşması ve bu antlaşmaya verilen tepkiler gibi çeşitli konulara yer verilmektedir. Etkinlikleri incelediğimizde hazırlık yapalım başlığı altında sorulan; ‘‘I. Dünya Savaşı öncesinde Avrupa’da kurulan üçlü ittifak ve üçlü itilaf devletlerinin hangileri olduğu sorusu, tarihsel olaylar bilgisi becerisine, ‘‘Osmanlı devleti I. Dünya Savaşına neden girmiş olabilir?’’ sorusu neden sonuç ilişkisi kurma becerisine, ‘‘I. Dünya Savaşı’ndan sonra dünya barışını sağlamak için yapılan çalışmalar hakkında bilgi toplayınız’’ etkinliği Tarihsel araştırma becerisine yönelik olarak verilen etkinliklerdir. Görüşünü söyle başlığı altında hazırlanan ‘‘I. Dünya Savaşından önce Osmanlı Devletinde bir yönetici olsaydınız savaşa girme düşünceniz ne olurdu?’’ sorusu tarihsel

empati becerisine yönelik olduğu görülmektedir. Soru- yorum başlığı altında yer alan; ‘‘Ermeni sorunu konusunda Osmanlı arşiv belgelerine mi inanmalı yoksa iddialara mı neden?’’ etkinliği çelişkili yorumları ayırt etme, sıra sizde başlığı altında yer verilen ‘‘Amasya Genelgesi’nde imzası olan komutanların adlarını yazınız’’ etkinliği tarihsel olaylar bilgisini geliştirmeye yönelik etkinliklere örnek olarak verilebilir.

Bu öğrenme alanında toplamda 58 adet etkinliğe yer verildiği tespit edilmiştir. Bu etkinliklere baktığımızda; tarihsel araştırma becerisine ait 4, kronolojik düşünme becerisine ait 1, neden sonuç ilişkisi becerisine ait 6, tarihsel analiz ve yorumlama becerisine ait 10, tarihsel empati becerisine ait 3, geçmişle günümüzü ilişkilendirme becerisine ait 1, tarihsel olaylar bilgisine ait 26, bilgi iletişim teknolojilerini kullanma becerisine yönelik 7 etkinliğe yer verildiği görülmektedir. Tarihsel anlama kavrama becerisi, tarihsel olayları anlatı şeklinde ifade etme becerisi ve ahlaki muhakeme yapabilme becerisi gibi alt becerilere ait etkinliklere yer verilmemiştir.

3.3. Milli Bir Destan: Ya İstiklal Ya Ölüm Öğrenme Alanı

Milli bir destan: Ya İstiklal Ya Ölüm öğrenme alanına ait etkinlikleri incelediğimizde; hazırlık yapalım etkinlik başlığı altında ‘‘cephe, otorite, tekalifi milliye, başkumandan, ateşkes, taarruz, gazi, savunma, mareşal ve milli marş kelimelerinin anlamlarını araştırınız’’ sorusu araştırma becerisine ve bilgi iletişim teknolojilerini kullanma becerisinin gelişimine yönelik, soru yorum etkinlik başlığı altında verilen ‘‘Doğu cephesinin kapanması diğer cephelere nasıl fayda sağlamış olabilir yorumlayınız’’ etkinliği tarihsel analiz ve yorumlama becerisine yönelik, sıra sizde etkinlik başlığı altında verilmiş olan ‘‘Kuvay-ı Milliye birliklerinin düşmana karşı verdiği mücadelede kısmen başarısız olma nedenleri nelerdir?’’ sorusu tarihsel olaylar bilgisine yönelik, soru yorum etkinliği başlığı altında sorulan ‘‘Sakarya Meydan Savaşı ülkemiz için neden bir ölüm kalım savaşı olarak kabul edilmektedir, açıklayınız?’’ etkinliği ise tarihsel analiz ve yorum yapma becerisine yönelik etkinlikler olduğu görülmektedir.

Bu öğrenme alanında toplamda 70 etkinliğe yer verilmiştir. Öğrenme alanına baktığımızda tarihsel araştırma becerisine yönelik 22, kronolojik düşünme becerisine ait 1, tarihsel anlama ve kavrama becerisine ait 3, neden sonuç ilişkisi kurma becerisine ait 1, tarihsel analiz ve yorumlama becerisine ait 24, geçmişle günümüz olaylarını ilişkilendirme becerisine ait 3 ve tarihsel olaylar bilgisine ait 16 adet etkinliğe yer verilmiştir. Çelişkili yorumları ayırt edebilme, tarihsel olayları anlatı şeklinde ifade etme ve ahlaki muhakeme edebilme gibi alt beceriler ait etkinliklere rastlanmamıştır.

3. 4. Atatürkçülük ve Çağdaşlaşan Türkiye Öğrenme Alanı

Atatürkçülük ve Çağdaşlaşan Türkiye öğrenme alanını incelediğimizde hazırlık yapalım etkinlik başlığı altında; ‘‘*Sizce Atatürk toplumsal yaşamda niçin yenilikler yapma gereği duymuştur? Düşüncelerinizi söyleyiniz*’’ etkinliği tarihsel analiz ve yorum yapma becerisine yönelik, araştırınız başlığı altında yer alan etkinliklere baktığımızda ‘‘*Laiklik kelimesinin anlamını araştırınız. Atatürk'ün laiklik ile ilgili söylediği sözleri araştırınız*’’ etkinliği tarihsel araştırma becerisine yönelik, soru yorum başlıklı etkinlik başlığı altına baktığımızda, ‘‘*Bir ülkede iki farklı tarzda eğitim kurumu varsa eğitim birliği veya kültür birliği oluşur mu? Neden?*’’ etkinliği tarihsel analiz ve yorum yapma becerisine yönelik, Bunları biliyor musunuz? başlığı altında verilen ‘‘Ülkemizde okuryazar oranı 1927 yılında %10,06 iken 2016 yılında % 96,5 olmuştur’’ etkinliği tarihsel olaylar bilgisine yönelik etkinliklere örnek olarak verilebilir.

Öğrenme alanında toplamda 68 adet etkinlik örneğine yer verildiği görülmektedir. Tarihsel araştırma becerisine yönelik 15, kronolojik düşünme becerisine yönelik 6, tarihsel anlama ve kavrama

becerisine yönelik 7, neden sonuç ilişkisi kurma becerisine yönelik 1, tarihsel analiz ve yorum yapma becerisine ait 13, tarihsel empati becerisine ait 1, geçmiş ve günümüzü ilişkilendirme becerisine ait 4, tarihsel olaylar bilgisine ait 14 etkinliğe yer verildiği görülmektedir. Çelişkili yorumları ayırt edebilme, tarihi olayları anlatı şeklinde ifade edebilme becerisi, ahlaki muhakeme yapabilme becerisi ve bilgi teknoloji araçlarını kullanma becerilerine ait etkinliklere rastlanmamıştır.

3. 5. Demokratikleşme Çabaları Öğrenme Alanı

Demokratikleşme Çabaları öğrenme alanını incelediğimizde hazırlık yapalım etkinlik başlığı altında; ‘‘*Çok partili hayat denildiğinde ne anlıyorsunuz? Çok partili hayata neden ihtiyaç duyarız? Bu konularla ilişkili düşüncelerinizi söyleyiniz*’’ etkinliği tarihsel anlama ve yorumlama becerisine yönelik, araştırınız etkinlik başlığı altında verilen ‘‘*Siyasi partilerin kurulma amacı ile ilgili bir araştırma yapınız”* etkinliği tarihsel araştırma becerisine yönelik, aynı zaman aynı mekân etkinlik başlığı altında kronolojik düşünme becerisine yönelik, soru yorum etkinlik başlığı altında ‘‘Sizce Mustafa Kemal askerlerin aynı zamanda milletvekili olmasını neden istememiştir’’ etkinliği tarihsel analiz ve yorum yapma becerisini geliştirmeye yönelik etkinliklerdir.

Bu öğrenme alanında 35 adet etkinliğe yer verildiği tespit edilmiştir. Bu etkinliklere bakıldığında tarihsel araştırma becerisini ölçmeye yönelik 4, kronolojik düşünme becerisine yönelik 4, tarihsel anlama ve kavrama becerisine yönelik 4, neden sonuç ilişkisi kurma becerisine yönelik 2, tarihsel analiz ve yorum yapma becerisine yönelik 13, tarihsel olaylar bilgisine yönelik 4, bilgi iletişim teknolojilerini kullanma becerisine yönelik 4 adet etkinliğe yer verildiği görülmektedir. Çelişkili yorumları ayırt edebilme, tarihsel olayları anlatı şeklinde ifade edebilme ve ahlaki muhakeme yapabilme becerilerine ait etkinliklere rastlanmamıştır.

3. 6. Atatürk Dönemi Türk Dış Politikası Öğrenme Alanı

Atatürk Dönemi Türk Dış Politikası öğrenme alanını incelediğimizde; hazırlık yapalım etkinlik başlığı altında ‘‘*Montrö Boğazlar Sözleşmesi’ni imzalayan devletlerin hangileri olduğunu araştırınız*’’ etkinliği tarihsel olaylar bilgisi ve tarihsel araştırma becerisine yönelik, soru yorum etkinlik başlığı altında ‘‘*Savaştan yeni çıkmış bir devletin dış borç ödemesinin zorluğu hakkında neler düşünüyorsunuz?*’’ sorusu tarihsel analiz ve yorum yapma becerisine yönelik, unutmayınız etkinlik başlığı altında ‘‘*Eski adı Cemiyeti Akvam olan milletler cemiyeti günümüzdeki Birleşmiş Milletler Teşkilatının bir benzeriydi*’’ etkinliği geçmişle günümüzü ilişkilendirme becerisi ile ilgili etkinliklerdir.

Bu öğrenme alanında 50 adet etkinlik örneğine yer verildiği görülmektedir. Öğrenme alanına baktığımızda tarihsel araştırma becerisine yönelik 3, kronolojik düşünme becerisine yönelik 3, neden sonuç ilişkisi kuram becerisine yönelik 3, tarihsel analiz ve yorum yapma becerisi 14, geçmişle günümüzü ilişkilendirme 1, tarihsel olaylar bilgisine yönelik 20, bilgi iletişim teknolojilerini kullanma becerisine yönelik 6 adet etkinlik örneğine rastlanmıştır. Çelişkili yorumları ayırt edebilme, tarihsel anlama kavrama becerisi, tarihsel olayları anlatı şeklinde ifade edebilme ve ahlaki muhakeme becerisi gibi becerilere yönelik etkinliklere rastlanmamıştır.

3.7. Atatürk’ün Ölümü ve Sonrası Öğrenme Alanı

Atatürk’ün Ölümü ve Sonrası Öğrenme Alanı incelediğimizde hazırlık yapalım etkinlik başlığı altında ‘‘*Atatürk’ün ölümünden sonra dünya basınında yer alan haberlerle ilgili bir araştırma yapınız*’’ etkinliği tarihsel araştırma becerisi ve bilgi iletişim teknolojilerini kullanma becerisine yönelik, soru soruyorum etkinlik başlığı altında ‘‘*En büyük eserim Türkiye Cumhuriyetidir diyen Atatürk sizce nasıl bir liderdir? Görüşünüzü söyleyiniz.*’’ etkinliği tarihsel analiz ve yorum becerisine yönelik, yine soru yorum etkinlik başlığı altında ‘‘*Dünya devletlerinin I. Dünya Savaşı’ndan sonra aralarında*

çözemedikleri sorunların II. Dünya Savaşının çıkmasına etkisi olmuş mudur? Neden? Görüşlerinizi söyleyiniz'' etkinliği neden sonuç ilişkisi kurma becerisiyle ilişkili etkinlik örnekleridir.

Öğrenme alnında toplam 27 etkinliğe yer verildiği görülmektedir. Bu etkinliklerin dağılımına baktığımızda; tarihsel araştırma becerisi 6, neden sonuç ilişkisi kurma becerisi 1, tarihsel analiz ve yorum becerisi 10, tarihsel olaylar bilgisi 8, bilgi iletişim teknolojilerini kullanma becerisi yönelik 2 adet etkinlik örneğine ulaşılmıştır. Bunun yanı sıra çelişkili yorumları ayırt edebilme, kronoloji düşünme becerisi, tarihsel olaylar bilgisi, tarihsel olayları anlatı şeklinde ifade edebilme becerisi ve ahlaki muhakeme yapabilme becerisi gibi alt becerilere ait etkinliklere yer verilmediği tespit edilmiştir.

Tablo. 1 8. Sınıf T.C. İnkılâp Tarihi Ve Atatürkçülük Ders Kitabında Yer Alan Etkinliklerin Tarih Okuryazarlığı Ve Alt Becerilerinin Sayısal Olarak Dağılımı

Öğrenme Alanı	Bir Kahraman Doğuyor	Milli Uyanış: Bağımsızlık Yolunda Atılan Adımlar	Milli Bir Destan: Ya İstiklal Ya Ölüm	Atatürkçülük ve Çağdaşlaşan Türkiye	Demokratikleşme Çabaları	Atatürk Dönemi Türk Dış Politikası	Atatürk'ün Ölümü ve Sonrası
Tarihsel Araştırma Becerisi	**4**	**6**	**22**	**15**	**4**	**3**	**6**
Çelişkili yorumları Ayırt Edebilme		**1**					
Kronolojik Düşünme Becerisi	**2**	**1**	**1**	**6**	**1**	**3**	
Tarihsel Anlama (Kavrama) Becerisi	**2**		**3**	**7**	**4**		
Neden-Sonuç İlişkisi Kurma Becerisi	**2**	**5**	**1**	**1**	**2**	**3**	**1**
Tarihsel Analiz ve Yorum Becerisi	**13**	**10**	**24**	**20**	**13**	**14**	**10**
Tarihsel Empati		**3**		**1**			
Tarihsel olayları anlatı şeklinde ifade etme becerisi							
Geçmiş ve Günümüz Olaylarını	**2**	**1**	**3**	**4**		**1**	

İlişkilendireb ilme Becerisi							
Ahlaki Muhakeme Yapabilme Becerisi							
Tarihsel Olaylar Bilgisi	**8**	**26**	**16**	**14**	**11**	**20**	**8**
Bilgi İletişim Teknolojileri ni Kullanma Becerisi		**7**			**4**	**6**	**2**

Tartışma ve Sonuç

T.C. İnkılâp Tarihi Atatürkçülük Ders kitabında yer alan etkinlikler tarih okuryazarlığı ve tarih okuryazarlığının alt beceriler bağlamında incelendiğinde 7 öğrenme alanında ait becerilerin bunları biliyor musunuz, soru- yorum, aynı zaman farklı mekân, metin inceleme, görüşünü söyle, ölçme değerlendirme, sıra sizde, unutmayın gibi etkinlik başlıkları altında yer verildiği görülmektedir.

Öğrenme alanı sonlarında yer alan ölçeme değerlendirme etkinliği başlığı altında bulunan etkinliklere baktığımızda açık uçlu soruların daha çok tarihsel analiz ve yorum becerisine yönelik olduğu; boşluk doldurma ve doğru yanlış etkinliklerinin ise tarihsel olaylar bilgisini ölçmeye yönelik olduğu tespit edilmiştir. Yine ilgili bölümlerde yer alan çoktan seçmeli soru etkinlerine baktığımızda bu sorunların da daha çok öncüllü şekilde hazırlandığı ve tarihsel analiz ve yorum becerisini ölçmeye yönelik olduğu görülmüştür.

Söz konusu öğrenme alanlarında en çok tarihsel analiz ve yorum becerisinin etkinlikler yoluyla öğrencilere kazandırılma amaçlandığı görülmektedir. Nitekim Bir Kahraman Doğuyor öğrenme alanında 13 kez, Milli Bir Destan: Ya İstiklal Ya Ölüm öğrenme alanında 24 kez, Demokratikleşme Çabaları öğrenme alanında 13 kez, Atatürk Dönemi Türk Dış Politikası öğrenme alanı 14 kez ve Atatürk'ün Ölümü ve Sonrası öğrenme alanında 10 kez olmak üzere toplamda 84 kez tarihsel analiz ve yorum becerisine yer verildiği görülmektedir.

Bu bağlamda Tarihsel analiz ve yorum becerisi tarihsel metinleri eleştirel bir bakış açısıyla incelemek ve yorumlayabilmek, olayların neden-sonuçlarını ve birbirleriyle ilişkisini anlama tarih dersinin amaçlarına ulaşmada bireylere katkı sağlayan bir beceri olduğu göz önünde bulundurulduğunda 7 öğrenme alanında bu beceriye fazlaca yer verilmesinin söz konusu becerinin öğrencilere kazandırılması bakımından önem arz ettiği görülmektedir.

Bununla birlikte, Bir Kahraman Doğuyor Öğrenme alanında tarihsel olaylar bilgisine 11 kez, Milli Bir Destan: Ya İstiklal Ya Ölüm öğrenme alanında tarihsel olaylar bilgisine ait 16 kez, Atatürkçülük ve Çağdaşlaşan Türkiye öğrenme alanı tarihsel olaylar bilgisine ait 14 kez yer verilirken, Milli uyanış: Bağımsızlık Yolunda Atılan Adımlar Öğrenme alanında tarihsel olaylar bilgisine 26 ve Atatürk Dönemi Türk Dış Politikası Öğrenme alanında tarihsel olaylar bilgisine yönelik etkinliklere 20 kez yer verildiği tespit edilmiştir. Bu çerçevede ilgili öğrenme alanlarının kazanımlarına paralel olarak tarihsel olaylar bilgisine çokça yer verildiği görülmüştür.

Atatürkçülük ve Çağdaşlaşan Türkiye öğrenme alanında ise Tarihsel Analiz ve Yorum becerisine yönelik 20 kez yer verildiği tespit edilmiştir. Söz konusu öğrenme alanında Türkiye'de çağdaşlaşma adına atılan adımları hissettirmek amacıyla Tarihsel Analiz ve Yorum becerisine ağırlıklı olarak yer verildiği düşünülmektedir.

Tarihsel olayları anlatı şeklinde ifade etme becerisine ve Ahlaki Muhakeme Yapabilme becerisine de hiçbir öğrenme alanında yer verilmediği ve Çelişkili yorumları Ayırt Edebilme becerisine sadece Milli Uyanış: Bağımsızlık Yolunda Atılan Adımlar öğrenme alanında yer verildiği görülmektedir.

Öte yandan Bir Kahraman Doğuyor öğrenme alanında neden-sonuç ilişkisi kurma 2, geçmişle günümüzü ilişkilendirme becerisine yönelik 2, Milli uyanış: Bağımsızlık Yolunda Atılan Adımlar Öğrenme Alanında kronolojik düşünme becerisine ait 1, geçmişle günümüzü ilişkilendirme becerisine ait 1, Milli Bir Destan: Ya İstiklal Ya Ölüm öğrenme alanında kronolojik düşünme becerisine ait 1, neden-sonuç ilişkisi kurma becerisine ait 1, Atatürkçülük ve Çağdaşlaşan Türkiye öğrenme alanında neden-sonuç ilişkisi kurma becerisine yönelik 1, tarihsel empati becerisine ait 1, Demokratikleşme Çabaları öğrenme alanında neden-sonuç ilişkisi kurma becerisine yönelik 2, Atatürk Dönemi Türk Dış Politikası öğrenme alanında geçmişle günümüzü ilişkilendirme becerisine 1, Atatürk'ün Ölümü ve Sonrası öğrenme alanında neden-sonuç ilişkisi kurma becerisine yönelik 1 etkinliğe yer verildiği görülmüştür.

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TÜRBÜLATÖR UYGULAMASININ GÜNEŞ ENERJİLİ HAVA ISITICISININ VERİMİNE ETKİSİNİN İNCELENMESİ

İsmail ATA[1*]

[*1]*Erciyes Üniversitesi, Havacılık ve Uzay Bilimleri Fakültesi, Uzay Mühendisliği Bölümü, Kayseri, Türkiye.*
ORCID Code: 0000-0003-0412-8397

ÖZET

Bu çalışmada türbülatör uygulamasının verime etkisinin incelenmesi amacıyla boru şeklinde hava akışkanlı güneş kollektörü tasarlanmıştır. İçerisinde türbülatör bulunmayan (Tip-I) ve türbülatör bulunan (Tip-II) kollektörler için aynı akışkan debisinde ölçümler alınmıştır. Deneyler Kayseri ili şartlarında Ağustos ayında saat 09:00 ile 17:00 zaman dilimleri arasında yapılmıştır. Deney sonuçlarına göre çalışma akışkanı olan havanın giriş-çıkış sıcaklık farkları ve kollektörlerin enerji verimleri değerlendirilmiştir. Güneş ışınım değerinin maksimum olduğu saat 13:00 de $\dot{m} = 0{,}0066$ kg/s akışkan debisi için Tip-II kollektörün enerji verimi Tip-I kollektöre göre %20 daha yüksek bulunmuştur. Türbülatör uygulaması sayesinde kollektör veriminin arttığı tespit edilmiştir.

Anahtar Kelimeler: Havalı Güneş Kollektörü, Güneş Enerjisi, Türbülatör

INVESTIGATION OF THE EFFECT OF TURBULATOR APPLICATION ON THE EFFICIENCY OF SOLAR AIR HEATER

ABSTRACT

In this study, a tubular solar air heater was designed in order to examine the effect of turbulator application on energy efficiency. Experiments were carried out at the same fluid flow rate for the collectors without a turbulator (Type-I) and with a turbulator (Type-II). Experiments were carried out in Kayseri province conditions between 09:00 and 17:00 in August. According to the test results, the inlet-outlet temperature differences of the working fluid and the energy efficiency of the collectors were evaluated. The energy efficiency of Type-II collectors was found to be 20% higher than Type-I collector for a fluid flow rate of $\dot{m} = 0{,}0066$ kg/s at 13:00 when the solar radiation value is maximum. It has been determined that the collector efficiency has increased thanks to the turbulator application.

Keywords: Solar air heater, turbulator, energy efficiency

GİRİŞ

Artan dünya nüfusuyla birlikte yaşam gereksinimleri için gerekli olan enerji kullanım miktarı da artmaktadır. Bu nedenle birincil tip enerji kaynaklarının azalmakta ve alternatif enerji kaynakları üzerinde çalışmalar yapılmaktadır. Güneş enerjisi, yenilenebilir bir enerji kaynağı olması, çevreyi kirletecek maddelerin olmayışı, kolay ve bölgesel uygulanabilmesi açısından alternatif enerji kaynaklarının başında gelmektedir. Güneş enerjisi uygulamalarından biri olan hava akışkanlı güneş kollektörleri seraların ısıtılması, binaların ısıtılması, sebze ve meyvelerin kurutulması gibi uygulamalarda kullanılmaktadır. Kullanılan kollektörlerin verimlerinin arttırılması için birçok yöntem kullanılmıştır. Bu yöntemlerden biri havanın yutucu yüzey üzerinden geçiş sayısını arttırarak, kollektör içerisinde daha fazla yüzeyle temas ettirilmesi sağlayarak daha fazla ısı yutulmasını amaçlayan yutucu yüzey alanını arttırmak için kanatçıklar yerleştirilmesi işlemidir. Akışkan toplayıcı yüzeyinden geçerken bu kanatçıklara temas etmekte ve gerçekleşen ısı miktarı arttırılarak verimin artması sağlanmaktadır (Garg ve diğ., 1991). Literatürde hava akışkanlı güneş kollektörlerinin veriminin

arttırılması amacıyla yapılmış birçok çalışma mevcuttur. (Moummi ve diğ., 2004) yaptıkları çalışmada öncelikle, hava akışkanlı güneş kollektörlerinde verimi arttırmak için yutucu yüzey ile arkadaki tahta tabaka arasında ilerledikçe artan türbülanslı bir akış oluşturmuşlardır. Bu akışı oluşturmak için farklı geometrilere sahip engeller kullanmışlardır. Akış bölgesine dik olacak şekilde konumlandırılmış dikdörtgen levha şeklinde kanatçıklar kullanmışlardır. Kollektör içerisinde akışkan, kanatçıklar arasındaki boşluklardan akmakta ve bu sayede kanal içerinde düzgün bir yayılma gerçekleşmektedir. Akışkanın düzgün bir şekilde yayılması sayesinde yutucu yüzeyle olan teması artmaktadır. Elde edilen bulgular, kanatsız hava akışkanlı güneş kollektörleriyle kıyaslanmıştır. (Acır ve diğ., 2016) tasarlamış oldukları hava akışkanlı güneş kollektöründe farklı akışkan debilerinde gerçekleştirdikleri deneylerde kollektörlerin enerji ve ekserji verimlerini incelemişlerdir. İçerisinde 45° açılı dairesel engeller bulunan Tip-II kollektörden elde edilen verimlerin diğer kollektörlere göre daha yüksek olduğunu bulmuşlardır. (Esen, 2008), kollektör yutucu yüzeyinde farklı tip engellerin bulunduğu ve üzerinde engel olmayan düz tip çift geçişli bir hava akışkanlı ısıtıcısının enerji ve ekserji analizini deneysel olarak incelemiştir. Deneyler, kollektör içerinde akışkan olarak kullanılan havanın farklı kütlesel debilerinde ve yutucu yüzeyin farklı tiplerdeki geometrileri için tekrarlanarak ölçümler alınmıştır. Elde edilen sonuçlar incelendiğinde, verim değerlerinin, içinde engel bulunan çift akışlı kollektörün, içerisinde engel bulunmayan kollektöre göre daha iyi olduğu sonucunu vermiştir. (Kurtbaş ve Durmuş, 2004) dört farklı yutucu yüzey geometrisine sahip toplayıcılar ile düzlemsel toplayıcıların arasındaki enerji ve ekserji verimliliklerini kıyaslamışlardır. Bunun yanı sıra, deneylerde kullanılan her toplayıcı için deneysel olarak sürtünme faktörünü ve Nusselt sayısını veren eşitlikleri geliştirmişlerdir. (Yeh ve Lin, 1996) yutucu yüzeyi düzlemsel olan havalı güneş kollektörlerinde ısı transfer miktarını arttırmak için yutucu yüzeye yerleştirdikleri paralel bariyer şeklindeki engellerin ısıl verime olan etkisini deneysel ve teorik olarak analiz etmişlerdir.

Bu çalışmada, yeni tasarlanan içerisi boş olarak imal edilen boru şeklinde düz bir kollektör (Tip-I) ve boru içerisine yarım daire şekilli türbülatör yerleştirilmiş kollektörün (Tip-II) giriş çıkış sıcaklık farkı ve enerji analizleri yapılmıştır. Sabit akışkan debisinde türbülatör uygulamasının kollektörlerin giriş-çıkış sıcaklık farkına ve enerji verimine etkisinin araştırılması amaçlanmıştır.

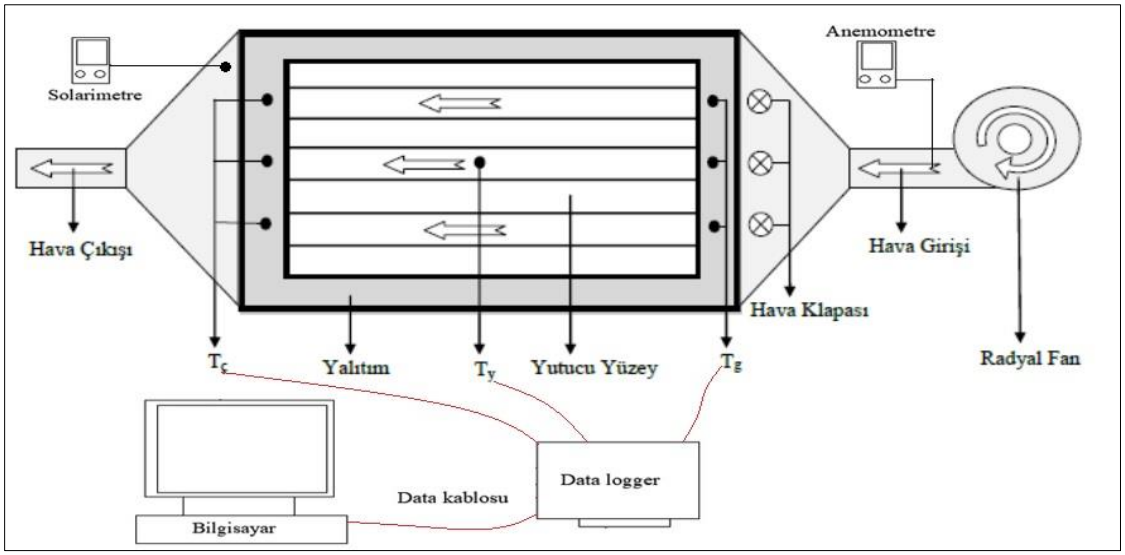
MATERYAL METOD

Deney Sistemi:

Yeni tasarlanan hava akışkanlı güneş kollektörünün tasarımı yapılırken kollektörde kullanılacak olan malzemelerin kalay temini, üretiminin kolay olması, sistemde oluşabilecek kayıpların en aza indirilmesi için ısı yalıtımı ve kullanılan malzemelerin ekonomik olması göz önünde bulundurulmuştur. Deneylerde kullanılan hava akışkanlı güneş kollektörünün şematik görünümü Şekil 1'de verilmiştir. Kollektör, 50 mm çapında 700 mm uzunluğunda üç adet borunun yan yüzeylerine aynı boyutlarda yüzey genişlemeleri monte edilerek oluşturulmuş 0,5 mm kalınlıkta bakır bir yutucu yüzeye sahiptir. Yutucu yüzey güneşten gelen ışınımları absorbe edebilmesi için siyah mat boya ile boyanmış ve kollektör kasasının üst yüzeyi 4 mm kalınlığında standart cam ile kapatılmıştır. Yan ve alt yüzeylerden meydana gelecek ısı kayıplarını önlemek amacıyla yalıtım malzemesi olarak 50 mm kalınlığında EPS köpük kullanılmıştır. Kollektörün kesit görünümü Şekil 2'de verilmiştir.

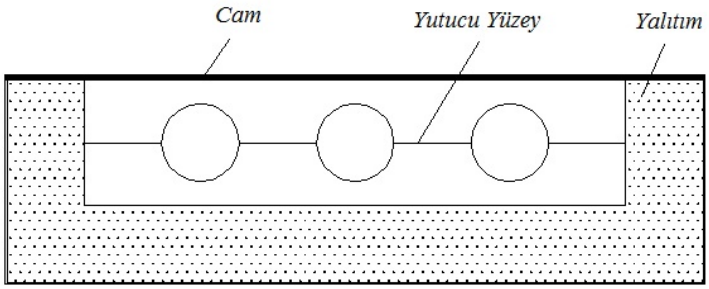
Deneyler, Ağustos ayında saat 09:00 ile 17:00 arasında $\dot{m} = 0{,}0066$ kg/s akışkan debisinde gerçekleştirilmiş ve belirli aralıklarla elde edilen veriler kayıt altına alınmıştır. Yapılan ölçümlerde güneş ışınım değerlerini ölçmek için bir adet 1 W/m^2 hassasiyete sahip solarimetre cihazı, hava akış hızını ölçmek için 0,01 m/s hassasiyetinde Anemometre ve basınç düşümü değerini ölçmek için 1,0 Pa hassasiyete sahip bir adet U tipi manometre kullanılmıştır. Kollektörden elde edilen sıcaklık değerleri, hassasiyetleri 0,01 °C olan K tipi ısıl çiftler yardımıyla ölçülmüş ve elde edilen değerler veri toplayıcı olarak kullanılan Data-Logger'a kaydedilerek bilgisayar ortamına aktarılmıştır. Gerçekleştirilen deneyler sonucunda her iki tip kollektör için, güneş ışınım şiddeti, akışkan olarak kullanılan havanın

hızı, kollektöre giren, çıkan, yutucu yüzey ve çevre sıcaklıkları ile basınç farkı değerleri elde edilmiştir.



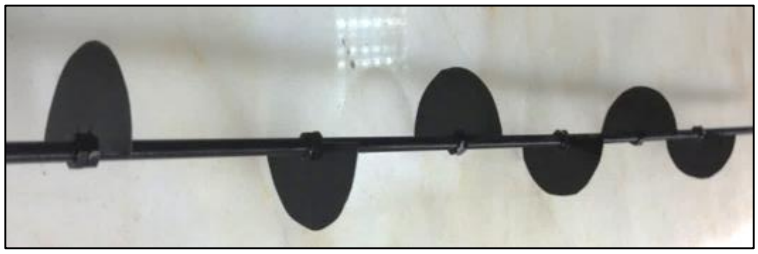
Şekil 1. Deney sisteminin şematik görünüşü

Kollektöre giren, çıkan havanın sıcaklıkları üç farklı borunun merkez noktasından ölçülmüştür. Yutucu yüzey sıcaklıkları ise beş farklı noktadan ölçülerek ortalama değer alınmıştır. Isılçiftlerden elde edilen sıcaklıkları saklamak için çok kanallı ve okunan değerleri bilgisayar programı vasıtasıyla kayıt yapıp hafızada saklayabilen bir data-logger kullanılmıştır. Kollektör içersinde akan havanın debisini ayarlamak için boru girişlerine klapalar yerleştirilmiş ve bu sayede akışkan debisi istenildiği gibi ayarlanması sağlanmıştır.



Şekil 2. Kollektör kesit görünümü

Deneyler, önce düz bir boru şeklinde olan kollektörde (Tip-I) yapılmış, elde edilen veriler kaydedilmiştir. Daha sonra ise boru şeklinde tasarlanan kollektörün içerisindeki akışkanın türbülans etkisini arttıracak türbülatör yerleştirilerek aynı akışkan debisinde tekrarlanmıştır. Deneysel çalışmada kullanılan türbülatör, girişten itibaren 100 mm aralıklarla 8 adet 50 mm çapında yarım daire şeklindeki engeller yerleştirilerek oluşturulmuştur. Kullanılan türbülatör geometrisi Şekil 3'te verilmiştir.



Şekil 3. Türbülatör Geometrisi

Türbülatör üzerinde kullanılan engeller 0,5 mm kalınlığında sac malzemeden imal edilmiş ve her engel bir önceki engele göre zıt yöne gelecek şekilde konumlandırılmıştır. Bu sayede boru şeklindeki kollektörden akan akışkanın bütün yüzeye temas ederek yolunu tamamlaması amaçlanmıştır.

Enerji Verimi:

Enerji analizi Termodinamiğin birinci yasasına dayanmaktadır (Tyagi ve diğ. 2010). Güneş enerjili bir kollektörün anlık verimi, çalışma akışkanı tarafından elde edilen yaralı ısının kollektör yüzeyine gelen güneş enerjisine oranıyla hesaplanır (Acır ve diğ., 2016).

Kollektör verimini bulmak için, kullanılan çalışma akışkanı tarafından elde edilen yararlı ısı şu şekilde hesaplanır (Acır ve diğ., 2017) ;

$$\dot{Q}_c = \dot{m}.c_p.(T_ç - T_g)$$

(1)

Güneş kollektörünün anlık verimi aşağıdaki gibi yazılabilir:

$$\eta_I = \frac{\dot{Q}c}{A_k.I}$$

(2)

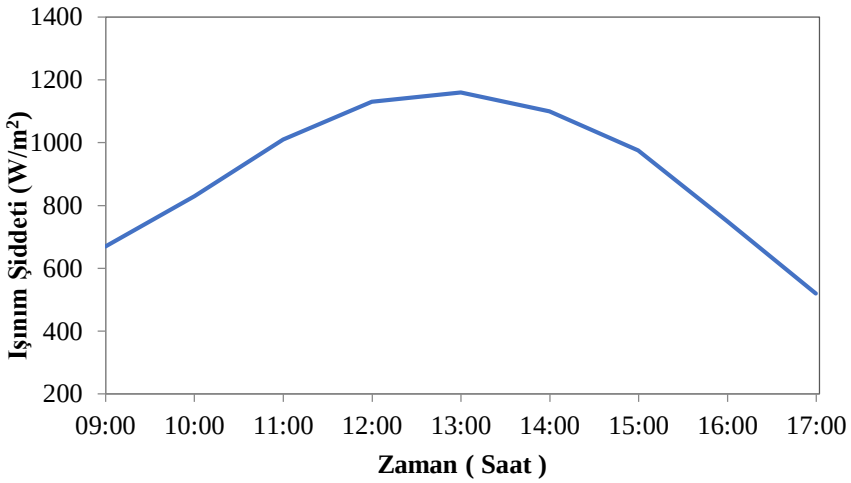
Burada, $\dot{m}$: akışkan debisi (kg/s), C_p: akışkanın özgül ısısı (j/kg°C), I: güneş ışınım şiddeti (W/m^2) ve A_k ise kollektör kesit alanıdır (m^2). Akışkanın bütün fiziksel özellikleri akışkanın giriş-çıkış sıcaklıkları ortalamasına göre seçilmiştir.

$$T_f = (T_ç + T_g)/2$$

(3)

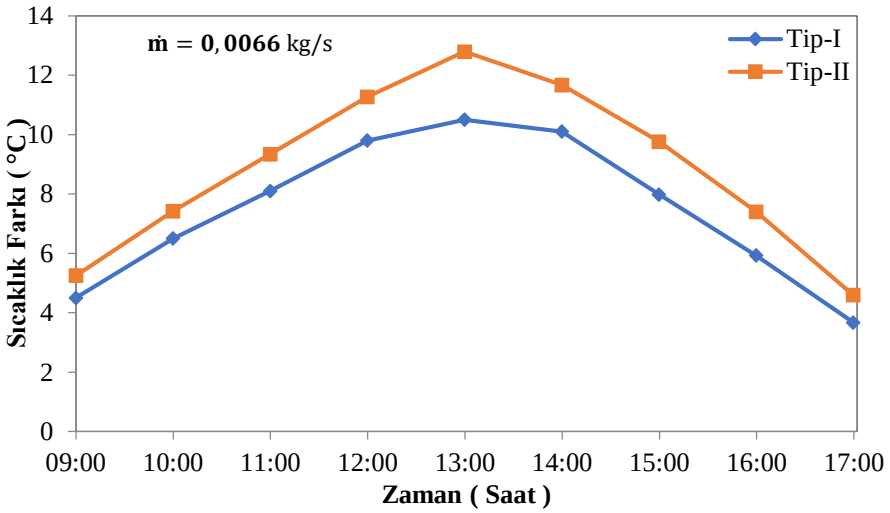
BULGULAR VE TARTIŞMA

Bu çalışmada, türbülatör uygulamasının kollektör verimine etkisini incelemek amacıyla boru şeklinde bir kollektör tasarlanmış ve türbülatörlü ve türbülatörsüz durumlar için kollektörlerin verimlerinin kıyaslanmıştır. Bu amaçla gün boyu güneşten elde edilen ışınım şiddeti değerleri ölçülmüş ve kayıt altına alınmıştır. Her iki durum için gün boyunca ortalama güneş ışınım değerleri Şekil 4'te verilmiştir. Şekil 4 incelendiğinde güneş ışınım değerlerinin, deneylerin başladığı saat 09:00'da 660 W/m^2 ile başlayıp en yüksek değerine saat 13:00'da 1160 W/m^2 olarak ulaştığı ve akşam vakitlerinde ise 550 W/m^2 değerlerine düştüğü görülmektedir.



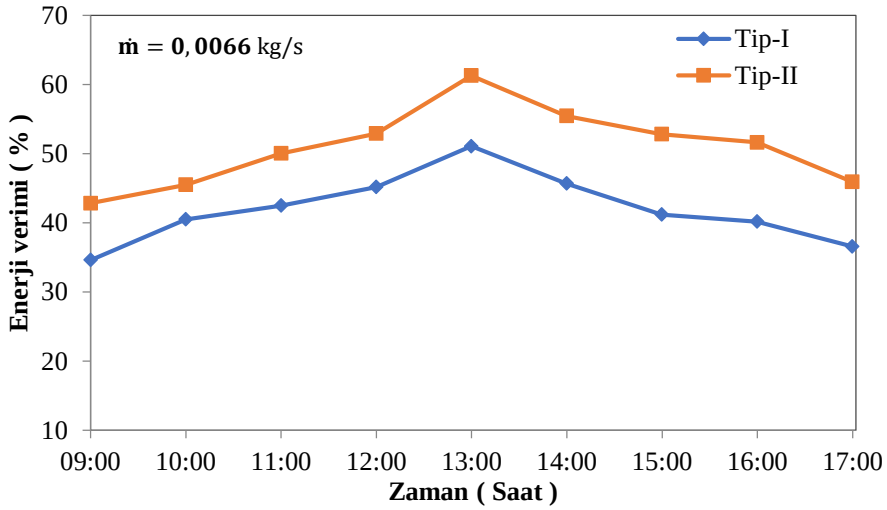
Şekil 4. Gün boyu ortalama güneş ışınım değerleri

Düz tip güneş kollektörü ve içerisinde türbülatör bulunan kollektörler için ısı transfer akışkanı olarak kullanılan havanın giriş-çıkış sıcaklık farkları (ΔT) Şekil 5'te verilmiştir. $\dot{m} = 0{,}0066$ kg/s akışkan debisi için elde edilen veriler incelendiğinde Tip-II kollektörden elde edilen sıcaklık farklarının Tip-I kollektörlerden elde edilen sıcaklık farkı değerlerine göre gün boyu değerlendirildiğinde ortalama %19 daha yüksek olduğu görülmektedir. En yüksek sıcaklık farkı saat 13:00'da 12,8 °C ile Tip-II kollektörden elde edilirken en düşük sıcaklık farkı ise 3,7 °C ile içerisi boş olan Tip-I kollektörden saat 17:00'da elde edilmiştir. Kollektör içerisinde türbülatör uygulanması sayesinde akışkan kollektör içerisinde daha fazla yüzeyle temas etmekte ve yutucu yüzeyde soğurulan enerji çalışma akışkanı olan havaya daha fazla oranda aktarılmaktadır. Bu sayede ısı transfer akışkanı olarak kullanılan havanının giriş-çıkış sıcaklık farkları artmaktadır.



Şekil 5. kollektörlerin zamana bağlı giriş-çıkış sıcaklık farkları

Bütün zaman aralıklarındaki sıcaklık değişimleri ve ışınım değerleri için 'Eş. (1)' ve 'Eş. (2)' kullanılarak hesaplamalar yapıldığında kollektörlerin enerji verimleri elde edilmektedir. Gün boyunca her saat için kollektörlere ait enerji verimleri Şekil 6'de verilmiştir. Şekil 6 incelendiğinde Tip-I kollektörden elde edilen enerji verimlerinin %34,6 ile %51,1 arasında değiştiği görülmektedir. Tip-II kollektörün enerji verimleri ise gün boyu %42,8 ile %61,3 arasında değişim göstermiştir.



Şekil 6. Kollektörlerin zamana bağlı enerji verimleri

Güneş ışınım şiddetinin en yüksek olduğu saat 13:00 için değerlendirme yapılacak olursa, Tip-II kollektörün enerji verimi %61,3 olurken aynı saat için Tip-I kollektörün verimi ise %51,1 olarak elde edilmiştir. Türbülatör uygulaması sayesinde kollektörde kullanılan havanın giriş çıkış sıcaklık farkı

artmış ve buna bağlı olarak da enerji verimi artmıştır. En yüksek ışınım şiddetinin gerçekleştiği saat 13:00 için değerlendirme yapıldığında, Tip-II kollktörden elde edilen enerji verimi Tip-I'e göre %20 daha fazla bulunmuştur. Türbülatör uygulaması sayesinde kollektörün enerji verimi artmıştır.

SONUÇLAR

Hava akışkanlı boru şekilli güneş kollektörü verimine türbülatör uygulamasının etkisinin incelenmesi için aynı akışkan debisinde gün boyu deneyler gerçekleştirilmiştir. İçerisinde türbülatör bulunmayan ve türbülatör bulunan kollektörler için gerçekleştirilen deneyler sonucunda aşağıdaki sonuçlar elde edilmiştir.

- Tip-II kollektörün sıcaklık farkları Tip-I kollektöre göre ortalama %19 daha yüksek bulunmuştur.
- En yüksek enerji verimi içerisine türbülatör uygulanan Tip-II kollektörden %61,3 olarak elde edilmiştir.
- Güneş ışınım değerinin en yüksek olduğu saat 13:00 için değerlendirme yapıldığında, Tip-II'den elde edilen enerji verimi Tip-I'e göre %20 daha fazla bulunmuştur.
- Türbülatör uygulaması kollektör verimini arttırmıştır.

Bu çalışmadan elde edilen bulgular ışığında bundan sonraki çalışmalarda farklı türbülatör geometrileri ve farklı akışkan debilerinin kollektör verimine etkileri araştırılabilir.

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COVID-19 PANDEMIC AND REFLECTIONS FROM HIGHER EDUCATION TEACHING APPLICATIONS FROM TURKEY

İbrahim ÇETİN & Onur İÇÖZ
Assoc. Prof. Dr. Akdeniz University Serik Business Faculty Tourism Management Department
PhD. Adnan Menderes University Tourism Faculty

ABSTRACT

The global consequences of Covid-19 influenced in every sectors of economy and social lives of humanity. Additionally, one of With the imposition of the pandemic conditions, academic education that has been given a student in the classroom environment and in the classical way of acquiring knowledge through a teacher in face-to-face mode was changed to the form remotely either partially or completely. The education system which is constituted by two parties as teacher and learner in naturally had to implement that new form of teaching by caring about the health of instructors and students as well as entire society. This study aims to reflects the results of distance education fostered by the technological developments from the side of the instructor who constitutes the one party of a two-way process of teaching system. The study explores the teaching materials, tools, demographics and the views of instructors refers to distance teaching materials. The study constituted quantitatively and explanatory research form. One of the significant results of the study that distance education if far from interaction and less motivative for instructors.

Keywords: Higher Education, distance education, Covid-19, Turkey

INTRODUCTION

During the pandemic regular systems of social and economic life that were continuing affected in different levels. And the happenings during the pandemic forced countries and their institutions response actively against its impacts for decreasing the negative consequences it caused. The education system was among the most effected sectors during this great breakdown and it was seen that the higher education sector has encountered considerable and dramatic changes compared to traditional form. Learning which is necessary for continuing development for human being either stopped or slowed for protection of communities. In this sense, institutions have started to apply their technological capabilities, acquired from the past to the present, as a necessity, in order to fulfill the rights and expectations of the society they address, without interrupting their basic functions for this vital activity in distance.

With the imposition of the pandemic conditions, academic education that has been given a student in the classroom environment and in the classical way of acquiring knowledge through a teacher in face-to-face mode was changed to the form remotely either partially or completely. Parallel to the results with the advent of the COVID-19 pandemic, many academic institutions that were earlier reluctant to change their traditional pedagogical approach had no option but to shift entirely to online teaching-learning" (Haider and Al – Salman 2020) as a new method of teaching based on technological innovations. The education system which is constituted by two parties as teacher and learner in nature had to implement that new form of teaching by caring about the health of instructors and students as well as entire society. Although it has been implemented for a temporarily during the pandemic, distance teaching erupted as new reality in education system without measuring the effectiveness on both parties as instructor and student. Some of authors among many, underline the significance of the impact of technology on education as “although online learning will not replace traditional face-to-face delivery, universities must be prepared for the new reality” (Njenga & Fourie, 2010; Tamim, 2018).

LITERATURE REVIEW

For long years technology has been used in education. In contemporary age it has been developed, changed and began a wide range use with the development of technology, especially

with the advent of internet. According to Anderson (2011) examined some cornerstones in distance education and noted that the internet had evolved from a text-based environment to one in which all forms of media are supported. Anderson and Dron, states that the distance education is historically constituted in the thinking and behavioural patterns of the developments. (Anderson and Dron, 2011). Moore and Kearsley (2001) underline the developments occurred previously in that field leaded the progresses contemporarily. When the stages carefully examined it is understood that that information and communication technologies played a vital role for the development of distance teaching. Distance education is an interdisciplinary field that tries to eliminate the limitations between learning, teaching and learning resources, and uses existing technologies with a pragmatist approach to achieve this (Bozkurt, 2017). Distance learning is non-location bounded and time independent through the use of synchronous (live conferences) and asynchronous (flexible assignments) means (Debeş,2021). All activities and contents is placed Information and Communications Technology System that enable educators and learners' connection in a virtual classroom which is reachable from different locations. The intense increasing relevance of distance learning created the opportunities of access nonlocational bounded and time independent learning materials. There are two methods used for implementing distance learning systems as synchronous and asynchronous (Offir et al.2008).. In synchronous form, learners are engaged in interactive and focused opportunities which are for helping learners build a basic understanding of technology-enhanced instruction, the use of technology in courses and effective online design. On the other hand, asynchronous form, without interaction of learners and instructor learners fulfill activities and tasks include quizzes, group work assignments, group's discussion, feedback and Project (Debes, 2021). The distance education framework requires a greater independent learning ability than the regular courses, mainly because it lacks full interaction between the students and the teachers (Offir et al.2008).

A large number of studies suggests that the roles of e-instructors may be more complex than those of traditional instructors (Baran, Correia, & Thompson, 2011; Bawane & Spector, 2009; Berge, 2001; Goold, Coldwell, & Craig,2010). The research which is studied by Chang et al. (2014). about the views, reactions, and attitudes towards the e-learning practice and the roles of e-learning instructors of faculty members in higher education indicates that "content expertise" and "instructional designer" are perceived by university faculty as the key components in e-instruction in higher education" and sthe study shows the need for e-instructor training. Changing communication modes requires e-instructors to adapt to e-Learning environments (Ryan, Scott, & Walsh, 2010). Dhawan (2020) reports that many academic units follow the traditional face-to-face model although many of them shifted to blended learning. According to the study by Roach and Lemasters (2006) about students' reactions on the advantages of online learning explains that once students are not experiencing face-to-face classroom instruction, they will start using additional resources and become their own investigators, learning and discovering more about their capabilities as independent learners (Roach and Lemasters, 2006). Isayeva (2020) claims that universities are currently required to provide faculty members who are competent enough in student-engagement activities and communication concerning the significance of student engagement in online learning,

Additionally, in any how it happens a shift to distance learning accelerated and triggered by COVID-19 the main concern among many is about the student-faculty interaction and peer interaction must be noteworthy. Thereof, this study aims to explore the views of its real user ones; academics who experience distance education either synchronous or asynchronous in Turkey. The originality of this study is that it aims broadly and primarily to bring out the considerable concerns of academics who actively used, experienced it comparatively face to face teaching in higher education system of Turkey.

RESEARCH METHODOLOGY

The purpose of the study, sample, and research instruments:

The primary aim of this study is to learn how responded the higher education system in

Turkey during the pandemic. Teaching as having a two-way process; what type of technological based tools and what level they have been used during pandemic on the name of continuing the teaching. The study also aims to clarify whether it satisfy the one of the parties as instructors that has a two-way process of teaching as distance teaching either synchronously or asynchronously. Data collected from the instructors who gave different level courses during 2020 and it aims to clarify the teaching materials, tools, demographics and the views of instructors refers to distance teaching materials.

FINDINGS OF THE STUDY

Demographic characteristics of instructors who have been participated the study were given in Table 1. Demographic information of the participants is shown in women. In the context of age range, 41.2% are "46 or more", 38.5% are "the Table1. Of the participants 51.5% are men and 48.5% are 36-45" and 20.3 % are "35 or less". As academic title; 29.9% of the participants are lecturer, 25.5% are Dr. lecturers, 16.9% are professors, 8.6% are lecturer doctors. 57.8% of the participants have been working as a lecturer/staff at the university for "11 or more", 22.1% "6-11" and 20.1% "5 or less" years. 45.3% of the participants have been conducting online courses for "7-12", 32.1% for "13 or more" and 22.5% for "6 or less" months. Majority of the participants are full-time lecturers (94.4%). 47.1% of the participants conducted "5 and more" lessons per week, 40.4% "3-4" lessons per week and 12.5% "1-2" lessons per week during the distance education process. In the context of the way the courses are conducted in the distance education process, more than half of the participants (59.8%) conducted their courses synchronously (simultaneously).

Table 1. Demographic Characteristics of Instructors Participated in the Study

Variable	**f**	**%**
Gender		
Female	198	48,5
Male	210	51,5
Age		
35 and below	81	20,3
36-45	157	38,5
46 and over	168	41,2
Academic Title		
Profesör	69	16,9
Associate Prof.	78	19,1
Dr.	104	25,5
Instructor Dr.	35	8,6
Instructor	122	29,9
How long have you been working as a faculty member at the university?		
5 years and less	82	20,1
6-10 years	90	22,1
11 and over	236	57,8
How long have you been running online courses?		
Less than 6 months	92	22,5
7-12 months	185	45,3
13 months and over	131	32,1
What status do you hold as an academic at the university?		
Full time	385	94,4
Part time	10	2,5
Hour based paid	13	3,2
How many lessons did you conduct in a week during the distance education process?		

1-2 courses	51	12,5
3-4 courses	165	40,4
5 courses and over	192	47,1
How did you conduct your lessons during the distance education process?		
Asynchronous (asynchronous)	35	8,6
Synchronous (simultaneous)	244	59,8
Both synchronous and asynchronous	129	31,6

Table 1 shows educational levels of conducted courses during the distance education process. Instructors mostly gave license degree and least certificate level courses. The number of participants giving lectures at doctorate level is 95, at master's level is 196 and at license 268, the number of participants teaching at vocational school level is 144 and the number of participants giving courses at certificate level is 5. As seen from the table 2, in this study largest proportion among course based given in distance education mode either synchronously or asynchronously is bachelor level (n=298, 65,7 %).

Table 2. Course Levels Conducted During the Distance Education Process

Course level	**No**		**Yes**	
	n	**%**	**n**	**%**
Doctorate level	313	76,7	95	23,3
Master's degree level	212	52,0	196	48,0
Bachelor level	140	34,3	268	65,7
Vocational School level	264	64,7	144	35,3
Certificate level	403	98,8	5	1,2

Table 3. shows the numbers of distance education management systems used. While the most used education systems in distance education are Zoom and Microsoft Teams Meet, the least used ones are Schoology, Youtube, Kahoot and WhatsApp.

Table 3 Distance Education Management Systems Used

System Name	No	Yes		
	n	%	n	%
Zoom	253	62,0	155	38,0
Google Class	362	99,7	46	11,3
Uzem	377	31,0	31	7,6
MS Team Meet	274	67,2	134	32,8
Perculus ALMS	383	93,9	25	6,1
Youtube	407	99,8	1	0,2
Canvas	400	98,0	8	2,0
Sakai	382	93,6	26	6,4
Moodle	358	87,7	50	12,3
Adobe	378	92,6	30	7,4
BigBlueButton	387	94,9	21	5,1
Kahoot	407	99,8	1	0,2
BlueBird	407	99,8	1	0,2
Mergen	402	98,5	6	1,5

WhatsUp	407	99,8	1	0,2
BlackBoardLearn	395	96,8	13	3,2
Schoology	407	99,8	1	0,2

The number of course tools used by the participants in the distance education process is given. The most used lesson tool is live online course (ie. via Zoom, Skype etc.) and the least used lesson tool is pre-recorded video or audio files.

Table 4. Tools Used as Teaching Material in the Distance Education Process

Lesson Tools	**No**		**Yes**	
	n	**%**	**n**	**%**
Power Point or Prezi Slides (silent)	348	85,3	60	14,7
Power Point or Prezi Slides (with audio narration)	341	83,6	67	16,4
Power Point or Prezi Slides (with video narration)	387	94,9	21	5,1
Pre-recorded video or audio files	389	95,3	19	4,7
Live online lesson (e.g. via zoom, Skype, etc.)	159	39,0	249	61,0

Table 5: Instructors' General Views About Online Education in Higher Education in Turkey

Statements: General Views About Online Education	Mean	Standard Deviation
The technology I use in the online teaching process is easy and user-friendly.	3,86	,831
Difficult to motivate students to learn online.	3,85	1,051
I consider continuing my online courses when necessary.	3,45	1,080
Online teaching is a reliable teaching method.	3,00	1,029
I feel more comfortable teaching online compared to traditional teaching.	2,64	1,173
Compared to traditional teaching, I was able to focus more easily on my lessons during the online teaching process.	2,52	1,117
Students are highly participatory during online classes.	2,14	1,003
Compared to traditional teaching, my students were able to focus on their lessons more easily during the online teaching process.	2,00	,981
Compared to the traditional course environment, communication with students is more intense in online courses.	1,97	,992

From the Table 5. it is seen that instructors perceive online teaching process easy and user-friendly (mean 3,86). However, that they find it difficult for students' motivation. For this reason, they perceive it as a mode of teaching when necessary although they find it a reliable mode of teaching. Additionally, instructors think that distance education creates a less communicated ambiance with the student compared to the traditional course environment. It can be said that distance education also enables a hard condition environment for students' focus to their courses.

CONCLUSION

Institutions have reacted to sustain their activities with the alternative methods during the pandemic. Higher education system in all over the world sifted their mode of teaching in different platforms. For this reason, academic way of teaching shifted to distance mode by using technology and internet based on the mobiles, laptops, or computers. This shift: from face-to-face mode to the

distance education required the use of different programs. This research brings out some demographics, software programs, workloads, and some views of instructors as the result.

One of the results of this study showed that 51.5% of the participants are men and 48.5% are women and largest proportion of the participants are over 46 years old and 57.8% of the participants have been working as a lecturer/staff at the university for 11 years and more. It was found that full-time lecturers (94.4%) constitute the major part of teaching comparing the part time. And with the increment of workload during the pandemic study shows that 47.1% of the participants conducted "5 and more" lessons per week. It is a heavy workload when considered the course preparation. The percentage of teaching 3and 4 courses is 40.4 %. and 12.5% "1-2" lessons per week during the distance education process. Traditional form of teaching allows teacher and student interaction in a classroom atmosphere but on the name of protecting the two parties in teaching, distance education allows student and teacher to communicate in distance form. During the distance education process, more than half of the participants (59.8%) conducted their courses synchronously (simultaneously). In this form of distance teaching, student and instructor share the course materials in live form. In this study Zoom program was found as the mostly used distance education program secondly Microsoft teams. According to their education level most of the participants are PhD holder and either master's degree or equal level experience in the industry. Associate and professor title participants in this study are considerably less comparing to the instructors and senior lecturers.

One of the considerable results of this study is that instructors perceive online teaching process easy and user-friendly although they find it difficult for students' motivation. Additionally, instructors think that distance education creates a less communicative ambiance with the student compared to the traditional mode of teaching.

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A VIEW FROM EXPO2020 SWEDEN PAVILION

Huseyin Ozdemir
Konya Technical University, Faculty of Architecture and Design, Department of Architecture, Konya, Turkey
ORCID Code: 0000-0002-5878-8668

ABSTRACT

In the twentieth century, an increase is observed in energy use in the world, especially with technological developments. This increase is due to environmental pollution, climate change, increased carbon emissions, etc. in the world. it causes as many major damages as possible. The deterioration of the ecological balance of the world turns into a threat to future generations. For the universe to continue in its own order, ensuring ecological balance by reducing the human footprint to a minimum is considered under the concept of "sustainability". By spreading the awareness of this concept by the society, it is to leave the universe a livable place for future generations. Pavilion structures show the best example of this in terms of designing a sustainable future in parallel with technological developments. In this sense, the Expo2020 Sweden pavilion, where wood, a sustainable material, is used extensively, is examined within the scope of the study. The study covers information about both the importance of Expo2020 and how an architectural approach can be in terms of sustainability by examining the Expo2020 Sweden pavilion, which is discussed under the theme of "sustainability". As a result, the selection of materials that can be reused and recycled according to the carbon emission and energy consumed by each material, and the use of systems suitable for nature will play an important role in leaving a livable environment for future generations with the least destruction to the order of the universe.

Keywords: Sustainability, Expo 2020 Sweden Pavilion, Materials, Architectural Approach

EXPO2020 İSVEÇ PAVYONUNDAN BİR İZLENİM

Hüseyin Özdemir
Konya Teknik Üniversitesi, Mimarlık ve Tasarım Fakültesi, Mimarlık Bölümü, Konya, Türkiye
ORCID Code: 0000-0002-5878-8668

ÖZET

Yirminci yüzyılda özellikle teknolojik gelişmeler ile birlikte dünyadaki enerji kullanımında artış gözlenmektedir. Bu artış dünyada çevre kirliliği, iklim değişikliği, karbon salınımının artması vb. gibi birçok büyük tahribatlara neden olmaktadır. Dünyanın ekolojik dengesinin bozulması gelecek kuşaklar için birer tehdit unsuruna dönüşmektedir. Evrenin kendi düzeni içerisinde devam edebilmesi için insan ayak izinin minimum düzeye indirgenmesiyle ekolojik dengenin sağlanması "sürdürülebilirlik" kavramı altında ele alınmaktadır. Bu kavramın toplum tarafından farkındalığının yaygınlaştırılmasıyla evrenini düzenin gelecek nesiller için yaşanılabilir bir yer bırakma çabası içerisindedir. Teknolojik gelişmelere paralel ve sürdürülebilir bir gelecek tasarlama anlamında bunun en güzel örneğini pavyon yapıları göstermektedir. Bu anlamda çalışma kapsamında sürdürülebilir bir malzeme olan ahşabın yoğun olarak kullanıldığı Expo2020 İsveç pavyonu incelenmektedir. Çalışma özellikle "sürdürülebilirlik" teması altında ele alınan Expo2020 İsveç pavyonu özelinde incelemeler yaparak hem Expo2020'nin önemine hem de sürdürülebilirlik anlamında bir mimari yaklaşımın nasıl olabileceği hakkında bilgileri kapsamaktadır. Bunun sonucunda her malzemenin karbon salınımına ve harcadığı enerjiye göre tekrar tekrar faydalanılabilen, dönüştürülebilen malzemelerin seçimi ve doğaya uygun sistemlerin kullanılması

gelecek nesillere evrenin düzenine en az tahribatla yaşanılabilir bir çevre bırakması açısından önemli bir rol oynayacaktır.

Anahtar Kelimeler: Sürdürülebilirlik, Expo2020 İsveç Pavyonu, Malzeme, Mimari Yaklaşım

HOW DO CULTURAL NATIONALISM AND POLITICAL NATIONALISM DIFFER?

Magda PIOTROW
Piotrowska Economic Science University, Poland

ABSTRACT

Cultural nationalism generally refers to ideas and practices that relate to the intended revival of a purported national community's culture. If political nationalism is focused on the achievement of political autonomy, cultural nationalism is focused on the cultivation of a nation. Cultural nationalism is a form of nationalism in which the nation is defined by a shared culture. It is an intermediate position between ethnic nationalism and civic nationalism. Therefore, it focuses on a national identity shaped by cultural traditions, but not on the concepts of common ancestry or race. Unmistakable social and political types of nationalism can be distinguished. Social nationalism underlines the recovery of the country as a particular progress based on a faith in the country as a special, verifiable and natural entirety. In this study, we will analysis political nationalism, then again, perceives the country as a discrete npolitical community, and is in this manner connected with thoughts, for example, power and self-assurance.

Keywords: Cultural Nationalism, Political Nationalism

NATIONALISM AND INTERNATIONALISM COMPATIBLE

Magda PIOTROW
Piotrowska Economic Science University, Poland

ABSTRACT

Nationalism, like any egoism, should not be leveled out, not destroyed, but transformed through the fulfillment of the commandment "love your neighbor as yourself." If you hate yourself, then you will hate those around you. So nationalism, filled with love for neighboring peoples and states, should be transformed into feelings of national dignity, national honor with a respectful and loving attitude towards other peoples. Therefore, in this article internationalism, leveling nationalism, is evil. The idea of internationalism, filled with love for a faceless humanity and not condescending to love for everyone, is dangerous and will always degenerate into totalitarianism.

Keyword: Nationalism, Internationalism.

PRESS UNION OF THE TURKISH PEOPLE

Mahmudova Guney Salam gizi
Baku State University
Faculty of Journalism, "Journalism"
Scientific Research Laboratory, researcher
ORCID Code: 0000-0002-7756-5849

ABSTRACT

The Turkish-speaking countries are mainly located in Asia and Eastern Europe. These are Azerbaijan, Turkey, Kazakhstan, Kyrgyzstan, Uzbekistan and Turkmenistan. Apart from Turkey, five other Turkic-speaking states gained their independence after the collapse of the USSR in 1991, The Republic of Turkey became the successor of the Ottoman Empire in 1923.

The first turning point of integration between the Turkic-speaking countries took place after the collapse of the USSR. Because until now, these Soviet-occupied countries were governed by official Moscow, acting within the framework of its decisions. With the launch of the Soviet Information Bureau, the government controlled news coverage of important events in the back and front through newspapers and radio. After the collapse of the Soviet Union, almost all Turkish-speaking states that gained their independence undertook large-scale reforms to build a democratic and civil society. The press has once again become a mirror of the people, laws on mass information have been adopted, and the number of modern media outlets has increased day by day. The media has played an important role in promoting culture and national values in these countries on a global scale. Summits of Turkic-speaking countries have begun to take place in order to strengthen the ties between the Turkic-speaking countries, lay a solid foundation for integration and consult with each other to overcome the problems that may arise after the Cold War. The media has also acted as a tool between Turkic-speaking countries. The Media Form of Turkic Speaking States was established in Ankara in December 2010. Under the title "Media in a Globalizing World: Opportunities and Challenges" held on the same date, ideas on the development of regional and global cooperation in Eurasia, the unification of the Turkic world in the media space, the establishment of a common Turkish language in the Turkic world and common perceptions were emphasized.While states prepare for traditional wars by developing their armed forces, they also prepare for information wars by increasing their influence and power over the media.

Keywords: Turkish, media, information

IDENTIFICATION OF KEY REGULATORS IN COMPLEX CERVICAL CANCER NETWORK AND THEIR FUNCTIONAL SIGNIFICANCE IN ORGANIZATION: A NETWORK THEORETICAL APPROACH

Naveen Kumar Singh[1], Md. Zubbair Malik[2*] and Saurabh Kumar Sharma[1*]

[1]School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi-110067, India.
[2]School of Computational and Integrative Sciences, Jawaharlal Nehru University, New Delhi-110067, India.

ABSTRACT

Introduction: Cervical carcinoma (CrC) is the fourth most frequent cause of death in women worldwide. About 70% of deaths occur in low or middle-income countries. The cancer emerges from cervix and due to abnormal growth, paves its way towards the other parts of the body.

Background: It has been seen that cancer of various types is interlinked by number of pathways that are perturbed in dissimilar diseases. As cancer is a multifactorial disease represented by PPIs, the insight into these networks can be able to reveal more of the biomarkers. In this study, we analysed the CrC networks to find out the fundamental regulators working for the integrity of the cell. This inclusive study will enable us to identify differences
between expression and control mechanism of cancer cell. The topological parameters depict hierarchal features of the CrC network, suggesting functional significance of FRs in disease. The study can be applied for more effective treatment of the disease.

Method: The cervical cancer network constructed from experimentally verified genes are found to follow hierarchical scale free network of heterogeneous modular organization with diverge leading hubs. The topological parameters (degree distributions, clustering co-efficient, connectivity and centralities) of this network obey fractal rules indicating absence of centrality lethality rule, and efficient communication among the components. From the network theoretical approach, we identified few key regulators out of large number of leading hubs, which are deeply rooted from top to down of the network, serve as backbone of the network, and possible target genes. Within the framework of network theory. we device a method to identify few fundamental regulators from a large number of leading hubs, which are deeply rooted in the network, serve as backbones of it and key regulators from grassroots level to complete network structure.

Results: We could be able to identify seven fundamental regulators, namely, EGFR, FYN, STAT1, PTK2, PIK3R1, GRB2 and PLCG1. The popularities of these hubs change in an unpredictable way at various levels of organization, and absence of these hubs cause enormous amount of wiring/rewiring energy which propagate throughout the network. The network compactness is found to increase as one goes from top to bottom of the network organization. The popularity of these hubs also gets changed in unpredictable way at various levels of organization and show disactivate nature.

Conclusion: The local community paradigm approach in this network shows strong correlation of nodes in majority of modules/sub-modules (fast communication among nodes) and weak correlation of nodes only in few modules/sub-modules (slow communication among nodes) at various levels of network organization.

Keywords: Complex Network, Cervical Cancer Network, Community Detection, Key Regulator

THE EFFECT OF THE ADDITIVE ON THE KINETIC PROPERTIES OF THE NICKEL-BASED ALLOY OBTAINED BY ELECTROCHEMICAL DEPOSITION

Katia Hebbache[1, a], Nadia Ait Ahmed[1, b], Nabila Aliouane[1, c]

[1]Laboratoire d'Electrochimie, de Corrosion et de Valorisation Energétique (LECVE), Université de Bejaia, 06000 Bejaia, Algérie.

ABSTRACT

It is well known that in the electrodeposition of metals and alloys that the introduction of small amounts of organic substances into the electrolytic bath leads to more or less significant changes in the deposit produced. In general, the morphology as well as the kinetics of the deposition are too sensitive to the presence of these organic additives in the electrolytic baths. Indeed, the influence of organic additives on The electroplating of Ni-Cu thin films has also been widely studied in recent years.

The kinetic study of the deposition using the cyclic voltammetry technique made it possible to optimize the conditions for the electrodeposition of these deposits.

The nickel-copper alloys were electrodeposited in an acid bath containing various ratios of metal cations. Different proportions of the two metals can be obtained using different deposition parameters, but at all Ni / Cu ratios studied**.**

The conditions for the electroplating of Ni-Cu alloys from a citrate additive electrolyte have been developed. Changes in the composition of deposits with pH and electrolyte concentration have been studied**.**

Ni-Cu alloys were studied on a glassy carbon electrode by kinetic study using an acid sulfate bath and compared with those of pure nickel and copper.

Keywords: Ni-Cu alloys, Citrate additive, Kinetic study, Cyclic voltammetry, Glassy Carbon, Electrodeposition.

SUCUĞUN UÇUCU BİLEŞİKLERİ ÜZERİNE OLGUNLAŞTIRMA HIZI, STARTER KÜLTÜR VE YAĞ ÇEŞİDİNİN ETKİLERİ

Mükerrem KAYA[1*], Güzin Kaban[1]

*[*1]Atatürk Üniversitesi, Ziraat Fakültesi,*
Gıda Mühendisliği Bölümü, Erzurum,
Türkiye.
ORCID Code: 0000-0001-6340-828X

ÖZET

Bu çalışmada, olgunlaştırma hızı (yavaş:nitrat ve başlangıç fermentasyon sıcaklığı 18°C ve hızlı: nitrit ve başlangıç fermentasyon sıcaklığı 24°C), tekli ve çoklu starter kültür kullanımı (doğal fermentasyon, *Lactobacillus plantarum* GM77, *Staphylococcus xylosus* GM92 ve *L. plantarum* GM77 + *S. xylosus* GM92) ve hayvansal yağ çeşidinin (et yağı, kuyruk yağ ve et yağı+kuyruk yağı) geleneksel bir Türk et ürünü olan sucuğun uçucu bileşikleri üzerine etkileri incelenmiştir. Sucuk üretimi kontrollü şartlarda gerçekleştirilmiştir. Uçucu bileşikler katı faz mikroekstraksiyon (SPME) tekniği ile ekstrakte edilmiş ve GC/MS kullanılarak identifiye edilmiştir. Genellikle hayvansal yağ çeşidi son ürünün uçucu bileşikleri üzerinde önemli bir etki göstermemiştir ($P>0,05$). Diğer taraftan uçucu bileşiklerin yüksek seviyeleri yavaş olgunlaştırılmış sucuk örneklerinde tespit edilmiştir ($P<0,05$). Yavaş olgunlaştırılan sucuk grubu, hızlı olgunlaştırılan sucuk grubuna göre etanol, asetik asit ve asetoin için daha yüksek ortalama seviyeler vermiştir ($P<0,05$). *L. plantarum* GM77 + *S. xylosus* GM92' nin starter kültür olarak kullanımı uçucu bileşiklerin seviyelerini önemli bir şekilde artırmıştır ($P<0,05$) ve bu çoklu kültür özellikle etanol ve asetik asitin seviyelerinde bir artışa neden olmuştur. Bu faktörlerin interaksiyonu bazı uçucu bileşikleri üzerinde önemli ($P<0,05$) veya çok önemli ($P<0,01$) etki göstermiştir.

Anahtar Kelimeler: Sucuk, uçucu bileşik, starter kültür, koyun kuyruk yağı

EFFECTS OF RIPENING RATE, STARTER CULTURE AND FAT TYPE ON VOLATILE COMPOUNDS OF SUCUK

Mükerrem Kaya[1*], Güzin Kaban[1]

*[*1]Atatürk Üniversitesi, Ziraat Fakültesi,*
Gıda Mühendisliği Bölümü, Erzurum,
Turkey.
ORCID Code: 0000-0001-6340-828X

ABSTRACT

In this study, the effects of ripening rate (slow: nitrate and initial fermentation temperature 18°C and rapid: nitrite and initial fermentation temperature 24°C), the use of mono and mixed starter culture (natural fermentation, *Lactobacillus plantarum* GM77, *Staphylococcus xylosus* GM92 and *L. plantarum* GM77 + *S. xylosus* GM92) and animal fat type (beef fat, sheep tail fat and beef fat + sheep tail fat) on the volatile compounds of sucuk, a traditional Turkish dry-fermented sausage, were investigated. The sucuk production was carried out under controlled conditions. Volatile compounds were extracted by solid phase micro-extraction (SPME) and gas chromatography / mass spectrometry (GC / MS) was used in the identification of volatile compounds. In general, type of animal fat had no significant effect on the volatile profile of the final product ($P>0,05$). On the other hand, high levels of volatile compounds were found in the slow ripened sucuk samples ($P<0,05$). The slow ripened sucuk group showed a higher mean level for ethanol, acetic acid and acetoin than the rapid ripened sucuk

group (P<0,05). The use of *L. plantarum* GM77 + *S. xylosus* GM92 as starter culture increased significantly (P<0,05) the levels of volatile compounds, and this mixed culture especially caused an increase in the levels of ethanol and acetic acid (P<0,05). The interaction between factors had a significant (P<0,05) or very significant (P<0,01) effect on some volatile compounds.

Keywords: Sucuk, volatile compound, starter culture, sheep tail fat

GİRİŞ

Fermente sosisler, kıyma makinesinde veya kuterde çekilen et ve yağın çeşitli baharat, şeker, tuz ve kürleme maddeleri ile karıştırılıp, doğal veya yapay bağırsaklara doldurulması ve belirli bir sıcaklık ve nispi rutubette olgunlaştırılması ile üretilen et ürünleridir (Soyer, 2002). Bu tip ürünler hammadde, bileşenler ve seviyeleri, şekil ve büyüklükleri, fermentasyon süresi, fermentasyon ve kurutma sırasındaki fizikokimyasal şartlar bakımından oldukça farklılık göstermektedir. Sucuk, bu gruba giren fermente bir et ürünüdür.

Et teknolojisinde starter kültür olarak laktik asit bakterileri (*Lactobacillus plantarum, L. curvatus, L. pentosus, L. sakei, Pediococcus pentosaceus, P. acidilactici*), katalaz pozitif koklar (*Staphylococcus carnosus, S. xylosus, Kocuria varians*) ile küfler (*Penicillum nalgiovense*) ve mayalar (*Debaryomyces hansenii*) yaygın olarak kullanılmaktadır (Jessen, 1995). Laktik asit bakterileri ve katalaz pozitif koklar fermente ürünlerin fermentasyonunda ve olgunlaştırılmasında teknolojik olarak önem arz eden iki bakteri grubudur (Aymerich et al., 2003). Laktik asit bakterileri, bozucu floraya ve patojenlere karşı inhibe edici etkiye sahiptir. Bu bakterilerin koruyucu etkisi kadar lezzet gelişimine de katkısı söz konusudur (Schillinger and Lücke, 1989). Katalaz pozitif koklar ise olgunlaşma süresince proteolisiz, lipolisiz, peroksitlerin parçalanması ve renk stabilitesi gibi arzu edilen reaksiyonlarda rol almaktadır (Garcia-Varona et al., 2000). Sucuk üretiminde aside hassas olan bu mikroorganizmaların yavaş ve hızlı olgunlaştırma koşullarında aromatik özelliklerine yönelik ise herhangi bir literatür söz konusu değildir. Diğer taraftan aynı olgunlaştırma koşullarında kuyruk yağı, sığır et yağı ve kuyruk yağı+sığır et yağı kullanılarak üretilen sucuklarda aromatik farklılıkların da belirlenmesi büyük önem arz etmektedir.

Bu araştırmada, olgunlaştırma hızı (yavaş olgunlaştırma: başlangıç fermentasyon sıcaklığı 18±1°C /nitrat, hızlı olgunlaştırma: başlangıç fermantasyon sıcaklığı 24±1°C /nitrit), starter kültür kullanımı (kontrol, *L. plantarum* GM77, *S. xylosus* GM92 ve *L. plantarum* GM77 +*S. xylosus* GM92) ve yağ çeşidinin (sığır et yağı, kuyruk yağı ve sığır et yağı + kuyruk yağı) sucuğun uçucu bileşik profiline etkileri incelenmiştir.

MATERYAL VE METOT

Materyal

Araştırmada sığır eti, sığır et yağı ve kuyruk yağı hammadde olarak kullanılmıştır.

Metot

Sucuk üretimi, Kaya and Gökalp (2004) tarafından belirtilen reçete dikkate alınarak hazırlanmıştır. *L. plantarum* GM77 suşu sucuk hamurlarına yaklaşık 10^7 kob/g düzeyinde, *S. xylosus* GM92 suşu ise 10^6 kob/g seviyesinde inoküle edilmiştir. Sucuk hamurunun hazırlanmasında laboratuar tipi kuter (MADO, Dornhan/Schwarzwald) kullanılmıştır. Hazırlanan hamurlar, sığır ince bağırsağı özelliklerine yakın özellikteki suni bağırsaklara (38 mm, kalojen materyal), laboratuvar tipi pistonlu doldurucu (MADO, Dornhan/Schwarzwald) kullanılarak doldurulmuştur. Dört saatlik dengeleme işleminden sonra olgunlaştırma, sıcaklık ve bağıl nemi otomatik olarak ayarlanabilen klima odasında (Reich, Germany) gerçekleştirilmiştir. Yavaş olgunlaştırmada sıcaklık 1-10. günlerde 18±1ºC, 11-14.günlerde ise 16 ±1ºC'ye ayarlanmıştır. Hızlı olgunlaştırmada ise sıcaklık 1. günde 24 ±1ºC, 2. ve 3. günde 22±1ºC, 4-6. günlerde 20±1ºC, 7-10.günlerde 18±1ºC ve 11-14.günlerde ise 16±1ºC'ye ayarlanmıştır. Bağıl nem, her iki olgunlaştırma prosesinde de %92±2'den %84±2' ye kademeli olarak düşürülmüştür. Hava cereyanı ise hızlıdan yavaşa doğru yine kademeli olarak düşürülmüştür.

Uçucu bileşiklerin belirlenmesi

Uçucu bileşiklerin ekstraksiyonu, katı faz mikroekstraksiyon ile tanımlama ise gaz kromatografisi/kütle spektrometrisi (GC/MS) ile gerçekleştirilmiştir. Tanımlamada kütle spektrometrisinin kütüphanesinden (NIST, WILEY, FLAVOR) ve ayrıca standart maddelerden yararlanılmıştır.

İstatistiksel Analizler

Araştırmada olgunlaştırma hızı (yavaş ve hızlı), yağ çeşidi (et yağ, kuyruk yağ ve et yağı+kuyruk yağı) ve starter kültür (kontrol, *L. plantarum* GM77, *S. xylosus* GM92 ve *L. plantarum* GM77 + *S. xylosus* GM92) faktör olarak seçilmiş ve denemeler 2x3x4 faktöriyel düzende tam şansa bağlı deneme planına göre iki tekerrürlü olarak kurulmuş ve yürütülmüştür. Elde edilen sonuçlar SSPS programı kullanılarak varyans analizine, önemli bulunan ana varyasyon kaynaklarına ait ortalamalar ise Duncan çoklu karşılaştırma testine tabi tutulmuştur.

BULGULAR

Farklı starter kültürler (kontrol, *L. plantarum* GM77, *S. xylosus* GM92, *L. plantarum* GM77 + *S. xylosus* GM92) ve yağlar (et yağı, kuyruk yağı, et + kuyruk yağı) kullanılarak üretilen yavaş ve hızlı olgunlaştırılmış sucuklarda toplam 75 bileşik belirlenmiştir. Varyans analiz sonuçlarına göre ana varyasyon kaynaklarından olgunlaştırma hızı diğer ana varyasyon kaynaklarına göre daha fazla bileşik üzerinde istatistiki olarak etki göstermiştir. Starter kültür ise yağ çeşidi faktöründen daha etkin olmuştur. Olgunlaştırma hızı, starter kültür kullanımı ve yağ çeşidi değişkenlerine ait ortalama değerlerin Duncan çoklu karşılaştırılma test sonuçları Tablo 1'de verilmiştir.

Hızlı olgunlaştırmada bir karbonhidrat metabolizması ürünü olan asetaldehit daha yüksek ortalama değer vermiştir. Diğer bir aldehit olan 2-metil-3-fenil propanal açısından ise en düşük ortalama *L. plantarum* GM77 varlığında tespit edilmiştir. Lipid oksidasyonunun bir ürünü olan pentanal açısından yavaş olgunlaştırmada hızlı olgunlaştırmaya göre daha yüksek bir ortalama değer belirlenmiştir (Tablo 1). Kuyruk yağı kullanımı ve *L. plantarum* GM77 + *S. xylosus* GM92 kültürü ise bu bileşiğin seviyesini artırmıştır (Tablo 1).

Asetik asit, yavaş olgunlaştırmada daha yüksek ortalama değer vermiştir (Tablo 1). Yağ grupları arasında da bazı farklılıklar görülmüş, en düşük ortalama değer, et yağı + kuyruk yağı grubunda belirlenmiştir. En yüksek ortalama değer ise kuyruk yağında belirlenmiş, ancak bu ortalama değer et yağına ait ortalamadan istatistiki olarak farksız bulunmuştur (Tablo 1). Starter kültürlerden *L. plantarum* GM77+ *S. xylosus* GM92 karışık kültürü kontrol grubu da dahil diğer gruplardan oldukça yüksek ortalama vermiştir (Tablo 1).

Mevcut araştırmada diasetil, aseton ve asetoin olmak üzere üç keton belirlenmiştir. Yavaş olgunlaştırmada diasetil ve asetoin oldukça yüksek miktarda belirlenmiştir. Her iki bileşik *L. plantarum* GM77 + *S. xylosus* GM92 varlığında yine oldukça fazla miktarda belirlenmiştir (Tablo 1).

Sucukta 8 aromatik hidrokarbon belirlenmiştir. Stiren açısından yağ grupları arasında bazı farklılıklar belirlenmiş ve en yüksek değeri kuyruk yağının verdiği tespit edilmiştir. Toluen açısından ise yavaş olgunlaştırma, hızlı olgunlaştırmaya göre daha yüksek bir ortalama vermiştir (Tablo 1).

Etil alkole ait ortalama değer yavaş olgunlaştırmada hızlı olgunlaştırmaya göre oldukça yüksektir. Starter kültürlerden ise en yüksek ortalamayı *L. plantarum* GM77 +*S. xylosus* GM92 karışık kültürü vermiştir (Tablo 1). Kümik alkol açısında en yüksek ortalama değer yavaş olgunlaştırmada ve *L. plantarum* GM77 + *S. xylosus* GM92 varlığında görülmüştür (Tablo 1).

Araştırmada belirlenen sülfürlü bileşiklerden alil metil sülfür, 3,3-tyiobis-1-propen, metil-2-propenil disülfür ve metil thiiran yavaş olgunlaştırmada hızlı olgunlaştırmaya göre daha yüksek ortalama değerler vermiştir (Tablo 1). Burada özellikle metil thiiran dikkat çekmiştir. Bu bileşik *L. plantarum* GM77 +*S. xylosus* GM92 grubunda diğer gruplara (kontrol, *L. plantarum* GM77, *S. xylosus* GM92) göre çok daha yüksek bir değer vermiştir. Alil metil sülfür ve 3,3-tyiobis-1-propen seviyeleri de *L. plantarum* GM77 +*S. xylosus* GM92 grubunda yüksektir (Tablo 1).

Esterler içerisinde etil asetat ve 2,4- hekzadienoik asit etil ester diğer bileşiklere göre daha yüksek değerlere sahiptir. Her iki bileşik yavaş olgunlaştırmada hızlı olgunlaştırmaya daha yüksek ortalamalar vermiştir. Diğer taraftan kuyruk yağı kullanımı etil asetat miktarını önemli ölçüde artırmıştır (Tablo

1). *L. plantarum* GM77 + *S. xylosus* GM92 karışık kültürü aynı şekilde etil asetat miktarını artırmıştır. *L. plantarum* GM77 + *S. xylosus* GM92 kültürü 2,4- hekzadienoik asit etil ester üzerinde de önemli derecede etkili olmuştur (Tablo 1).

TARTIŞMA

Sucuk gruplarında belirlenen 2-metil-3-fenil propanal, Kaban and Kaya (2009a,b) tarafından da belirlenmiş ve bu bileşiğin sucuk için önemli bir aldehit olduğu bildirilmiştir. Mevcut bu çalışmada yavaş olgunlaştırmada uçucu bileşiklerin miktarında genellikle bir artış gözlenmiştir. Benzer şekilde *Staphylococcus xylosus* ilave edilerek üretilen sosisler üzerinde yürütülen bir araştırmada da hızlı olgunlaştırmada (yüksek fermantasyon sıcaklığı, glikoz, nitrit ve *P. pentosaceus*), yavaş olgunlaştırmaya (nitrat ve düşük fermantasyon sıcaklığı) göre lipit otooksidasyon ürün miktarlarının daha az olduğu tespit edilmiştir (Stahnke, 1995).

Bu çalışmada belirlenen asetik asit, sucuk (Kaban and Kaya, 2009a,b; Kaban, 2010) ve diğer fermente et ürünlerinde de belirlenmiştir (Flores et al., 2004). Asetik asit, homofermantatif laktik asit bakterileri ve stafilokoklar tarafından üretilebildiği gibi yağ asidi oksidasyonu ve alanin katabolizması sonucunda da oluşabilmektedir (Spaziani et al., 2009).
Fermente et ürünlerinde bulunan diğer bir uçucu bileşik grubu ketonlardır. Sucuk gruplarında belirlenen asetoin ve diasetilin seviyesi yavaş olgunlaştırmada artmıştır. Kürleme tuzu olarak nitrat ve nitritin kullanıldığı yavaş olgunlaştırılan kuru fermente et ürünleri üzerinde yürütülen bir araştırmada, karbonhidrat fermantasyonu ve amino asit degradasyonundan kaynaklanan uçucu bileşiklerin miktarının nitrat kullanılarak üretilen örneklerde daha yüksek olduğu belirtilmiştir (Marco et al., 2006). Asetoin ve diasetil fermentasyon prosesinde ortaya çıkan düşük molükül ağırlıklı bileşiklerdir. Karbonhidrat fermentasyonu sırasında bu tür spesifik bileşiklerin oluşumu kullanılan starter kültüre bağlıdır(Toldra et al., 2001).

Tablo 1. Sucukların uçucu bileşiklerine ait ortalamaların Duncan çoklu karşılaştırma test sonuçları(% alan)

	Olgunlaştırma Hızı		Yağ Çeşidi			Starter Kültür			
Bileşik Adı	**Yavaş**	**Hızlı**	**Et yağı**	**Kuyruk yağı**	**Et + Kuyruk yağı**	**Kontrol**	***L. plantarum***	***S. xylosus***	***L. plantarum* + *S. xylosus***
Asetaldehit	1,80±4,59b	7,00±8,87a	3,82±7,78a	4,88±8,89a	4,51±5,60a	4,39±5,35a	6,93±11,76a	3,32±5,44a	2,98±4,89a
Etanol	75,14±137,49a	35,92±33,10b	50,67±67,32a	54,89±79,77a	61,04±142,97a	41,45±44,56b	22,69±27,19b	25,47±6,63b	132,51±176,20a
Aseton	0,00±0,00b	0,47±0,83a	0,30±0,92a	0,23±0,49a	0,18±0,35a	0,00±0,00c	0,64±1,10a	0,00±0,00c	0,30±0,37b
Karbon disulfit	0,00±0,00b	0,31±0,44a	0,13±0,28a	0,19±0,39a	0,14±0,35a	0,11±0,28a	0,12±0,28a	0,22±0,41a	0,17±0,40a
Thiirane,metil	237,96±532,07a	22,80±21,76b	95,89±311,36b	215,73±526,70a	79,53±279,60b	6,12±5,56b	33,15±19,09b	6,99±2,29b	475,28±677,38a
Diasetil	7,40±15,19a	0,11±0,49b	4,06±10,97a	4,72±13,36a	2,48±9,40a	0,00±0,00b	2,74±3,02b	0,00±0,00b	12,28±20,23a
Etil asetat	17,43±24,36a	8,68±6,97b	9,33±11,45b	17,91±25,02a	11,93±15,21b	11,44±8,56b	5,55±6,07c	9,44±5,47bc	25,79±31,62a
Asetik asit	118,37±221,73a	11,37±9,11b	69,65±166,42a	93,66±208,40a	31,30±100,07b	14,04±13,40b	20,70±10,12b	14,21±8,04b	210,54±286,70a
Heptan	13,89±28,19a	1,16±2,21b	15,20±33,16a	3,05±4,43b	4,32±11,03a	14,24±34,45a	1,61±2,14b	8,02±14,71ab	6,23±17,21ab
Sulfit,allil metil	54,23±75,58a	13,27±11,23b	36,82±60,94a	39,64±68,87a	24,79±39,02b	24,00±23,45b	15,16±9,32b	16,05±8,79b	79,78±99,50a
Pentanal	1,57±3,81a	0,34±0,71b	0,22±0,82b	1,93±4,03a	0,71±2,33a	0,33±0,75b	0,65±0,97b	0,12±0,33b	2,70±5,11a
1-Propene,1-(metilthio)	0,00±0,00b	0,37±1,42a	0,33±1,60a	0,13±0,63a	0,09±0,37a	0,39±1,83a	0,30±0,83a	0,05±0,30a	0,00±0,00a
Disulfit,dimetil	0,30±0,84a	0,51±0,88a	0,23±0,89a	0,42±0,95a	0,55±0,71a	0,71±1,13a	0,01±0,07b	0,89±1,05a	0,00±0,00b
Asetoin	9,85±20,21a	0,95±1,85b	6,18±15,02a	8,69±20,59a	1,34±2,26b	0,04±0,21c	5,67±4,76b	0,00±0,00c	15,91±26,86a
1H-Pyrrole,1-metil	2,30±4,79a	0,58±0,75b	1,27±2,85b	2,19±4,77a	0,86±2,43b	0,39±1,07b	0,90±0,93b	0,33±0,39b	4,15±6,19a
İzoamil alkol	0,34±1,55a	0,13±0,57a	0,37±1,86a	0,20±0,73a	0,14±0,40a	0,60±2,16a	0,00±0,00a	0,35±0,81a	0,00±0,00a
Toluen	6,47±8,94a	1,69±1,59b	4,73±9,16a	4,27±6,47a	3,25±3,85a	5,89±9,88a	1,97±1,36b	2,52±2,03b	5,94±8,57a
Butanoik asit, etil ester	0,17±0,49b	0,52±0,79a	0,08±0,20b	0,40±0,74a	0,55±0,84a	0,48±0,68a	0,10±0,42b	0,59±0,85a	0,21±0,62b
Hekzanal	10,10±14,20a	7,76±36,93a	10,00±35,80a	9,06±16,10a	7,74±28,73a	9,87±32,39a	10,10±41,05a	3,09±3,34a	12,68±19,58a
Etil laktat	0,14±0,55a	0,22±0,46a	0,17±0,64a	0,20±0,45a	0,17±0,40a	0,03±0,16a	0,26±0,48a	0,21±0,47a	0,21±0,73a
Butanoik asit,3-metil,etil ester	0,15±0,44b	0,49±1,41a	0,07±0,41b	0,55±1,59a	0,33±0,76ab	0,20±0,57b	0,01±0,03b	1,06±1,85a	0,01±0,03b
1-propene,3,3-thiobis	44,30±63,63a	8,03±8,04b	28,38±50,65a	29,92±56,27a	20,18±37,87a	16,76±15,10b	11,44±7,32b	8,94±6,24b	67,51±83,67a
p-xylene	1,42±2,82a	0,59±1,09b	0,30±0,62b	1,93±3,24a	0,79±1,41b	0,59±0,71b	0,49±0,65b	0,99±1,45b	1,95±3,85a
Stiren	0,49±1,37a	0,30±0,54a	0,33±0,65b	0,70±1,63a	0,15±0,32b	0,23±0,35a	0,31±0,71a	0,34±0,51a	0,69±1,86a
α –thujen	2,78±4,11a	1,61±1,83b	2,07±3,20a	2,42±3,55a	2,09±2,97a	1,79±2,07b	1,78±1,99b	1,70±1,99b	3,50±5,29a
Heptanal	1,27±3,24a	1,67±11,76a	2,79±14,50a	0,85±2,65a	0,76±2,25a	0,50±0,58a	3,37±16,58a	0,31±0,41a	1,69±4,54a
α-pinen	16,65±25,78a	5,43±3,96b	13,60±25,80a	11,53±17,45a	7,98±11,73a	6,93±10,36b	5,06±2,95b	5,98±4,31b	26,18±32,54a
Disulfit,metil 2-propenil	13,88±13,83a	9,48±8,82b	10,84±13,57a	12,48±11,16a	11,72±10,54a	16,25±14,75a	6,31±4,26c	13,56±9,13ab	10,58±13,80b
Kamfen	0,42±1,06a	0,25±0,29a	0,26±0,45a	0,51±1,23a	0,23±0,28a	0,28±0,51a	0,26±0,32a	0,26±0,32a	0,53±1,39a
Metil-trans-propenil-disulfit	0,15±0,34b	0,47±0,58a	0,23±0,43b	0,28±0,40b	0,42±0,63a	0,61±0,70a	0,04±0,14b	0,57±0,42a	0,02±0,07b
Sabinen	4,03±5,76a	1,62±2,43b	2,93±5,25a	3,67±5,15a	1,88±2,79a	3,11±5,66a	1,65±1,73a	2,56±3,26a	3,97±6,04a
Dekan	1,04±2,35a	0,65±181a	0,83±2,18a	1,11±2,58a	0,61±1,40a	0,75±1,87ab	0,37±1,05b	1,60±2,78a	0,67±2,21b
β-pinen	15,97±28,77a	10,65±8,29a	16,63±24,69a	14,62±25,99a	8,68±7,41a	14,72±22,79ab	7,84±8,05b	10,41±7,16b	20,25±33,47a
β-myrcen	84,04±146,97a	16,86±15,77b	56,65±123,77a	56,36±101,34a	38,34±103,20a	16,05±14,31b	24,17±18,01b	19,59±13,59b	141,99±191,64a
Nonane	0,13±0,44a	0,06±0,23a	0,07±0,26a	0,09±0,33a	0,13±0,45a	0,27±0,60a	0,00±0,00a	0,11±0,32b	0,00±0,00b
α-fellendren	26,36±44,95a	8,33±8,89b	21,37±48,75a	19,27±27,15a	11,40±15,84a	9,15±8,54b	10,04±6,45b	9,91±8,85b	40,29±60,65a
3-karen	48,82±76,37a	13,81±12,66b	42,45±80,09a	34,19±52,53a	17,30±21,97b	23,09±26,90b	15,63±12,24b	19,09±13,89b	67,44±102,63a
α- terpinen	5,00±9,42a	2,28±3,68b	3,50±7,13a	5,01±9,37a	2,41±4,24a	3,08±7,22b	2,69±3,73b	1,80±2,13b	6,99±11,31a
Oktanal	0,47±2,57a	0,15±0,62a	0,07±0,24a	0,71±3,20a	0,14±0,36a	0,03±0,20a	0,51±0,93a	0,00±0,00a	0,69±3,61a
Limonen	119,92±183,63a	28,50±28,32b	86,89±166,40a	87,20±146,23a	48,54±92,04b	38,53±28,03b	36,22±33,31b	35,68±28,87b	186,41±242,14a
1-metil-4-(1-metiletil)-benzen	216,09±264,57a	63,95±58,86b	160,19±239,90a	132,74±190,97a	127,13±184,51a	105,70±57,36b	88,40±63,51b	106,15±131,13b	259,82±358,35a
β –fellendren	13,13±22,57a	2,96±3,14b	6,37±12,71a	10,69±21,05a	7,08±15,75a	2,34±2,88b	4,15±4,15b	3,48±3,77b	22,21±29,03a

Tablo 1.(devam)	Olgunlaştırma Hızı		Yağ Çeşidi			Starter Kültür			
Bileşik Adı	**Yavaş**	**Hızlı**	**Et yağı**	**Kuyruk yağı**	**Et + Kuyruk yağı**	**Kontrol**	***L. plantarum***	***S. xylosus***	***L. plantarum + S. xylosus***
β-osimen	0,30±0,55b	0,85±1,16a	0,51±0,94a	0,63±0,98a	0,58±0,93a	0,45±0,98ab	0,80±1,10a	0,33±0,61b	0,71±0,98a
Eukaliptol	0,93±2,77a	1,21±1,46a	1,20±3,16a	1,25±1,79a	0,77±1,24a	1,01±1,41a	1,41±3,63a	1,43±1,88a	0,44±0,74a
γ-terpinen	93,55±131,07a	30,13±24,56b	63,03±84,18ab	76,09±124,52a	46,41±83,07b	35,90±32,55b	34,73±27,76b	32,63±21,16b	144,09±169,26a
Undecane	15,55±33,13a	10,64±7,54a	11,31±16,12a	15,65±30,61a	12,32±23,57a	7,56±7,30b	7,28±7,13b	14,80±10,53ab	22,75±44,57a
α-terpinolen	1,87±4,75a	1,57±1,62a	1,62±2,60a	2,09±5,40a	1,45±1,37a	1,05±1,28a	2,06±2,65a	1,32±1,41a	2,45±6,25a
1-Heksakosanol	0,00±0,00b	0,34±0,81a	0,25±0,63a	0,10±0,50a	0,17±0,65a	0,11±0,50a	0,36±0,95a	0,11±0,37a	0,10±0,36a
2-etil-1-dodekanol	0,00±0,00b	0,26±0,59a	0,15±0,48a	0,19±0,49a	0,05±0,31a	0,05±0,21b	0,19±0,52ab	0,02±0,13b	0,25±0,64a
1-metil-4-(1-metiletenil)-benzen	10,44±13,72a	2,71±2,52b	5,48±7,41a	7,53±10,81a	6,72±12,88a	4,52±4,19b	4,90±4,43b	4,47±3,96b	12,42±18,88a
Disulfit,di-2-propenil	33,25±54,50a	20,96±17,98a	26,34±40,95a	26,18±43,28a	28,79±39,20a	28,86±26,11a	21,10±13,84a	19,89±7,92a	38,55±75,31a
2,4-Hekzadienoik asit,etil ester	7,20±15,74a	0,31±0,84b	0,94±2,14b	5,83±12,10a	4,51±15,73ab	2,16±2,30b	0,96±1,19b	2,00±3,03b	9,92±22,00a
Linalool	29,09±47,39a	8,46±6,83b	19,96±35,62a	21,47±39,08a	14,89±31,13a	10,79±8,20b	9,43±7,43b	9,09±5,28b	45,79±62,73a
Nonanal	1,43±8,40a	0,51±1,25a	0,38±0,98a	0,31±0,79a	2,23±10,27a	0,00±0,00a	1,07±1,34a	0,00±0,00a	2,81±11,83a
Dodekan	2,96±10,55a	0,38±0,89b	1,92±5,68a	0,75±1,46a	2,34±11,78a	4,30±14,60a	0,41±0,56a	1,20±2,39a	0,77±2,25a
Octanoik asit , etil ester	0,00±0,00b	0,42±0,47a	0,06±0,19c	0,22±0,33b	0,34±0,53a	0,37±0,45a	0,17±0,35b	0,11±0,23b	0,18±0,45b
4-Terpinenol	2,75±10,52a	1,06±1,36a	1,00±1,83a	1,71±3,70a	3,00±12,38a	3,28±13,91a	0,86±0,66a	0,78±0,81a	2,70±5,63a
α –terpineol	2,13±4,35a	0,55±0,68b	1,04±2,13a	1,78±4,20a	1,20±2,94a	0,37±0,51b	0,61±0,51b	0,47±0,51b	3,91±5,65a
Tridekan	0,47±0,66a	0,14±0,36b	0,26±0,52a	0,31±0,62a	0,35±0,53a	0,55±0,67a	0,20±0,43bc	0,39±0,57ab	0,07±0,42c
Propanal,2-metil-3-fenil	46,97±42,85a	39,51±45,14a	42,85±33,50a	44,26±44,97a	42,62±52,42a	55,02±59,46a	18,12±6,81b	42,50±18,04a	57,32±54,88a
1-metoksi-4-(1-propenil)-benzen	0,10±0,27b	0,35±0,44a	0,25±0,37a	0,17±0,27a	0,27±0,49a	0,16±0,28b	0,15±0,39b	0,34±0,39a	0,25±0,45ab
4-karene	0,00±0,00b	0,17±0,41a	0,06±0,29a	0,09±0,33a	0,11±0,30a	0,07±0,31ab	0,16±0,43a	0,11±ab	0,00±0,00b
Alfa-Metilbenzilalkol	1,00±2,60a	0,71±0,70a	0,61±0,90a	1,20±2,75a	0,74±1,59a	0,50±0,68b	0,32±0,61b	0,49±0,56b	2,09±3,40a
Benzenemetanol,alfa-propil	0,00±0,00b	0,45±1,86a	0,10±0,47a	0,39±2,19a	0,19±0,57a	0,00±0,00a	0,69±2,55a	0,06±0,29a	0,16±0,58a
Kümik alkol	11,11±17,73a	4,32±4,54b	6,34±12,72a	9,52±15,64a	7,28±11,39a	0,60±1,13c	5,27±3,18b	3,00±3,16bc	21,97±20,39a
Tetradekane	0,55±1,55a	0,06±0,19b	0,32±1,43a	0,37±1,25a	0,22±0,49a	0,30±0,71a	0,11±0,38a	0,21±0,33a	0,60±2,07a
Dekanoik asit, etil ester	0,00±0,00b	0,07±0,17a	0,00±0,00b	0,10±0,19a	0,01±0,04b	0,06±0,16ab	0,01±0,06c	0,02±0,07bc	0,07±0,16a
Kopaen	3,55±5,14a	1,31±0,67b	2,41±3,37a	2,96±4,84a	1,92±3,00a	1,10±0,86b	1,52±0,76b	1,27±0,58b	5,83±6,48a
β –elemen	0,04±0,14b	0,12±0,21a	0,07±0,18a	0,11±0,20a	0,07±0,17a	0,10±0,21a	0,04±0,14a	0,07±0,19a	0,11±0,20a
Eugenol	0,05±0,13b	0,51±0,42a	0,31±0,41a	0,26±0,36a	0,27±0,40a	0,21±0,33b	0,32±0,47ab	0,22±0,27b	0,37±0,43a
1,2-dimetoksi-4-(2-propenil)-benzen	6,30±9,45a	4,18±2,26b	4,93±5,45a	6,05±8,43a	4,75±6,66a	2,83±2,74b	3,25±2,09b	3,10±2,02b	11,77±11,03a
Izokaryofillen	4,30±6,88a	1,44±1,24b	2,65±5,09a	3,43±6,40a	2,54±3,57a	1,52±1,06b	1,67±1,36b	1,38±0,91b	6,92±0,01a
Karyofillen	29,58±45,23a	11,70±5,27b	24,64±36,25a	23,69±39,99a	13,59±19,69b	12,87±8,23b	12,78±5,03b	10,33±4,89b	46,59±59,08a
α-karyofillen	0,55±1,08a	0,43±0,26a	0,33±0,36b	0,70±1,08a	0,46±0,71b	0,17±0,22b	0,34±0,31b	0,34±0,15b	1,13±1,33a

Sucuk gruplarında belirlenen aromatik hidrokarbonların kaynakları oldukça farklılık göstermektedir. Bu bileşiklerden toluen, lipit degradasyonu sonucu oluşabildiği gibi hayvan yemi olarak kullanılan otlardan da kaynaklanabilmektedir (Berdagué et al.,1993). Stiren de hayvan beslemede kullanılan otlarda bulunmaktadır (Meynier et al., 1999). Sucukta alifatik hidrokarbonlar da belirlenmiştir. Alifatik hidrokarbonların toplam pik alanındaki oranları oldukça düşüktür. Benzer sonuçlar Kaban and Kaya (2009 a,b) ile Kaban (2010) tarafından da tespit edilmiştir.

Fermente kuru et ürünlerinde alkollerin en önemli kaynakları lipit oksidasyonu, karbonhidrat metabolizması ve amino asit katabolizmasıdır (Mateo and Zumalacarregui, 1996). Etil alkol ve kümik alkol, yavaş olgunlaştırmada daha yüksek miktarda oluşmuştur. *L. plantarum* GM77 +*S. xylosus* GM92 karışık kültürü de bu bileşiklerin miktarını artırmıştır. Kümik alkol, sucukta Kaban ve Kaya (2009a) tarafından da belirlenmiştir.

Araştırmada bazı sülfürlü bileşiklerin seviyesi yavaş olgunlaştırmada artış göstermiştir. Karışık kültür (*L. plantarum* GM77 +*S. xylosus* GM92) ise bazı bileşiklerin miktarını artırmıştır. *S. carnosus*, yüksek inokülasyon seviyelerinde sülfürlü bileşiklerin seviyelerini önemli ölçüde artırmaktadır (Tjener ve et al., 2004). Buna karşın Kaban ve Kaya (2009a) sucukta starter kültür kullanımının 3,3-tyiobis-1-propen üzerinde önemli bir etkisinin olmadığını ancak alil metil sülfür, propen,1,3-epitiyo, metil-2-propenil disülfür ve di-2-propenil disülfür bileşikleri üzerinde önemli etki gösterdiğini tespit etmişlerdir. Diğer taraftan mevcut bu araştırmada, *L. plantarum* GM77 + *S. xylosus* GM92 esterlerin miktarında artışa neden olmuştur.

Terpenler sucuk için önem arz eden bileşiklerdir. Meynier et al. (1999) Milano salami olarak adlandırılan kuru kür edilmiş sosis örneklerinde çok sayıda terpen belirlemişler ve bu bileşiklerin baharat kaynaklı olduklarını belirtmişlerdir.

SONUÇ

Araştırmada varyasyon kaynaklarından olgunlaştırma hızı, çok sayıda bileşik üzerinde etkili olurken yağ faktörünün etkisi oldukça sınırlı olmuştur. Starter kültür kullanımı ise yağ çeşidi faktöründen daha fazla etki göstermiştir. Uçucu bileşikler üzerinde *L. plantarum* GM77 + *S. xylosus* GM92 karışık kültürü diğer gruplara göre daha etkili olmuştur.

TEŞEKKÜR

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İBN KAYYIM EL-CEVZİYYE'NİN İ'LAMÜ'L MUVAKKIÎN ESERİ BAĞLAMINDA LAFIZLARIN HÜKÜMLERE DELÂLETİNDE GÖZETİLEN MAKÂSID

Hatice Nuriye Dursun
Yüksek Lisans, Kırıkkale Üniversitesi İslami İlimler Fakültesi
Temel İslam Bilimleri Bölümü
Fıkıh Anabilim Dalı
Macester, University of KırıkkaleFaculty of IslamicSciences
Department of Fıqh.
Kırıkkale, Turkey
ORCID Code: 0000-0001-5887-629X

ÖZET

İslâm Hukuku içerisinde şerî amelî hükümlerin bir gaye arka planı vardır. Hükümlerin doğru anlaşılabilmesi ve doğru hüküm konulabilmesi için bu gaye arka planı olan makâsıdü'ş-şerîa ilminin bilinmesi önem arz etmektedir. Makâsıd nedir ve önem derecesi bakımından zarûriyyât, hâciyat ve tahsîniyyât ne demektir izah edilecektir. Öncelikle lafızların şeriata göre anlaşılmasını sağlayan etkenler işlenecektir. Ardından İbn Kayyım el-Cevziyye'nin İ'lâmü'l Muvakkı'în eseri bağlamında lafızların hükümlere delaleti konusunda gözetilen makâsıd izah edilecektir.

Anahtar Kelimeler: İslam Hukuku, Makâsıd, İbn Kayyım El-Cevziyye, İ'Lamü'l Muvakkıîn, Lafız.

FAVORED PURPOSES IN INDICATION OF WORDS TO PROVISIONS WITHIN THE CONTEXT OF IBN QAYYIM EL-CEVZIYYE'S WORK OF I'LAMU'L MWAQKIIN

ABSTRACT

In Islamic law, there is a background purpose of shariah applied rules. It is important to know the science of makâsıdü'ş-şerîa (The Purposes of shariah), which is the background of this purpose, in order to understand the provisions correctly and to make the right decision. What is makâsıd (purposes) and what is the meaning of zarûriyyât (obligations), haciyat (needs) and tahsîniyyat (admirations) in terms of importance will be explained. First of all, the factors that enable the words to be understood according to the Shari'ah will be covered. Then, in the context of Ibn Qayyim al-Cevziyya's work of İ'lâmü'l Muvakkı'in, the Makasıd (purposes) regarding the signification of the words to the provisions will be explained.

Keywords: İslamic Law, Maqāsid, Ibn Qayyim Al-Jawciyyah, I'laam ul Muwaqqi'een, Homonym

GİRİŞ

Hukuk üzerinde araştırma yapıp kendini bu alanda geliştirmek isteyenler özellikle hükümlerin arka planında olan makâsıd ilmine hâyız olmaları gerkmektedir. Çünkü hükümlerin gayelerini bilmeden hükümleri öğrenmek veya hüküm koyarken makâsıdı gözetmeksizin hükmü çıkarmak sıkıntılara sebep olmaktadır.

İşte tamda bu sebepten dolayı köklü her hukuk sisteminde olduğu gibi, islâm hukukunda da buna ayrı bir ehemmiyet verilmiştir. Fıkıh usûlü kitaplarına bakıldığında bu konuya ait pek çok yazının yazıldığı görülmektedir. Usûlcüler makâsıd çeşitlerini genel anlamda farklı taksimatlara tabi tutmuştur. Bunlardan en yaygın ve geleneksel olan ise önem derecesine göre üçlü taksimattır. Çalışma konusuna binaen bu yazıda da sadece bu taksimat

üzerinden bilgi verilmiştir. Zarûriyyât bunların ilki ve insanların dünya huzurlu ve güvende ahirette ise cennet nimetlerinden faydalanabilmeleri için olmazsa olmaz makâsıddır. Bunlar beş temel unsurun korunmasını esas almaktadır. Bahsedilen beş temele Zarûrat-ı hamse ise din, can, mal, nesil ve aklın korunmasıdır. Zarûrat-ı hamsenin korunmaması dünyada kaosa ahirette ise cennet nimetlerinden mahrumiyete sebep olmaktadır. En önemli mertebe bu beş unsurun korunmasından oluşan zarûriyyâttır. Ardından Zarûriyyât mertebesine ulaşamayan lakin ihtiyaç olan hâciyat gelmektedir. Hâciyatın yokluğu ise düzeni ve refahı bozmaktadır. Örneğin bir kimsenin seferîlik halinde kasrı salat etmesi ruhsat gereği aslen hâciyat kabilindedir. Üçüncü mertebe ise ne zarûriyyât kadar ne de hâciyat kadar öneme sahip olan tahsîniyyât mertebesidir. Tahsîniyyât güzelleştirici unsurlardır. Şerîatın ikmâli açısından ayrı öneme sahiptir. Tahsîniyyatın yokluğu ne kaosa ne de sıkıntılara sebep olmaktadır. Lakin kâmil mü'minde olmazsa kınanmayı hak edeceği olgulardır.[8]

Konunun anlaşılması bakımından işlenen makâsıd ve çeşitlerinin ardından asıl konumuz olan İbn Kayyım el-Cevziyye'nin bakış açısı ile Lafızların hükümlere delâleti konusu I'lâmü'l Muvakkı'în eseri bağlamında incelenmiştir. İbn Kayyım el- Cevziyye islâmiyetin en karışık ve sıkıntılı döneminlerin birinde hayatını geçirmiş bir âlimdir. Kendisi pek çok fıkrî akım ile mücadele etmiştir. Çok yönlü bir âlim olduğundan dolayı pek çok ilimde tedrisat görmüştür.[9] Babası Kayyımdır bundan dolayı ilim hayatına girişi babasından aldığı tedrisat ile başlamıştır. Ardından pek çok âlimden ilim edinen ibn Kayyım el-Cevziyye pek çok eser kaleme almıştır. Kendisi hanbeli mezhebi içerisinde üstün âlimlerden birisidir.[10] Konun anlaşılması âlimin tanınması ile ilişkili olduğundan hakkında bu bilgiler verilmiştir.

İ'lâmü'l Muvakkı'în eserini Mezhepler üstü bir metodoloji denemesi niteliğinde hz. Peygamber'den itibaren fıkhın gelişim seyrini ve genel esaslarını ele almıştır.[11] Eser içerisinde konuların izahı hanbeli mezhebi eksenli tüm mezhepleri kapsayan bir karakteristiği vardır. [12] Makalenin yazımında kullanılan çeviri dört ciltten oluşmaktadır.

Makalenin asıl konusu olan lafızlaın hükümlere delâletinde gözetilmesi gereken makâsıdlardır. Bunlar ise lafzın zâhiri ile aldanmayıp sözün maksadına bakılması gerektiğidir. İbn Kayyım el-Cevziyye şayet sadece sözlerin kendisine bakılırsa o vakit ya anlam daraltır ya da kaldırmayacağı anlamlar yükleme hatasına düşülebilineceğinden bahsetmiştir. Bundan dolayı lafızların vaz oldukları anlamların bilinmesi ve kastlarının anlaşılması önem arz etmektedir.[13]

1. MAKÂSIDÜ'Ş-ŞERÎA VE ÇEŞİTLERİ

Konun anlaşılmsı açısından makâsıdü'ş-Şerîa kavramının anlaşılması ehemmiyetlidir. Makâsıd kelimesi aslen Arapça kökenli bir kelimedir.[14] Kelimenin Müfret hali maksıd'dır.

[8] Mustafa Türkan, Makâsıdü'ş-Şerîa ile İlgili Eserlerde Zarûriyyât Tertibi Sorunu, Hitit Üniversitesi İlahiyat Fakültesi Dergisi, Sayı 34, 2018/2, s. 440,441.

[9] Cebrail Yavuz, Eserinde İbn Kayyim El- Cevziyye'nin İlâmü'l-Muvakkîn Hiyel Kavramı, Kahramanmaraş Sütçü İmam Üniversitesi Sosyal Bilimler Enstitüsü, Kahramanmaraş 2019, s. 6.

[1010] Hüseyin Akıncı, *İbn Kayyım el- Cevziyye'nin Hayatı, Eserleri ve İçtihad Anlayışı*, Selçuk Üniversitesi Sosyal Bilimler Enstitüsü, Konya, 2006, s. 29,30.

[11] Yunus Apaydın, "*İbn Kayyım El-Cevziyye*", DİA, XX. Cilt, s.120; Hüseyin Akıncı, *İbn Kayyım el- Cevziyye'nin Hayatı, Eserleri ve İçtihad Anlayışı*, s. 31,32; Cebrail Yavuz, *İbn Kayyim El- Cevziyye'nin İlâmü'l-Muvakkîn Eserinde Hiyel Kavramı*, s. 8,9.

[12] Yunus Apaydın, "*İbn Kayyım El-Cevziyye*", DİA, XX. Cilt, s.120; Akıncı, İbn Kayyım el- Cevziyye'nin Hayatı, Eserleri ve İçtihad Anlayışı, s. 31,32; Yavuz, İbn Kayyim El- Cevziyye'nin İlâmü'l-Muvakkîn Eserinde Hiyel Kavramı, s. 8,9.

[13] İbn Kayyım el- Cevziyye, İ'lâm'ül Muvakkı'în, trc. Pehlül Düzenli, İstanbul, Pınar Yayınları, III. Cilt, s. 125-129.

[14] Rahmi Yaran, makâsıd kelimesinin Arapça kökenli olması sebebiyle Arapça dil kuralları açısından maksıdın çoğulu olsa da fakihlerin onu maksud'un çoğulu olarak kullandıklarını da belirtir. Bkz. Rahmi Yaran, "*Cüveynî Öncesi*

Arapçada kelime yapıları kök olarak üç harften oluşmaktadır. Mâksıd kelimesinin kökü bu durumda (ق-ص-د) kasd 'dir. Kelimenin anlamı ise amaç, gaye, niyet ve hedeftir.[15] İslâmm Hukuku Literatürü içerisinde geniş anlamda "din" dar anlamda ise " Dini tebliği etmeye yönelik ameli hükümler"dir. Yurkarıda yer alan terkipte makâsıd kelimesi şeriat kelimesi ile birlikte kullanılmıştır. Bu şekilde ki terkibin anlamı ise, "naslarda yer alan amlelî hükümlerin gaye arka planı"dir.[16] Makâsıd kavramı ilk dönem eserlerde her ne kadar kıyas konusu içerisinde zikredilmiş olsa da burada tutunamamış bilakis maslahat konusu içerisinde daha çok yer almıştır.[17] İslam hukukunda şarinin koyduğu hükümlerde gözetilen gayeye "makâsıdü'ş-Şerîa" denilmiştir.[18]

Makâsıdın pek çok nevisi mevcuttur. Çeştitler ise katagorileştirilmiştir. Her taksimat kendi içerisinde ayrı bir öneme vurgu yapmaktadır. Ararlarında en yaygın ve geleneksel taksimat olan, Önem Derecesine göre makâsıd çeşitleridir. Makâsıd; Kaffal, Cüveynî ve Gazzâlî ile birlikte en son üçlü taksimatı almıştır.[19] Bu üçlü taksimatın içerisinde en önemliyeri zarûriyyâttır. Zarûri olanın zarara uğramsı, diğer ikisi olan Haciyyât ve Tahsîniyyâtın da zarara uğraması demektir. Zira bunlar çeşitleri olsa da temelde birbirilerine bağlıdırlar. Aynı kural hacînin zarar görmesi ile tahsîni'nin de zarar görmesine sebeptir.[20]

1.1. Zarûriyyât

En yaygın ve geleneksel taksimat; Zarûriyyât, Hâciyat ve Tahsîniyyât'tır. Birinci Çeşit olan Zarûriyyât, zârûri kelimesinden türemiş bir kelimedir.[21] Anlamı ise üzerinde detaylı araştırma gerektirmeyen asli ihtiyaçlardır. Zarûri olanlar ise, nefis, din, akıl, nesil ve maldır. Bunların korunması herşeyin temelindedir. Zira bunlar olmazsa gerisinin bir önemi yoktur.[22] İslam Hukukunun korumayı amaçladığı bu beş unsura literatürde " Zarûrât-ı hamse", " Makâsıd-ı hamse", "Külliyât-ı Hamse" gibi isimler verilmektedir.[23] Bunların korunmamasının sonucu dünyada fesada ahirette ise cennet nimetlerinden mahrum olmaya sebep olmaktadır. Buna göe Allah'u Teâlâ şeriatın dünyada varlığını oluşturmak için bunların korunmasını emretmiştir. Nesillerin devam edebilmesi için nikâhı meşru kılmış, bedene karşı yapılacak olan tüm saldırıları ise yasaklamıştır. Ve yine aynı şekilde malın emek karşılığı elde edilmesini meşru kılarken haksız kazanç olan her türlü eyleme hak tanımamıştır.[24] Bunların arasında din, hem dünyevi hem uhrevi anlamda zaruridir. Şayet din korunmaz ise hem dünyada hem ahirette zelil olunulur.[25] Dindar olma yetisine sahip olan tek varlık insan iken elbette dinin korunması önem arz etmektedir. İnanç hürriyyeti insanın

Makâsıd/Maslahat Söylemi", M.Ü. İlâhiyat Fakültesi Dergisi, Sayı 28, 2005/1, s. 95; Yunus Vehbi Yavuz, "*Makâsıdi Yorum*", İslâmm Hukuku Araştırmaları Dergisi, Sayı 8, 2006, s. 42.

[15] İbn Manzûr, *Lisân'l-Arab*,"ksd", III. Cilt, y.t, s. 352-353; İbrâhim Enes v.d, "ksd", el-Mu'cemü'l-Vasît, s. 738.

[16] Muhammed Tâhir b. Âşûr, *Makâsıdu'ş-Şerîati'l-İslâmmiyye*, Vezâretu'l-Ufuk ve'n-Neşûn lîl İslâmmiyye, Katar, 2004, s. 51.

[17] Boynukalın, Ertuğrul, "*Makâsıdü'ş-Şerîa*", DİA, TDV Yayınları, Ankara, 2003, XXVII. Cilt, s. 424.

[18] Ali Pekcan, Makâsıd Teorisine Giriş, Hikmet yayınları, İstanbul, 2013, s. 65.

[19] Kaffal, *Mehâsinu'ş-Şerîa fî furûi'ş-Şâfiiyye Kitabın fî makâsıdı'ş-Şeria*, thk. Muhammed b. Avdeh, Beyrut, 2007, s. 128; Cüveynî, , *el-Burhan fî usûli'l-fıkh*, Beyrut, 1997, I. Cilt, s. 128.

[20] Gazzâlî, *Mustasfâ*, Klasik Yayınları, İstanbul, 2017, s. 470-471.

[21] Yusuf Hamid Âlim, *el-Makâsıdu'l-âmme li'ş-şerîati'l-İslamiyye*, el-Meahedu'l alemiyye lîl fikr Yayınları, Riyad, 1994, s.167-171.

[22] Mehmet Erdoğan, *Fıkıh ve Hukuk Terimleri Sözlüğü*, Ensar Yayınları, İstanbul, 2019, s. 617.

[23] Boynukalın, Makâsıdü'ş-Şerîa', XXVII. Cilt. , s.425.

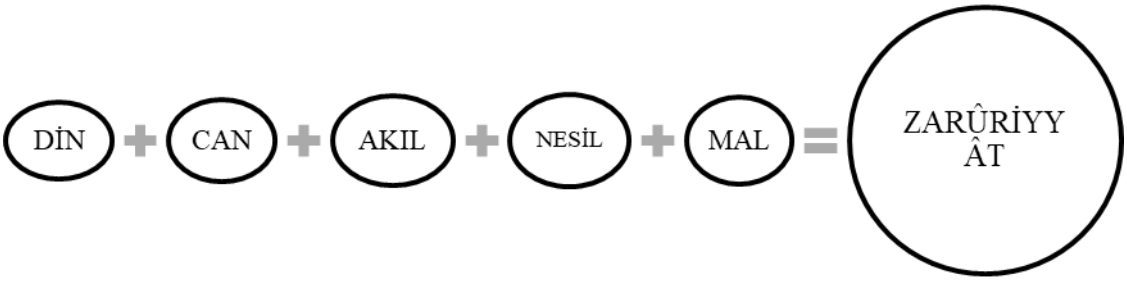
[24] Mustafa Türkan, *Makâsidu'ş-Şerîa İle İlgili Eserlerde Zarûriyyâtın Tertip Sorunu*, Hitit Üniversitesi Dergisi, 2018/2, s. 441.

[25] İzmirli İsmail Hakkı, *İlm-i Hilâf, Hüner Yayınları*, Konya, 2010, s. 82.

refahı ve huzuru için önemlidir.[26] Zikredilen bu beş esas aslen tüm dinlerde korunması hedeflenmektedir. Böylelikle bu değerler temelde evrenseldir.[27]

İslam Hukuku Literatüründe zarûriyyâtı ekserriyyeti beş olarak ansada bazı âlimler bunun üzerine eklemeler yapmaktadır. Bu eklemelerden bazıları ise ırz, özgürlük ve eşitliktir. Her ne kadar âlimlerden bazıları eklemeler yapmış olsada günümüzüe kadar yaygın ve geleneksel olarak gelen beşli ayrımdır.[28]

[29]



1.2. Hâciyat

Zarûriyyât derecesine ulaşmamış maslahatları kapsamaktadır.[30] Hâciyat, Hâcî olan her şeydir. Hâcî, ihtiyaç ile ilgilidir.[31] Bunlar Zarûriyyât ile bağlantılı veya onu koruma kabilindedir.[32] Bunlar olmadığı zaman dünyada işler aksayabilir, düzen bozulabilir ve tıkanmalar meydana gelebilir. Bunlar toplum için bulunan ihtiyaçlara binaen ortaya çıkmıştır. Toplumun gereksinimlerini gidermekte önemlidirler.[33] Ortaya çıkış sebebpleri üçtür. Bunlar ise, ümmetin yararlarını ve düzenini muhafaza etmek, gözetilmediğinde toplum doğru bir düzende işlemez ve mertebesinden de anlaşıldığı gibi hâciyata olan muhtaçlık zarûriyyât mertebesi kadar elzem değildir.[34] Hasta, engellilere veya Seferîlere

[26] Adem Yıldırım, "*İslâmm Hukuk Literatüründe Makâsıdü'ş-Şerîa''ya Genel Bir Bakış*", İslâmmî İlimlerde Maslahat, ed. Ayten Erol, Ankara, 2017, s. 166.
[27] Ali Bakkal, *Makâsıdu'ş-Şerîa ve Sosyal Değişim*, Çağımızda Sosyal Değişim ve İslâmm Sempozyumu, TDV Yayınları, 2007, Ankara, s. 354.
[28] Musrafa Türkan, *Makâsıdu'ş-Şerîa İle İlgili Eserlerde Zarûriyyâtın Tertip Sorunu*, s. 441.
[29] Zarûriyyât Unsurları Hiyerarşisi
[30] Ömer Nasuhi Bilmen, *Hukuki İslâmmiyye ve Istılahatı Fıkhıyye Kamusu*, Bilmen Yayınları, İstanbul, 1999, I. Cilt, s. 202.
[31] İbn Manzûr, *Lisânü'l Arap*, "hâcce", II. Cilt, s. 228.; Fîrûzâbâdî, *el-Kâmmûsü'l-Muhît*, s. 183; Erdoğan, Fıkıh ve Hukuk Terimler Sözlüğü, s. 165.
[32] Muhammed Ebû Zehra, *İslâmm Hukuk Metodolojisi Fıkıh Usûlü*, Fecr Yayınları, Çev.: Abdulkadir Şener, 13. Baskı, Ankara, 2017, s. 321.
[33] Erdoğan, *Fıkıh ve Hukuk Terimler Sözlüğü*, s. 165, Zekkiyyüddîn Şaban, *Usûlü'l Fıkh*, El Mektebetül Hanefiye Yayınları, İstanbul 2010, s. 387.
[34] Ali Pekcan, *İslâmm Hukuk Felsefesinde Makâsıdu'ş-Şeriâ'*, Rağbet yayınları, İstanbul 2017, 3. Baskı, s. 193,194.

tanınan ruhsatlar, selem ve istisna akdi gibi hükümler hâciyat kapsamında tahkik edilmiştir.[35]

1.3. Tahsîniyyât

Sözlükte (التحسـين) et-tahsîni kelimesinden türeme olarak zikredilen tahsîniyyât kelimesinin anlamı "güzelliğe atfedilen"dir. Tahsîn kelimesi ise bu kelimenin tef'il babı olarak çekimlenmiş halidir. Anlamı ise, süslemektir.[36] İslam Hukuku Literatürü içerisinde anlamı ise, aslen kemâle ermiş olan, yüksek ahlak ve hoş muamele nitelendirmelerinin gerekli olduğu durumlardır.[37] Bu şekilde isimlendirilmesinin altında yatan sebep ise zarûriyyât ve hâciyatı kemale erdirdiği içindir.[38] Bu katagori içerisinde yer alan maslahatlar ne zaruri ne de ihtiyaçtır. Bu mertebede zikredilen maslahatlar aslen insani ilişkileri güzelleştiren, kolaylaştıran ve yaygın olanına uyulmasına yöneliktir. Kölenin şâhitliğinin kabul edilmemesinin altında yatan maslahat tahsîniyyattır.[39] Tamdan bu sebebpten dolayı bunlara uymamak ne kaosa sebep olur ne de insanlara sıkıntı getirir. Ancak kâmmil mü'minde bu vasıfların olmaması onu eksik ve çirkin göstermektedir.[40] Her ne kadar yokluğu kaos ve zorluk getirmese dahi bu onların gereksiz olduğu anlamına gelmemektedir. Zira onlar hâciyat ve zarûriyyât-ı hamseyi muhafaza etme kabilindedirler. Bundan dolayı hâciyattan sonra gelmektedirler. Örneğin canın korunması zarûriyyât-ı hamse içerisindeyken haysiyet zedeleyici şeylerin hükümleri bu mertebededir.[41]

2. MAKÂSIDÜ'Ş-ŞERÎA'NIN BİLİNMESİNİN ÖNEMİ VE FONKSİYONU

Müçtehidler hüküm çıkaracak insanlarda belli vasıflar aramıştır. Bu vasıfların içerisinde hükümleri doğru koyabilmesi ve bir kaosa sebep olmaması açısından müçtehidin makâsıd ilmine hâyız olmasını istemişlerdir. İçtihat yapabilmesi için şahsın belli ön bilgilere vâkıf olması gerekmektedir. Bu ön bilgilerin sıralaması Cüveynîye göre şöyledir;

(1) Kur'an ilmi
(2) Mütevatir Sünnete
(3) Âhad sünnet
(4) Kıyas
(5) Kur'anın tahsise ihtiyaç duymayan zâhiri hükümler
(6) Tahsise gerek varsa onların bilinmesi
(7) Zahiri ile ilgili bilgi yoksa mütevatir ve ahad sünnet ile amel edilmesi

diye zikretmektedir.[42]

Bunun yanı sıra şârînin gayesini bilmek ve maslahata uygun hüküm vermeyi ise icmadan önce sünnetten sonra bir derecede zikretmektedir. Ve ekler şayet genel maslahatı bulamaz ise o zaman icmayaya göre karar verir.

İmam Şâtibi ise Hüküm koyucunun gayesini anlamak ve bu anlamaya yönelik hüküm çıkarma işlemine müçtehidin hâyız olması gerektiğine vurgu yapmaktadır.[43] Sonuç olarak

[35] Mustafa Türkan, *Makâsıdu'ş-Şerîa İle İlgili Eserlerde Zarûriyyâtın Tertibi Sorunu*, s. 441-442.
[36] İbn Manzûr, *Lisânü'l Arap*, XIV. Cilt, s. 114, Fîrûzâbâdî, el-Kâmmûsü'l-Muhît, s. 1190.
[37] Zekkiyyüddîn Şaban, *Usûlu'l Fıkhi'l İslâmmiyye*, El Mektebetül Hanefiye Yayınları, İstanbul 2010, s. 388.
[38] Pekcan, İslâm Hukuk Felsefesinde Makâsıdu'ş-Şeriâ, s. 210.
[39] Ahmet Yaman, *Makâsıd ve İçtihat*, " Gazzâlî ve Maslahat",İFAV Yayınları, İstanbul, 2017, s.273.
[40] Zekiyyüddîn Şaban, *Usûlü'l Fıkh*, s. 388.
[41] Muhammed Ebû Zehra, *İslâm Hukuku Metodolojisi Fıkıh Usûlü*, Çev.: Abdulkadir Şener, Fecr Yayınları, Ankara 2017, s. 322.
[42] Cüveynî, *el-Burhân fî usûli'l-Fıkıh*, II. Cilt, s. 874.
[43] Şâtîbî, *el-Muvâfakât*, thk. Meşhûr bin Hasan âle Salman, y. y., 173, II. Cilt, s. 77-78.

hülâsa edilirse müçtehidin şârînin hükümlerinin gayelerini bilmesinde üç temel yarar mevcuttur. Bunlar, Nasları doğru kavrayıp yorumlanmasına, Hukuki problemlerin çözümlenmesinde yeni bir metod olarak, Sorumlu olan insanlara pskolojik destek olmasıdır.[44]

3. İBN KAYYIM EL-CEVZİYYE'NİN İ'LAMÜ'L MUVAKKIÎN ESERİ LAFIZLARIN HÜKÜMLERE DELÂLETİNDE GÖZETİLEN MAKÂSID

Fıkıh Usûlü hükümlerin çıkarılmasında metodik yapıdır. Bu yapı ise Kur'an ve sünnet etrafında cereyan etmektedir. Bunun için lafız-mana ilişkisi ile hükme delaleti konusu içiçe bir konudur.[45] Şer'i hükümler Kur'an ve Sünnetten istinbat edilmektedir. Kur'an ve Sünnette geçen lafızları ve anlamlarının bilinmesi ayetin kavranmasını sağlamaktadır. Bundan Dolayı Usûl Uleması lafızların anlamlarını kavrayabilmek için arapça dil kurallarında anlamlarını emir, nehir, âmm, hâs, itlak, takyid, hakikat, mecaz, mantık, mefhum araştırmışlar ve genel kurallar koymuşlardır. Bu kurallar doğrultusunda Şârînin söylediği lafızlardan asıl kast edilen mana nedir buna ulaşılmaya çalışılmıştır.[46] Naslarda edilen lafızların kastını kavramak için lafızların kendi yapısını bilmek yeterli değildir. Bundan dolayı Usûlcüler şârî'nin ettiği lafızlardan anlaşılmasını beklediği hususları anlayamak için makâsıdü'ş-Şerîa ilkelerini oluşturmuşlardır. Bu ilkeler ile lafızlar hakkındaki bilgiler birlikte kullanıldığında şârînin kastı anlaşılacaktır.[47] Doğruya muavaffak kılan Allahtır. O halde makâsıdü'ş-şerîa ile oluşturlan metodlar zikredilecek ardından İbn Kayyım'ın Kitabında değindiği bağlamda açıklanacaktır.

Birinci Metod lafzın özelliklerinden yararlanmaktır. Bu metoddan anlaşılması gereken şudur: Kur'an ve Sünnet arap dilinde inzâl olmuştur. Anlaşılması için arap dilini bilmek elzemdir. Bunlardan bir kısımında anlam zaten sözün kendisidir bundan dolayı müçtehid herhangi bir işlem yapmak zorunda değildir. Bir lafzın hâs-âmm, Müşterek-müevvel, mutlak-mukayyed, hakikat-mecaz-kinâye, açık-kapalı olması o lafzın kendinden olan özelliktir. Bunlar olduğu gibi kabul edilmelidir. Vaz olunduğu anlam üzere taksim edilmesi bu anlama gelmektedir. Yani söz söylenen tarafından hangi anlamda söylendiyse, söz o anlam ile anlaşılmalıdır. Örneğin hakikat olan bir lafız mecaz olarak anlaşılamaz. Bu sadece anlamı kaydırmak sözü maksadı dışında kullanarak saptırmaktan ibaret bir eylemdir. Bir kişi "köye hınzır indi" bu sözü hakikat anlamıyla anlaşılmalıdır. İri yapılı, ahlaksız veya çirkin bir adam geldi gibi bir anlama çekmek sadece anlamı saptırmak olacaktır. Bir diğer taksim ise lafızların delalatleri açısındandır. Bundan kastı söylenen sözden tam anlatılmak istenen maksat nedir? Ne eksik ne fazla tam kast edilen anlam. Bu taksim bir yandan nasslarda yorum metodu ile bunun hududlarını belirlemektedir. Zira Müçtehidin naslara istediğini söyletme yetkisi yoktur. Bir nass bir anlamı ya ibaresiyle ya göstergesiyle ya daha zâhir bir mana delâletiyle göstermektedir. Bunların dışında nassa atfedilmesi doğru değildir. Sonuç olarak sözü söyleyene söylemek istemediği bir şeyi atfetmek dini açıdan bir vebaldir. Bundan dolayı Usûlcüler her ne kadar lafızları doğru anlamak için metodlar geliştirmiş olsa bile çok dikkatli davranmışlardır. Bu metodları anlatırken ise " Allah'ın muradını bulmak

[44] Reysûnî, *İslâm Hukuk Felsefesine Giriş*, Çev.: Sefa Atik, İstanbul, 2019, s. 12.
[45] Tahsin Görgün, *Lafiz*, TDV İslâmm Ansiklopedisi, 2003, Ankara, XXVII. Cilt, s. 44-45.
[46] Enver Osman Kaan, *Tablolarla Fıkıh Usûlü*, İFAV Yayınları, İstanbul, 2020, s. 93.; Abdullah Kahraman, *Fıkıh Usûlü*, Rağbet Yayınları, İstanbul, 2018, s. 305,306; Zekiyyüddin Şaban, *İslâm Hukuk İlminin Esasları*, çev.: İbrahim Kâfi Dönmez, TDV Yayınları, 2019, Ankara, 401,402.
[47] Abdullah Kahraman, *Fıkıh Usûlü*, s. 306.

ameliyesi" olarak tanımlamaktadırlar. Bu sebepten dolayı hiçbiri "Allah'ın kast ettiği budur bundan başkası bâtıldır" gibi bir sonuç çıkarmamıştır. Ayetler lafızları, ibareleri, işaretleri ve iktizalarıyla belli anlamlara delâlet etmektedir. Tek taraflı bakmak anlamı daraltır ve mütekellimin söylemek istediğini aktarmasına mani oluşturur. Bundan dolayı her birine ayrı bakmak ve incelemek gerekmektedir.[48]

Lafızların manalarıyla güçlü bir bağlantıları vardır. Lafızların anlaşılması için Hanefi mezhebi dört ayrı kriter oluşturmuştur. Bunlar lafzın hangi anlam için konulduğu, konulduğu anlam da mı kullanılmış, kullanıldığı anlama delâletinin açıklık ve kapalılık kademesi son olarak ta kullanıldığı anlama delâletin şekli yani doğrudan mı yoksa dolaylı yönden mi anlam çıkarılmaktıdır. Bu ayrımlar ile lafızları tekrar taksim etmişlerdir.[49]

Tüm bu bilgilerle beraber İbn Kayyım el-Cevziyye'nin eserinde birden fazla yerde zikrettiği konu mütekellimin sözüne değil kastına bakılır makâsıdı ele alınacaktır. Bu makâsıd, Bir söz söyleyen kimsenin sözüne değil kasdına bakılması gerektiğine vurgu yapmaktadır. Zira lafızlar bazen farklı kullanılabilir. Örneğin bir kimse "ders çalışıyorum" derken kastı "fıkıh öğreniyorum" pekâlâ olabilir. Ancak bunun anlaşılması için sözün değil söyleyen kismenin kastına riayet edilmesi gerekir. Bazen hâs olan bir lafzı âmm bir anlamda kullanabilir. Ya da tam tersi âmm olan bir lafzı tahsis edebilir. Yukarıda zikredelin örnek âmm olan "ders" kelimesinin hâs olan "fıkıh" kelimesine karşılık kullanılması vardır. Bunun örneği Allah'u Teâlâ'nın ayetlerinde de vardır. Bazen Allah âmm bir sözü tahsis ederek hâs anlam yüklemiş kelimenin kapsamını daraltmıştır. Burada ayetin sadece zâhirine bakılır kastına bakılmaz ise kavramaktan uzak bir eylem gerçekleştirilmiş olur. Lafızların maksadını ise mütekellimin bazen kullandığı kelimeden bazende gerekçesinin genelliğinden bilinir. Sadece zâhire bakanlar sözlerin kasdını daraltır ve anlaşılması gerekeni gizli bırakır. Aksini yapıp kelimelere taşımadıkları anlamlar yüklemekte yanlış sonuçlar çıkarmaya sebep olmaktadır. Asıl mesele lafızlar değildir bilakis anlatılmak istenendir. Kur'an'da Allah sadece lafızların zâhirine bakanları yermiş, asıl anlamını arayıp kavrayanları ise medh etmiştir. Böylelikle ayetleri okuyan kimse şârî'nin kasdını kavrayıp ne anlamı darlatacak nede kaldırabileceğinden fazla genişletecek bir anlam yüklememelidir. Bu makâsıda hayız arifler " kastı neydi" diye sorarken lafızarın zâhiri ile yetinenler " "ne söyledi?" sorusunu yönlendirir.[50]

Amellerin ruhu nedir? Diye soran yazar cevabına niyetlerdir demektedir. Niyetin amelin bel kemiği olduğunu amelin niyete tabi olduğunu vurgulamıştır. Bunu ifade ederken Allah Resulün'nün "*Ameller ancak niyetlere göredir. Herkes için ancak niyet ettiği vardır."*hadis-i şerifini zikretmiştir. Hadise bakış açısı ise şöyledir: birinci cümle amellerde niyetin esas olduğunu onsuz amellerin olamayacığını ifade ederken ikinci cümle ise insana yaptığı eylemlerde kastının karşılığını alacağına vurgu yapılmıştır. Bu makâsıdın kapsamı ise muâmelat, İbâdat, yeminler, adaklar ve akitlerdir. Örneğin bir kimse alım-satım yaparken niyeti faiz işlemi ise o kimse faiz günahı işlemiş olmaktadır. Her ne kadar yapılan işlem alım-satım yani helal olan bir eylem de olsa niyeti haram olan olması hasebiyle eylemi onu günahtan kurtaramaz. Bir başka örnek kişinin üç talak ile boşandıktan sonra tekrar eski

[48] Abdullah Kahraman, *Fıkıh Usûlü,* s. 306-308.; Halit Boz, *Kur'an'da Lafızların Delâlet Şekilleri,* Bingöl Üniversitesi İlahiyat Fakültesi Dergisi, 2015, s. 148,149.
[49] Zekiyyüddin Şaban, *İslâm Hukuku İlminin Esasları*, s. 402; Halit Boz, Kur'an'da Lafızların Delâlet Şekillleri, s. 149.
[50] İbn Kayyım el-Cevziyye, *İ'lâmmü'l Muvakkı'în*, Çev: Pehlül Düzenli, thk. Muhammed Enes Topgül, Pınar Yayınları, İstanbul, 2017, I. Cilt, s. 259-262, III. Cilt, s. 97-129.

eşine dönebilmesi için nikâhta bulunması lakın nikâh niyetinin hülle olmasıdır.[51] Bu kimse de aynı bir önceki örnekte ki gibi haram olan bir eyleme niyet etmiş ise onu yapmıştır. Zira eylemin kendisinde ki kastı o eylemi haram kılmaktadır. Burada yapılan aslen hiledir. Bir eylemde gaye ne olursa olsun ona ulaşırken güdülen metodlarda gayeye bağlıdır. Metod ile gaye birbiri ile yakından bağlantılıdır. Zira metod helal ise gaye de helaldir. Aksi durumda metod haram ise gayede haramdır. Bunun temelinde Hile'nin islâm'da haram oluşu vardır. Konun bağlamından kopmamak için hile ile ilgili hikmetler ele alınmamaktadır.[52]

İbn Kayyım hüküm verirken zâhiri ile yetinenlere ise eleştiriler yapmaktadır. Onları şöyle bir teşbih ile anlatmaktadır: " bid'at ehline selam verme" söylenmesine rağmen, onlara gidip övgüler ve medhlerde bulunmak ancak selam vermeyen kişinin hali gibidir. Onlar içkinin haram kılınışını zâhire bakıp hükmetmektedir. Bundan dolayı içkinin adı değişince helal olabileceğini iddia etmişlerdir. Hâlbuki bilindiği üzere haramlık, hakikat ve mefsedete binaen verilmiştir, isim veya şekle binanen değil. Zira insanlar arasında kötülük, fesat ve kaosa sebep olan isimin değişmesi ile bu vasıflardan arınmış olmuyor. Ardından yazar böyle bir davranış Alah ve Resulünü yanlış anlamak ve fıkıh anlayışından mahrum olmaktan başka ne olabilir ki? Diye eleştirmektedir. Yazar onları pek çok teşbih ile anlatmış yanlışlıklarını bu şekilde vurgulamıştır.[53]

SONUÇ

Fıkhın içerisinde her bir şerî amelî hükmün muhafaza etmeye çalıştığı bir takım Makâsıdın olduğu genel olarak kabul edilmiştir. Bunun yanı sıra bu makâsıdın tespit edilebilir olup olmadıkları ve çeşitlerinin neler olduğu literatürde tartışılmıştır.

Makâsıdü'ş-Şerîa ile ilgili eserler incelendiğinde hükümlerin maslahatları ekseri ulemâ tarafından üçlü taksimata tabi tutulmuştur. Bu taksimat Zarûriyyâ, Hâciyat ve Tahsîniyyâttır.

Zarûriyyâtta dinin, nefsin, canın, neslin ve malın muahafaza edilmesi hususunun olduğu kabul görmüştür. Bunlardan birine karşı yapılan ihlalin ise dünyada kaosa ahirette ise cennet nimetlerinden mahrumiyete sebep olacağı kabul edilmiştir.

Hâciyat mertebesinde bulunan Makâsıd ise zarûriyyât derecesine ulaşamamış olanlardır. Bunların yokluğu insanlara sıkıntılar ve acıların nüksetmesine sebebiyet vermektedir. Bundan dolayı bunlarında gözetilmesi gerektiği hususu kabul görmüştür.

Tahsîniyyât derecesinde zikredilen Makâsıdlar ise ne zarûriyyât ne de hâciyat derecesine ulaşamamış makâsıdlardır. Bu makâsıdların amacı güzelleştirmektir. Kamil bir şeriat için kemale erdirecek makâsıdların bu mertebe de olduğu kabul görmüştür. Bunların gözetilmemesi kâmil Müslümana yakışmayacağından kınamaya uğrayacağı anlaşılmıştır.

Tüm bu bilgilerin ışığında İbn Kayyım el- Cevziyye'nin İ'lâm'ül Muvakkı'în eseri bağlamında incelenen lafızların hükümlere delâletinde gözetilen Makâsıdlar anlaşılmıştır. Lafızlar öncelikle vaz olundukları anlamları ihtiva ettiklerinden bu şekilde değerlendirmeleri gerektiği hususu kabul görmüştür. Ardından lafızların değil aslen kast

[51] İbn Kayyım el-Cevziyye, İ'lâmmü'l Muvakkı'în, III. Cilt, s. 144-145.
[52] İbn Kayyım el-Cevziyye, İ'lâmmü'l Muvakkı'în, III. Cilt, s. 171.
[53] İbn Kayyım el-Cevziyye, İ'lâmmü'l Muvakkı'în, III. Cilt, s. 149-151.

edilenin anlaşılmasının hükümleri çıkarmak ve anlamakta önemli bir yeri olduğu kabul edilmiştir.

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EFFICIENT IMAGE FILES TRANSFER USING CRYPTOGRAPHY

*** K.Thamizhmaran, ** M.Pooja, *** P.Nihariha**
, **, * Department of ECE, Government College of Engineering, Bodinayakkanur, India*

ABSTRACT

Steganography is the art of hiding the fact that communication is taking place, by hiding information in other information. Many different carrier file formats can be used, but digital images are the most popular because of their frequency on the Internet. For hiding secret information in images, there exists a large variety of stenographic techniques some are more complex than others and all of them have respective strong and weak points. Different applications have different requirements of the steganography technique used. For example, some applications may require absolute invisibility of the secret information, while others require a larger secret message to be hidden. This project intends to give an overview of image steganography, its uses and techniques. It also supports steganography in Audio files. For a more secure approach, the project encrypts the message using secret key and then sends it to the receiver. The receiver then decrypts the message to get the original one.

Keywords: Image; Steganography; Watermarking; Cryptography; Encryption; Decryption

1. INTRODUCTION

One of the reasons that intruders can be successful is the most of the information they acquire from a system is in a form that they can read and comprehend. Intruders may reveal the information to others, modify it to misrepresent an individual or organization, or use it to launch an attack. One solution to this problem is, through the use of steganography. Steganography is a technique of hiding information in digital media. In contrast to cryptography, it is not to keep others from knowing the hidden information but it is to keep others from thinking that the information even exists. Steganography become more important as more people join the cyberspace revolution. Steganography is the art of concealing information in ways that prevents the detection of hidden messages. Stereography includes an array of secret communication methods that hide the message from being seen or discovered. Due to advances in ICT, most of information is kept electronically. Consequently, the security of information has become a fundamental issue. Besides cryptography, streganography can be employed to secure information. In cryptography, the message or encrypted message is embedded in a digital host before passing it through the network, thus the existence of the message is unknown. Besides hiding data for confidentiality, this approach of information hiding can be extended to copyright protection for digital media: audio, video and images. The growing possibilities of modern communications need the special means of security especially on computer network. The network security is becoming more important as the number of data being exchanged on the internet increases. Therefore, the confidentiality and data integrity are requires to protect against unauthorized access and use. This has resulted in an explosive growth of the field of information hiding.

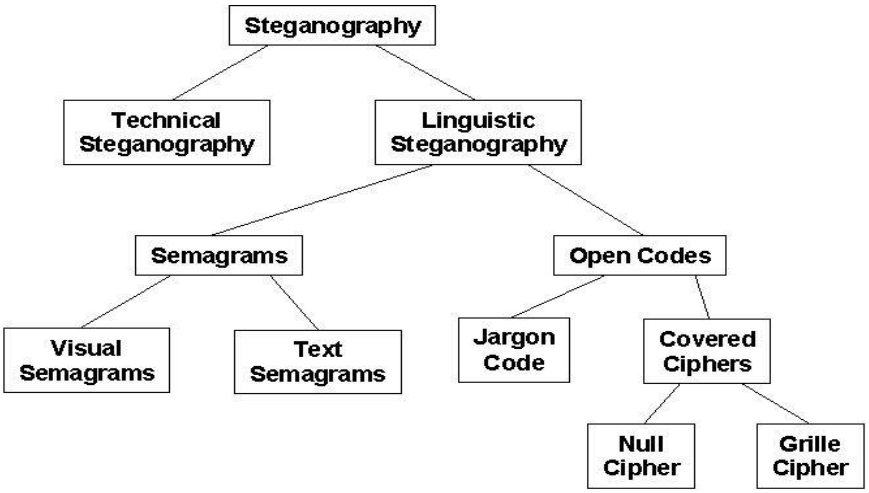


Fig 1 STAGENOGRAPHY TYPES

2. RELATED WORK

[1] In the year of 2013 Soni, A.; Jain, J.; Roshan, R., The Fractional Fourier transform (FrFT), Investigated on as a generalization of the classical Fourier transform, introduced years ago in mathematics literature. The enhanced computation of fractional Fourier transform, the discrete version of FrFT came into existence DFrFT. This study of illustrates the advantage of discrete fractional Fourier transform (DFrFT) as compared to other transforms for steganography in image processing. The result shows same PSNR in both domain (time and frequency) but DFrFT gives an advantage of additional stego key. The order parameter of this transform. [2] Implemented a variation of plain LSB (Least Significant Bit) algorithm. The stego-image quality has been improved by using bit-inversion technique. LSB method improving the PSNR of stegoimage. Through storing the bit patterns for which LSBs are inverted, image may be obtained correctly. For the improving the robustness of steganography, RC4 algorithm had been implemented to achieve the randomization in hiding message image bits into cover image pixels instead of storing them sequentially. The presented method shows good enhancement to Least Significant Bit technique in consideration to security as well as image quality. In the year of 2013 Prabakaran , G.; Bhavani, R. and Rajeswari P.S. [3] This methodology provides an efficient and storage security mechanism for the protection of digital medical images. Authors proposed a viable steganography method using Integer Wavelet Transform to protect the MRI medical image into a single container image. The patient's medical diagnosis image has been taken as secret image and Arnold transform was applied and scrambled secret image was obtained. In this case, the scrambled secret image was embedded into the dummy container image and Inverse IWT was taken to get a dummy secret image. It has been observed that the quality parameters are improved with acceptable PSNR compared to the existing algorithms. In the year of 2012 Thenmozhi, S. and Chandrasekaran, M., [4] presented the novel scheme embeds data in integer wavelet transform coefficients by using a cropping function in an 8×8 block on the cover image. The optimal pixel change process has been applied after embedding the message. Authors employed the frequency domain to increase the robustness of our steganography method. Integer wavelet transform avoid the floating point precision problems of the wavelet filter. Result shows that the method outperforms adaptive steganography technique based on integer wavelet transform in terms of peak signal to noise ratio and capacity. In the year of 2012 Das, R. and Tuithung, T. [5] proposed a novel technique for image steganography based on Huffman Encoding. Two 8 bit gray level image of size M X N and P X Q are used as cover image and secret image respectively. Huffman Encoding is performed over the secret image/message before embedding and each bit of Huffman code of secret image/message is embedded inside the cover image by altering the least significant bit (LSB) of each of the pixel's intensities of cover image. The size of Huffman A. Parmar Ajit Kumar Maganbhai et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (1), 2015, 685-688 www.ijcsit.com 686 embedded inside the cover image, in order that the StegoImage becomes standalone information to the receiver. Results show that the algorithm has a high capacity and a good invisibility.

3. STAGENOGRAPHY

3.1 WHAT IS STAGENOGRAPHY?

Steganography is the practice of hiding private or sensitive information within something that appears to be nothing out to the usual. Steganography is often confused with cryptology because the two are similar in the way that they both are used to protect important information. The difference between two is that steganography involves hiding information so it appears that no information is hidden at all. If a person or persons views the object that the information is hidden inside of he or she will have no idea that there is any hidden information, therefore the person will not attempt to decrypt the information. What steganography essentially does is exploit human perception, human senses are not trained to look for files that have information inside of them, although this software is available that can do what is called Steganography. The most common use of steganography is to hide a file inside another file.

3.2 HISTORY OF STAGENOGRAPHY:

Throughout history Steganography has been used to secretly communicate information between people.

Some examples of use of Steganography is past times are:

- During World War 2 invisible ink was used to write information on pieces of paper so that the paper appeared to the average person as just being blank pieces of paper. Liquids such as milk, vinegar and fruit juices were used, because when each one of these substances are heated they darken and become visible to the human eye.
- In Ancient Greece they used to select messengers and shave their head, they would then write a message on their head. Once the message had been written the hair was allowed to grow back. After the hair grew back the messenger was sent to deliver the message, the recipient would shave off the messengers hair to see the secrete message.

4. METHODOLOGY

User needs to run the application. The user has two tab options – encrypt and decrypt. If user select encrypt, application give the screen to select image file, information file and option to save the image file. If user select decrypt, application gives the screen to select only image file and ask path where user want to save the secrete file.

- This project has two methods – Encrypt and Decrypt.
- In encryption the secrete information is hiding in with any type of image file.
- Decryption is getting the secrete information from image file.

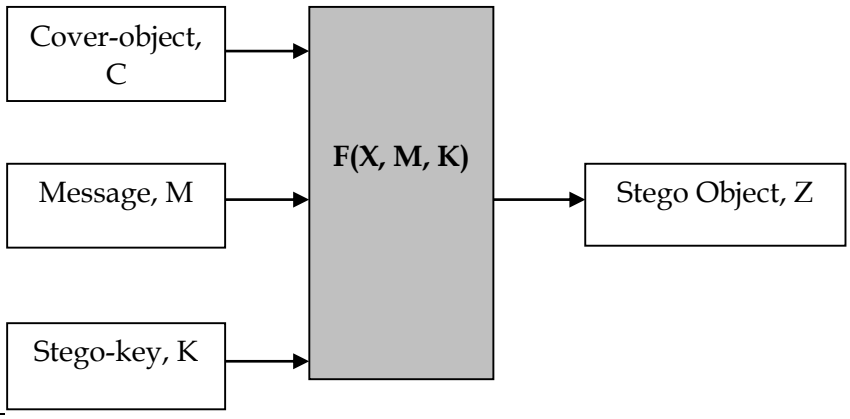


Fig 2 STAGENOGRAPHY METHODOLOGY

CRYPTOGRAPHY VS STAGENOGRAPHY

Basically, the purpose of cryptography and steganography is to provide secret communication. However, steganography is not the same as cryptography. Cryptography hides the contents of a secrete message from a malicious people, whereas steganography even conceal the existence of the message. In cryptography, the system is broken when the attacker can read the secret message. Breaking a steganography system need the attacker to detect that steganography has been used. It is possible to combine the techniques by encrypting message using cryptography and then hiding the encrypted message using steganography. The resulting stego-image can be transmitted without revealing that secret information is being exchanged

STAGENOGRAPHY VS WATERMARKING

Steganography pay attention to the degree of Invisibility while watermarking pay most of its attribute to the robustness of the message and its ability to withstand attacks of removal, such as image operations(rotation, cropping, filtering), audio operations(rerecording, filtering)in the case of images and audio files being watermarked respectively. It is a non-questionable fact that delectability of a vessel with an introduced data (steganographic message or a watermark) is a function of the changeability function of the algorithm over the vessel.

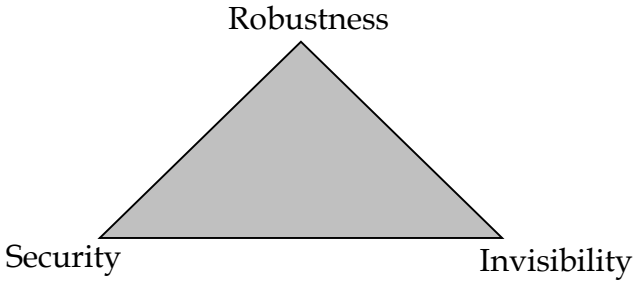


Fig 3 SECURITY GOALS

That is the way the algorithm changes the vessel and the severity of such an operation determines with no doubt the delectability of the message, since delectability is a function of file characteristics deviation from the norm, embedding operation attitude and change severity of such change decides vessel file delectability. Security is sin ominous to the cryptographic idea to message security, meaning inability of reconstruction of the message without the proper secret key material shared. Robustness refers to the endurance capability of the message to survive distortion or removal attacks intact. It is often used in the watermarking field since watermarking seeks the persistence of the watermark over attacks, steganographic messages on the other hand tend to be of high sensitivity to such attacks. The more invisible the message is the less secure it is (cryptography needs space) and the less robust it is (no error checking/recovery introduced).The more robust the message is embedded the more size it requires and the more visible it is.

STAGENOGRAPHY TECHINIQUES

Over the past few years, numerous steganography techniques that embed hidden messages in multimedia objects have been proposed. There have been many techniques for hiding information or messages in images in such a manner that alteration made to the image is perceptually indiscernible. Commonly approaches are include LSB, Masking and filtering and Transform techniques. Least significant bit (LSB) insertion is a simple approach to embedding information in image file. The simplest steganography techniques embed the bits of the message directly into least significant bit plane of the cover-image in a deterministic sequence. Modulating the least significant bit does not result in human perceptible difference because the amplitude of the change is small. In this technique, the embedding capacity can be increased by using two or more least significant bits. At the same time, not only the risk of making the embedded message statistically detectable increase but also the image fidelity degrades. Hence a variable size LSB embedding schema is presented, in which the number of LSBs used for

message embedding/extracting depends on the local characteristics of the pixel. The advantage of LSB-based method is easy to implement and high message pay-load. Although LSB hides the message in such way that the humans do not perceive it, it is still possible for the opponent to retrieve the message due to the simplicity of the technique. Therefore, a system named Secure Information Hiding System (SIHS) is proposed to improve the LSB scheme. It overcomes the sequence-mapping problem by embedding the massage into a set of random pixels, which are scattered on the cover-image. Masking and filtering techniques, usually restricted to 24 bits and gray scale image, hide information by marking an image, in a manner similar to paper watermarks.

7.1 Image Steganography and bitmap pictures:

Using bitmap pictures for hiding secret information is one of most popular choices for Steganography. Many types of software built for this purpose, some of these software use password protection to encrypting information on picture. To use these software you must have a 'BMP' format of a pictures to use it, but using other type of pictures like "JPEG", "GIF" or any other types is rather or never used, because of algorithm of "BMP" pictures for Steganography is simple. Also we know that in the web most popular of image types are "JPEG" and other types not "BPM", so we should have a solution for this problem. This software provide the solution of this problem, it can accept any type of image to hide information file, but finally it give the only "BMP" image as an output that has hidden file inside it.

7.2 Bitmap Steganography:

Bitmap type is the simplest type of picture because that it doesn't have any technology for decreasing file size. Structure of these files is that a bitmap image created from pixels that any pixel created from three colors (red, green and blue said RGB) each color of a pixel is one byte information that shows the density of that color. Merging these three color makes every color that we see in these pictures. We know that every byte in computer science is created from 8 bit that first bit is Most-Significant-Bit (MSB) and last bit Least-Significant-Bit (LSB), the idea of using Steganography science is in this place; we use LSB bit for writing our security information inside BMP pictures. So if we just use last layer (8st layar) of information, we should change the last bit of pixels, in other hands we have 3 bits in each pixel so we have 3*hight*width bits memory to write our information. But before writing our data we must write name of data (file), size of name of data & size of data. We can do this by assigning some first bits of memory (8st layer).

(00101101 00011101 11011100)
(10100110 11000101 00001100)
(11010010 10101100 01100011)

ADVANTAGES & DISADVANTAGES

Steganography is beneficial for securely storing sensitive data, such as hiding system passwords or keys within other files. However, it can also pose serious problems because it's difficult to detect. Steganography is less popular than Cryptography. While cryptography is more popular than Steganography. Steganography supports Confidentiality and Authentication security principles. While cryptography supports Confidentiality and Authentication security principles as well as Data integrity and Non-repudiation. Steganography is the art of hiding a message. The purpose of steganography is to hide a message from a someone you don't want to see it. It is different than cryptography, the art of secret writing, which is intended to make a message cannot be read, but does not hide the existence of the secret communication.

DISADVANTAGES:

Huge number of data, huge files size, so someone can suspect about it. If this technique is gone in the wrong hands like hackers, terrorist, criminals then this can be very much dangerous for all. Steganography is not encryption! Encryption means that the method is known, but that's not a problem,

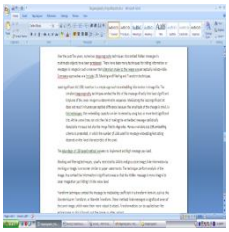
the data can't be decrypted without a key. ... Pure steganography (just the hiding process) is security by obscurity, which is a bad practice.

5. RESULTS

ENCRYPTION PROCESS:

IMAGE FILE **INFORMATION FILE**





BMP FILE



Fig 4 ENCRYPTION PROCESS

DECRYPTION PROCESS:

BMP FILE



INFORMATION FILE **IMAGE FILE**

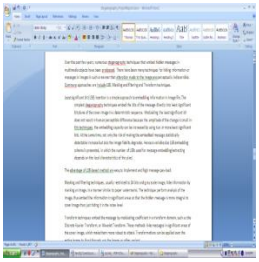




Fig 5 DECRYPTION PROCESS

6. CONCLUSION

We have studied for improving the steganalysis performance and also analyzing the hiding capacities of the existing research work. The steganalysis performance of state-of-the-art detectors is

near-perfect against current steganographic schemes. A novel, robust and secure hiding schemes that can resist steganalytic detection must be implemented. Hiding schemes are characterized by three complementary requirements- security against steganalysis, robustness beside distortions in the transmission channel, and capacity in terms of the embedded method. This work would be able to be extended for different formats of images. This work may be extended using other transforms methods also.

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AN OVERVIEW OF COVID-19 PANDEMIC AND OCCUPATIONAL HEALTH AND SAFETY FROM THEORY OF RISK SOCIETY[54]

Tamer GÜNEY and Ömer GÜNDOĞDU

Iğdır University, Graduate Education Institute, Occupational Health and Safety Department 76100 Iğdır, Turkey
Atatürk University, Mechanical Engineering Department, 25240 Erzurum, Turkey

ABSTRACT

The concept of globalization is one of the most discussed concepts, particularly in academic and economic circles. What globalization is, the causes of globalization and the results of globalization process, the positive and negative aspects of globalization are discussed with many different mindscapes, especially by academic circles. With the development of globalization concept, it was said that a new society style emerged in the 1980s. This new social style was conceptualized as "Risk Society" by Ullrich Beck. In this theory, which claims that various natural disasters such as Chernobyl and global pandemics put all societies at a global risk, he also states that risks are hence forwards inevitable phenomenon in the modern world. With the Covid-19 pandemic that emerged in 2019, the basic theses of this theory began to be expressed more strongly.

The Covid-19 pandemic has had great effects on business and employee lives. To take this pandemic under control, many workplaces were closed or have switched to home office system. However, because working in some sectors must continue and the nature of these works is inappropriate for home office work, the point of occupational health and safety has become a current issue against pandemic in workplaces. The aim of this study is to discuss the effects of the Covid-19 pandemic on occupational health and safety as a negative effect of globalization with Ullrich Beck's *Theory of Risk Society*. In this study, the transformations created in occupational health and safety by the risks posed by the pandemic in the world, which has turned into a global risk society, new occupational health measures and the results of their negative effects, and solution recommendations are discussed.

Keywords: Globalization, Risk Society, Covid-19 Pandemic, Public Health, Occupational Health and Safety.

1. INTRODUCTION

Globalization is one of the concepts that is frequently used among academics and economists and is also open to discussion. It does not seem possible to say that there is a consensus among scientists on the definition of globalization, its positive and negative aspects, and its historical dimension on a scientific basis (Dumanlı Kürkçü, 2013).

Modelski sees globalization as a general cooperation and connection between nations, civilizations and political communities in the historical process, and also considers globalization as an articulation between people, capital, technology and services (Held and McGrew, 2008: 71). Adams defines globalization as increasing cooperation between people, technology, economy and service. According to him, the processes that bring about globalization are economic, technological, political, sociological, environmental and intellectual compelling and pushing factors (Adams, 2008: 725).

Anthony Giddens considers globalization as "the intensification of social relations around the world, in which local events are determined by what happens in distant places, kilometers away, and

[54] This article is based on the term project conducted in the Iğdır University Occupational Health and Safety Master's Program under the supervision of Ömer GÜNDOĞDU.

vice versa" (Giddens, 2018: 64). Globalization has brought with it a series of social problems, as well as revealing the endless network of relations that surrounds the whole world. Undoubtedly, the most prominent of these social problems are insecurity and risks.

The concept of risk was first used in Homer's Odyssey during the Ancient Greek period. Later, this concept was used in maritime in the 17th century and then entered the German language in the 18th century (Lupton, 1999: 5). The word risk is used as risk in Spanish, risiko in German, risico in Italian. This word, passed from French to Turkish today, is used in the meaning of danger, being in danger, being harmed (Doğan, 1981:1113).

It is seen that the term risk gained more importance especially after 1970's. The main reason for this is that the effects of nuclear power plants on people and the environment play a role in people's fear. Risk has become a common priority in terms of calculating and predicting situations that may arise in the fields of medicine, law, business life, environment and labor economics. Based on this situation, the risk dimension in social psychology, the creation of risk groups for diseases that may pose a risk to the public in the field of medicine, the effect of risk management on capital in the field of business, the calculation of the risks for the environment, and the importance of taking precautions by predicting the consequences emerge.

The origins of the risk society theory are based on the transformation of the dangers emerging in the social field theoretically established by Ulrich Beck into a socio-cultural infrastructure, turning into an encompassing discourse. According to him, risks are different in every period and these risks are valid for every geography of the world. The risk society is a transition society. When examining this transitional society, he first begins by defining the concept of risk. According to Beck, the concept of risk continues in a series of frameworks from ancient times to the modern period. Risks still exist today as they were yesterday. Risks are global and exist for everyone. Risks are unpredictable and therefore it is impossible to take preventive measures. Uncontrolled and uncertainties created by modernization make it impossible to prevent and control risks (Beck, 2005:47).

Events that will pose a risk, such as nuclear accidents, fall under the scope of uninsured. This area of uninsured has reached the point where it threatens the entire human society. A risk situation emerging in a region has become globalized and encompasses the whole world. The lack of authority and control created by modernization has become the main factor in the globalization of these risks (Beck, 1992: 22-27).

Coronavirus (Covid) is a large group of viruses that can cause dangerous diseases such as the common cold, Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). SARS-CoV emerged in 2003 and is the first international health emergency of the 21st century (Newey and Gulland, 2020).

Covid-19, which is different from the two corona viruses mentioned above, can be said to be a different virus with the extent of the disease and 80% of the infected people. It is also seen in people who have this disease and have no symptoms, making it impossible to control this disease. The corona epidemic intensified in the city of Wuhan in the Hubei region of China in 2019 and spread all over the world. With its emergence in Wuhan, cases have reached 13 times and the number of affected countries has tripled. The World Health Organization declared a public health emergency, and then the disease spread all over the world, reaching epidemic proportions (WHO, 2020).

This pandemic, which was first seen in Wuhan, China in December 2019, is called Covid-19 and has been effective in all areas of social, political, economic and cultural life. This domain cannot

operate in the physical environment in private sectors as well as educational institutions, commercial institutions and most public institutions and organizations. The virus, which spread all over the world in just 4 months, caused economic recession and serious social problems.

The Covid-19 outbreak has had great effects on human life and business life. Many businesses had to decide to close down in order to control the Covid-19 epidemic. A digital and remote working system has been introduced in homes. However, in sectors where it is not possible to work remotely, the issue of occupational health and safety has come to the fore, and it has emerged that the work continues by taking Covid-19 measures in workplaces.

The aim of this study is to discuss the effects of the Covid-19 pandemic on occupational health and safety, as a negative effect of globalization, with Beck's Risk Society theory. In a world that has turned into a global risk society, the transformations created by the risks created by the pandemic in occupational health and safety, new occupational health measures and the consequences of the negative effects it brings will be the conceptual framework of this study.

When we look at this situation from the perspective of Occupational Health and Safety, it is thought that the studies will create positive effects on people. It is thought that a social support board proposed to eliminate the negative socio-psychological situation brought by the pandemic for the employees to work with a good mood and sense of belonging at their job will increase the work and worker productivity and make a positive contribution. In the study, the measures to be taken regarding the social and psychological improvements of the workers are included. It is thought that the application of the Risk Society theory in studies in the field of OHS will lead the study to a current issue. In addition, thanks to this social theory, the perspective of social science and multidisciplinary thinking will be an important plus of the study.

2. THE CONCEPT OF GLOBALIZATION

The concept of globalization began to be widely used in the 1960s. With the proliferation of debates on globalization, it is observed that studies on the concept of globalization in the late 1990s and early 2000s and the references to this concept are increasing (Stegen, 2010: 1-2).

The concept of globalization is examined in two different ways. First, when globalization is viewed subjectively, it is a process of increasing awareness of interdependence. From an objective point of view, it is a process in which economic and political relations intensify and are examined empirically. The phenomenon of globalization can be classified in three different ways as holistic, positive and negative. With the effect of globalization, the sovereignty of nation states has lost its importance and the global dominance of liberal democracy has been ensured, and the rational world market has become "crystallization of the whole world in a single place" (Aktel, 2003: 7).

According to Friedman (2002: 283), this hegemonic centralization and monopolization of globalization is directly related to Americanization. Friedman argues that America is the statement that globalization is us, the viewpoint at the center of globalization. According to Friedman (2002: 84), the US market economy sees the economy as a tiger and they state that those who manage to ride on this tiger are the US people themselves.

According to Giddens, globalization is not a linear process; on the contrary, it is a bundle of facts in which complex processes come together, and naturally this bundle contains contradictions within itself. According to Giddens' sociological interpretation, globalization means an acceleration of

integration and interdependence in various meanings such as political, economic, technological and cultural (Giddens, 2003: 8-9).

According to Yılmaz (2004: 78), globalization is the state of internationalization of markets, companies, organizations and administrations, integrating the economies of countries in this process, in which information comes to the fore revolutionarily. The globalization of the economy means the increase in economic contacts between countries as a result of the increase in international goods, capital and labor transfers, and the expansion of the size of the commercial relations of the countries with each other. In the global economy process, it refers to the international capital movements of goods and services, diversification and the rapid spread of technology around the world. In this process, multinational companies undertake important tasks and result in the transfer of technology from developed countries to developing countries through these companies (Aktan, 2004: 8).

With the multidimensionality of globalization, it has led to new developments not only in economic, political, cultural and technological fields, but also in the field of health. It should be stated that health and health services in a global sense are also affected by global policies. With the globalization of the health field, issues such as the establishment of the foundations of health policies, the determination of health services, the development of cooperation and transnational transportation come to the fore.

2.1. GLOBAL TRANSFORMATION IN HEALTH AND HEALTH POLICIES

Although it is difficult to define health policy, it is defined as preparing and organizing it in line with the principles adopted in the fields of health services in the country. The studies carried out in the health policy adopted in the field of health services are studies such as health financing, organizing the elections in an organized manner regarding health manpower and needs. The health policy created by politicians in a country can be associated with the relevant articles of the relevant regulation, law and constitution of that country and can be monitored and audited.

The first concepts that come to mind in health services are the whole of preventive, healing and treatment services. In the social structure, these three service branches should be provided together and in coordination from a single source. The distribution of these health services within the system may vary according to the environment, the focal point of which is within the society. Preventive health services are services aimed at protecting public health. When it comes to preventive health services, the first thing that comes to mind is vaccination studies and training activities aimed at raising public awareness against preventable diseases and protecting public health. Therapeutic services are the activities and arrangements made to deal with the negative consequences that arise at the point where preventive services are insufficient. Holistic action should be taken to eliminate diseases and reduce the disease state. Surgical, medical and psychological interventions should be viewed as a whole. After the treatment, improvement procedures should be carried out so that the patients can return to their daily lives. Supported by psychological and physical therapy services, it should be tried to restore the people who receive treatment to their normal lives.

3. RISK SOCIETY AND THE COVID-19 PROCESS

Ulrich Beck's theory of Risk Society is the theory he built in 1992 in his work called Risk Society and stated that risks spread to the whole area of society in the post-modern period. It has entered a period in which individuals are mostly at risk in terms of the processes they live in, both in terms of work, education and private and family relations. The risk society theory expresses a period in which it not only affects the country, the company, but also the human population of the whole world, from the

September 11 attack to global warming, from diseases such as AIDS and HIV to the danger of nuclear war, from epidemics to major accidents (Slatterry, 2014: 454).

For Beck, he states that the phenomenon that determines the postmodern society is risk, and the period and society we live in is a risk society. Beck stated that the dangerous systems created by modernization threaten human life. In this context, risks point out that modern society creates risks and that the conditions of survival and self-production of humanity are under threat due to global reasons (Slatterry, 2014: 454).

There were natural and man-made hazards and risks in the lives of pre-modern societies. Plague, floods and drought were the most common risks faced by premodern societies. In the transition to industrial society, human beings attempted to dominate nature. He built dams and embankments as a remedy for floods. In order to prevent epidemics, they took steps towards drug production and differences from nutrition policies. However, while attempting to dominate nature, he made the world he lives in open to dangers, and these dangers brought great risks. For example, production factories were opened one after another in the name of rapid industrialization, but eventually the factories caused great damage to people's respiratory systems and created air pollution (Slatterry, 2014: 455).

In the post-modern period, the human being's attempt to take nature under his own control has left humanity faced with great disasters and risks. Nuclear power plants and the fission of the atom are not only a great source of energy for humans, but they can also turn into weapons of mass destruction. Decoding of DNA codes can turn into a way of preventing many diseases beforehand, and it also leads to live cloning. With the development of the petro-chemical industry, energy needs have been met, and on the other hand, it has become the number one cause of global warming. As human beings control and dominate the nature in which they live, the world has become a place where great risks are sheltered (Slatterry, 2014: 455).

During the Second World War, the idea that the atomic bomb caused deadly causes and that the power of scientific knowledge should be controlled in developed countries and that their citizens should participate in this control became stronger (Dursun, 2010: 10). Since then, in many risk situations, states have given this control power in an event related to the health status of all citizens. Therefore, when the Covid-19 pandemic emerged in 2020, the Ministry of Health in our country tried to convey scientific information to its citizens through communication tools, with mottos such as "social distance, stay at home, life fits at home".

4. COMMUNITY, OCCUPATIONAL HEALTH AND SAFETY DURING THE COVID-19 PANDEMIC

The widely accepted definition of occupational health by the World Health Organization (WHO) and the International Labor Organization (ILO) is to ensure that the individual is in complete well-being not only physically, but also spiritually and socially, and that the health conditions of the employees are at the highest level. In this respect, the concept of occupational health can be seen as an effort to achieve the healthiest result by minimizing the negative working conditions of the employees and blending them with the work done (Yiğit, 2013: 2).

Although Covid-19 is a biological risk factor, the threats it creates and the perceptions these threats create on businesses have serious negative effects. In the context of the process and crisis management, it is anticipated that this negative effect will gradually prolong. Obviously, it will cause various important economic, financial and legal consequences, especially the social and psychological consequences on employees, business owners and society.

The risks that emerged as a result of the risk assessment caused many sectors to stop and slow down. Due to travel restrictions, companies with headquarters in different places have difficulty in working in coordination. Even though less workforce is needed due to the Covid-19 businesses preventing them from working at full capacity, the need for experienced and qualified employees who understand the crisis management has increased to manage the emerging crisis.

5. THE EFFECT OF THE STATEMENT CREATED BY THE COVID-19 PANDEMIC ON OCCUPATIONAL SAFETY AND HEALTH PROCESSES

Occupational health and safety is the most important part of working life. Occupational Health and Safety is a set of laws, regulations and bulletins, investigations and practices designed to ensure the protection of employees. In fact, occupational health and safety are the basic elements that enable the physical, mental and motivational energy of human resources to be thrown out (Erol, H., 2016: 2).

The Covid-19 pandemic has had a huge impact on business. In order to control the epidemic, many workplaces were closed or a remote/home working system was adopted. However, due to the fact that working in some sectors has to continue and the nature of the work is not suitable for remote working, the issue of occupational health and safety has come to the fore against the pandemic in workplaces. In the context of mutual responsibilities established between the employee and the employer due to the personal nature of the employment contract, the employer has to protect the employee, take measures against the damages that the employee may suffer due to his work, and refrain from behaviors that will harm his interests. The Covid-19 pandemic has brought great responsibilities for employers. The measures to be taken by employers in order to reduce the risks of Covid-19 in workplaces are listed below by considering them from the perspective of occupational health and safety.

5.1. Risk Assessments

Companies should quickly and carefully review their risk assessments to identify the potential impact of Covid-19 and the measures to be taken; they need to be updated according to deficiencies and requirements. These updates should be repeated with each new development regarding Covid-19. The identified hazards should be determined and each should be handled separately, the frequency of the risks that these hazards may cause and the persons, contents, methods and dimensions of the risks that may be damaged should be determined (Temir, 2014: 56).

While determining the risk assessment, it is necessary to evaluate the places and ways where the employees may be exposed to the COVID-19 virus in the workplace, and to determine the workplace and workplace characteristics, taking into account the general situation and working conditions of the workplace. High-risk groups in the workplace should re-plan the working process and working methods according to the working conditions and evaluation results (www.eforosgb).

5.2. Emergency Plans

The emergency and action plan is one of the most important plans to protect the integrity of the company and the health of workers from various adverse conditions that may threaten the survival of the company. The plan can be effective for facilities, workplaces or buildings and their environment and areas, responding to natural disasters, explosions, hazardous chemicals, terrorism, biological events, wars, public movements, intentions and accidents, especially fires (Selek, 2016: 76).

Prevention from communicable diseases and personal protection methods should be added to the training topics for employees. Preventive and restrictive measures against epidemics should be updated with the emergency plan created in accordance with the relevant laws and regulations and made

available for Covid-19 (ailevecalisma.gov.tr/covid19). Employer representatives should include a plan to counter biological attacks and epidemics in their emergency planning and take precautions.

5.3. Engineering Controls

Engineering measures should be taken, such as airing the workplaces, installing high-efficiency and high-performance air filters when choosing filters, drawing social distance strips, using physical barriers, etc. In order to prevent occupational accidents that may occur as a result of not performing periodic inspections of work equipment on time, these procedures should be carried out in accordance with the necessary social distance and health compliance rules in order to be able to perform these procedures in a timely and safe manner. Work processes and technical control measures should be arranged to prevent the release of biological agents into the environment. Workplace ventilation systems should be maintained on time and reviewed. If possible, the workplace should be naturally ventilated at regular intervals and the ventilation capacity should be increased.

5.4. Workplace Health Surveillance and Administrative Controls

Worker/visitor entry procedures, health checks and a list of questions questioning visitor contact for the last 14 days should be prepared and implemented, and necessary steps should be taken to include and implement additional measures. Routine cleaning and decontamination of the floor and contact areas, equipment and work environment should be defined and practiced as an unavoidable routine. The clothes worn by the workers in the working environment and the other products they use due to working conditions should be washed and ventilated in accordance with the principles of healthiness, work clothes and daily clothes should be stored separately. The manufacturer's instructions should be followed for the concentration, application and contact time of all cleaning and disinfection products, and the use of personal protective and hardware equipment.

At the entrance of the business or where the employer has frequent entrances and exits, fever measuring devices and protective equipment for healthcare workers must be complete. Masks and gloves, disinfectant products should be provided. Preventive measures should be taken for suspicious persons referred to the hospital and appropriate surgical masks should be worn. Employees should not be in close contact at the workplace as much as possible, and the common use of tools and equipment should be prevented as much as possible. Workers should wash their hands with soap and water for at least twenty seconds on first entry to the workplace and frequently. Daily cleaning and disinfection of the floors and surfaces of the working environment, equipment and other common use elements of the working environment should be done routinely (New Coronavirus Epidemic, 2020).

Work areas, toilets, sinks, stair handrails, faucets, cafeterias, restaurants, dormitories, rest areas, changing rooms, doors, revolving doors, etc. common areas must comply with sanitary conditions. The keyboard and other equipment of the computer, as well as devices, should also be cleaned regularly. Whenever possible, employees should be prevented from using other staff's office equipment.

Training on health information should be given in the enterprise and informative posters and brochures should be hung in the common areas. Hand washing is a behavior that is important for the health of the individual and also affects other individuals. Hands should be washed and cleaned after touching raw food, after using the toilet, at the beginning of every job, after coughing and sneezing, after using cigarettes and tissue, after touching wounds and acne, after touching dirty tools, after touching garbage, after touching money (Şahingöz ve Şık, 2015:105). If it is suspected or confirmed that someone in the business is infected with Covid-19, the Ministry of Health should be informed by informing the Occupational Health and Safety Board.

5.5. Safe Working Practices

Banners/posters/instructions encouraging employees to stay at home when they are sick, including coughing and sneezing etiquette, and explaining the importance of hand hygiene should be posted at the entrance of the workplace and other areas where everyone can see it. Paper napkins, non-contact bins, hand soap, alcohol-based hand cleaners containing at least 60% alcohol, disinfectants and disposable towels should be provided for workers to clean work surfaces. Disposable wipes and separate garbage bags for biological wastes should be provided to the employees, necessary practices should be made by the cleaning personnel to empty the garbage without touching the contents. The working conditions should be reconsidered in order to bring the risk to an acceptable level, and especially the shifts and the number of employees should be organized in a way that minimizes the risk. Social distancing, gradual work shifts, downsizing, remote service delivery and other exposure reduction measures should be tailored to the grievance of workers. It should be ensured that social distancing practices are put into effect, safe distances are marked clearly and visibly for employees in work areas, and employees are trained in this regard.

The necessary procedures and measures for supplier visits, meetings, audits, etc. that employees have to carry out outside the business should be re-evaluated, taking into account the risk of Covid-19 contamination that may arise during these studies. In addition to the economic dimensions such as determining the need for additional precautions and increasing the number of services in the service/transportation vehicles that provide the transportation of the employees to the workplace, it should also be considered to take the risks arising from the additional personnel who will use the additional services under control. Cleaning and hygiene of service vehicles, especially frequently touched surfaces, should be ensured at frequent intervals. The contact of employees using the service and public transportation vehicles with the surfaces inside the vehicle should be reduced as much as possible.

5.6. Personal Protective Equipment

Business owners and employer representatives should take every precaution to ensure that the personnel are safe while working and must provide the necessary personal protective and equipment within the needs of the personnel.

Personal protective equipment (PPE) are basically of visors, masks, gloves. The conditions of use and duration of use of PPE, the frequency of risk and exposure may vary according to the characteristics of the job in which the employee works (PPE Regulation, article 6/c). According to article 19 of Law No. 6331, employees are obliged to use, protect and properly store the personal protective equipment provided to them in line with the occupational health and safety training they receive and the instructions of their employers (PPE instruction, article 8/2).

It is important to select and allocate personal protective equipment according to risk priority. Employees should be provided with fully closed eye masks or face masks/face visors, protective clothing, respiratory protection, airtight masks and gloves, especially in work environments where there is a risk of direct contact or contamination with people suspected of being infected.

Those working within 2 meters of patients known or suspected to be infected with the Covid-19 virus should wear an N95 filter mask or respirator. N95 filter mask respirators or more appropriate National Institute for Occupational Safety and Health (NIOSH) approved respirators should be used in the context of a comprehensive written respiratory protection plan that includes fit testing and training and physical examination. Masks with the NR logo (not reusable) should be used to protect against the

covid-19 virus. Work clothes and PPE should be removed before leaving the work area, stored in cabinets different from normal clothes, and if necessary, contaminated clothing and PPE equipment should be disinfected and cleaned or destroyed in cases where cleaning is not possible.

5.7. Educational studies

Within the scope of education principles, events that do not have a problem in delay and that are not urgent should be cancelled. Meetings for training purposes should be restricted and crowded meetings should not be organized. Social distancing should be observed in meetings and training activities and should be carried out with a minimum number of people. Whenever possible, meetings should be held online or digitally via teleconference. Employees should be informed about personal rights, health and safety issues that may arise during the epidemic, and the question marks in the minds of employees should be eliminated. Informing about this issue should be done by the relevant experts by following the social distance rules and by providing social isolation. Employees should be informed about biological risk factors, measures that can be taken against biological risk factors should be explained to employees and shown in practice. Detailed information should be given about the negativities, symptoms and contamination of the Covid-19 virus, and prevention methods should be explained. Research should be conducted to educate about the symptoms, spread and how to prevent Covid-19. The importance of personal hygiene and ensuring the hygienic conditions of the environment should be mentioned. Occupational health and safety training in the form of distance education should be given to personnel on personal cleaning, environmental cleaning, workplace cleaning and order. Information should be given about the use of masks and gloves, and trained personnel should be employed for the storage and disposal of these medical wastes. The trainings should be aimed at working well of the individual, and the trainings should also cover the issues of family and social life.

6. DISCUSSION

All definitions of risk are based on the distinction between reality and probability. The relationship between present and future depends on the ideas society has about itself today. The concept of risk will be shaped according to the society's perspective on coping with the future and its own change. Until recently, people were talking about both good and bad risks. In the Middle Ages, risk-taking by sailors was considered a respectable undertaking. In recent years, the positive side of risk has been eliminated, and it more often expresses a problem, danger or threat. While taking the risks into account, it mostly manifests as taking precautions against the dangers that may occur in the future. When the concept of risk came together with the economy, “risk” itself began to be bought and sold as a commercial value.

In the process of transition from traditional society to modern society, society is completely redesigned. At the center of the effort to establish a new order is a rational mind, scientific knowledge, and a safe world free from risks and dangers. The idea of a new order is a society free from all kinds of magic, beliefs, fears and fairy tales. Just as the machine works, so the society is wanted to be set up like clockwork.

In the most advanced stage of modernization, the problems of uncertainty and uncontrollability emerged. The society designed with the rational mind was constantly moving forward. According to Beck, modernization has become a maverick. The new face of the obsolescence of industrial modernity is the risk society. An understanding that both increases and legitimizes the dangers produced by decision is dominant in the industrial society. Industrial societies became creators and legitimators of dangers they could not control. According to Giddes, the disseminating and intensifying effects of

globalization have made these dangers even more evident. This crisis situation brought about by modernization has been evaluated in different dimensions. According to Beck, we began to pay for the mistakes made in the early stages of modernity. Risk and uncertainty surrounded our entire lives. The boomerang effect had begun. Moreover, without distinction between rich and poor countries. In the early stages of modernization, the sharing of blessings/wealth was replaced by the sharing of risks. Giddens, on the other hand, argued that it is possible to compensate for the natural risks and dangers that arise. However, it is not possible to compensate for the high-impact risks included in the manufactured risks. Because such risks cannot be calculated. Its effect will continue for a very long time.

While some thinkers refer to the age we live in as the information age, the postmodern period and the age of nervousness, Ulrich Beck, who is the subject of the study, preferred the concept of "Risk Society". Beck, who presents an evaluation of that period and the future in the conditions of the period with his work published after the Chernobyl disaster, underlines that today's society is a risk society and people are constantly at risk. Indeed, when we look at the scientific and technical developments experienced, on the one hand, the progress in fields such as health, medicine and genetics contributes positively to human health and lifespan, on the other hand, the destructive effects of the developments in the defense industry, petro-chemistry and nuclear energy draw attention.

The Covid-19 epidemic, which emerged in China in December 2019 and spread rapidly to the world, makes itself felt in all economic, political and social areas. Combined with the effect of globalization, the rapidity of the virus's transmission, the effects of the global epidemic seen in 185 countries around the world have also been great. Due to the epidemic, in which all world economies were negatively affected, all life was blocked, and many activities from education to sports, from art to scientific meetings had to be stopped.

Although there have been outbreaks in the world before, these have been relatively limited to certain regions. For the first time, all countries in the global sense feel threatened. In this context, in the first period of the epidemic, there was a great atmosphere of panic, curfews and quarantine practices were put into practice by governments. However, the consumption-based structure of the global capitalist system has shown that these measures cannot be sustained any longer. Accordingly, concepts such as controlled social life, mask, social distance, hygiene and precaution have entered our lives and become a part of daily life. The mass media also shared the decisions taken regarding the epidemic and the developments experienced in this period with the world public opinion.

Occupational health and safety became more important in the world in the 19th century due to the increasing number of occupational accidents in the field of work, which put workers and occupational safety at risk. Occupational health and safety, in a narrow sense, is to protect the safety of the worker and the occupational health against dangerous and risky situations that occur in the workplace. In the historical process, this concept has been defined as preventing and eliminating risk situations that will threaten the social environment of workers in these activities, as well as occupational diseases and work accidents. It has been observed that the occupational health and safety perspective has developed unique methods for these processes. In our study, it is important to show the linear relationship between the measures taken in the field of occupational safety and health in pandemic conditions and the justification of the objections of the risk society theory.

The Covid-19, which appeared in 2019 and turned into a pandemic in 2020, deeply shook the field of occupational health and safety. Business life has reached the point of collapse and has brought the living conditions of workers to an unsustainable level. A new era has begun for workplaces and employees in pandemic conditions. The Covid-19 pandemic process has brought about economic,

financial and legal consequences for both workplaces and employees. While it creates fear and panic in social and business life for employees, closure for workplaces and economic crises have occurred in every sector. The scope of the epidemic has increased, and the issue of occupational safety and health in the workplace has also gained importance.

In its transformation into a society where risk spreads, the field of occupational health had to revise itself in a sense. The extent of legal obligations that workplaces and employers must comply with has changed in this pandemic conditions. One of the main tasks expected from the workplaces is the risk assessment of the workplaces. While making a risk assessment, risk steps should be determined and taken in advance, and those who work in appropriate measures should also be taken into account. It should be ensured that measures are taken for workers in terms of personal risk factors and possible negative situations (mental, psychosocial and informational). In Covid-19 conditions, it is necessary to develop alternative working methods and programs such as reducing the number of workers, creating digital workspaces such as remote working or working at home.

During the Covid process, emergency plans have started to be prepared in the workplace. Employers and their representatives have been included in their programs and measures to include biological attack and spread-breaking chain-breaking plans in the emergency planning. Along with the pandemic, engineering measures are also important in addition to the emergency plan in the workplaces. Engineering measures such as ventilation in workplaces, use of filters, drawing social distance strips, and placing physical barriers have now become the most important practices of the workplace. In this process, as workplace health surveillance and administrative control, the clothes worn by the workers in the working environment should be cleaned and ventilated in accordance with health and hygiene rules, and the separation of daily clothes and work clothes has become a priority activity. Regularly following the personal protective and equipment rules in the manufacturer's instructions had to be a priority. Furthermore, in addition to measuring devices and a fourteen-day test history in the entrance and exit sections of the workplaces, visits were limited and it was requested to be reduced to a minimum level. During the Covid-19 period, it has been requested not to organize training meetings and crowded meetings in the workplaces. Social distancing rules and reducing the number of people in meetings, providing meetings in digital environments if possible, have become important rules of daily business life.

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VEKİL MODELLER KULLANARAK DOĞRUSAL OLMAYAN FERMİYONİK BİR MODELDE YÖRÜNGELERİN İNCELENMESİ

Dr. Mine AK
Independent Researcher

ÖZET

Gursey model dört boyutlu konformal invaryant saf fermiyonik bir modeldir (Gursey, 1956). Yakın zamanda Gursey model ve Heisenberg anzatı kullanılarak saf spinör instanton çözümlerine karşılık gelen lineer olmayan diferansiyel denklemler elde edilmiştir(Aydogmus, 2013). Instantonlar topolojik solitonlar olarak bilinir ve sıfır enerji-momentum tensörü ve sonlu eylem ile ifade edilir ve farklı topolojik yapılara sahip vakumlar arasındaki tünelleme özelliği sayesinde kuarkların parçacıklar içinde hapsolmasını ifade etmede önemli bir rol oynar (Dunajski,2010). Önceki çalışmalarda, spinör tipi instanton çözümünün kaotik davranışları incelenmiştir(Aydogmus, 2013). Bu çalışmada spinör tipi instantonların yörüngeleri analiz edilmiştir. Bu analizde, Yerel Lyapunov üstellerinin (YLÜ'leri) tahminine dayanarak, bir yörüngenin düzenli olma olasılığını belirlemek için bir Gaussian Bayesian sınıflandırıcısı kullanılmaktadır ve burada YLÜ'lerin her sınıfta normal olarak dağıldığını varsayılmaktadır. İlk olarak, sınıflandırıcı, Genelleştirilmiş Hizalama İndeksi (GALI) olan seçilen referanstan kaynaklanan ilgili sınıf etiketleri ile T eşleme yinelemeleri için 200 farklı başlangıç koşulundan kaynaklanan YLÜ'ler üzerinde eğitilmektedir. 10^4 test yörüngesi örneklenir, bunların YLÜ'leri T eşleme yinelemeleri için hesaplanır ve yörüngeler daha sonra sınıflandırılmaktadır(Rath, 2021). T = 100 ile bağlantı sabitinin faklı değerlerine göre yörüngeler incelenmektedir. Bu çalışmada spinör tipi instantoların yörüngelerinin kaotik yapısı hakkında önemli bilgiler elde edilmiştir.

Anahtar Kelimeler: Instanton, spinör, kaos, dinamik sistemler, Lyapunov Üsteli, Gaussian Bayesian sınıflandırıcısı

INVESTIGATION OF ORBITS IN A NONLINEAR FERMIONIC MODEL USING SURROGATE MODELS

ABSTRACT

The Gursey model is a four-dimensional conformal invariant pure fermionic model (Gursey, 1956). Recently, nonlinear differential equations corresponding to pure spinor instanton solutions have been obtained using the Gursey model and Heisenberg ansatz (Aydogmus, 2013). Instantons are known as topological solitons and are expressed by the zero energy-momentum tensor and finite action and play an important role in expressing the confinement of quarks within particles, thanks to the tunneling property between vacuums with different topological structures (Dunajski, 2010). In previous studies, the chaotic behavior of the spinor-type instanton solution was investigated (Aydogmus, 2013). In this study, the orbits of spinor type instantons are analyzed. In this analysis, a Gaussian Bayesian classifier is used to determine the probability that an orbit is regular, based on the estimation of Local Lyapunov Exponents (LLEs), where it is assumed that the LLEs are normally distributed in each class. First, the classifier is trained on LLEs resulting from 200 different initial conditions for T-mapping iterations with the corresponding class labels originating from the selected reference with the generalized alignment index (GALI). 10^4 test trajectories are sampled, their LLEs are calculated for T-mapping iterations, and the trajectories are then classified (Rath, 2021). Trajectories are examined according to different values of the coupling constant with T = 100. In this study, important information has been obtained about the chaotic structure of spinor type instantos orbitals.

Keywords: Instanton, spinor, chaos, dynamical systems, Lyapunov exponent, Gaussian Bayesian classifier

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NATION-BUILDING PROCESS IN TURKMENISTAN AFTER INDEPENDENCE

Mizango VIOLA
Warsaw University, Poland

ABSTRACT

In order to identify the general characteristics of the history teaching system applied in Turkmenistan during the USSR period and the changes made in the history teaching system after Turkmenistan declared its independence, screening models and document review methods were used in this study. Studies on curricula and textbooks in Turkmenistan, as in other republics of the Soviet Union the result of two kinds of public with the history lesson, which taught USSR, the curriculum and textbooks used in this period of intense political-ideological orientations and it was found that contained various historical forms of the abuse. During this period, when issues related to Turkmen history were included only within the scope of the history of the USSR and very limited, many historical realities were distorted, especially the issue of Russia's invasion of Turkmenistan. After Turkmenistan declared its independence on 27 October 1991, it implemented policies aimed at getting rid of the cultural and ideological influence of the USSR and building a Turkmen national identity. During this period, the history of the USSR was abolished and the history of Turkmenistan was started to be taught instead, and the contents of the Public History taught during the USSR period and the amount of weekly course hours were reorganized and taught. During this period, when the ideological approach to the teaching of history of the USSR was abandoned, the teaching of national history was taken to the forefront and the balance of nationalism-universality, knowledge-skills and values were tried to be observed in the teaching of history. Despite all these changes, it can be said that in the new period, the understanding of Homeland history, historical periodization and the weight of the cult of the person in textbooks, based on the geographical boundaries of the USSR period, continued to some extent.

NATION BULDING PROCCES AFTER INDEPENDENCE OF AZERBAIJAN

Mizango VIOLA
Warsaw University, Poland

ABSTRACT

Before ındepence of Azerbaijan and other Soviet States, almost all of them ruled and dominated by Russsian and Russian culture for centuries. This fenom ınclude the Azerbaıjan too. Before the Russian civil war, Azerbaijan ruled by Russian Empire for 80 years but in the Russian çivil war Azerbaijan decleare independence under the precidency of Mehmet Emin Resulzade in 1918. However this indepence end in just 2 years after Red Army took control over all Azerbaijan. People can think that this 2 years of independence meant nothing for Azerbaijan peope but this is not the case and not just for Azerbaijan but all Sovieet states. Because this give other states that ruled by russian for centuries that they can take their indepence and this 2 years of independence affect the Azerbaijan culture that they were free once and they can be free again.

Therefore the collapse of the Soviet Union, every member state were dominated by the Soviet-Russian culture which this is not allowed them to bulding their own nation with their identity. But after the indepence of the Soviet states, every of them started to make their own nation with their culturel and historical heritage. One of these member state was Azerbaijan. After the independence, Azerbaijan faces with difficulties that shaped their identity and their nation bulding process. This was Armenian-Azerbaijan War over The Nagorno-Karabakh region. There were lots of affects and policies that affect the nation bulding process in Azerbaijan.

PHOTOMETRIC ELEMENTS OF AN EA-TYPE ECLIPSING BINARY IN ASAS-SN DATABASE: TU CrB

Özlem Ekinci[1*], Burcu Özkardeş[2,3]

*[*1]Çanakkale Onsekiz Mart University, School of Graduate Studies, M.Sc. Program in Space Sciences and Technologies, 17100 Çanakkale, Turkey.*
[2]Çanakkale Onsekiz Mart University, Faculty of Arts and Sciences, Space Sciences and Technologies Department, 17100 Çanakkale, Turkey.
[3]Çanakkale Onsekiz Mart University, Astrophysics Research Center and Ulupınar Observatory, TR-17100 Çanakkale, Turkey.
ORCID Code: 0000-0002-4447-5644
ORCID Code: 0000-0002-6764-9299

ABSTRACT

In this study, the preliminary results of the light curve analysis of the Algol type (EA type) eclipsing binary star TU CrB are presented. The *V* band photometric data in ASAS-SN database were modeled by Wilson-Devinney method. The geometric and physical parameters of the system were determined. Using the results masses and radii were estimated for the component stars, and a distance to the system was determined.

Keywords: Binary stars, Eclipsing Binary, Algol type, TU CrB, Photometric analysis, ASAS-SN Database.

INTRODUCTION

Binary stars move around their common center of mass according to Kepler's laws and consist of at least two components. By examining the time dependent light changes of binary systems, the basic parameters of the systems can be obtained. Binary star systems have an important place in astronomy, as they allow the basic stellar parameters of their components to be determined. In this study, the eclipsing binary TU CrB, which is a relatively less-studied system, whose basic parameters have not been determined, is investigated. The variability of the binary star was discovered by Tsesevich (1960). The author gave the system's type to be an Algol type. Budding et al. (2004) determined that the system is a semi-detached binary. The basic information of TU CrB is given in Table 1 according to SIMBAD database.

Table 1. Basic information of TU CrB from SIMBAD database

ICRS coord.	16 09 44.2478940521 +39 34 32.091284022
Galactic coord.	062.9561266880596 +47.3357419412751
Parallaxes (mas)	1.2714±0.0577
V mag	11.61±0.12

MATERIALS AND METHODS

All-Sky Automated Survey for Supernovae (ASAS-SN)

Photometric data from the ASAS-SN database (Jayasinghe et al. (2018b); https://asas-sn.osu.edu/variables) was used in the study. All-Sky Automated Survey for Supernovae (ASAS-SN) project is automatically surveying the entire visible sky every night down to about 18th magnitude. From these scans it has discovered about 240000 variable stars stars so far. The detailed information of ASAS-SN project can be found in these publications: Shapee et al. (2014), Kochanek et al. (2017). In Figure 1, the *V* band light curve and field image of the system, which is retrieved from the ASAS-SN archive (https://asas-sn.osu.edu/variables/a81d69ed-1b7c-5657-a848-4e336902ee07), is shown.

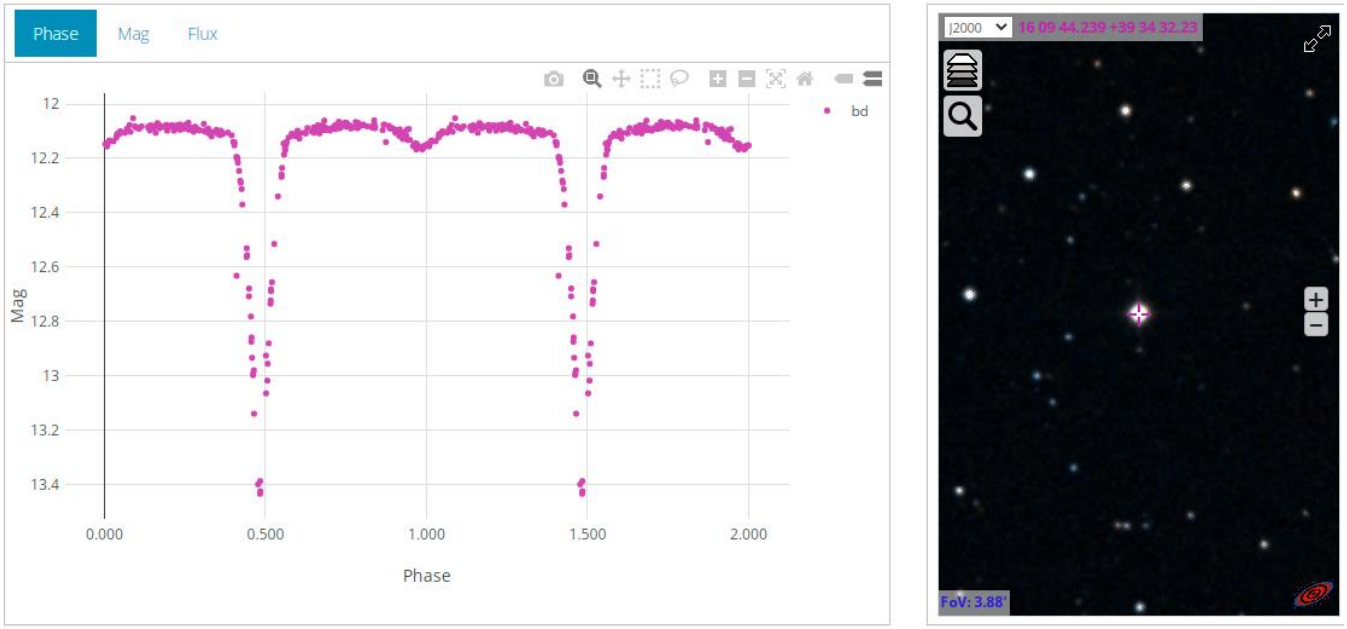


Figure 1. ASAS-SN *V* light curve (left panel) and field image (right panel) of TU CrB

Light Curve Analysis

To obtain the geometric and physical parameters of TU CrB ASAS-SN *V* light curve was modeled with Wilson-Devinney (WD) method (Wilson and Devinney,1971). But for the modeling MC algorithm (Zola et al., 2010; Özkardeş, 2021) was used instead of DC code in WD program. The range of values entered in the search for each parameter describing the light curve is given in Table 2. In the analysis some parameters were fixed: T_1 (the temperature of the primary component) was accepted to be 6590 K from Qian et al. (2018). g_{12} and A_{12} values were fixed at 0.32 (Lucy (1968)) and 0.5 (Rucinski (1969)), respectively, for convective atmospheres. The limb darkening coefficients of Claret and Bloemen (2011) and Claret (2013) were used. In Figure 2 shows the comparison of the observational and model light curves. The results of the MC search are given in Table 3.

Table 2. Search interval in the MC algorithm of the light curve parameters of TU CrB

i (°)	**T_2 (K)**	**Ω_1, Ω_2**	**Mass ratio**	**Phase shift**	**Luminosity of primary (L_1/L_{ttotal})**	**Third light***
75-90	3000-6500	2.5-6.0	0.4-0.6	-0.2-0.2	2.0-12.5	0.0

*Assumed.

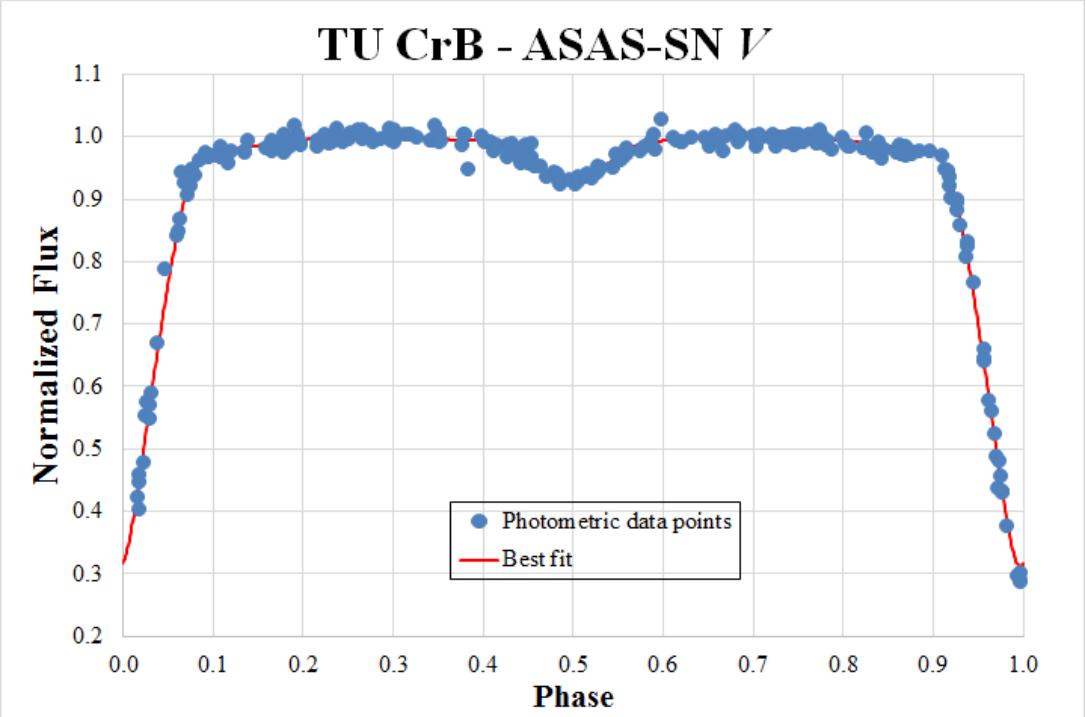


Figure 2. ASAS-SN *V* light curve and MC algorithm best fit of TU CrB

Table 3. Results of the light curve analysis for TU CrB

Parameter	Value	Error	Parameter	Value	Error
i (°)	85.9	0.8	e*	0	fixed
Phase shift	-0.0034	0.0004	w*	90	fixed
T_1 (K)	6590	Fixed	r_1 (mean)	0.30	0.01
T_2 (K)	3872	50	r_2 (mean)	0.25	0.01
q (M_2/M_1)	0.404	0.047	l_1/l_{total}	0.96	0.01
Ω_1	3.7609	0.9754	l_2/l_{total}	0.04	0.01
Ω_2	2.9346	0.1719	$\Sigma W(O-C)^2$	0.128	

*: Assumed.

RESULTS

The photometric solution describes TU CrB as an F4+M1 eclipsing binary with a mass ratio of 0.404±0.047. The filling factors of the primary and secondary component were found to be 72% and 92%, respectively, revealing the secondary is near to fill its Roche lobe.

Absolute parameters of TU CrB were estimated using the photometric results. Due to the lack of spectroscopic observations the primary mass M_1 was accepted as 1.20±0.03 $M_\odot$ according to 6590 K from the Budding and Demircan (2007)'s empirical main sequence calibration table. The semi-major axis was calculated by the third Keplerian equation. The values given by Pecaut and Mamajek (2013) were taken into account for solar unit. Absolute physical parameters of the components are listed in Table 4.

Table 4. Absolute estimated parameters of TU CrB

Parameter	Primary	Secondary
a ($R_\odot$)	6.89±0.27	
M ($M_\odot$)	1.20±0.03	0.49±0.07
R ($R_\odot$)	2.08±0.15	1.73±0.14
T (K)	6590±500	3872±502
L ($L_\odot$)	7.35±2.44	0.61±0.35
log g (cgs)	3.88±0.09	3.65±0.01
d (pc)	787±127	
d (GAIA) (pc)	786.5±35.7	

CONCLUSION

Algol type binary systems are an important laboratory in terms of investigating important issues such as mass transfer, angular momentum loss, chromospheric activity, X-ray emission etc. Detailed photometric analysis based on archival data of the Algol type eclipsing binary star TU CrB was performed in this study, and preliminary results are presented.. In our further study, we plan to analyze other archival light curves (*TESS*, KWS) along with the multi-color light curves we obtained and examine the evolutionary status of the system.

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TÜRKİYE'DE ORMAN YANGINLARI VE DEĞİŞEN KOŞULLAR ALTINDA GELECEĞİ

Mertol ERTUĞRUL[1] ,Tuğrul VAROL[2*],

*[*1,2]Bartın University, Faculty of Forestry, Department of Forest Engineering, Bartın, TURKEY*

ORCID Code: [1]0000-0002-4482-7347, [2]0000-0002-0499-2129

ÖZET

Geniş bir Akdeniz iklimi kuşağına sahip olan Türkiye, her yaz sezonunda gerçekleşen çeşitli büyüklükteki yangınlar ile orman yangınlarına hiç de yabancı olmayan bir ülkedir. Orman Genel Müdürlüğü 1937 yılından bu yanan yıllık yangın istatistiklerini tutmakta ve bu istatistiklerde orman yangınlarının durumu görülebilmektedir. Uzun bir döneme ait bu veriler incelendiğinde belirli dönemlerde azalma, belirli dönemlerde ise artış trendinde olduğu görülebilmektedir. Türkiye 80'ler ve özellikle 90'lardan sonra hızlanan nüfus artışı, büyük kentlere ve sahildeki yerleşim yerlerine sürekli ya da dönemsel nüfus akışı ile sosyo-ekonomik olarak önemli bir değişim sürecine girmiştir. Bu yeni koşulların sosyal ve ekonomik alanda etkileri olduğu gibi ormanlar ve çevre üzerine de ciddi etkileri olmuş olup bu değişim bu gün de devam etmektedir. Türkiye, son yılllarda önemli düzeyde nüfus artışı gösteren ülkelerden birisi olmasına rağmen TUİK verilerine gore Bodrum, Manavgat ve Marmaris gibi hem önemli sayfiye yerleri, hem de 1. derecede orman yangını risk alanları olan bölgelerde, bu genel artışın kat ve kat fazlası düzeyde nüfus artışları gerçekleşmiştir. Bu gelişmeler, doğal olarak yangınların ve orman alanları üzerindeki baskının artmasına sebep olmuştur. Bu koşullar ile birlikte özellikle son yıllarda tüm dünyada orman yangınlarını gerek sayı, gerekse şiddeti yönünde olumsuz yönde etkileyen küresel iklim değişikliği olgusunun getirdikleri de orman yangınları ile mücadelenin daha da güç hale gelmesine yol açmıştır. Özellikle 2021 yangın sezonu ülkemizde 1937 yılından bu yana en yüksek yangın istatistiklerinin geçildiği yangın sezonu olmuştur. Öyleki meydana gelen orman yangınları 41 günlük bir periyotta 61 farklı ile yayılmıştır. Bu durum gelecek yönünden endişe vericidir. ABD'de Kaliforniya'da, 2000 yılından bu yanan 500 bin hektardan fazla alanın yandığı 3 sezon, 2017, 2018 ve 2020 yaz sezonlarıdır. Avustralya'da da 2019 yılı sonu ve 2020 yılı başında gerçekleşen, bilinen tüm zamanların en kötü yangın sezonu olarak kabul edilen ve yaklaşık 19 milyon hektar alanın yanmasına sebep olan orman yangınları dikkati çekmektedir. Özellikle iklim ve bitki örtüsü olarak bize benzeyen Avrupa'nın Akdeniz iklim kuşağında ise, 66 kişinin hayatını kaybettiği 2017 Portekiz ve 102 can kaybına sebep olan 2018 Yunanistan yangınları, dikkate alınması ve iyi analiz edilmesi gereken olaylardır. Son yıllarda gerçekleşen tüm bu büyük yangınlar, orman yangınları ile mücadele eden ülkeler arasında araştırma, bilimsel çalışma ve yangınlarla mücadele gibi konularda yakın işbirliğine gidilmesinin de büyük önem taşıdığını ortaya koymuştur.

Anahtar kelimeler: Orman yangını, yangın adedi, yanan alan, yangın istatistikleri, 2021

FOREST FIRES IN TURKEY AND THE FUTURE UNDER CHANGING CONDITIONS

ABSTRACT

Turkey, which has a wide Mediterranean climate zone, is a country that is not unfamiliar with the fires of various sizes and forest fires that take place every summer season. The General Directorate of Forestry has been keeping annual fire statistics since 1937 and the status of forest fires can be seen in these statistics. When these data belonging to a long period are examined, there is a decrease in certain periods and an increase trend in certain periods. Turkey has entered a period of socio-economic change with the accelerating population growth after the 80s and especially after the 90s, with the continuous or periodic population flow to the big cities and coastal settlements. These new conditions have had serious effects on forests and the environment, as well as social and economic impacts, and this change

continues today. Although Turkey is one of the countries with a significant population increase in recent years, according to TUIK data, population increases have occurred in areas such as Bodrum, Manavgat and Marmaris that are both important summer resorts and 1st degree forest fire risk areas. These developments naturally caused fires and increased pressure on forest areas. Together with these conditions, the global climate change phenomenon, which has adversely affected forest fires all over the world in recent years, both in terms of number and severity, has made the fight against forest fires even more difficult. Especially, the fire season of 2021 has been the fire season in our country, where the highest fire statistics have been passed since 1937. The forest fires that occurred spread with 61 different types in a period of 41 days. This situation is worrisome for the future. In California, USA, the 3 seasons in which more than 500 thousand hectares have burned since 2000 are the summer seasons of 2017, 2018 and 2020. Forest fires in Australia, which took place at the end of 2019 and at the beginning of 2020, are considered the worst fire season of all time and caused the burning of more than 18,600,000 hectares of forest fires. Especially in the Mediterranean climate zone of Europe, which is similar to us in terms of climate and vegetation, the 2017 Portugal fires, in which 66 people lost their lives, and the 2018 Greece fires, which caused 102 deaths, are events that need to be considered and analyzed well. All these big fires that have taken place in recent years have revealed that close cooperation between the countries fighting forest fires in matters such as research, scientific work and firefighting is of great importance.

Keywords: Forest fire, number of fires, burned area, fire statistics, 2021.

GİRİŞ

Orman yangınları her yaz ülkemizde geniş alanları yakarak gündem olan, bizim için deprem kadar tanıdık bir konu durumundadır. Çevresi açık olması nedeniyle serbest yayılma eğiliminde olan Orman yangını, kendine ait tüm önemli özelliklerini bu kısa tanımın içinde bulundurmaktadır aslında. Burada uzman olmayan gözler tarafından en çok gözden kaçırılan şey, orman yangınının "çevresinin açık olması" söz öbeğinin, onun sınırsız yayılması kadar, dış etkenlere açık olduğunu da ifade etmek amacıyla kullanılmış olduğudur. Burada sözü edilen dış faktörler, Hava koşulları, yanıcı madde ve topografya olarak sıralayabiliriz. Ancak bu bileşenler, pek çok farklı etkiyi yaratacak olan, çeşitli hava olayları, yanıcı madde tipi, ağaç türü, meşcere tipi, meşcere bakım durumu, yamaç, sırt, vadi ve başkaca çok çeşitli topografik yapı özelliğini de kendi içinde barındırmaktadır. Tüm bunlara insan faaliyetleri ve insan elinden çıkmış yapı ve yerleşim yerlerinin de durumlarını katarsak, başlangıçta son derece basit görünen orman yangınının aslında son derece karmaşık bir olay olarak olduğu anlaşılacaktır.

Sözünü ettiğimiz tüm faktörler üzerindeki değişiklikler yangın rejimlerinin değişmesine yol açmaktadır. Ancak tüm bu faktörler arasında büyük yangınların gerçekleşmesinde iklim faktörlerinin ayrı bir yeri bulunmaktadır.

İklim ve havanın, orman yangını aktivitesinde kilit rol oynadığı uzun zamandır bilinmekte olan bir gerçektir. Bu durum küresel ısınma ile birlikte yangınların etkilerinin doğal ve kentsel ekosistemler üzerindeki tahribatlarının daha da şiddetlenmesi beklenmektedir. Gelecekteki yangın rejimlerinin tahmin edilmesi, bu yangınların kontrol edilebilmesi için geliştirilecek planlamalar için büyük önem taşımaktadır. Bunların hesaplanmasında gelecekteki mevsimleri öngören iklim modelleri araştırmacılara büyük ölçüde destek olmaktadır. Doğal olarak bu, yıllık yangın aktivitesini iklim değişikliğiyle ilişkilendiren tarihsel analizleri gerektirmektedir. Burada iklim faktörlerinden etkilenen yanıcı maddenin durumu da büyük önem taşımaktadır **(Keeley & Syphard, 2016).** Tüm dünyada olduğu gibi Avrupa'da da, iklimde gerçekleşen ısınma nedeniyle yangına hassas alanların kuzeye ve Akdeniz'in dağlık alanlarına doğru genişlemesi büyük endişe yaratmaktadır. **(Dupuy et al. 2020).** Bu durum özellikle son 10 yıldır, hemen her yangın sezonunda gerçekleşen yangınlarla kendini göstermektedir. Avrupa'da en büyük yangınların gerçekleştiği yerlerden biri durumunda olan

Portekiz'de, 2017 yangın sezonunda 120'den fazla kişi hayatını kaybetmiş, 500.000 hektarlık rekor bir alan yanmıştır. Bu yangınları da kapsayan bir çalışmada Portekiz'e ait 1980-2017 dönemi iklim serileri kullanılarak, yanmış alandan sorumlu olan iklim faktörleri analiz edilmiştir. Hesaplamalarda Standardize Yağış Evapotranspirasyon İndeksi (SPEI), Standardize Yağış İndeksi (SPI) ve Standardize Toprak Nemi İndeksleri (SSI) kullanılmıştır. Elde edilen sonuçlara göre, diğer faktörlerin yokluğunda, iklim değişikliği daha yüksek yanan alan değerlerine yol açacaktır. Önümüzdeki yıllar için beklenen kuraklık ve yüksek sıcaklık koşullarındaki artışlar, potansiyel yangın aktivitesindeki artışlara da işaret etmektedir. **(Turco et al, 2019).**

Avrupa'da iklimdeki bu olumsuz koşullardan kaynaklanan ekstrem yangınlar büyük kayıplara yol açarken, 2019/20 yaz sezonu, Avustralya'da tüm zamanların dünya üzerinde yangınlar ile gerçekleşmiş en büyük tahribatına sebep olmuştur. Öyle ki yaz sezonu sona erdiğinde yaklaşık 19 milyon hektarlık bir alanın yanmış olduğu tespit edilmiştir. Sözü edilen tahribatın kıtanın faunasına verdiği zarar ise çok daha büyüktür. Verilere dayanarak elde edilen sonuçlara göre, etkilenen bölgelerde ekonomi ve altyapının eski haline getirilmesi ve hayvan ve bitki biyo-çeşitliliğinin geri kazanılmasının çok uzun yıllar alacağı belirlenmiştir. Avustralya'da "Kara yaz yangınları" adı verilen bu yangın sezonu, rekor kıran sıcaklıkların ve aşırı düşük yağışların olduğu bir dönemde meydana gelmiştir. Mart 2020'ye kadar "Kara Yaz yangınları" bahsettiğimiz gibi yaklaşık 19 milyon hektar alanı yakarken, bunun yanında 3.000'den fazla evi yok etmiş ve 33 kişinin hayatını kaybetmesine neden olmuştur **(Filkov et al, 2020)**.

Bu ekstrem yangınların en çok etkilediği yerler günümüzde "yerleşim yer-orman" ya da "kent-orman geçiş zonları" (WUI) olarak tanımlanan bölgelerdir. Dünyanın neresine giderseniz gidin, özellikle son 10 yıl içinde orman yangınlarının en fazla vurduğu ve en çok zarar verdiği yerler bu alanlardır. Bu tip kent-orman geçiş zonu yangınları, bu gün ve yakın gelecek için orman yangınları ile ilgili en büyük tehlike arz eden durum haline dönüşmüşlerdir. Kent - orman geçiş zonu, orman alanları ile komşu durumda bulunan yerleşim yerleri ya da yapılar ile ilgili olarak kullanılan bir terimdir. Son yıllarda yangınlar, dünyanın hemen her yerinde bu özelliğe sahip yerlerde yoğunlaşmakta ve can kaybı ve yerleşim yerlerinin tahribatları şeklinde çok büyük zararlar vermektedir. ABD, Kanada ve Avustralya'dan sonra Akdeniz ülkelerinde de bu tip yangınların gerçekleşmesi, orman yangınları ile ilgili araştırmalarda, dikkatlerin bu yerlere çevrilmesine yol açmıştır. ABD'de son yıllarda bu alanlarda gerçekleşen bina tahribatı ile ilişkili olarak yapılan bir çalışmada, bina kaybını açıklayan en önemli faktörlerin topografya ve mekânsal düzenleme durumları olduğu tespit edilmiştir. Ayrıca bu kayıplarda bitki örtüsü bağlantısının, bitki türünden daha önemli olduğu belirlenmiştir **(Alexandre et al., 2015).** Ekim 2013'te Yeni Güney Galler- Avustralya'da 200 evi yok eden iki yangının incelendiği bir çalışmada, yanan evlerin sahip oldukları özeliklerden; evin korunup korunmadığı, ormana olan uzaklığı, orman yangının yayılma yönü gibi 85 farklı potansiyel değişkenin analizi yapılmıştır. Elde edilen sonuçlarda; bitki örtüsüne en az 40 metre uzaklıkta ve diğer evler ile arasında önemli bir mesafe bulunan evlerin genellikle korunduğu, ancak, savunmasız, yeterli savunulabilir alana sahip olmayan, yakınlarda yanmış evler bulunan, evler arası mesafenin az olduğu ve o bölgede batı yönündeki evlerin genellikle tahrip oldukları tespit edilmiştir. Yapılan çalışmaya göre kötü özelliklere sahip evlerin, iyi yerleştirilmiş ve güvenliği sağlanmış evlere kıyasla evlerden 10 kat daha fazla etkilenme olasılığı olduğu belirlenmiştir. Bu sonuçlar ev sahiplerinin, mevcut yangın koşullarındaki riski en aza indirebilecek şekilde önlem alma seçeneklerine sahip olduklarını göstermektedir. **(Price et al., 2021)**.

Kaliforniya'da, 2013-2018 yılları arasında orman yangınına maruz kalan 40.000'den fazla yapı için, yangınlarda tahrip olma ve yangından kurtulma nedenlerinin araştırıldığı bir diğer çalışmada da; Evlerin bitki örtüsü ile ilişkisi kadar yapısal özelliklerinin de tahribatın sebebiyle önemli düzeyde ilişkisi olduğu belirlenmiştir. Elde edilen sonuçların neticesinde gelecekteki yapı kaybının azaltılması için ek stratejilerin geliştirilmesi gerekliliği belirtilmiştir **(Syphard & Keeley, 2019).**

Kent-orman geçiş zonlarında gerçekleşen yangınlar Avrupa'da da benzer şekilde tahribat yapmaya devam etmektedir. Bu yangınlar Portekiz'de, küçük kırsal köylerden, büyük şehirlerin kenarlarına kadar tüm kentsel alanları tehdit etmektedir. Bu durumun temelinde, iklim değişikliği ve bunun bitki örtüsüne olan olumsuz etkileri olduğu kadar, arazi kullanımında, yerleşim yeri modellerindeki bölgesel farklılıklar ve bu yerlerdeki geçiş zonlarında mevcut olan eksiklikler ve alınması gereken önlemlerdeki yetersizlikler yer almaktadır **(Pereira et al. 2018)**. Bu duruma bir örnek olarak, 17 Haziran 2017'de, Portekiz tarihinin en dramatik ve yıkıcı orman yangınlarından biri gerçekleşmiştir. Bu yangın, birden fazla yangının bir araya gelmesi ile toplamda 45.000 hektarlık bir alanın tahrip olmasına sebep olmuştur. Yangınlarda çoğu evden kaçmaya çalışırken 66 kişi hayatını kaybetmiş, 250'den fazla kişi yaralanmış, 1000'den fazla yapı tahrip olmuş (263 konut dahil) ve yaklaşık 200 milyon avro olarak tahmin edilen maddi zarar gerçekleşmiştir. Yangın sezonu sonrası yapılan çalışmada, analiz için toplam 1043 yapı dikkate alınmıştır. Bu yapılar arasında hangarlar veya depolar gibi yapılar (%38,6) olduğu gibi, aynı zamanda yangında tahrip olmuş konutların yaklaşık %25'i (%13,3 birincil ve %11.9 ikincil) de incelenmiştir. Çalışmada elde edilen verilere göre, bölgedeki yapıların %60'ından fazlasının yangın nedeniyle zarar gördüğü belirlenmiştir **(Ribeiro et al, 2020)**.

MATERYAL VE METOT

Çalışmada kuraklığı belirlemek için standartlaştırılmış yağış-evapotranspirasyon indeksi (SPEI) kullanılmıştır.
Standardize Yağış-Evapotranspirasyon İndeksi (SPEI), iklimsel verilere dayanan çok ölçekli bir kuraklık indeksidir. SPEI, tarım ürünleri, ekosistemler, nehirler, su kaynakları vb. gibi çeşitli doğal ve yönetilen sistemlerde normal koşullara göre kuraklık koşullarının başlangıcını, süresini ve büyüklüğünü belirlemek gibi çok farklı çalışmalarda kullanılabilmektedir.

SPEI, toplam yağış ve potansiyel evapotranspirasyon (PET) dikkate alarak su dengesini kullanır. PET, Hargreaves PET tahmin yöntemi kullanılarak hesaplanmıştır (sıcaklık ve yağış ile enlem düzeltme faktörü dikkate alındı). SPEI, farklı zaman ölçeklerinde temsil edilebilir (SPEI1…SPEI48). Burada 3, 12, 24 ve 48 ay gibi dört zamanlı skalalar dikkate alınmaktadır. 3 aylık olanları meteorolojik kuraklığı, 6-9 aylık olanları tarımsal kuraklığı, 12-24 aylık olanları ise genellikle hidrolojik kuraklığı ifade etmede kullanılır. Hidrolojik kuraklıkta en önemli etken iklim olmasına rağmen arazi kullanımı (örneğin ağaç kesimi), arazinin verimsizleşmesi bölgenin hidrolojik özelliklerini etkilemektedir. Bölgeler hidrolojik sistemleri ile birbirine bağlı oldukları için meteorolojik kuraklığın etkisi ile yağış kıtlığı yaşanan alanların sınırları genişleyebilir. İnsan aktiviteleri; arazi kullanımında değişim meydana getirdiği için meteorolojik kuraklığın frekansında değişim olmadığı halde su kıtlığının frekansında değişim meydana getirmesinden dolayı en önemli etken olarak gözlenmektedir. Bu nedenle çalışmada SPEI12, SPEI24 ve SPEI48 değerleri dikkate alınmıştır. SPEI'da -0.80 ile -1.29 aralığı orta kurak, -1.30 ile -1.59 aralığı şiddetli kurak, -1.60 ile -1.99 aralığı çok şiddetli kurak, -2.00 dan daha küçük değerler ise olağanüstü kurak periyotları tarif etmektedir.

PET ve SPEI hesaplamaları R programı üzerinden "SPEI" paketi 1.7 kullanılarak yapılmıştır. SPEI verileri 0,5 grid alanı için hesaplandı ve ardından Coğrafi Bilgi Sistemleri (CBS) aracılığıyla enterpolasyon yapıldı ve halka yayıldı. SPEI hesaplama prosedürü https://spei.csic.es/home.html adresinden indirilebilir. Bölge için SPEI hesaplaması için gerekli olan meteorolojik veriler Meteoroloji Genel Müdürlüğü'nden temin edilmiştir.

BULGULAR

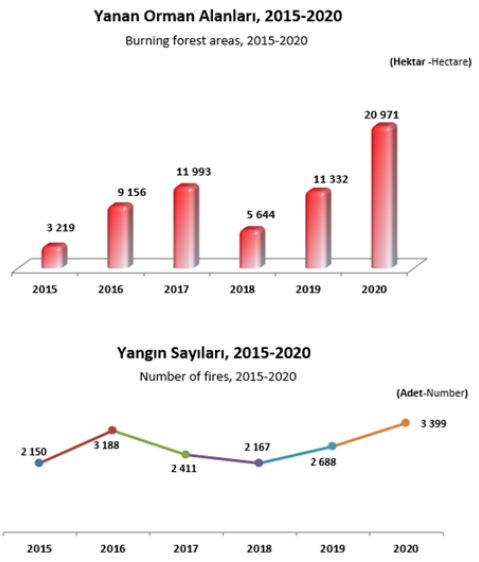
Türkiye, gerek iklim, gerekse bitki örtüsü gibi faktörler nedeniyle, orman yangınları ile ilgili pek çok yönden Avrupa'da Akdeniz kıyısında yer alan ülkeler ile benzerliklere sahiptir. Bu benzerliklerin,

ülkelerin farklı sosyo-ekonomik koşullara sahip olmalarına uygun olarak çeşitli farklılıklar içermesi normal olarak değerlendirilmelidir. Aynı şekilde yangın aktivitesi ve istatistikleri olarak da tüm ülkeler birbirlerinden farklı rakamlara sahip olmaktadır. Ancak ortak olan bir şey, özellikle son yıllarda sadece Akdeniz ülkelerinde değil, dünya genelinde ekstrem şiddetteki yangınların trendinde görülen artıştır.

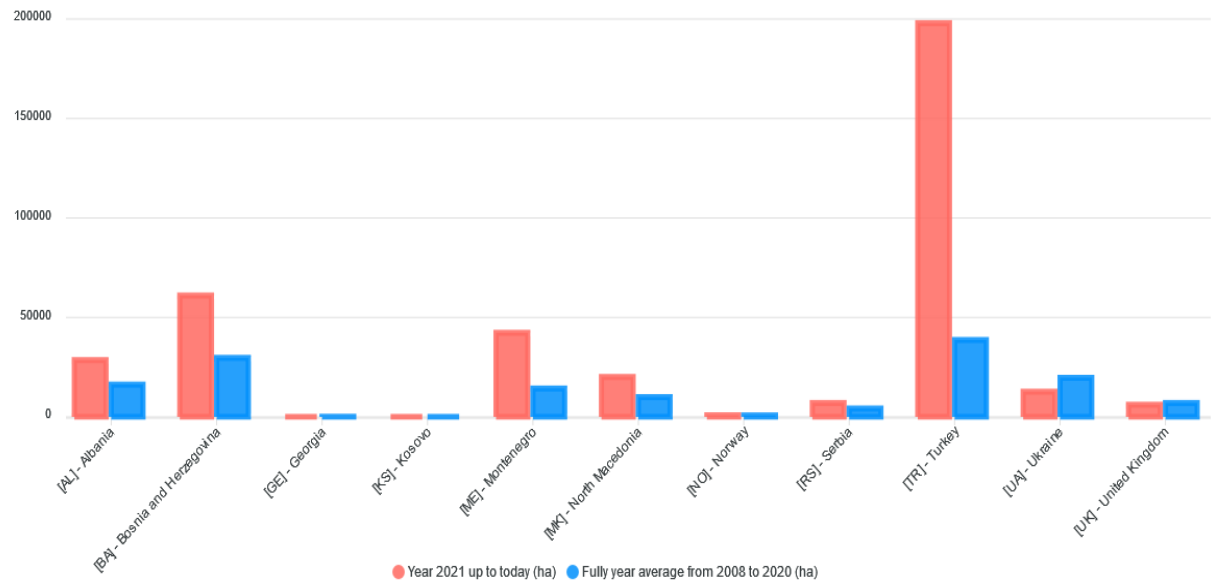
Orman yangını istatistikleri, Orman Genel Müdürlüğü tarafından 1937 yılından bu güne dek tutulmaktadır. Aşağıda 1988-2020 ve 2015-2020 yılları arasına ait istatistikler görülmektedir (Şekil1).

12.1 Orman yangınları, 1988-2020
Forest fires, 1988-2020

Yıl Year	Yanan alan miktarı Amount of burnt area (Hektar Hectare)	Yangın sayısı Numbers of forest fires (Adet Number)	Yangın çıkış nedeni Causes of forest fires: Kasıt Intentional (Adet Number)	Kasıt Intentional (Hektar Hectare)	İhmal-Kaza Negligence-Accident (Adet Number)	İhmal-Kaza Negligence-Accident (Hektar Hectare)	Doğal Natural (Lighting) (Adet Number)	Doğal Natural (Lighting) (Hektar Hectare)	Sebebi Bilinmeyen Unknown (Adet Number)	Sebebi Bilinmeyen Unknown (Hektar Hectare)
1988	18 210	1 372	-	-	-	-	-	-	-	-
1989	13 099	1 633	-	-	-	-	-	-	-	-
1990	13 742	1 750	-	-	-	-	-	-	-	-
1991	8 081	1 481	-	-	-	-	-	-	-	-
1992	12 232	2 117	-	-	-	-	-	-	-	-
1993	15 393	2 545	-	-	-	-	-	-	-	-
1994	30 828	3 239	-	-	-	-	-	-	-	-
1995	7 676	1 770	-	-	-	-	-	-	-	-
1996	14 922	1 645	-	-	-	-	-	-	-	-
1997	6 317	1 339	193	923	696	3 389	78	37	372	1 968
1998	6 764	1 932	249	1 655	1 163	3 713	53	20	467	1 376
1999	5 804	2 075	279	1 926	1 151	2 808	203	126	442	944
2000	26 353	2 353	410	4 417	1 384	19 017	132	167	427	2 752
2001	7 394	2 631	251	651	1 629	4 247	188	735	563	1 761
2002	8 514	1 471	218	509	809	7 287	181	261	263	457
2003	6 644	2 177	258	665	1 317	4 520	120	694	482	765
2004	4 876	1 762	242	748	1 033	3 093	128	233	359	802
2005	2 821	1 530	272	402	867	2 084	140	48	251	288
2006	7 762	2 227	166	206	1 315	5 873	330	543	416	1 139
2007	11 664	2 829	292	1 705	1 642	7 994	407	243	488	1 722
2008	29 749	2 135	377	797	1 018	26 283	330	699	410	1 970
2009	4 679	1 793	231	792	884	3 082	333	105	345	700
2010	3 317	1 861	146	526	861	1 851	281	69	573	871
2011	3 612	1 954	153	283	1 067	2 368	130	39	604	922
2012	10 454	2 450	197	1 615	936	5 780	373	334	944	2 725
2013	11 456	3 755	260	1 478	1 419	4 051	258	138	1 818	5 789
2014	3 117	2 149	127	85	801	1 682	328	77	893	1 273
2015	3 219	2 150	138	167	794	1 198	257	95	961	1 759
2016	9 156	3 188	157	240	990	5 222	310	170	1 731	3 524
2017	11 993	2 411	151	619	721	7 146	259	84	1 280	4 144
2018	5 644	2 167	92	148	693	2 216	413	141	969	3 139
2019	11 332	2 688	124	686	883	6 529	372	373	1 309	3 744
2020	20 971	3 399	72	718	1 156	8 285	312	197	1 859	11 771

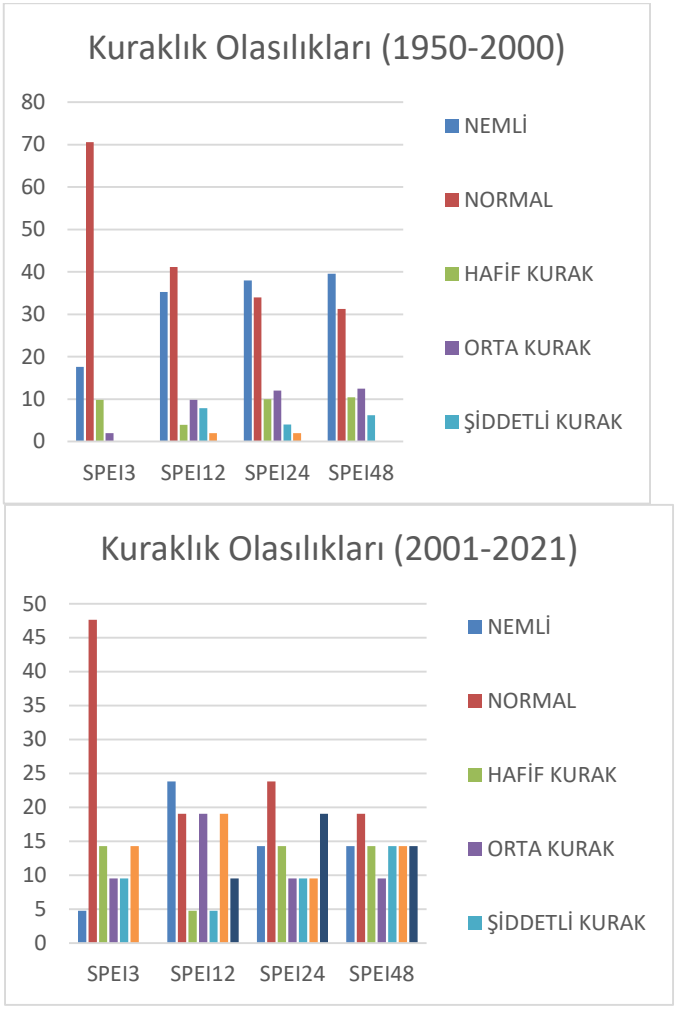


Şekil 1. Türkiye'de 1988-2020 ve 2015-2020 yılları arasında gerçekleşen yıllık orman yangınlarına dair veriler (Kaynak: Orman Genel Müdürlüğü, 2021)



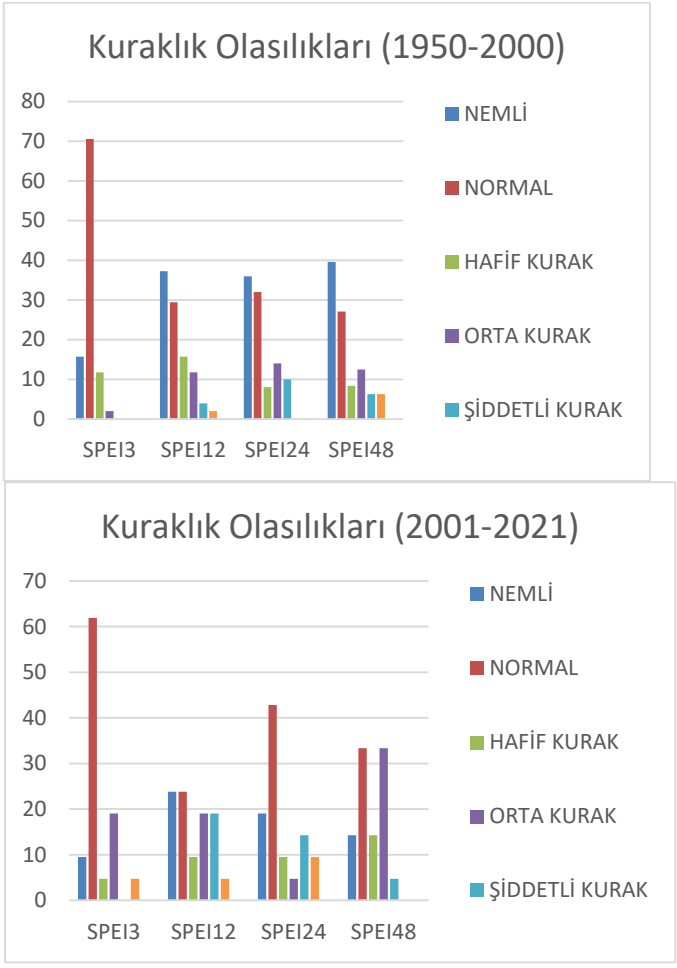
Şekil2. Avrupa Birliği üyesi olmayan diğer Avrupa ülkelerine ait 2021 yılı yangın istatistikleri (Kaynak: European Forest Fire Information System, 2021)

2021 yılı tüm Akdeniz kıyısı Avrupa ülkeleri için kötü bir yangın sezonu olarak geçmiştir. Yukarıdaki grafikte Avrupa Birliği üyesi olmayan ülkelerin yangın istatistikleri görülmektedir. Mavi olanlar 2008-2020 sezonlarının ortalamaları, kırmızı olan sütun ise 2021 yaz sezonu istatistiklerini göstermektedir. Bu grafikte bulunmayan Yunanistan ve İtalya da, 2021 yılında oldukça kötü bir yangın sezonu geçirmiştir (Şekil2).



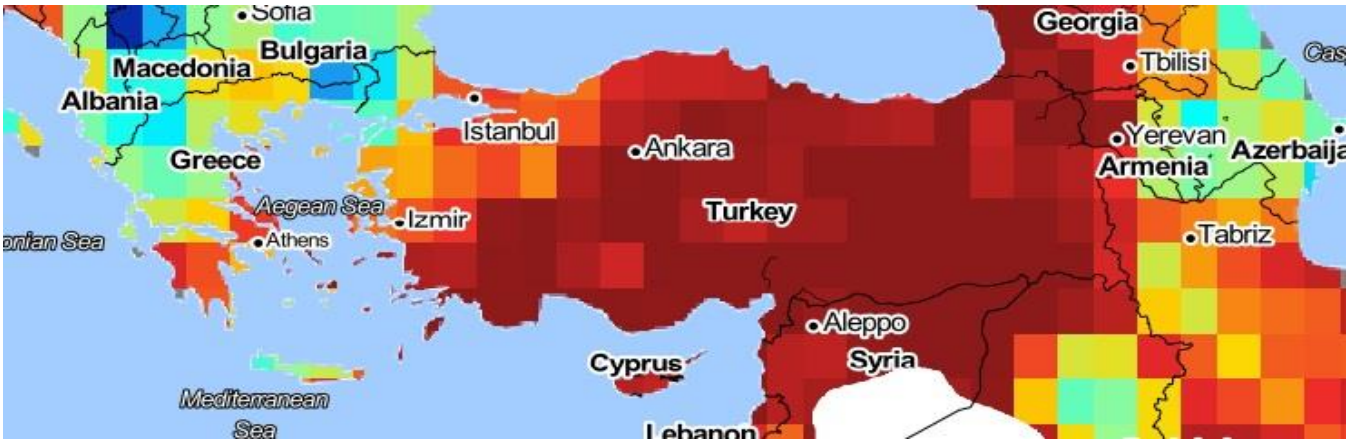
Şekil3. Antalya 1950-2000 ve 2001-2021 yılları arası için SPEI değerleri

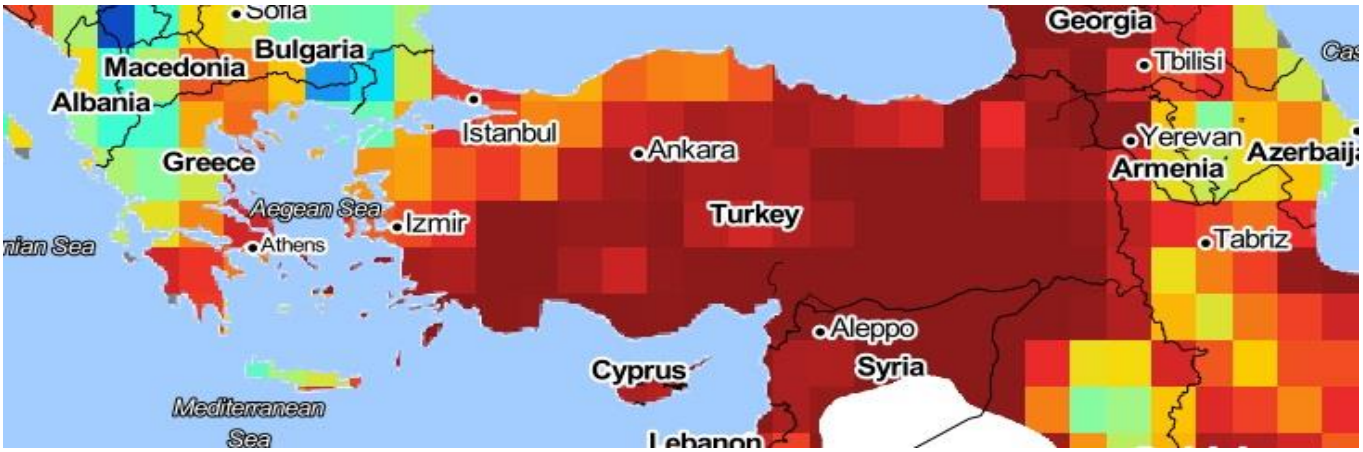
Antalya ve Muğla yöreleri için elde meteorolojik veriler ile SPEI ile kullanılarak yapılan hesaplamalar sonucunda, Antalya ve Muğla için 1950-2000 ve 2001-2021 yılları arasındaki kuraklık durumları aşağıda gösterilmiştir. Her iki çalışma alanı için yüksek kuraklık sonuçları dikkati çekmektedir.



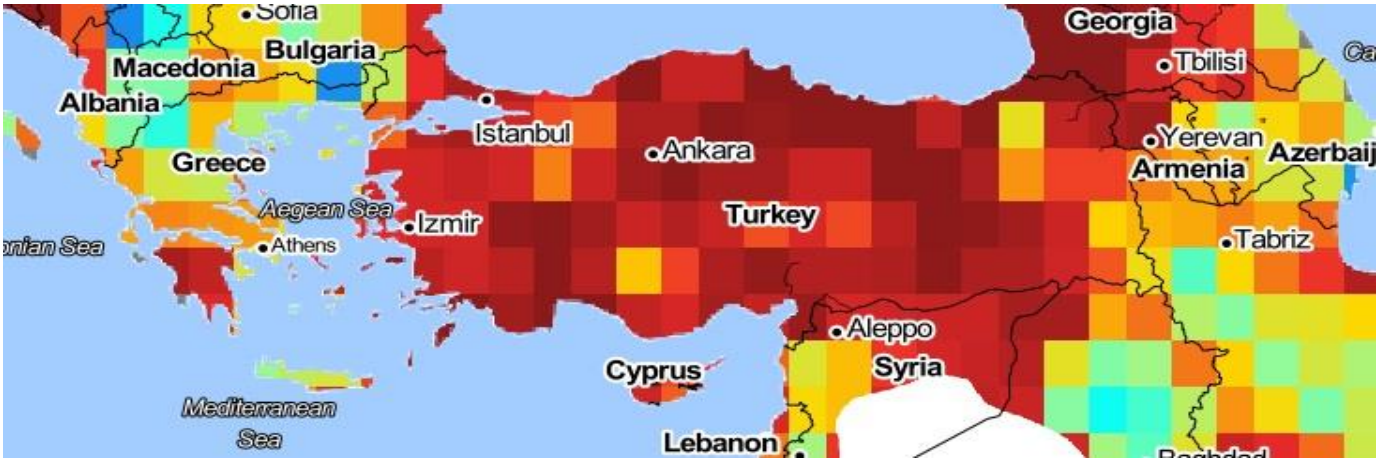
Şekil4. Muğla 1950-2000 ve 2001-2021 yılları arası için SPEI değerleri

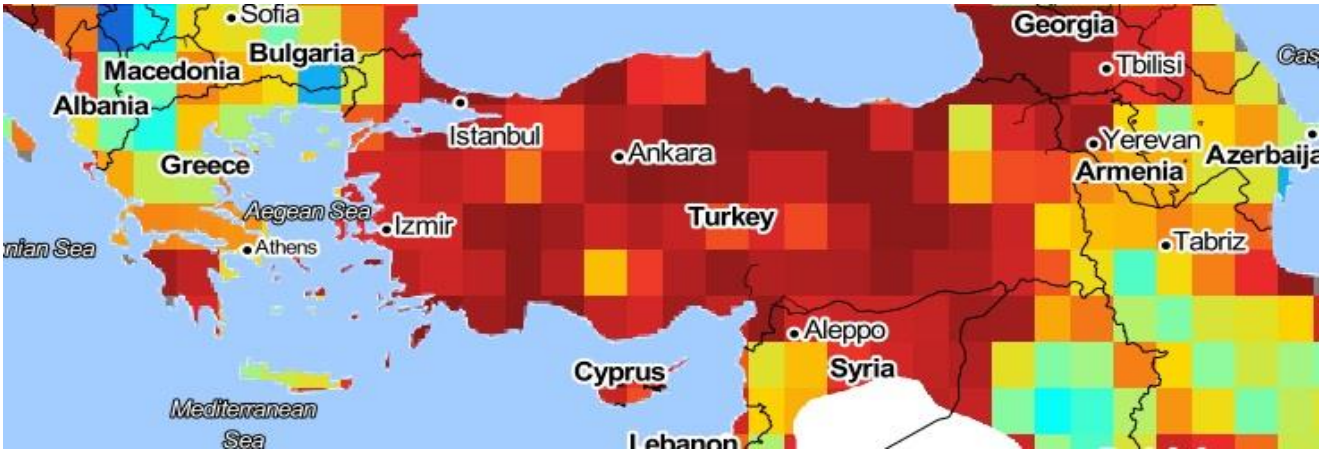
Elde edilen SPEI kuraklık sonuçlarına göre 2021 yılı Temmuz ve Ağustos ayları, için 12 ve 24 aylık hesaplamaların sonuçları aşağıda ki haritalar ile gösterilmiştir. Özellikle yangınların yoğunlaşıp şiddetlendiği Temmuz ayı haritası dikkati çekmektedir.





Şekil 5. SPEI12, 2021 yılı Temmuz ve Ağustos aylarına ait haritalar



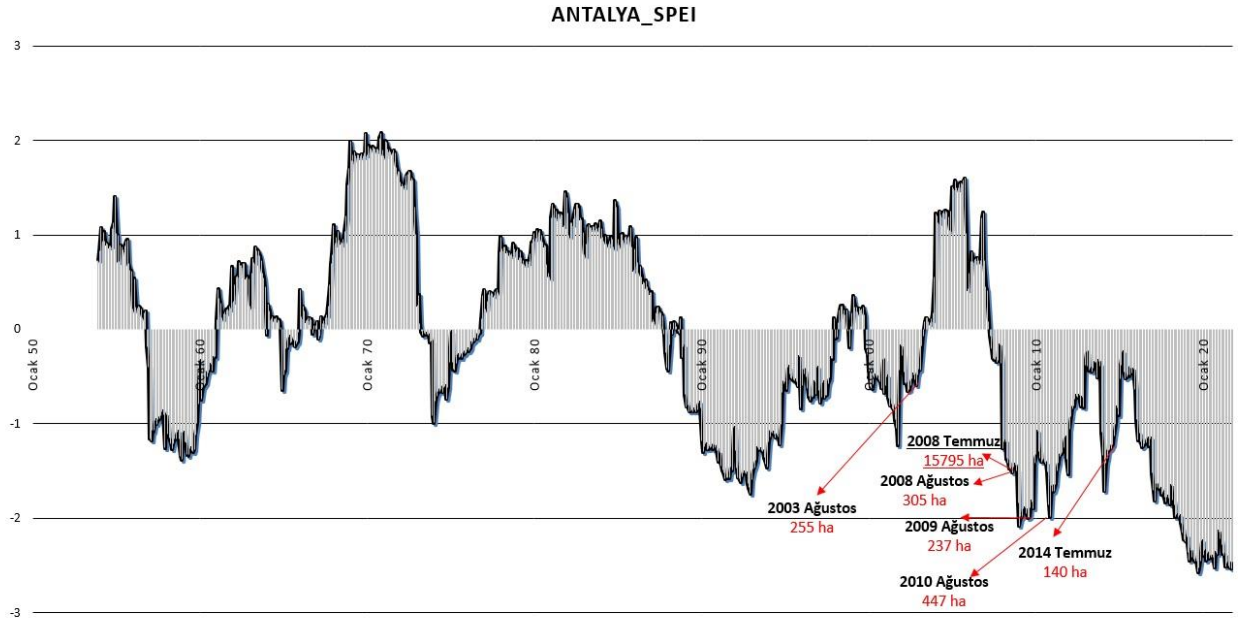


Şekil 6. SPEI24, 2021 yılı Temmuz ve Ağustos aylarına ait haritalar

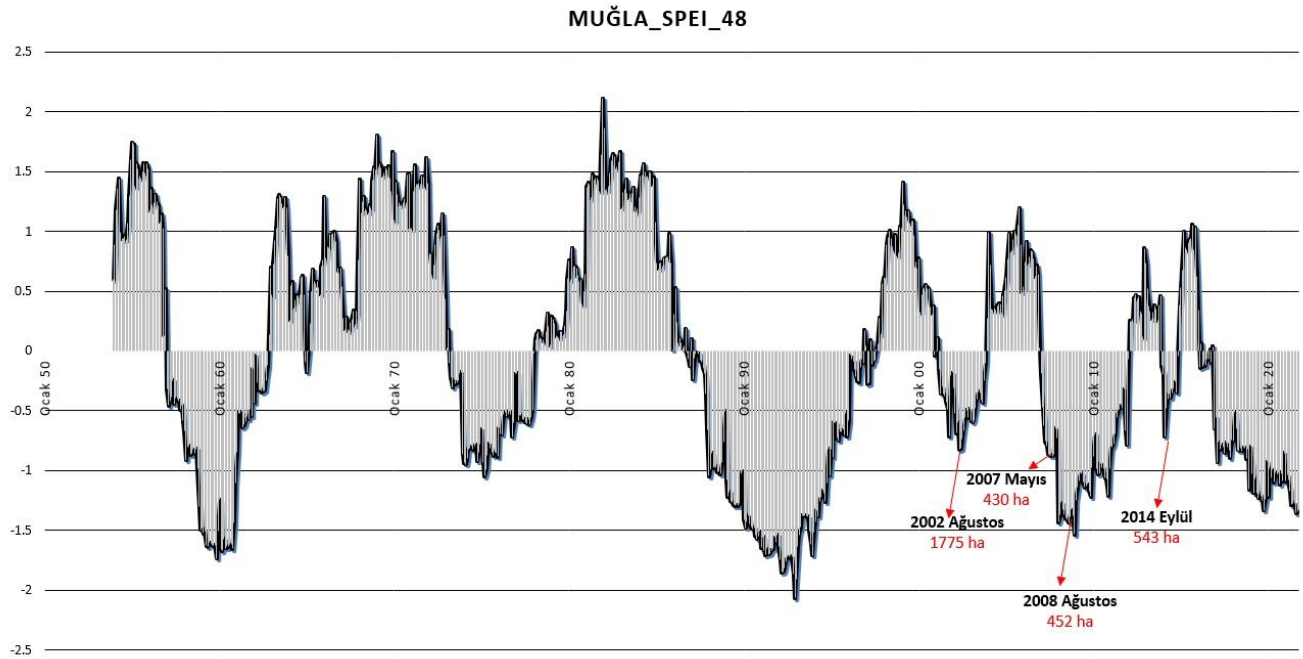
Uzun döneme ait SPEI hesaplamaları ile Antalya ve Muğla yöreleri için yaz kuraklık durumunu gösteren grafikler elde edilmiştir (Şekil7, 8). Bu süre boyunca gerçekleşmiş özellikle geniş alanları tahrip eden yangınlar ile düşük SPEI değerleri arasında dikkate değer bir ilişki görülmektedir.

Elimizdeki verilere bakıldığında Antalya bölgesi 1950 yılından bu yana en uzun süren kuraklık periyodunu 2007-2021 yılları aralığında yaşamıştır. Gerek Antalya gerekse Muğla bölgesi 1950-2000 ve 2000 sonrası olmak üzere iki tarih aralığında değerlendirildiğinde kuraklığın şiddetlenme

olasılığında ciddi bir artış görülmektedir. Öyle ki Muğla bölgesi için çok şiddetli kuraklık görülme olasılığı bir önceki periyoda göre iki katına, Antalya bölgesi için ise yedi katına çıkmıştır. Aşağıdaki şekilden de görüldüğü gibi ister SPEI12 isterse de SPEI24 verilerini kullanın 2000 yılı öncesi görülmeyen çok şiddetli ve olağanüstü kuraklık değerleri 2001 yılından itibaren görülmeye başlanmıştır. Muğla bölgesinde ise olağanüstü kuraklık değerleri her iki periyotta da gözükmese de ikinci dönemde çok şiddetli kuraklığın görülme sıklığı artmıştır. Özellikle içinde yaşadığımız 2021 yılı yangın sezonunda meydana hem adet hem de alansal olarak fazla olan orman yangınları ile Temmuz ve Ağustos aylarındaki SPEI değerleri ile ilişkilendirilebilir. Geçmişe baktığımızda da Antalya bölgesinde 2008 Temmuz ayında 15795 ha ormanlık alana zarar veren yangında SPEI değeri -1.48 (Şiddetli kuraklık), Muğla bölgesinde 2002 Ağustos'unda 1775 ha alana zarar veren yangında da SPEI değeri -1.31 (Şiddetli kuraklık)'dir.



Şekil7. Antalya yöresi uzun dönemli SPEI değerleri ile büyük yangınları gösteren şekil



Şekil8. Muğla yöresi uzun dönemli SPEI değerleri ile büyük yangınları gösteren şekil

TARTIŞMA VE SONUÇ

Tüm dünyada, orman yangınlarının %90'ından fazlası insan eliyle çıkmaktadır. Buna karşın bu orman yangınları bir doğa olayı olarak nitelendirilebilirler. Tüm doğa olayları çevre koşullarına bağlı olarak zaman içinde değişim gösterirler. Orman yangınları da özellikle son 20 yıl içinde dikkati çeker bir şekilde değişim içine girmiştir. Bu değişim gerek dünya üzerinde gerçekleşen şiddetli yangınlar ile gerekse bu yangınlar ile ilgili yapılan araştırmalarda görülebilmektedir. Birbirinden tamamen farklı coğrafyalarda bulunan ülkelerde, giderek artan bir şekilde geniş alanları yakan, şiddetli yangınlar çıkmakta, yangın sezonları giderek kötüleşmektedir.

Orman yangınları ülkemiz gibi Akdeniz ülkelerinde bitki örtüsü ve iklim sebebiyle son derece normal olaylardır. Bu iki faktöre son yıllarda bu tip yangına hassas, ülkemizde özellikle Ege ve Akdeniz kıyısındaki önemli tatil beldelerinde artan insan nüfusu ve aktivitesi de eklenmiş durumdadır. Koşullar yangınlar yönünden son derece olumsuz bir hale gelmiştir. Yaz ayları yangına hassas özelikteki bu yerlerde daha sıcak, daha kurak, daha kalabalık geçmektedir. Bu olumsuzluklar ağırlıklı olarak kızılçam ve çeşitli maki elemanlarından oluşan bitki örtüsünün de hassasiyetini arttırmaktadır. Bu amaçla geçmişe kıyasla alınması gereken önlemler daha acil ve daha önleyici olmak zorunda olup, yerleşim yerlerinde gerekli düzenlemeler, bu tip yerlere kıyı orman alanlarında ekstra önlemler ve bakım faaliyetleri ve orman teşkilatı, yerel yönetimler, halk ve diğer bileşenlerin de içine alındığı yeni komplike bir mücadele planı geliştirilmek zorundadır. Aksi takdirde her yaz sezonu bir öncekinden daha zor geçmeye aday sezonlar olacaktır.

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DIFFICULTY OF ENGLISH SPEAKING OF THE 3RD YEAR STUDENTS IN ENGLISH DEPARTMENT, FACULTY OF EDUCATION, CHAMPASACK UNIVERSITY

Soulichanh Luangsombath[1*]. Thipphavanh Khanthaphone[2]. Thiphachanh Nouthaphone[3]. Bounmy Phalychan[4], Daovy Pongpanya[5]. [6]Phonesouda Vongthong,

*[*1]Naxaythong Education and Sports Office, Laos. [2,3,4,5]Champasack University, Laos. [6]University of health sciences*

ABSTRACT

This study aims to describe the English speaking performance, difficulties in English speaking, and ways to improve English speaking. The participants comprised 50 students, 24 females, from two classes. They are selected randomly from a list of students. The study took place in the English Department, Faculty of Education, Champasack University. Tool to collect data applied two types of questionnaires. Percentage questionnaire used for demographic data and Likert rating scale questionnaire. The findings of this study indicated that speaking class is insufficient for practicing their English speaking ability because they have to learn other subjects in the curriculum. They mentioned they need more English classes to improve their speaking skill in different topics. They feel embarrassed and pressured to demonstrate their words on unfamiliar topics. Also, the constraint of vocabulary knowledge contributed to their English speaking ability. They found it is demanding to build sentences even they know the grammar, but they are cannot put it in a sentence. Thus, their speaking was not fluent and smooth. They felt too shy to speak English because they were worried about making mistakes, mispronunciation, and defacement. They are nervous while speaking English because they are not confident in applying language correctly. However, they attempt to use English every day, talk with friends and lecturers in English. This practice will dramatically improve their speaking ability. They build their confidence to speak English because they require achievement in speaking English. Therefore, they tried to overcome the difficulties.

Keywords: Speaking Skills, Learning English, Pedagogy, Methodology

PUBLIC'S PROTECTION BEHAVIOR, ATTITUDE AND KNOWLEDGE TOWARDS COVID-19 PANDEMIC

Phonesouda Vongthong [1*]. Soulichanh Luangsombath[2]. Daovy Pongpanya[3]. Thipphavanh Khanthaphone[4]. [5]Chansy Phomphithak

*[*1]University of health sciences. [2]Naxaythong Education and Sports Office, Laos. [3,4]Champasack University, Laos. [5]Champasak College of Health Sciences*

ABSTRACT

The objectives of the study are to investigate Public protective behavior and knowledge towards the Covid-19 pandemic, investigate the correlation between public protective behavior and knowledge towards the Covid-19 pandemic. The target group is the public in Pakse City, Champasack Province, Laos. The sample group comprised 150, randomly selected. Their ages range from 20 to 60 years old. Research instruments applied questionnaire which is scrutinized content validity by three experts. The index validity of item – objective congruence (IOC) = 0.67-1. The analysis of the alpha Cronbach coefficient is 0.89 and 0.91 respectively. The data analysis is distributed as a percentage, average, standard deviation, and Pearson product-moment correlation. The study found that most participants are knowledgeable of covid-19 protection. However, they misunderstood about the Covid-19 virus is similar to Sars and MERS which is more dangerous (20%). The covid-19 virus can incubate in the human body in the last 3 – 14 long days, it can transmit from person to person and instant transmission without symptom demonstration (13.33%). Virus protective behavior revealed total questionnaire respondents mentioned they are aware to protect themselves from the virus (mean=1.61, SD=0.28). However, the smallest percentage of their protective behavior is less concerned about handwashing with the liquid containing 70% of product before leaving from public areas (mean=1.03, SD=0.67). Washing hands with soap regularly after cash touching (mean=1.23, SD=0.68). The correlation between public protective behavior and knowledge towards the Covid-19 pandemic found that the correlation is at the middle level (r =.327), a statistically significant test result (p-value = .000). According to the study, participants had protective behavior and knowledge on Covid-19 at a high level. Nevertheless, there was some miscomprehension about the virus outbreak at a low score. This would contribute to transmission behavior. As a result, it is the potential to provide knowledge and increase awareness to be self-protective to Covid-19.

Keywords: Covid-19. Pandemic, Protective behavior, attitude, Virus transmission

ÇAĞDAŞ TÜRK YAZI DİLİNDE BİRLEŞİK CÜMLE KAVRAMI

Rüfet Rüstemov
Prof.Dr., Doğu Bilimleri Bölümü Türk filolojisi Kürsüsünün başkanı, Bakü Devlet Üniversitesi, Azerbaijan

ÖZET

Çağdaş Türk yazı dilinde birleşik cümle konusu bilimsel açıdan sona dek tam çözülmemiştir söylersek, fikrimizce yanılmayız. Araştırma için şu konuya başvuru yapmamız rastlantı sayılamaz. Türk dilbilimciliğinde eylemsi grupları ve yan cümlelerin karşılıklı ilişkisi sorununa değinmeden önce birleşik cümlenin belirtilmesi konusunun çözülmesi gerekiyor. Çünkü söz konusu sorun eylemsi grupları ve yan cümlenin sınırlarının belirtilmesiyle sıkı şekilde bağlıdır. Türkçede birleşik cümle kavramı farklı dil bilginleri tarafından türlü terimlerle addediliyor. Birleşik cümleyle bağlı fikir yürüten M.Ergin, T.Banguoğlu birleşik cümleyi "**birleşik cümle**" terimiyle ifade eder, T.N.Gencan, V.Hatiboğlu, H.Dizdaroğlu ise araştırmalarında "**birleşik tümce**" teriminden faydalanmışlar. Türk dilbilimciliğinde içinde birden fazla yüklem barındıran cümle, bir temel ve birkaç yan cümleden oluşan cümle yapısı birleşik cümle olarak kabullenmektedir. M.Gece Türk dilbilimciliğinde "birleşik cümle" olarak adlandırılan cümle yapısını şu şekilde yorumlar: "Birleşik yapılı cümleler iki veya daha fazla cümleden oluşan, bir ortak cümle intonasyonuna sahip bulunan , birden fazla fikri toplu şekilde ifade eden sözdizimsel yapıdır. Söz konusu cümleler basit cümlelerden ve onların farklı şekillerde birleşmelerinden oluşmaktadır." Genellikle Türkçede yan tümcenin önde, temel tümcenin ise sonda gelmesi fikri vurgulanmaktadır. Bununla da Türk dilbilimciliğindeki birleşik cümle kavramının Azerbaycan Türkçesi dilbilimciliğindeki birleşik cümle kavramından yeterli kadar farklılığı görülmektedir. Eğer bir kadar farklı şekilde ifade edecek olursak, Azerbaycan dilbilimciliğindeki birleşik cümle kavramı Türk dilbilimciliyindeki "birleşik cümle "kavramından daha geniştir. Adı geçen kavram Azerbaycan dilbilimciliğindeki "bağımlı birleşik cümle" şeklinde oluşan cümlelere analojik olarak elealınabilir. Azerbaycan dilbilimciliğinde birleşik cümle yapısına ait edilen birçok cümle türleri Türk dilbilimciliğinde başka adlar altında ("sıralı cümle","bağlı cümle") öğrenilmektedir. Tabii ki, bu zaman Türk dilbilimciliğindeki "bağlı cümle","sıralı cümle" kavramlaryla Azerbaycan dilbilimciliğindeki "bağımlı cümle" kavramının aynı olduğu söylenemez.

Türkçede sıralı cümle kavramının da farklı şekilde yorumlandığını vurgulamamız gerekiyor. Türk dili araştırmacılarının bir kısmının sıralı cümleleri birleşik cümlelerin bir kolu olarak incelemesine rağmen, kimi araştırmacılar bu gruptan olan cümleleri ayrıca bir cümle türü olarak değerlendirmektedirler. V.Hatiboğlu semantik bakımdan bağlanmış cümleleri sıralı cümleler olarak adlandırmış bulunur. T.Banguoğlu sıralı cümleleri şu şekilde açıklar: "Sıralı cümle türlü anlam ilişkileri bulunan iki yargının bir bağlama aracılığıyla oluşturduğu cümledir". Araştırmacı sıralı cümleyi "tümleme birleşik cümle"nin bir çeşidi olarak değerlendirmiştir. Sonuç olarak eylemsi gruplarının bulunduğu cümlelerin basit tümce, sıralı cümlelerin ise birleşik cümlenin bir çeşidi olarak değerlendirilmesinin doğru olması kanısındayız.

Anahtar sözcükler: birleşık cümle, eylemsi grupları, temel tümce, yan tümce

OPTIMIZATION OF EXTRACTION OF PHENOLIC COMPOUNDS FROM PISTACIA LENTISCUS SEEDS USING BOX BENHKEN DESING

Sara oumenoune TEBBI[(1)], nadjet Debbache-benaiada [(1)]

(1) Applied Biochemistry Laboratory, Faculty of Natural and Life Sciences, Université Abderrahmane Mira de Bejaia 06000, Algeria.

ABSTRACT

Pistacia lentiscus is Algerian plant widely used in traditional medicine as a potent anti-inflammatory and antioxidant source, the main objective of this work is to optimize the extraction yield of phenolic compounds of this plant using respose surface methodology and box benhken desing. The optimum values of the three independent variables including water percentage, temperature and time were 25%, 40 °C and 15 minutes respectively. The antioxidant and anti-inflammatory activities with multi-tests in-vitro of crude polyphenols using different concentrations (from 200 to 3.125 µg/ml) was evaluated and the results showed that inhibition percentage was very significante compared to other plant extracts. In conclusion,the present study demonstrated that pistacia lentiscus L. extract was rich in bioactive molecules that can be used as nutraceutical agents for very interesting activities and can be tested as vaso-relaxant agents.

Keywords: Green extraction, Biological Activities, *Pistacia lentiscus*, polyphenols, optimization

UN RESPONSIBILITY FOR PROMOTION OF PEACEFUL SOCIETIES THROUGH JUST SYSTEMS OF GOVERNANCE

Prof. M. Afzal Wani
Professor of Law and Former Member,
Law Commission of India and Ex-Dean,
University School of Law and Legal Studies,
GGS Indraprastha University, Dwarka, Delhi-110078

ABSTRACT

Post World War world emerged with a strong commitment to humanity that it should sustain with peace for dignity of all human beings. The concerns were deep enough to conceive a global mechanism for avoiding horrors of disharmony through a sound conflict resolution mechanism and promotion of human rights to their optimum through the rightful use of state machineries and interstate cooperation. A meticulous programming to operate through a fine institutional network was rightly a dream to advance fair human values. Even world trade was to be regulated and promoted through transnational understanding and openness as a true contributor to prosperity and happiness of all on this planet, avoiding hegemony and autocracy. This all got a shape now as a post-war world history, though not without challenges of severe nature, counting from cold war and decolonization to democracy, new economic order and human rights movement. Today the world seems at the path of development and prosperity, but yearning for authoritarianism, false self-pride, maneuvering of divisive ideas, historical wrongful orientations for future manipulations, implanting foggy perspectives in coming generation and discrimination has not given in. So we find around still substantially prevailing poverty, hunger, disease, restlessness, non-cooperation, injustice, coercion, imposition, bloodshed and despondency. This scenario invites serious discussions to expose the underlying misunderstanding, misgiving, misadventure, and misleading, wrongful guidance of masses for bringing in clarity of thought, vision and action, resulting into a movement for a better world. This task with global dimensions needs more concern, attention, understanding, effort, resources and consistency. The humanity can definitely attain better goals, but what is the necessary pathway to that prosperity is realization of facts on the ground, required sincerity and promoting a fair international legal framework with the support of a strong cooperative action by nation states. This basic idea needs a presentation and deliberation in various international fora to bring results and bear fruits through a fine mechanism that can be evolved.

CAN CHINA ABLE TO LEADER IN THE LIBERAL INTERNATIONAL SYSTEM?

Assist. Prof. Dr. Mesut ŞÖHRET[1]

[1]*Gaziantep University, Faculty of Economics and Business Administration, International Relations, Gaziantep, Turkey*
ORCID Code: 0000-0003-4052-9286

ABSTRACT

After the Second World War, the United States, as the rising hegemonic power of the liberal Western world, was in a unique position to construct rules and institutions that had a profound impact on the development of world order. The liberal system, which was created according to capitalist values and democratic institutions, in general terms, provided a great economic and political benefit to the USA and its allies until the end of the 2000s. On the other hand, the People's Republic of China, which had no influence and weight in the international system until the late 1970s, enabled Deng Xiaoping, who came to power after the death of Mao Zedong, the founder of the country, by opening the country to foreign countries with reforms and adding it to this system established under the leadership of the USA. In the last 45 years, China first learned the rules of the liberal system to which it was articulated and then became one of the most important actors of this system. Moreover, the economic, financial, military, and technological balance between the USA and China has been changing rapidly in favor of China in the last two decades. While this situation causes China to increase its economic and political weight in the international arena, the rise of China has led to a debate as to whether China will be a stakeholder or a dissatisfied-revolutionary power. The liberal view assures that "China's rise does not have to trigger an overwhelming hegemonic transition" because the liberal world order built under US leadership is based on rules and norms of non-discrimination and market openness. However, the point reached shows that China has to decide whether it can live with the US-led order or create a new order to sit next to it, or even surpass it. In this study, the question of whether China can re-establish and lead the liberal international system will be answered, and the advantages and possible obstacles will be discussed.

Keywords: China, Liberal System, International Order, US-China Rivalry, Hegemonic Power, Rise of China

INTRODUCTION

World order refers to the dominant values, rules, and norms that define the terms of global governance and give shape and substance to the international community at any given time. (Zhao, 2016: 13) Emerging as a rising hegemonic power immediately after the Second World War, the United States was uniquely positioned to construct rules and institutions that had a profound impact on the establishment and development of world order. Because of this unique location, Stanley Hoffman and some other American scholars often describe their place in the world as 'extraordinary'. So far, they argue, only the United States has "tried to develop foreign policies that reflect such exceptionalism" and has had the scope of sufficient power to take a distinctive course in the international jungle. (Hoffmann, 2006: 115) "Protected by two oceans and bordered by weaker neighbors, the nineteenth-century United States focused largely on westward expansion and sought to avoid confusion in the Eurocentric global balance of power. By the early twentieth century, America had become the world's largest economy, and its intervention in the First World War had upset the balance of power" (Nye, 2019:64-65). Although it did not consciously take over the hegemonic power from the United Kingdom until after the Second World War, the United States became the dominant power of the international system after the First World War. After World War II, the global system created under the leadership of the USA, in a way, caused this country to spread its power and the values it defended all over the world. "The resulting system of security alliances, multilateral institutions, and relatively open economic policies has been called the American international order, or "liberal international order," and determined America's place in the

world for 75 years. Today, it is questioned on the international stage by the rise of new powers like China and the rise of a new wave of populist politics in democracies" (Ikenberry, 2018: 7-8).
While the United States has benefited immensely from this, its allies have developed economically and continue to enjoy the benefits of the post-1945 order. In this liberal international system established under the leadership of the USA, although China began to be a beneficiary after Deng Xiaoping's reform and opening up in the late 1970s, China has remained a beneficiary in the last 45 years, especially with the economic performance it has shown after becoming a member of the World Trade Organization in the last 20 years. In this case, it caught up with the USA and even started to pass. At this point, it is seen that China, which has risen as a great power in the 21st century, has to decide whether it can live in the liberal international system led by the USA or whether it can create a new order to sit next to it or even surpass it.
Therefore, the rise of China has sparked debate as to whether China will become a stakeholder or a dissatisfied-revolutionary power. The liberal view creates the conditions for emerging states to advance their own goals while assuring that "China's rise does not have to trigger an overwhelming hegemonic transition" because the world order built under US leadership is based on rules and norms of non-discrimination and market openness. To put it bluntly, while this economic and political rise of China was not expected within the global liberal system, many academics and politicians around the world seem to be increasingly concerned that rising China might want to challenge the US leadership and overhaul the fundamental rules of the current world order (Ikenberry, 2008: 24).
Realist scholars predict that as China gets stronger and the leadership position of the USA will decrease, China will try to use it to reshape the rules and institutions of the international system to better serve its national interests due to its increasing influence, while other states in the international system, especially the USA, which is the leader of this system, predict that China will try to use it to better serve its national interests. They expect China to see China as a growing security threat. As a result of this perception, they expect that there will be distrust and conflict between the USA and China struggling for leadership in the international system.
However, it should not be forgotten that in today's liberal system, China is not only facing the USA; It is faced with an open, integrated, and rule-based Western-centered system with broad and deep political foundations. Therefore, from the point of view of China, it does not seem easy to overthrow the existing system and install a new one.
This study tries to analyze whether the People's Republic of China, which has risen economically and politically in the international system, can manage the current liberal international system by examining the advantages and disadvantages of China.

ESSENTIALS OF THE US ORIGIN LIBERAL INTERNATIONAL SYSTEM

Today's, international liberal order established under the leadership of the USA has a historically unique structure and understanding. Any international order dominated by a strong state relies on a mix of coercion and consent, but the US-led liberal order differs from the imperial in that it is more liberal and unusually accessible, legitimate, and durable. Its rules and institutions are rooted in and reinforced by the emerging global forces of democracy and capitalism. It is comprehensive, with a broad and expanding spectrum of participants and stakeholders. While generating tremendous economic growth and strength, it also points to the constraint that makes it difficult to topple and easier to participate.
"The expansion of capitalism that free trade stimulates tends to alter the preferences and character of other states in a liberal and democratic direction, thus producing a more strategically and politically hospitable system. The architects of the liberal system perceived that a world populated by liberal states would be much more compatible with American interests and the survival of democracy and capitalism in the United States. This proposition suggests that liberal economic order is not fundamentally dependent on bipolarity and American hegemony, but rather has a powerful independent source that is unlikely to be affected by the end of the Cold War" (Deudney and Ikenberry, 1999: 192).
Free trade was essential for the sort of economic recovery and growth that would support centrist and progressive postwar political leadership in the United States and Europe. (Ikenberry, 2018: 15). This situation caused voluntary compromise among the Western world to on the US leadership. Therefore, American policymakers "agreed that it is time to Washington's should take the lead in creating postwar

international institutions that would stabilize currencies, ease the financial crisis, and promote world commerce, as well as a new collective security organization that would deter aggression. A proper functioning system of world trade would foster interdependence among nations, they reasoned, thereby raising the price of aggression" (Ikenberry, 2011:171).

"American liberal hegemony was also defined by its commitment to a 'managed' open world economy. This is what John Ruggie has called 'embedded liberalism. International agreements, embodied in the Bretton Woods system, were designed to give governments greater ability to regulate and manage economic openness to ensure that it was reconciled with domestic economic stability and policies in pursuit of full employment" (Ruggie, 1982:392). Thus, the countries participating in the Bretton Woods system not only benefited from their advantages by being members of the IMF, World Bank, and GATT regime established with this system but also gained an advantage in developing their economic structures.

The ultimate and desired aim of this structure is to achieve a balance between stability and openness. In this case, Free trade was a vital factor for the establishment of the hegemony of the USA over the Western World. In this way, "The United States would be the hegemonic sponsor and protector of the liberal order. With American leadership, the 'free world' would be a sort of 'security community. It would have rules, institutions, bargains, and full-service political functions. To join the western liberal order was to join a 'mutual protection society. To be inside this order was to enjoy trade, expanding growth, and tools for managing economic stability. Inside, it was warm; outside, it was cold. Countries would be protected in alliance partnerships and an array of functional organizations. In other words, in the postwar era, liberal internationalism became both more universal in its ideas and principles and more tied to a US-led international political order" (Ikenberry, 2018: 15).

When the postwar liberal international order is constructed, the multilateral international institutions have a crucial effect that would manage a widening array of political, economic, and security relationships among western states. Just after WWII, American policymakers believed that it was not enough to survive or open up the system. Therefore, new forms of intergovernmental cooperation would need to be invented. This emphasis was remarkable never before had a major state laid out such an expansive agenda for international institution building (Ikenberry, 2011: 182). The continued viability and expansion of capitalism, made possible by liberal multilateral institutions, sustain the business, commodity, and transnational cultures that in turn make it more politically feasible to sustain these institutions. (Deudney and Ikenberry, 1999: 195) However, the main task of these institutions was primarily to serve American interests.

"America's identity as a liberal polity organized around the rule of law reinforced its postwar agenda of building order around multilateral rules and institutions. The fact that the United States was the world's most powerful state and possessed the largest and most competitive economy gave it material incentives to create an open world system. But the political architecture of openness—the emphasis on a system of multilateral rules and institutions—was nonetheless encouraged and reinforced by America's liberal identity" (Ikenberry, 2011: 182).

"The American hegemonic organization of liberal order is weakening, but the more general organizing ideas and impulses of liberal internationalism run deep in world politics. What liberal internationalism offers is a vision of open and loosely rules-based order. It is a tradition of order-building that emerged with the rise and spread of liberal democracy, and its ideas and agendas have been shaped as these countries have confronted and struggled with the grand forces of modernity" (Ikenberry, 2018: 8-9).

THE RISE OF CHINA

The rise of China will undoubtedly be one of the greatest dramas of the twenty-first century. China's phenomenal economic growth and active diplomacy are already transforming East Asia, and the coming decades are likely to see even greater increases in China's power and influence. Some observers believe that the American era is coming to an end as the Western-centered world order is increasingly being replaced by an Eastern-dominated world order. Historian Niall Ferguson has written that the bloody twentieth century saw the "descent of the West" and the "reorientation of the world to the East" (Ikenberry, 2008: 23).

China, which showed an incredible increase in economic scale in the period from 1978 to 2008, thus achieved a much better growth rate than the dominant power USA. In this context, it has been seen that the development of multi-faceted national power and strategic force projections is emphasized in the strategic focus of China, which is created with the economic center of gravity. In this process, China has given importance to increasing its power by pursuing the "peaceful rising" strategy and simultaneously executing the strategic defense doctrine. The "Chinese Dream" rhetoric formulated by Chinese President Xi Jinping for his ruling period supports all these and gives important signals that we are faced with an assertive China. (Dulkadir, 2020: 79)

In the last years of Mao, China's share in the world economy decreased to 5%. However, after Deng Xiaoping came to power, he first made some important reforms for the free market transition, rejecting the classical command economy practices such as price control, agricultural communes, material balance planning, limited foreign trade, and implementing the necessary regulations for a market economy. (Sandıklı, 2009: 42-43)

Post-Mao leaders have prioritized the modernization of China's agriculture, industry, defense, science, and technology, known as the "Four Modernizations" (Tunç and Kızıl, 2018: 56). During the economic development policy implemented under the name of "Chinese Style Socialist Market Economy", Deng targeted the economic transformation of China with reforms such as constitutional, rural, banking, and state enterprises (Aysan, 2013: 10). In this process, in which an attitude was displayed within the framework of a utilitarian approach, economic policies were put into practice based on concrete data, and instead of a single program that would cover the whole country, programs were planned for each region and economic sector that would adapt to their conditions. During the period, a banking system was established and implemented with the aim of both financing the state-owned enterprises and taxing the surplus-value originating from the free market economy being implemented.

After 2003, inflationary pressure trends that emerged due to overheating, that is, excess demand began to be seen in the Chinese economy. Since the supply and demand increased simultaneously in China, the problem was no longer the price increases, instead, the excessive increases in investments had reached alarming levels. The reason for the increase in investments in this period was the inability of the state-controlled banks to distribute loans efficiently. Upon these developments, measures to cool the economy came to the fore in China. With the measures taken, China started to get out of the overheating trend in the economy. In the following years, the economy achieved growth rates of around 9-10% on average. It reached growth rates of 9.3% in 2003, 9.2 % in 2004, 9.9% in 2005, 10.7 % in 2006 and 11.4 % in 2007, respectively. While the world average grew by around 5 percent in this period, the Chinese economy grew by around 10 percent on average. (Örmeci, 2013: 3)

Today, although China is a foreign-dependent country in terms of foreign investments and exports, it is one of the rare countries in the world that has a budget surplus. China has a foreign trade surplus of close to 260 billion dollars. Again, today, China is the rising power of the world and a candidate to become the dominant power. China, which is the third-largest exporter country after the USA and Germany, has started to import not only cheap goods and agricultural products but also advanced technology. More than 450,000 foreign companies still operate in China, which is a member of the International Monetary Fund and the World Trade Organization. (Köken, 2012)

The UK-based Center for Economics and Business Studies (CEBR) has predicted that the People's Republic of China will overtake the United States in 2028 to become the world's largest economy. With a Gross Domestic Product (GDP) of $14.4 trillion in 2020, China now ranks second in the list of countries with the largest economic power in the world, after the United States, with a GDP performance of $ 21.4 trillion in the same period. However, according to CEBR, the Chinese economy averaged 5.7 percent each year between 2021 and 2025; In the 2026-2030 period, it will grow by 4.5 percent every year. According to CEBR in the report, the US economy will average 1.9 percent per year between 2022 and 2024; Between 2025 and 2030, it will be able to grow by 1.6 percent. (Deutsche Welle, 2020)

From the point of view of China, the 21st century is defined not only as a rival of the dominant power USA with an economic and political rise but also as a period of leaving it behind with much more. To realize this goal, perhaps the strongest Trump card will be the transformational power of the current market economy and the perception of authoritarian communist leadership. In this process, it applied the principles of the capitalist system it was integrated into in the 1980s and kept the strict controls that

it had been applying in other areas. Undoubtedly, this rise of China has brought with it a fear towards China in the international arena; because the 21st century looks like it will be the scene of a power transition where China will leave the USA behind.

THE DECLINE OF USA

The USA, which was the only superpower of the world at the beginning of the 21st century, is gradually losing its dominant position in world politics, due to the erroneous policies followed after the 9/11 attacks. The loss of military and political power experienced by the USA after 9/11 began to show more impact during the Obama era with the global crisis in 2008. The 2008 economic crisis and the subsequent economic recession in the USA led to the questioning of the power of the USA in the international system. While the Obama administration emphasized the need for a strong military structure with its smart power policies, it also preferred to invest heavily in alliances, partnerships, and institutions to spread America's influence and give legitimacy to US initiatives (Nye, 2009:160).

President Obama accepted diplomacy as the main tool of foreign policy and stated that he would conduct a foreign policy based on common interests and benefits through international organizations and norms. Prioritizing rebalancing policies with the Obama administration, the US administration has focused on the Asia-Pacific region and adopted a new regional strategy. The Asia-Pacific policy of the USA, which is called rebalancing in this period, is that the American national interests in this region cannot be left to a passive leadership directed from Washington. In this context, it is based on the necessity of active American participation and guidance in the region against the rising Chinese threat. (Tokatlı, & Kocamaz, 2021: 111)

The Obama era was a period when the 2008 global crisis was experienced, the US economy and EU economies experienced significant difficulties due to this crisis, and the economic power that enabled the USA to be the leading power of the system was eroded. While the 2008 global crisis reduced the economic power of the Western alliance, China, Russia, and developing countries got through this crisis better, and at this point, the way for China to emerge as a rival power to the USA was paved. The erosion of power that started during the Obama era continued increasingly during the Trump era. The US administration, which defended the globalization thesis more loudly and drew a liberal profile before Donald Trump, took on an isolationist and protectionist profile after Donald Trump came to power. (Küntay, 2019:182)

The loss of power experienced by the USA has started to negatively damage the normative values together with the Trump administration. The report, which was prepared at the 56th Munich conference held in 2020, is defined under the heading of Westlessness, due to the uncertainty about the values and strategic orientations of Western countries. (Munich Security Report, 2020). The aggressive and interest-oriented decisions taken by the Trump administration in its domestic and foreign policy have damaged multilateralism. In addition, the slogan America First, which he used in this period, also caused damage to the understanding of alliance in the Western world. The separatist/exclusive attitudes of the Trump administration, which prioritizes American interests, have brought about an increase in populist discourses and a more pronounced polarization. However, the regression in transatlantic relations made it difficult to find common solutions, and the national and international trust gap led to the questioning of the legitimacy of the US administration (Tokatlı, & Kocamaz, 2021: 112-113).

However, the USA's not supporting its allies sufficiently in the face of common threats, especially during the COVID-19 pandemic, conflicts with its allies (even having problems with its border neighbor Canada), difficulties in the economy, and the decrease in its influence on the liberal system, interest policies that keep liberal values in the background. and increasing populist rhetoric has led to the expansion of China's field of action.

WILL CHINA REPLACE THE USA IN THE LIBERAL INTERNATIONAL ORDER?

Today, many observers believe that this American order is coming to an end and that as it does so a major change is occurring in America's position in the world. For example, Martin Wolf argues that: "*We are at the end of both an economic era (the era of Western-led globalization) and a geopolitical era, the post-cold war "unipolar moment" of the US-led global order. The question that follows is whether the post-WWII era will turn into a period of deglobalization and conflict very similar to the first*

half of the 20th century, or whether the non-western powers, especially China, will transform into a new era" (Wolf, 2017).

"Some economists expect China to eventually overtake the United States as the world's largest economy, but the estimated date for this event is between 2028 and 2040. However, it should not be forgotten that even if China one day surpasses the USA in total economic size, this is not the only measure of geopolitical importance. Power—the ability to affect others to get what you want—has three aspects: coercion, payment, and attraction" (Nye, 2011: 1-3).

"Economic might is just part of the geopolitical equation, and even in economic power, while China may surpass America in total size, it will still lag in per capita income (a measure of the sophistication of an economy). On military and soft power indices, meanwhile, China is well behind the United States. US military expenditure is currently four times that of China. While Chinese military capabilities have been increasing in recent years, analysts who look carefully at the military balance conclude that China will not be able to exclude the United States from the western Pacific. The RAND Corporation estimates that while the war between the two powers would be costly for both, the United States would prevail" (Nye, 2020: 14).

"As China's power grows, some observers worry that it will not contribute to an international order that it did not help to create. But this overstates the 'not invented here' problem" (Nye, 2019: 73). "As Rosemary Foot argues in her article in this issue, China has benefited from the post-1945 international order, but the question remains whether it will cooperate in the production of public goods" (Foot, 2019). Overall, "Chinese behavior to date indicates an intention not to overthrow a prevailing world order from which it benefits but rather to increase its influence within that order; nevertheless, this could change as Chinese power grows. As a RAND study concludes, 'it is not entirely appropriate to speak of China's interaction with the international order—its posture has been highly differentiated depending on the component of the order" (Mazarr et. all., 2018:4). "In any event, as Chinese power grows, the American liberal world order will have to change. For one thing, power will have to be shared, and China has little interest in liberalism or American domination. Analysts would be wise to discard the terms 'liberal' and 'American' and refer instead to the prospects of an 'open international order' or a 'rules-based order" (Nye, 2019: 74).

The Western order's strong framework of rules and institutions is already starting to facilitate Chinese integration. At first, China embraced certain rules and institutions for defensive purposes: protecting its sovereignty and economic interests while seeking to reassure other states of its peaceful intentions by getting involved in regional and global groupings (Ikenberry, 2008: 31-32). The most important thing that distinguishes China from previous global powers is that although it is not a Western state and does not have Western values, it was born within the current liberal international system and makes the best use of the institutions and rules of this Western system.

"State power today is ultimately based on sustained economic growth, and China is well aware that no major state can modernize without integrating into the globalized capitalist system; if a country wants to be a world power, it has no choice but to join the World Trade Organization (WTO). The road to global power, in effect, runs through the Western order and its multilateral economic institutions. China not only needs continued access to the global capitalist system; it also wants the protections that the system's rules and institutions provide. The WTO'S multilateral trade principles and dispute-settlement mechanisms, for example, offer China tools to defend against the threats of discrimination and protectionism that rising economic powers often confront" (Ikenberry, 2008: 32).

At this point, although the Chinese administration has achieved serious economic growth in the current liberal international order, it has not reached a position to gain political weight in this system due to its lack of management style and the values of the Western world. In addition, it does not seem very willing at this stage to create alternative institutions to this system and to lead it. In other words, it does not seem possible to reach the political and military power that can replace the USA in this system soon.

CONCLUSION

In the 21st century, the decline of US global power and the rising potential power of China will determine the power struggle and systemic transformation in the international arena. According to the structural realism theory, a state needs military power, material power, and capacity to dominate other

states in the system. While realist theory focuses on the concept of power within the system, it emphasizes the need for a leading power for the continuity and stability of the system. While the discussions about the end of the capitalist system in the international structure are increasing, the arguments for China to replace the USA in the future are also getting stronger.

The USA needs to reproduce the power it has in the international system. The attitude of the US administration, which puts its national interests ahead of international interests, has caused it to lose its current allies, its role in global governance to regress, and it has been left out of the system. In today's world, the Hegemonic power must be willing to do so, as well as have the ability to establish and maintain rules and norms within the liberal economic order. As the hegemonic power begins to lose its power within the system, the liberal economic order will also weaken to a great extent (Gilpin, 2012: 95). The USA is aware that the rising powers are more aggressive in the system when they fail (Holstag, 2015, p. 15).

The weakening economic capacity of America has led to the reshaping of the balance of power within the system. Global financial crises are generally seen as an important turning point in the transition to a multipolar world. In addition to the economic recession experienced by the United States, its unsuccessful military interventions, its erosion of international institutions and agreements, and the erosion of democratic values have led to the loss of legitimacy of the United States. The reluctant attitude of the USA regarding its role in global governance, which became evident especially during the Trump era, led to the gaining importance of the ideology of nationalism and the loss of the spirit of global unity and common struggle. As a result of the replacement of global and humanitarian interests by national interests, nationalism has increased and the problem of inequality in the capitalist order has become more evident. The decline in the power of the United States with the Trump administration led to a decrease in the leadership role and with it, new powers began to take more place in the system. (Tokatlı, & Kocamaz, 2021: 122)

The decline in the current position of the USA in the system has created an opportunity for China to become a more effective power through regional organizations and alternative institutions. China ensures the continuity of economic and political cooperation with the international organizations it has built under its leadership. China's institutionalization and infrastructure projects play a role in shaping the new economic order, leading to an increase in political solidarity between states. China's economic policies carried out within the framework of the principle of common benefit within the system, its institutionalization initiatives, and its increasing diplomatic activity in line with its discourses supporting soft power can be evaluated as efforts to build a new power itself against the status quo.

While China relies on its economic power, large population, developing technological and military power, the lack of attraction of its political model and culture as its weak belly, the political problems that will arise within itself as it develops, the lack of leadership experience, the inadequacy of its military power and the lack of strong allies stand out as the disadvantages of the rising power. (Örmeci, 2013: 12) Although China adopts a foreign policy that emphasizes the consent factor and proceeds in line with the concept of peaceful ascension, its authoritarian government structure, violent actions in the Xinjiang-Uyghur Autonomous Region, increasing provocative activities in the South-China Sea and Taiwan region, and human rights violations have brought down its international prestige. affects negatively. When analyzed within the framework of the neo-Gramscian theory, China must increase its economic, military, political, and cultural power in parallel to become a hegemonic power, and to legitimize its smart power policies both at the national and international level at the same rate. (Tokatlı, & Kocamaz, 2021: 127)

It is seen that China has reached the capacity to realize its economic and political interests at the global level with its increasing economic power, regional policies, influence on international organizations, and huge economic projects. Although this situation is currently perceived as a threat to the US national interests, China's geopolitical position with its current military capacity, the problems it has with the Tibetan and Uyghur Turks in the country, the development differences between the regions, the border disputes with the neighboring states, etc. Due to the reasons, it is not in a position to assume the leadership of the liberal international system established after the Second World War under the leadership of the USA and to manage it. Although it is predicted that it will surpass the USA in terms of economic size in the next ten years, it is unlikely that the USA will catch up with its position militarily.

In this respect, it seems likely that we will see a different power transition or a hegemonic order in the international system in the coming years.

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ESTABLISHMENT OF OPTIMUM MINERAL PARTICLE SIZE FOR TANTALITE CONCENTRATION BY JIGGING OF A HIGH-GRADE PEGMATITE ORE

Melvin M. Mashingaidze*[1], Chiedza T. Nzuma[1]

*[*1]University of Namibia, Faculty of Agriculture, Engineering and Natural Sciences, Department of Mechanical and Metallurgical Engineering, Ongwediva, Namibia.*

ABSTRACT

Tantalum is a highly corrosion-resistant refractory metal, which is widely used in the manufacture of solid capacitors, surgical implants, screws and other components that are left embedded in human tissue. It also finds application in plant equipment construction for heat exchangers, reactors, and parts for high-temperature furnaces. Arguably, main usage in the current age is in tantalum capacitors in electronic equipment such as mobile phones. The primary sources of tantalum (Ta) are columbite-tantalite ores which are oxides of tantalite. Pegmatites are the major sources of this rare metal where columbite-tantalite, with a chemical formula of $(Fe,Mn)(Nb,Ta)_2O_6$, hosts both tantalum (Ta) and niobium (Nb). This study aimed to establish the particle size for optimum liberation of tantalite (Ta_2O_5) which is concentration by jigging at a mineral processing plant for high-grade tantalite pegmatite ore where the recoveries have been historically low. Quantitative experiments were conducted on a completely randomized basis. Experiments included Particle Size Distribution (PSD) analysis of jig tailings, feed and concentrate with each stream classified into four size classes per trial, for a total of five trials. Classified material was pulverized then characterized by X-ray Fluorescence (XRF) analysis for Ta_2O_5. Average tantalite recovery from the jig was 47%, with average Ta_2O_5 grade in the feed, concentrate and tailings at 607, 1641 and 451 ppm respectively. 1-2 mm was the particle size class with the highest Ta_2O_5 grade. The p-value of 0.006 indicated a significant difference at the 5 % level in tantalite recoveries for different particle size classes of jig feed. The concentration criterion for the jigging operation was 3.8 and compared with the industry benchmark of 2.5, it shows that tantalite minerals separation from the gangue is very efficient using this specific gravity concentration method.

Keywords: tantalum, mineral particle size, tantalite, jigging, XRF analysis, separation efficiency.

INTRODUCTION

Pegmatites are the major sources of this rare metal with columbite-tantalite [chemical formula: $(Fe,Mn)(Nb,Ta)_2O_6$)] hosting both tantalum (Ta) and niobium (Nb). Other commercialy important minerals of tantalum are microlite, wodginite, simpsonite, stibiotantalite, euxenite, and struverite (Burt, 2004, Linnen et al., 2014). The reader is referred to the same works for chemical formulas, thorough discussion of tantalum ores, typical tantalum gravity concentration circuits and the tantalum industry. The largest producers of tantalum and niobium are Brazil and Australia, followed by Canada, Mozambique and Ethiopia (Nete et al., 2012). Compared to other metal ores, Ta ores contain very small amounts of the metal ranging from 200 to 1000 grams per ton. The quality of the ore varies with associated gangue material and levels of impurity in the ore. Concentration of metal in the ore and impurities influence the ore beneficiation costs. Generally ore grade above 250 g per ton of Ta is considered economically minable (Jeangrand, 2005).

Tantalite recoveries from secondary sources

In a research carried out by Ghorbani et al. (2017) to recover tantalite from tin mining waste which had a particle size greater than 2mm, it was found that over 70% of the tantalite was contained within the

125 µm fraction. The tailings were obtained from gravity concentration of particle sizes +2mm. Representative samples of 1kg were split from the tailings and analyzed using Scanning Electron Microscope (SEM) to qualitatively assess the mineralogy of the ore at a lab scale. Mineral recovery was performed using shaking tables.

In another research (Odo et al., 2014) to recover niobium from tin slag, the tin slag was crushed and ground to very fine particle sizes of nanometer level using laboratory ball mill, piston and mortar. The particles were sieved and 150 nm and 180 nm particle sizes range were used for this experiment. The tantalite concentration within the slag was upgraded from a grade of 20.8% to 39.7% after leaching the minerals at this particle size.

The results of both Ghorbani et al. (2017) and Odo et al. (2014) showed that there was tantalite being lost to the tailings at a particle size greater than 2 mm.

Gravity concentration of tantalum ores

The equipment used mainly includes jigs, shaking tables and spiral concentrators. Usually the spirals operate with a fine size class of less than 1mm, while jigs can work with material in the size range of 20 to 1 mm (Mirji et al., 2016). The shaking tables operate in series with the spirals and work with a particle size within 100 to 1000 -µm range. Jigging is a gravity separation method commonly used by the mineral industry to separate gold, tantalite and other minerals on the basis of particle size and/or density. The particles are first crushed and screened before being fed to the jig. The particles are introduced to the jig bed (usually a screen) where they are thrust upward by a pulsing water column or body, resulting in the particles being suspended within the water.

As the pulse dissipates, the water level returns to its lower starting position and the particles once again settle on the jig bed. As the particles are exposed to gravity whilst in suspension within the water, those with a higher density settle faster than those with a less density, resulting in a concentration of material with higher density at the bottom, on the jig bed (Balasubramanian, 2017). The particles are now concentrated according to density and can be extracted from the jig bed separately. In the mining of most heavy minerals, the denser material would be the desired mineral and the rest would be discarded as tailings. As a result of repeating this operation particles will separate and eventually meet product requirements.

The jig that was used for this study is a conventional pulsating gold jig and operates as depicted in Figure 1. It operates at an average of 60-75 strokes per minute with a feed rate of 15t/h with the feed having a particle size range 8-1mm. The optimum operating particle size in a research done by Abols et al. (2006) on maximizing the efficiency of gravity concentration equipment was determined to be between 500 to 3000 µm, although jigs can work with material in the size range 200 to 5000 µm. In another research done by Mitchel, 1997 on gold particle size and recovery methods, recoveries of the gold were 50% at 100µm and 1000 µm. Abols et al. (2006) concluded that smaller particle sizes do not necessarily mean higher recoveries in jig operation and jigs work best with a narrow size range. The efficiency of gravity processes increase with particle size.



Figure 3. Picture of jig in tantalite concentration operation.

Mineral liberation for gravity concentration

Liberation is a key driver in all mineral separation processes as it limits the maximum possible grade for a given recovery (Wills, 2006). Particle size determines level of mineral liberation and plays a significant role in gravity separation circuits. For Ta processing, it is particularly important to minimize the production of fines as large losses are encountered through poor recovery in the finer sizes when using gravity concentration. It is essential for separation and concentration by gravity that there is a definite specific gravity difference between the various components and this is known as the concentration criterion (Vijayendra, 2001), as given in Equation 1.

$$C_c = \frac{specific\ gravity\ of\ heavy\ component - specific\ gravity\ of\ fluid}{specific\ gravity\ of\ light\ component - specific\ gravity\ of\ fluid} \quad (1)$$

Where C_C = concentration criterion.

In general terms, when the ratio is 2.5 or greater, gravity separation is relatively easy and the separation of particles down to 200 mesh (0.075 mm-0.007366 mm) is possible. For a ratio of 1.75, separation is possible to 65 mesh (0.212 mm-0.20828 mm), for 1.50 it is possible to 10 mesh (1.70 mm-1.651 mm). As the ratio reduces, the effectiveness of the separation reduces.

Below 1.25 only material above 12.5 mm in size can be gravity concentrated and separation cannot be done in water. At this larger particle size another fluid heavier than water is needed for separation. Columbite-tantalite deposits are mainly associated with feldspar, quartz and silica. Tantalite has a specific gravity of 6.8-7.9, while feldspar, quartz and silica have a specific gravity of about 2.8.

The aim of this study was to establish the particle size at which there would be optimum liberation of the tantalite. Pursuant to the study aim, the specific objectives were to determine the:

a. Particle size distribution of the jig feed, concentrate, and tailings before grinding.
b. Tantalite grade after grinding and classification in each particle size class of the jig feed, concentrate and tailings.
c. Tantalite recoveries after grinding and classification in each particle size class of the jig feed, concentrate and tailings.

The study hypothesis was based on tantalite recoveries as a function of particle size since the particle size impacts the tantalum liberation, which in turn impacts the gravity concentration. Thus:

(H_0): There is no significant difference in tantalite recoveries from the jig at different particle size classes at 95 %

confidence interval.

(H_1): There is a significant difference in tantalite recoveries from the jig at different particle size classes.

MATERIALS AND METHODS

Instruments and materials used included 10 kg sample bags; analytical balance; scoop; wire brush and cloth; sieves, XRF analyser; pulveriser; 1 kg sample bags; jig feed, concentrate and tailings samples.

The research design was quantitative, and experiments were conducted on a completely randomized basis. It aimed at determining particle size at which there would be optimum liberation of the tantalite mineral. Therefore, Particle Size Distribution (PSD) analysis was carried out for the jig tailings, feed and concentrate and each stream was classified into four size classes per trial. The classified material was then pulverized and X-ray fluorescence (XRF) was used to ascertain the grade of the samples. The recoveries in each particle size class were then calculated. A total of 5 trials were carried out. Analysis of variance (ANOVA) was used to compare the statistical significance of the hypothesis.

RESULTS

The particle size distribution trends (Figure 2) of the jig feed, tailings and concentrate showed that the particle sizes of the concentrate are much smaller compared to that of the feed and tailings. The mean P_{80} values for these three jig streams are provided in Table 1, while Table 2 is a record of the tantalite grades as determined by XRF analysis, in the jig streams for the four particle size classes obtained in the study. Figure 3 illustrates that highest occurrence of the tantalite minerals is in the 1 - 2 mm size range, followed by the < 1 mm size fraction with the other two size fractions conatining comparable tantalite amounts.

Table 1. Average P_{80} values

Stream	Mean P_{80}, mm
Feed	5.92
Concentrate	2.56
Tailings	6.22

Table 2. Tantalite grades at different particle sizes as determined by XRF analysis

Size class	Jig stream	Tantalite grade, ppm
4 – 8 mm	Concentrate	1918.6
	Tailings	210.0
	Feed	298.8
2 – 4 mm	Concentrate	1523
	Tailings	250.2
	Feed	347.6
1 – 2 mm	Concentrate	1565.8
	Tailings	261.0
	Feed	568.6
< 1 mm	Concentrate	1557.4
	Tailings	1083.0
	Feed	1214.4

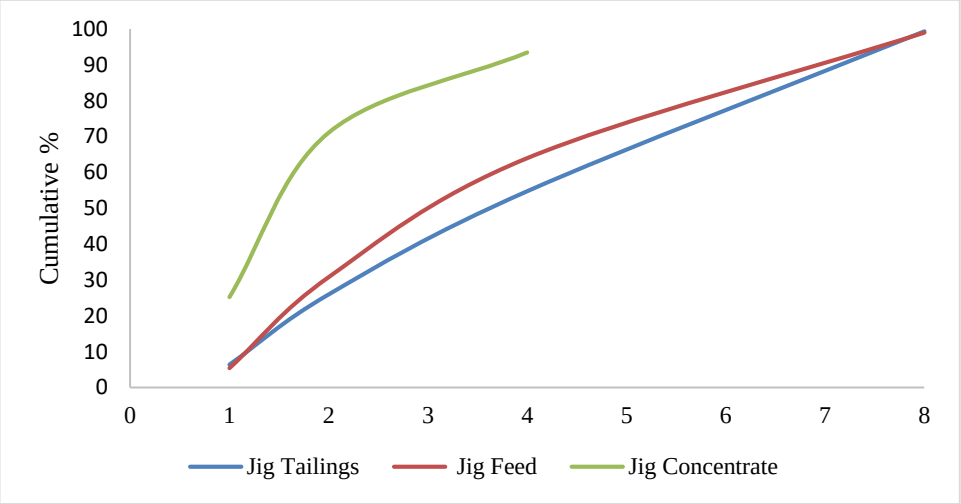


Figure 4. Jig streams particle size distribution

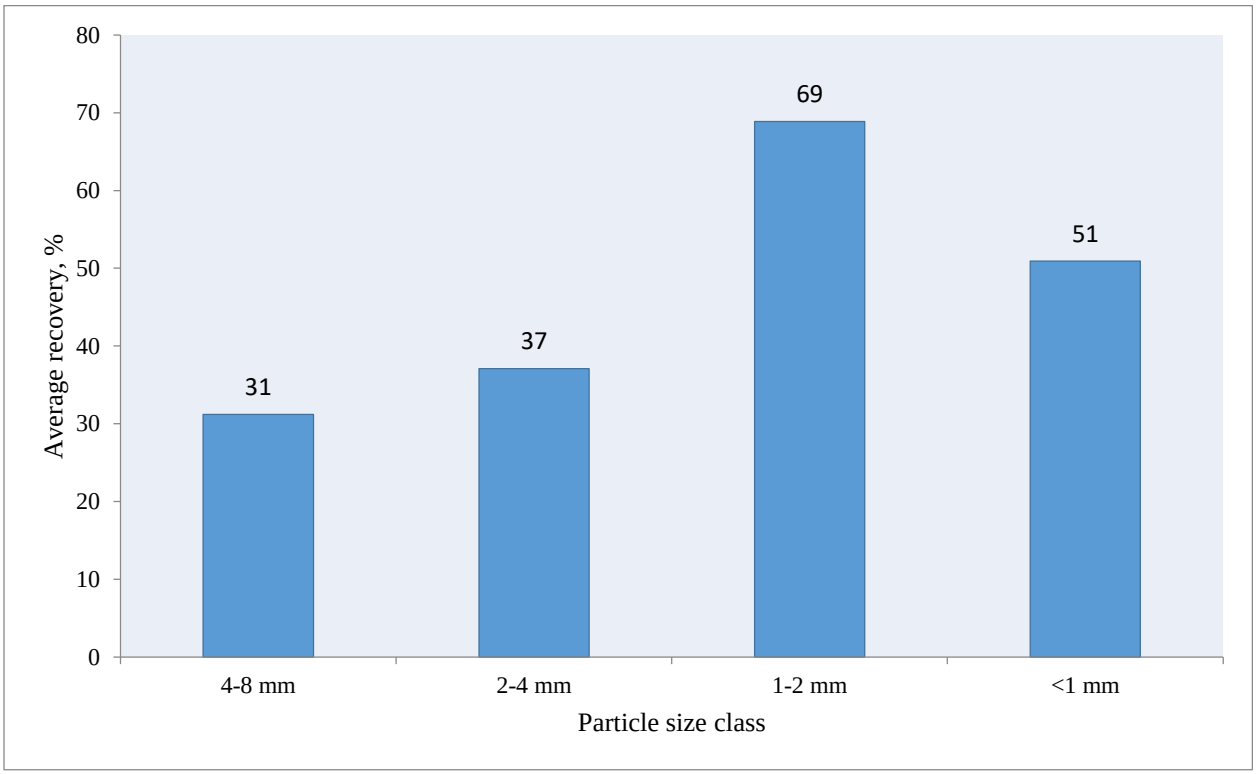


Figure 5. Average tantalite recoveries obtained

DISCUSSION

The fraction of Ta in the ore that reports to the concentrate is characterized as the recovery (Burt, 2004). Recoveries of minerals can be calculated using grades of materials or both grades and mass of materials (Wills, 2006). Equations 2 and 3 show the formulas for calculating recoveries based on grades/assays and masses
respectively.

$$R = (c(f-t))/(f(c-t)) \times 100 \quad (2)$$

Where *c*, *f* and *t* represent grades of concentrate, feed and tailings respectively.

$$R = 100Cc/((Cc + t(F-C)) \quad (3)$$

Where *c* and *t* represent grades of concentrate and tailings respectively and *C* and *F* represent masses of concentrate and feed respectively.

Recoveries in particle size 1-2 mm were consistently high for all 5 trials which is comparable to the results
obtained by Ghorbani (2017). The concentration criterion of 3.8 was determined using Equation 1 and since it

is greater than 2.5, the tantalite separation efficiency using the jigging method is high. Since this implies gravity separation is relatively easy and the separation of particles down to 200 mesh (0.075 mm-0.007366 mm) is possible (Wills, 2006), then finer crushing or grinding of the ore before feeding it to the jig can be attempted to optimize tantalite recoveries.

The null hypothesis was that there would be no significant difference at 95 % CI in the resultant tantalite recoveries at different particle size classes. ANOVA was used to test this hypothesis and Table 4 summarizes the result.

Table 4. ANOVA result

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4204	3	1401	6.144	0.006	3.239
Within Groups	3649	16	228			
Total	7853	19				

It can be seen that the *F-value* (6.144) is greater than the *F-critical value* (3.239) at the 5 % significance level and p(0.006) < α (0.05). Therefore, the null hypothesis was rejected meaning that there was a significant difference in the tantalite recoveries at different particle size classes of material fed to the jig.

CONCLUSION

This study sought to establish the optimum particle size for liberation of the tantalite via jigging, by grinding and of the jig feed, concentrate, and tailings. After evaluation of the findings, the ensuing conclusions were formed:

- The mean P_{80} of the jig feed, concentrate, and tailings before grinding were 5.92 mm, 2.56 mm, and 6.22 mm respectively.
- Particle size class of 1-2 mm was the optimum size range for liberation of tantalite when separating by jigging as it showed the highest recoveries.
- Average recovery of tantalite from the jig is 47%, while average tantalite grade in the feed, concentrate, and tailings are 607, 1641 and 451ppm respectively.

The p-value of 0.006 indicates a significant difference at the 5 % level in tantalite recoveries for different particle size classes of jig feed. Considering the tailings mean P_{80} 6.22 mm and the 210 ppm tantalite grade of the 4 - 8 mm tailings size fraction, it is apparent a significant amount of tantalite is being disposed at the tailings dam. Thus the tailings can be reprocessed in a suitably tuned cone crusher to liberate the locked tantalite and then routed to the shaking tables in order to concentrate the tantalite.

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INVESTIGATION OF FLOW STRUCTURE OF ROTARY OSCILLATING CYLINDER WITH PIV MEASUREMENT TECHNIQUE

Mustafa Soyler[*1], Cemre Polat[2], Dogan Burak Saydam[1,3], Coskun Ozalp[1]

*[*1]Energy Systems Engineering, Osmaniye Korkut Ata University, Turkey*
[2]Duzici Vocational School, Motor Vehicles and Transport Technology, Osmaniye Korkut Ata University, Turkey
[3]Osmaniye Korkut Ata University, Energy Education-Etude Application and Research Center, Osmaniye, Turkey

ORCID Code: 0000-0003-4767-5825, 0000-0002-7001-1042, 0000-0001-8453-2917, 0000-0003-2249-7268

ABSTRACT

If the flow on an object cannot move across the surface of the object and creates a wake region behind the object, that object is defined as a bluff body. In other words, objects that force the fluid to leave the surface and have a large cross-sectional area relative to the direction of motion or flow are called bluff bodies. Blunt bodies cause flow separation, unsteady flow and vortex shedding. To eliminate or minimize these problems, various methods of flow control have been developed. One of these methods is the rotational oscillation of the body about its center. Experiments were carried out in a water channel using the Particle Image Velocimetry (PIV) technique. The flow characteristics of the wake region of a rotary oscillating cylinder were investigated experimentally. The experiments were conducted at Reynolds number Re = 1000, oscillation amplitude $\theta A=\pi/2$, different frequency ratios (F_R=0.8, 1.7, 2.5, 3.3 and 6.7). Time-averaged streamlines, streamwise velocity contours and vorticity contours were analyzed. The control of the cylinder wake region and the instability of the shear layer has been achieved to a great extent.

Keywords: Active flow control, Frequency ratio, Rotary oscillation, PIV

INTRODUCTION

The circular cylinder is widely used as a bluff body in studies due to its simple geometry and wide use in engineering applications. The shedding of vorticity in the wake region leads to structural vibrations that cause even large structures to collapse, and large fluctuating pressure forces that can cause resonance. Therefore, the flow in the wake region of the bluff body is of great direct engineering importance.

Active flow control techniques have been developed that apply some energy to the flow to achieve beneficial changes in the flow field. The active flow control technique manages the flow using an auxiliary energy that allows instant control of different flow patterns. Active flow control provides great convenience and freedom in control methods, as it allows the flow effects of the cylinder to be changed or eliminated at any time (Ozalp, Soyler, et al., 2021).

Feedback control, electromagnetic control, rotating cylinder, trace heating, suction and blowing, and rotary oscillating cylinder are some examples of active control systems. One of the active flow control strategies is the circular oscillating motion around a cylinder. The application of rotary oscillating motion, an active flow control technology, to the cylinder will be investigated in this study.

Many experimental studies have been carried out on rotary oscillating cylinders. (Lecointe & Piquet, 1989), (Mih & Marston, 1991), (Mittal et al., 1999), (Lee & Lee, 2008), (Nazarinia et al., 2012), (Gao et al., 2018), (Ozalp, Soyler, et al., 2021), (Ozalp, Saydam, et al., 2021) experimentally investigated the effects of the rotary oscillating cylinder on the flow structure. (Kumar et al., 2013), experimentally investigated a flow passing a cylinder that performs sinusoidal rotary oscillations about its axis. Experiments are performed with extensive flow visualization using the PIV technique according to Reynolds number 185, oscillation amplitudes $\pi/8$ to π, and dimensionless forcing frequencies from 0 to 5. The variation of time average flow characteristics was explored in this study using the Particle Imaging Velocimetry (PIV) technology. By comparing the results of a stationary cylinder to the results of rotary oscillating motion, an active flow control technique, the effect of rotary oscillating motion on the cylinder wake region was examined.

MATERIALS AND METHODS

Experiments were performed in a circulating open water channel with a length of 6m and a cross section of 0.8m by 0.8m at Osmaniye Korkut Ata University's Advanced Fluid Mechanics Laboratory. Details of the PIV system and water channel can be found in study by the authors (Ozalp, Soyler, et al., 2021). The model used in this experiment is a cylinder with a diameter of D=25 mm. The free flow velocity was about 0.04 m/s and the corresponding Reynolds number $Re=U_\infty D/\nu$ was 1000, where ν is the kinematic viscosity of the fluid and U_∞ free stream velocity.



Figure 1. Panoramic image of Osmaniye Korkut Ata University PIV Laboratory experimental setup.

Figure 2 shows experimental setup of the test section. To emphasize the flow characteristic, the laser plate is positioned at the middle height of the submerged part of the cylinder for measurements in the horizontal plane.

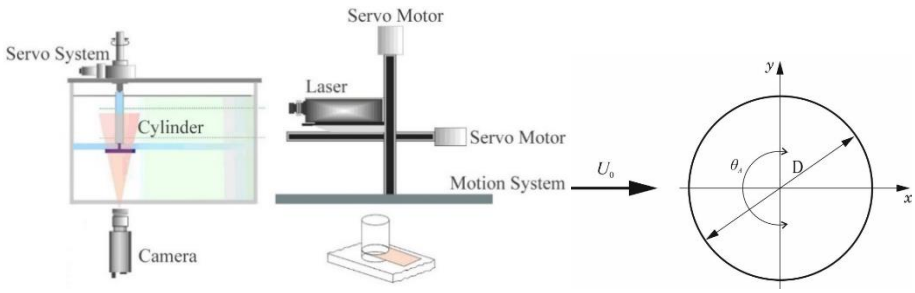


Figure 2. Experimental setup of the test section.

A programmable controller can precisely control the frequency and amplitude of oscillation of the cylinder. The oscillating motion can be represented as follows:

$$\theta = \theta_A sin(2\pi f_f t) \quad (1)$$

where θ is the angular position of the cylinder, t is time, θ_A and f_f indicate the oscillation amplitude and the forcing frequency, respectively. The vortex frequency of the stationary cylinder is indicated by f_0. All the frequencies in this article are nondimensionalized using the stationary cylinders frequency f_0 and the ratio f_f/f_0 is called the frequency ratio and is indicated by F_R.

The flow field in the wake of the rotary oscillating cylinder was analysed by the PIV technique. Velocity fields were detected with the Dantec PIV system, consisting of a dual-head Nd: YAG laser, a high-resolution CCD camera, a USB synchronizer and optics. The measuring planes were illuminated with a thin and dense laser sheet using a pair of dual pulsed Nd: YAG laser units, each with a maximum energy output of 145 mJ/pulse at a wavelength of 532nm. After the data of the velocity field is taken, the corrupted vectors are removed, the extracted vectors are replaced, and the data are filtered and smoothed. In PIV, particle images are used to obtain vector displacement information. After the velocity field was calculated, the vectors were verified by the CleanVec program. The bilinear least-square fit technique was used to fill in the missing vector fields, scale the image area to the original flow region, and calculate the vortex distribution after the corrupted vectors were removed.

RESULTS AND DISCUSSION

Figure 3 shows the time-averaged streamline <ψ> at the number Re_D=1000 at different frequency ratios. It can be observed that the rotational oscillation of the cylinder destroys the symmetry of the streamline structures and significantly affects both the positions of the vortex core and the velocity distribution. When F_R=1.7, the vortex formation in the cylinder wake region disappears, as well as all focal points and the separation point.

Figure 4 shows the dimensionless time-averaged streamwise velocity $<u/U_\infty>$ contours at the number Re_D=1000 for different frequency ratios. While the minimum and maximum values of the contours changed within the range ($-0.3 \leq [<u/U_\infty>] \leq 1.2$), the amount of increase was determined as ($\Delta[<u/U_\infty>]=0.1$). The region with negative $<u/U_\infty>$ values is clearly visible in the cylinder trace. After the stagnation point, it is seen that the flow accelerates and reaches a maximum value of approximately 1.2 .

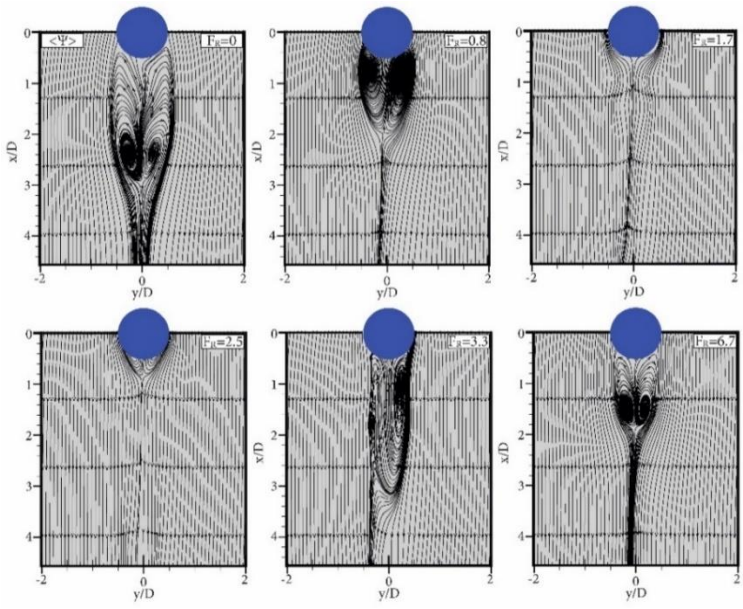


Figure 3. Time-averaged streamlines with $\theta_A = \pi/2$ oscillation amplitude and different frequency ratios $<u/U_\infty>$.

Figure 5 shows the time-averaged dimensionless vorticity <ω> contours for different frequency ratios and oscillation amplitudes. The minimum and maximum values of the contours are in the range of -8≤ [<ω>] ≤8 and the increment amount is Δ[<ω>] =1. In all time-averaged vorticity contours, a symmetrically shaped trace region and a structure extending towards the cylinder with a sliding layer can be seen from this region. Positive and negative vorticity contours are shown as solid and dashed lines, respectively. Both positive and negative values are spread almost symmetrically along the y/D=0 axis. Spread of the shear layer is observed along x/D.

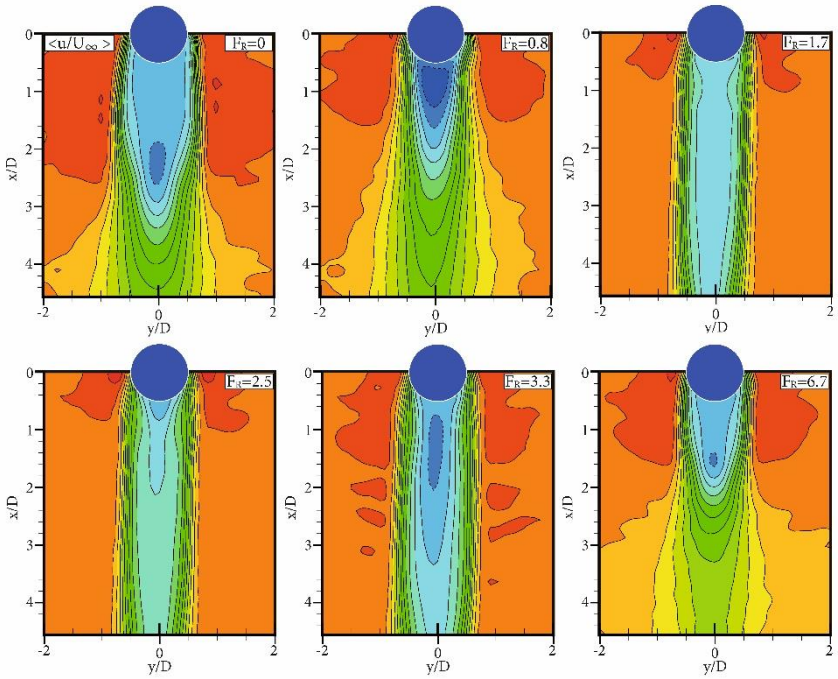


Figure 4. Time-averaged streamwise velocity with $\theta_A = \pi/2$ oscillation amplitude and different frequency ratios <u/U∞>.

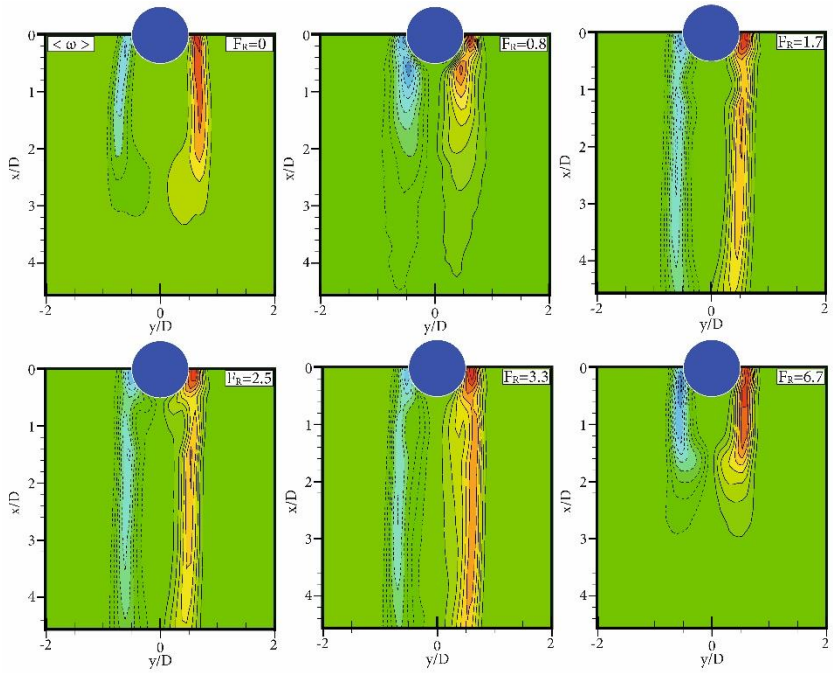


Figure 5. Time-averaged vorticity with $\theta_A = \pi/2$ oscillation amplitude and different frequency ratios < ω >.

CONCLUSION

The flow characteristic of a rotationally oscillating cylinder in the wake region was experimentally investigated with oscillating amplitude $\theta_A = \pi/2$ and various frequency ratios. It is observed that five different frequency ratios (FR = 0.8, 2.5,1.7, 3.3 and 6.7) and oscillating amplitude $\theta_A = \pi/2$ have a significant effect on the flow structure in the cylinder wake region by using the Particle Image Velocimetry (PIV) technique. A circular cylinder's rotating oscillatory motion was discovered to be an effective and promising way for managing the near-wake flow structure. Furthermore, the current findings demonstrate that temporally resolved quantitative and qualitative flow information is beneficial in comprehending the cyclic oscillation of vortex shape and examining the influence of open-loop active flow control on the near-wake flow structure.

ACKNOWLEDGEMENTS

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NUMERICAL ANALYSIS OF THE EFFECTIVENESS OF DIMPLES ON A NACA WING PROFILE

Mustafa Söyler[*1], Cemre Polat[2]

*[*1]Energy Systems Engineering, Osmaniye Korkut Ata University, Turkey*
[2]Düziçi Vocational School, Department of Motor Vehicles and Transportation Technologies, Osmaniye, Turkey
ORCID Code: 0000-0003-4767-5825, 0000-0002-7001-1042

ABSTRACT

To improve the aerodynamic performance of the airfoil, delaying boundary layer separation, use of vortex generators, attachments to the surface, suction/blowing and dimpled surfaces, etc. techniques are possible. It is known that pitted surfaces create eddies and energize the flow over them. It is believed that vortex formation can be used to reduce boundary layer separation thereby improving lift, reducing drag, and delaying stall for an airfoil. In this study, to manipulate the flow formed in the upper region of the NACA 0012 airfoil, the flow structure formed by giving a dimple shape was investigated computationally using ANSYS FLUENT software. Calculations were performed at $6x10^6$ Reynolds number in two different angle of attack configurations ($\alpha=0°$, $\alpha=4°$). In the study, firstly, the flow structure on the NACA 0012 airfoil was calculated and verified with the literature, then cavities with the size of 1% of the chord length and 0.5% of the chord length were opened on the upper trailing edge and their effects were examined. In the study, it was observed that the modification made on the upper surface of the wing was effective on the vortex regime and drag/lift coefficients, and this situation was examined in detail.

Keywords: Wing Profile, Flow Control, CFD

BİR NACA KANAT PROFİLİ ÜZERİNDEKİ OYUKLARIN ETKİNLİĞİNİN SAYISAL ANALİZİ

Mustafa Söyler[*1], Cemre Polat[2]

*[*1]Enerji Sistemleri Mühendisliği, Osmaniye Korkut Ata Üniversitesi, Türkiye*
[2]Düziçi Meslek Yüksekokulu, Motorlu Araçlar ve Ulaştırma Teknolojileri Bölümü, Osmaniye, Türkiye

ORCID Code: 0000-0003-4767-5825, 0000-0002-7001-1042

ÖZET

Kanat profilinin aerodinamik performansını iyileştirmek için sınır tabaka ayrılmasını geciktirmek, girdap oluşturucuları, yüzeye yapılan eklentiler, emme/üfleme ve çukurlu yüzeylerin kullanımı vb. tekniklerle mümkündür. Çukurlu yüzeylerin girdaplar oluşturarak üzerindeki akışa enerji verdiği bilinmektedir. Girdap ve girdap oluşumunun, sınır tabakası ayrılmasını azaltmak için kullanılabileceğine ve böylece kaldırmayı iyileştirdiğine, sürtünmeyi azalttığına ve bir kanat profili

için durmayı geciktirdiğine inanılmaktadır. Bu çalışmada NACA 0012 kanat profilinin üst bölgesinde oluşan akışı manipüle etmek amacıyla dairesel çukur şekli verilerek ortaya çıkan akış yapısı ANSYS FLUENT yazılımı kullanılarak hesaplamalı olarak incelenmiştir. Hesaplamalar Reynolds sayısı $6x10^6$'te iki farklı hücum açısı konfigürasyonunda ($\alpha=0°$, $\alpha=4°$) gerçekleştirilmiştir. Çalışmada önce NACA 0012 kanat profili üzerindeki akış yapısı hesaplanarak literatür ile doğrulanmış, ardından üst firar kenarına kiriş uzunluğunun %1'i büyüklüğünde ve aralarında kiriş uzunluğunun %0.5'i kadarı mesafe bulunan oyuklar açılmış ve etkileri incelenmiştir. Yapılan çalışmada kanat üst yüzeyinde yapılan modifikasyonun girdap rejimi ve sürüklenme/kaldırma katsayılarında etkili olduğu gözlemlenmiş ve bu durum ayrıntılı olarak irdelenmiştir.

Anahtar Kelimeler: Kanat Profili, Akış Kontrolü, HAD

GİRİŞ

Kanatlar, uçakların birincil yapısal bileşenidir ve kanatlar için önemli tasarım özelliklerinden biri de kaldırma kabiliyetidir. Birçok kanat çeşidi vardır ve her kanat tasarımının ayrı bir akış davranışı ve uçuş performansı vardır. Bu yüzden kanat profilleri üzerindeki çalışmalar sürekli gelişmektedir. Aerodinamik, aeroelastik ve gövde kuvvetlerinin tümü kanatların işleyişinde mevcuttur (Nguyen & Tuzcu, 2009). Belirli ihtiyaçları karşılamak için farklı kanatlar geliştirilmekte ve bunların çoğu NACA kanat yapısına sahip olarak kategorize edilmektedir. Tasarım süreçleri için, hava ve su kanalı akış deneylerinin yanı sıra hesaplamalı akışkanlar dinamiği (HAD) yaygın olarak kullanılmaktadır. (Saini & Saini, 2018)

Uçan cisimler üzerinde yapılan aerodinamik çalışmalarda, cisimlerin üzerlerine etki eden dört kuvvet; kaldırma, ağırlık, sürükleme ve itme kuvvetleri olarak belirtilmiştir. Uçağın kaldırma kuvveti esas olarak kanatların kendisi tarafından oluşturulmaktadır. Kanatların aerodinamik tasarımı, kanatların üst yüzeyindeki havanın daha hızlı akmasını sağlayarak, kanatların üst yüzeyine etki eden basıncın, kanatların alt yüzeyine etki eden basınca göre daha düşük olmasına ve dolayısıyla kanatların üst yüzeyine etki eden basıncın daha düşük olmasına neden olur. Kaldırma kuvveti, basınç farkından dolayı üretilir. Kaldırma kuvvetinin genel bir tanımı, kaldırma katsayısı, havanın yoğunluğu, cismin hızı ve kanat yüzey alanı arasındaki ilişki olarak ifade edilebilir. (Talay, 1975)

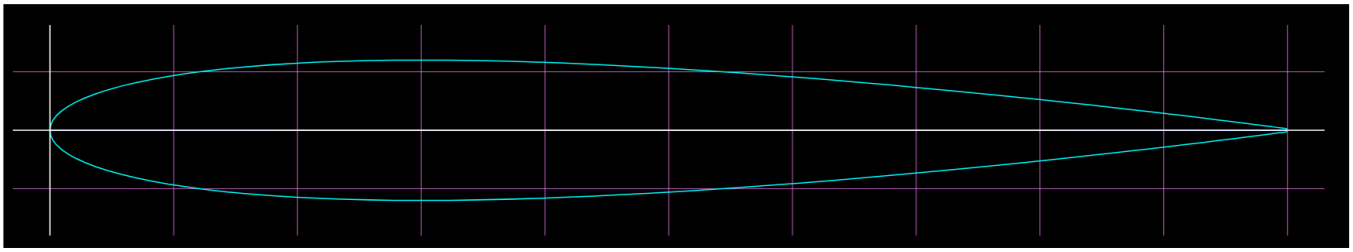
Bir kanadın ürettiği kaldırma kuvveti hava aracının doğrudan performansını etkilemektedir. Günümüzde kanat modellerinin performansını arttırmak için çeşitli pasif ve aktif akış kontrol yöntemleri denenmektedir. Bunlardan biri vorteks jeneratörleri adı verilen yapıların kullanımıdır. Vorteks üreteçleri uçak yüzeyinde en sık kullanılan modifikasyonlardır. Vorteks üreteçleri, sınır tabaka ayrılmasını geciktiren girdaplar oluşturarak türbülans yaratır, bu da basınç direncinin azalmasına ve ayrıca durma açısının artmasına neden olur. Yüksek hücum açısında basınç direncini azaltmaya yardımcı olur ve ayrıca hava aracının genel kaldırmasını arttırır (Fouatih vd., 2016; Jukes vd., 2012; Reuss vd., 1995; Siauw vd., 2010; Wendt & Reichert, 1996).

Kanat üzerindeki akışı manipüle etmenin bir başka yolu da kanat üzerine oyuklar açmaktır. Oyuklar, potansiyel enerjiyi kinetik enerjiye yeniden enerji vererek türbülanslı sınır tabakası oluşturarak akış ayrılma noktasını geciktirir (Guglielmo & Selig, 1996). Uçağın kanat yapısının oyuklar yerleştirilerek modifiye edilmesi, sürüklemeyi toplam sürüklemeden önemli bir miktara indirecek ve stall sırasında hava aracının dengelenmesine yardımcı olacaktır (Kundu, 2020; Livya vd., 2015; Mustak, 2017; Sowmyashree vd., 2020).

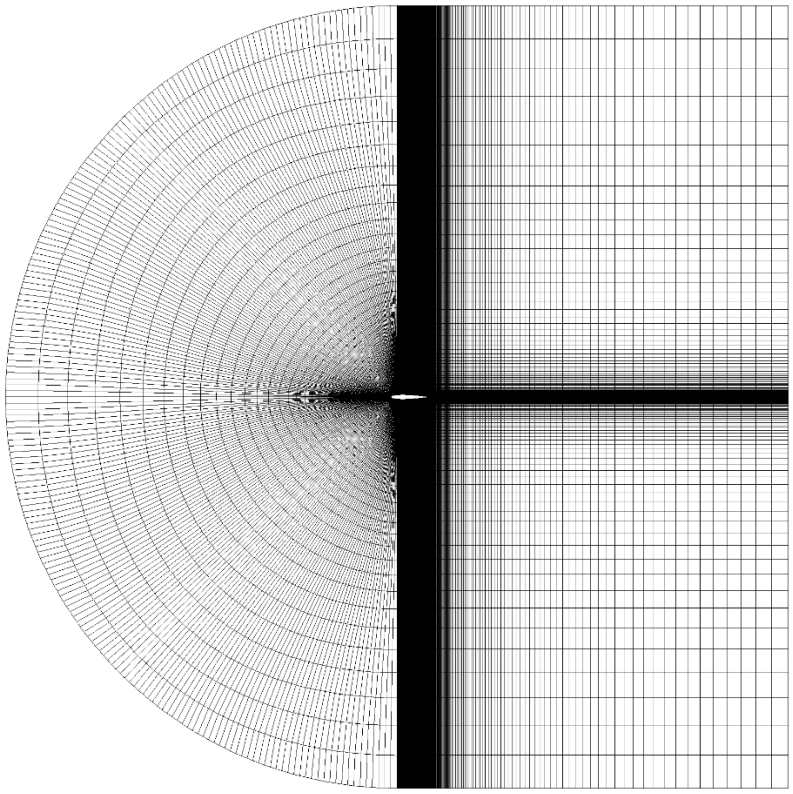
Bu çalışmada NACA – 0012 kanat modelinin üzerine eklenen oyukların oluşturduğu pasif akış kontrolünün cisim üzerindeki kaldırma ve sürüklenme kuvvetlerine olan etkisi hesaplamalı akışkanlar dinamiği yöntemi ile incelenmiştir.

MATERYAL VE METOT

NACA – 0012 kanat profili üzerinde yoğun olarak çalışılmış bir kanat profili olduğundan ve literatürde çok miktarda deneysel ve hesaplamalı çalışma verisi mevcut olduğu için seçilmiştir. Bu kanat profili, yüksek manevra kabiliyeti gerektiren uçaklarda ve bazı ticari uçakların yatay ve dikey stabilizatörlerinde yaygın olarak kullanılmaktadır. Bu çalışmada kullanılan iki boyutlu model, Şekil 1'de gösterilmiştir. Hesaplamalar için gerekli ağ yapısı Şekil 2'de gösterilmiştir. Oluklar dairesel olarak seçilmiş, olukların çapı ise kiriş uzunluğunun % 1'i olarak alınmıştır. Hesaplamalar yapılırken hava akışı hızı 88.6531 m/s ve yoğunluk 1.225kg/m^3 olarak alınmıştır. Reynolds benzerliği kurulduğunda çalışmadaki Reynolds sayısı 6x10^6 olarak hesaplanmıştır.



Şekil 1. NACA – 0012 kanat profili



Şekil 2. Problemin çözümü için oluşturulan ağ yapısı

Spalart – Allmaras Türbülans Modeli

HAD modelinde, sırasıyla denklemler (1) ve (2) ile verilen kütlenin (süreklilik) ve momentumun (RANS denklemleri) korunumunu tanımlamak için kısmi diferansiyel denklemler kullanılarak sabit, sıkıştırılamaz, izotermal akış varsayımlarında bulunulmuştur.

Süreklilik

$$\frac{\partial \bar{U}_\iota}{\partial x_j} = 0 \tag{1}$$

Ortalama momentum taşınımı

$$\frac{\partial\left(\bar{U}_\iota \bar{U}_J\right)}{\partial x_j} = -\frac{\partial \bar{P}}{\partial x_i} + \frac{\partial}{\partial x_j}\left\{\mu_i\left(\frac{\partial \bar{U}_\iota}{\partial x_j} + \frac{\partial \bar{U}_J}{\partial x_i}\right) - \rho\overline{u_\iota' u_J'}\right\} \tag{2}$$

Denklemleri ile ifade edilir. Akışkan türbülansının etkisi nedeniyle Reynolds gerilmesi teriminin $u_i' u_j'$ mevcudiyeti bulunduğu için RANS denklemleri diğer denklemlerden daha fazla değişken içerir. Denklem sistemini kapatmak için, bir türbülans modeli kullanılarak Reynolds gerilmeleri için yaklaşımlar sunulmuştur. Spalart-Allmaras modeli için taşıma denklemi denklem 3'te gösterilmiştir.

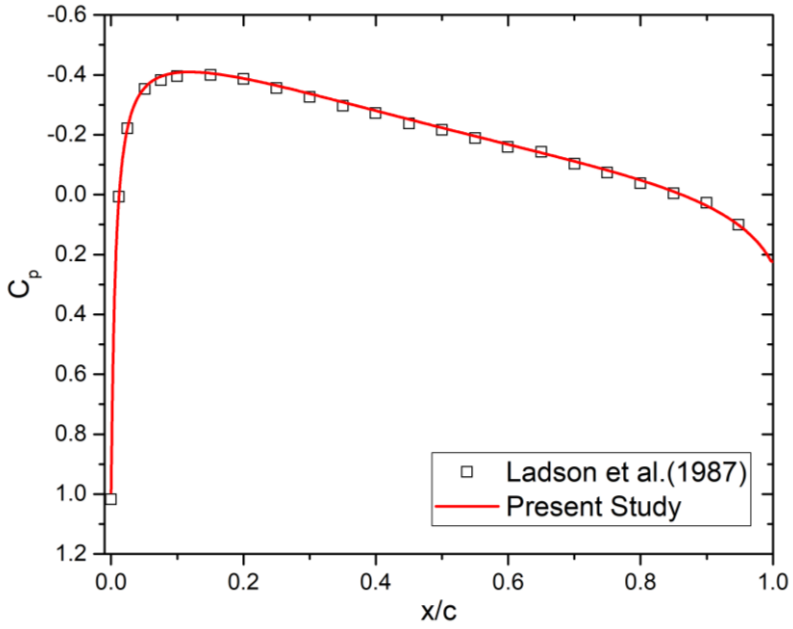
$$\frac{\partial(\rho\tilde{\nu})}{\partial t} + \frac{\partial(\rho\tilde{\nu}u_i)}{\partial x_i} = G_\nu + \frac{1}{\sigma\tilde{\nu}}\left[\frac{\partial}{\partial x_j}\left\{(\mu + \rho\tilde{\nu})\frac{(\rho\tilde{\nu})}{\partial x_j}\right\} + C_{b2}\rho\left(\frac{\partial\tilde{\nu}}{\partial x_j}\right)\right] - Y_\nu + S_{\tilde{\nu}} \tag{2}$$

Burada $\tilde{\nu}$ türbülans kinematik viskozitesini, G_ν türbülanslı viskozite üretimini, Y_ν ise türbülans viskozite yıkımını ifade eder. $\sigma\tilde{\nu}$ ve C_{2b} sabitlerdir ve ν, laminer kinematik viskozitedir, $S_{\tilde{\nu}}$ ise kullanıcı tanımlı bir kaynak terimdir.

BULGULAR VE TARTIŞMA

Pürüzsüz kanat profilinin hesaplanan sonuçları deneysel (Ladson vd., 1987) ve sayısal (Ladson, 1988) sonuçlar ile karşılaştırılmıştır. Bu sayede hesaplamaların doğruluğu sağlanmıştır. Şekil 3'te pürüzsüz kanat profilinin yüzey basınç katsayısının literatürdeki (Ladson vd., 1987) sonuçlar ile karşılaştırılması verilmiştir. Elde edilen sayısal sonuçların deneysel sonuçlar ile oldukça uyumlu olduğu görülmektedir. Tablo 1'de yapılan çalışmanın sürükleme ve kaldırma katsayılarının sonuçlarının daha önce yapılan sayısal çalışma (Ladson, 1988) ile oldukça uyumludur. Özellikle α=0° hücum açısında neredeyse aynı sürükleme katsayısı elde edilmiştir.

Düz modelin validasyonu sağlandıktan sonra aynı model kullanılarak kanat modeli üzerinde farklı konumlarda dairesel çukurlar oluşturulmuştur. Bu çalışmada, biri düz ve kalan diğer kanat profillerinin uzunluğunun %67'sinde ilk oyuk olacak şekilde tek, iki ve üç oyuklu kanat profili kullanılmıştır. Pürüzsüz kanat profilinin sonuçları, bu üç farklı kanat profilinin sonuçlarıyla karşılaştırılmıştır.

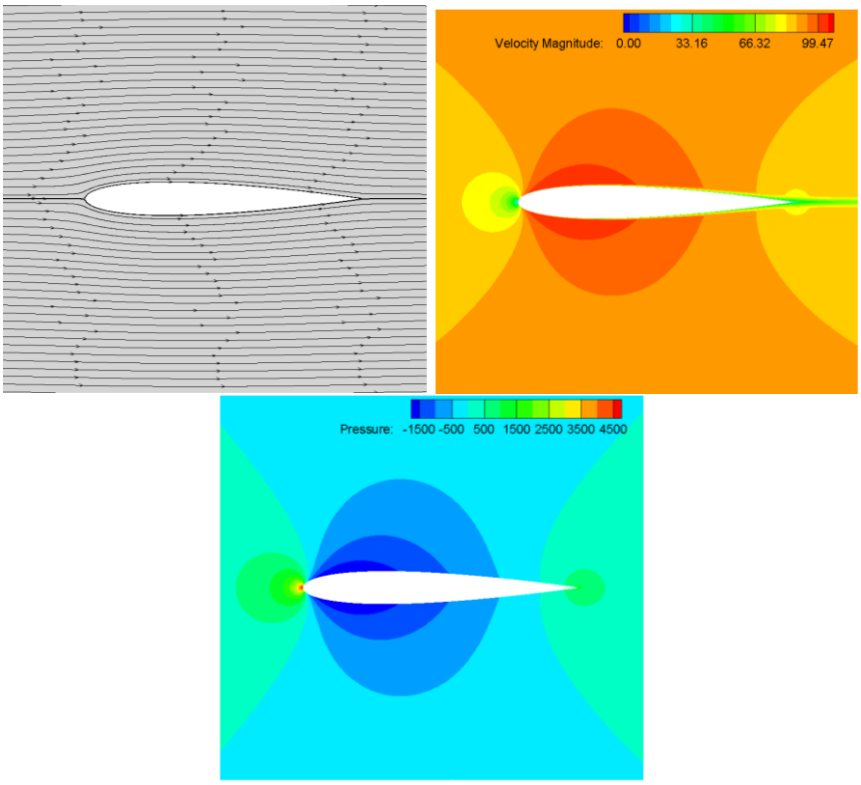


Şekil 3. Pürüzsüz kanat profilinin yüzey basınç katsayısı

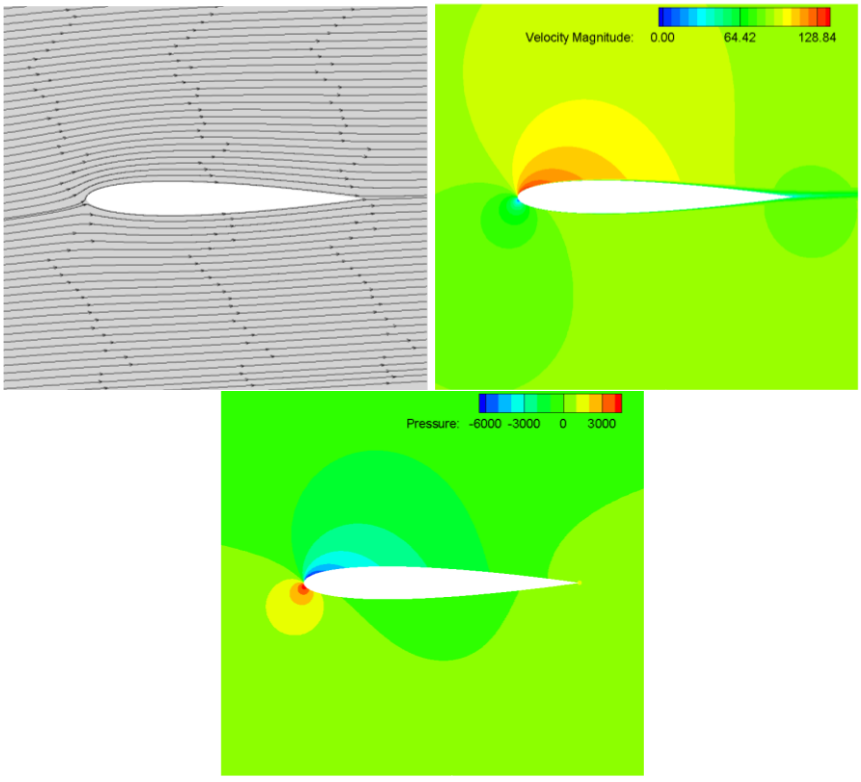
Tablo 1. Yapılan çalışmanın sürükleme ve kaldırma katsayılarının literatür ile uyumu

	Ladson, 1987		**Yapılan Çalışma**	
Hücum açısı	**Cd**	**Cl**	**Cd**	**Cl**
α=0°	0.00807	0.0064	0.00808	0.0006
α=4°	0.0082	0.435	0.0090	0.437

Şekil 4 ve 5 incelendiğinde sıfır derecelik hücum açısı konfigürasyonunda hız ve basınç konturlarının simetrik olduğu görülmektedir. Bu durumda kanat profili üzerinde bir kaldırma kuvveti oluşmamaktadır. Hücum açısı arttığında kanat profilinin üst bölgesindeki basıncın azaldığı, alt yüzeydeki basıncın ise arttığı görülmüştür. Bu durumda kaldırma kuvvetinin oluştuğundan bahsedilebilir.



Şekil 4. α=0º Hücum açısında akım çizgileri, ortalama hız ve ortalama basınç konturu

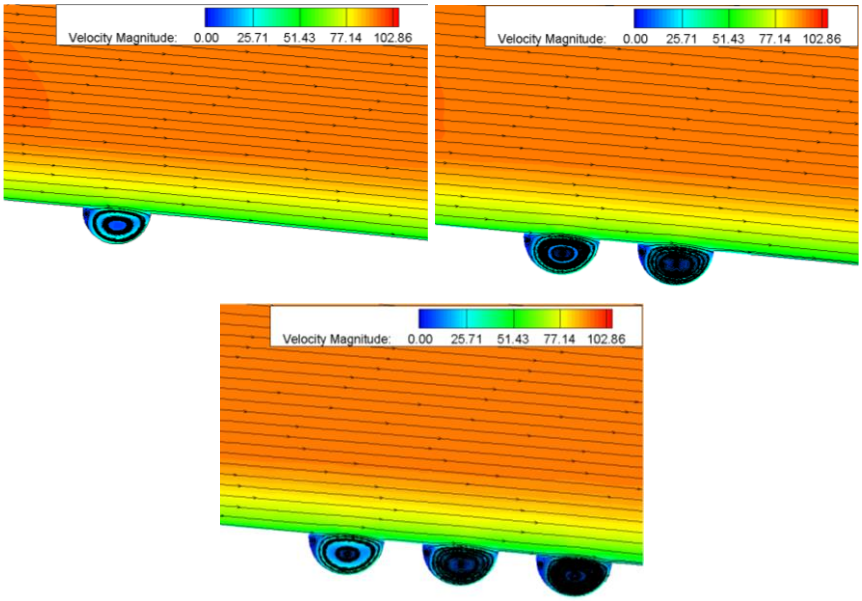


Şekil 5. α=4º Hücum açısında akım çizgileri, ortalama hız ve ortalama basınç konturu

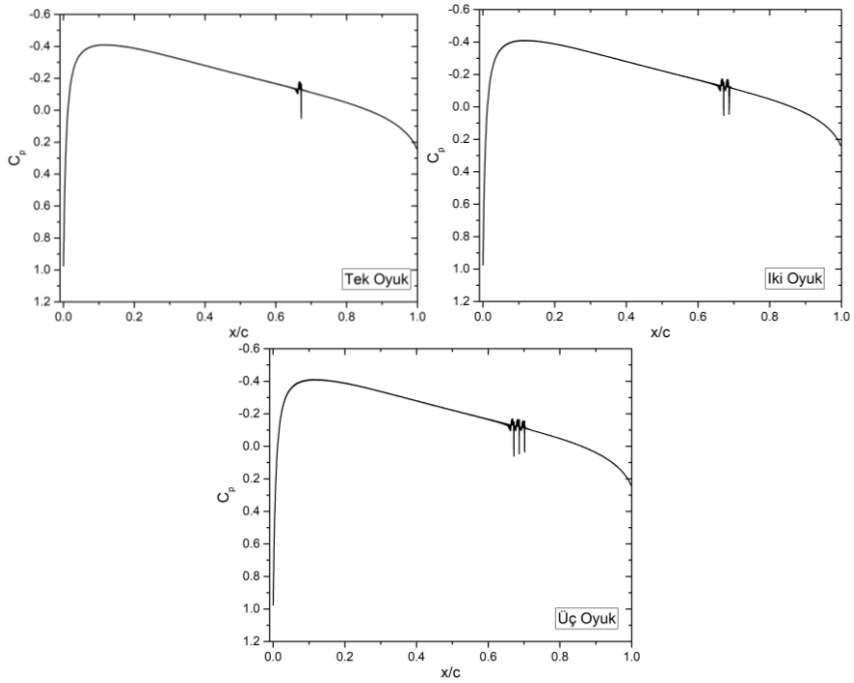
CFD analizi, 2D NACA0012 oyuklu ve düz kanat profilleri üzerinde yapılmıştır. Kiriş uzunluğunun %67'si konumu dışındaki farklı mesafelerindeki oyuklar iyi performans göstermemiştir. Buradan hareketle kirişin %67'si konumunda bulunan oyukların sayısı arttırılarak hesaplamalar gerçekleştirilmiştir. Tablo 2'de sürüklenme ve kaldırma kuvvetlerinin oyuk sayısı ile değişimi verilmiştir. Oyuklu kanat profilinde kirişin %67'sinde α=0° hücum açısında kaldırma katsayısı artmış ve sürüklenme katsayı ise azalmıştır. α=0° hücum açısında oyuk sayısı arttıkça hem sürükleme hem de kaldırma katsayıları artarken, α=4° hücum açısında ise en yüksek sürükleme ve kaldırma katsayısı tek oyukta elde edilmiştir. Şekil 6'da kanat profilinin üzerinde kirişin %67'si konumunda bulunan dairesel oyuklar etrafındaki akış yapısının akım çizgileri ve hız konturları verilmiştir. Şekil 7'de üç farklı oyuk sayısında α=0° hücum açısında basınç katsayısını değişimi gösterilmektedir. Oyukların neden olduğu ani basınç düşüşü ve yükselişi görülmektedir.

Tablo 2. Oyuk sayısının sürüklenme ve kaldırma katsayılarına olan etkisi

	Cd	Cl	Hücum Açısı
Pürüzsüz	0.00808	0.0006	0°
	0.009	0.435	4°
Tek Oyuk	0.007406	0.001007	0°
	0.02198	0.4375	4°
İki Oyuk	0.007463	0.00199	0°
	0.02181	0.4361	4°
Üç Oyuk	0.007519	0.002874	0°
	0.02168	0.435	4°



Şekil 6. Üç farklı oyuk sayısında α=0° hücum açısında akım çizgileri ve ortalama hız konturu detay görseli



Şekil 7. Üç farklı oyuk sayısında α=0º hücum açısında basınç katsayısı

SONUÇ

Bu çalışmada NACA 0012 kanat profili üzerinde dairesel oyuklar açmak sonucunda meydana gelen kaldırma ve sürükleme katsayısı değişimleri analiz edilmiş ve pozitif hücum açısında karşılaştırılmıştır. Elde edilen sonuçlar, kiriş uzunluğunun %67'sinde konumlandırılmış tek oyuğun, çukurlu kanat profili için kaldırma katsayısının düz kanat profiline kıyasla %68 arttırdığını göstermektedir. Sürükleme katsayısı ise aynı kanat profili için %8 oranında azaltıldığı görülmektedir. Oyukların kanat profili üzerindeki konumu ve sayısı önemli bir rol oynamaktadır.

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MARKET ORIENTATION AND DAIRY FUNCTIONAL FOOD IN SMALL AND MEDIUM ENTERPRISES PERFORMANCE IN HUNGARY

Mohammad Mohammad[1*], Dr. habil SZIGETI Orsolya[2*]

*[*1]Szent István University Kaposvár Campus, Institute of Marketing and Management, Faculty of Economics, Gödöllő, Hungary.*
*[*2]Szent István University Kaposvár Campus, Institute of Marketing and Management, Faculty of Economics, Gödöllő, Hungary.*

ABSTRACT

Functional food is one of the main directions of healthy lifestyle, and dairy food processors have seen escalating levels of competition over the previuse three decades due to its positive influence on health because of the usage of raw materials of natural origin. Therefore, it attracted the interest of consumers and manufacturers concerning human healthy and sustainable economic growth. SMEs represent the greater part of European food firms and it is very difficult to adapt market changes due to the high competetion with big enterprises. This review is part of Ph.D thesis incorporates the theory of market orientation (MO) (competitor orientation, customer orientation, and interfunctional coordination) which has recently received considerable attention in both marketing and the strategic management literature. In our review, we are foucsing on the small and mediume enterprices (SMEs) working in the dairy fuctional food sector to explain the importance of intraction between (MO) and (SMEs) performace in Hungary.

Keywords: Market orientation, Dairy Functional food, SMEs performance, Hungary.

1. INTRODUCTION:

In our globalized world the mindset and business practice of companies has changed, it is constantly Changing. The instability of Global Markets, the Sustainability crisis, and the constant changes in Consumer Demand are few of the local and global challenges. Companies are facing tough times to stay and stay competitive. The secret of successful companies has many facets, one of which is a well-chosen competitive strategy. Most of the national companies use different types of strategies and practices to Adjust to the national capabilities (Szabó-Szentgróti et al., 2017). (Ungerman et al., 2018) also concurred that marketing strategies and market orientation are part of the marketing concepts that differed significantly from the original marketing methods. Marketing strategies were the implementation of new marketing methods that involve significant changes in product design, packaging, product placement, product promotion or pricing to increase the benefits, income, and sales (Gituma, 2017). The operation of smaller enterprises diverges in several ways from the logic of the general market orientation models. These are worth calling attention to, and we must assess the research results dealing with them. In their case, personal attitudes can have a significant influence on the culture, operation, and learning abilities of the organization in terms of marketing and market orientation knowledge (Cegarra-Navarro & Rodrigo-Moya, 2007). Marketing strategies are an important element of development to ensure better performance of SMEs. There was a substantial association between strategy and performance at the firm (Spillan & Parnell, 2006). According to (Sok et al., 2013), marketing orientation is one of the key contributors to SMEs' performance. This was

supported by (Stokes et al., 2010) that the impact of marketing orientation on competitive advantage and business performance would encourage SMEs to emulate marketing strategies with innovative approaches to achieve better performance. Meanwhile, market orientation refers to the implementation of the new marketing concept which consisted of three elements namely inter-functional coordination, customer orientation, and competitor orientation (Kohli & Jaworski, 1990; Narver & Slater, 1990). However, inter-functional coordination is less appropriate for small-sized firms than large-scale organizations. The authors also described market orientation as the organization culture that most effectively and efficiently for continuous superior performance for the business (Narver and Slater, 1990; Kohli et al., 1990).

In our research project mainly dairy functional food SMEs in Hungary are involved, therefore the literature review will focus in this sector due to contributing to economic development and studying their performance is essential for understanding the health of the economy. For the last some decades, the strategic orientation of businesses such as learning orientation, technology orientation, entrepreneurial orientations market orientation and customer orientation has gained considerable attention from management, marketing and entrepreneurship scholars since these orientations are assumed as principles which direct and impact the activities of a firm and generate the behaviours intended to ensure its sustainability & performance (Hakala, 2011). Furthermore, spread of diet- and lifestyle-related diseases of civilization is continually increasing around the world, and obesity, hypertension, cardiovascular disease and diabetes carry severe personal, economic and social burdens on a global scale. Consequently, the role of disease prevention has become strategically important and a growing scale of consumer groups has realized that proper nutrition can beneficially influence their quality of life (Mullin & Delzenne, 2017; Szakály et al., 2016). This new trend presents new challenges for the food industry: companies must develop and commercialize food products that, due to their health preservation values, are capable of preventing the spread of diseases of civilization. The increasing number of consumers requiring a special diet due to health problems or lifestyle decisions has opened up new opportunities for operators in the food chain. This could designate the directions for the development of products of the Hungarian food industry. Since functional food products can only be successful in the market if they meet consumer expectations.

2. LITERATURE REVIEW:

2.1. Market Orientation (MO):

Market orientation (MO) is the degree to which an organization applies the marketing concept in their strategic and tactical marketing decisions (Jaworski, B.J., Kohli, 1993; Kohli & Jaworski, 1990). MO has been found to be an antecedent in the creation of superior customer value, increasing competitive capacity, and enhancing financial performance (Narver & Slater, 1990). While MO has typically been explored at the customer–marketer dyad unit of analysis; there has been increasing interest in exploring the efficacy of MO at the value chain level of analysis (Baker & Sinkula, 1999; Langerak, 2001). In the field of marketing, the concept which has attracted the interest of many scholars is market orientation (Marketing Science Institute, 1990). As a result, a great number of studies have been seen in the last decade, which has approached market orientation from a fundamentally dual perspective: either as a cultural aspect or as a constituent part of organisations' culture or as a series of specific conducts in accordance with this orientation (Kohli & Jaworski, 1990).

The concept of market orientation has been viewed as the culture that mainly effectively and efficiently create superior value for customers through customer orientation, competitor orientation as well as inter-functional coordination (Narver & Slater, 1990). Customer orientation refers to "the sufficient understanding of one's target buyers to be able to create superior value for them continuously". that places customer's interest first and requires a thorough understanding of client needs so as to products

or services of superior value; competitor orientation difined as, “a seller’s understanding of the short term strengths and weaknesses and the long-term capabilities and strategies of both the key current and potential competitors” and that leads to gather information about competitors help the firm to reposition its offering so as to prepare for the future survival of the entity; and inter functional means that “the coordinated utilization of a business’s resources in creating superior value for target customers”, that interprated to all the department in the business must coordinate well with each other in all aspect of the business operations (Narver & Slater, 1990).

Market orientation is very important to businesses as a result of intense global competition and fluctuations in consumer needs, companies must organize their activities with a strong focus on their markets, in order to survive (Kurtinaitiene, 2005; Mahmoud et al., 2010). Looking critically at explanations given by authors with respect to market orientation, one theme that runs through the meaning is that, businesses need to gather some sort of information from the business landscape and implement decisions based on such information in order to create value for stakeholders. Maintaining that a firm has to foster business-wide interdepartmental synergy by effectively integrating its entire human and other capital resources in its continuous effort to create superior value for buyers. (Narver & Slater, 1990) explain market orientation primarily must have long-term focus both in relation to profits and in implementing each of the three behavioural components and they argue that more market orientation improves the analysis of sources of sustainable competitive advantage. The effective use of resources and capabilities results in competitive advantage for an organization (Lado et al., 1998). Moreover, to sustain this advantage, companies need organizational knowledge that is not easily replicable by competitors. This kind of knowledge happens through the market orientation process and is innovation per se. Again, others see market orientation as part and parcel of firms’ culture and process as it may be facilitated by factors that are internal to the organization (Harris & Ogbonna, 2001).

2.2. Market orientation and business performance:

Market orientation is very significantly important in aiding organizations to have clear understanding of the market place and develop suitable and proper products and service strategies to meet customer needs and requirements (Liu, 2009). A researcher reported positive relationship between market orientation and firm performance. (Julian et al., 2007) believed that, market orientation represents a major marketing strategy that can be adopted by business organization to improve its performance. The contradictory results reported by previous studies suggest that the relationship between market orientation and performance may be more complex and the impact cannot be viewed in a simple manner (Baba, 2012). In case of Hungarian SMEs, there are three factors significantly associated with leadership styles to higher market orientation: The industry, the size of the business, and the location of the company, and results confirmed that market orientation is significantly and positively related to financial performance. This means that the SME leader should pay closer attention to collect information and create market intelligence pertaining to current and future customer needs, to disseminate this intelligence across departments and to respond to it organization-wide (Polereczki et al., 2016).

2.2.1. Customer orientation and firm performance: The main aim of customer orientation is to lay a solid foundation of gaining information concerning current and future clients for strategic actions based on sufficient information provided by customer, hence resulting in creating improved superior value to the customer base. As an aspect of market orientation has to do with the culture of placing customers’ interest first and requires a thorough understanding of client needs so as products or services of superior value (Narver & Slater, 1990). Customer orientation is commonly seen as an aspect of firm’s strategic means of delivering desires value to clients (Zhou & Tse, 2005). Different surveys showed that consumer acceptance of functional foods is far from being unconditional, with one of the main conditions for acceptance pertaining to taste, besides, product quality, price,

convenience and trustworthiness of health claims. As a rule, consumers seem to evaluate functional foods first and foremost as foods (Németh et al., 2020; Szakos et al., 2020).

2.2.2. Competitor orientation and firm performance: For businesses to be competitive, it is required of them to know the weaknesses and strengths as well as capabilities and activities of competitors. Information that is gathered about competitors helps the firm to reposition its offering so as to prepare for the future survival of the entity (Narver & Slater, 1990). Competitor orientation as part of market orientation is seen as an organizational strategy to improve on the products they deliver to customers. The Hungarian SMEs sector has innovation shortage and shareholder communication is not conceptual and productive enough (Sára et al., 2014). SMEs survival rate and business entry is different all over the world depending on the business environment. SMEs sector need different strategy approaches both in Hungary and internationally. Productivity discrepancies translate into unequal wages in the SMEs sector compared to large companies (Rabelo et al., 2016).

2.2.3. inter-functional coordination and firm performance: The final component of market orientation, as indicated by (Narver & Slater, 1990), is the**.** This component called for the coordination of personnel and other resources of the various functional units throughout the enterprise in other to create value for buyers (Slater & Narver, 2000). For example, engineering and production staff in manufacturing industries should regularly discuss their capabilities and limitations with those in sales and marketing, so that capabilities can be leveraged and limitations avoided, when promoting products/services (Slater & Narver, 1994). analysed the difference between size categories of milk processing enterprises and results showed a much higher realized return on assets in the case of large companies compared to smaller ones (Tacken et al., 2009). However, dairy companies with Hungarian ownership could raise their financial performance and market share in the last few years (Tálas & Rózsa, 2015).

2.3. Small and medium enterprices performace:

Business performance is a company's ability to adapt to the business environment and develop a good strategy that complement management's ability to create harmony between the environment and internal company. Organization performance has also been explained as the capability of firm to accomplish its goals and objectives with the help of talented administration, good governance and have a constant rededication to accomplish business objectives. As far as business performance is concerned, it can be perceived from two perspective: judgmental performance and objective performance (Agarwal et al., 2003). (Tuan et al., 2016) argued that, enterprise performance can be identified as a multidimensional concept that can be measured by three indicators: production, finance and marketing. (Brown & Guzmán, 2014) concluded that firms that have more propensity to innovate are the largest, with high technological intensity and market share. Researchers have indicated that judgmental measures of performance are significant to profitability whereas objective measures of performance throw more light on profitability in most service organizations (Agarwal et al., 2003). An enterprise is defined as any legal entity possessing the right to economic activity and to conduct business on its own, for example to enter contracts, own property, sustain liabilities and open bank accounts. Enterprises are classified in different categories according to their size based on criteria such as the number of employees and annual turnover. Small and medium-sized enterprises (SMEs) employ fewer than 250 people and their annual turnover does not exceed EUR 50 million. SMEs are further subdivided into micro enterprises with fewer than 10 employees and an annual turnover and/or annual balance sheet total less than EUR 2 million and small enterprises with 10 to 49 employees and an annual turnover and/or annual balance sheet total not exceeding EUR 10 million. This indicator is measured as the number of employees in manufacturing (European Commission, 2021). Small and

medium entrepreneurship (SMEs) sector is made up of providers of a prosperous and strong economy. SMEs have a significant weight in the growth of the economy of a country. SMEs contribute to economic progress in numerous ways: by providing job opportunities for rural and urban areas, supporting required sustainability and innovation, supplying products and services in the economy as a whole. A large number of people rely on the small and medium enterprises and most of the current larger enterprises have started as SMEs.

Milk production and processing is one of the main agro-food sectors in Hungary, and Hungarian milk sector plays an important role in the Central-European region. Among Member States which acceded the European Union as from 2004, Hungary has the second largest share (1.2%) from the total EU-27 milk production, after Poland (6%) (Tacken et al., 2009). In the case of agri-food SMEs, relevant and reliable information on a product's ingredients and production processes is needed so that companies can recall their products in case of food safety concerns (Füzesi et al., 2016). Those food processing in SMEs which are adequately financed still lack qualified professional staff, only half of the SMEs prepare a business plan, a quarter of them does not even have a vision in writing, there is no brand building or marketing strategy (Csath, 2011).

It was highlighted that there is a significant difference between Hungarian agricultural enterprises according to their size; the small sized enterprises (mostly family farms) are unable to develop and they are lagging behind the better-developed large agricultural companies (Törné Dunay Anna, 2012). According to the Eurostat database, 127 enterprises operated in milk processing sector in 2016, with a sample of (37 enterprises) covers 30% of the total population. SMEs are emphasized more due to the higher number of SME companies and higher market influence. On the other hand, SMEs take much smaller share of the export than large companies. Most of the European SMEs (90%) are successful on the local market, typically within their own region (Óhegyi, 2013).

Hungarian dairy industry shows a rather diverse picture. The majority of the dairy sector is not up-to-date and modern enough (Szabó-Szentgróti et al., 2017). Despite growth and opportunities, challenges are expected for milk processing companies, one of the main problems could be the environmental sustainability in the forthcoming period (Chen & Holden, 2018). The length and the degree of complexity of food supply chains depend on the product and market characteristics (Commission, 2016). One of the biggest problems is the high rate of stocks and receivables; the financing between creditors and receivers has many problems. Most of the agricultural enterprises have liquidity problems (Aranka et al., 2010). After analyzing the performance of the Hungarian agricultural enterprises and the food-processing sector, results show that most of the agricultural enterprises can not take the advantages of several supports (e.g. tax allowances) because of their poor financial performance (Hustiné Béres, 2012). The advantages of the accession translated to expanded market, the co-financed investments and modernization programmers, the higher income level increased by the payments etc. But advantages could not be utilized by most of the farms (Illés et al., 2012). According to the results of collected information concerning to the general market orientation is typical of the respondents, and few of them have particular information about their own product. Otherwise, they believe that their market research activity is at the required level. It shows that they are unaware of the lack of information and do not believe it is a barrier from the point of view of their market success. (Polereczki et al., 2016).

Managers say the biggest problems for them are selling their products. They claimed that the trading companies had stronger marketing positions and that they could not compete with foreign dairy products. According to company executives, they want to innovate different products but it costs more and are not well paid by the market. From a corporate point of view it was shown that retail stores and wholesale stores (chains) are the main activities of daily product sales; direct marketing was marginally present. consumers report that there is more demand for direct sales from companies. Processors should

pay more attention to this type of application in the future. Direct selling can be developed in two ways in case of the companies. The first one is to run own shops in towns/villages, or even in markets. Secondly, online selling will prove to be an extremely good alternative of producers considering direct selling (Szabó-Szentgróti et al., 2017). It is difficult to fulfil the new technological conditions for milk producing (Paura & Arhipova, 2016). Research and development costs have a negative impact on the innovation performance in the case of small and medium sized enterprises operating in the Hungarian food supply chain (Török et al., 2019). The results also indicate the sustainability challenges that dairy manufacturers have to face, and the authors implemented an energy consumption model (Zhang et al., 2018). The competitiveness of dairy manufacturers can be increased through cost reduction that is enabled by environmentally sound technologies (Vőneki et al., 2015).

3. CONCLUSIONS AND RECOMMENDATIONS

The concept of market orientation has been viewed as the culture that mainly effectively and efficiently create superior value for customers through customer orientation, competitor orientation as well as inter-functional coordination. MO represents a major marketing strategy that can be adopted by business organization to improve its performance. MO improves the analysis of sources of sustainable competitive advantage. SMEs have a significant weight in the growth of the economy of a country. However, SMEs sector need different strategy approaches both in Hungary and internationally. In Hungarian SMEs dairy sector, there are three factors significantly associated with leadership styles to higher MO: The industry, the size of the business, and the location of the company, many researches proved that MO is significantly and positively related to financial performance. The trading companies had stronger marketing positions and that they could not compete with foreign dairy products. Those food processing in SMEs which are adequately financed still lack qualified professional staff, only half of the SMEs prepare a business plan, a quarter of them does not even have a vision in writing, there is no brand building or marketing strategy, innovation shortage, shareholder communication is not conceptual and productive enough. Dairy functional food products can only be successful in the market if they meet consumer expectations. the biggest problems for them are selling their products. That's why direct selling could be the solution and can be developed in two ways in case of the companies. The first one is to run own shops in towns/villages, or even in markets. Secondly, online selling will prove to be an extremely good alternative of producers considering direct selling.

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THE RAMSEY NUMBERS FOR THETA GRAPHS VERSUS THE WHEEL GRAPHS

M.M.M. Jaradat
Department of Mathematics, Statistics and Physics College of Arts and Sciences, Qatar University 2713, Doha-Qatar

ABSTRACT

The study of the Ramsey numbers of graphs (exact or bound) form an important family of the extremal graph theory problems. For a set of graphs W and a graph H, the Ramsey number $R(W;H)$ is the smallest positive integer r for which every graph G on r vertices, G contains a graph in W as a subgraph or the complement of G contains H as a subgraph. Ramsey numbers of various graphs including cycles, book, complete, theta graphs and wheels have been extensively studied. We present the known results on Ramsey problem and We extend known results in the area by presenting exact values of the Ramsey numbers for a class of graphs, in specic theta graphs verses wheel graphs.

AMS subject classications [2010]: Primary 05C55; Secondary 05C35, 05C38, 05C45.

Keywords: Ramsey number, theta graphs, Wheel graphs.

JEOTERMAL KAYNAKLAR VE DOĞAL MİNERALLİ SULAR KANUNU KAPSAMINDA KAMULAŞTIRMA UYGULAMASI

Meltem KUTLU GÜRSEL[1]
[1]*Dokuz Eylül Üniversitesi, Hukuk Fakültesi, İdare Hukuku Anabilim Dalı, İzmir, Türkiye.*
[1]*ORCID Code: 0000-0002-3334-0832*

ÖZET

5686 sayılı Jeotermal Kaynaklar ve Doğal Mineralli Sular Yasası nın 12. Maddesinde düzenleme "irtifak ve kamulaştırma" başlığını taşımaktadır. Kamu yararı amacıyla idare tarafından yapılan kamulaştırma işlemi, ruhsat sahibinin lehine kullanım yaratacağı için Anayasa'nın 35. Maddesi bağlamında da değerlendirilmesi gerekir. Jeotermal kaynak arama ruhsat sahibinin hakları ile jeotermal işletme ruhsatı sahibinin haklarının kapsamı bir birinden farklı olup, özel hukuk kişisi ruhsat sahibinin hangi aşamada irtifak veya kamulaştırma talebiyle idareye başvurabileceğinin belirlenmesi gerekmektedir. Mülkiyet hakkının tescili ve kamulaştırma amacının ortadan kalkması halinde eski malikin taşınmazını tekrar elde etme koşullarının tartışılması önem taşımaktadır. Bu çalışmada kamulaştırmanın özel bir idari usul olması nedeniyle, 2942 sayılı Kamulaştırma Kanunu ve 5686 sayılı Yasa arasındaki bağın kurulması amaçlanmaktadır. Ayrıca yenilebilir enerji kaynak alanlarında ilgili mevzuat ile bağ kurmak suretiyle kamulaştırma işlemleri, mevzuat ve uygulama açısından içtihatların ışığında değerlendirilmektedir.

Anahtar kelimeler: Kamulaştırma, jeotermal enerji kaynağı arama ruhsatı, jeotermal enerji kaynağı işletme ruhsatı, YEKA

EXPROPRIATION APPLICATION UNDER THE LAW ON GEOTHERMAL RESOURCES AND NATURAL MINERAL WATER

Meltem KUTLU GÜRSEL[1]
[1]*Dokuz Eylül Üniversitesi, Hukuk Fakültesi, İdare Hukuku Anabilim Dalı, İzmir, Türkiye.*
[1] *ORCID Code: 0000-0002-3334-0832*

ABSTRACT

In the 12th article of the Geothermal Resources and Natural Mineral Waters Law No. 5686, the regulation has the title of "easement and expropriation". Since the expropriation process carried out by the administration for the purpose of public interest will create use in favor of the license holder, it should also be evaluated in the context of Article 35 of the Constitution. The scope of the rights of the geothermal resource exploration license holder and the rights of the geothermal operation license holder are different from each other, and it should be determined in which stage the private legal person license holder can apply to the administration with a request for easement or expropriation. It is important to discuss the conditions for re-acquiring the immovable property of the former owner in the event that the purpose of registration of the property right and expropriation disappears. In this study, it

is aimed to establish the connection between the Expropriation Law No. 2942 and the Law No. 5686, since expropriation is a special administrative procedure. In addition, expropriation procedures in renewable energy resource areas are evaluated in the light of jurisprudence in terms of legislation and implementation by establishing a connection with the relevant legislation.

Keywords: Expropriation, geothermal energy resource exploration license, geothermal energy resource operation license, YEKA.

GİRİŞ

5686 sayılı Jeotermal Kaynaklar ve Doğal Mineralli Sular Kanunu[55] 2007 yılında yürürlüğe girmiştir. Bu tarihe kadar jeotermal kaynakların aranması ve işletilmesinde Maden Kanunu'nda yer alan geçici 4. maddeye dayanılarak uygulama yapılmıştır. Jeotermal kaynak; 5686 sayılı Yasası 3. maddenin birinci fıkrasının altıncı bendine göre, jeolojik yapıya bağlı olarak yerkabuğu ısısının etkisiyle sıcaklığı sürekli olarak bölgesel atmosferik yıllık ortalama sıcaklığın üzerinde olan, çevresindeki sulara göre daha fazla miktarda erimiş madde ve gaz içerebilen, doğal olarak çıkan veya çıkarılan su, buhar ve gazlar ile yeraltına insan düzenlemeleri vasıtasıyla gönderilerek yerkabuğu veya kızgın kuru kayaların ısısı ile ısıtılarak su, buhar ve gazların elde edildiği yerlerdir. MTA'nın resmi internet sitesine göre[56], jeotermal kaynak potansiyeli bakımından Türkiye çok zengin olup, jeotermal enerji kurulu gücü 2018 yılı sonu verilerine göre 14.9 GWe düzeyinde olup, dünyada jeotermal enerjiden elektrik üretiminde ilk 5 ülke içerisindedir. Diğerleri ABD, Filipinler, Endonezya,Yeni Zelandadır. Elektrik dışı kullanım ise 70.000 MWt i aşmıştır. Türkiye'de jeotermal enerjiden elektrik üretimi, ısıtma (sera ve konut), termal ve sağlık turizmi, endüstriyel mineral eldesi, balıkçılık, kurutmacılık vb. gibi alanlarda yararlanılmaktadır.

Jeotermal kaynaklar, Anayasa'nın 168. maddesi uyarınca devletin hüküm ve tasasrrufu altındadır. Bir taşınmazın mülkiyetine sahip olmak, jeotermal kaynağı kullanım hakkı vermez. Çünkü jeotermal kaynaklar mülkiyet hakkına konu edilemez. Bu kaynakları, devletler insanlığın ortak mirası olarak gelecek kuşaklara bırakmakla yükümlüdür. Bu nedenle de Devlet, jeotermal kaynakları doğrudan doğruya işletebileceği gibi, özel hukuk kişileri eliyle işletilmesi konusunda da tasarrufta bulunabilir. Devletin jeotermal kaynakları koruma ve gözetme yükümlülüğünü yerine getirmek suretiyle, sınırları yasada belirlenen kurallar çerçevesinde bu kaynakların özel hukuk kişileri eliyle aranması ve işletilmesi de mümkündür. Günümüzde akıllı konutlar, seracılık faaliyetleri, balık çiftlikleri, elektrik üretimi gibi çok geniş bir alanda yararlanılan jeotermal enerjinin 5686 sayılı Yasa bağlamında hukuki alt yapısının değerlendirilmesi ve tartışılması da önemlidir.

5686 sayılı Yasa'dan önce 2005 yılında yürürlüğe giren 5346 sayılı Yenilenebillir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanun[57]da jeotermal kaynaklara da yer verilmiştir. Ancak jeotermal kaynak alanlarının belirlenmesi, korunması ve kullanılmasına ilişkin somut kurallar bu yasada düzenlenmemiştir. 5346 sayılı Yasa, yenilenebilir enerji kaynaklarından elde edilen elektrik enerjisinin

[55] R.G., 13.06.2007, S.26551.
[56]"https://www.mta.gov.tr/v3.0/arastirmalar/jeotermal-enerji-arastirmalari" (08.12.2021)
[57] R.G., 18.5.2005, S. 25819.

belgelendirilmesi ve bu kaynakların kullanımına ilişkin usul ve esasları kapsar. 5346 sayılı Yasaya, terim ve kavramlar bakımından 14/3/2013 tarihli ve 6446 sayılı Elektrik Piyasası Kanununa gönderme yapan bir kural eklenmiştir. 5686 sayılı Yasa yürürlüğe girmesiyle, jeotermal kaynak alanlarının kullanımının hukuki rejiminin belirlenmesi konusunda önemli bir adım atılmıştır.

Jeotermal kaynak taşınmazın mülkiyet hakkı kapsamında olmadığı, diğer bir ifadeyle devletin hüküm ve tasarrufı altında olduğu için jeotermal kaynak arama ve işletilmesi faaliyetlerinde özel hukuk kişisinin mülkiyetindeki taşınmazların kullanımına ihtiyaç duyulabilir. Yenilenebilir enerji kaynağı niteliğindeki jeotermal enerji kaynağının aranması ve işletilmesinde özel yasa niteliğinde olan 5686 sayılı Yasa'nın 12. Maddesinde jeotermal kaynak faaliyetlerinde ihtiyaç duyulacak olan özel hukuk kişisinin mülkiyetindeki taşınmazlar üzerinde irtifak hakkı tesisi veya taşınmazın mülkiyetinin kamulaştırılabileceği konusunda özel hüküm bulunmaktadır.

Bu bildiride amacımız özel hukuk kişisinin taşınmazının hangi koşullarda kamulaştırılacağını belirleyen Anayasa'nın 46. Maddesi ve kamulaştırma yetkisinin kullanımında idari usulü özel olarak düzenleyen 2942 sayılı Kamulaştırma Kanunu ile 5686 sayılı Yasa'nın 12. Maddesi arasındaki bağı kurarak, jeotermal kaynak arama ve işletme faaliyetleri sürecinde kamulaştırma yetkisininin kullanımını ve uygulamasını değerlendirmektir. Bu çerçevede ilkin kamulaştırma kavramı, jeotermal kaynak alanlarında kamulaştırmanın konusu, özel hukuk kişisinin mülkiyetinin bir başka özel hukuk kişisinin talebi üzerine kamulaştırılmasının anayasa uygun olup olmadığının değerlendirilmesi, kamulaştırılan arazinin mülkiyetinin kime ait olacağı, kamulaştırma bedelinin kimin tarafından ödeneceği ve en önemlisi de arama veya işletme faaliyeti sonucunda kamulaştırılan taşınmazın mülkiyetinin ne olacağı hususlarını uygulama örnekleri ile değerlendireceğiz.

KAMULAŞTIRMA KAVRAMI VE JEOTERMAL KAYNAK ALANLARINDA KAMULAŞTIRMA İŞLEMİNİN KONUSU

Kamulaştırma, devlet veya kamu tüzel kişilerinin yerine getirmekle yükümlü oldukları kamu hizmetlerinin yürütülmesinde kullanılmak üzere, kamu yararı amacıyla, özel hukuk kişisinin mülkiyetinde bulunan taşınmazın (kaynak veya irtifak hakkının), malik ile satın alma sürecinde bedel konusunda anlaşılamaması nedeniyle, idarenin başvurusu üzerine asliye hukuk mahkemesi tarafından tespit edilecek gerçek karşılığının idarece ödenmesi halinde mülkiyetinin mahkemenin tescil kararı ile idareye geçmesine ilişkin idari ve adli aşamadan oluşan karma bir işlemdir (Kutlu Gürsel, 2019).

Kamulaştırma işlemi, özel hukuk kişisinin mülkiyetindeki taşınmazlarının mülkiyetinin idareye geçmesi hukuki sonucunu meydana getirir. Bu nedenle devletin hüküm ve tasarrufu altındaki yerler kamulaştırma işleminin konusunu oluşturmaz. Jeotermal kaynak da kamulaştırma işleminin konusunu oluşturmaz. Jeotermal kaynaklar tıpkı madenler gibi devletin hüküm ve tasarrufu altındadır. Bu alanlar nitelikleri gereği mülkiyet hakkına da konu olamaz (Onar, 1966). Devlet, egemenlik yetkisine dayanarak jeotermal kaynakları işletme yetkisine sahiptir.

Doğal kaynaklar üzerinde halkların ve devletlerin "sürekli egemenliği" ilkesi geçerlidir. Bu ilkenin içeriği Birleşmiş Milletler Genel

Kurulu'nun 14.12.1962 tarihli ve 1803 (XVII) sayılı "Doğal Kaynaklar Üzerindeki Sürekli Egemenlik Bildirisi" ile belirlenerek, kabul edilmiştir (Pazarcı, 2021). Devletin doğal kaynaklar üzerindeki sürekli egemenlik ilkesi, 1976 yılında yürürlüğe giren Birleşmiş Milletler Medeni ve Siyasi Haklara İlişkin Sözleşme ile BM Ekonomik, Sosyal ve Kültürel Haklara İlişkin Sözleşmede yer almaktadır. Her iki Sözleşmenin de 1. maddesinin 2. fıkrasında da bu ilke şu şekilde düzenlenmektedir: ***"Bütün halklar, kendi amaçları doğrultusunda karşılıklı yarar ilkesine dayanan uluslararası ekonomik işbirliği ve uluslararası hukuktan doğan yükümlülüklerine halel getirmemek kaydıyla, kendi doğal zenginlik ve kaynaklarından özgürce yararlanabilirler. Bir halk hiçbir durumda, kendi varlığını sürdürmesi için gerekli olanaklarından yoksun bırakılamaz."***

Bu durum özellikle yabancı yatırımlar açısından da önem taşımaktadır. Yatırım yapılan devletin sınırları içindeki devletin hüküm ve tasarrufu altındaki kaynakları kamulaştırmama, millileştirmeme gibi eş etkili önleyici kurallar ile devletin kendisini bağlayıcı bir taahhütte bulunması egemenlik yetkisinin devri olarak nitelendirilebilir (Kutlu Gürsel, 2019) Nitekim gelişmekte olan ülkeler açısından Birleşmiş Milletler Ekonomik, Sosyal ve Kültürel Haklara İlişkin Sözleşme'nin 25. Maddesinde "*Bu Sözleşmenin hiçbir hükmü, tüm halkların, doğal zenginlik ve kaynaklarından tam olarak özgürce yararlanma ve bunları kullanma konusunda kendiliğinden sahip bulundukları hakları haleldar edecek şekilde yorumlanamaz.*"

Sonuç olarak; devletin, jeotermal kaynaklar üzerindeki yetkisi, Türk Medeni Kanunu kapsamında mülkiyet hakkının bahşettiği bütün yetkileri kapsamamaktadır (Karakuş, 2010). Devlet, hüküm ve tasarrufu altındaki yerlerde egemenlik yetkisinden kaynaklanan bir denetim ve gözetim yetkisine sahiptir (Duran, 1986). Bu yerleri egemenlik yetkisine dayanarak işletebilir veya işlettirebilir, gelir elde edebilir (Gülan, 1999). Jeotermal kaynaklar üzerinde devletin dahi devir ya da satış yetkisi bulunmamaktadır. Devlet, egemenlik yetkisinin sahibi olarak, jeotermal kaynak rezervini tüketmeksizin rezervin yenilenebilirliğini koruyucu önlemler altında kullanılıp kullanılmadığını objektif bir şekilde denetlemekle yükümlüdür.

Jeotermal kaynak arama faaliyetinde kamulaştırma yoluyla irtifak hakkı tesisi ve işletme faaliyetlerinde kamulaştırma işleminin konusu, jeotermal kaynak alanını kapsayan bölgede yer alan özel hukuk kişilerinin mülkiyetindeki taşınmazlardır. Jeotermal kaynakların aranması ve işletilmesi faaliyetlerini devlet bizzat yapabileceği gibi, özel hukuk kişileri eliyle de bu hizmetleri gördürebilir (Gözübüyük ve Tan, 2021). Devlet bu kaynakları Enerji ve Tabii Kaynaklar bakanlığının kamu tüzel kişiliğini haiz bağlı kuruluşu niteliğindeki Maden Tetkik Arama Genel Müdürlüğünün kuruluş görev ve yetkileri bağlamında arayabileceği gibi, özel hukuk kişileri eliyle de arayabilir.

Özel hukuk kişisi ruhsat sahibi olarak bu arama veya işletme faaliyetlerini yürütürken proje kapsamındaki faaliyetle ilgili olmak koşuluyla faaliyet alanında yer alan özel hukuk kişisinin mülkiyetinde bulunan taşınmazın kullanımına ihtiyacı olabilir. Ruhsat sahibi, taşınmazın mailiki ile kullanım konusunda anlaşamaz ise, arama faaliyetinde kullanılacak taşınmazın üzerinde kamulaştırma yoluyla irtifak hakkı tesisi, işletme projesi kapsamında ise taşınmazın kamulaştırılması için idareye başvurabilir.

Jeotermal Kaynak Arama ve İşletme Faaliyetinde Özel Hukuk Kişisinin Başvurusuyla İdare Tarafından Bir Başka Özel Hukuk Kişisinin Taşınmaz Mülkiyetinin Kamulaştırılmasının Değerlendirilmesi

Jeotermal kaynak arama[58] ve işletme faaliyetleri[59] bakımından jeotermal kaynak, arzın mülkiyetinden ayrıdır. Bu kaynağın yer altında aranması ve bulunan kaynağın da işletilmesi faaliyetleri teknik açıdan yüksek maliyetli ve uzmanlık gerektiren faaliyetlerdir. Çoğu zaman da bu faaliyetlerin yürütüldüğü yeraltındaki jeotermal kaynağın bulunduğu bölgedeki taşınmazlar (arazi, arsa) özel hukuk kişilerinin mülkiyetindedir.

5686 sayılı Yasa'nın 5. maddesine göre, jeotermal kaynak arama ruhsatına özel hukuk kişisinin sahip olması, arama ruhsat sahibine o kaynağı işletme hak ve yetkisi vermemektedir. Arama ruhsatına sahip olan özel hukuk kişisinin işletme ruhsatına sahip olması konusunda haklı beklentisi oluşmuş olsa da (Oğurlu, 2003) bu durum kazanılmış hak anlamına gelmez. İşletme ruhsatı almak için ayrıca 5686 sayılı Yasa'daki koşulların sağlanması gerekmektedir. Danıştay 8. İdari Dava Dairesi de bir kararında bu hususu vurgulamaktadır. ***"İdarenin ister düzenleyici işlem, ister bir taahhüt, isterse uzun süren bir uygulamasına güvenerek olsun, bireylerin çıkarlarına ya da lehlerine olan bir sonuca ulaşabileceklerini ümit etmelerine de "haklı beklenti" denilmektedir****. Olayda, davacının ruhsatlı sahası içerisinde bulunan kuyunun, ruhsat sınırına 57 metre mesafede yer aldığı, yukarıda yer verilen Yönetmelik değişikliği ile getirilen "açılacak olan tüm üretim/reenjeksiyon kuyularının kuyu içi koordinatları ile ruhsat sınırı arasındaki mesafenin 100 metreden az olamayacağı" şartının sağlanmadığı gerekçesiyle davacıya işletme ruhsatı verilmesinin uygun olmadığı belirtilmiş ise de; davacının anılan değişiklikten önce uyuşmazlık konusu kuyuya ilişkin olarak 14.08.2013 tarihli dilekçesiyle davalı idareden izin istediği ve davalı idarenin aralarında jeoloji mühendisinin de bulunduğu elemanlarınca sahanın incelenerek gerekli tedbirlerin alınması koşuluyla sondajın yapılmasının uygun olduğunun belirtildiği; buna istinaden verilen **sondaj kuyusu açma iznine güvenen davacı tarafından kuyunun açılması için gerekli planlama ve harcamaların yapılmaya başlandığı, her arama ruhsatı sahibinin işletme ruhsatı alabilmek için kazanılmış hakkı olduğunun kabulü mümkün olmamakla beraber** davacının işletme ruhsatı alabilmesine engel olan durumun sondaj kuyusunun ruhsat sınırına olan uzaklığından kaynaklandığı ve fakat somut uyuşmazlıkta davacının ruhsat sahasının genişliğinin (eninin) 180 metre olduğu, bu durumda davacının arama faaliyeti sonucunda bulduğu jeotermal kaynağı üretebilmesi, kullanabilmesi ve bu faaliyetlere yönelik sondaj çalışması yürütebilmesinin imkansız hale geldiği; zira 180 metre içerisindeki herhangi bir noktada kuyu açılması halinde

[58] 5686 sayılı Yasanın 3. maddesinin 23. bendine göre arama faaliyeti, jeotermal sistemden akışkan elde etmek amacıyla jeolojik araştırmalarla başlatılan, jeokimyasal ve jeofizik çalışmalarla desteklenen, yapılan tüm çalışmalara ait verilerin değerlendirilmesi sonucu belirlenen lokasyon veya lokasyonlarda amaç ve tekniğine uygun olarak jeolojik takiple açılan sondaj çalışmaları ile üretime yönelik test çalışmalarını da içeren projede belirtilen faaliyetler bütününü ifade eder.

[59] 5686 sayılı Yasa'nın 3. Maddesinin 25. Bendine göre, arama faaliyetleri sonucunda elde edilen kaynağın üretim, kullanım, reenjeksiyon, enjeksiyon, deşarj ve bu faaliyetlere yönelik sondaj çalışmalarını içeren projede belirtilen faaliyetler bütününü ifade eder.

kuyunun sınırlara ya da diğer sınıra olan mesafesinin mutlaka 100 metreden az olacağı, bunun ise ***haklı beklenti içerisinde bulunan davacı açısından hakkaniyete aykırı bir durum oluşturduğu anlaşılmaktadır****."*(D.8.D 15.11.2018, E. 2017/6058, K. 2018/7021).

5686 sayılı Yasa'nın 12. Maddesi jeotermal kaynak arama faaliyetinde idareye kamulaştırma yetkisi vermemekte, fakat kamulaştırma yoluyla irtifak hakkı tesisi yetkisi vermektedir. Jeotermal kaynak işletme faaliyetinde ise idarenin kamulaştırma yetkisi vardır. Ancak idarenin bu yetkiyi kullanması için kamu yararı kararı alması gerekir. Anayasa'nın 46. Maddesi ve 2942 sayılı yasa kapsamında kamulaştırma kamu yararı amacıyla yapılabilir. Özel hukuk kişisi yararına kamulaştırma yapılamaz. Jeotermal kaynak arama ve işletme ruhsat sahibinin özel hukuk kişisi olması nedeniyle ilk bakışta kamulaştırma yapılamayacağı ileri sürülebilir ise de, ruhsat sahibi özel hukuk kişilerinin yürüttüğü faaliyet devletin gözetim ve denetimi altında yürütülen bir faaliyettir. Jeotermal kaynaklarla ilgili özel yasa niteliğindeki 5686 sayılı Yasa'daki bu kural "özel kural" niteliğindedir.

5686 sayılı Yasa'nın 12. maddesi işletme ruhsatı süresince **sadece sondaj yerleri ve isale hattı, kaptaj gibi** gerekli olan yerler için taşınmazın sahibi ile anlaşma sağlanamaz ise ruhsat sahibine, idareye müracaat ederek kamulaştırma veya irtifak hakkı talebinde bulunabilme olanağı sağlamaktadır. Kısaca **kamulaştırma işlemi, jeotermal kaynak işletme ruhsatı sahibinin projesi kapsamındaki işletme faaliyeti için gerekli ise idarece kamu yararı kararı alınarak yapılabilir.** Proje kapsamı dışındaki işletme faaliyeti ile ilgili idarenin 12. Maddeye göre kamulaştırma yetkisi bulunmamaktadır. Arama ruhsatı sahibinin arama faaliyeti aşamasında kamulaştırma talebinde bulunması mümkün değildir. Yasa koyucu kamulatırma talebi başvurusunu işletme ruhsatı sahibine vermektedir.

Arama ruhsatı sahibi, taşınmazın kamulaştırılmasını talep edememekle birlikte, taşınmaz üzerinde irtifaka hakkı tesisi talebiyle idareye başvurabilir. Arama ruhsatı lehine taşınmaz üzerinde irtifak hakkı talebi tesisinde de yine Kamulaştırma Kanununda yer alan 4. madddedeki kural uyarınca "Taşınmaz malın mülkiyetinin kamulaştırılması yerine, amaç için yeterli olduğu takdirde taşınmaz malın belirli kesimi, yüksekliği, derinliği veya kaynak üzerinde kamulaştırma yoluyla irtifak hakkı kurulabilir..." Medeni Kanundaki irtifak hakkı tesisi iki özel hukuk kişisinin karşılıklı ve birbirine uygun irade beyanları ile kurulur. Eğer arama ruhsatı sahibi ile taşınmaz maliki anlaşırsa sorun yoktur. Anlaşamaz ise bu durumda arama ruhsatı sahibi idareye başvurarak irtifak hakkı talebinde bulunur. İşte bu durumda taşınmaz özel hukuk kişisine ait ise idare tek yanlı işlemi ile KK'daki kurallara uygun olarak zorlayıcı tek yanlı idari işlem ile arama ruhsatı sahibinin kullanımı için idare lehine irtifak hakkı tesis eder. Bu işlem "kamulaştırma yoluyla irtifak hakkı" tesisi olarak adlandırılır.

Jeotermal kaynakların aranması ve işletilmesinin hukuki rejimi kamu hukuku kurallarına tabidir. Jeotermal kaynak faaliyetlerinde özel hukuk kişilerine ait taşınmazların kamulaştırılmasına izin veren 5686 sayılı Yasa'nın 12. maddesindeki kural, idareye kamulaştırma yetkisi vermektedir. Fakat bu kuralın Anayasa'nın 35. ve 46. maddelerine uygun olarak uygulanması zorunludur.

Anayasanın 35. Maddesine göre *"Herkes, mülkiyet ve miras haklarına sahiptir. Bu haklar, ancak kamu yararı amacıyla, kanunla sınırlanabilir. Mülkiyet hakkının kullanılması toplum yararına aykırı olamaz."* Mülkiyet hakkını düzenleyen bu kural ""kişi hak ve ödevleri" arasında yer almaktadır. Mülkiyet hakkı ancak ve ancak kanun ile sınırlanabilir. Kamulaştırma işlemi ise mülkiyet hakkını sınırlandıran bir işlem olmayıp, mülkiyet hakkına son veren bir işlemdir (Kutlu Gürsel, 2019). Bu nedenle Anayasa'nın 46. maddesi, Anayasanın 35. maddesine istisna getirmiş ve bu istisnai uygulamanın çerçevesini de çizmiştir. Normlar hiyerarşisi bakımından 2942 sayılı Kamulaştırma Kanunu Anayasanın bu maddesine uygun olarak kamulaştırmada uygulanacak idari usulü belirleyen temel yasa niteliğindedir. Anayasa'nın 46. maddesi uyarınca özel hukuk kişisinin mülkiyetindeki taşınmaz, devlet ve kamu tüzel kişileri tarafından ***kamu yararı amacı*** ile kamulaştırılabilir. Kamu yararı olmaksızın kamulaştırma işlemi yapılamaz. Aksi tutum Anayasa'nın 46. maddesine aykırı olacaktır. Durum böyle olunca 5686 sayılı Yasa'nın 12. maddesindeki kuralın anayasaya uygun olup olmadığı hususunun öncelikle değerlendirilmesi gerekir.

Bu değerlendirmeyi yapmak için KK 2. Maddesindeki "idare" içinde geçen "gerçek ve özel hukuk tüzel kişileri" deyiminin hukuki anlamını belirlemek gerekir. Bir özel hukuk kişisi bir başka özel hukuk kişisinin taşınmazını kamulaştıramayacağına göre, özel hukuk kişisi jeotermal kaynak işletme ruhsatı sahibinin de özel hukuk kişisinin taşınmazını kamulaştırma yetkisi yoktur. Jeotermal kaynak işletme ruhsatı sahibinin doğrudan doğruya bizzat kamulaştırma yapması idare hukuku açısından hiçbir hukuki sonuç meydana getirmez. Diğer bir ifadeyle özel hukuk kişisinin kamulaştırma yapması yok hükmündedir. Jeotermal kaynaklar ile ilgili olmasa da özel hukuk kişilerinin kamulaştırma yetkisi olmadığına dair örnek kararlar şu şekildedir.

"… Anonim Şirket İdare Meclisince verilen kararın iptali isteğiyle açılan davanın, bir hususi hükmi şahıs olan davacı şirketin idare meclisinin özel kişilere ait taşınmaz malın kamulaştırılmasına karar veremeyeceği, İdare'ye ait yetki gasp edilerek verilen bu kararın yok hükmünde olduğu ve ortada idari bir makam tarafından verilmiş dava konusu olabilecek bir kamulaştırma kararı bulunmadığından…" (D. 6. DD., 21.2.1968, E.1966/2621, K.1968/524).

"… İzmir Yüksek İslâm Enstitüsü genişleme alanı ile ilgili imar planı değişikliği işlemi Dairemizce iptal edilmiş olduğundan dava konusu kamulaştırma işleminin dayanağı kalmamış bulunmaktadır. Diğer yandan, Anayasa'da ve 6830 sayılı Kanunda açıklandığı üzere kamulaştırmayı kamu tüzel kişileri ve kamu müesseseleri yaparlar. Hususi şahıslar için kamulaştırma ise, ancak <<mahsus kanunlarında>> hüküm bulunması halinde mümkündür. Dolayısıyla kamu kurumu olmayıp özel hukuk tüzel kişisi olan İzmir Yüksek İslâm Enstitüsü Yaptırma ve Koruma Derneğinin özel yasa hükmü bulunmaksızın okul yeri kamulaştırma kararı alması açıkça yasaya aykırıdır, hiçbir hukuki değer taşımaz. Bu nedenle dava konusu kamulaştırma kararının hükümsüz (yok) sayılmasına …" (D.6.DD, 13.5.1981, E.1980/1388, K: 981/1547, D.D., S.44- 45, s.256).

Anayasa Mahkemesi, "özel kişi yararına" kamulaştırma yapılamayacağını, özel kanunlarda hüküm bulunması halinde ne yönde işlem

tesis edileceğini göstermek amacıyla Kamulaştırma Kanunun bu ifadeyi kullandığını belirtmektedir:

"Anayasa'nın 38'inci maddesi, mülkiyet hakkına ilişkin genel kuralın bir istisnası olan kamulaştırmanın hangi durumlarda yapılabileceğini açıklamış ancak nasıl yapılacağını kanuna bırakmıştır. 6830 sayılı Kanun, kamulaştırmanın nasıl yapılacağını göstermektedir. Çeşitli kamulaştırmalarda bir usul birliğine varılmasını gerçekleştirmek üzere çıkarılmış, böyle olduğu için, kapsamı belirten 1'inci maddede özel kişiler yararına yapılacak kamulaştırmalara da yer verilmiştir.

Dava konusu hüküm, özel kişiler yararına kamulaştırma yapılabilmesini sağlayan bir kural koymuş değildir. Bu hüküm, yalnızca özel kanunlarda böyle bir yetkinin bulunması halinde ne yolda işlem yürütüleceğini göstermektedir.

Maddedeki "Hususi şahıslar lehine mahsus kanunlarına müsteniden yapılacak istimlâkler" deyimi bu konuda herhangi bir tereddüde yer bırakmayacak açıklık ve kesinliktedir. Özel kanunu yetki vermiyorsa, özel kişiler yararına dava konusu hükme dayanılarak kamulaştırmaya gidilmesi düşünülemeyeceği gibi bu hüküm bulunmasa, yahut kaldırılmış veya iptal edilmiş olsa dahi özel kanunun verdiği kamulaştırma yetkisi yürürlükte kaldıkça kamulaştırma hükmünün işleyeceğinde şüphe yoktur.

Şu duruma göre özel kişiler yararına kamulaştırma yapılabilmesinde Anayasa'ya aykırılık bulunup bulunmadığının incelenme yeri, dava konusu hüküm değil, ancak böyle bir kamulaştırmaya yetki veren özel kanunlardır. Dava, bu türlü yasalar hakkında açılmış olmadığından yalnızca özel kişiler yararına, özel kanunlarına dayanılarak yapılacak kamulaştırmaların 6830 sayılı Kanundaki usul ve esaslara bağlı tutulması durumunun Anayasa'ya aykırı bulunup bulunmadığının incelenmesi ile yetinilmesi gerekir. Üyelerden İbrahim Senil, Hakkı Ketenoğlu ve Muhittin Taylan bu görüşe katılmamışlardır.

Anayasa'nın 38'inci maddesi kamulaştırma esas ve usullerinin kanunlarda göstereceğini açıklamaktadır. Dava konusu hüküm de özel kişiler lehine mahsus kanunlarına dayanılarak yapılacak kamulaştırmalarda 6830 sayılı İstimlâk Kanununda yazılı esas ve usullerin uygulanacağını belirtmekte bulunmuştur. Böyle olunca hükmün Anayasa'ya aykırılığı düşünülemez. Davanın reddi gerekir" (Anayasa Mahkemesi, 28.12.1965, E.1963/66, K.1965/67, R.G., 19.4.1966, S.12278).

2942 sayılı Yasa'nın 2. maddesinin tasarı gerekçesinde (Tutanak Dergisi, 1983, C.11, B.175-189, S.683) de eski yasa dönemindeki Anayasa Mahkemesi kararının gerekçesine benzer bir ifadeye yer verilmektedir. Özel kişiler adına kamulaştırma yapmak için Kamulaştırma Kanunu dışında tıpkı 5686 sayılı Yasa'nın 12. Maddesinde olduğu gibi, özel bir yasada, kamulaştırma ile ilgili açık bir kurala gereksinim bulunmaktadır.

5686 sayılı Yasanın 12. Maddesi de jeotermal kaynaklar ile ilgili olarak işletme ruhsatı sahibine kamulaştırma talebiyle yetkili idareye başvuru hakkı vermektedir. Taşınmaz malikinin taşınmazını kamulaştırma yetkisi vermemektedir. Kamulaştırma yetkisi KK 5 ve 6. Maddelere uygun olarak yetkili idarenin kullanması gerekmektedir.

Jeotermal kaynağın işletilmesinde k**amu yararı gereği** özel hukuk kişisine kamulaştırma talep etme yetkisi tanınabilir. İşte bu durumda uygulanacak kurallar 2942 sayılı Yasa'da yer almaktadır. KK 5 ve 6'ncı maddeler de özel bir yasada; örneğin Maden Kanunu 46'ncı maddede olduğu gibi, açık bir kural bulunması halinde, uygulamanın nasıl yapılacağını gösteren kurallar niteliğinde değerlendirilmektedir. Ancak bu tür kamulaştırma yapma yetkisi veren özel kanunlardaki kural/kuralların anayasaya aykırılık riskinin kuvvetli olduğunu da belirtmeliyiz (Kutlu Gürsel, 2019). Nitekim Anayasa Mahkemesi Maden Kanunu 46'ncı madde ile ilgili 1993 yılında verdiği kararın gerekçesinde, özel hukuk kişileri adına kamulaştırmayı öngören özel yasadaki hükmün, anayasaya uygunluk bakımından denetlenebileceğini belirtmektedir (Anayasa Mahkemesi, 22.9.1993, E.1993/8, K.1993/31, R.G., 16.4.1994, S.21907). Anayasa'nın 35'inci maddesi bakımından yapılan değerlendirmede Anayasa Mahkemesi maden işletme ruhsatı sahibi olan özel hukuk kişisi tarafından yürütülen belli süreli maden işletme çalışmaları konusunda gerçekleştirilecek kamu yararının karşılanması gereksiniminin, eski malikin yararından üstün tutulması gerektiğini vurgulamaktadır. Jeotermal kaynak işletilmesi ile gerçekleşecek kamu yararının, kamulaştırılacak taşınmazın malikinin yararından üstün tutulması gerekir. Ayrıca tarım arazileri veya zeytinlik alanlarda yürütülen jeotermal kaynak işletme faaliyetleri ile ilgili olarak, 5403 sayılı Toprak Koruma ve Arazi Kullanımı Kanunu ve 3573 sayılı Zeytinciliğin Islahı ve Yabanilerinin Aşılattırılması Hakkında Kanunun 20. maddesindeki emredici kuralların uygulanmasının da devletin yükümlüğünde olduğu gözardı edilmemelidir. Türkiye'de jeotermal potansiyel oluşturan alanların % 78'i Batı Anadolu'da bulunmaktadır. Türkiye'deki jeotermal kaynakların ise %10'u elektrik enerjisi üretimi için uygundur (https://www.mta.gov.tr/v3.0/arastirmalar/jeotermal-enerji-arastirmalari" (08.12.2021).

Sonuç olarak, genel yararın gerektirdiği durum olsa dahi, yasada açık kural yok ise özel kişi yararına kamulaştırma yapılamaz. Hatta bu tür durumlarda, açıkça özel hukuk kişisi yararına kamulaştırmayı öngören "özel yasa"da, kamulaştırmayı hangi idarenin yapacağı, kamulaştırma amacının sona ermesi halinde eski malikin geri alma hakkı, kamulaştırma bedelinin ödenmesi, mülkiyetin kime ait olacağı gibi hususların da açıkça düzenlenmesi gerekmektedir. Aksi takdirde, özel hukuk kişisi yararına idareye kamulaştırma yetkisi veren kuralın Anayasaya aykırılığı ileri sürülebilir.

5686 sayılı Yasa2nın 12. maddesine göre, kamulaştırma yoluyla irtifak hakkı bedeli veya kamulaştırma bedeli ruhsat sahibi tarafından ödenir. Kamulaştırılan taşınmazın mülkiyeti ise idareye ait olur. Yalnızca kamulaştırılan taşınmazın kullanımı rusat sahibine ruhsat süresi boyunca tahsis edilir. Kamulaştırılan taşınmaza ihtiyaç kalmaz veya ruhsat süresi sona erer ise, eski malike idare tarafından durum yazılı olarak tebliğ edilir. Eski malik tebliği izleyen altı ay içinde idareye KK'ya göre hesaplanan taşınmaz bedelini ödeyerek taşınmazını geri alabilir. Eğer eski malik taşınmazını geri alma hakkını kullanmaz ise, taşınmaz idarenin mülkiyetinde kalır.

JEOTERMAL KAYNAK ALANLARINDA KAMULAŞTIRMA YAPMAYA YETKİLİ İDARE

Jeotermal kaynak alanında kamulaştırma yapmaya yetkili idare, Büyükşehirlerde Yatırım İzleme ve Koordinasyon Başkanlıklarıdır. YIKOB,

1 Sayılı Cumhurbaşkanlığı Kararnamesinin 273. Maddesine göre valiye bağlı, kamu tüzel kişiliğini haiz ve özel bütçeli idaredir.

Büyükşehir belediyesi bulunmayan illerde ise, 5686 sayılı Yasa uyarınca kamulaştırma yetkisi il özel idaresine aittir.

Eğer 5686 sayılı Yasa'ya uygun olarak idare henüz kamulaştırma yapmamasına rağmen arama ve işetme ruhsatına sahip özel hukuk kişisi, bir başka özel hukuk kişisinin taşınmazına fiilen müdahale ederse bu durum mülkiyet hakkı ihlali oluşturur. Haksız fiil hükümlerine göre kamulaştırmasız elkoyma iddiasıyla idare aleyhine adli yargıda dava açılabilir. Her ne kadar ruhsat sahibi özel hukuk kişisi olsa da devletin gözetim ve denetiminde bu faaliyeti yürüttüğü için idarenin şirketin hukuka aykırı faaliyetlerini denetleme yükümlülüğü vardır. Ruhsatın özel hukuk kişisine ait olması şirketin haksız yere bir başkasının taşınmazına kamulaştırmasız elkoymasında idareyi sorumluluktan kurtarmaz. Yargıtay'ın bir kararında da 5686 sayılı yasa kapsamında yürütülen faaliyetler ile ilgili kamulaştırmasız elkoyma davalarının kamulaştırma yetkisine sahip idareye açılacağı belirtilmektedir: "*jeotermal enerji nakil hattı geçirilmesi amacıyla boru hattı döşenmesi için dava kendisine ihbar olunan İ... Jeotermal Enerji San. Tic. A.Ş'ye davalılardan İzmir İl Özel İdaresi tarafından arama ve işletme ruhsatı verildiği, 5686 Sayılı Kanun uyarınca da yetkili ve sorumlu idarenin İl Özel İdareleri olduğu, 5686 Sayılı Kanunun 12. maddesiyle getirilen "sondaj yerleri ve isale hattı, kaptaj gibi gerekli olan yerler için taşınmazın sahibiyle anlaşma sağlanamaz ise ruhsat sahibi, idareye müracaat ederek kamulaştırma veya irtifak hakkı talebinde bulunabilir. Talep, idarece incelenip değerlendirildikten sonra uygun bulunması halinde kamu yararı kararı alınır. İrtifak ve kamulaştırma işlemleri, 4.11.1983 tarihli ve 2942 Sayılı Kamulaştırma Kanunu hükümlerine göre yürütülür. İrtifak ve kamulaştırma bedelleri ve masrafları ruhsat sahibince ödenir. Kamulaştırılan taşınmaz, tapuya idare adına tescil edilip, faaliyetler devam ettiği sürece ruhsat sahibi adına tahsis edilir." şeklindeki düzenlemeler dikkate alındığında davaya konu eylemde kamulaştırma yetkisinin İzmir İl Özel İdaresine ait olduğu ve ihbar olunan şirketin de bu idare adına hareket ettiği anlaşıldığından diğer davalı İzmir Büyükşehir Belediye Başkanlığı'na yönelik açılan davanın reddine karar verilmesi gerektiğinin düşünülmemesi doğru görülmemiştir*." (Yargıtay, 18. HD., 27.02.2014, E.2013/21011, K.2014/3519)

SONUÇ

Jeotermal kaynak alanlarında idare kamu yararı amacıyla işletme ruhsatı sahibinin başvurusu üzerine Kamulaştırma Kanunundaki usul kurallarına uymak suretiyle kamulaştırma yetkisine sahiptir. Yasa koyucu bu yetkiyi büyükşehir belediyesi olan illerde, valilik bünyesinde yer alan kamu tüzel kişiliğini haiz YİKOB'na vermiştir. Büyükşehir belediyesi olmayan illerde ise yetki il özel idaresine aittir.

5346 sayılı Yenilenebilir Enerji Kaynaklarının Elektrik enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanun'un 4. Maddesi de kamulaştırma ile ilgili kurallar içermektedir. Fakat 5686 sayılı Yasa jeotermal kaynaklarla ilgili **özel yasa** niteliğinde olduğu için 5346 sayılı Yasa'nın kamulaştırma ile ilgili kuralının jeotermal kaynak alanının bulunduğu bölgede uygulanamayacağını belirtebiliriz.

İşletme ruhsatı sahibi, 5686 sayılı Yasa 12. Madde kapsamındaki irtifak hakkı veya kamulaştırma istemli idareye başvurusunu, ruhsat süresi içinde ve proje kapsamındaki sadece sondaj yerleri ve isale hattı, kaptaj gibi gerekli olan yerler için yapabilir. Yani jeotermal kaynak işletme ruhsatını alırken sunulan proje kapsamındaki işletme faaliyeti ile sınırlı ve işletme için zorunluluk taşıyan taşınmazların kamulaştırılması idareden talep edilebilir. İdare de başvuruyu değerlendirip, kamu yararı kararı almaksızın kamulaştırma yapamaz. Kamulaştırma yoluyla irtifak hakkı tesisi yeterli olacak iken kamulaştırma işlemi yapılmış ise, kamulaştırma işleminin konu, sebep ve amaç unsuru yönünden hukuka aykırı olduğu ileri sürülebilir.

5686 sayılı Yasa kapsamında yürütülen faaliyetler ile ilgili kamulaştırmasız el koyma davaları da kamulaştırma yetkisine sahip idareye karşı açılabilir. Çünkü özel hukuk kişisine verilen ruhsat, idareyi bu faaliyetlerin hukuka aykırı bir şekilde yürütülmesi halinde sorumluluktan kurtarmamaktadır. Jeotermal faaliyetler, özel hukuk kişilerinin mülkiyet hakkı ihlal edilmeksizin yürütülmek zorundadır.

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FRONT LOWER SUSPENSION ARM ANALYSIS USING ANSYS TOPOLOGY OPTIMIZATION

Eren YALÇINÖZ[1]
[1]*Kocaeli University, Engineering Faculty, Mechanical Engineering Department, Kocaeli, Turkey.*
[1]*ORCID Code: 0000-0001-7158-1576*

Burak ASLAN[2]
[2]*Kocaeli University, Engineering Faculty, Mechanical Engineering Department, Kocaeli, Turkey.*
[2]*ORCID Code: 0000-0003-3367-4194*

Okan GÜL[3*]
[3*]*Kocaeli University, Engineering Faculty, Mechanical Engineering Department, Kocaeli, Turkey.*
[3]*ORCID Code: 0000-0002-1617-1029*

ABSTRACT

In this study, it is aimed to lighten the mass of the swing arm used in the automotive industry, which is manufactured with Aluminium alloy by topology optimization. After the static analysis results obtained, a new topological geometry was obtained with the topology optimization module in the sample ANSYS 19.1 package program. This newly obtained topological geometry was subjected to static analysis again and compared with the new results.

Maximum stress values and critical regions were determined by making static analysis in ANSYS 19.1 program under the boundary conditions accepted by the company for the existing part. The conventional part is topology optimized to reduce mass by %50. The data obtained from the topology optimization were transferred to ANSYS SpaceClaim software and necessary arrangements were made. In order to make the optimized part can be manufactured in the SolidWorks 2019 environment, the final test parts were created by redesigning the shape optimization and creating a smoother geometry. The conventional part and the topology optimized part were subjected to static analysis under the same boundary conditions and the results were compared. The results obtained were compared with the data in the experimental studies applied to the part available in the company. As a result of the study, it is aimed to reduce the volume and mass of the new topological geometry compared to the part produced with traditional production, and to obtain a new topological swing arm geometry with the same and/or higher strength as the conventional part.

Keywords: Topology Optimization, Wishbone, Static Analysis, Mass Reduction, Volume Reduction.

1. INTRODUCTION

The application of topology optimization is not used very commonly in industrial problems. Main reason is that, we must use large number of element and iteration to find optimum structure but this causes very long solution time for optimization process. In today's conditions, it is one of the most important requests that the machine parts used in all sectors, especially in the automotive and defense industry, have a lightweight structure without compromising their strength and functionality. In the defense industry, each weight lightened from the vehicle means more ammunition that can be taken inside the armored vehicle.

Topology optimization is based on the strength of the part. It helps us to gain mass and volume in the part by detecting places that affect the order and having information about places other than it. After the introductory part, a literature survey was conducted in connection with the content of the dissertation. Topology optimization studies on parts such as swing arm, vehicle pedal have been investigated from the literature.

Later in the study, research was carried out on issues such as the use of the swing arm, its function, importance and functions in the vehicle. In this context, it is aimed to provide information about the swing to be analyzed before the analysis. Then, information was given about the studies related to optimization and optimization types. In the following sections, information was given about the methods applied and the analysis stages related to the static analysis part of the study. By adding the topology optimization module to the static analysis results obtained, the part that has been optimized according to the optimization result is designed. The designed model was subjected to static analysis under the same boundary conditions as the main part and the results were compared.

2. LITERATURE RESEARCH AND GENERAL INFORMATIONS

In this section, reviews and evaluations have been made about some of the past studies on topology optimization and swing arm.

In the study "Design, Modeling, Production and Analysis of Parts Geometry With The Topology Optimization Method for Satellite Equipments" conducted by Mehmet Emin BADIR. An organic geometric modeling approach and a topology optimization were applied to lighten a sample bracket designed according to conventional fabrication methods for use on a satellite. All design approaches have been handled by considering the innovative possibilities and capabilities offered by additive manufacturing technologies. First of all, a rough optimization model is obtained by defining the boundary conditions and targets according to the finite element method. The parts forming the main line of the load flow and the structure were determined, tree branch geometries were used to ensure that the stress loads formed in these lines can absorb each other, thus reducing the amount of stress and increasing the natural frequency modes. An elephant foot shape is used on the ground contact surfaces to increase overall stiffness and minimize oscillations. When the model obtained as a result of iterations is considered to be manufactured by selective laser melting method, which is one of the additive manufacturing methods, a model that is 38% lighter by mass and 57.7% lower in terms of Von- mises stresses has emerged. By making topological optimization of satellite parts with organic modeling approach, design approaches suitable for additive manufacturing have been developed (Ay, 2021).

In the study, "Nose Landing Gear Main Fitting Design With Topology Optimization" conducted by Enes AY. The aim of the thesis is to show that the lightest nose landing gear strut main fitting can be designed in a shorter time at sufficient strength with the use of topology optimization at the beginning of the design process as a better solution than traditional design. Nose landing gear main fitting design with topology optimization steps are shown in Figure 1. In order to optimize the topology, a finite element model was established in the Hypermesh Optristruct and optimization parameters were determined. The calculated landing gear loads were transferred to the finite element model. Made for the verification of the topology optimization can be produced work that can be made in a three-dimensional model of the nose landing gear main part of the link topology optimization in the model boundary conditions and loading conditions according to the linear static finite element analysis is used for analysis and the finite element model used for the optimization of the differences from that model are described (Ay, 2021).

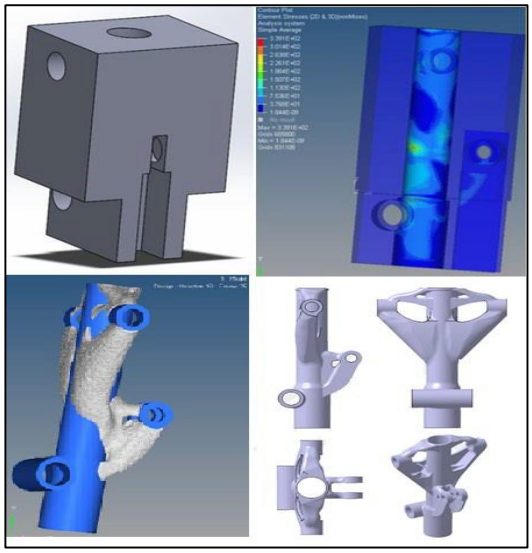


Fig. 1. Nose landing gear main fitting design with topology optimization steps (Ay, 2021).

As a result, the main connecting part of the nose landing gear strut, which can be produced in the december weight range, was designed and shown to be of sufficient strength by the results of the analysis. By evaluating the benefits and findings obtained from the studies conducted, ideas about the studies that can be carried out going forward are presented (Ay, 2021).

In the study "Design, Modeling, Production and Analysis of Parts Geometry With The Topology Optimization Method for Satellite Equipments" conducted by Mehmet Emin BADIR. An organic geometric modeling approach and a topology optimization were applied to lighten a sample bracket designed according to conventional fabrication methods for use on a satellite. All design approaches have been handled by considering the innovative possibilities and capabilities offered by additive manufacturing technologies. First of all, a rough optimization model is obtained by defining the boundary conditions and targets according to the finite element method. The parts forming the main line of the load flow and the structure were determined, tree branch geometries were used to ensure that the stress loads formed in these lines can absorb each other, thus reducing the amount of stress and increasing the natural frequency modes. An elephant foot shape is used on the ground contact surfaces to increase overall stiffness and minimize oscillations. When the model obtained as a result of iterations is considered to be manufactured by selective laser melting method, which is one of the additive manufacturing methods, a model that is 38% lighter by mass and 57.7% lower in terms of Von-mises stresses has emerged. By making topological optimization of satellite parts with organic modeling approach, design approaches suitable for additive manufacturing have been developed (Badır, 2019)

In the study "Optimal Design of the Brake Pedal for Weight Reduction in a Formula SAE Car using the Topology Optimization Method" conducted by Albak, a study was conducted on the brake pedal used in a Formula car to obtain the optimal design using topology optimization. It is noted that the material 7075 T6 was chosen because of its lightness, mechanical properties and cost advantage. The results of stretching and displacement of the brake pedal of the new model of the study given in Figure 2 (Albak, 2019).

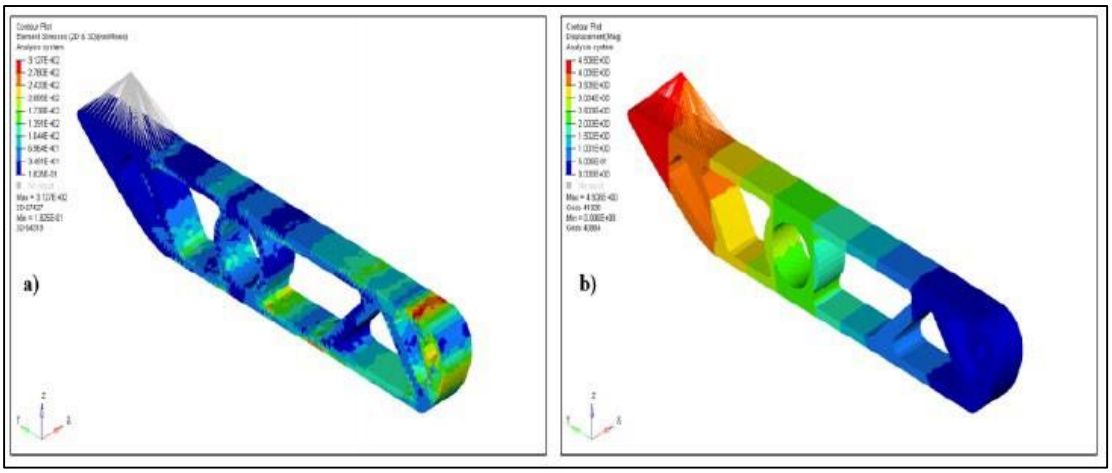


Fig. 2. Structural analysis of the new model stress and displacement results a) Stress result,b) Displacement result (Albak, 2019)

As a result of the study, the max stress of 293 Mpa and the weight of 309 grams were measured in the first model, and the max stress of 312 Mpa and the weight of 273 g were measured after optimization (Albak, 2019).

As a result, it was stated that there was a max stress increase of 6.48% versus a mass mitigation of 11.65%. The indicated results are given in Table 1 (Albak, 2019).

Table 1. Albak's Results (Albak, 2019)

	İlk Model	Yeni Model	Değişim
Ağırlık(gr)	309	273	-%11,65
Gerilme(Mpa)	293	312	+%6,48
Yer Değiştirme(mm)	4,73	4,51	-%4,65

3. TOPOLOGY OPTIMIZATION

Topology optimization is a technique that optimizes the material density distribution by meeting various performance goals in a particular design area. This technique is used on the 20th since the beginning of the century, it has started to come to the forefront in engineering applications. Examining the historical roots of Topology Optimization, it can be seen that its beginnings date back to Michell's 1904 article, The Limits of Material Economy in Beam Systems. Michell (1904) developed some new relations for the smallest weight structures given different stress constraints and design regions, and enabled the following question to be asked in the article he published: Can a structure subjected to the same loads be constructed using less material? Again, this method, which began to take its final form in technique and practice towards the end of the 20th century, was used in the 21st century. In the last century, it has become a method of determining trends in an industrial sense, especially to meet the need for weight reduction of the aviation industry (Erol, 2019)

Topology optimization is a kind of structural optimization which is to find the optimal path of materials' distribution. Hence it finds to be an effective tool in design for AM (Additive Manufacturing) to design

the products, which are lighter and still holds good for required loading and boundary conditions. Topology optimization involves finding the number, location, shape of the hole and connectivity in the design domain (Kumar & Arumaikkannu, 2019).

4. MODELLING AND ANALYSIS

In this section, static analysis with finite element method will be applied to our wishbone in accordance with the current working conditions. The maximum stresses that will occur and where the critical points are formed will be determined. Along with these, finite element model, boundary conditions and loadings will be mentioned. The analysis studies were carried out using ANSYS 19.1 software.

4.1. Material Determination

The material of the wishbone we will use Aluminum Alloy. The yield strength of this material is based on 260 MPa and the tensile strength is based on 310 MPa. It is indicated in Figure 3.

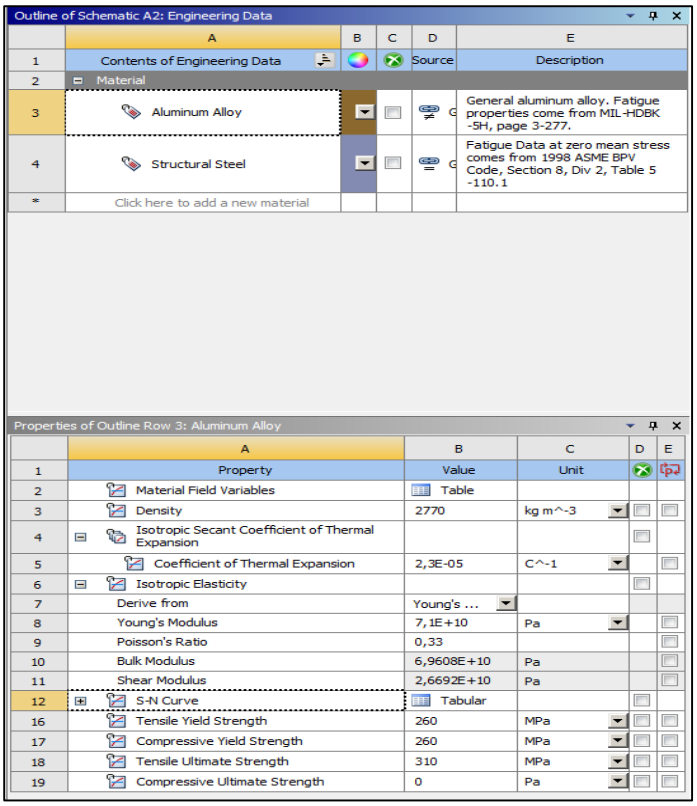


Fig. 3. Transfer of the desired mechanical values to the analysis environment

4.2. Creation of A Finite Element Model

In the finite element method, the transformation of the model to be analyzed into a model consisting of finite elements is one of the most important stages. For this reason, the "mesh" process plays an important role in providing realistic results of the analysis.

In this context, the mesh quality differs according to the selected element type, the size of the elements, the mesh knitting method and the geometry. However, the most suitable method for the study to be carried out by establishing a balance between the mesh quality and the solution time determined as a result of the studies.

Then, the mesh process was started. As a global mesh, Body Sizing was applied and the mesh element

was taken to you as 3 mm.

Then, the meshing process was performed. The visual Figure of the resulting mesh process also given in Fig.4.

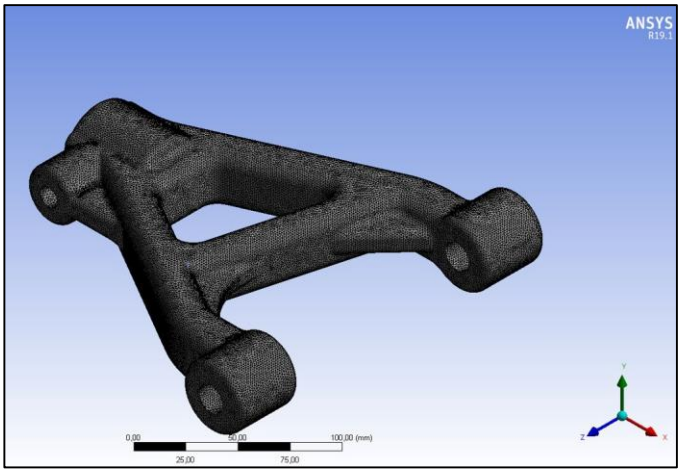


Fig. 4. Mesh process result

As a result of the meshing process, the number of 146446 Nodes and 802157 Elements were obtained. In this case, the Skewness value was 0.80 maximum, the Orthogonal Quality was 0.19 minimum and the Element Quality value was 0.89 average. According to the acceptance criterion given in Figure 5 and Figure 6, the analysis was accepted and continued.

Skewness mesh metrics spectrum:

Excellent	Very good	Good	Acceptable	Bad	Unacceptable
0-0.25	0.25-0.50	0.50-0.80	0.80-0.94	0.95-0.97	0.98-1.00

Orthogonal Quality mesh metrics spectrum:

Unacceptable	Bad	Acceptable	Good	Very good	Excellent
0-0.001	0.001-0.14	0.15-0.20	0.20-0.69	0.70-0.95	0.95-1.00

Fig. 5. Skewness and orthogonal quality mesh metrics spectrum

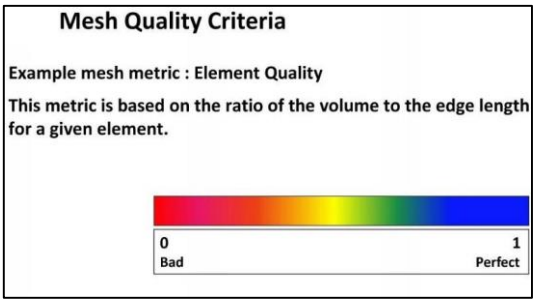


Fig. 6. Element quality mesh acceptance criteria

Figure 7 is showing that if element size decrease our maximum equivalent stress value is increasing. Thats why we need to study small element sizes while applying analyse.

Element Size (mm)	Min. Element Size (mm)	Max. Equvalent Stress (Mpa)	Max. Stress (Mpa)	Mesh Node Number	Mesh Element Number	Element Quality
1,5	1	30,03	16,51	2658274	1926547	0,9075
2,5	2	29,26	17,03	635320	448030	0,8851
3,5	3	28,43	16,52	339389	232834	0,8881
4,5	4	24,66	15,59	146109	100109	0,8738
5,5	5	22,63	16,11	781561	523821	0,8506
6,5	6	24,88	15,21	462491	302281	0,8349

Fig. 7. The relationship of mesh, maximum stress and element quality

According to the information received from the commercial company, the vehicle rotation diameter is 30 meters, the vehicle speed is 50 km/h. In addition, as the vehicle weight, the heaviest mass, 1400 kg, was taken as the basis, taking into account the car segments in which the part was used. According to the obtained data, it was determined that a compound force of 5000 N at an angle of 45° will act on the wishbone, and these values will be referenced to the test device. In accordance with the operating conditions of the wishbone, a compound force of about 5000 N was applied in the specified direction by applying +3536 N in the X direction and -3536 N in the Z direction. Together with them, the bushing bearing and shaft parts are fixed. The specified boundary conditions given in Figure 8.

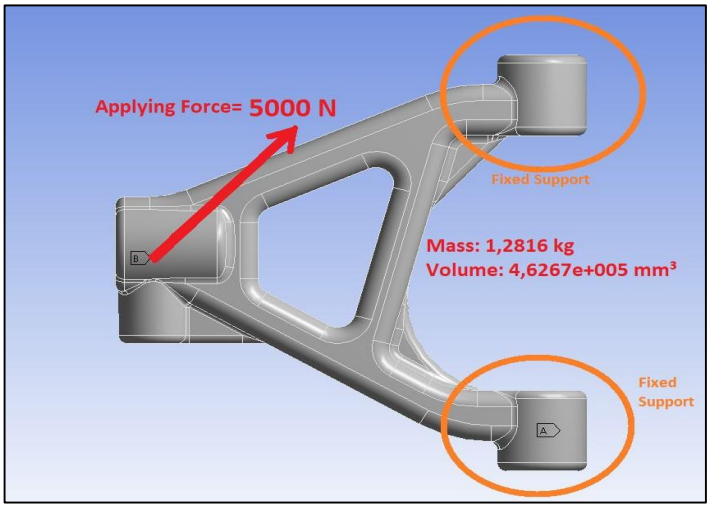


Fig. 8. Determination of Boundary Conditions

The wishbone is fixed from the chassis ports. The force on the part is defined. The forces are taken in the sizes and directions specified in the article.

Finally, a force of 5000 N is applied to the part at an angle of 45°. This value was transferred in the analysis with a resultant force of 5000.7 N by applying +3536 N in the X direction and -3536 N in the Z direction. Conditions the visual of the specified force operation is given in Figure 9.

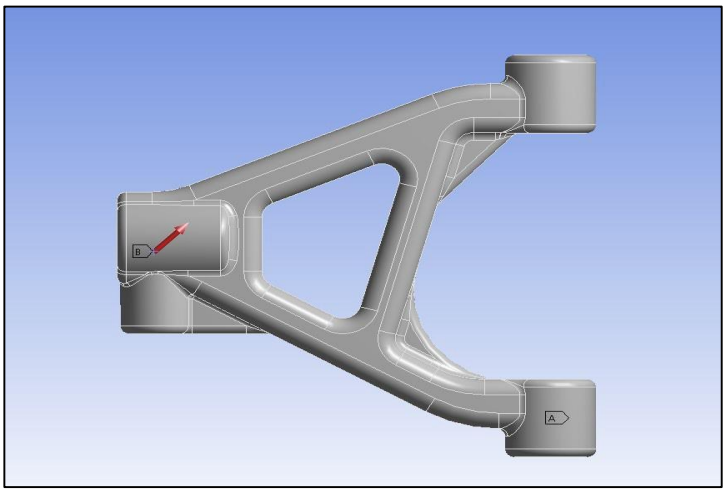


Fig. 9. Representation of boundary

5. RESULT AND DISCUSSION

After the material description (Aluminium Alloy), mesh values and boundary conditions explained above, the part was subjected to static analysis under these conditions. The maximum stress value was obtained as 30,03 MPa that is shown in the Figure 10 and Figure 11.

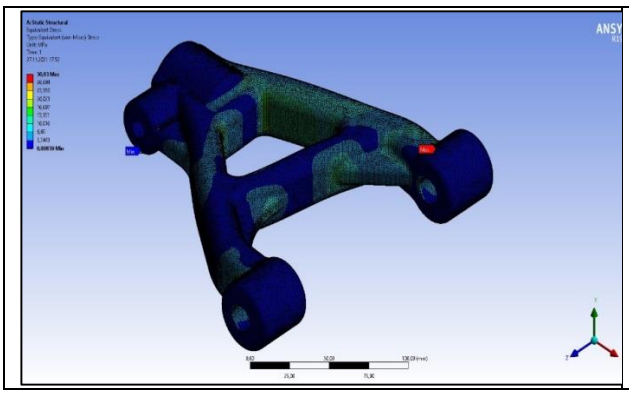


Fig. 10. Maximum stress analyses value

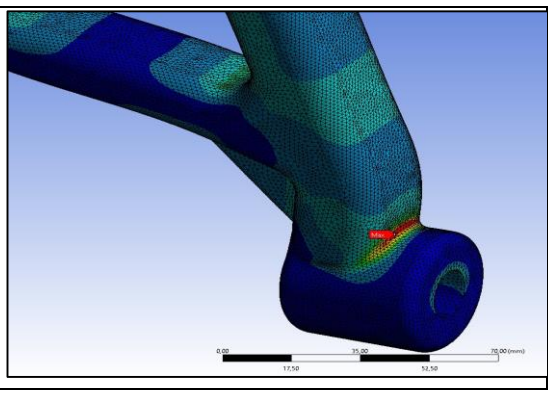


Fig. 11. Maximum point of equivalent (Von-Misses) stress

Max at the closest critical incident once the jam has been located. It is considered to be the fixed part as the fixed support of the part of this part. It will be referred to in Figure 12.

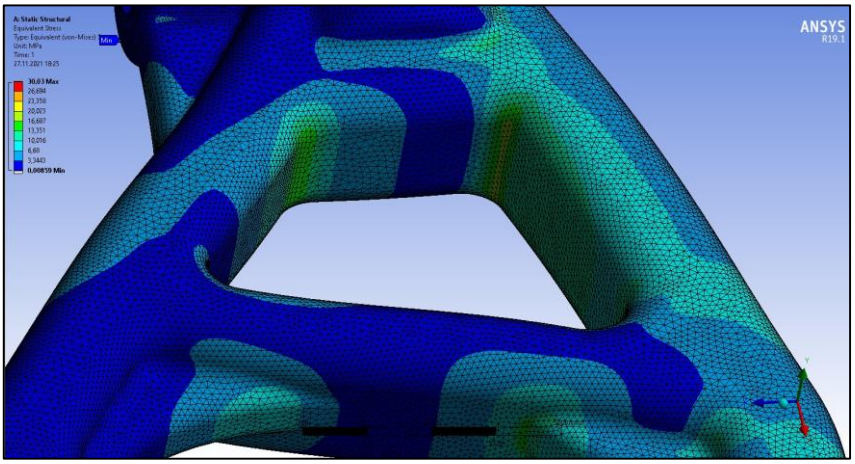


Fig. 12. The critical places closest to the maximum stress

Under these conditions, the maximum total deformation of the part was obtained as 0.02847 mm. It has been observed that this part is formed around the applied load of 500,7 N. Its deformed state and its initial state are given in Figure 13 as an exaggerated view.

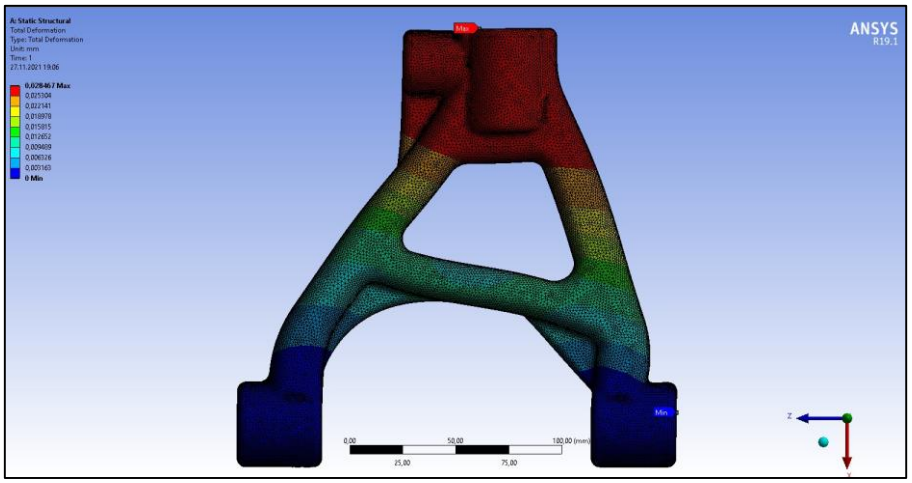


Fig. 13. Maximum total deformation result

5.1. Wishbone Topology Optimization

In this part, it is aimed to reduce the mass of the part by applying the topology optimization method to the wishbone whose static analysis is performed.

As mentioned in the optimization section, the main purpose of topology optimization is to reduce mass without compromising the rigidity of the part under load and under current operating conditions.

The goal of topology optimization is to find the best material distribution that maximizes stiffness or maximizes natural frequency while reducing the volume of the part. Two different methods, Density Method and Homogenization Method, are used in solving topology optimization problems. The homogenization method, which is one of the main methods used in solving topology optimization problems, was developed by Bendsoe and Kikuchi in 1988.

Developed by Another widely used method is the density method, R.J. Yang and C.H. It was developed by Cuhang in 1993. This method is also called material distribution method in the literature.

5.2. Main Methods In Topology Optimization

5.2.1. Material Distribution Method

Material distrubiton method, fixed-size finite elements (checkerboard shape) are used as the design space. Material densities are made variable depending on physical properties (such as resistivity, thermal conductivity coefficient, magnetic permeability).

5.2.2. Homogenization Method

Homogenization method, based on the perforated material model, which consists of microscopic hardware material and extensive basic cell. An optimized design of designs of homogenization is obtained by uniform distribution from the resulting product. The homogenization system is accepted as a system and microstructural formation and this structure is homogenized. According to this method, a microstructure; A sample of three children: material (hole size = =1), material containing (hole size = 0) and generalized porous material containing thoropopic material (0 < hole size <1) material.

Homegenization method is to theorize material density as a microstructure which is similar to a composite material including lots of small voids. These features can have various density between 0% and 100%. Within the scope of this mechanical project, the Density Method method was used during the topology optimization. In this method, distribution is achieved by assigning an imaginary density to each element in the FEA model. The value of this imaginary density changes between 0 and 1 and the places where the material can be discharged are determined (Görür, 2018).

Before starting the swing topology optimization process, the places that will not be included in the optimization are specified in the exclusion region section that is shown in Figure 14.

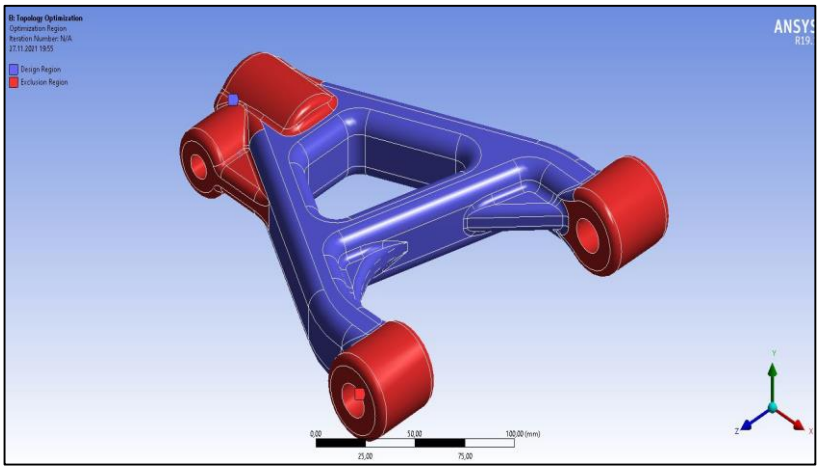


Fig. 14. Determination of exclusion region

Considering the connection points of the part, these parts have been removed from the topology optimization. After determining the parts that will not be included in the optimization part, the type of topology optimization should be determined.

ANSYS offers 3 different topology optimization types in this section in version 18.0. These are mass discharge, volume discharge and Global Von-Mises stress discharge. In this study, since it is aimed to reduce the maximum possible mass without affecting the part strength, this part was preferred as mass discharge in the analysis.

After the topology optimization type is determined, it is necessary to determine the rate to be discharged from the "Percent to Retain" section. In the analysis, this value was entered as 50%. This value means

reducing a mass of 100 kilograms to 50 kilograms. In other words, it is aimed to discharge 50% of the mass. Then the analysis was started.

Analysis time lasted approximately 120 minutes. This value varies according to the performance of your computer. The geometry obtained as a result of the analysis is given in Figure 15.

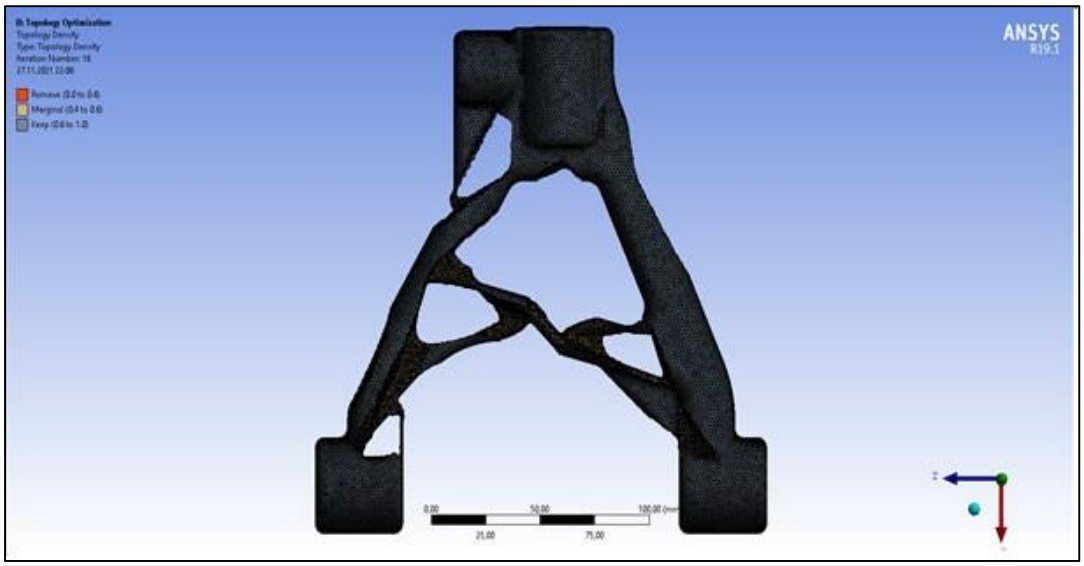


Fig. 15. Result of topology optimization

The geometry obtained as a result of this analysis and the volume, mass and iteration information of the values of the main part are given in Figure 16.

Details of "Topology Density"

Calculate Time History	Yes
Suppressed	No
Results	
Minimum	1,e-003
Maximum	1,
Average	0,53975
Original Volume	4,6265e+005 mm³
Final Volume	2,5026e+005 mm³
Percent Volume of Original	54,092
Original Mass	1,2815 kg
Final Mass	0,69321 kg
Percent Mass of Original	54,092
Visibility	
Show Optimized Region	Retained Region
Information	
Iteration Number	16

Section Planes

Fig. 16. Details of Topology Density

Considering the results obtained, the original mass of 1.2815 kg showed a decrease of 45.9% as 0.69321 kg after the analysis. When the manufacturability of the part is involved in the design phase, it will be very difficult to catch this value in CNC machines. However, if it is produced with the layered production method, the data obtained as a result of the topology can be exported in STL format, and the closest results to the topology optimization can be obtained.

The piece obtained after the optimization was transferred to SpaceClaim and a more precise structure was obtained from the triangular elements with the Shrinkwrap command.

Shrinkwrap ratio was chosen as 1mm. By adjusting 180 degrees on the body with the Smooth command, the transitions in the structure were softened and the resulting delicate structure was transformed into a smoother structure.

Then, the conventional sample was transferred to the SolidWorks 2019 program and the necessary unloading process was carried out so that the topological sample can be unloaded at the same points as the topological sample.

In the arrangements made, mass discharges that would create a notch effect on the part and unnecessarily prolong the production period were avoided.

In this design shown in Figure 17, the changes made are limited to the middle part in order not to spoil the part skeleton.

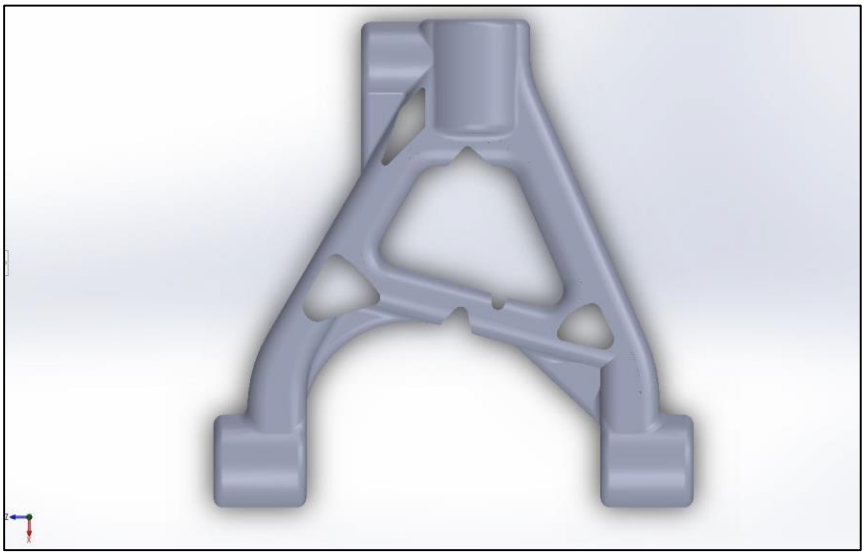


Fig. 17. The process of mass unloading in the SolidWorks 2019 program

Details of "Part 1"

Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Treatment	None
Material	
Assignment	Aluminum Alloy
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Properties	
Volume	4,1882e+005 mm³
Mass	1,1601 kg
Centroid X	-16,675 mm
Centroid Y	5,1289e-004 mm
Centroid Z	-14,65 mm
Moment of Inertia ...	3543,8 kg·mm²
Moment of Inertia ...	7828,2 kg·mm²
Moment of Inertia ...	4506,5 kg·mm²
Statistics	

Fig. 18. Details of Part

The weight of the unloaded piece was 1.1601 kg from Figure 18. As a result, 0.1214 kg was lightened with the conventional part unloading process which was 1.2815 kg. In addition, it was obtained as a

result of the analysis that the strength values and the total amount of deformation increased.

As a result of the design, the swing;

Its volume has been reduced from $4.65x10^5$ mm^3 to $4.18x10^5$ mm^3. In this case;

%9,47 from mass

A gain of %10,10 was achieved from the volume.

5.3. Static Analysis of Topological Design

Our model, which was designed according to the topology optimization result, was analyzed under the same boundary conditions as the main part.

Before the boundary conditions, the material was taken from the material library by taking the mechanical properties of the Aluminum Alloy and included in the analysis.

The schematic picture of the boundary conditions applied in the design of the topological sample is given in Figure 19.

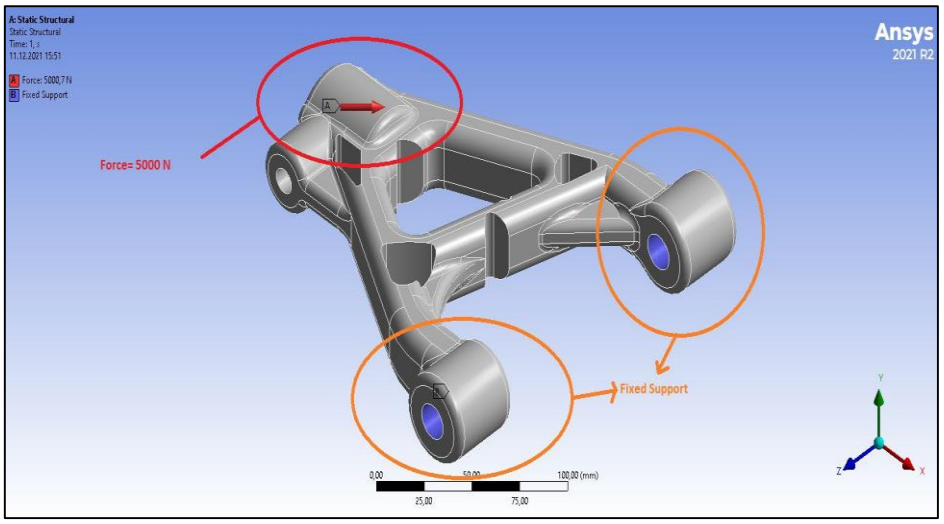


Fig. 19. Defining the same boundary conditions for the model

After the boundary conditions applied to the existing part, meshing process was started. The applied mesh methods are also chosen with the same value as the method and element dimensions applied in the main part. Then meshing was performed. The visual of the mesh process obtained is given in Figure 20.

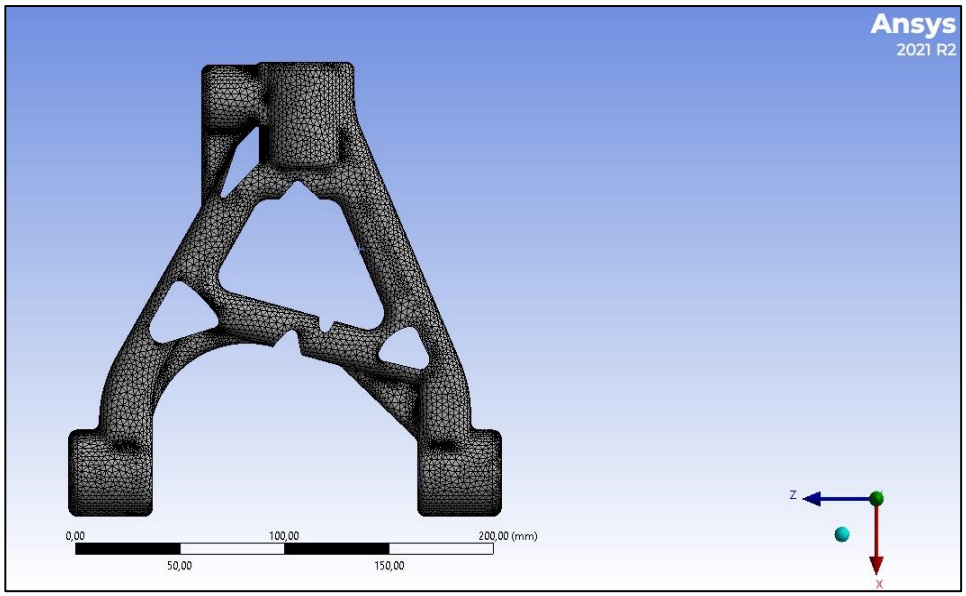


Fig. 20. The mesh process of the design

As a result of the mesh process, 203544 Node and 137250 Element numbers were obtained. Skewness value was maximum 0.91205, Orthogonal Quality minimum 0.079 and Element Quality value 0.82781 on average. In this case, it was accepted according to the acceptance criteria given in Figure 5 and Figure 6 and the analysis continued.

After determining the material (aluminum alloy), acceptable mesh values and boundary conditions mentioned above, the part was subjected to static analysis under these conditions.

As a result of the static analysis, the place where the maximum equivalent stress occurred in the part occurred in the same place as the main part. The maximum stress occurred in the same direction as the direction of the force and at the lower protrusion of the part form, where it underwent a sudden cross-sectional change. Its value was obtained as 35,354 MPa. It is shown in Figure 21.

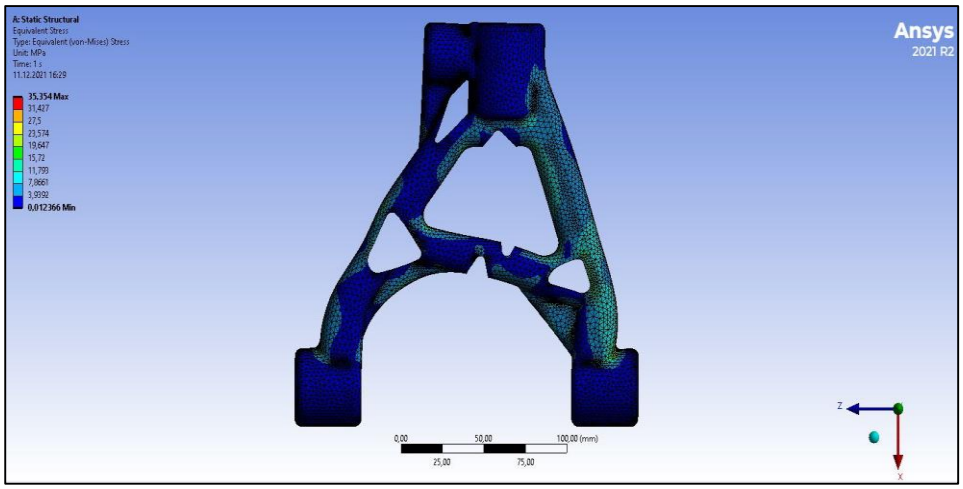


Fig. 21. Max stress of the design

The maximum total deformation, which was obtained as 0.028467 mm in the main part, was obtained as 0.035978 mm in this analysis. In Figure 22, a visual of the maximum total deformation is given.

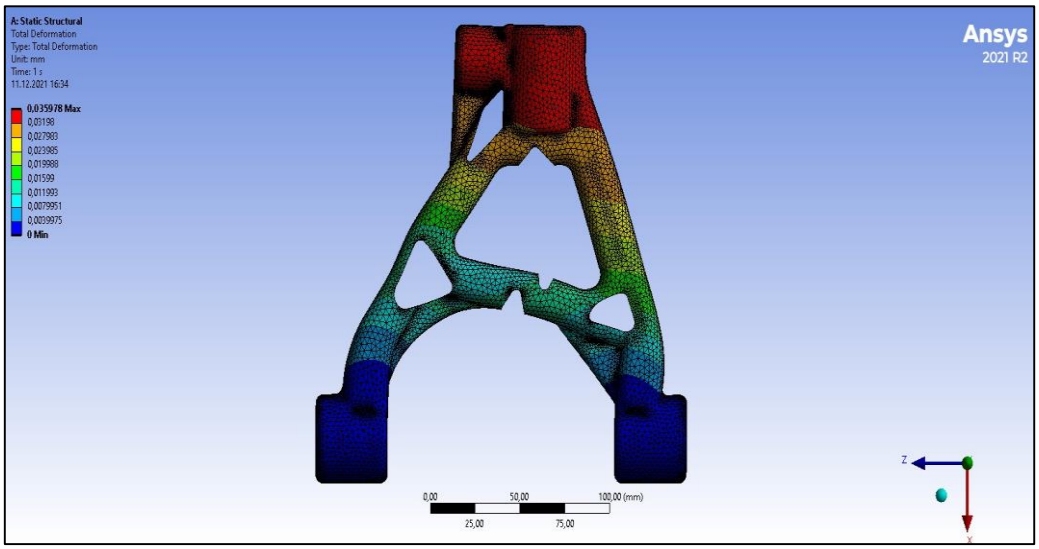


Fig. 22. Max. Total Deformation

6. CONCLUSION

In this study, it is aimed to reduce the mass of a swing arm belonging to passenger vehicles in the automotive industry, without sacrificing its strength by topology optimization study.

First of all, the swing arm which is the main part was subjected to static analysis with the operating conditions. Afterwards, 50% mass evacuation was aimed by making topology optimization for the static analysis obtained. The resulting geometry was transferred to the SolidWorks 2019 program. Considering the manufacturability of the part together with the necessary arrangements in SolidWorks 2019, the design study of the new geometry was carried out as a result of the necessary adjustments. The designed newly optimized geometry was subjected to static analysis again and the total amount of deformation and equivalent stress value were found. The results found were compared with the results of the conventional part.

As a result of the topology optimization, the mass of the part decreased from 1.2815 kg to 1.1601 kg, resulting in a %9,47 mass reduction. Likewise, the volume of the part was reduced from $4.65x10^5$ mm^3 to $4.18x10^5$ mm^3. The volume reduction rate was %10,10. Thus, by reducing both the mass and volume of the part, the lightening of the part without compromising its strength value has been completed.

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STRESS ANALYSIS OF A TRAILER FIXED AXLE

Halil İbrahim Akgün[1], Okan Gül[2*]

[1]*Kocaeli University, Engineering Faculty, Mechanical Engineering Department, Kocaeli, Turkey.*
ORCID Code: 0000-0002-4251-2405

[2*]*Kocaeli University, Engineering Faculty, Mechanical Engineering Department, Kocaeli, Turkey.*
ORCID Code: 0000-0002-1617-1029

ABSTRACT

This work; trailers, wagons, etc. used in sectors such as logistics and agriculture. It covers the mechanical design process of the fixed straight axle, which is the main load carrier of the vehicles. Lightweight and simple mechanical designs result in lower overall cost. This has a positive effect on market competition. However, reasons such as insufficient use of mechanical design features and not following new technologies by some small and medium-sized enterprises producing in this field cause the vehicles produced to malfunction in the field and increase production and maintenance costs. In the study, the minimum circular and square cross-section dimensions required for the straight axle of an agricultural trailer were determined by basic strength calculations, taking into account the static loading situation. The final cross-section dimensions were decided by taking into account the dimensions of the axles currently produced in the market. Then, static analysis of the axle modeled in the Solidworks package program was made according to the determined measures. As a result of the analysis, the maximum stress and deflection values in each axle were obtained.

Keywords: Axle, Trailer, Solidworks, Finite Element Analysis.

INTRODUCTION

Fixed axles are systems that are still widely used in the front and rear axles of today's commercial vehicles due to their simple design, high load carrying capacity and easy production. Figure 1.a (Trailer axle assembly, 2021) and Figure 1.b (Choosing tandem axles, 2021) shows a manufactured trailer fixed axle.



a b

Figure 1. a. General view of the fixed trailer axle and basic structural elements b. An applied fixed axle construction (Trailer axle assembly, 2021; Choosing tandem axles, 2021).

The axle beam, which is the main load-bearing part of the fixed axle system, covers a significant part of the suspension mass. For this reason, the element in question should be designed as light as possible, as well as being resistant to the effects that may come from the road during service. Thus, besides meeting the safety requirement, it is also possible to keep the production cost of the axle at reasonable levels. However, some small and medium-sized enterprises that manufacture trailers use larger or smaller axle sizes than they should be, by not taking into account the static and dynamic loading conditions during

the design of the vehicle. This may lead to an increase in the overall cost, as well as bring with it possible safety problems (Manasa & Reddy, 2013; Manish & Sunil, 2013; Patil & Kulkarni, 2016; Topaç & Atak, 2016).

MATERIALS AND METHOD

Preliminary Design

The technical data of the base trailer can be seen in Table 1 (Frensiz Dingiller, 2021). The data in Table 1 was used for axle modeling in solidworks program and theoretical calculations. Also, the free body diagram of the axle beam is shown in Figure 2.

Table 1. Technical data of the base trailer (Frensiz Dingiller, 2021)

1.	Trailer overall length	3800 mm
2.	Trailer overall width	1500 mm
3.	Trailer overall height	1100 mm
4.	Capacity	24,53 kN
5.	Curb Weight	7,37 kN
6.	Total Weight Loaded	31,9 kN
7.	Axle Dimensions	1320 mm straight axle

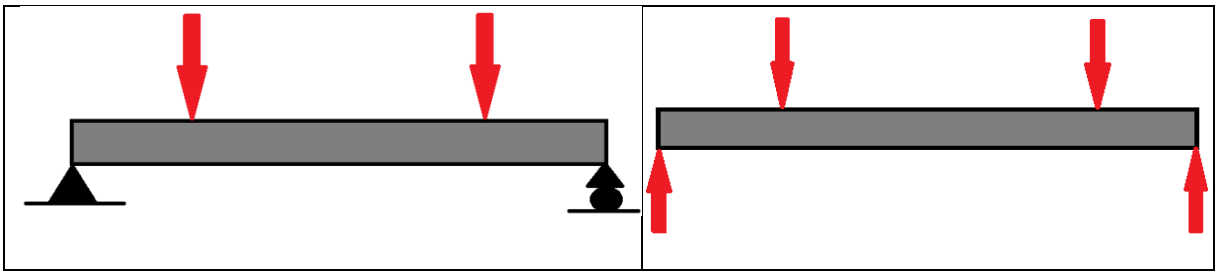


Figure 2. Free body diagram of axle beam

In the design, the axle body is considered as a simple beam. It is assumed that the beam is supported from the wheel connection points. SAE/AISI 1020 forged steel was preferred in the manufacture of the axle beam. Forged steels are used in parts with high ductility such as crankshaft, crank arms, axle shaft and axle sleeve, in automobile and aircraft construction, gear and wheel construction, construction and agricultural machinery, machine tools, parts such as bolts, nuts and studs. It is also a material suitable for surface hardening. It is a steel with high toughness. The mechanical properties of this material are given in Table 2 (SAE 1020 çelik veri sayfası, 2021).

Table 2. SAE 1020 mechanical properties (SAE 1020 çelik veri sayfası, 2021).

Material	Tensile Strength (MPa)	Yield Strength (MPa)	Shear Strength (GPa)	Modulus of Elasticity (GPa)	Poisson Ratio
SAE 1020	420	350	80	205	0.29

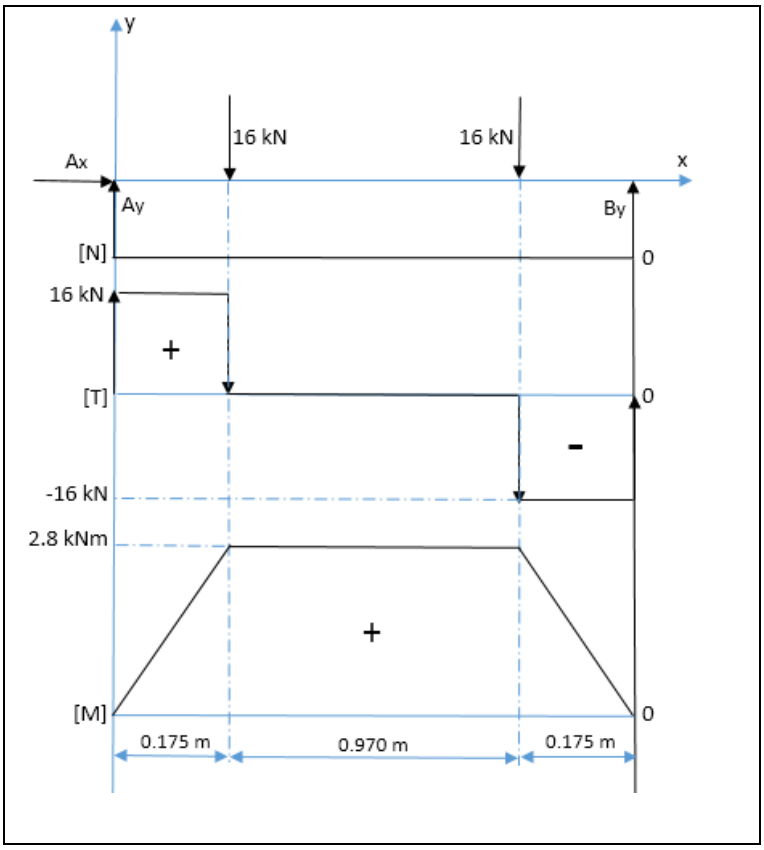


Figure 3. Shear force and bending moment diagrams

The trailer is approximately 32 kN with its carrying capacity and empty weight. It is assumed that this load affects each suspension (leaf spring) equally and with a value of 32/2=16 kN. As can be seen in the shear force and bending moment diagrams of the beam given in Figure 3, the maximum bending moment in the beam with a length of 1.320 m occurs with a value of 2.8 kNm between 0.175 m and 1.145 m. The safety factor of the beam was chosen as 1.5 considering the road and terrain conditions. Therefore, the safety stress of the beam is 350/1.5= 233.333 MPa.

Based on these data, the ideal cross-section of the beam is calculated as follows Eqs. (1) - (2);

For square section;

$$\sigma_{max} = \frac{M_{max}}{I_x} y_{\max} \rightarrow 233.333 = \frac{2.8\times10^6}{\frac{1}{12}\times b\times h^3} \times \frac{h}{2} \quad (1)$$

Since b=h, the equation becomes $233.333 = \frac{2.8\times10^6}{\frac{1}{6}\times h^3}$

From here,

It is found as h=b=41.6 mm.

For circular section;

$$\sigma_{max} = \frac{M_{max}}{I_x} y_{\max} \rightarrow 233.333 = \frac{2.8\times10^6}{\frac{1}{64}\times \pi\times D^4} \times \frac{D}{2} \quad (2)$$

If the equation is arranged and solved; It is found as D=49.63 mm. Steel bars produced as standard in the dimensions closest to the values found are 45x45 mm^2 for square section and D=50 mm for circular section. These dimensions were used in the design.

Modelling

Solidworks program was used for modelling. D=50 mm circular cross-section axle beam and 45x45 mm^2 square cross-section axle beam created in Solidworks program are shown in the Figure 4 and Figure 5, respectively.

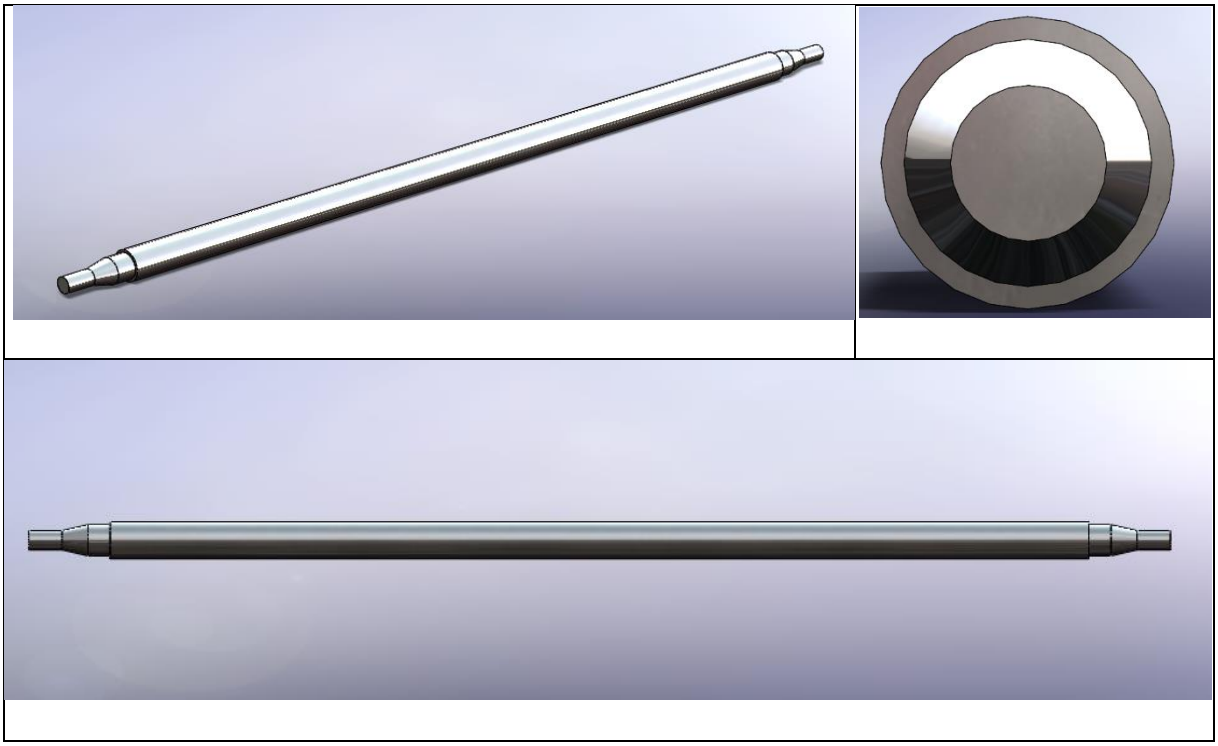


Figure 4. D=50 mm circular cross-section axle beam created in Solidworks program

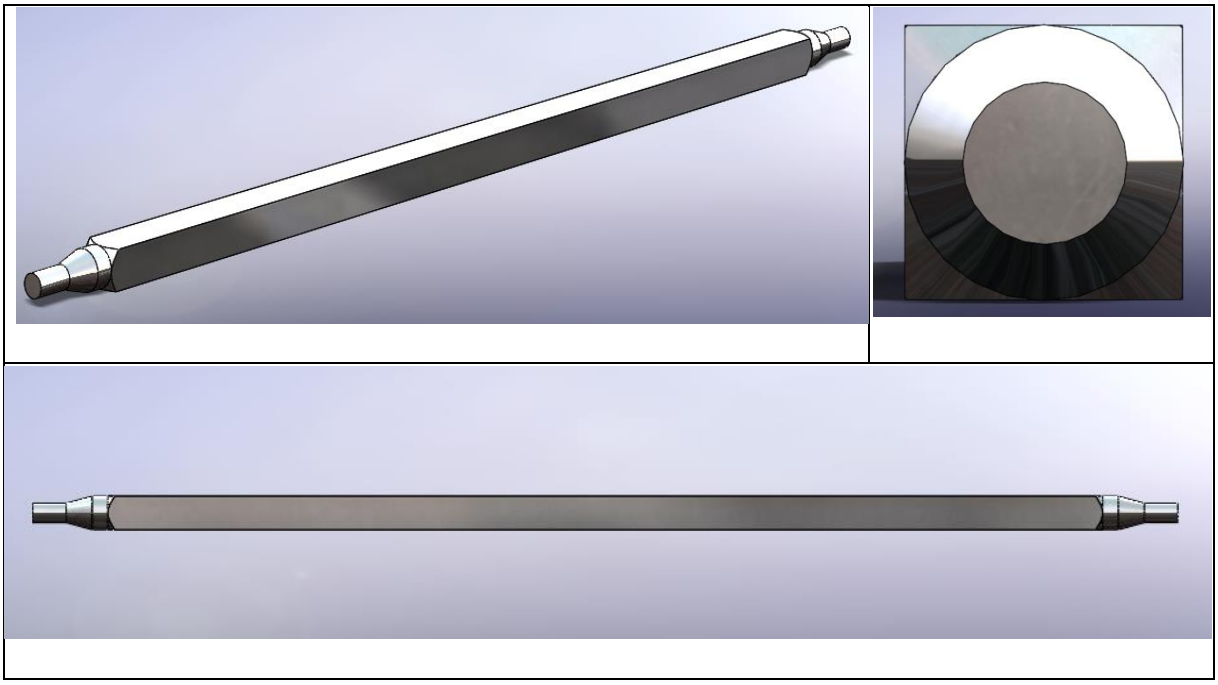


Figure 5. 45x45 mm^2 square cross-section axle beam created in Solidworks program

RESULTS AND DISCUSSION

Analysis With The Finite Element Method

Each axle has been separately simulated and introduced to the Solidworks program as a beam. Strength analyzes were made by entering initial and boundary conditions. Stress and displacement on square cross-section axle are seen in Figure 6 and Figure 7, respectively.

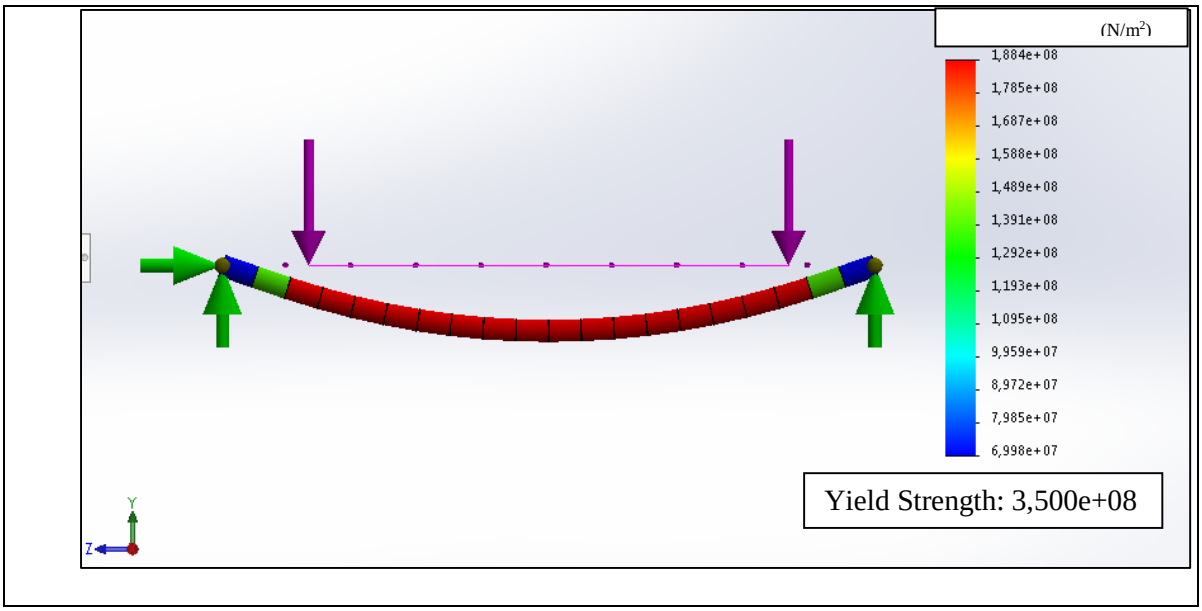


Figure 6. Stress on square cross-section axle

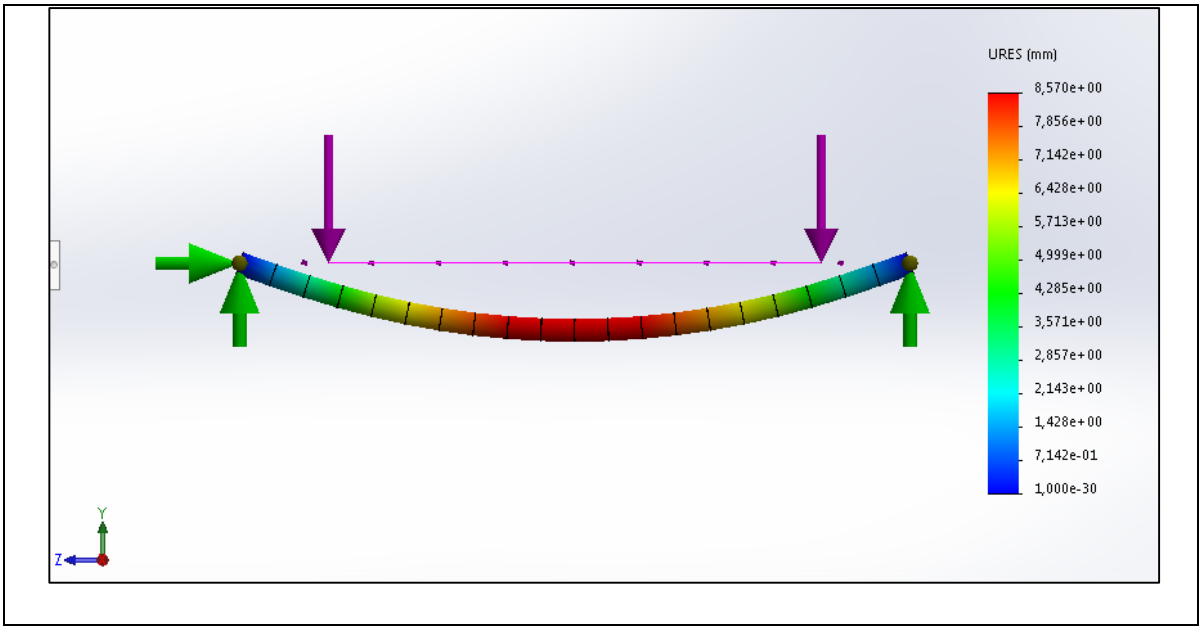


Figure 7. Displacement on square cross-section axle

The maximum stress on the axle modeled as a square cross-section of 45x45 mm^2 is 188.4 MPa. This value obtained is smaller than the safety stress of 233.333 MPa. Therefore, the beam is safe. The maximum displacement in the beam is 8.57 mm. The maximum factor of safety in the beam is calculated as 1.858 and is greater than the initial value of 1.5.

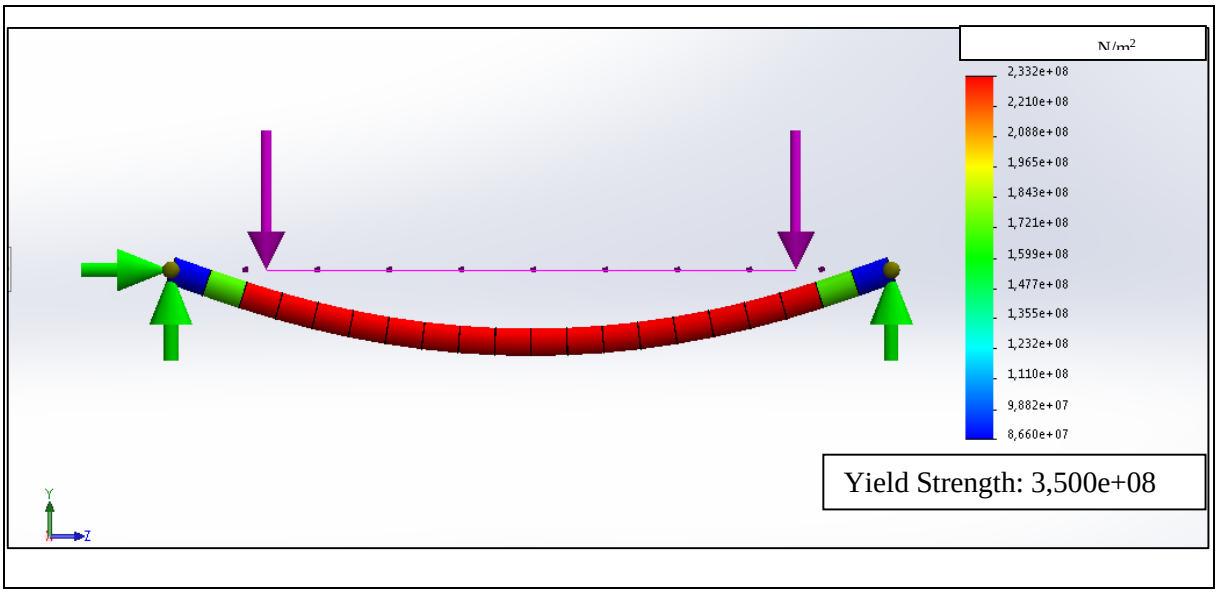


Figure 8. Stress on circular cross-section axle

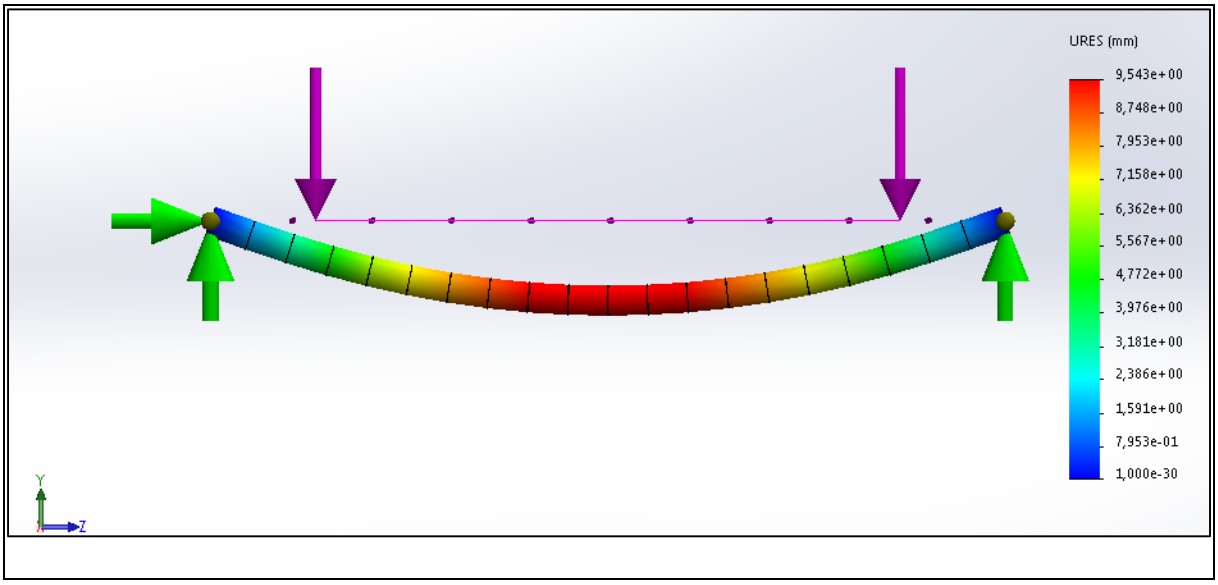


Figure 9. Displacement on circular cross-section axle

Stress and displacement on circular cross-section axle are seen in Figure 8 and Figure 9, respectively. The maximum stress on the axle modeled as a circular cross-section is 233.2 MPa. This value obtained is almost equal to the safety stress determined as 233.333 MPa. Therefore, the beam is safe. The maximum displacement of the beam is approximately 9.55 mm.

CONCLUSION

In this study, the mechanical design process of the axle beam, which is the main load-bearing structural element of the trailer, is summarized. In the study, the technical data of a trailer that has already been produced has been taken into consideration. Initially, the axle body was considered as a simply supported beam. Then, necessary initial and boundary conditions are entered and solved in Solidworks Simulation module. It has been determined that both square cross-section and circular cross-section axle designs work safely. However, the square-section design is safer than the circular-section design.

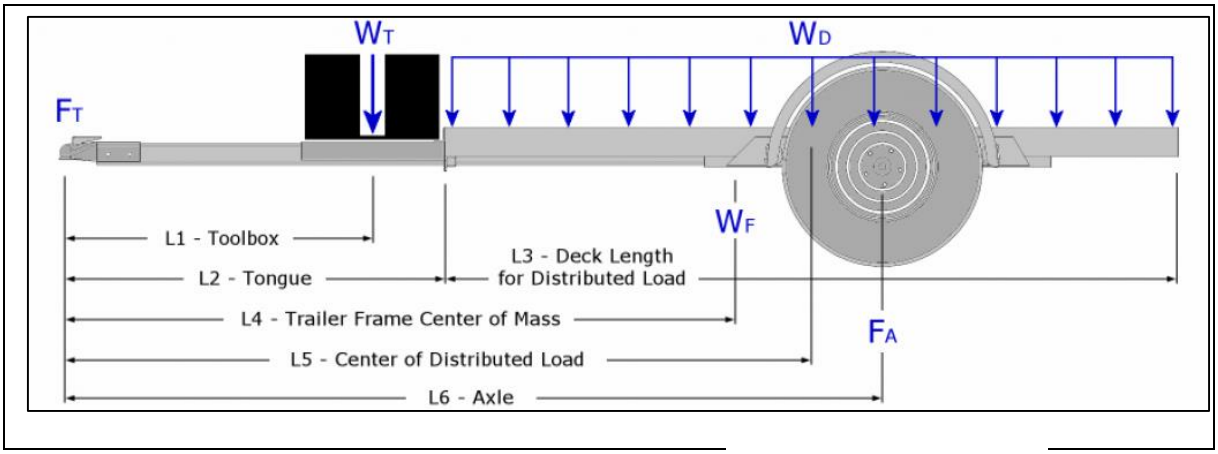


Figure 10. Trailer chassis under distributed load (Trailer axle position, 2021)

In the solution, it is assumed that the empty weight and the total carrying capacity of the trailer are completely loaded on the axle beam. But this may not always be the case. For example, the Figure 10 (Trailer axle position, 2021) shows a trailer under the influence of a uniformly distributed load. In such a case, a part of the total load affects the tractor to which the trailer is connected and the load on the axle beam is reduced. In such a case, it was observed that the static safety factor in the square cross-section axle increased up to 2.5. Calculations related to this situation are not included in this study.

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PV*SOL PREMİUM SİMİLASYON KULLANILARAK GÜNEŞ PV SİSTEM TASARIMI VE FİNANSAL ANALİZİ: ATATÜRK ÜNİVERSİTESİ ÖRNEK ÇALIŞMASI

Nesrin ADIGÜZEL[1], Muhammet ÖZGERİŞ[2]

[1]Atatürk Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği, Erzurum, Türkiye
ORCID Code: 0000-0001-7610-2757
[2] Atatürk Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği, Erzurum, Türkiye
ORCID Code: 0000-0002-2945-9937

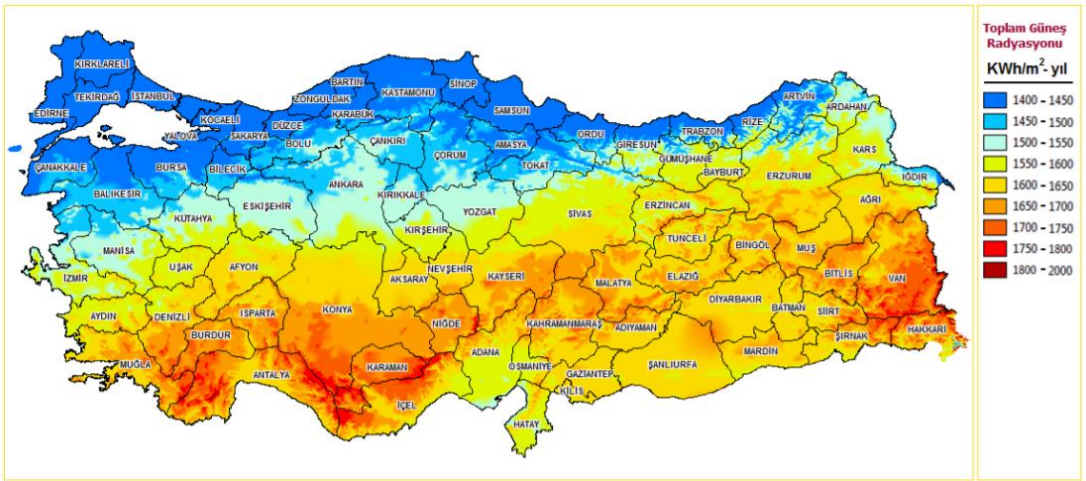
ÖZET

Bu çalışma, Erzurum Atatürk Üniversitesi kampüsündeki Mühendislik Fakültesi ek binası için güneş enerjisi fotovoltaik sistem tasarımı ve hesaplamasından oluşmaktadır. Çalışmada kullanılacak olan çatının güney cephesinin yüzey alanı 616,4 m² 'dir. Fotovoltaik paneller çatının güneye bakan yüzeyine yerleştirilmiş olup, toplam 378 adettir. Kullanılan fotovoltaik paneller SunPower şirketine ait SPR-E20-327 modelidir. Bu çalışmada bazı parametreler varsayılarak bu sistemlerin finansal analizi de yapılmıştır. Elde edilen veriler ile yatırım maliyeti, amortisman süresi ve elde edilecek olan enerji miktarı hesaplanmıştır. Sistemin modellenmesi ve finansal analizi, PV*Sol yazılımı kullanılarak optimize edilmiştir.

Anahtar Kelimeler: Fotovoltaik, Güneş Enerjisi, PV*Sol, Yenilenebilir Enerji

1. GİRİŞ:

Dünyanın en önemli enerji kaynağı güneştir. Güneşin ışınım enerjisi, yer ve atmosfer sistemindeki fiziksel oluşumları etkileyen başlıca enerji kaynağıdır. Dünyadaki madde ve enerji akışları güneş enerjisi sayesinde mümkün olabilmektedir. Rüzgâr, deniz dalgası, okyanusta sıcaklık farkı ve biyokütle enerjileri, güneş enerjisini değişim geçirmiş biçimleridir. Güneş enerjisi, doğadaki su döngüsünün gerçekleşmesinde de rol oynayarak, akarsu gücünü yaratmaktadır. Fosil yakıtlarında, biyokütle niteliğindeki materyallerde birikmiş güneş enerjisi olduğu kabul edilmektedir. Doğal enerji kaynaklarının pek çoğunun kökeni olan güneş enerjisinden, ısıtma ve elektrik elde etme gibi amaçlarla doğrudan yararlanılmaktadır.**(Varınca and Gönüllü 2006)**



Şekil 1. Türkiye Güneş Enerjisi Potansiyel Atlası (GEPA) **(YEGM, 2020).**

Türkiye, 783.562 km² yüzey ölçümüyle, 36°-42° kuzey paralelleri arasında güneşli bir kuşakta yer almakta ve güneş enerjisi potansiyeli açısından coğrafi olarak iyi bir konumda bulunmaktadır. Ülkemiz, güneş kuşağı içinde konumlanmasına rağmen, güneş enerjisinden faydalanma istenilen miktarda değildir. Bu sebeple, yakın gelecekte enerji ihtiyacının karşılanmasında, dünyanın en önemli yenilenebilir enerji kaynağı olan güneşin etkili ve sürdürülebilir bir biçimde değerlendirilmesi gerekmektedir. Şekil 1'de ülkemizin güneş ışımasından maksimum şekilde yararlanabileceği şehirler açık ve koyu kırmızı renklerle gösterilmiştir. Bu renklerle gösterilen şehirlerde güneş enerjisi global radyasyon değerleri 1600-1800 arasında değişmektedir. En fazla güneş enerjisi potansiyeline sahip bölgemiz Güney Doğu Anadolu iken, en düşük potansiyele sahip bölgemiz Karadeniz'dir. Ancak buna rağmen Karadeniz'de görülen değerler Almanya'nın en yüksek potansiyele sahip olan noktalarından daha yüksektir.(**KAYNAR 2020**)

Elektrik İşleri Etüt İdaresi (EİE) tarafından, 1966-1982 yıllarında Devlet Meteoroloji İşleri Genel Müdürlüğü (DMİ) tarafından ölçülen güneşlenme süresi ve ışınım şiddeti verilerinden de yararlanılarak yapılan çalışmaya göre, Türkiye'nin ortalama yıllık toplam güneşlenme süresi 2640 saat (günlük toplam 7,2 saat), ortalama toplam ışınım şiddeti yılda 1311 kWh/m² (günlük toplam 3,6 kWh/m²) olduğu tespit edilmiştir. Güneş Enerjisi potansiyeli 380 milyar kWh/yıl olarak hesaplanmıştır. Bu potansiyel, toplam 56.000 MW kurulu güce sahip doğal gaz çevrim santrali elektrik enerjisi üretimine eşdeğerdir.(**Bedeloğlu, Demir and Bozkurt 2010**)

Fotovoltaik sistemler alternatif enerji kaynakları arasında baş sıralara yerleşmiştir. Uluslararası enerji ajansı 2050 yılında dünya elektrik üretiminin %11 ile %16 kadarının güneş enerjisinden karşılanacağını öngörmektedir.(**Viessmann 2021**)

Bir bölgedeki güneşin gökyüzünde görünebildiği süreye güneşlenme süresi denir. Güneşlenme süresinin uzun olması, o bölgede güneşten alınan enerjinin artmasına ve ısınmaya yol açar. Yeryüzünde güneşlenme süresinin yıl boyunca en fazla olduğu yerler dönenceler çevresidir. Kutup bölgelerinde yaz mevsiminde güneşlenme süresi uzundur, fakat sıcaklık düşüktür. Bu durumun temel sebebi güneş ışınlarının eğik açılarla gelmesidir.

ERZURUM	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık	Yıllık
	Ölçüm Periyodu (1929 - 2020)												
Ortalama Sıcaklık (°C)	-9.2	-7.7	-2.5	5.3	10.7	14.8	19.1	19.5	14.8	8.2	1.1	-5.8	5.7
Ortalama En Yüksek Sıcaklık (°C)	-4.0	-2.3	2.6	10.9	16.9	21.8	26.5	27.2	22.7	15.2	6.8	-1.0	11.9
Ortalama En Düşük Sıcaklık (°C)	-14.0	-12.6	-7.1	0.0	4.4	7.3	11.1	11.2	6.4	1.8	-3.8	-10.3	-0.5
Ortalama Güneşlenme Süresi (saat)	3.3	4.3	5.1	6.3	7.9	10.2	11.3	10.7	9.1	6.9	4.9	3.1	6.9
Ortalama Yağışlı Gün Sayısı	9.5	9.7	12.1	15.3	18.2	12.6	7.9	6.6	6.4	10.3	9.7	9.8	128.1
Aylık Toplam Yağış Miktarı Ortalaması (mm)	21.8	26.8	34.9	53.7	74.1	48.9	26.9	18.0	24.4	47.2	33.1	22.4	432.2
	Ölçüm Periyodu (1929 - 2020)												
En Yüksek Sıcaklık (°C)	8.0	10.6	21.4	26.5	29.6	32.2	35.6	36.5	33.3	27.0	20.7	14.0	36.5
En Düşük Sıcaklık (°C)	-36.0	-37.0	-33.2	-22.4	-7.1	-5.6	-1.8	-1.1	-6.8	-14.1	-34.3	-37.2	-37.2

Şekil 2. Erzurum İklim Verileri (**MGM**)

Erzurum güneşlenme süresi olarak Türkiye ortalamalarının üzerindedir. En yüksek yaz yazlarında, en düşük işe kış aylarıdır. (**Şekil 2**) Güneşlenme süresi fotovoltaik sistemlerin amortisman süresi bakımından oldukça etkilidir. Güneşlenme süresi ne kadar uzun ise sistemin verimliliği o kadar yüksektir.

2. MATERYAL ve METOT

Fotovoltaik; güneş panelleri ile güneşten elektrik üretme yöntemidir. Güneş hücreleri üzerlerine düşen güneş ışığını (foton) direk olarak doğrusal akıma dönüştürür. Akımı iletmek için ise galyum, kadmiyum, arsenit gibi yarı iletken olarak bilinen materyalleri kullanır. Fotovoltaik modüller daha yüksek akım elde etmek için paralel ve daha yüksek voltaj elde etmek için seri olan bağlanmış olan hücrelere sahiptir. Büyük ölçekli enerji üretimi için, altmış hücreli bir modül piyasada uygulanan standarttır. Kirlenmiş cam benzeri şeffaf bir malzeme modül yüzeyini kaplamak için kullanılır. Arka yüzü ise su geçirmez malzemeyle korunmuştur. Hava şartlarına karşı koruyan malzemeler kenarları yalıtmak için kullanılmıştır ve hafif alüminyumdan çerçeve içerisine alınmıştır.



Şekil 3. Atatürk Üniversitesi Mühendislik Fakültesi Ek Binası

Tarımın yapılacağı bina **Şekil 3**'te görüldüğü gibidir. Fotovoltaik paneller çatı alanının sadece güney tarafına kurulması planlanmıştır.

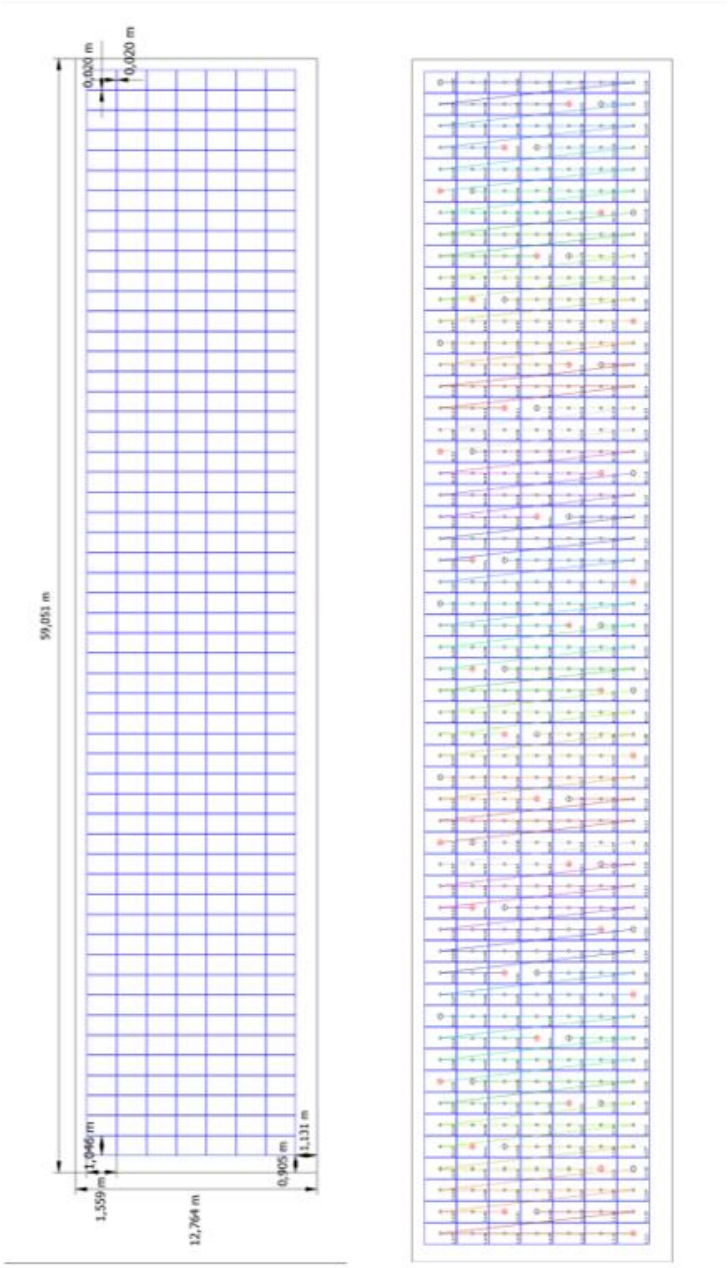
Tablo 1. Çatı üzeri modül özellikler

Isim	Bina 01-Çatı Alanı Güney
PV modülleri	378 x SPR-E20-327 (v2)
Üretici	SunPower
Eğim	20 °
Yerleşim Yönü	Güney 173 °
Montaj Türü	Çatı paraleli - iyi hava aldırır
PV jeneratör yüzeyi	616,4 m²

Çatı özellikleri **Tablo 1**'de görüldüğü gibidir. Çatı eğimi 20° olup, PV panel yerleşimi güney yönünde 173° eğimle olacak şekildedir. Paneller çatı paralelinde dik bir biçimde yerleştirilip, iyi hava alır şekildedir.

2.1. Tasarım ve Boyutlandırma

Kullanılacak olan paneller SunPower şirketine ait SPR-E20-327 modelidir. Paneller tüm kenarlarda 60 cm boşluk bırakılarak uzun kenara göre dik bir şekilde yerleştirilmiştir.



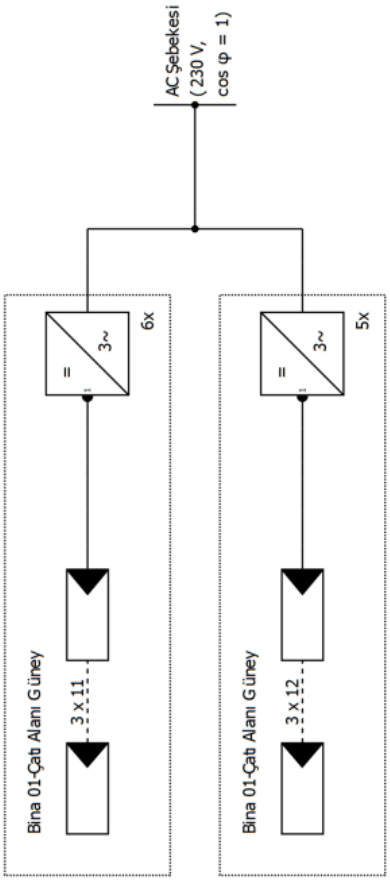
Şekil 4. Boyutlar ve kablo bağlantıları

Bir elektrik tesisatında kablo kesiti çalışma voltajına, akım taşıma kapasitesine, gerilim düşümü ve kısa devre hesaplarına göre seçilir. FV sistemlerin tesisatında da aynı yöntem geçerlidir ancak kablo üzerindeki güç kaybını %1 ile sınırlamak genel olarak tercih edilir. Bunun için dc devrede gerilim düşümü <%1 olacak şekilde bir iletken seçimi yapılması yeterli olacaktır. Çok sayıda dizi bulunan ve farklı kesitlerde iletkenlerin olduğu durumda ise en genel yöntem olarak MGN akımında bütün iletkenlerin üzerinde düşen I 2R kayıpları bulunur ve toplam panel gücüne oranlanır. Bulunan değer %1'i geçmemelidir. 12-48V gibi düşük gerilimli sistemlerde %1 güç kaybını elde etmek için gerekli iletken kesitleri çok büyük olabilir. Bu gibi durumlarda kayıp oranının %1'i biraz geçmesine izin verilebilir veya paralel iletkenler kullanılabilir. Burada dikkat edilmesi gereken nokta kablo kayıpları arttığı oranda FV sistem enerji üretimi azalmaktadır. (**Boztepe, 2017**) Bina çatısında panel yerleşimi ve kablolama **Şekil 4'**te görülmektedir. Panel kurulması planlanan yüzeyin alanı 616,4 m² olup toplam da 378 fotovoltaik panel kullanılmıştır.



Şekil 5. Modül Çatı Alanı Güney

PV*Sol programı kullanılarak PV paneller istenilen model ve adette bina üzerine yerleştirilmiştir. Yerleşim **Şekil 5'**te görülmektedir.



Şekil 6. Devre şeması

Evirici(inventör) panellerin ürettiği DC enerjiyi evlerde kullanılan AC enerjiye (220V-50 Hz) çevirir. Tam sinüs özelliği de çamaşır makinesi, bulaşık makinesi ve buzdolabı gibi endüktif yükleri karşılamak

ve bozmamak için gereklidir. Çalışmada kablo bağlantıları seri olarak bağlanmış olup; Advanced Energy Industries, Inc şirketine ait toplamda 11 adet AE 3TL 10 modeli inventör ile desteklenmiştir. Çalışmanın devre şeması **Şekil 6**'te olduğu gibidir.

Tablo 2. Evirici bilgileri

Modül Alanı	Bina 01-Çatı Alanı Güney
İnvertörler 1	
Model	AE 3TL 10 (v1)
Üretici	Advanced Energy Industries, Inc.
Sayı	6
Boyutlandırma faktörü	107,9 %
Konfigürasyon	MPP 1: 3 x 11
İnvertörler 2	
Model	AE 3TL 10 (v1)
Üretici	Advanced Energy Industries, Inc.
Sayı	5
Boyutlandırma faktörü	117,7 %
Konfigürasyon	MPP 1: 3 x 12

Eviriciler; 6 adet MPP 1:3*11, 5 adet MPP 1:3*12 konfigürasyon değerine sahiptir. Eviricilere ait veriler **Tablo 1**'de olduğu gibidir.

SONUÇLAR

Sistem için program yardımıyla hesaplanan PV jeneratör çıkış gücü 123,61 kWp'dir. Sistemin kullanılması neticesinde 234472 kWh şebeke beslemesi sağlanacaktır.

Tablo 3. Kazançlar

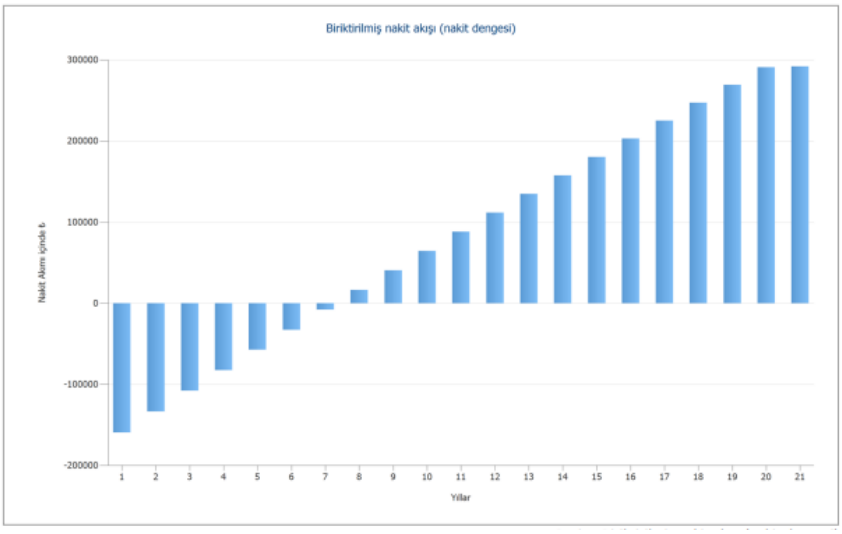
PV jeneratör enerjisi (AC şebekesi)	234.472	kWh
Şebeke beslemesi	234.472	kWh
Besleme noktasındaki düzenleme	0	kWh
Kişisel Güç Tüketimi	0,0	%
Güneş Enerjisi Oranı	0,0	%
Yıllık Özgül Kazanç	1.896,73	kWh/kWp
Sistem kullanım oranı (PR)	91,4	%
Gölgelemeden dolayı oluşan kazanç kaybı	0,0	%/Yıl
Önlenen CO_2 emisyonu	110.190	kg/yıl

CO2 emisyonu, atmosfere salınan karbonu ifade eder. Her sistemin kendine ait bir karbon emisyon dengesi vardır. Bilinçsiz fosil yakıt kullanımı, geri döndürülemez bir CO2 emisyonuna yol açıyor. Kullanılacak olan PV sistem ile elde edilecek olan elektriğin yanı sıra doğaya fosil yakıtlar gibi egzoz salınımı yapmadığından dolayı, yılda 110190 kg CO_2 emisyonu önlenmiş olacaktır. PV*Sol yardımıyla hesaplanan veriler **Tablo 2.**'de görülmektedir.

Tablo 4. Maliyet verileri

Toplam yatırım maliyeti	185.409,00 ₺
Varlıkların Getirisi	12,90 %
Amortisman süresi	7,3 Yıllar
Elektrik üretim maliyeti	0,04 ₺/kWh
Enerji Dengesi / Şebekeyi Besleme Kavramı	Tam besleme

İstenen özellikler sonucunda tasarlanan sistemin; tam besleme durumunda ilk yatırım maliyeti 185409,00 TL tutarındadır. Elektriğin birim maliyeti 0,04 TL/kWh, geri kazanım ömrü ise 7,3 yıldır. (**Tablo 3**)



Şekil 7. Biriktirilmiş nakit akış tablosu

Sistem kendisini **Şekil 7**'de görüldüğü gibi 8.yıldan itibaren ilk yatırım maliyeti olan 185409,00 TL'yi karşılayarak işletmeye getiri sağlamaya başlamıştır.

Tablo 5. Nakit akış tablosu

	Yıl 1	Yıl 2	Yıl 3	Yıl 4	Yıl 5
Yatırımlar	-₺185.409,00	₺0,00	₺0,00	₺0,00	₺0,00
şebekeye beslemeden gelir	₺25.997,20	₺25.877,88	₺25.621,67	₺25.367,99	₺25.116,82
Yıllık nakit akışı	**-₺159.411,80**	**₺25.877,88**	**₺25.621,67**	**₺25.367,99**	**₺25.116,82**
Biriktirilmiş nakit akışı (nakit dengesi)	-₺159.411,80	-₺133.533,91	-₺107.912,25	-₺82.544,26	-₺57.427,44

	Yıl 6	Yıl 7	Yıl 8	Yıl 9	Yıl 10
Yatırımlar	₺0,00	₺0,00	₺0,00	₺0,00	₺0,00
şebekeye beslemeden gelir	₺24.868,14	₺24.621,92	₺24.378,14	₺24.136,77	₺23.897,79
Yıllık nakit akışı	**₺24.868,14**	**₺24.621,92**	**₺24.378,14**	**₺24.136,77**	**₺23.897,79**
Biriktirilmiş nakit akışı (nakit dengesi)	-₺32.559,30	-₺7.937,38	₺16.440,75	₺40.577,52	₺64.475,31

	Yıl 11	Yıl 12	Yıl 13	Yıl 14	Yıl 15
Yatırımlar	₺0,00	₺0,00	₺0,00	₺0,00	₺0,00
şebekeye beslemeden gelir	₺23.661,18	₺23.426,91	₺23.194,96	₺22.965,31	₺22.737,93
Yıllık nakit akışı	**₺23.661,18**	**₺23.426,91**	**₺23.194,96**	**₺22.965,31**	**₺22.737,93**
Biriktirilmiş nakit akışı (nakit dengesi)	₺88.136,49	₺111.563,40	₺134.758,36	₺157.723,67	₺180.461,60

	Yıl 16	Yıl 17	Yıl 18	Yıl 19	Yıl 20
Yatırımlar	₺0,00	₺0,00	₺0,00	₺0,00	₺0,00
şebekeye beslemeden gelir	₺22.512,80	₺22.289,90	₺22.069,21	₺21.850,70	₺21.634,36
Yıllık nakit akışı	**₺22.512,80**	**₺22.289,90**	**₺22.069,21**	**₺21.850,70**	**₺21.634,36**
Biriktirilmiş nakit akışı (nakit dengesi)	₺202.974,40	₺225.264,30	₺247.333,51	₺269.184,21	₺290.818,57

	Yıl 21
Yatırımlar	₺0,00
şebekeye beslemeden gelir	₺1.181,04
Yıllık nakit akışı	**₺1.181,04**
Biriktirilmiş nakit akışı (nakit dengesi)	₺291.999,61

Sistem için 21 yıllık ömür hesabı yaparsak bu süreçte yatırılan ilk maliyetin yıllık olarak gelir, gider dengesi **Tablo 4**'te verilmiştir. İlk yıl 25997 TL getiri sağlayan sistem süre gelen yıllarda %4 kayıpla getiriye devam etmektedir. Ve 21 yılın sonunda 291999,61 TL işletmeye ekonomik getiri sağlamaktadır.

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OCCUPATIONAL HEALTH AND SAFETY IN ARCHITECTURE EDUCATION

Mustafa TAŞCI

Research and Teaching Assistant, Konya Technical University, Faculty of Architecture and Design, Department of Architecture, Konya, Turkey.
ORCID Code: 0000-0003-2739-6829

ABSTRACT

Architecture is an interdisciplinary profession that includes branches such as art, design, engineering, business, and economics. The biggest difference that distinguishes architecture, which is a building production profession, from other design branches is the production stage. The build production spaces are inherently a very high-risk workspace. Therefore, work should always be carried out in the construction site by considering occupational health and safety. The increasing demand for architectural works in recent times has accelerated production considerably. However, due to this speed in demand, occupational health and safety practices have been mostly ignored. As a result, occupational accidents at construction sites have become more frequent. Authorities are making radical changes and innovations to take and implement occupational safety measures. One of these changes is making theoretical occupational health and safety courses compulsory in universities. However, despite the elapsed time, no decrease has been observed in occupational accidents in the construction businesses. On the contrary, an increase has been observed in the number of occupational accidents and related deaths and injuries.

Within the scope of the notification, the studies that can be done to teach the occupational health and safety course more effectively will be examined. It should not be forgotten that occupational health and safety is a culture, not a lesson.

Keywords: occupational health and safety, architecture, education

THE STALIN ERA USSR CENTRAL ASIA POLICIES

Nahimuli OLIVIA
SGH University, Department of Pol. Sci. Warsow – Poland
ORCID Code: 7765-987-00X1-2237

ABSTRACT

This study focuses on the ideologies adopted in the Stalin Period and the Russification policy of Stalin, as well as the policies Stalin applied to the Central Asian states and other states. The details of the ideology of Marxism-Leninism and the politics of the Stalin era will be expressed by comparing them with the ideologies that took place before and after. The pressures, policies and exiles that the Central Asian states and especially the Caucasus have been subjected to will also be discussed.

Keywords: Joseph Stalin, Marxism-Leninism, nationalism, Union of Soviet Socialist Republics (USSR)

BOLSHEVIK REVOLUTION

Nahimuli OLIVIA
SGH University, Department of Pol. Sci. Warsow – Poland
ORCID Code: 7765-987-00X1-2237

ABSTRACT

Revolution refers to actions against the current order. The history of the world has witnessed many changes and transformations with revolutions. Revolutions throughout history are sometimes limited to the country in which they originated, and sometimes they have global influence. The Bolshevik Revolution, which had international consequences and was based on an ideological basis, also took its place in history with its important effects. This study explained the reasons that were influential in the occurrence of the Bolshevik Revolution and examined the changes and transformations that the revolution created in Russian society. Finally, the impact and consequences of the Bolshevik Revolution on the international arena are explained.

Keywords: Revolution, Russia, Bolshevik Revolution, International Consequences

POLITICAL LEGITIMACY

Nakimuli VIVIERNA
Vistula University, Poland

ABSTRACT

While citizens may lose trust in political authorities, democratic principles and ideals continue to exercise considerable appeal. This Policy Brief argues that this paradox must be understood as a crisis of legitimation. Research suggests that legitimacy is inherently subjective and must be constantly reearned. Low levels of political trust can be explained as the result of the complexity of globalised yet fragmented societies. The present feeling of malaise calls for a redefinition of the relationship between citizens and the authorities by which they are ruled. If popular sovereignty is to mean anything in today's age, it requires a new legitimising narrative.

Keywords: Politics, Legitimacy.

DEMOCRACY IN MODERN SOCIETY?

Nakimuli VIVIERNA
Vistula University, Poland

ABSTRACT

When asked the what is greatest threat to democracy in the a third of respondents told world that it was money in politics. The government's purpose of being for the people has been subverted by money." Barb Anderson of Blaine, Minn concurred: "If money weren't a requirement to run a successful political campaign, a wider variety of candidates without interests in corporations would have opportunities to run. Also, money seems to sway candidates and the elected too much.

Keywords: Democracy, Modern State.

THE MANDATE REGIME IN THE PALESTINIAN TERRITORIES AND ITS EFFECTS ON TODAY'S POLITICS[1]

Sebahattin PÜSGÜLLÜ
Yalova University, Institute of Social Sciences, Department of International Relations, Master Student.
ORCID Code: 0000-0002-2002-77OX.

ABSTRACT

After the Balfour Declaration, the United Kingdom and France issued a joint declaration on the Middle East on 7 November 1918, stating that they had been fighting for the liberation of the peoples living under the oppression of the Turks for a long time, and stated that the National governments in the Middle East countries based on the free elections of the peoples. and they declared that they would establish administrations. What is not taken into account in this statement is the people, the indigenous Arab people of Palestine, who are not recognized as a people and who do not even need to be consulted about their homeland, lands, and traditions. The Palestinian Arabs had no choice but to choose Britain as a mandate and accept its policy of "national home". Despite the facilities provided during the mandate period, the proportion of lands belonging to the Jews remained at the rate of 6-7%. The most important reason for this was the growing resistance of the Palestinian Arabs and their desire for independence, which was one of the obligations undertaken by England as a mandeter. From this point of view, the study will discuss the mandate regime established with the Balfour Declaration in the Palestinian territories and its effects on today's politics, based on the developments that followed.

Keywords: Palestine, History, Israel, Mandate Regime

[1] Bu çalışma "ORTADOĞU TARİHİNE KARŞILAŞTIRMALI BİR BAKIŞ: 1973 SAVAŞINA KADAR FİLİSTİN SORUNU VE ARAP-İSRAİL SAVAŞI" başlıklı tez çalışmasından türetilmiştir.

SPİNÖR TİPİ INSTANTON ÇÖZÜMLERİNİN ÇEKİM HAVZASI

Dr. Öğr. Üyesi Beyrul CANBAZ

İstanbul Yeni Yüzyıl Üniversitesi, Sağlık Bilimleri Fakültesi
ORCID Code: 0000-0002-5633-2296

ÖZET

İnstantonlar sıfır enerjili, sonlu ve sıfırdan farklı eylemlerdeki konformal simetriyi kendiliğinden kıran klasik çözümlerdir ve farklı topolojik yapılara sahip vakumlar arasındaki tünelleme süreçleri olarak tanımlanır. Bu özellik kuarkların parçacıklar içinde hapsolması problemlerini anlamada önemli bir rol oynamaktadır. Quantum alan teorisinde denek modeli olarak kullanılan 2 boyutlu Thirring Model de Heisenberg anzatı kullanılarak saf spinör instanton çözümlerine karşılık gelen lineer olmayan diferansiyel denklemler elde edilmiştir (Canbaz, 2012). Daha önce yapılan çalışmalarda, Thirring modelden elde edilen spinör tipi instanton çözümlerinin kaotik davranışları incelenmiştir (Canbaz, 2012). Bu çalışmada spinör tipi instanton çözümlerinin çekici havzaları ve havza entropisi incelenecektir. Bir çekicinin çekim havzası, üzerinde yinelemelerin tanımlandığı, o bölgedeki herhangi bir noktanın (herhangi bir başlangıç koşulu) çekiciye asimptotik olarak yineleneceği faz uzayının bölgesidir(Zhang, 2021). Havza entropisi belirli bir ölçekte faz uzayı yapılarını karakterize etmemize imkân sağlamaktadır. Faz uzayının M ayrı havzası olan bir bölge ele alınarak ε boyutunda N kutu kullanılarak örneklendirilmektedir. Kutu boyutu ε sınır yapılarını incelemek için ölçeği belirlemektedir. Bu çalışmada çekici havzaları gösterilmiştir ve havza entropisi hesaplanmıştır.

Anahtar Kelimeler: İnstanton, spinör, kaos, dinamik sistemler, havza entropisi, çekim havzası

BASINS OF ATTRACTION IN SPINOR TYPE INSTANTON SOLUTIONS

ABSTRACT

Instantons are classical solutions that spontaneously break conformal symmetry in zero-energy, finite and non-zero actions and are defined as tunneling processes between vacuums with different topological structures. This property plays an important role in understanding the problems of quark entrapment within particles. Nonlinear differential equations corresponding to pure spinor instanton solutions were obtained by using Heisenberg ansatz in the 2D Thirring Model, which is used as a subject model in quantum field theory (Canbaz, 2012). In previous studies, the chaotic behavior of spinor-type instanton solutions obtained from the Thirring model was investigated (Canbaz, 2012). In this study, basins of attraction and basin entropy of spinor type instanton solutions will be examined. The basin of attraction is the region of the phase space on which recursions are defined, where any point in that region (any initial condition) repeats asymptotically to the attractor (Zhang, 2021). Basin entropy allows us to characterize phase space structures at a certain scale. Considering a region with M separate basins of the phase space, it is sampled using N boxes of ε dimension(Puy, 2021). The box size ε determines the scale for examining boundary structures. In this study, basins of attraction are shown and basin entropy is calculated.

Keywords: Instantan, spinor, chaos, dynamical systems, basin entropy, basin of attraction

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DEDEGÖL DAĞI'NDA SON BUZULLAŞMA DÖNEMİNE AİT KALICI KAR SINIRININ FARKLI YÖNTEMLER KULLANILARAK BELİRLENMESİ

Zeynel ÇILĞIN
Doç. Dr., Munzur Üniversitesi, Edebiyat Fakültesi, Coğrafya Bölümü

ÖZET

Kalıcı kar sınırı, buzulun birikim alanı ile ablasyon (erime) alanı arasındaki denge hattı (*ELA=Equilibrium Line Altitude*) olarak kabul edilir. Eski buzullara ait kalıcı kar sınırının belirlenmesi paleoiklim çalışmalarında önemli bir yere sahiptir. Bu çalışmada, Türkiye'nin güneybatısında, Batı Toroslar dağ kuşağında yer alan Dedegöl Dağı'nda (2992 m) meydana gelen buzullaşmalara ait kalıcı kar sınırı veya buzul denge hattının tespit edilmesi amaçlanmıştır. Bu çerçevede, kalıcı kar sınırı yükseltisi tespiti için, yan morenlerinin maksimum yükseltileri, yükseklik oranı (THAR), yüz ölçümü (AAR) yöntemi ve sirk tabanı yükseltisi yöntemleri kullanılmıştır. Elde edilen bulguların değerlendirilmesinde, yüzölçümü metodu (AAR=0.60) kullanılarak elde edilen kalıcı kar sınırı değerlerinin topografya ile daha uyumlu olduğu değerlendirilmiş ve Dedegöl Dağı'nda, son buzul döneminde, çalışma alanı genelini temsil eden kalıcı kar sınırı yükseltisinin 2230 m olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: Dedegöl Dağı, Kalıcı Kar Sınırı, ELA, Buzullaşma

ESTIMATION OF THE EQUILIBRIUM LINE ALTITUDE (ELA) OF THE LAST GLACIAL PERIOD ON MOUNT DEDEGÖL USING VARIOUS METHODS

ABSTRACT

The snowline is considered to be the equilibrium line altitude (ELA) between the accumulation and ablation areas of a glacier. Estimating the ELAs of former glaciers has an important place in paleoclimate studies. The goal of this study is to determine the snowline or ELA of former glaciers on Dedegöl Mountain (2992 m), which is located in the Western Taurus Mountain belt in southwestern Turkey. In this context, the maximum altitudes of the lateral moraines, the Toe to Headwall Altitude Ratio (THAR), the Accumulation-Area Ratio (AAR), and the Cirque Floor Altitude methods were employed to estimate the ELA of former glaciers. The results were evaluated, and it was revealed that the ELA values obtained using the accumulation area ratio method (AAR=0.60) were most compatible with the topography of Mount Dedegöl, and the ELA representing the complete research area was 2230 m during the last glacial period.

Keywords: Mount Dedegöl, Snowline, ELA, Glaciation

GİRİŞ

Buzulun birikim alanı ile ablasyon (erime) alanı arasındaki sınır denge hattı (*ELA=Equilibrium Line Altitude*) olarak ifade edilir (Turoğlu, 2011). Kalıcı karların en alçak sınırı olarak da tanımlanan kalıcı kar sınırı dağ buzullarında ablasyon sezonu sonunda en alçak kar sınırı olan neve (*firn*) sınırına tekabül eder. Bu tür buzullarda neve (*firn*) sınırı, yıllık bütçenin sıfır olduğu noktaları birleştiren çizgi (hat) olan denge hattına yaklaşır. Bu çalışmada, Türkiye'nin güneybatısında, Batı Toroslar dağ kuşağında yer alan Dedegöl Dağı'nda (2992 m), kalıcı kar sınırı tespit edilmesi hedeflenmiştir. Dedegöl Dağı (Batı Toroslar) Beyşehir Gölünün batısında bulunan ve en yüksek yeri 2992 m olan bir dağ kütlesidir. Dedegöl Dağı'nın yüksek kesimlerinde, Pleyistosen'nin soğuk dönemlerinde dağ buzullaşmaları meydana gelmiştir. Buzullaşmalara bağlı olarak başta sirk, buzul vadisi, hörgüç kaya, törpülenmiş yüzeyler, glasiyal çizikler ve morenler olmak üzere buzul aşınım ve birikim şekilleri oluşmuştur (Çılğın, 2012, 2015). Bu dönemde meydana gelen buzullaşmalara ait kalıcı kar sınırı veya ELA seviyeleri yan morenlerinin maksimum yükseltileri, buzulun ortalama yükseklik oranı (THAR),

yüz ölçümü (AAR) yöntemi ve sirk tabanı yükseltisi yöntemleri (Benn ve Evans, 1998; Porter, 2001; Turoğlu, 2011) kullanılarak belirlenmeye çalışılmıştır.

1. Yan Morenlerin Maksimum Yükseltisi Metodu

Yan morenlerin maksimum yükseltileri önceki buzullaşmalara ait denge hattının minimum yükseltisini elde etmede kullanılan yöntemlerden biridir. Bu yöntemin teorik temeli yan morenlerinin, yalnızca denge hattı yükseltisi altında depolandıklarıdır (Meierding, 1982; Benn ve Evans, 1998; Ramage vd., 2005; Turoğlu, 2011).

Bu yöntemin avantajlarından biri arazi gözlemlerine dayalı olmasıdır. Dezavantajı ise morenlerin yükselti değerlerinin doğruluğunun, morenlerin ilksel durumlarını korumasına bağlı olmasıdır. Ancak yan morenleri, özellikle son buzul maksimumundan önceki (*Pre-Last Glacial Maximum*) buzullaşma dönemlerinde oluşanlar, bütünselliklerini nadiren muhafaza ederler (Ramage vd., 2005).

Çalışma alanında yer alan yan morenlerinin maksimum yükselti değerleri 1/25000 ölçekli topografya haritalarından ve arazi gözlemlerinden elde edilmiştir. Elde edilen değerler Tablo 1'de gösterilmiştir.

Tablo 1: Çalışma alanında en yüksekte yer alan yan morenlerinin maksimum yükseltileri.

Buzullaşma Alanı	Yan morenlerin Maksimum Yüksekliği (m)	Geliştiği Yön
Sayacak Dere	1955	Kuzey
Kisbe Dere	1955	Kuzey
Elma Dere	2510	Kuzeydoğu
Karagöl	2470	Doğu
Muslu	2368	Doğu
Kar Çukuru	2150	Kuzeybatı
DEDEGÖL DAĞI ORTALAMASI	2234	-

Dedegöl Dağı'nda yan morenlerin depolandığı maksimumu yükselti değerlerine bakıldığında, en düşük yükselti değerinin, kuzeye bakan yamaçlarda gelişen Sayacak Dere ve Kisbe Dere (1955 m) buzullaşma alanında olduğu görülür. Yan morenlerin maksimum yüksekliğinin ise doğuya bakan yamaçlarda bulunan Karagöl alanında yer aldığı (2470 m) anlaşılır. Çalışma alanında yer alan, altı farklı buzullaşma alanında bulunan yan morenlerinin ortalama yükselti değeri ise 2234 m olarak tespit edilmiştir (Tablo 1).

2. THAR (*Toe to headwall altitude ratio*) Yöntemi

THAR yöntemi, güncel buzullarda kalıcı kar sınırı yüksekliğinin, buzulun en yüksek ve alçak yükselti değerlerinin yaklaşık olarak ortalamasına denk geldiği gözlemine dayanmaktadır (THAR=0,5) (Meierding, 1982; Porter, 2001; Hubbard ve Glasser, 2005; Ramage vd., 2005). THAR yöntemi, buzulların hipsometrik özelliklerini ve iklim koşullarını hesaba katmayan basit bir yöntemdir. Buna karşın, denge hattı yükseltisinin hesaplanmasında pratik bir yöntemdir (Meierding, 1982; Benn ve Evans, 1998). Paleoglasiyer rekonstrüksiyon çalışmalarında, 0,35-0,40 THAR değerlerinin daha sağlıklı sonuçlar verdiği belirtilmiştir (Meierding, 1982; Ramage vd., 2005). Bu çalışmada 0,35 ve 0,40 THAR değerleri ayrı ayrı kullanılarak kalıcı kar sınırı (denge hattı yüksekliği=ELA) hesaplanmıştır (Tablo 2).

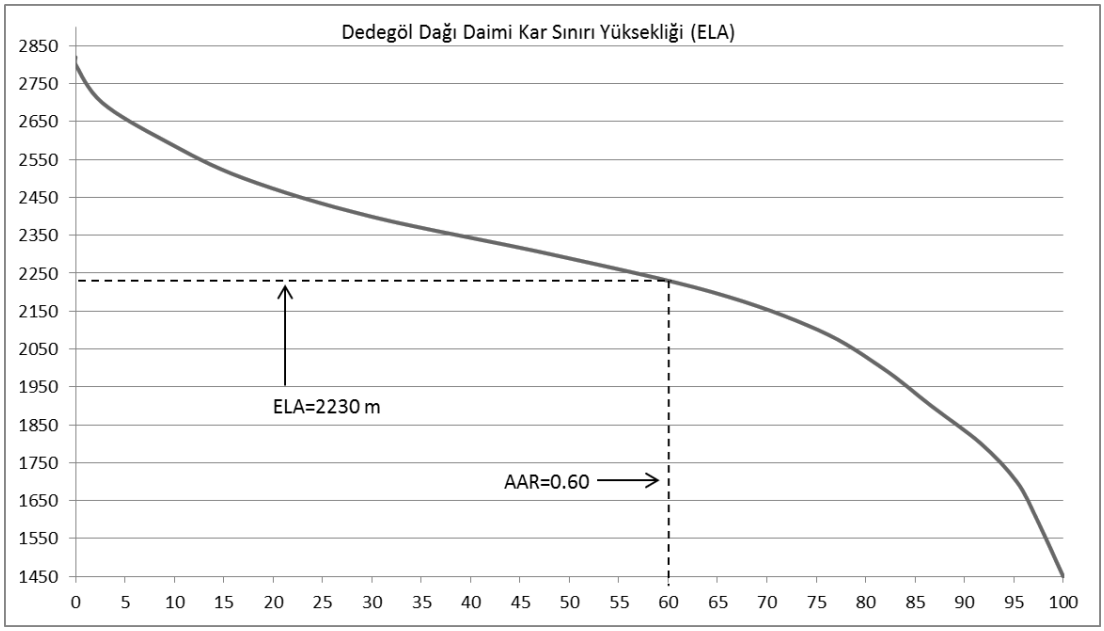
Tablo 2: Çalışma Alanında THAR yöntemi elde edilen kalıcı kar sınırı yükseltisi.

Buzullaşma Alanı	Maksimum Buzul Yüksekliği (m)	Minimum Buzul Yüksekliği (m)	ELA (m) (THAR 0,35)	ELA (m) (THAR 0,40)
Sayacak Dere	2820	1530	1982	2046
Kisbe Dere	2493	1680	1965	2005
Elma Dere	2733	1896	2189	2231
Karagöl	2804	1685	2077	2133
Muslu	2780	1480	1935	2000
Kar Çukuru	2820	1861	2197	2245
DEDEGÖL DAĞI ORTALAMASI			**2057**	**2110**

Dedegöl Dağı'nda THAR yöntemiyle yapılan kalıcı kar sınırı yükseltileri hesaplanmıştır. Buna göre çalışma alanında THAR 0,35 ve 0,40 değerlerine göre kalıcı kar sınırı yüksekliği sırasıyla 2054 m ve 2107 m hesaplanmıştır (Tablo 2).

3. Yüzölçümü Metodu (*Accumulation-Area Ratio*=AAR)

Yüzölçümü yöntemi buzulun birikim alanının, buzulun toplam alanına ait belirli bir bölümünü temsil etmesi esasına dayanır (Benn ve Evans, 1998; Erinç, 1971; Porter, 2001; Turoğlu, 2011). Bu yöntemle, buzul alanı tamamı 1 ise, birikim alanı 0.6 (ya da % 60) oranında bir bölümü oluşturmaktadır. Bu bölümün sınırından geçen buzul yüzeyi yükseltisi teorik olarak o dönemin denge hattı, neve hattı ve kabaca ortalama kalıcı kar sınırı olarak kabul edilir (Turoğlu, 2011). Güncel buzullarda yapılan deneysel çalışmalarda, AAR oranının 0.5 – 0.8 (0.65 ± 0.15) değerlerin arasında olduğu ortaya konmuştur (Porter, 2001). Çalışma alanın geneli ve her buzullaşma alanı için ayrı ayrı yüzölçümü yöntemi kullanılarak denge hattı yükseltisi belirlenmiştir (Şekil 1, Tablo 3). Yapılan hesaplamalarda AAR oranı olarak 0.6 değeri kullanılmıştır (Turoğlu, 2011). Çalışma alanında yüzölçümü yöntemi ile belirlenen kalıcı kar sınırı yüksekliği 2230 metredir (Şekil 1, Tablo 3).



Şekil 1: Çalışma alanının yüzölçümü yöntemi ile elde edilen kalıcı kar sınırı yükseltisine ait hipsometrik eğri.

Tablo 3: Çalışma alanında yüzölçümü (AAR) yöntemi elde edilen kalıcı kar sınırı yükseltisi.

Buzullaşma Alanı	**ELA (m) (AAR 0.60)**	**Geliştiği Yön**
Sayacak Dere	2230	Kuzey
Kisbe Dere	2105	Kuzey
Elma Dere	2265	Kuzeydoğu
Karagöl	2250	Doğu
Muslu	2210	Doğu
Kar Çukuru	2385	Kuzeybatı
DEDEGÖL DAĞI GENEL	**2230**	-

4. Sirk Tabanı Metodu

Sirk tabanı yüksekliği yönteminde, kalıcı kar sınırı yüksekliği için temsili olarak sirk tabanı yüksekliği kullanılır. Bu yöntem sadece sirk buzullarıyla kaplı alanlar, yani buzulların sirk eşiğinde sonlandığı Pleyistosen buzulları için uygundur (Porter, 2001; Ramage vd., 2005). Ayrıca Dedegöl Dağında olduğu gibi buzulların sirk tabanları dışına uzayıp, vadi buzulları oluşturdukları sahalarda kalıcı kar sınırı yüksekliği sirk tabanı yükseltisinin oldukça altında yer alır (Tablo 4). Bu durumlarda, kalıcı kar sınırı yükseltisinin belirlenmesinde sirk tabanı yöntemi gerçek kalıcı kar sınırı yüksekliğini yansıtmada yetersiz kalır (Porter, 2001).

Tablo 4: Çalışma alanında sirk tabanı yöntemi elde edilen kalıcı kar sınırı yükseltisi.

Buzullaşma Alanı	**Sirk Adı**	**Sirk Tabanı Yüksekliği (m)**	**Buzullaşma Alanı**	**Sirk Adı**	**Sirk Tabanı Yüksekliği (m)**
Sayacak Dere	Sirk 1	2661	Elma Dere	Elma Dere	2440
Sayacak Dere	Sirk 2	2569	**ELMA DERE ORTALAMA: 2440**		
Sayacak Dere	Sirk 3	2496	Karagöl	Sirk 1	2643
Sayacak Dere	Sirk 4	2733	Karagöl	Sirk 2	2630
Sayacak Dere	Sirk 5	2588	Karagöl	Sirk 3	2571
Sayacak Dere	Sirk 6	2585	Karagöl	Sirk 4	2665
Sayacak Dere	Sirk 7	2586	**KARAGÖL ORTALAMA: 2627**		
Sayacak Dere	Sirk 8	2658	Muslu	Sirk 1	2377
Sayacak Dere	Sirk 9	2450	Muslu	Sirk 2	2440
Sayacak Dere	Sirk 10	2541	Muslu	Sirk 3	2387
Sayacak Dere	Sirk 11	2548	Muslu	Sirk 4	2423
Sayacak Dere	Sirk 12	2314	Muslu	Sirk 5	2442
Sayacak Dere	Sirk 13	2471	Muslu	Sirk 6	2617
Sayacak Dere	Sirk 14	2636	Muslu	Sirk 7	2707
Sayacak Dere	Sirk 15	2678	**MUSLU ORTALAMA: 2485**		
SAYACAK DERE ORTALAMA: 2567			Karçukuru	Sirk 1	2416
Kisbe Dere	Kum Çukuru	2317	Karçukuru	Sirk 2	2693
KİSBE DERE ORTALAMA: 2317			**KARÇUKURU ORTALAMA: 2554**		
DEDEGÖL DAĞI ORTALAMASI: 2542					

Sirk çanağının taban kısmında, suyun erime ve donma şeklindeki hal değişiklikleri tabanın aşınmasına yol açar. Bu aşınım süreci, buzul altında yaklaşık 0º C sıcaklık şartlarında gelişir. Bu durumda, buzul çanağı tabanında yaz izotermi yaklaşık 0ºC'dir. Bu izoterm teorik olarak, yaklaşık kalıcı kar sınırı yükseltisi olarak kabul edilmektedir. Bir bölgede sirk tabanlarının ortalama yükseltileri alınarak oluşturulan hat, kalıcı kar sınırını temsil eder. Bu yöntemde bölgesel yükselti ve bunlara ait ortalama yükseltiler kullanılmasına karşın, bulunan kalıcı kar sınırı orografik kar sınırıdır (Turoğlu, 2011).

Çalışma alanında, sirk tabanı yöntemi kullanılarak kalıcı kar sınırı yükseltisi belirlenmiştir. Sirk tabanlarının belirlenmesinde, bütün buzullaşma alanlarında yer alan sirklerin taban yükselti değerleri, sirk morfometrik çalışmaları kapsamında elde edilmiştir. Elde edilen değerler, önce buzullaşma alanı ortalamasının belirlenmesinde kullanılmıştır. Bütün buzullaşma alanlarının ortalama değerleri belirlendikten sonra, çalışma alanı ortalamasına ulaşılmıştır. Çalışma alanında sirk tabanı yöntemi kullanılarak elde edilen kalıcı kar sınırı yüksekliği değerleri Tablo 4'te gösterilmiştir. Bu yönteme göre, Dedegöl Dağı'nda kalıcı kar sınırı yükseltisi 2542 m bulunmuştur.

SONUÇ

Dedegöl Dağı'nda son buzul döngüsünde gerçekleşen buzullaşmaya ait kalıcı kar sınırı yükseltileri, yan morenlerinin maksimum yükseltileri, THAR, yüzölçümü (AAR) ve sirk tabanı yükseltisi yöntemleri kullanılarak belirlenmiştir (Tablo 5).

Tablo 5: Çalışma Alanında farklı yöntemlerle elde edilen kalıcı kar sınırı yükseltisi.

Buzullaşma Alanı	**ELA (m) (YanMoreni Maksimum Yüksekliği)**	**ELA (m) (THAR 0,35)**	**ELA (m) (THAR 0,40)**	**ELA (m) (AAR 0.60)**	**ELA (m) (Sirk Tabanı Yüksekliği)**
Sayacak Dere	1955	1982	2046	2230	2567
Kisbe Dere	1955	1965	2005	2105	2317
Elma Dere	2510	2189	2231	2265	2440
Karagöl	2470	2077	2133	2250	2627
Muslu	2368	1916	1986	2210	2485
Kar Çukuru	2150	2197	2245	2385	2554
DEDEGÖL DAĞI ORTALAMASI	**2234**	**2054**	**2107**	**2230**	**2542**

Çalışma alanında, buzulların kalıcı kar sınırı (denge hattı) yükseltisini belirlemede kullanılan yöntemlerle elde edilen sonuçlar değerlendirilmesi yapıldığında;

Sirk tabanı yüksekliği yöntemi, buzulların sadece sirk çanaklarında geliştiği ve sirk eşiğini geçemediği alanlar için uygun olduğu belirtilmiştir (Porter, 2001; Ramage vd., 2005). Dedegöl Dağı'nda sirklerde gelişen buzullar, sirk eşiğini geçip kilometrelerce ilerlediği için, sirk tabanı yükseltisi yöntemi ile elde edilen 2542 m yükseltisi, Dedegöl Dağı'ndaki kalıcı kar sınırı yükseltisinin belirlenmesinde gerçeği yansıtmaktan uzaktır. Bu yükselti değerinin, kalıcı kar sınırı yükseltisinden daha fazla bir değere sahip olduğu sonucuna ulaşılmıştır.

Yan moreni maksimum yükseltisi, THAR(0.40) ve yüzölçümü yöntemi (AAR=0.60) ile elde edilen denge hattı yükseltilerinin bir birine yakın değerler gösterdiği görülmektedir. Ancak, THAR yönteminin hipsometrik ve klimatik özellikleri dikkate almaması ve buna bağlı olarak denge hattı yükseltisini kabaca göstermesi güvenilirliğini azaltmaktadır (Meierding, 1982; Benn ve Evans, 1998). Yan morenlerin maksimum yükselti değerlerine dayanan yöntemde de bazı problemler bulunmaktadır. Bunların başında, güncel periglasiyal koşulların kütle hareketleriyle yan morenleri üzerinde meydana getirdiği morfolojik deformasyonlar gelmektedir. Bu nedenle yan morenleri ilksel şekillerini nadiren korurlar (Ramage vd., 2005; Turoğlu, 2011). Bu problemler nedeniyle yan morenlerinden elde edilen kalıcı kar sınırı yükseltileri, diğer yöntemlerle elde edilen sonuçlarla mukayese edilmek üzere belirlenmiştir.

Yüzölçümü yöntemi (AAR=0.60), ayrı ayrı vadilerin yükselti dağılımını hesaba kattığında dolayı, farklı alansal dağılış ve şekillere sahip olan buzullardan farklı sonuçlar çıkar. Bu nedenle kalıcı kar sınırı yükseltisi belirlemelerinde, yüzölçümü yöntemi kullanılarak daha gerçeğe yakın sonuçlar elde edilir. Ayrıca bu yöntem daha düşük hata oranına sahiptir (Porter, 2001; Ramage vd., 2005).

Yüzölçümünün (AAR=0.60) daha sağlıklı sonuçlar vermesi nedeniyle, Dedegöl Dağı'nda kalıcı kar sınırı belirlemelerinde bu yöntemin kullanılmasının daha doğru olacağı düşünülmüştür. Bundan yola çıkarak, son buzul çağı esnasında, çalışma alanı genelini temsil eden kalıcı kar sınırı yükseltisinin 2230 m olduğu sonucuna ulaşılmıştır. Çiner (2003)'te, Batı Toroslar'da Würm kalıcı kar sınırının yaklaşık 2200 m'den geçtiği, Dedegöl Dağı'nda ise bu sınırının 2350-2400 m yükseltisinden geçtiğini belirtmiştir. Yaptığımız detaylı çalışma ile elde edilen yükselti değerlerinin, Çiner (2003) tarafından belirlenen değerlerden yaklaşık 120-170 m daha düşük olduğu, Batı Toroslar için belirtilen 2200 m yükselti değerleriyle uyuştuğu görülmektedir.

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THE IMPORTANCE OF C-BANDED KARYOTYPES IN THE FRESHWATER FISHES OF TURKEY

Muhammet Gaffaroğlu[1], Muradiye Karasu Ayata[2*]

[1]Kırşehir Ahi Evran University, Faculty of Science and Arts, Department of Molecular Biology and Genetics, Kırşehir, Turkey

*[*2]Kırşehir Ahi Evran University, Faculty of Health, Department of Nutrition and Dietetics, Kırşehir, Turkey*

ORCID Code: 0000-0001-7436-5828, 0000-0001-8890-8547

ABSTRACT

Fish chromosome studies are very important in terms of contributing to fish cytotaxonomy. In this context, chromosomal banding studies also have an important role. C-banding technique is one the most common technique that applied to fish chromosomes. Detailed comparisons between the fish species should be made with C-banded karyotypes. In C-banded karyotypes; information on the number, location, and size of C-banded chromosomes should be obtained. Also, sex chromosomes should be distinguished with this method. Otherwise, 384 fish species are distributed in the inland waters of Turkey which have a very high endemism rate (208 species). Chromosomal studies in the Anatolian freshwater fishes have been increased in the recent years. From these studies, C-banded karyotypes were reported only in 13 freshwater fish species. This study is aimed to obtain C-banded karyotypes of three Anatolian endemic freshwater fish species. Firstly, fish individuals were collected by electrofishing from the native habitats. Individuals were carried alive to the laboratory and chromosome slides were prepared by air-drying technique. C-banding technique was applied to the chromosome slides. Photographs of C-banded metaphases were captured under the light microscope with camera equipment. After this step, chromosomes were measured by a digital caliper. According to the arm ratios, C-banded karyotypes of the three species were arranged manually. The locations of the C-bands were obtained in details on the three karyotypes. This study may improve the knowledge about the C-banded karyotypes of Anatolian freshwater fish species.

Keywords: Pisces, chromosome, chromosomal banding

TÜRKİYE TATLISU BALIKLARINDA C-BANTLI KARYOTİPLERİN ÖNEMİ

ÖZET

Balık kromozom çalışmaları, balık sitotaksonomisine oldukça önemli katkılar sağlar. Bu bağlamda kromozom bantlama çalışmalarının da önemi vardır. C-bantlama tekniği balık kromozomlarına uygulanan en yaygın tekniklerden birisidir. C-bantlı karyotipler ile balık türleri arasında detaylı kıyaslamalar yapılabilmektedir. C-bantlı karyotiplerde, C-bantlı kromozomların sayısı, yerleşimi ve büyüklüğü konusunda bilgiler elde edilebilmektedir. Ayrıca bu metotla cinsiyet kromozomları da ayırt edilebilir. Ülkemiz içsularında toplam 384 balık türünün yayılış gösterdiği bilinmekte olup, bu türlerin büyük bir kısmı endemiktir (208 tür). Anadolu tatlısu balıklarındaki kromozom çalışmaları son yıllarda artış göstermiştir. Yapılan kromozom çalışmalarında sadece 13 tatlısu balığının C-bantlı karyotipleri rapor edilmiştir. Bu çalışmada Anadolu'ya endemik üç tatlısu balığının C-bantlı karyotiplerinin ortaya çıkarılması amaçlanmıştır. İlk olarak, balık örnekleri elekroşoker ile doğal yaşam alanlarından toplandı. Örnekler canlı olarak laboratuvara getirildi ve havada kurutma tekniğine dayalı olarak kromozom preparatları hazırlandı. Kromozom preparatlarına C-bantlama tekniği uygulandı. C-bantlı metafazların, kamera düzeneğine sahip ışık mikroskobunda fotoğrafları çekildi. Bu aşamadan sonra, kromozomlar dijital kumpas ile ölçüldü. Kol oranlarına dayalı olarak her üç türe ait C-bantlı karyotipler manuel

olarak düzenlendi. Her üç karyotipte de C-bantların hangi çift kromozomda lokalize olduğu ayrıntılı olarak bulundu. Bu çalışmanın Anadolu tatlısu balıklarının C-bantlı karyotip bilgisine katkı sağlayacağı düşünülmektedir.

Anahtar kelimeler: Balık, kromozom, kromozom bantları

GİRİŞ

Ülkemiz içsularında toplam 384 balık türünün yayılış gösterdiği bilinmekte olup, bu türlerin 208'i endemiktir (Çiçek vd., 2020). Anadolu tatlısu balıklarındaki kromozom çalışmaları son yıllarda artış göstermiştir (Gaffaroğlu vd., 2014). Yapılan kromozom çalışmalarında sadece 13 tatlısu balığının C-bantlı karyotipleri rapor edilmiştir (Arslan ve Taki 2012; Arslan ve Gündoğdu, 2016; Karasu Ayata vd., 2018; Karasu Ayata ve Gaffaroğlu, 2019; Doori, 2019; Alpaslan, 2020; Karasu Ayata, 2020; Arslan ve Alpaslan, 2020; Ünal Karakuş, 2021).

Anadolu tatlısu balıklarının bir cinsi olan *Pseudophoxinus* Bleeker, 1860 (Leuciscidae, Leuciscinae) ülkemiz içsularında yayılış gösteren 21 endemik türe sahiptir (Güçlü ve Küçük, 2017; Saç vd., 2019). Bu cinste yapılan sitogenetik araştırmalar son yıllarda artış göstermiştir (Karasu Ayata, 2020). Ülkemiz içsularına endemik *Pseudophoxinus* türlerinden; *P. antalyae, P. battalgilae, P. burduricus, P. crassus, P. egridiri, P. elizavetae, P. evliyae, P. fahrettini, P. firati, P. hittitorum, P. maeandri* ve *P. zekayi*'de sitogenetik çalışmalar çeşitli araştırıcılar tarafından rapor edilmiştir (Tablo 1). Bu çalışmalarda türlere ait diploit kromozom sayısı, kromozom morfolojisi, C-bantlama ve Ag-NOR boyama özellikleri verilmiştir. Ayrıca *P. antalyae'de* G- ve Q bantlama özellikleri (Ergene vd., 2010); *P. elizavetae, P. hittitorum* ve *P. firati*'de ise CMA_3/DAPI bantlama özellikleri bildirilmiştir (Karasu Ayata, 2020). Bu türlerin hiçbirinde C-bantlı karyotiplere ilişkin bir veri bulunmamaktadır. Yapılan çalışmalarda C-bantlı metafazlardaki, C-bantların yerleşimi (sentromerik, perisentromerik ve kromozomların çoğunluğunda veya bir kısmında şeklinde) genel olarak rapor edilmiştir (Tablo 1). Tablo 1'deki herhangi bir *Pseudophoxinus* türüne ait C-bantlı karyotip bilgisine rastlanmamıştır.

C-bantlama, balık kromozomlarına başarıyla uygulanan bantlama yöntemlerinden biridir (Karasu Ayata vd., 2016). C-bant metodu; hafif asit muamelesi, baz muamelesi ve sıcak tuzda inkübasyonu gerektirir. Daha sonra boyama yapılır ve böylece C-bantlar görünür hale gelir (Sumner, 1972). C-bantlama ile konstitütif heterokromatin bölgeleri koyu boyanmış olarak gözlenirler. Bu bantlar homolog kromozomların tespiti ve cinsiyet kromozomlarının belirlenmesinde oldukça faydalıdır (Ulupınar ve Alaş, 2002). Ayrıca türler arasındaki filogenetik ilişkilerin belirlenmesinde de C-bantlamanın önemi büyüktür. Türlere özgü C-bantlar tespit edilerek türler arasında karşılaştırmalar yapılabilmektedir. Bu bantların büyüklüğü türler arasında farklılık gösterebilir. C-bantlar kromozomun herhangi bir bölgesinde bulunmakla birlikte genellikle sentromer ve telomerde bulunurlar (Arslan ve Arslan, 2007). Ayrıca bu bantların kromozom kolları boyunca (interstitial) ve submetasentrik (veya subtelo-akrosentrik) kromozomların kısa kollarında da olabildiği bildirilmiştir (Gold vd., 1986).

C-bantlı metafazlar ile C-bantların yerleşimi konusunda sadece genel bir kanıya varılmaktadır. Oysa C-bantlı karyotipler, hangi kromozomun C-bant taşıdığını birebir göstermektedir. Karasu Ayata vd. (2016); *P. battalgilae, P. burduricus* ve *P. evliyae*'de C-bantların çok sayıda kromozomun sentromerinde olduğunu kaydetmiştir. Ancak ilgili çalışmada türlere ait C-bantlı karyotipler düzenlenmediğinden, C-bantların hangi çift veya sentromer konuma göre hangi tip kromozomlarda olduğunu bildirmemişlerdir. Bu çalışmada, Anadolu'ya endemik *P. battalgilae, P. burduricus* ve *P. evliyae* türlerinin C-bantlı karyotipleri ortaya çıkarıldı ve Anadolu tatlısu balık türleri arasında C-bant karyotip kalıpları bakımından karşılaştırmalar yapıldı.

Tablo 1. *Pseudophoxinus* türlerinde rapor edilmiş sitogenetik veriler

Tür adı	2n	Kromozom morfolojisi	FN	C-bant yerleşimi	Kaynaklar
P. antalyae	50	16m+14sm+12st	92	Birçok kromozomun	Ergene vd. (2010)

		+8a		sentromerinde	
P. firati	50	38m-sm+12st	88	Bazı kromozomların sentromerinde	Karasu vd. (2011)
P. elizavetae	50	8m+34sm+8st	92	Çok sayıda kromozomun sentromerinde	Gaffaroğlu vd. (2014)
P. crassus	50	12m+30sm+8st-a	92	Çok sayıda kromozomun perisentromerinde	Ünal vd. (2014)
P. hittitorum	50	14m+26sm+10st-a	90	Çok sayıda kromozomun perisentromerinde	Ünal vd. (2014)
P. battalgilae	50	16m+28sm+6st-a	94	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P.burduricus	50	18m+26sm+6st-a	94	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P. egridiri	50	14m+28sm+8st-a	92	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P. evliyae	50	14m+30sm+6st-a	94	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P. fahrettini	50	16m+26sm+8st-a	92	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P. maeandri	50	10m+32sm+8st-a	92	Çok sayıda kromozomun sentromerinde	Karasu Ayata vd. (2016)
P. zekayi	50	16m+26sm+8st-a	92	Çok sayıda kromozomun perisentromerinde	Ünal ve Gaffaroğlu (2016)

MATERYAL VE METOT

Bu çalışmada Anadolu'ya endemik üç tatlısu balık türü çalışılmıştır. *Pseudophoxinus* cinsinde yer alan bu türlerden; *P. battalgilae*'ye ait örnekler Kuğulupark Göleti, Seydişehir, Konya'dan (37°23′N, 31°50′E); *P. burduricus*'a ait örnekler Düğer Pınarı, Burdur'dan (37°34′N, 30°01′E) ve *P. evliyae*'ye ait örnekler ise Kırkpınar Köyü, Korkuteli, Antalya'dan (37°08′N, 29°55′E) elektroşoker ile 2018 yılında toplandı (Şekil 1). Balık örnekleri havalandırmalı taşıma bidonları ile canlı olarak Kırşehir Ahi Evran Üniversitesi Fen-Edebiyat Fakültesi Genetik Araştırma Laboratuvarına getirildi. Öncelikle her örnekten Bertollo vd. (2015)'ne göre havada kurutma tekniği uygulanarak baş böbrek hücrelerinden kromozom eldesi yapıldı. Kromozom preparatları hazırlandı. Hazırlanan kromozom preparatlarına Sumner (1972)'ın C-bantlama tekniği uygulandı. C-bantlı kromozom preparatları Leica DM 3000 kameralı ışık mikroskobunda taranarak, AKAS programı ile C-bantlı metafazların fotoğrafları çekildi. Fotoğrafı çekilen C-bantlı metafaz plaklarından her türe ait C-bantlı karyotipler manuel olarak düzenlendi. Kromozom ölçümleri dijital kumpas ile yapıldı. Kromozomlar Levan vd. (1964)'ne göre kol oranlarına dayandırılarak sınıflandırıldı.



Şekil 1. *Pseudophoxinus* örneklerinin toplandığı yerleri gösteren Türkiye haritası. Harita Google Earth Pro uygulamasında düzenlenmiştir.

BULGULAR VE TARTIŞMA

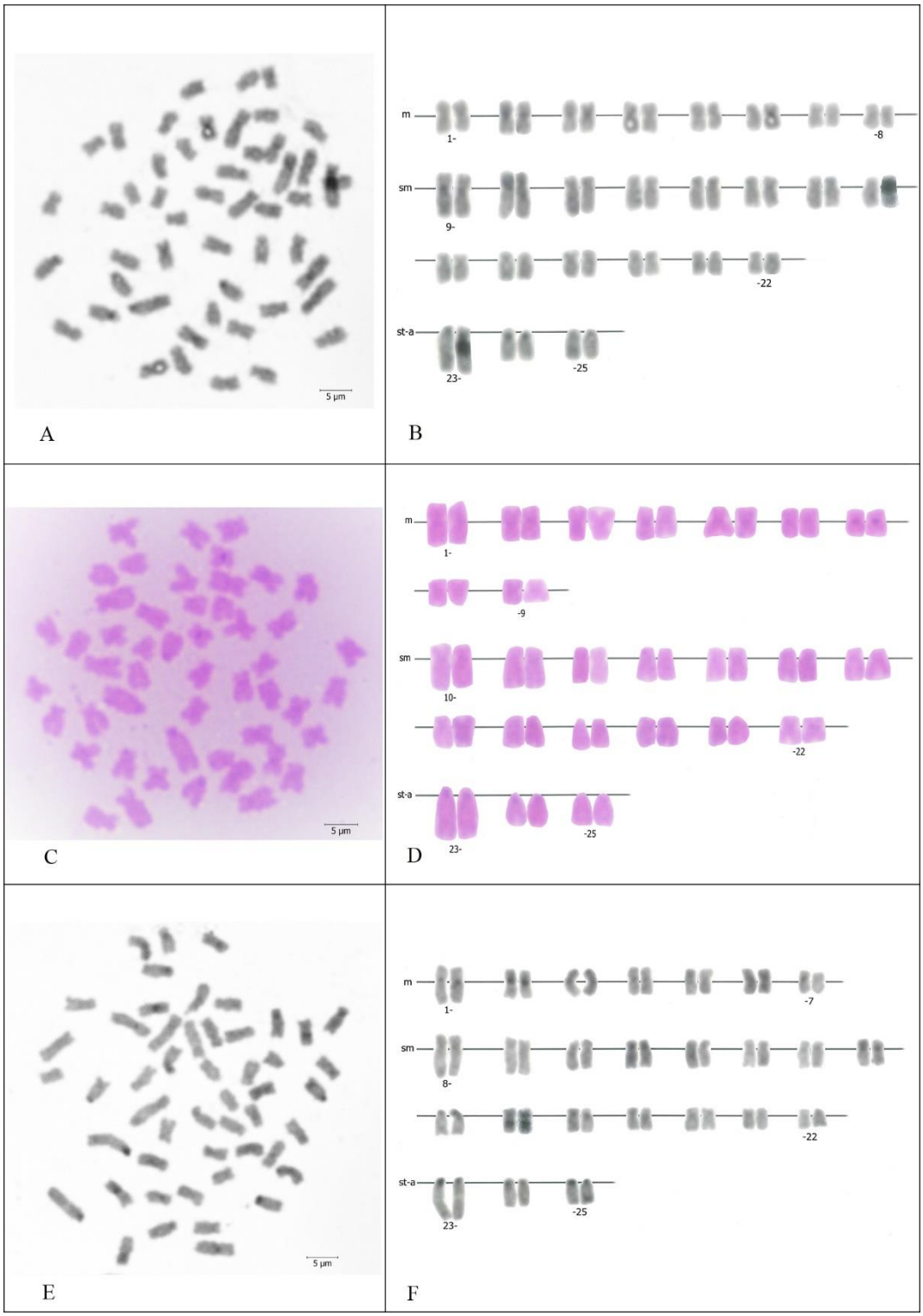
Karasu Ayata vd. (2016) tarafından rapor edilen sitogenetik çalışmada üç türün karyotipleri şu şekilde bildirilmiştir: 2n = 50 olmak üzere *P. battalgilae*'nin 16 metasentrik, 28 submetasentrik ve 6 subtelo-akrosentrik kromozom; *P. burduricus*'un 18 metasentrik, 26 submetasentrik ve 6 subtelo-akrosentrik kromozom; *P. evliyae*'nin 14 metasentrik, 30 submetasentrik ve 6 subtelo-akrosentrik kromozomdur. Bu çalışmada elde edilen C-bantlı karyotiplerde de üç türün yukarıda rapor edilen karyotiplerle aynı kromozom morfolojisine sahip olduğu görüldü (Şekil 2B, D, F).

Bu çalışmada üç türe ait elde edilen C-bant metafazlarından (Şekil 2A, C ve E) oluşturulmuş C-bantlı karyotiplerde *P. battalgilae*'nin ikinci metasentrik; birinci, ikinci ve beşinci submetasentrik; birinci, ikinci ve üçüncü subtelo-akrosentrik kromozomlarının perisentromerinde yoğun C-bantlar gözlendi (Şekil 2B).

P. burduricus'un ikinci ve yedinci metasentrik; birinci ve ikinci subtelo-akrosentrik kromozomlarının perisentromerinde de yoğun C-bantlar gözlendi (Şekil 2D). *P. battalgilae* ve *P. burduricus*'un C-bantlı karyotiplerindeki diğer kromozom çiftlerinin perisentromerinde ise çok az C-bant tespit edildi (Şekil 2B, D).

P. evliyae'de ise ikinci metasentrik; dördüncü, sekizinci ve dokuzuncu submetasentrik; birinci, ikinci ve üçüncü subtelo-akrosentrik kromozomlarının perisentromerinde yoğun C-bantlar gözlendi (Şekil 2F). Ayrıca bu türün birinci ve yedinci metasentrik; on birinci submetasentrik kromozomlarının perisentromerinde ise daha az yoğun C-bantlar tespit edildi (Şekil 2F).

Bu çalışmada *P. battalgilae* ve *P. evliyae*'nin C-bantlı karyotiplerinde *P. burduricus*'a göre daha fazla kromozomda yoğun C-bant tespit edilmiştir. Bu çalışmadaki C-bantlı karyotiplerde ikinci metasentrik; birinci ve ikinci subtelo-akrosentrik kromozomlardaki C-bant yerleşiminin üç tür için de ortak bir özellik olabileceği düşünülmektedir. Karyotiplerdeki üçüncü subtelo-akrosentrik kromozomlardaki C-bantların ise *P. battalgilae* ve *P. evliyae* için ortak bir özellik olabileceği düşünülmektedir. Diğer C-bantların yerleşimi bakımından türler arasındaki kromozomlarda farklılıklar gözlenmiştir. Anadolu'da yayılış gösteren diğer *Pseudophoxinus* türlerinin kromozomal çalışmalarında (Tablo 1) C-bantlı karyotipler rapor edilmediğinden bu çalışma ile bir kıyaslama yapılamamaktadır.



Şekil 2. *Pseudophoxinus*'un 3 türüne ait C-bantlı metafazlar (A) *P. battalgilae*, (C) *P. burduricus*, (E) *P. evliyae*.
Pseudophoxinus'un 3 türüne ait C-bantlı karyotipler (B) *P. battalgilae*, (D) *P. burduricus*, (F) *P. evliyae*.

Anadolu tatlısu balıklarında yapılan sitogenetik araştırmalarda C-bantlı karyotipler son yıllarda düzenlenmeye başlanmıştır. Bu kapsamdaki ilk çalışma Arslan ve Taki (2012)'ya aittir. Bu çalışmaların son 5 yılda artış gösterdiği görülmektedir (Arslan ve Gündoğdu, 2016; Karasu Ayata vd., 2018; Karasu Ayata ve Gaffaroğlu, 2019; Doori, 2019; Alpaslan, 2020; Karasu Ayata, 2020; Arslan

ve Alpaslan, 2020; Ünal Karakuş, 2021). Bu kapsamda toplam 13 türde rapor edilen çalışmalar sırasıyla; *Tinca tinca* (Familya: Tincidae) (Arslan ve Taki, 2012), *Chondrostoma beysehirense* (Familya: Leuciscidae) (Arslan ve Gündoğdu, 2016), iki *Cobitis* türünde (Familya: Cobitidae) (Karasu Ayata vd., 2018), *Luciobarbus kottelati* (Familya: Cyprinidae) (Karasu Ayata ve Gaffaroğlu, 2019), *Squalius recurvirostris* (Familya: Leuciscidae) (Doori, 2019), *Alburnus nasreddini* (Familya: Leuciscidae) (Alpaslan, 2020), iki *Squalius* türünde (Familya: Leuciscidae) (Karasu Ayata, 2020), *Esox lucius* (Familya: Esocidae) (Arslan and Alpaslan, 2020) ve üç *Gobio* (Familya: Gobionidae) (Ünal Karakuş, 2021) türlerindedir.

Yaptığımız bu çalışmada Leuciscidae familyasında yer alan üç *Pseudophoxinus* türünün C-bantlı karyotiplerinin daha önce aynı familyanın diğer temsilcilerinde yapılan (Arslan ve Gündoğdu, 2016; Doori, 2019; Alpaslan, 2020; Karasu Ayata, 2020) C-bantlı karyotipler ile benzerlik gösterdiği görülmektedir. *C. beysehirense* 6 çift kromozomda belirgin perisentromerik C-bant içermesi bakımından (Arslan ve Gündoğdu, 2016) *P. battalgilae* ve *P. evliyae* ile benzerlik göstermektedir. *C. beysehirense* bir çift submeta-subtelosentrik kromozomun kısa kolunun tamamında C-pozitif içermesi (Arslan ve Gündoğdu, 2016) bakımından ise bu çalışmadaki üç *Pseudophoxinus* türünden farklılık göstermektedir. *Squalius carinus* ve *S. fellowesii* C-pozitif heterokromatinin çok sayıda kromozomun perisentromerinde olması (Karasu Ayata, 2020) bakımından bu çalışmadaki üç *Pseudophoxinus* türüyle benzerlik göstermektedir. Diğer taraftan *S. carinus* iki kromozom çiftinde heterokromatik blok içermesi bakımından bu çalışmadaki üç *Pseudophoxinus* türüyle farklılık göstermektedir. *S. recurvirostris* bazı iki kollu ve tek kollu kromozomların sentromer bölgesinde C-bant içermesi (Doori, 2019) bakımından bu çalışmadaki üç türle de benzerlik göstermektedir. Aynı çalışmada bazı kromozomlarda bildirilen hafif C-bantlar (Doori, 2019) da bu çalışmadaki bazı kromozomlarda gözlenmiştir. *A. nasreddini* ise özellikle üç metasentrik, üç submetasentrik ve beş akrosentrik kromozomda içerdiği sentromerik ve perisentromerik C-bantlar (Alpaslan, 2020) ile bu çalışmadaki üç türle benzerlik göstermektedir.

Bu çalışma ile Anadolu tatlısu balıklarındaki C-bantlı karyotip sayısı 16'ya yükselmiştir. Bu çalışma, Anadolu *Pseudophoxinus* türlerinin C-bantlı karyotiplerini açığa çıkaran bir çalışmadır. Diğer *Pseudophoxinus* türlerinde de yapılacak C-bantlı karyotipler ile türler arasında daha ayrıntılı karşılaştırmalar yapılabilecektir.

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RSM-BASED OPTIMIZATION ON RECYCLING OF WASTE ADDITIVES IN MORTARS

Nihan Gülmez[1*]
[*1]*Munzur University, Faculty of Engineering, Department of Civil Engineering, Tunceli, Turkey.*
ORCID Code: 0000-0002-8650-9670

ABSTRACT

The discharge of industrial wastes, which have reusability potential in cement mortars, harms environment and causes various health problems. This study shows results obtained from an experimental study on some physical and mechanical properties of mortars with aluminum chips (AL) and marble powder (MP) as two different wastes originating from metal and marble processing plants. At the end of 7 and 28 days of curing, compressive (CS) and flexural strength (FS) and water absorption (WA) percentage of mortars were determined by laboratory experiments. In addition, based on experimental results, a regression analysis was performed to predict engineering properties of metal chip- reinforced mortars using response surface methodology (RSM). An optimum design solution based on the desired properties was proposed for mortars with multi-objective optimization technique. As a result of the analysis, it was observed that mortars containing 1% aluminum chips had the best design performance with a desirability value of 0.821 in 28-day curing period (CP).

Keywords: Aluminum chips, Marble powder, Strength, Optimization

INTRODUCTION

Today, the threat to natural resources is growing due to the increasing demand in construction industry (Possan et al., 2017). In addition, cement industry due to carbon dioxide emissions has a large share in global warming, which is one of the most important agenda items in the world (Shobeiri et al., 2021). Therefore, sustainable concrete production by using waste or by-products as substitute materials is very important in minimizing these environmental effects (Teixeira et al., 2022). Marble powder (MP) is a type of waste that is produced during marble processing and causes various environmental and health problems if not used effectively (Talah et al., 2015). Apart from positive effects of marble powder, which was used as a cement or fine aggregate replacement material, on concrete, its negative effects on mechanical performance were reported by different researchers (Anitha et al., 2021, Benjeddou et al., 2020). The brittle behavior of concrete when exposed to tensile forces was tried to be improved by means of fibers produced in different geometries and shapes included in concrete (Chen et al., 2022). However, there is an increasing interest in the use of recycled fibers in concrete due to increasing construction costs with commercial fibers. It was observed by Moghadam et al. (2021) that the effect of recycled fibers on improving flexural strengths was of great importance and flexural strength of samples reinforced with 1% fiber increased by 122% compared to control mix.

In previous studies, mechanical performance of such composite mortars was investigated in detail, but optimization based on strength capacity of specimens produced with marble-aluminum constituents was not studied effectively. In this study, compressive strength, flexural strength and percentage of water absorption data of waste-based mortars were evaluated together in the development of design models. As a result, suggestions were presented for mortar mixes based on optimum responses that aid decision making in engineering applications.

MATERIALS AND METHODS

In the experimental study, marble powder and aluminum chips as waste additives, cement (CEM I 42.5R), river aggregate and crushed aggregate were used. Marble powder was replaced by 0.10% and 20% of cement. Aluminum chips were added to mixtures by replacing 0%, 2% and 4% of fine aggregates. Mortars, which were removed from their molds after 24 hours, were subjected to two different curing conditions, 7 and 28 days. After the curing process, flexural strength and water

absorption tests were carried out on 40x40x160 mm prism mortars. Mortars, which were divided into two parts from flexural strength test, were subjected to compressive strength test.

In this research, an optimization-based solution was studied to determine optimum values of independent parameters in order to obtain maximum strength capacity. Modeling and optimization were made through the response surface methodology using statistical and mathematical approaches, and mathematical expressions related to models were derived. A summary of dataset used to generate design models was given in Table 1. The percentage of additives included in mixtures and curing conditions were determined as input parameters. Output parameters of design models were flexural strength, compressive strength and water absorption percentage of composite mortars containing waste. Letters "a" and "p" in front of names of output parameters presented in Table 1 represent “actual” and “predicted” values, respectively. For example, aFS showed the actual value of flexural strength.

Table 1. Dataset with design parameters

Number of Data	AL (%)	MP (%)	CP (day)	aFS (MPa)	pFS (MPa)	aCS (MPa)	pCS (MPa)	aWA (%)	pWA (%)
1	0	0	7	3.9	3.92	24.3	24.5	11.7	11.6
2	2	0	7	4.6	4.46	19.6	21.0	11.3	11.4
3	4	0	7	4.8	4.83	21.2	19.9	11.2	11.3
4	0	10	7	2.5	2.67	23.1	21.1	11.7	11.7
5	2	10	7	3.1	3.20	16.2	16.6	11.8	11.6
6	4	10	7	3.8	3.57	13.5	14.6	11.5	11.4
7	0	20	7	2.3	2.12	22.2	23.4	11.7	11.8
8	2	20	7	2.8	2.65	18.4	18.0	11.4	11.7
9	4	20	7	2.8	3.01	15.4	15.0	11.5	11.5
10	0	0	28	4.8	4.65	30.1	31.4	11.4	11.2
11	2	0	28	4.9	4.97	26.4	26.5	11.0	11.1
12	4	0	28	5.0	5.12	25.6	24.0	10.6	10.9
13	0	10	28	3.6	3.60	29.1	26.4	11.1	11.3
14	2	10	28	3.7	3.91	20.2	20.6	11.4	11.2
15	4	10	28	4.2	4.06	14.4	17.2	11.1	11.1
16	0	20	28	3.1	3.24	25.2	27.3	11.5	11.5
17	2	20	28	3.7	3.55	22.3	20.5	11.1	11.3
18	4	20	28	3.7	3.69	16.6	16.1	11.5	11.2

RESULTS AND DISCUSSION

Flexural Strength

The model that maximizes Adjusted R^2 (0.9453) and Predicted R^2 (0.8696) was determined to be Quadratic for flexural strength by model statistics. Predicted R^2 and Adjusted R^2 with difference less than 0.2 were in agreement. Table 2 gives ANOVA analysis results of the proposed Quadratic model for flexural strength. Based on P values less than 0.0500, A, B, C, B^2 were important model terms. Results of the analysis showed the importance of curing conditions as well as waste additives included in mixtures on flexural strength. 3D surface plotting of flexural strength of mortars subjected to 7 and 28 days curing conditions was presented in Figure 1. It was observed that the substitution of marble powder with cement decreased flexural strength. In the study conducted by Singhal et al. (2021), the optimum 28-day flexural strength value was achieved with a mixture containing 20% marble powder as a fine aggregate replacement. This situation revealed effect of differences in the use of marble powder as binder or aggregate on strength. Fibers incorporated into cementitious composites increase energy absorption capacity, deformation capacity, and post-cracking load-bearing capacity due to their

ability to transfer tensile stress along the matrix-fiber interface by bridging cracks (Bediwy and El-Salakawy, 2021). In this study, it was clear that a significant increase in flexural strength was observed as a result of the bridging of cracks with the addition of aluminum chips. Final equation in terms of coded factors obtained from regression analysis was presented in Eqs. (1). Coded factors are used to estimate responses of each factor at certain levels and to determine the relative effects of factors by considering coefficients.

$$FS= +3.64+ 0.2242A-0.8084B +0.3255C -0.0045AB -0.0829AC +0.0993BC -0.0470A^2 +0.3495B^2 \quad (1)$$

Table 2. ANOVA analysis of flexural strength

Model	**Sum of Squares**	**df**	**Mean Square**	**F-value**	**p-value**	
	12.23	8	1.53	37.72	< 0.0001	significant
A-AL	0.6127	1	0.6127	15.11	0.0037	
B-MP	7.17	1	7.17	176.84	< 0.0001	
C-CP	1.74	1	1.74	43.02	0.0001	
AB	0.0003	1	0.0003	0.0070	0.9351	
AC	0.1465	1	0.1465	3.61	0.0898	
BC	0.1184	1	0.1184	2.92	0.1216	
A^2	0.0279	1	0.0279	0.6884	0.4282	
B^2	0.4885	1	0.4885	12.05	0.0070	
Residual	0.3649	9	0.0405			
Cor Total	12.60	17				

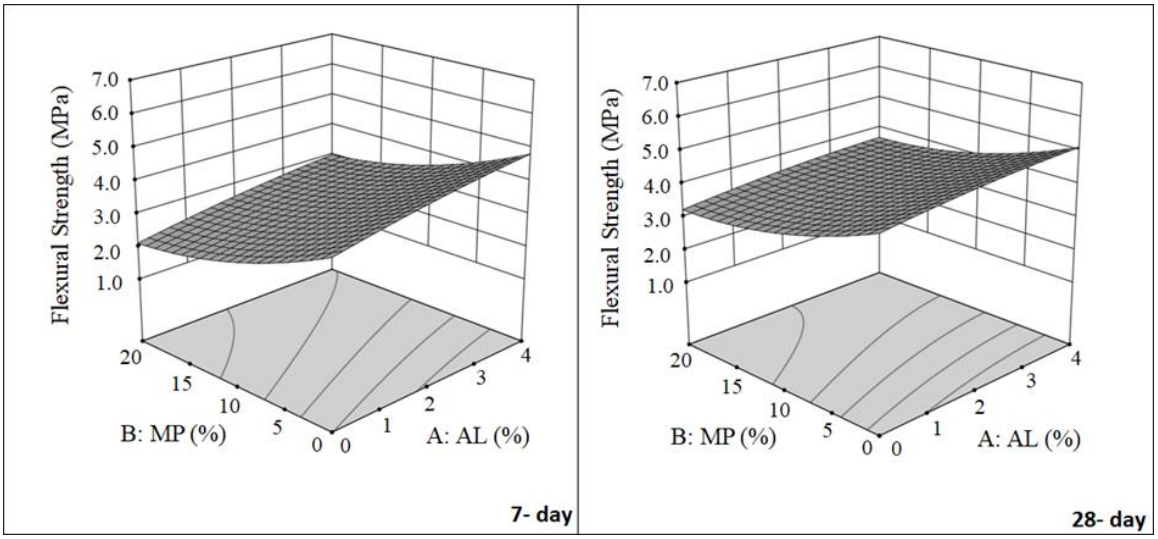


Figure 1. 3D surface plotting for flexural strength

Compressive Strength

Quadratic model (with Adjusted R^2 of 0.8264 and Predicted R^2 of 0.6094) and Linear model (with Adjusted R^2 of 0.7179 and Predicted R^2 of 0.6217) for compressive strength were proposed. ANOVA

analyzes were performed for Quadratic model, focusing on model that maximized Adjusted R^2 and Predicted R^2, and results were presented in Table 3. A, B, C, B^2 with P values less than 0.0500 were important model terms. This result showed that the percentage of additives substituted for mortar constituents had a significant effect on compressive strength. The lowest compressive strength with a value of 13.5 MPa was observed in mortars prepared with 10% marble powder and 4% aluminum chips. It was reported by Sabapathy et al. (2021) that maximum compressive strength was obtained with 0.5% aluminum fibers by volume, and strength showed a constant decreasing trend with more fiber reinforcement. 3D surface graphs for compressive strengths were given in Figure 2. In this study, it was observed that marble powder substitution had a negative effect on compressive strength. Du et al. (2021) reported that although the compressive strength of geopolymer mortars decreased with the addition of marble powder, strength was within the acceptable range. Final equation for compressive strength in terms of coded factors was given in Eqs. (2).

$$CS= +17.70-2.50A -2.50B+1.82C- 0.7192 AB- 0.5225AC- 0.7470BC +0.6780A^2 +2.86B^2 \quad (2)$$

Table 3. ANOVA analysis of compressive strength

Model	Sum of Squares	df	Mean Square	F-value	p-value	
	377.20	8	47.15	11.12	0.0008	significant
A-AL	76.32	1	76.32	17.99	0.0022	
B-MP	68.56	1	68.56	16.16	0.0030	
C-CP	54.38	1	54.38	12.82	0.0059	
AB	7.36	1	7.36	1.73	0.2204	
AC	5.82	1	5.82	1.37	0.2714	
BC	6.70	1	6.70	1.58	0.2406	
A^2	5.81	1	5.81	1.37	0.2719	
B^2	32.63	1	32.63	7.69	0.0216	
Residual	38.18	9	4.24			
Cor Total	415.37	17				

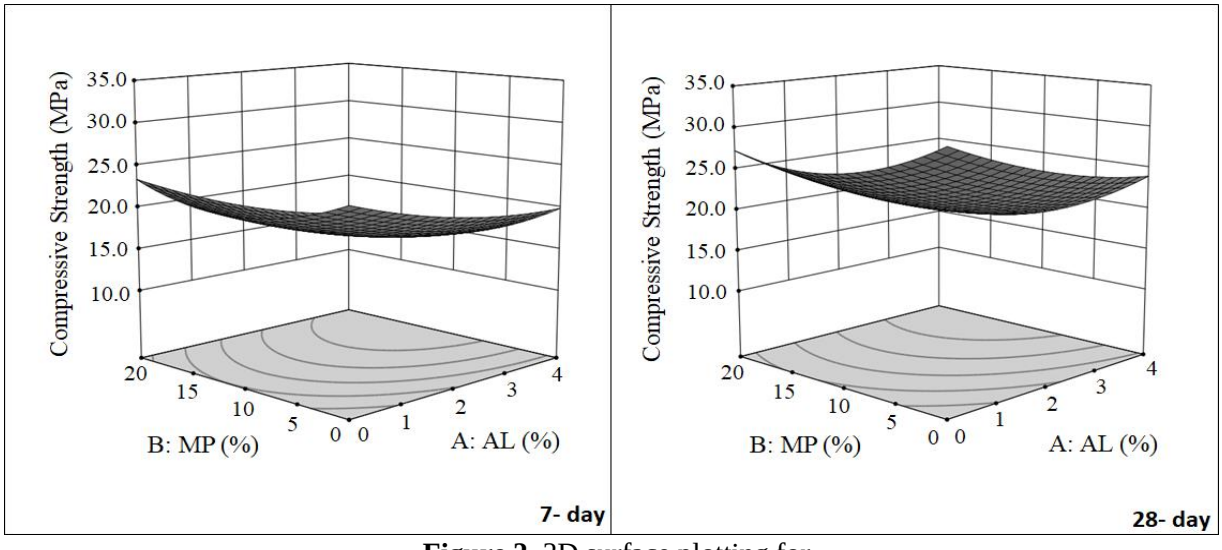


Figure 2. 3D surface plotting for compressive strength

Water Absorption

The maximized Adjusted R^2 and Predicted R^2 values of Linear model given for water absorption by model statistics were 0.5390 and 0.3815, respectively, and were in reasonable agreement due to the difference of less than 0.2 between them. Table 4 shows ANOVA analysis for the proposed Linear model. With P values less than 0.0500, A and C were significant model terms. As a result, it could be said that parameter that had a significant effect on water absorption was the percentage of aluminum substitution rather than marble powder. Contrary to the data obtained from this study, it was observed by Danish et al. (2021) that while marble powder physically reduced the porosity of matrix of cement-based materials, chemically marble powder had a basic cementing property developed by the hydration of calcium aluminate and calcite. In the study conducted by Garg and Satyaprakash (2021), it was reported that water absorption increases with increasing metal filler percentage and this type of concrete can be used in pavements that have water accumulation problems due to allowing water to pass through. In addition, the percentage of water absorption was also affected by curing conditions. 3D surface graphs of water absorption percentages were given in Figure 3. Final equation in terms of the coded factors for water absorption was given in Eqs. (3).

$$WA = +11.34 - 0.1076A + 0.1228B - 0.1743C \quad (3)$$

Table 4. ANOVA analysis of water absorption

Model	Sum of Squares	df	Mean Square	F-value	p-value	
	0.9748	3	0.3249	7.63	0.0029	significant
A-AL	0.2472	1	0.2472	5.80	0.0304	
B-MP	0.1811	1	0.1811	4.25	0.0583	
C-CP	0.5465	1	0.5465	12.83	0.0030	
Residual	0.5965	14	0.0426			
Cor Total	1.57	17				

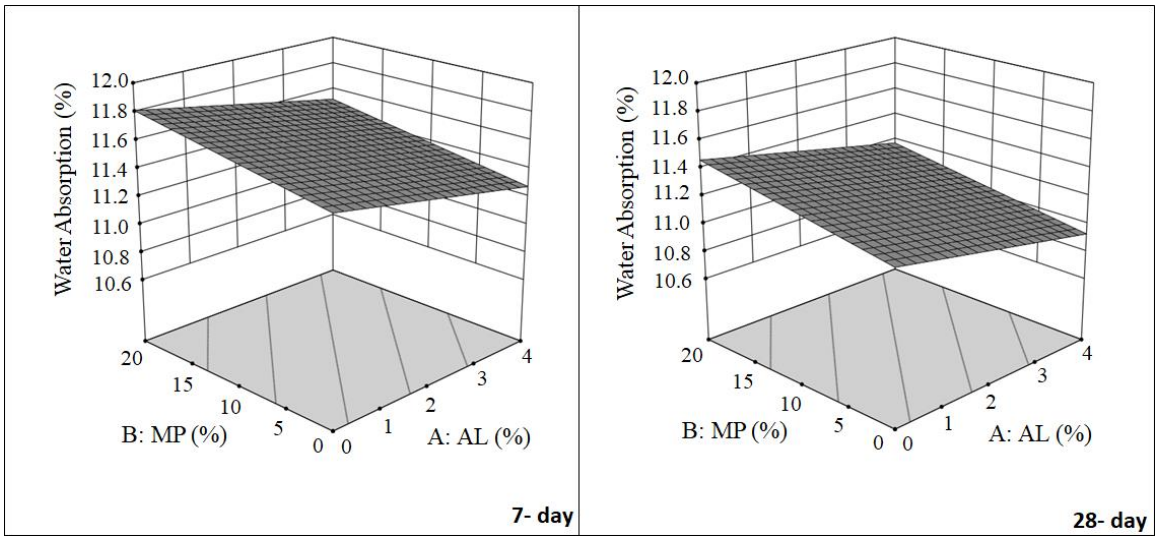


Figure 3. 3D surface plotting for water absorption

Optimization

Table 5 gives constraint limits for specific optimization purposes. In the study, optimization values related to minimum water absorption performance as well as maximum strengths of mortars with the

addition of waste additives were targeted. Solutions obtained as a result of analysis were shown in Table 6. 3D graphs showing the desirability according to two different curing period were presented in Figure 4. Results showed that with longer curing period, strengths increased significantly and water absorption percentages decreased. Maximum flexural strength of 5.05 MPa was obtained with a desirability value of 0.809 by substituting 2.78% aluminum to mixtures. However, considering combinations of all desired output parameters, optimum aluminum percentage to be used in mixtures was determined as 1% with a desirability of 0.821, and a flexural strength of 4.83 MPa was obtained at this percentage of substitution. Therefore, the use of aluminum chips in the calculated percentage can be considered an effective practice that combines advantages of material and its reusability potential to improve compressive and flexural strength properties of mortar. It was observed that the high percentage substitution of aluminum in mixtures was responsible for the increase in water absorption. This result could be explained by the high porosity caused by irregular geometric shapes of aluminum in mortars. In addition, it could be said that the addition of marble powder considerably reduced desirability. It was observed that mortars containing 3.14% aluminum-20% marble powder showed a minimum compressive strength of 15.9 MPa, with the lowest desirability. However, despite its low compressive strength value, it was clear that it could be used in many applications as plaster mortar. For this reason, it is thought that even low percentages of these industrial wastes added as additives will provide great benefits in terms of sustainability.

Table 5. Constraints for optimization

Name	Goal	Lower Value	Upper Value	Importance
A:AL	in range	1	4	3
B:MP	in range	0	20	3
C:CP	in range	7	28	3
Flexural Strength	maximize	2.27344	5	5
Compressive Strength	maximize	13.5	30.1094	4
Water Absorption	minimize	10.6332	11.8406	3

Table 6. Solutions for combination of factors

No	AL	MP	CP	Flexural Strength	Compressive Strength	Water Absorption	Desirability
1	1.000	0.000	28	4.827	28.605	11.146	0.821
2	1.303	0.000	28	4.874	27.893	11.124	0.820
3	1.595	0.000	28	4.915	27.261	11.103	0.819
4	1.801	0.000	28	4.942	26.843	11.088	0.819
5	1.846	0.000	28	4.948	26.757	11.085	0.818
6	2.275	0.000	28	4.997	25.982	11.054	0.816
7	2.771	0.000	28	5.045	25.227	11.019	0.809
8	4.000	0.000	7	4.832	19.910	11.279	0.586

9	4.000	0.104	7	4.816	19.825	11.280	0.581
10	1.249	0.000	7	4.275	22.016	11.476	0.522
11	3.145	20.000	7	2.874	15.952	11.586	0.191

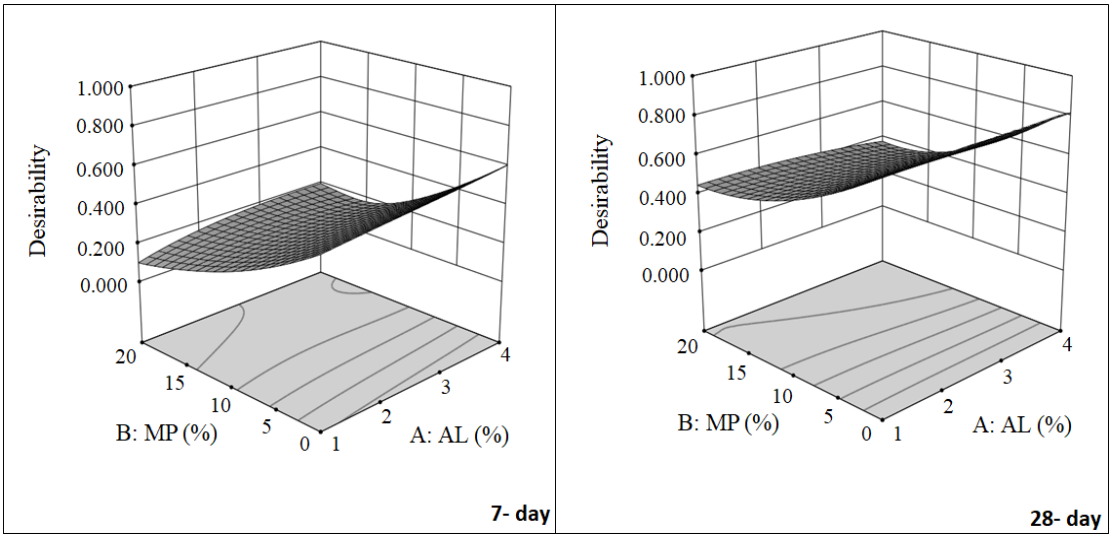


Figure 4. 3D surface plotting for desirability

CONCLUSION

- Aluminum and marble powder as waste additives had a significant effect on flexural strength.
- Mortars designed with 20% marble powder - 3.1% aluminum showed the maximum water absorption percentage of 11.6%.
- A decreasing trend in compressive strength was observed with aluminum content higher than 1%.
- Maximum strength and minimum water absorption were obtained in 28-day mortars containing 1% aluminum with a desirability value of 0.821.

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CAM ELYAF TAKVİYELİ GEÇİRİMLİ BETONLARIN BAZI MEKANİK ÖZELLİKLERİNİN İNCELENMESİ

Mehmet Uzun[1*], Sadık Alper Yıldızel[2]

*[*1]Karamanoğlu Mehmetbey Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü, Karaman Türkiye.*
[2] Karamanoğlu Mehmetbey Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü, Karaman Türkiye.
ORCID Code: 0000-0002-6347-1243[1], 0000-0001-5702-807X[2]

ÖZET

Günümüzde Geçirimli Beton (GB) kullanılması çevresel, ekonomik ve sosyal faydaları arttırmaktadır. Bu faydalardan bazıları, yer altı sularının yenilenmesi, erozyon ve yüzey kirleticilerin kontrolleri, eğimsiz yüzey sağlayabilme ve daha fazla ağaçlı alana yer verilmesi olarak sıralanabilmektedir. Bu çalışma kapsamında Cam Elyaf (CE) takviyeli geçirimli betonun basınç, eğilme dayanımları da dahil olmak üzere bazı mekanik özellikleri incelenmiştir. Beton karışımlarına ağırlıkça %1, %1,5, %2 ve %2,5 oranlarında CE takviyesi yapılmıştır. Numunelerin ayrıca su geçirimlilik testleri de yapılmıştır. Gerçekleştirilen test sonuçlarına göre %2 CE takviyeli GB en iyi mekanik dayanım sonuçlarını verirken, su geçirimliliği elyafsız numuneye göre %13 azalmıştır.

Anahtar Kelimeler: Beton, geçirimli beton, cam elyaf, mekanik testler

MECHANICAL PROPERTIES INVESTIGATION OF GLASS FIBER REINFORCED PERVIOUS CONCRETE

ABSTRACT

Nowadays, the use of Pervious Concrete (PC) increases environmental, economic and social benefits. Some of these benefits can be listed as regeneration of groundwater, controls of erosion and surface pollutants, providing a smooth surface and more wooded areas. In this study, some mechanical properties of glass fiber (GF) reinforced permeable concrete, including compressive and flexural strengths, were investigated. GF reinforcement was applied to the concrete mixes at rates of 1%, 1.5%, 2%, and 2.5% by weight. Water permeability tests of the samples were also performed. According to the test results, 2% GF reinforced PC reflected the best mechanical strength results, while its water permeability decreased by 13% compared to the non-fiber containing reference sample.

Keywords: Concrete, pervious concrete, glass fiber, mechancial tests

GİRİŞ

Geçtiğimiz son birkaç yılda, hızlı şehirleşme ve endüstriyel gelişmelere bağlı olarak geçirimsiz yüzey alanlarından büyük bir gerileme olmuştur. Bunun sonucunda yeraltı su seviyesini de ciddi şekilde etkileyen, en üst düzeyde sel sorunları yaygın olarak görülmeye başlamıştır. Bu sorunun üstesinden gelebilmek için son yıllarda sürdürülebilirlik kriterlerini de sağlayan çevre dostu drenaj sistemleri geliştirilmektedir. Bu sistemlerin klasik drenaj sistemlerinden farkı geçirgen bir yüzey katmanı oluşturularak, yağışların hızlı şekilde alt tabakaya geçirilmesi mekanizması üzerine kurulu olmalarıdır(Ferguson, 2006). Bu çözümlerden bir tanesi de geçirimli beton uygulamalarıdır.

Geçirimli beton literatürde poroz beton olarak da adlandırılmaktadır. Geleneksel betondan en önemli farkı büyük oranda iri agrega içermesidir. Bunun sonucu olarak da daha çok su ve hava geçirimlilik

özelliklerine sahiptir. Bu tür betonların geçirimlilikleri, birbirine bağlı ve büyüklükleri 2 mm ve 8 mm arasında değişen makro boşluklardan faydalanılarak belirlenmektedir(ACI Comitee 522, 2010). Bu tür betonların tasarımı sırasında öncelikle porozite değeri belirlenmeli sonrasında servis yüklerini taşıyabilecek ve her türlü aşınmaya karşı koyabilecek çimento miktarı belirlenmelidir(Xie et al., 2020).

Günümüzde, ülkemizde olduğu gibi dünyanın her bölgesinde geçirimli betona olan talep artmaktadır. Avrupa'da yol gürültüsünü ve yağışlı havanın etkisini azaltmak, sürtünmeyi arttırmak için geçirimli beton kullanılmaktadır(Henderson & Tighe, 2012). Çin'de ise kentsel sel ve aşırı yüklenmiş drenaj sistemlerinin önüne geçmek için tercih edilmektedir(Zhou, Zheng, Wang, Yang, & Lin, 2016). GB (Şekil 1)'nin diğer faydaları ise yüzey kirleticilerinin ve erozyonun kontrolü, kentsel ısı adası etkisine olumlu katkıları, kar erimelerini hızlandırma, eğimsiz yüzey sağlayabilme ve azaltılmış gece aydınlatması olarak sayılabilmektedir.



Şekil 1. Laboratuvar şartlarında üretilmiş GB örneği

Fiberler, betonda genellikle mekanik özellikleri iyileştirmek için kullanılmaktadır. En yaygın olarak kullanılanlarından birisi de CE'dir. CE eklenmesi betonda özellikle, matris çatlağının başlangıç aşaması ve çatlak ilerleme aşaması sırasında iyi bir engelleyici etkiye sahiptir(Yuan & Jia, 2021). Gerilimli beton üzerine uygulamaları üzerine günümüzde yeterli seviyede kaynak bulunmamaktadır.

Bu çalışma kapsamında CE takviyeli GB'nin basınç, eğilme dayanımları ile su geçirimlilik değerleri üzerine yoğunlaşılarak, fiber katkısının bu özellikler üzerine etkisi incelenmiştir.

MATERYAL VE METOD

Bu çalışma kapsamında bağlayıcı olarak CEM I 52.5 R tipi Portland çimentosu kullanılmıştır. Kullanılan çimentoya ait kimyasal ve fiziksel özellikler Tablo 1'de sunulmuştur. Alkali dayanımlı 8 mm uzunluğundaki CE ağırlıkça %1, %1,5, %2 ve %2,5 oranlarında karışıma eklenmiştir. Kullanılan CE'ye ait malzeme özellikleri Tablo 2'de sunulmuştur.

Tablo 1. Çimentonun Fiziksel ve Kimyasal Özellikleri

Kimyasal özellikler (%)	
SiO_2	21,6
Al_2O_3	4,03
Fe_2O_3	0,27
CaO	65,6
MgO	1,3
Na_2O	0,3
K_2O	0,35
SO_3	3,30
Serbest CaO	1,60
Kızdırma kaybı	3,2
Fiziksel özellikler	
Özgül Ağırlık	4600
Özgül yüzey (cm2/gr.)	85,5

Tablo 2. CE özellikleri

Eğilme dayanımı (MPa)	20-28
Elastik limit (MPa)	7-11
Basınç dayanımı (MPa)	50-80
Elastisite modülü (GPa)	10-20
Isıl iletkenlik (W/mK)	0,034-0,04
Yoğunluk (kg/cm^3)	1870-2100

Agrega olarak Karaman'da bulunan kırmataş üretim tesislerinden 9,5-12,5 mm aralarında bulunan kırmataş agrega tercih edilmiştir. Hazırlanan numunelerin karışım içerikleri Tablo 3'te gösterildiği gibidir.

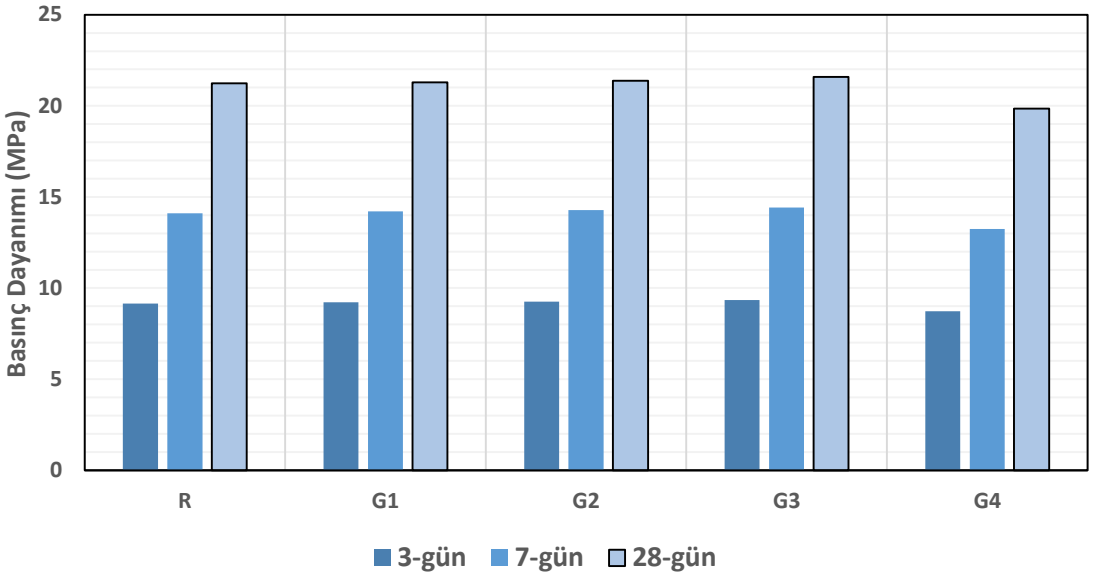
Tablo 3. Karışım Oranları

Numune	Agrega (kg/m^3)	Çimento (415 kg $/m^3$	Fiber (kg/ m^3)	S/Ç
R	1530	420	-	0,34
G1	1530	420	19,5	0,34
G2	1530	420	29,25	0,34
G3	1530	420	39	0,34
G4	1530	420	48.75	0,34

Numunelerin basınç dayanımları TS EN 12390-3 standartı uyarınca 150 x300 mm silindirik numuneler üzerinden 3,7 ve 28 günlük olarak tayin edilmiştir. Eğilme dayanımı belirlenirken ise 40 x40 x 160 mm'lik numuneler tercih edilmiştir. Su geçirimlilik testleri ise 28 günlük numuneler üzerinde ACI 522-ACI 522R-10 uyarınca yapılmıştır.

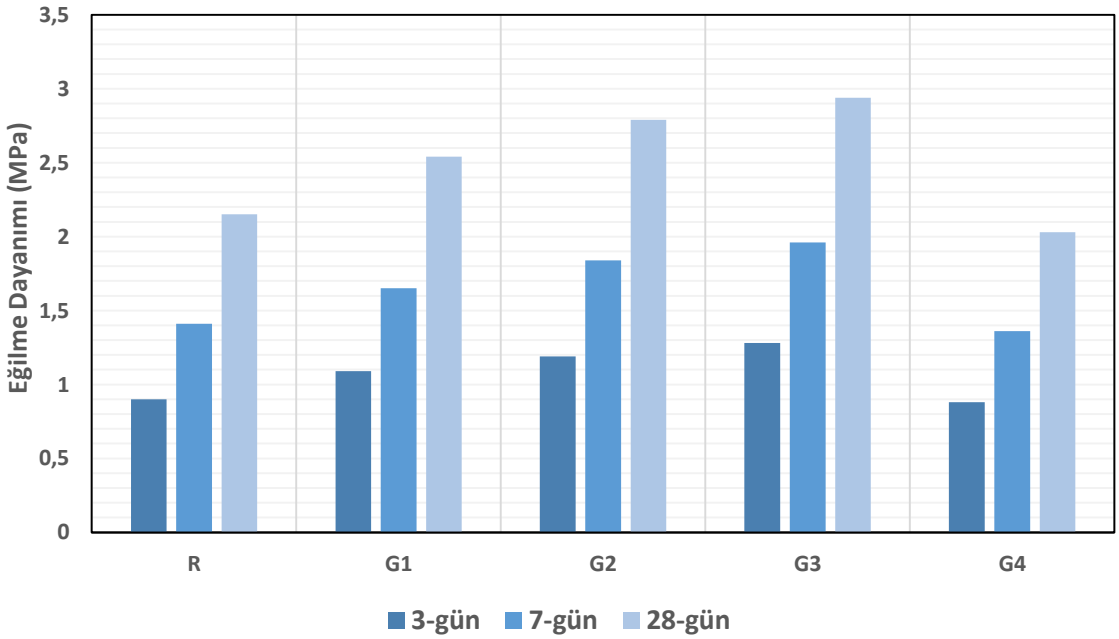
BULGULAR VE TARTIŞMA

Basınç dayanımı test sonuçları Şekil 2.'deki gibidir. Her bir karışım ve test için 3'er numune kırılarak ortalamaları değerlendirilmiştir. Referans numune ile karşılaştırıldığında en kötü performansı %2,5 CE katkılı GB göstermiştir. 28 günlük dayanımlar incelendiğinde G_3 numunesi 21,59 MPa'lık basınç test sonucu ile en iyi değere sahiptir. El edilen sonuçlar, literatürde bulunan elyaf takviyeli beton çalışmaları ile benzer artışlar göstermiştir(Madhkhan & Katirai, 2019; Moceikis, Kičaitė, Sahmenko, & Selskienė, 2020; Yildizel, Tayeh, & Calis, 2020).



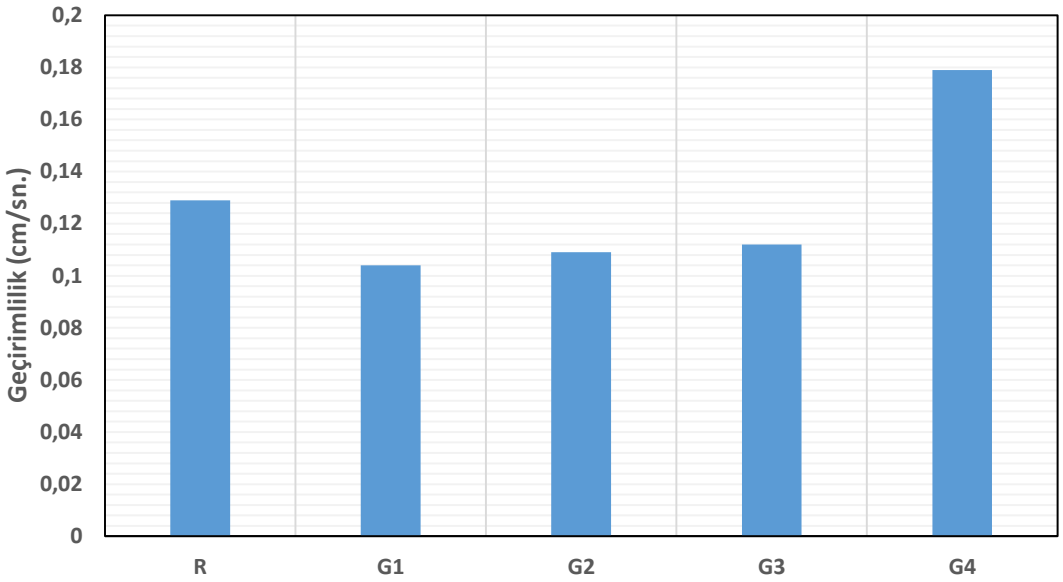
Şekil 2. Basınç test sonuçları

Eğilme dayanımı test sonuçları ise Şekil 3'te sunulmuştur. Tüm test sonuçları incelendiğinde CE takviyesinin G_4 numunesi dışında eğilme dayanımı üzerine olumlu etkisi gözlemlenebilmektedir. Maksimum eğilme dayanımı, 28 günlük G_3 numunesi için 2,94 MPa olarak elde edilmiştir. Referans numunesi için aynı test sonucu ortalaması ise 2,15 MPa'dır. Eğilme dayanımındaki iyileşme yaklaşık olarak %35'tir. El edilen sonuçlar CE takviyeli beton üzerine yapılmış olan benzer çalışmalar orantılıdır(Kizilkanat, Kabay, Akyüncü, Chowdhury, & Akça, 2015; Kumar, Rex, Sethuraman, Gokulnath, & Saravanan, 2020; MOCEIKIS, KIČAITĖ, SKRIPKIŪNAS, & KORJAKINS, 2018). Elde edilen sonuçlar CE takviyesinin mikro çatlak oluşması ve yayılması üzerine azaltıcı etkisini de göstermektedir.



Şekil 3. Eğilme test sonuçları

Üretilen numunelere ait su geçirimlilik test sonuçları Şekil 4'te gösterildiği gibidir. Referans numune (0,129 cm/sn.) ile karşılaştırıldığında geçirimlilikteki tek artışın 0,179 cm/sn. ile G_4 numunesine ait olduğu görülmektedir. Dayanım sonuçları ile değerlendirildiğinde ise bu artışın porozitedeki artışa bağlanmaktadır. Üretilen numunelerdeki boşluk oranlarının azalması ile dayanımlar artmakta, su geçirimlilik değerleri ise düşmektedir. G_3 numunesindeki düşüş ise %13'tür.



Şekil 4. Su geçirimlilik test sonuçları

SONUÇLAR

Bu çalışma kapsamında CE eklenmesinin GB üzerindeki etkilerinden olan basınç, eğilme dayanım ve geçirimlilik değişimleri incelenmiştir. Çıkarılan sonuçlar şu şekilde özetlenebilir:

- Basınç dayanımları açısından CE eklenmesi %2'lik ağırlıkça orana kadar olumlu sonuçlar doğurmuştur. Geçirimli betonların basınç dayanımları az miktarda da olsa iyileştirilebilmiştir.
- Eğilme dayanımları CE eklenmesi ile iyileştirilmiştir. %2'lik CE eklenmesi ile %36'lık eğilme dayanımı artışı elde edilmiştir.
- %2'ye kadar CE eklenen tüm numunelerde geçirimlilik değerleri düşmüştür. Bunun en önemli nedeni porozitedeki düşüş olarak görülmektedir.
- CE takviyeli GB'ların uygulanabilirliğinin artması ve geliştirilmesi için aşınmaya karşı direnci, donma ve çözülme etkisindeki davranışları da gelecek çalışmalarda detaylı şekilde incelenmelidir.

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BAZALT FİBER KATKILI DİKEY KOMPOZİT YAPI ELEMANLARININ MEKANİK ÖZELLİKLERİNİN İNCELENMESİ

Mehmet Uzun[1*], Sadık Alper Yıldızel[2]

[1]Karamanoğlu Mehmetbey Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü, Karaman Türkiye.
[2]Karamanoğlu Mehmetbey Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü, Karaman Türkiye.
ORCID Code: 0000-0002-6347-12431, 0000-0001-5702-807X2

ÖZET

Savunma yapıları insan yaşamını koruma amacıyla inşa edilen askeri yapılardır. İlerleyen teknoloji ile savunma yapılarını korumak zorlaşmıştır. Özellikle 1. Dünya Savaşı'nın kazandırdığı savaş teknolojileri ile savunma yapılarında darbe tesiri önem kazanmıştır. Betonun savunma yapılarında kullanılması sonucu basınç dayanımı, eğilme dayanımı, işlenebilirlik gibi mekanik özelliklerinin yanı sıra darbe dayanımı özelliği de önem kazanmıştır. Savunma yapılarında kullanım ömrü boyunca etki edebilecek darbe tesirlerinden ortaya çıkacak enerjinin sönümlenebilmesi gerekmektedir. Betonun darbe dayanımı ise su/çimento, agrega, mineral katkısı ve lif kullanımı dozajı, lif geometrisi, lif narinlik oranı gibi parametrelerden etkilenmektedir. Bu çalışmada, basalt fiber katkılı betonun mekanik özellikleri incelenmiştir. Farklı dozajlarda basalt fiber katkılı numuneler hazırlanarak, işlenebilirlik, basınç dayanımı, eğilme dayanımı ve darbe dayanımı özellikleri irdelenmiştir. Darbe dayanımı tespiti için İzod deneyi, Charpy deneyi, Yüksek hızda mermi darbesi deneyi ve Ağırlık düşürme deneyi gibi farklı yöntemler uygulanmaktadır. Bu çalışmada ISO 7892'de tanımlanan darbe dayanımı deneyi uygulanmıştır. Çalışma sonucunda fiber dozajındaki artışın belirli bir orana kadar betonun mekanik özelliklerine katkı sağladığı görülmüştür. Ancak fiber dozajının daha fazla artırılması durumunda mekanik özelliklere olumsuz etkisinin olduğu görülmüştür.

Anahtar kelimeler: Bazalt fiber, darbe etkisi, betonun mekanik özellikleri

INVESTIGATION OF MECHANICAL PROPERTIES OF BASALT FIBER REINFORCED VERTICAL COMPOSITE STRUCTURAL ELEMENTS

ABSTRACT

Defense structures are military structures built to protect human life. With the advancing technology, it has become difficult to protect the defense structures. Especially with the war technologies developed during the First World War, the impact effect has gained importance in defense structures. As a result of the use of concrete in defense structures, in addition to its mechanical properties such as compressive strength, flexural strength, workability, impact resistance has also gained importance. It is necessary to absorb the energy that will emerge from the impact effects that can affect the defense structures throughout their lifetime. Impact strength of concrete is affected by parameters such as water/cement ratio, aggregate, mineral additive and fiber usage dosage, fiber geometry, fiber slenderness ratio. In this study, the mechanical properties of basalt fiber reinforced concrete were investigated. By preparing samples with basalt fiber in different dosages, their workability, compressive strength, flexural strength and impact resistance properties were examined. Different methods such as Izod test, Charpy test, High velocity bullet impact test and Weight drop test are applied for impact strength determination. In this study, the impact strength test defined in ISO 7892 was applied. As a result of the study, it was observed that the increase in fiber dosage contributed to the mechanical properties of the concrete up to a certain extent. However, it has been observed that increasing the fiber dosage has a negative effect on the mechanical properties.

Keywords: Basalt fiber, impact effect, mechanical properties of concrete

GİRİŞ

Beton sahip olduğu düşük maliyet, malzemeye ulaşım kolaylığı, durabilite gibi avantajlar nedeniyle dünya genelinde inşaat mühendisliği alanında en çok tercih edilen yapım malzemesidir (Sanjeev & Sai Nitesh, 2020). Ancak betonun avantajları yanı sıra gevreklik, düşük çekme mukavemeti, düşük eğilme mukavemeti ve tokluk gibi dezavantajları da vardır (Merta & Tschegg, 2013). Son yıllarda yapılan çalışmalar ile betonun sünekliğini ve tokluğunu artırmakta mümkün olmaktadır.

Betonun önemli bir özelliği olan tokluk değerinin artırılması hizmet ömrü boyunca darbelere maruz kalabilecek yapılar için ayrı bir önem taşımaktadır. Gelişen savaş teknolojisi ile kullanılan silahların yıkıcı etkileri artmaktadır. Bu nedenle kullanımı sürekli devam etmesi gereken askeri yapılar, havaalanları, demiryolları, köprüler, tüneller gibi yapıların darbe dayanımı yeterli seviyelerde olmalıdır(OLTULU & Altun, 2018). Özellikle darbeye maruz kalabilecek yapılar düşünüldüğünde malzeme olarak betonun ve yapısal eleman olarak betonarmenin basınç dayanımı kadar darbe dayanımı da önemli bir kriter haline gelmektedir (Wan et al., 2016). Geleneksel betonun darbe etkisine karşı dayanımı oldukça zayıftır ve oluşan hasarlar ile çatlaklar kontrol dışı ilerlemektedir (Yazıcı & Sezer, 2008). Oluşan kalıcı hasarlar betonda basınç ve eğilme dayanımı gibi kayıplara neden olmaktadır. Kullanım amacına göre geliştirilen özel betonlarda, betonun bazı zayıf özellikleri iyileştirilebilmektedir. Kullanım amacına uygun üretilen bazı özel betonların ise darbe dayanımının yüksek olduğu bilinmektedir.

Darbe, herhangi bir elemanın doğal titreşim periyodundan çok daha kısa sürede bir etkiye maruz kalmasıdır (Alkayış & Başyiğit, 2021). Darbe etkisi yapı elemanında ani gerilme değişikliklerine yol açmaktadır. Ani değişimler ise yapı elemanında darbe dayanımı zayıf ise çatlakların hızlı ilerlemesi ve göçme mekanizması oluşması ile sonuçlanır . Betonun darbe dayanımı tokluk ile doğrudan ilişkilidir. Betonda fiber kullanımı ise beton ile fiber arasında bir sürtünme yüzeyi oluşturarak mekanik ankraj görevi üstlenir (Benedetty et al., 2021). Darbe sonucu betonda oluşacak çatlakların ilerlemesi fiberler ile önlenerek ortaya çıkan enerjinin fiberler ile beton arasındaki bağ sayesinde sönümlenebilmektedir. Bu sayede betonun tokluğunu artırmak mümkün olmaktadır ve betonda tokluk artırılarak darbe dayanımında da önemli kazançlar elde etmek mümkün olmaktadır. Malzemelerin darbe dayanımı ölçmek için kullanılan Charpy deneyi (Marar et al., 2001), İzod deneyi (Çanakçı, 2016), Bölünmüş Hopkinson basınç çubuğu deneyi (Rong et al., 2010), ağırlık düşürme deneyi (Xu et al., 2012) ve mermi darbesi deneyi (Luo et al., 2000) gibi birçok yöntem bulunmaktadır.

Bu çalışmada, bazalt fiber kullanımının betonun mekanik özelliklerine etkisi incelenmiştir. Numunelerde hacimce %0.25, %0.50, %0.75 ve %1.00 bazalt fiber kullanılmıştır. Beton basınç testleri için silindirik numuneler hazırlanmıştır. Eğilme testleri için dikdörtgen prizma numuneler hazırlanmıştır. Darbe testleri için de dikdörtgen plaka numuneler hazırlanarak cephe kaplamasında kullanılan dikey kompozit taşıyıcı elemanlar simüle edilmiştir.

MATERYAL VE YÖNTEM

Çalışmada, TS-EN 197/1 yönetmeliğine uygun olarak CEM I 42.5 R çimento kullanılmıştır (TS-EN-197-1, 2012). Kullanılan çimentonun fiziksel ve kimyasal özellikleri Tablo 1'de verilmiştir. Karışımda kırma taş agrega kullanılmıştır. Akışkanlaştırıcı olarak polikarboksilik eter esaslı super akışkanlaştırıcı kullanılmıştır.

Tablo 1. Kullanılan çimentonun fiziksel ve kimyasal özellikleri

Kimyasal özellikler (%)		Fiziksel ve mekanik özellikler	
SO_3	2.84	Priz başlangıç süresi (dk.)	137
MgO	3.76	Priz bitiş süresi (dk.)	179
CaO	62.96	2 günlük basınç dayanımı (MPa)	25.4
SiO_2	17.99	28 günlük basınç dayanımı (MPa)	51.8
K_2O	0.35	Özgül ağırlık (g/cm^3)	3.12
Na_2O	0.17	Özgül yüzey alanı (cm^2/g)	3674

Al_2O_3	4.43
Fe_2O_3	3.35
Cl^-	0.0211

Hazırlanan numunelerde hacimce %0.25, %0.50, %0.75 ve %1.00 oranlarında Şekil 1'de görülen bazalt fiberler kullanılmıştır. Kullanılan fiberlerin teknik özellikleri Tablo 2'de verilmiştir. Numuneler hazırlanırken agrega çimento ve fiberler beton mikserine eklenerek 20 s. karıştırılmıştır. Daha sonra su ilave edilerek 150 s daha karıştırılmıştır. Kalıplara yerleştirilen numuneler standartlara uygun olarak 28 gün kür edilmiştir (TS-EN-12390-1, 2013; TS-EN-12390-2, 2019). Basınç testleri için 1500 mm çapında 300 mm yüksekliğinde silindirik numuneler, eğilme testleri için 100x100x400 mm boyutlarında prizmatik numuneler ve darbe testleri için 50x600x600 mm boyutlarında dikey taşıyıcı elemanları temsil edecek şekilde plaka numuneler hazırlanmıştır.

Tablo 2. Bazalt fiber fiziksel ve mekanik özellikleri

Fiziksel ve mekanik özellikler	
Çekme dayanımı (MPa)	4840
Elastisite modülü (GPa)	89
Ergime sıcaklığı (^{0}C)	1450
Uzunluk (mm)	12
Özgül ağırlık (g/cm^3)	2.60-2.80
Fiber çapı (μ)	9-23



Şekil 1. Bazalt fiber

Çalışmada, kontrol numunesi dahil 5 farklı karışım hazırlanmıştır. Hazırlanan karışımların içerikleri 1 m^3 beton için Tablo 3'de verilmiştir. Tabloda numune isimlendirmeleri görüldüğü gibi fiber dozajına göre yapılmıştır. Örneğin N-F0.25 numunesi fiber dozajı %0.25 olan numuneyi temsil etmektedir.

Tablo 3. Beton karışım oranları (1 m^3)

Numuneler	Çimento (kg/m^3)	Su (kg/m^3)	Agrega (kg/m^3)			S/Ç	Süper akışkanlaştırıcı (%)	Fiber (%)
			0-4 mm	4-8 mm	8-16 mm			
N-F0.00	265	159	1086	275	614	0.60	1.35	0.00
N-F0.25	265	159	1086	275	614	0.60	1.35	0.25
N-F0.50	265	159	1086	275	614	0.60	1.35	0.50
N-F0.75	265	159	1086	275	614	0.60	1.35	0.75
N-F1.00	265	159	1086	275	614	0.60	1.35	1.00

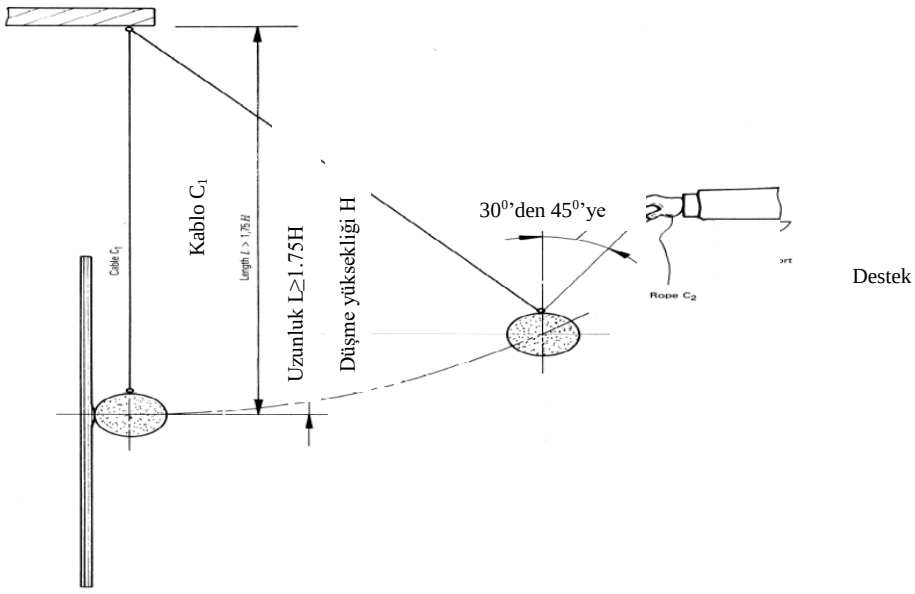
Numunelere basınç testleri TS EN 12390-3'e göre uygulanmıştır (TS-EN-12390-3, 2019). Numunelerin basınç testleri 7 ve 28 günlük kür sonucunda ayrı ayrı elde edilmiştir. Numuneler Şekil 2'de görülen 2000 kN yükleme kapasitesine sahip basınç test cihazı ile test edilmiştir. Yükleme sırasında, yükleme hızı sabit tutularak deney gerçekleştirilmiştir. Basınç testleri için 150 mm çapında 300 mm yüksekliğinde silindirik numuneler kullanılmıştır.



Şekil 2. Basınç test cihazı

Eğilme testleri TS EN 12390-5'e göre yapılmıştır. Eğilme testi numuneleri 7 ve 28 günlük kür süreleri sonunda test edilmiştir (TS-EN-12390-5, 2019). Eğilme testleri için 100x100x400 mm boyutlarında prizmatik numuneler kullanılmıştır.

Darbe testleri ISO 7892 yönetmeliği takip edilmiştir (ISO-7892, 1988). 50x600x600 mm boyutlarında dikey taşıyıcı elemanları temsil edecek plaka şeklinde numuneler hazırlanmıştır. 28 günlük kür süresi sonrasında numuneler test edilmiştir. Testler için ISO 7892'de tanımlanan Şekil 3'teki düzenek hazırlanmıştır. Düzenek için küresel bir deri kılıf hazırlanmıştır. Deri kılıf 400 mm çapındadır. Deri kılıf içi 500 g ağırlığında çelik bilyeler ile doldurulmuştur. Numune dikey pozisyonda sabitlenmiştir. Numuneye çarpacak ağırlık ise numunenin belirli bir seviye üzerine kablo ile bağlanmıştır. Sarkaç şeklini alan ağırlık belirli bir yükseklikten serbest bırakılarak numuneye çarpması sağlanmıştır. Burada kablo uzunluğu ağırlığın serbest bırakıldığı yüksekliğin 1.75 katından az olamaz (ISO-7892, 1988).



Şekil 3. ISO 7892 darbe deney düzeneği (ISO-7892, 1988)

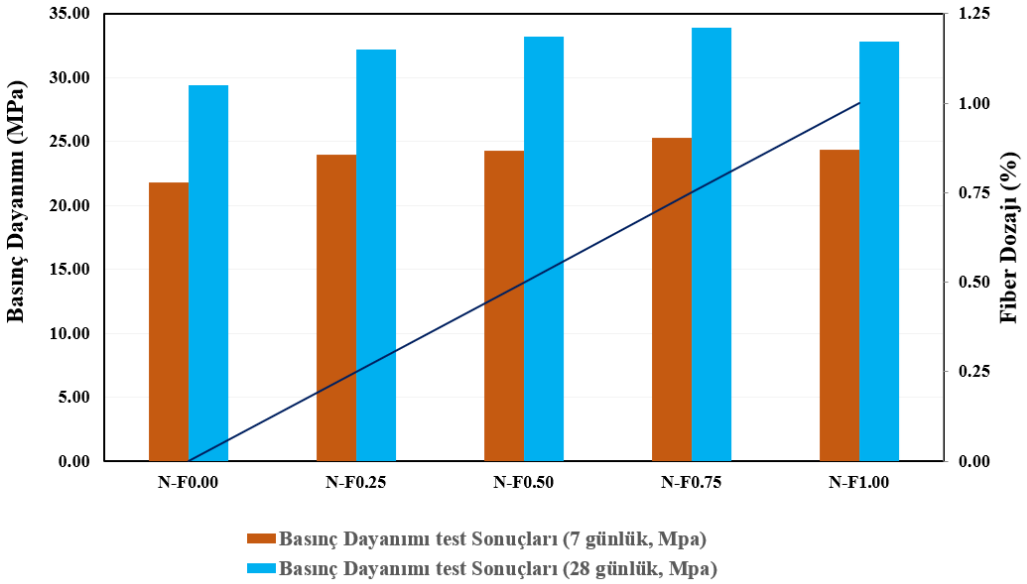
Darbe deneyi için hazırlanan düzenek Şekil 4'te verilmiştir.



Şekil 4. Darbe deneyi

ARAŞTIRMA BULGULARI VE TARTIŞMA

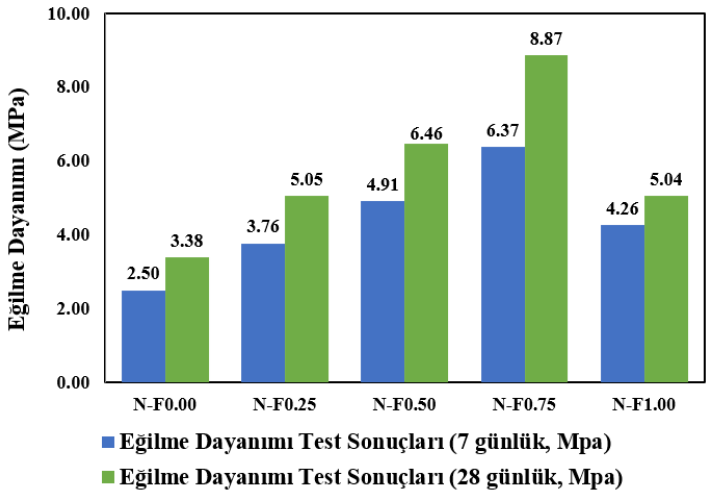
Çalışmada kullanılan 4 farklı fiber dozajına göre 7 günlük ve 28 günlük basınç dayanım test sonuçları Şekil 5'te verilmiştir. %0.25, %0.50, %0.75 ve %1.00 fiber dozajıyla basınç dayanım değerleri referans numunesine göre sırasıyla %8.63, %11.30, %13.14 ve %10.28 daha yüksek elde edilmiştir. Fiber katkısının betonda kenetlenmeyi artırdığı ve çekme gerilmesi dayanımı yükselttiği düşünülürse, basınç dayanımına çok fazla katkı sağlaması mümkün olmayacaktır. Burada görüldüğü gibi bir miktar basınç dayanımı artışları elde edilmiştir. Ancak artışlar çok yüksek değildir. Fiber dozajındaki artış %0.75'e kadar basınç dayanımına pozitif etki yaparken fiber dozajının %1.00'e çıkması basınç dayanımını düşürmüştür. Fiber dozajındaki artış sertleşmiş beton özelliklerini artırırken işlenebilirliği azaltmaktadır. Sonuç olarak işlenebilirliğin çok fazla azalması karışımda topaklanmalara neden olarak yerleşimi zorlaştırmaktadır. Betonda yerleşimin kötü olması ise basınç dayanımını olumsuz etkilemektedir.



Şekil 5. Basınç dayanımı sonuçları

Eğilme dayanımı test sonuçları farklı fiber dozajındaki numuneler için 7 günlük ve 28 günlük olarak Şekil 6'da verilmiştir. Fiber dozajı %0.25, %0.50, %0.75 ve%1.00 olan numunelerde görülen eğilme dayanımı artışları referans numunesine göre sırasıyla %33.10, %47.70, %61.91 ve%32.99 olarak elde

edilmiştir. %0.75'e kadar fiber dozajındaki artış numunelerde eğilme dayanımını artırırken, daha yüksek dozajda fiber kullanımı eğilme dayanımındaki artışı azaltmıştır. Fiber dozajındaki artış betonda ankraj etkisi yaratarak eğilme dayanımı kapasitesini artırmaktadır. Ancak %0.75 oranından daha yüksek fiber kullanımı betonda topaklanmaya neden olarak eğilme dayanımını azaltmaktadır.



Şekil 6. Eğilme dayanımı sonuçları

Darbe dayanımı için hazırlanan 50x600x600 mm boyutlarındaki plaka şeklinde numuneler belirlenen darbe dayanımı test yöntemine göre test edilmiştir. N-F0.00 numunesi darbe sonucu temas yüzeyinde ezilmeler ve köşelerden merkeze doğru diyagonal çatlaklar oluşması sonucu kırılmıştır. N-F0.25 numunesinde darbe testi sonucunda geniş diyagonal çatlaklar oluşmuş ve plaka iç bükey şeklini almıştır. N-F0.50 numunesinde çarpma sonucunda yüzeyde eğilmeler ve N-F0.25 numunesine göre daha küçük diyagonal çatlaklar oluşmuştur. Numunede eğilme gözlemlenmemiştir. N-F0.75 numunesinde ise mikro çatlaklar oluşmuştur. Yüzeyde çok az miktarda ezilmeler oluşmuştur. N-F1.00 numunesinde geniş diyagonal çatlaklar ve numune yüzeyinde bükülmeler oluşmuştur. Genel olarak numunelerde fiber dozajındaki artış darbe etkisini azaltarak oluşan çatlakların ilerlemesini önlemiştir. Ayrıca fiber dozajının %1.00'e çıkması durumunda numunelerde çatlak ilerleyişi kontrolden çıkmıştır.

SONUÇLAR

Bu çalışmada, fiber dozajı değişken numunelerin mekanik özellikleri incelenmiştir. Genel olarak elde edilen sonuçlar aşağıda verilmiştir:

- Fiber dozajına göre en iyi sonuçlar %0.75 fiber dozajı ile elde edilmiştir. Bu numunede basınç dayanımında %13.13 ve eğilme dayanımında %61.91 oranında iyileşmeler görülmüştür.
- Fiber dozajının %0.75 değerinin üstüne çıkması durumunda basınç dayanımı ve eğilme dayanımında kayıplar ortaya çıkmıştır. Ancak yine de referans numunesinden daha iyi sonuçlar elde edilmiştir. Fiber dozajındaki artış betonda işlenebilirliği azaltarak betonun yerleşmesi sırasında boşluklar oluşmasına neden olmuştur.
- Fiber katkılı betonlarda darbe dayanımında önemli artışlar oluştuğu görülmüştür. Fiber oranındaki artışlar sayesinde betonda oluşan çatlakların ilerlemesi control altına alınmış ve büyümesi engellenmiştir. Bu sayede yapısal elemanlarda göçme engellenerek hasar sınırlı bir seviyede tutulabilir.
- Fiber oranının %1.00 olması durumunda ise işlenebilirliğin azalması sonucu oluşan boşlukların hasar seviyesini artırdığı gözlemlenmiştir.
- Sonuç olarak darbe etkisine maruz yapılarda basalt fiber katkılı betonların kullanımının uygun olabileceği görülmüştür.

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WHY DO WE USE VIRTUAL COMMUNITIES? CONSUMPTION RELATED VIRTUAL COMMUNITY PARTICIPATIVE BEHAVIOR AND ITS ANTECEDENTS FROM A BEHAVIORAL PERSPECTIVE USING MULTIPLE REGRESSION TECHNIQUE FOR KNOWLEDGE DISCOVERY

Asst. Prof. Dr. Özerk Yavuz
Management Information Systems, Haliç University, Istanbul
ORCID Code: 0000-0002-1371-688X

ABSTRACT

Purpose – The purpose of the study is to understand desire and intention to participate to virtual communities and its antecedents

Design/methodology/approach – A research model has been developed following the literature review. In research part of the study, following the pre-test of the sample, an exploratory factor analysis has been conducted. This is later followed with regression analysis of the primary data gathered as part of the quantitative research methodology. Significance and respective contributions of individual independent variables to the dependent variable has been assessed with the hypothesis tests conducted by applying a quantitative research paradigm.

Findings – Based on the analysis conducted it has been found out that positive anticipated emotions, perceived usefulness, norm of reciprocity, attitude towards virtual community usage and social comparison are significant predictors of desire and intention to participate to virtual communities. Respective influence of independent variables on the dependent variable found by calculating the slope values in the regression equation.

Research limitations/implications – Not any.

Originality/value – This study investigates consumption related virtual community participative behavior and underlying factors of this form of behavior from a behavioral perspective considering the changes brought by information and communication technologies into our lives. Therefore, assessment of such phenomenon in the light of changes brought to our lives and business landscape as a result of the developments in information age can be useful in this context.

Keywords- Virtual community participation behavior, knowledge sharing behavior, virtual communities, desire and intention to participate to virtual communities, positive anticipated emotions, perceived usefulness, norm of reciprocity, attitude towards virtual community usage, social comparison, Quantitative Research, SEM, Regression

Paper Type- Research Paper

1. Introduction

Today virtual communities give people chance to come together in virtual spaces and venues where they can communicate, build relations, share information, ideas, cooperate, collaborate, discuss about different topics, work, learn, play and generate content, using several information systems or technologies. Also virtual community members found chance to be organized around shared interests, content and goals in the virtual environments impressively. Today it is estimated that over 40 million people worldwide participate in some form of virtual community where an increase in the usage of virtual communities are expected in the near future (Kozinets, 1999).

As virtual community concept emerged during time, new definitions of the term found place in the literature. Among them, Hagel defines a virtual community as a network of people with common interests communicating with each other electronically whereas Porter proposes a virtual community definition that, a virtual community is an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least partially supported and/or mediated by technology and guided by some protocols or norms (Hagel and Armstrong,1995,1997;Porter, 2006). Plant approaches the term from a similar perspective defining a virtual community as a collective group that come together either temporarily or permanently through an electronic medium to enable the

interaction of entities, individuals or organizations in a common problem or interest space (Plant, 2004). In addition to these, Rheingold defines a virtual community as "social aggregations that emerge from the Internet when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace" (Rheingold, 2000).

In understanding the virtual communities and their implications on society, with all the other influential factors taken into consideration, it would be important to point out some of the important milestones that had effected the development of virtual communities significantly. These are derregulation of the internet in 1995 which importantly changed how the society interacts, development of open access systems which enabled people to access information, each other, regardless of the information point of origin or destination and finally advancements in the production technologies and reaching economies of scale in IT based products which gave society the chance to afford and use the necessary systems, tools and equipment in relatively cheap ways. These provided people the opportunity to maintain some of the personal or business activities cheaply compared to traditional ways of performing the same activities. Also developments in the Electronic data interchange technologies, maintainance of communication and messaging standards via protocols as TCP/IP, use of service oriented and distributed system architectures, XML and similar web based technologies can be counted as some of the factors that facilitated and sped up this evolution process in parallel within this transition period.

2. Literature Review

2.1. Virtual Communities

In literature individual determinants (as positive anticipated emotions and desires), community influences as social identity (Bagozzi, 2002), community related and personal outcome expectations (Chao-Min Chiu, 2006), group norms, social identity, size of the community (group based or network based) (Bagozzi et al., 2004), subjective norms, tendency to social comparison, social identity (Jaeki, 2006;Dong, 2008), venue interactivity and different levels of community engagement (Silvia, 2010) have been some of the factors that have been cited and proposed to be some of the direct and indirect determinants of participating to different types of virtual communities and sharing knowledge in these communities.

Positive anticipated emotions, perceived usefulness, norm of reciprocity, attitude towards virtual community usage and social comparison can be used to shed light in understanding desire and intention to participate to virtual communities and its antecedents. As suggested in literature, positive anticipated emotions refer to the pre-factuals hypothesized to influence desires to perform a behavior which can be in the form of positive anticipated emotions or negative anticipated emotions and it's likely to expect its influence on virtual community participation and desire and intention to participate to virtual communities (Bagozzi, 2002). Likewise technology acceptance model has been one of the major theories used in understanding knowledge sharing and virtual community participative behavior in virtual communities. In Davis' technology acceptance model which is known to be mainly focusing on explaining and understanding acceptance of a technology in terms of perceived usefulness and perceived ease of use, perceived ease of use and perceived usefulness are known to be the two important determinants of technology acceptance (Davis,1989). Perceived ease of use here refers to the degree to which the prospective user expects the technology to be free of effort whereas perceived usefulness refers to the degree which a person believes whether using a particular system would enhance his or her job performance (Davis, 1989 ; Dong, 2008). As Bertrand points out, technology acceptance model is based on the social psychology and draws on Fishbein's and Ajzen's reasoned action model which intends to understand and predict motivational influences on human behavior by means of behavioral intention, attitude and subjective norm (Ajzen & Bertrand, 2008; Fishbein, 1980).

If we focus on the relationships in virtual venues and spaces it is likely that some of the relationships in virtual venues in reciprocical form. As Chiu points out norm of reciprocity refers to knowledge exchanges that are mutual and perceived by the parties as fair and one of the important factors that leads

to knowledge sharing behavior and virtual community participation in virtual communities and can be used to shed light in understanding virtual community participation and desire and intention to participate to virtual communities (Chiu et al., 2006).

Fishbein and Ajzen's Theory of Reasoned Action is a widely used theory in social psychology for explaining an individual's behavior and understand, predict motivational influences on human behavior by means of behavioral intention, attitude and subjective norms (Hsu, 2005; Ajzen & Fishbein, 1980). In theory of reasoned action, behavior is a form of behavioral intention, attitude and subjective norms in which influence of each factor may vary from one person to another depending on a variety of social, cultural and individual characteristics. In this context predisposition to virtual community usage (attitude toward virtual community usage) as in Ajzen's theory of reasoned action refers to the idea that attitudes are formed as a result of the beliefs about the outcomes of performing that act and expected outcomes. If the outcome of performing that behavior seems beneficial to the individual, he/she may participate in that particular behavior (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980; Bagozzi, 2002).

Over the years virtual communities became venues where it has given many people chance to engage in social comparisons in virtual venues. As Festinger points out there is a drive within individuals to look outside images in order to evaluate their own opinions and abilities where it is tried to be explained and understood tendencies of individuals in evaluating and comparing their own opinions and desires with others (Festinger, 1954).

As it is defined by Dholakia, We-Intentions refer to the intentions to participate together as a group which is to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants whereas desires provide the motivation to decide in favor of acting as part of a virtual community (Dholakia, 2004). We intentions stand for the intentions to participate together as a group, to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants (i.e., subjective norms, group norms, and social identity) (Dholakia, 2004).

In addition to that, McMillans and Chavis' prior studies about sense of community concept, would be a good reference in understanding some of the factors that have major impact on virtual community participation in this context. According to McMillan and Chavis, membership, influence, integration and fulfillment of needs, shared emotional connection are some of the influential factors of community participation (McMillan & Chavis, 1986). As McMillan states, people become members of a community when they feel emotionally secure, personally invested and a sense of belonging or identification in the community and these features of membership fit together in a circular, self reinforcing way, with all conditions having both causes and effects (McMillan, 1996). In a complimentary way, Preece strengths this view by highlighting the importance of establishment of a sense of purpose among members of the community, policies and guidelines that help to guide the behavior of its members which he defines as an important criteria in building a community (Preece, 2000). As an alternative to Preece and McMillan, Hennig points out that, need to express feelings, concern for other community participants, need for self development or self enhancement, social benefits, economic incentives, platform assistance and helping the company are some of the reasons for community participants to post online (Hennig, 2004).

Kim states that participation to virtual communities can be regarded as social behavior or a behavior affected by social factors in which theory of reasoned action, social identity theory and social comparison theory, involve the explication of social influence process (Kim, 2006; Bordia, 2004). In this framework Kim hypothesizes that social identity positively influences behavioral intention to use virtual profiles (avatar) in a virtual community. social identity positively influences external subjective norms, individual users' tendencies to social comparison have a positive impact on their behavioral intention to use virtual profiles (avatar) and individual users' favorable subjective norms positively influence their behavioral intention to use Avatar(virtual profiles) (Kim, 2006; Bordia, 2004).

In a different research in literature, Dong aims to explain some antecedents that have influence in intention to transact in virtual media. In his proposed framework, perceived usefulness stands for the degree which a person believes whether using a particular system would enhance his or her job performance. In this framework, perceived ease of use refers to the degree to which the prospective user expects the technology to be free of effort. Trust refers to an overall construct where trustor is willing to be vulnerable to the action of the trustee or as a general belief that the trustee can be trusted. Subjective norm is similar to a social norm which involves referent identification and norm compliance. Finally perceived risk refers to the risk perceived by consumers when evaluating products and services (Dong, 2008).

Dholakia, in his social influence model of virtual community participation, uses purposive value, self discovery, maintaining interpersonal connectivity, social enhancement, entertainment value, group norms, mutual agreement and mutual accommodation, social identity and desire constructs in understanding participation behavior in virtual communities (Dholakia, 2004).In this model, purposive value refers to the value derived from accomplishing some predetermined instrumental purpose (including giving or receiving information) through virtual community participation. Self discovery refers to the understanding and deepening salient aspects of one's self through social interactions. Maintaining interpersonal connectivity refers to the social benefits derived from establishing and maintaining contact with other people such as social support, friendship, and intimacy. Social enhancement is the value that a participant derives from gaining acceptance and approval of other members, and the enhancement of one's social status within the community on account of one's contributions to it. Entertainment value is derived from fun and relaxation through playing or otherwise interacting with others. Group norms refer to the adoption of common self guides for meeting idealized goals shared with others, since they are viewed as coinciding with one's own goals. Both mutual agreement and mutual accommodation represent mechanisms through which the participant moves from rather general and broadly defined goals and conventions of the group, toward actualizing specific episodes of online social interactions (Dholakia, 2004). In this framework, as stated by Dholakia, social identity captures the main aspects of the individual's identification with the group in the sense that the person comes to view himself or herself as a member of the community, as belonging to it. Desires provide the motivation to decide in favor of acting as part of a virtual community. We intentions stand for the intentions to participate together as a group, to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants (i.e., subjective norms, group norms, and social identity) (Dholakia, 2004)

Table 1: Studies Used To Understand Desire and Intention To Participate In Virtual Communities

Variable Name	Some Literature Contributions Highlighted
Positive and Negative Anticipated Emotions	**Dholakia, 2002; Perugini and Conner, 2000; Shiu, 2008; Bagozzi, 2006; Shen, 2010; Hsien-Tung, 2014**
Perceived Usefulness	**Davis, 1989; Lin, 2007; Wang, 2011; Davis and Venkatesh, 1996, Porter, 2006, Kwon, 2000; Tsai, 2011; Chinomona, 2013; Hsiu-Ling, 2013; Hsiu-Fen Lin, 2009 ; Tamjidyamcholo, 2016; Shin-Yuan, 2015**
Norm of Reciprocity	**Chiu et al., 2006; Chen, 2010; Li, 2015; Shin-Yuan, 2015**
Predisposition to Virtual Community Usage (attitudes toward virtual community usage)	**Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980, Bagozzi, 2002 ; Bagozzi, 2006; Ibragimova, 2012; Shen, 2013; Blažič-Džonova, 2016; Mai,**

	2015; Walker, 2017; Hsien-Tung, 2014; Ahmed, 2016; Kujur, 2017
Social comparison	**Festinger, 1954; Kim, 2006; Dakin and Arrowood, 1981; Vassileva, 2007; Chen, 2007; Harper, 2008; Chen, 2010; Batenburg, 2015**
Desire and Intention to Participate in Virtual Communities	**Dholakia, 2004; Bagozzi, 2002; Okazaki, 2009; Hsien-Tung, 2014**

3. Research Model and Hypothesis

3.1. Research Model

Following the literature review of the study, a research model has been formed considering some of the theories and models evolved over time. Among them positive anticipated emotions (Bagozzi, 2002), norm of reciprocity (Chiu et al., 2006), perceived usefulness Davis, 1989 ; Dong, 2008), predisposition towards virtual community usage (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980; Bagozzi, 2002), social comparison (Festinger, 1954; Kim, 2006) and desire and intention to participate to virtual communities (Dholakia, 2004) have been used.

Figure 1: Research Model

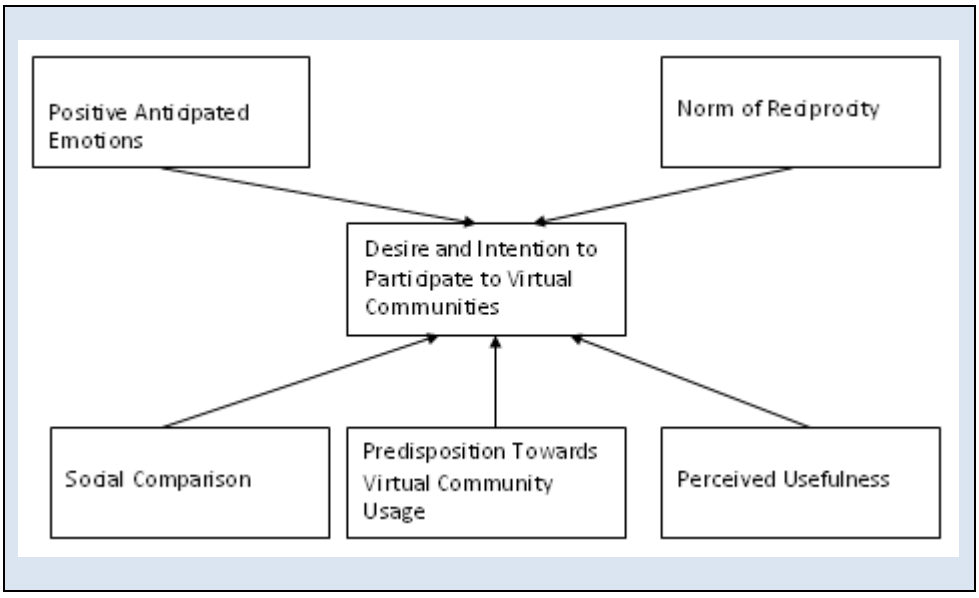


Table 2: Constructs Used in Research Model

Positive and Negative Anticipated Emotions	**Dholakia, 2002; Perugini and Conner, 2000; Shiu, 2008; Bagozzi, 2006; Shen, 2010; Hsien-Tung, 2014**
Perceived Usefulness	**Davis, 1989; Lin, 2007; Wang, 2011; Davis and Venkatesh, 1996, Porter, 2006, Kwon, 2000; Tsai, 2011; Chinomona, 2013; Hsiu-Ling, 2013; Hsiu-Fen Lin, 2009 ; Tamjidyamcholo, 2016; Shin-Yuan, 2015**

Norm of Reciprocity	**Chiu et al., 2006; Chen, 2010; Li, 2015; Shin-Yuan, 2015**
Predisposition to Virtual Community Usage (attitudes toward virtual community usage)	**Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980, Bagozzi, 2002 ; Bagozzi, 2006; Ibragimova, 2012; Shen, 2013; Blažič-Džonova, 2016; Mai, 2015; Walker, 2017; Hsien-Tung, 2014; Ahmed, 2016; Kujur, 2017**
Social comparison	**Festinger, 1954; Kim, 2006; Dakin and Arrowood, 1981; Vassileva, 2007; Chen, 2007; Harper, 2008; Chen, 2010; Batenburg, 2015**
Desire and Intention to Participate in Virtual Communities	**Dholakia, 2004; Bagozzi, 2002; Okazaki, 2009; Hsien-Tung, 2014**

3.2. Hypotheses

Positive anticipated emotions refer to the pre-factuals hypothesized to influence desires to perform a behavior which can be in the form of positive anticipated emotions or negative anticipated emotions and it's likely to expect its influence on virtual community participation and desire and intention to participate to virtual communities (Bagozzi, 2002).
H1: Positive anticipated emotions have a positive influence on desire and intention to participate to virtual communities

Norm of reciprocity refers to knowledge exchanges that are mutual and perceived by the parties as fair and one of the important factors that leads to knowledge sharing behavior and virtual community participation in virtual communities and can be used to shed light in understanding virtual community participation and desire and intention to participate to virtual communities (Chiu et al., 2006).
H2: Norm of Reciprocity has a positive influence on desire and intention to participate to virtual communities

Perceived usefulness refers to the degree to which a person believes that using a particular system would enhance his or her performance (Davis, 1989; Dong, 2008). As it is indicated by Porter, in the technology acceptance model, perceived usefulness and perceived ease of use are the beliefs that are presumed to influence attitudes toward new technology (Porter, 2006).
H3: Perceived usefulness has a positive influence on desire and intention to participate to virtual communities

Predisposition to Virtual Community Usage (attitudes toward virtual community usage) as in Ajzen's theory of reasoned action refers to the idea that attitudes are formed as a result of the beliefs about the outcomes of performing that act and expected outcomes. If the outcome of performing that behavior seems beneficial to the individual, he/she may participate in that particular behavior (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980; Bagozzi, 2002).
H4: Predisposition to Virtual Community Usage has a positive influence on desire and intention to participate to virtual communities

Social comparison construct used in the model refers to the drive within individuals to look to outside images in order to evaluate their own opinions, abilities, enhance their self images which is based on Festinger's social comparison theory that focuses on explaining and understanding tendencies of individuals in evaluating and comparing their own opinions and desires with others (Festinger, 1954; Kim, 2006). Today individuals make these comparisons via other individuals' (members') profiles in virtual communities.Social comparison hypothised to have a positive influence on desire and intention to participate to virtual communities.
H5: Social Comparison has a positive influence on desire and intention to participate to virtual communities

Finally desire and intention to participate in virtual communities refers to the willingness and intention to the virtual communities for engaging several types of behaviors. Desire and intention to participate to virtual communities refers to the combination of we-intention and desires of Dholakia where desires provide the motivation to decide in favor of acting as part of a virtual community and we intentions stand for the intentions to participate together as a group, to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants (i.e., subjective norms, group norms, and social identity) (Dholakia, 2004).

4. Research Methodology

4.1. Overview

In social sciences research literature, it is seen that quantitative and qualitative research methods are two of the frequently used research approaches used in understanding a research phenomena. In this research an empirical research methodology has been applied after conducting an extensive literature review to understand some of the motivational and influential factors of desire and intention to participate to virtual communities. Based on that in developing the research instrument, some of the scales and questions have been adapted from the available studies empirically. As research method, quantitative research approach which composed of quantifying the data and using it with the help of several statistical techniques and analysis preferred for finding answers to the research questions under consideration (Malhotra, 2005).

For this purpose a research process for facilitating and maintaining tasks necessary for conducting a well organized, scientific research has been followed. In this context, initially the research has been designed to understand some of the motivational and influential factors of desire and intention to participate to virtual communities whereas sample has been chosen from the undergraduate and graduate students of Bahcesehir University and their friends. Later this has been followed by development of the measurement instrument, analysis and interpretation of the data. In the last part of the study, evaluation of the research findings, managerial implications and suggestions have been presented.

4.2. Research Questions

1. Do positive anticipated emotions have an important role on desire and intention to participate to virtual communities?
2. Does norm of reciprocity have an important role on desire and intention to participate to virtual communities?
3. Does perceived usefulness have an important role on desire and intention to participate to virtual communities?
4. Does predisposition towards virtual community usage have an important role on desire and intention to participate to virtual communities?
5. Does social comparison have an important role on desire and intention to participate to virtual communities?

4.3. Measures

Positive anticipated emotions refer to the pre-factuals hypothesized to influence desires to perform a behavior which can be in the form of positive anticipated emotions or negative anticipated emotions and it's likely to expect its influence on virtual community participation and desire and intention to participate to virtual communities (Bagozzi, 2002). As it is stated in Bagozzi's 'Intentional Social Action in Virtual Communities' study, seven measures have been used in order to measure seven *positive anticipated emotions* (excited, delighted, happy, glad, satisfied, proud, self-assured) among virtual community usage have been measured with the following question (Bagozzi,2002). How would you feel if you were able to chat in the virtual chat room with the group of friends during the next 2 weeks? **1.** I would feel excited. **2.** I would feel delighted. **3.** I would feel happy. **4.** I would feel glad, 5**.**

I would feel satisfied, **6.** I would feel proud 7**.** I would feel self-assured (7 point likert scale for each feeling).

In the literature, it is pointed out that in general people are in a tendency to expect some return when they share their knowledge. As it is defined by Chiu, *norm of reciprocity* refers to knowledge exchanges that are mutual and perceived by the parties as fair and one of the important factors that leads to knowledge sharing behavior (Chiu et al., 2006). Norm of reciprocity scale used in the study in order to measure this construct is adapted from Chiu which is composed of two five point Likert scales (Chiu et al., 2006). **1.** I know that other members in the virtual community that I am a member of will help me, so it's only fair to help other members (Five Point Likert Scale). **2.** I believe members in the virtual community that I am a member of would help me if I need it (Five Point Likert Scale).

As it is suggested in literature, three questions are used to measure perceived usefulness which have been adapted from Dong's *Perceived Usefulness* scale as follows (Dong, 2008). 1. I think that virtual communities are helpful for improving my performance in general 2. I think that virtual communities are helpful in enhancing electiveness of my life in general 3. I think that virtual communities are very useful for my life in general (Seven Point Likert Scale).

As it is pointed out in Fishbein and Ajzen's theory of reasoned action, attitudes are formed as a result of the beliefs about the outcomes of performing that act and expected outcomes. If the outcome of performing that behavior seems beneficial to the individual, he/she may participate in that particular behavior (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980). From this point forward, *attitudes toward virtual community usage (Predisposition to Virtual Community Usage)* have been measured with the following statement using a seven point semantic differential item scale which have been adapted from Bagozzi (Bagozzi, 2002).On the following scales, please express your attitude toward chatting in the virtual chat room with your group of friends in the following days. **1.** foolish– wise (seven point semantic differential scale) **2.** Harmful–beneficial (seven point semantic differential scale) **3.**bad–good (seven point semantic differential scale), **4.**punishing–rewarding (seven point semantic differential scale)

Early definitions of social comparison theory date back to 1954s that started with Festinger's social comparison theory (Festinger, 1954). As stated in the literature according to social comparison theory, there is a drive within individuals to look to outside images in order to evaluate their own opinions and abilities in the sense that it mainly focuses on explaining and understanding tendencies of individuals in evaluating and comparing their own opinions and desires with others which may lead to an self enhancement in individuals' self images (Festinger, 1954). From this point forward, a *social comparison* scale have been adapted from Kim (Kim,2006) which is composed of three measures in the form of seven point Likert scale.**1.** In the virtual community that I am a member of, I always compare my profile to that of other members to check which more attractive (seven point likert scale) is. **2.** I always evaluate the efforts I put into my profile relative to those of others (seven point likert scale). **3.** I usually judge the attractiveness of my profile against that of others (seven point likert scale)

As it is pointed out in literature *desires* provide the motivation to decide in favor of acting as part of a virtual community (Dholokia, 2004) Therefore desire construct has been measured with the help of questions adapted from Dholokia'srespective scale (Dholokia ,2004). 1. I desire to meet my group of friends in the virtual communities during the next 2 weeks (five point likert scale). **2.** My desire for chatting/meeting/engaging in different activities in the virtual communities with my group of friends during the next 2 weeks can be described as: (five point no desire at all-very strong desire likert scale). **3.** I want to chat /message/interact in the virtual communities with the group of friends during the next 2 weeks. (five point does not describe me at all/ describe me very well likert scale)

As it is defined by Dholokia, *We-Intentions* construct used in the model refers to the intentions to participate together as a group which is to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants (Dholokia,

2004). Therefore, the perspective have been adapted from Bagozzi's we-Intentions scale which can be found in his 'a social influence model of consumer participation in network- and small-group-based virtual communities' research as below. **1.**I intend to chat/meet with my group of friends in the virtual communities sometime during the next two weeks. (five point agree-disagree likert scale) . **2.** We (me and my close friends) intend to chat in the virtual chat room together sometime during the next 2 weeks (five point agree-disagree likert scale).

Desire and intention to participate to virtual communities refers to the merge of we-intention and desires of Dholakia where desires provide the motivation to decide in favor of acting as part of a virtual community and we intentions stand for the intentions to participate together as a group, to be a function of both individual (i.e., attitudes, perceived behavioral control, positive, and negative anticipated emotions) and social determinants (i.e., subjective norms, group norms, and social identity) (Dholakia, 2004). Respective scale has been adapted from Dholakia's respected scale as **1.** I desire to meet my group of friends in the virtual communities during the next 2 weeks (five point likert scale). **2.** My desire for chatting/meeting/engaging in different activities in the virtual communities with my group of friends during the next 2 weeks can be described as: (five point no desire at all-very strong desire likert scale). **3.** I want to chat /message/interact in the virtual communities with the group of friends during the next 2 weeks. (five point does not describe me at all/ describe me very well likert scale) **4.**I intend to chat/meet with my group of friends in the virtual communities sometime during the next two weeks. (five point agree-disagree likert scale) . **5.** We (me and my close friends) intend to chat in the virtual chat room together sometime during the next 2 weeks (five point agree-disagree likert scale).

Table 3: Scales Used in Study

Norm of reciprocity	Adapted from Chiu et al., 2006	**Five Point Likert Scale, Two Meas.**
Perceived Usefulness	Adapted from Dong, 2008	**Seven Point Likert Scale, Three Meas.**
Predisposition to Virtual Community Usage	Adapted from Bagozzi, 2002	**Seven Point Semantic Differential Scale, Four Meas.**
Social Comparison	Adapted from Kim,2006	**Seven Point Likert Scale, Three Meas.**
***Desire and Intention to Participate Virtual Communities**	Adapted from Dholakia, 2004	**Five Point Likert Scale, Five Meas.**
Desires	Adapted from Dholakia, 2004	**Five Point Likert Scale, Three Meas.**
We-Intention	**Adapted from Dholakia, 2004**	**Five Point Likert Scale, Two Meas.**

*Desire and Intention to Participate Virtual Communities is the combination of Desires and We-Intention Scales

4.4. Data Collection and Sampling Method

The sample of the study has been defined as 'undergraduate and graduate students of Bahcesehir University and their friends'. A snowball sampling has been chosen for the sampling method of this study considering its high applicability and usage in marketing studies of this type. One other reason of choosing snowball sampling was to reach a wide range of people using university students' personal networks. As suggested in literature over 385 observations (425 in our sample in this study) has been found sufficient for the sample size values with an error of 5% and a confidence level of 95% (Águila et. al.,2014; Lemeshow et.al.,1990; Yau,2013; survey monkey site-sample size calculator).In literature used formula to calculate this has been $n= t^2 x (p x q) / e^2$ where n refers to sample size, p refers to proportion, percentage or presence of the study characteristics (In literature it is suggested that when we have no prior values for the proportions to be estimated, we can use p- and q-values as 50%.) q=1-p, e refers to margin of error; t = 1.96 (with 95% confidence level). Based on that, $n = 1.96^2 x 0.5 x 0.5 / 0.05^2$ sample size has been found 384.16 and rounded to 385 Águila et. al.,2014; Lemeshow et.al.,1990; Yau,2013; survey monkey site-sample size calculator, 2017).

4.5. Questionnaire Design and Data Gathering

An online questionnaire has been developed with the help of available survey design tools in Survey Monkey site. Later link of the questionnaire has been sent to the participants who are selected among undergraduate, graduate students of Bahcesehir University and their friends.

In marketing literature, it is possible to find various data collection methods as self administered surveys, telephone, personal or postal surveys, recording data followed by different forms of interviews (in-depth, focus group) which is generally selected based on the different type and characteristics of the research topic, research area, research objectives, research focus, research environment, target audience, time and cost constraints (Malhotra & Birks, 2007). Among these different methods, questionnaires are known to be one of the most structured data collection ways of collecting a wide range of information from a large group of respondents. After data is collected using an electronic or a postal questionnaire, meaningful relations and important knowledge patterns are analyzed and understood employing some of the statistical tools and approaches as suggested in the research literature. Main ability of these tools are giving the chance of employing some of the statistical techniques and approaches with the aim of discovering unknown relations and useful information or ensure some of the pre-existing or suggested relations and knowledge that have been suggested in literature.

In this research, an online questionnaire method has been selected considering some of the unique advantages as being visually appealing, ease of customization, questionnaire designs, reaching different respondents regardless of time and space, ease of access, higher availability and reducing data processing time. After determination and selection of structured questions that are going to be asked to the respondents, online questionnaires have been developed and implemented using the available tools and themes in the survey monkey site. After the questionnaire is prepared, it has been published publicly online. Later respondents from undergraduate, graduate students of Bahcesehir University and their friends were invited to participate in the survey on a voluntary basis. They were also asked to invite their friends if possible as well. In this way a snowball sampling has been chosen for the sampling method of this study considering it's high applicability and usage in marketing studies of this type.

The questionnaire is composed of questions aiming to understand participant's familiarity and usage of virtual communities, understanding some of the influential and motivational factors that have been suggested in literature and their influence on desire and intention to participate to virtual communities. These questions have been adapted from the studies available in literature. In the last part of the questionnaire, questions aiming to understand the demographic characteristics of the respondents have presented.

4.6. Data Analysis

In order to test the proposed hypothesis an exploratory factor analysis has been conducted which is followed with reliability analysis and linear regression analysis.

5. Results

5.1. Pre Test

Before administering the survey with a small group of respondents a pre-test has been conducted with a group of 125 students. The profile of the respondents participated and the reliability measures of the scales used in the pre-test can be found as follow. In the pre-test it has seen that all Cronbach alpha values for the respective constructs have a value of higher than .70, in other words all the constructs used in the research model are statistically reliable and can be regarded as reliable constructs of the research model. (Hair et al., 1998, 2010; Nunnally, 1978; Cronbach, 1951)

Table 4: Reliability measures of the Scales in Pre-test

Scale Used	Items	Cronbach Alpha
Positive anticipated emotions	7	**,924**
Norm of reciprocity	2	**,734**
Perceived Usefulness	3	**,904**
Predisposition to Virtual Community Usage	4	**,822**
Social Comparison	3	**,887**
***Desire and Intention to Participate Virtual Communities**	**5**	**,929**

Table 5: Education Status of Respondents

		Frequency
Education Status	High School and Below	56
	2 Year Programs	2
	4 Year Programs	52
	Master and Above	15

Table 6: Age Status of Respondents

		Frequency
Age	18-20	11
	20-23	51
	23-25	36
	25-30	14
	30 and above	13

Table 7: Gender Status of Respondents

		Frequency
Gender	Female	44
	Male	81

5.2. Sample Characteristics and Descriptive Statistics

The data for the main survey has been collected with an online administered survey and questions aiming to understand some of the antecedents of desire and intention to participate to virtual communities have been directed to the respondents. Also, demographic questions aiming to measure different respondent characteristics placed in the questionnaire. Some of the demographic characteristics of the respondents participated in this survey is as followed.

Table 8 Education Status of Respondents

		Frequency
Education Status	High School and Below	189
	2 Year Programs	15
	4 Year Programs	177
	Master and Above	43

Table 9: Age Status of Respondents

		Frequency
Age	18-20	37
	20-23	191
	23-25	97
	25-30	56
	30 and above	44

Table 10: Gender Status of Respondents

		Frequency
Gender	Female	179
	Male	246

5.3. Validity and Reliability of the Measures

As it was earlier done in the pre-test, reliability of the constructs have been re-assessed and re-evaluated considering suggested lower limit of Cronbach's alpha in literature. As it is shown in table 13 with the sample size of 425 it has been seen that all Cronbach alpha values for the respective constructs have a value of higher than .70, in other words all the constructs used in the research model are statistically reliable and can be regarded as reliable constructs of the research model. (Hair et al., 1998,2010; Nunnally, 1978; Cronbach, 1951)

Table 11: Reliability measures of the Scales

Scales Used	**Items**	***Cronbach Alpha***
Positive anticipated emotions	7	*,918*
Norm of reciprocity	2	*,798*
Perceived Usefulness	3	*,886*
Predisposition to Virtual Community Usage	4	*,857*
Social Comparison	3	*,869*

Desire and Intention to Participate Virtual Communities	**5**	***,921***

5.4. Exploratory Factor Analysis and Reliability Assessment

Exploratory factor analysis results can be seen as below.

Table 12: Exploratory Factor Analysis Result for Positive Anticipated Emotions

Positive Anticipated Emotions	Factor Loading	(%)	Cronbach Alpha
Q1: I would feel excited	,670		
Q2: I would feel delighted	,840		
Q3: I would feel happy	,887		
Q4: I would feel glad	,888	67,915	,918
Q5: I would feel satisfied	,859		
Q6: I would feel proud	,817		
Q7: I would feel self-assured	,788		
KMO = ,876 Bartlett Test of Sphericity (X2)=2402,453, p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

Table 13: Exploratory Factor Analysis Result for Norm of Reciprocity

Norm of Reciprocity	Factor Loading	(%)	Cronbach Alpha
Q1: I know that other members in the virtual community that I am a member of will help me, so it's only fair to help other members	,912		
Q2: I believe members in the virtual community that I am a member of would help me if I need it	,912	83,212	,798
KMO = ,500 Bartlett Test of Sphericity (X2)=244,733 p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

Table 14: Exploratory Factor Analysis Result for Perceived Usefulness

Items For Perceived Usefulness	Factor Loading	(%)	Cronbach Alpha
Q1: I think that virtual communities are helpful for improving my performance in general	,867		
Q2: I think that virtual communities are helpful in enhancing electiveness of my life in general	,922	81,467	, 886
Q3: I think that virtual communities are very useful for my life in general	,918		
KMO = ,727 Bartlett Test of Sphericity (X2)=737,124 p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

Table 15: Exploratory Factor Analysis Result for Predisposition to Virtual Community Usage

Items For Predisposition to Virtual Community Usage	Factor Loading	(%)	Cronbach Alpha
Q1: foolish– wise (seven point semantic differential scale)	, 900		
Q2: Harmful–beneficial	, 922	71,384	, 857
Q3: bad–good	, 696		
Q4: punishing–rewarding	,844		
KMO = ,784 Bartlett Test of Sphericity (X2)=945,665 p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

Table 16: Exploratory Factor Analysis Result for Social Comparison

Items For Social Comparison	Factor Loading	(%)	Cronbach Alpha
Q1: I always evaluate the efforts I put into my profile relative to those of others	,917		
Q2: I always compare my profile to that of other members to check which is more attractive	,917	79,785	, 869
Q3: I usually judge the attractiveness of my profile against that of others	,844		
KMO = ,711 Bartlett Test of Sphericity (X2)=691,334 p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

Table 17: Exploratory Factor Analysis Result for Desire and Intention to Participate to Virtual Communities

Items For Desire and Intention to Participate to Virtual Communities	Factor Loading	(%)	Cronbach Alpha
Q1: I desire to meet my group of friends in the virtual communities during the next 2 weeks	,924		
Q2: My desire for chatting/meeting/engaging in different activities in the virtual communities with my group of friends during the next 2 weeks can be described as	,899	76,584	,921
Q3: I want to chat /message/interact in the virtual communities with the group of friends during the next 2 weeks	,718		
Q4: I intend to chat/meet with my group of friends in the virtual communities sometime during the next two weeks.	,898		
Q5: We (me and my close friends) intend to chat in the virtual chat room together sometime during the next 2 weeks	,919		
KMO = ,845 Bartlett Test of Sphericity (X2)=1815,568 p=,000			

Note 1:The items which had communalities less than 0.50, the ones with less than 0.50 factor loadings as well as the ones which were loaded to more than one factor were excluded (Hair et al., 1998).
Note 2:Principal component analysis and orthogonal varimax rotation were used

The six factors used in the model were extracted based on the principal component method which is to say that the eigen values of all factors bigger than one (Hair et al., 1998,2010). The KMO measure of sampling adequacy (Kaiser, 1970) and Bartlett Test of Sphericity demonstrated that the EFA was applied correctly for all the constructs meaning KMO values for all the constructs found to be equal and higher than 0.50 which is the suggested cut-off point of the measure in literature (Kaiser,1970). Also Bartlett Test of Sphericity (BTS) suggested that the bivariate correlations among the scales' items were significantly different from zero (p=0.000) for all six factors used in the model. Lastly Cronbach alpha statistics for each factor has been found significant and bigger than the cut-off point 0.70 (Nunnally, 1978).

5.5. Confirmatory Factor Analysis and Reliability Assessment in SEM

As it is stated by Karahoca, reliability and validity analysis is used in the assessment of the model in SEM. For this, composite reliability, convergent validity and discriminant validity criteria should be met for the reliability and validity of the model that is being used (Karahoca, 2018).

Based on the confirmatory factor analysis results presented in table 21, it is confirmed that the composite reliability of the scales used in the study which reflects the internal consistency of the measurement model found to be reliable since it reaches the suggested lower limit of this measure 0.60 in literature (Dholakia and Yi, 1995).

In assessing convergent validity as suggested in research literature two criteria taken into consideration which were composite reliability should exceed average variance extracted and average variance extracted should be above 0,50 threshold (Anderson, 2010). According to that all of the constructs found to have a high convergent validity (Anderson, 2010).

Finally discriminant validity of the respective constructs have been assessed based on the criteria that MSV should be less then AVE and ASV should be less then AVE (Anderson, 2010). Based on these results it is seen that required discriminant validity criteria for all of the 21 constructs met. Table 3.51 shows confirmatory factor analysis results.

Table 21: Confirmatory factor analysis results in SEM

Name Of The Latent Variable	CR	AVE	MSV	ASV
Desire and Intention to Participate in Virtual Communities	0,925	0,715	0,453	0,158
Positive Anticipated Emotions	0,918	0,621	0,320	0,130
Norm of Reciprocity	0,798	0,664	0,513	0,212
Perceived Usefulness	0,890	0,729	0,513	0,199
Predisposition to Virtual Community Usage	0,899	0,750	0,261	0,098
Social Comparison	0,879	0,709	0,328	0,092

CR: Composite Reliability
AVE: Average Variance Extracted
MSV: Maximum Shared Squared Variance
ASV: Avarage Shared Squared Variance

5.6. Results of the Hypothesis Tests

H1: Positive anticipated emotions have a positive influence on desire and intention to participate to virtual communities

Positive anticipated emotions refer to the pre-factuals hypothesized to influence desires to perform a behavior which can be in the form of positive anticipated emotions or negative anticipated emotions and it's likely to expect its influence on virtual community participation and desire and intention to participate to virtual communities (Bagozzi, 2002). In order to understand respective influence of Positive anticipated emotions on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,000; β=,210 meaning positive anticipated emotions' influence on desire and intention to participate to virtual communities is significant. Therefore the first hypothesis stating that Positive anticipated emotions have a positive influence on desire and intention to participate to virtual communities has been accepted.

H2: Norm of Reciprocity has a positive influence on desire and intention to participate to virtual communities

Norm of Reciprocity refers to knowledge exchanges that are mutual and perceived by the parties as fair and one of the important factors that leads to knowledge sharing behavior (Chiu et al., 2006).In order to understand respective influence of norm of reciprocity on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,000; β=,291 meaning norm of reciprocity's influence on desire and intention to participate to virtual communities is significant. Therefore the second hypothesis stating that norm of reciprocity has a positive influence on desire and intention to participate to virtual communities has been accepted

H3: Perceived usefulness has a positive influence on desire and intention to participate to virtual communities

Perceived usefulness refers to the degree which a person believes whether using a particular system would enhance his or her job performance (Dong, 2008).In order to understand respective influence of perceived usefulness on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,003; β=,136 meaning perceived usefulness' influence on desire and intention to participate to virtual communities is significant. Therefore the third hypothesis stating that perceived usefulness has a positive influence on desire and intention to participate to virtual communities has been accepted.

H4: Predisposition to virtual community usage has a positive influence on desire and intention to participate to virtual communities

Predisposition to virtual community usage refers the attitude towards virtual community participation (Ajzen & Fishbein, 1980;Bagozzi, 2002). In order to understand respective influence of predisposition towards virtual community usage on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,003; β=,113 meaning predisposition to virtual community usage's influence on desire and intention to participate to virtual communities is significant. Therefore the fourth hypothesis stating that social comparison has a positive influence on desire and intention to participate to virtual communities has been accepted.

H5: Social Comparison has a positive influence on desire and intention to participate to virtual communities

As stated in the literature according to social comparison theory, there is a drive within individuals to look to outside images in order to evaluate their own opinions and abilities in the sense that it mainly focuses on explaining and understanding tendencies of individuals in evaluating and comparing their own opinions and desires with others which may lead to an self enhancement in individuals' self images (Festinger, 1954; Kim, 2006). In order to understand respective influence of social comparison on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,003; β=,113 meaning social comparison's

influence on desire and intention to participate to virtual communities is significant. Therefore the fifth hypothesis stating that social comparison has a positive influence on desire and intention to participate to virtual communities has been accepted.

Table 18: Multiple Regression Analysis Results

Dep. Variable: Desire and Intention to Participate in Virtual Communities	Beta	t value	P value
Independent Variables:			
Constant	,006	,176	,860
Positive Anticipated Emotions	,210	5,113	,000
Norm of Reciprocity	,291	6,368	,000
Perceived Usefulness	,136	2,948	,003
Predisposition to Virtual Community Usage	,234	5,690	,000
Social Comparison	,113	2,970	,003
R= 0,709 R^2= 0,502 F=82,785 P = 0,000			

Regression Equation has found as below,

Desire and Intention to Participate to Virtual Communities=0.210(Positive Anticipated Emotions)+0.291(Norm of Reciprocity)+0.136(Perceived Usefulness)+0.234(Predisposition to Virtual Community Usage)+0.113(Social Comparison)+0.06

H4: Predisposition to Virtual Community Usage has a positive influence on desire and intention to participate to virtual communities

As it is pointed out in Fishbein and Ajzen's theory of reasoned action, attitudes are formed as a result of the beliefs about the outcomes of performing that act and expected outcomes. If the outcome of performing that behavior seems beneficial to the individual, he/she may participate in that particular behavior (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980;Bagozzi, 2002). In order to understand respective influence of predisposition towards virtual community usage on desire and intention to participate to virtual communities a multiple regression analysis has been conducted which produced an adjusted R^2 =0,502; F =82,785; p = 0,000; β=,234 meaning predisposition towards virtual community usage's influence on desire and intention to participate to virtual communities is significant. Therefore the fourth hypothesis stating that perceived usefulness has a positive influence on desire and intention to participate to virtual communities has been accepted.

6. Conclusion and Discussion

6.1. Discussion of Results

As part of of the changes that, information and communication technologies brought into our lives virtual communities, which had several forms entered into our lives. Virtual communities became one of the important phenomenon that found place in virtual spaces where individuals got chance to be organized around shared interests, communicate, build relations and share their ideas under different names and several focuses. Shorthly after that, virtual community concept became an important topic of interest and virtual communities became an emerging research area that gained a lot of attention from varied disciplines. As a result of that, there has been a significant increase in the number of virtual community studies (Li, 2004). Today virtual communities became one of the important venues and spaces for all human beings where wide ranges of options are immense.

In this study it is aimed to understand desire and intention to participate to virtual communities and its antecedents with the aim of making a contribution for the understanding of this issue and bringing new ideas and insights. Considering this in the early phases of this study an intensive literature review has been conducted in order to understand virtual communities in a detailed way and identify antecedents of desire and intention to participate to virtual communities in order to shed light why we participate to virtual communities from a behavioral perspective.

In the first hypotheses, positive anticipated emotions hypothised to have an influence to desire and intention to participate to virtual communities. Positive anticipated emotions refer to the pre-factuals hypothesized to influence desires to perform a behavior which can be in the form of positive anticipated emotions or negative anticipated emotions and it's likely to expect its influence on virtual community participation and desire and intention to participate to virtual communities (Bagozzi, 2002). Second hypotheses of the research has been that norm of Reciprocity has a positive influence on desire and intention to participate to virtual communities. Norm of Reciprocity refers to knowledge exchanges that are mutual and perceived by the parties as fair and one (Chiu et al., 2006).Third hypotheses has been that perceived usefulness has a positive influence on desire and intention to participate to virtual communities. Perceived usefulness refers to the degree which a person believes whether using a particular system would enhance his or her job performance (Dong, 2008).

The fourth hypotheses has been predisposition to virtual community usage has a positive influence on desire and intention to participate to virtual communities. As it is pointed out in Fishbein and Ajzen's theory of reasoned action, attitudes are formed as a result of the beliefs about the outcomes of performing that act and expected outcomes. If the outcome of performing that behavior seems beneficial to the individual, he/she may participate in that particular behavior (Fishbein & Manfredo, 1992; Ajzen & Fishbein, 1980;Bagozzi, 2002). Finally last hypotheses has been that social comparison has a positive influence on desire and intention to participate to virtual communities. As stated in the literature according to social comparison theory, there is a drive within individuals to look to outside images in order to evaluate their own opinions and abilities in the sense that it mainly focuses on explaining and understanding tendencies of individuals in evaluating and comparing their own opinions and desires with others which may lead to an self enhancement in individuals' self images (Festinger, 1954; Kim, 2006).

As a result of the analysis conducted, it has been found out that positive anticipated emotions, perceived usefulness, norm of reciprocity, attitude towards virtual community usage and social comparison found to be the important factors that lead to desire an intention to participate to virtual communities.

6.2. Managerial Implications

As it is pointed out in literature today virtual communities gave people chance to come together in virtual spaces where they can communicate, build relations, share information, share ideas, cooperate, collaborate, discuss about different topics, meet friends, work and come together using several information systems or technologies. Also same members found chance to be organized around shared interests, content and goals in the virtual environments impressively. Today it is estimated that over 40 million people worldwide participate in some form of virtual community where an increase in the usage of virtual communities are expected in the near future. (Kozinets, 1999). Therefore understanding importance of virtual communities, desire and intention to participate to virtual communities and factors as positive anticipated emotions, perceived usefulness, norm of reciprocity, attitude towards virtual community usage and social comparison that lead to that has an important value. Having awareness and considering these factors would help managers in developing strategies and action plans for their business and marketing decisions.

6.3. Limitations of The Study

In conducting this research a significant limitation or constraint has not been encountered. Making a good panning in the beginning of the research has given an advantage in managing the research time line appropriately.

For a suggestive remark a multicultural and an empirical version of the study can be applied in different forms for comparison purposes and in order to capture more comparative insights.

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TİCARİ AÇIKLIK VE CO2 EMİSYONU ARASINDAKİ İLİŞKİ: TÜRKİYE ÖRNEĞİ

Nurgün TOPALLI[1]

Doç. Dr., Nevşehir Hacı Bektaş Veli Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Nevşehir, Türkiye
ORCID Code: 0000-0003-2299-5363

ÖZET

Ekonomik faaliyetlere dayalı sera gazları dünya genelinde artış göstermektedir. Bu artışın nedenleri arasında ekonomik büyüme, fosil yakıt kullanımını, kentleşme ve küreselleşme yer almaktadır. Küreselleşmenin hız kazanması ile birlikte ülkeler arasındaki ticaret hacmi artmaktadır. Daha fazla mal üretimi ve tüketimi, CO_2 emisyonlarını artırmakta, ülkelerde çevre sorunlarını gündeme getirmektedir. Bu nedenle ticari açıklık ve CO_2 emisyonu arasındaki ilişki hem gelişmiş hem de gelişmekte olan ülkeler için önemini koruyan bir konudur.

Bu çalışmada, Türkiye'de 1960-2014 dönemi için CO_2 emisyonu ve ticari açıklık arasında uzun dönemli ilişki olup olmadığı analiz edilmiştir. Çalışmada imalat sanayi ve inşaattan kaynaklanan CO2 emisyonu, mal ve hizmet ihracatı, mal ve hizmet ithalatı değişkenleri kullanılmıştır. Değişkenlerin durağanlık düzeyleri Fourier durağanlık testi (Fourier KPSS), Fourier ADF birim kök testi, ADF birim kök testi ve Phillips-Perron birim kök testi kullanılarak test edilmiştir. Değişkenler arasındaki eşbütünleşme ilişkisi Fouirer eşbütünleşme test kullanılarak incelenmiştir. Çalışma sonucunda Türkiye'de değişkenler arasında uzun dönemli ilişki olduğu sonucuna ulaşılmıştır. CO_2 emisyonu ihracattan negatif, ithalattan ise pozitif olarak etkilenmektedir. Ancak katsayılar istatistiksel olarak anlamsız bulunmuştur.

Anahtar Sözcükler: CO_2 Emisyonu, Ticari Açıklık, Fourier Eşbütünleşme Testi, Türkiye

THE RELATIONSHIP BETWEEN TRADE OPENNESS AND CO2 EMISSIONS: THE CASE OF TURKEY

Nurgün TOPALLI[1]

Assoc. Prof Dr.,Nevşehir Hacı Bektaş Veli University, Faculty of Economics and Administrative Sciences, Nevşehir, Turkey
ORCID Code: 0000-0003-2299-5363

ABSTRACT

Greenhouse gases based on economic activities are increasing worldwide. Economic growth, fossil fuel use, urbanization and globalization are among the reasons for this increase. With the acceleration of globalization, the trade volume between countries is increasing. The production and consumption of more goods raises CO_2 emissions, bringing environmental problems to the agenda in countries. Therefore, the relationship between trade openness and CO_2 emissions is an issue that remains important for both developed and developing countries. In this study, it is analyzed whether there is a long-term relationship between CO2 emissions and trade openness for the period 1960-2014 in Turkey. In the study, the variables of CO2 emissions from the manufacturing industry and construction, exports of goods and services, imports of goods and services were used. The stationarity levels of the variables were tested using the Fourier stationarity test (Fourier KPSS), the Fourier ADF unit root test, the ADF unit root test and the Phillips-Perron unit root test. The cointegration relationship between the variables was examined using the Fouirer cointegration test. As a result of the study, it was concluded that there is a long-term relationship between the variables in Turkey. CO2 emissions are affected negatively by exports and positively by imports. However, the coefficients were found to be statistically insignificant.

Keywords: CO_2 Emission, Trade Openness, Fourier Cointegration Test, Turkey

1.GİRİŞ

İktisadi faaliyetler kaynaklı iklim değişikliği ve buna paralel olarak ortaya çıkan sera gazları etkisi dünya genelinde artış göstermektedir. Ekonomik büyüme, enerji tüketimindeki artış, enerji tüketiminin fosil kaynaklara bağımlılığı, nüfus artışı, kentleşme, küreselleşme gibi kavramlar her geçen gün karbondioksit emisyonunu yükseltmektedir. Malların, üretimin ve sermayenin küreselleşmesi ülkeler arasındaki ekonomik ve mali işlemlerin hacminde ve hızında büyük değişimlere neden olmaktadır. Küreselleşmenin hız kazanması ile birlikte özellikle ülkeler arasında gerçekleşen ticaret hacminde artışlar yaşanmaktadır. Daha fazla mal-hizmet ihracatının ve ithalatının gerçekleşmesi hem ekonomik büyümeyi hem de daha fazla kaynak kullanımını beraberinde getirmektedir. Bu ise ülkeleri çevre bozulması sorunu ile karşı karşıya bırakmaktadır. Günümüzde ekonomik faaliyetler ve çevre kalitesi arasındaki ilişki hem gelişmekte olan hemde gelişmiş ülkeler için önemini korumaktadır.

Ticari açıklık ve çevre arasındaki ilişki üç etkiye dayanarak incelenebilmektedir. Bu etkiler teknoloji (teknik etki) etkisi, ölçek etkisi ve bileşim (kompoziyon) etkisidir. (Mutascu, 2018: 443; Farhani ve Ozturk, 2015: 15664). Dış ticaret çevresel kaliteyi bozabileceği gibi çevresel kalitenin iyileşmesini de sağlayabilmektedir. Teknik etkiye göre ticari serbestleşmenin CO_2 emisyonu üzerindeki etkisinin negatif, ölçek ve bileşim etkilerine göre ticari açıklığın CO_2 emisyonu üzerindeki etkisinin pozitif olması beklenmektedir (Chen vd. , 2021:3). Literatürde ticari açıklık ve $C0_2$ emisyonu arasındaki ilişkiyi inceleyen çalışmalara göre karma bulgular elde edilmiştir. Örneğin Ang (2009), Atici (2012), Ertuğrul vd. (2016), Shahzad vd. (2017) çalışmalarında ticari açıklık ve CO_2 emisyonu arasındakş ilişki pozitif, Lv ve Xu (2019), Jayanthakumaran, Verma ve Liu (2012), Koç ve Buluş (2020) çalışmalarında ticari açıklık ve CO2 arasındaki ilişki negatif olarak tespit edlmiştir. Sun vd. (2019), Ansari vd. (2020) çalışmalarında ise analize dahil edilen bazı ülkelerde ilişkinin pozitif bazılarında negatif olduğu sonucuna ulaşılmıştır.

Bu çalışmanın amacı Türkiye'nin 1960 – 2014 dönemi dikkate alınarak ticari açıklık ve CO_2 emiyonu arasında uzun dönemli ilişkinin olup olmadığının test edilmesidir. Literatürde ağırlıklı olarak çevre göstergesi olarak kişi başına düşen CO_2 miktarı, ticari açıklık değişkeni olarak toplam ihracat ve ithalatın GSYİH içindeki payı kullanılmıştır. Bu çalışmada çevre değişkeni olarak diğer çalışmalardan farklı olarak imalat sanayilerinden ve inşaattan kaynaklanan CO2 emisyonları (toplam yakıt yanmasının %) kullanılmıştır. Çünkü Türkiye'nin ihracatında ve ithalatında imalat sanayinin payı yüksek düzeydedir. Ayrıca ihracatın ve ithalatın CO_2 emisyonu üzerindeki etkisini ayrı olarak tesbit edebilmek için ticari açıklık göstergesi olarak mal ve hizmet ihracatı (% GSYİH) ve mal ve hizmet ithalatı (% GSYİH) değişkenleri kullanılmıştır. Konu ile ilgili yapılan çalışmaların büyük bir çoğunluğunda geleneksel birim kök testleri ve eşbütünleşme testleri kullanarak analiz gerçekleştirilmiştir. Son dönemlerde yumuşak yapısal kırılmları dikkate alan testler kullanılmaktadır. Bu çalışmada yumuşak kırılmayı dikkate alan durağanlık testi, birim kök testi ve eşbütünleşme testi kullanılmıştır. Çalışmada değişkenlerin durağanlığını sınamak amacıyla Fourier KPSS Durağanlık testi Fourier ADF birim kök testi ve ADF birim kök testi ve Phillips-Perron birim kök testi uygulanmıştır. Değişkenler arasında uzun dönemli ilişkiyi belirlemek amacıyla Tsong vd.(2016) çalışmasına dayanan Fourier eşbütünleşme analizi gerçekleştirilmiştir.

Çalışma dört bölümden oluşmaktadır. İkinci bölümde Türkiye ile ilgili ticari açıklık ve CO_2 emisyonu arasındaki ilişkiyi inceleyen çalışmalara yer verilmiştir. Üçüncü bölümde yöntem ve elde edilen bulgular özetlenmiştir. Son bölümde ise elde edilen bulgular çerçevesinde genel bir değerlendirme yapılmıştır

2. LİTERATÜR

Öztürk ve Acaravcı (2013) çalışmasında Türkiye'nin 1960-2007 dönemi için finansal gelişme, ticari açıklık, ekonomik büyüme, enerji tüketimi ve karbon emisyonu arasındaki uzun dönemli ilişki sınanmıştır. Sınır testi yaklaşımının kullanıldığı çalışma sonucunda değişkenler arasında uzun dönemli ilişki olduğu ve ticari açıklığın CO2 emisyonunu artırdığı sonucuna ulaşılmıştır. Artan vd. (2015)'de Johansen ve Juselius koentegrasyon yöntemi kullanılarak Türkiye'nin 1981-2012 dönemi ekonomik büyüme, ticari açıklık ve çevre kirliliği arasındaki ilişki incelenmiştir. İlgili değişkenler arasında uzun

dönemli ilişki tespit olduğu, ticari açıklığın CO_2'yi pozitif olarak etkilediği tespit edilmiştir. Ayaydın vd. (2016)'da Türkiye'nin 1960-2013 döneminde kişi başına düşen GSYİH ve dışa açıklığın CO_2 emisyonu üzerindeki etkisi Johansen- Juselius eşbütünleşme testi kullanılarak analiz edilmiştir. Çalışmadan elde edilen bulgular ilgili dönemde CO_2 emisyonu ve ticari açıklık arasında ters U şeklinde ilişki olduğu yönündedir. Diğer bir ifadeyle CO_2 emisyonu ile dışa açıklık arasında negatif ilişki bulunmuştur. Dışa açıklık arttıkça hava kirliliği azalmaktadır. Kızılkaya vd. (2017) çalışmasında Türkiye'de karbondioksit emisyonu, enerji tüketimi, ekonomik büyüme ve dışa açıklık ilişkisi Johansen maksimum olabilirlik yöntemi kullanılarak test edilmiştir. 1967-2010 döneminin analiz edildiği çalışma sonucunda karbondioksit emisyonu üzerinde ekonomik büyümenin, ulaşım sektörü enerji tüketiminin ve dışa açıklığın pozitif etkisi olduğu bulgusu elde edilmiştir. Kanberoğlu vd. (2017) çalışmasında Türkiye'nin 1980-2015 yılları arasında ekonomik büyüme, enerji tüketimi, kişi başına ticari açıklık ve CO_2 emisyonu arasındaki ilişki ARDL yöntemi kullanılarak incelenmiştir. Çalışma sonucunda enerji tüketimi ve CO2 arasında istatistiksel olarak anlamlı ve pozitif ilişki, ekonomik büyüme ve CO_2 arasında negatif yönlü bir ilişki tespit edilmiştir. Ticari açıklık ve CO_2 değişkenleri arasındaki ilişkinin ise pozitif fakat istatistiksel olarak anlamsız olduğu sonucuna ulaşılmıştır. Kaygısız (2018) çalışmasında Johansen eşbütünleşme testi kullanılarak Türkiye'nin 1968-2015 dönemi analiz edilmiştir. Kişi başına GSYİH, kişi başına enerji tüketimi ve ticari açıklık değişkenlerinin kullanıldığı çalışmada ticari açıklığın CO_2 emisyonunu pozitif olarak etkilediği bulgusu elde edilmiştir. Gövdeli (2019) çalışmasında ARDL sınır testi yaklaşımı kullanılarak Türkiye'de 1970-2014 dönemi ekonomik büyümenin, dışa açıklığın ve turist sayısının CO_2 üzerindeki etkisi test edilmiştir. Değişkenler arasında uzun dönemli ilişki tespit edilmiştir. Uzun dönemde dışa açıklığın CO_2 emisyonunu pozitif olarak etkilediği (0.40, 0.33, 0.37) bulgusu elde edilmiştir. Vecm Granger nedensellik testi sonuçlarına göre dışa açıklıktan CO_2 emisyonuna doğru tek yönlü nedensellik olduğu tespit edilmiştir. Şahin ve Durmuş (2019)'da Türkiye için 1982-2014 dönemi için CO_2 emisyonu, ekonomik büyüme ve dış ticaret arasındaki ilişki Gregory Hansen eşbütünleşme testi kullanılarak test edilmiştir. Çalışma sonucuna göre dış ticaretteki %1'lik artışın CO_2 emisyonunu %0.079 artırdığı tespit edilmiştir. Orman vd. (2019) çalışmasında Türkiye'de dışa açıklık ve çevresel kirlilik arasındaki ilişki ARDL modeli kullanılarak 1980-2016 dönemi için incelenmiştir. Çalışma sonucunda dışa açıklığın çevre üzerinde olumsuz etkisi olduğu ve dışa açıklıkta %1'lik artışın CO_2'yi %0.304 oranında artırdığı tespit edilmiştir. Okumuş (2020) çalışmasında Türkiye'nin 1968-2014 dönemi için ARDL modeli kullanılarak yenilenebilir enerji tüketimi, ticari serbestleşme, kentleşme ve CO_2 emisyonu arasındaki ilişki araştırılmıştır. Çalışmadan elde edilen bulgulara göre Türkiye'de tarımsal katma değer, yenilenemez enerji tüketimi, ticari serbestleşme ve kentleşme hem kısa hem de uzun dönemde CO_2 emisyonunu artırmaktadır.

Ticari ağırlık ve çevre arasındaki ilişki analiz edilen ülke, kullanılan yöntem ve döneme göre farklılık gösterebilmektedir. Bununla birlikte Türkiye ile ilgili yapılan çalışmalardan elde edilen bulgular ağırlıklı olarak ticari açıklık ve CO_2 emisyonu arasındaki ilişkinin pozitif yönde olduğu şeklinde yorumlanabilir.

3.YÖNTEM VE BULGULAR

Çalışmada, Türkiye'nin CO_2 emisyonu ve ticari açıklık arasındaki ilişki araştırılmak üzere 1960 – 2014 dönemine ait yıllık verileri kullanılmıştır. Çalışmada değişkenlerin durağanlığını sınamak amacıyla, Forurier KPSS Durağanlık testi, Fourier ADF birim kök testi, ADF birim kök testi ve Phillips-Perron birim kök testi uygulanmıştır. Değişkenler arasında uzun dönemli ilişkiyi belirlemek amacıyla Tsong vd.(2016) çalışmasına dayanan Fourier eşbütünleşme analizi gerçekleştirilmiştir. Çalışmada değişkenlerin logaritmik halleri kullanılmıştır. Söz konusu analizler için WİNRATS 8.1 ve E-Views 10 ekonometrik analiz programlarından yararlanılmıştır.

Tablo 1. Değişkenlerin Tanımlanması

Değişkenler	Değişkenlerin Tanımlanması	Kaynak
Lnco2	İmalat sanayilerinden ve inşaattan kaynaklanan CO2 emisyonları (toplam yakıt yanmasının %)	Dünya Bankası
Lnex	Mal ve hizmet ihracatı (% GSYİH)	Dünya Bankası
Lnımp	Mal ve hizmet ithalatı (% GSYİH)	Dünya Bankası

3.1. Birim Kök Testi Sonuçları

Çalışmada cari açığın sürdürülebilirliği Beckers vd.(2006) Fourier Durağanlık Testi, Enders ve Lee (2012) Fourier ADF birim kök testi, ADF ve Phillips- Perron birim kök testleri kullanılarak analiz edilmiştir.

Tablo 2. Fourier Durağanlık Testi ve Fourier Birim Kök Testi Sonuçları

Beckers vd.(2006) Fourier Durağanlık Testi : Ho: Durağanlık Ha: Birim Kök							
Değişkenler	T	k	Hesaplanan Test İstatistiği	%1	%5	%10	Sonuç
lnco2	100	1	0.0650	0.0716	0.0546	0.0471	Birim Kök
lnex	100	1	0.0938	0.0716	0.0546	0.0471	Birim Kök
lnmp	100	1	0.1351	0.0716	0.0546	0.0471	Birim Kök
Enders ve Lee (2012) Fourier ADF Birim Kök Testi: Ho: Birim Kök Ha: Durağanlık							
Değişkenler	T	k	Hesaplanan Test İstatistiği	%1	%5	%10	Sonuç
lnco2	100	1	-3.1268	-4.95	-4.35	-4.05	Birim Kök
lnex	100	5	-2.2465	-4.20	-3.56	-3.22	Birim Kök
lnmp	100	5	-3.8442	-4.20	-3.56	-3.22	Birim Kök
Ho: Katsayılar anlamsız Ha: Katsayılar anlamlı			Hesaplanan Test İstatistiği	%1	%5	%10	Sonuç
lnco2	100	F(k)	4.1673	12.21	9.14	7.78	Anlamsız
lnex	100	F(k)	2.5223	12.21	9.14	7.78	Anlamsız
lnmp	100	F(k)	7.2096	12.21	9.14	7.78	Anlamsız

* Sabitli ve Trendli Model sonuçları dikkate alınmıştır**.** T gözlem değerini, k frekans sayısını göstermektedir. Tablo kritik değerleri Beckers vd. (2006) ile Enders ve Lee (2012) çalışmalarından alınmıştır.

Beckers vd. (2006) Fourier durağanlık testi sonuçlarına göre hesaplanan test istatistiği mutlak değer olarak tablo değerinden büyük olduğu durumda Ho hipotezi reddedilmektedir. Beckers vd. (2006) Fourier durağanlık testi sonuçlarına göre %5 anlamlılık düzeyi dikkate alındığında Ho hipotezi reddedilmektedir. Diğer bir ifadeyle lnco2, lnex ve lnmp değişkenleri düzeyde birim kök içermektedir. Becker vd. (2006) çalışmasında katsayıların anlamlılık sınaması için gerçekleştirilen F testinin sadece sıfır hipotezi reddedilemediği durumda kullanılabileceği belirtilmiştir (Beckers vd., 2006: 391). Bu nedenle katsayıların anlamlılığı sınamaya yönelik F testi gerçekleştirilememiştir. Enders ve Lee (2012) Fourier birim kök testi sonuçların göre ilgili değişkenlerin Fourier katsayılarının anlamlılıkları sınandığında elde edilen F istatistikleri %5 anlamlılık düzeyine göre tablo kritik değerinden küçüktür (lnco2 değişkeni için 4.1673< 9.14, lnex için 2.5223<9.14, lnmp için 7.2096<9.14). Katsayıların istatistiksel olarak anlamsız olduğu boş hipotezi reddedilememektedir. Bu nedenle serilerin birim köke sahip olup olmadıkları ve değişkenlerin kaçıncı düzeyden durağan oldukları tespit etmek amacıyla ADF ve Phillips-Perron birim kök testleri gerçekleştirilmiştir.

Tablo 3. ADF ve Phillips-Perron Birim Kök Testi Sonuçları

ADF Birim Kök Testi					
Değişken		**Hesaplanan test istatistiği**	**McKinnon Kritik Değerleri**		
			%1	**%5**	**%10**
Düzey	lnco2	-1.4735	-4.1372	-3.4952	-3.1766
Birinci Fark	Δlnco2	-7.8952**	-4.1408	-3.4969	-3.1775
Düzey	lnex	-2.8017	-4.1372	-3.4952	-3.1766
Birinci farkı	Δlnex	-7.8562**	-4.1408	-3.4969	-3.1775
Düzey	lnmp	-3.3858	-4.1372	-3.4952	-3.1766
Birinci Farkı	Δlnmp	-7.2181**	-4.1408	-3.4969	-3.1767
Phillips-Perron Birim Kök Testi					
Değişken		Hesaplanan test istatistiği	%1	%5	%10
Düzey	lnco2	-1.4239	-4.1372	-3.4952	-3.1766
Birinci Fark	Δlnco2	-8.4909**	4.1408	-3.4969	-3.1775
Düzey	lnex	-3.1547	-4.1372	-3.4952	-3.1766
Birinci Fark	Δlnex	-7.8562**	-4.1408	-3.4969	-3.1775
Düzey	lnmp	-3.3858	-4.1372	-3.4952	-3.1766
Birinci fark	Δlnmp	-7.5806**	-4.1408	-3.4969	-3.1775

*Sabitli ve Trendli model sonuçları dikkate alınmıştır. Schwarz Bilgi Kriteri kullanılmış ve otomatik olarak 10 gecikme uzunluğu belirlenmiştir. **%5anlamlılık düzeyine göre durağanlığı ifade etmektedir.***Phillips-Perron birim kök testinde Barlet-Kernell ve Newey-West Bandwith kullanılmıştır.

ADF ve Phillips-Perron birim kök testi sonuçlarına göre hem lnco2, lnex ve lnmp değişkenlerinin düzeyde birim kök içerdikleri, değişkenlerin birinci farklarında I(1) düzeyinde durağan olduğu tespit edilmiştir. Değişkenlerimizin I(1) düzeyinde durağan çıkması sonucu değişenler arasındaki ilişki Fourier eşbütünleşme testi kullanılarak incelenecektir.

Tablo 4. Fourier Eşbütünleşme Testi Sonuçları

Sabitli Model			**Kritik değerler (m=0)**		
p	k	Hesaplanan test istatistiği	%1	%5	%10
2	1	0.053762	0.155	0.092	0.070
Fourier Katsayılarının Anlamlılığı Ho: Trigonometrik terimler anlamsız Ha: Trigonometrik terimler anlamlı		5.825	5.774	4.066	3.352
Sabitli ve Trendli Model			**Kritik Değerler (m=1)**		
p	k	Hesaplanan test istatistiği	%1	%5	%10
2	1	0.055655	0.059	0.045	0.038
Fourier Katsayılarının Anlamlılığı Ho: Trigonometrik terimler anlamsız Ha: Trigonometrik terimler anlamlı		6.164	5.860	4.019	3.306

*p=bağımsız değişken sayısı, k=frekans, m=0 sabitli model, m=1 sabitli ve trendli modeli göstermektedir. Tsong vd. (2016) çalışması Tablo1'deki kritik değerler kullanılmıştır.

Tablo 4'te Fourier eşbütünleşme testi sonuçları yer almaktadır. Fourier eşbütünleşme testi sonucuna göre sabitli model için %1, %5 ve %10 anlamlılık düzey değerine göre Ho hipotezi reddedilememektedir. Diğer bir ifadeyle lnco2 lnex ve lnmp değişkenleri arasında eşbütünleşme ilişkisi vardır. Eşbütünleşme ilişki tespit edildiği için Fourier katsayılarının anlamlılığının sınanması gerekmektedir. Sabitli modelde hesaplanan F istatistiği (5.825), sırasıyla %1, %5 ve %10 anlamlılık düzeyindeki test istatistiği (5.774, 4.066, 3.352) değerlerinden büyük olduğu için Ho hipotezi reddedilmektedir. Trigonometrik katsayılar anlamlıdır. İlgili model kullanılabilir.

Sabitli ve trendli model dikkate alındığında Fourier eşbütünleşme testi sonucuna göre sadece %1 anlamlılık düzey değerine göre Ho hipotezi reddedilememektedir. %1 anlamlık düzeyine göre lnco2 lnex ve lnmp değişkenleri arasında eşbütünleşme ilişkisi vardır. Sabitli ve trendli model için hesaplanan F istatistiği (6.164), %1 düzeyindeki test istatistiği (5.860) değerinden büyük olduğu için Ho hipotezi reddedilmektedir. Trigonometrik katsayılar anlamlıdır. Bu bağlamda ilgili modelin kullanılabileceği, lnco2, lnex ve lnmp ve değişkenleri arasında eşbütünleşme ilişki olduğu söylenebilir. Ancak kurulan modelde trend değişkeni %1, %5 ve %10 anlamlılık düzeylerine göre istatistiksel olarak anlamsız çıktığı için (t istatistik değeri 1.12) sabitli modelin tahmin sonuçları değerlendirilecektir.

Tablo 5. Fourier Eşbütünleşme Denklemi Tahmin Sonuçları

Değişkenler	Katsayı	Std.Hata	t-istatistik
c	3.13	0.44364	7.074
lnex	-0.48858	0.41699	-1.172
lnmp	0.41709	0.39291	1.062

Fouirer eşbütünleşme tetsi sonuçlarına göre Türkiye'de ihracat ve CO_2 emisyonu arasında negatif, ithalat ve CO_2 arasında pozitif yönlü ilişki vardır. Ancak her iki değişken de %1, %5, %10 anlamlılık düzeyine göre istatistiksel olarak anlamsız çıkmıştır. Kanberoğlu vd. (2017) çalışmasında Türkiye'nin 1980-2015 yılları arasında ticari açıklık ve CO_2 değişkenleri arasındaki ilişkinin pozitif fakat istatistiksel olarak anlamsız olduğu sonucuna ulaşılmıştır. Çalışmadan elde edilen bulgu Kanberoğlu vd. (2017) çalışması ile benzerlik göstermektedir. Katsayıların anlamsız olduğu sonucundan bağımsız olarak elde edilen bulgular değerlendirildiğinde Türkiye'de ihracatın imalat sanayi ve inşaattan kaynaklanan CO_2 emisyonunu üzerinde negatif etkisi olduğu söylenebilir. İthalat ise CO_2 emisyonunu artırmaktadır. Elde edilen bu bulgu Çin, Japonya ve Güney Kore'nin incelendiği Dou vd. (2021) çalışması ile tutarlıdır.

4. SONUÇ

Küreselleşme ve serbest dış ticaret politikalarının dünya genelinde yaygınlaşması ülkeler arasındaki mal ve hizmet akımlarını artırarak daha fazla mal ve hizmet üretimini ve tüketimini, daha fazla kaynak kullanımını beraberinde getirmiştir. Ticari açıklıkla birlikte iktisadi faaliyetlere bağlı ekonomik büyümenin ve enerji kullanımının artması CO_2 emisyon miktarını yükselterek çevrenin bozulmasına neden olabilmektedir. Bununla birlikte ticaret hacmindeki artışlar daha temiz teknoloji kullanımı yaygınlaştırarak çevre kalitesinin iyileşmesini de sağlayabilmektedir. Dünya genelinde sera gazı etkilerinin yoğun şekilde gözlenmeye başlanması nedeniyle dış ticaret ve çevre ilişkisi ülkeler için önemini koruyan bir konu olma özelliğini sürdürmektedir.

Bu çalışmada Türkiye'nin 1960-2014 dönemi yıllık verileri kullanılarak dışa açıklık ve CO_2 emisyonu arasında ilişki olup olmadığı test edilmiştir. Çalışmada yumuşak kırılmaları dikkate alan Fourier KPSS durağanlık ve Fourier ADF birim kök testi ile geleneksel ADF ve Phillips-Perron birim kök testleri kullanılmıştır. İlgili testlerden elde edşlen sonuçlara göre lnco2, lnex ve lnmp değişkenlerinin birinci farklarında durağan olduğu tespit edilmiştir. Daha sonra değişkenler arasındaki uzun dönemli ilişki Fourier eşbütünleşme tesi kullanılarak analiz edilmiştir. Eşbütünleşme testi sonucu değişkenler arasında uzun dönemli ilişki olduğu, ihracatın CO_2 üzerinde negatif, itahaltın CO_2 üzerinde pozitif etkisi olduğu

sonucuna ulaşılmıştır. Ancak katsayılar istatistiksel olarak anlamsız çıkmıştır. Elde edilen bu bulgu Kanberoğlu vd.(2017), Dou vd. (2021) çalışmaları ile benzerlik göstermektedir. Katsayıların anlamsız olması dikkate alınmadığında Türkiye için ihracatın CO_2 üzerinde azaltıcı etkide bulunması Türkiye'nin ihracatının ağırlıklı olarak emek yoğun mallara, ithalatının CO_2 emisyonunu artırması ise ithalatın ağırlıklı olarak sermaye yoğun malları dayanması ile açıklanabilir. Aynı zamanda uluslararası mal ticaretinde uygulanan uluslararası yasalar sonucu Türkiye'de ihracata söz konusu malların üretiminde çevre dostu yaklaşımlara ağırlık verildiği söylenebilir. Çalışmadan elde edilen bulguya göre dış ticaret hacmi ve CO_2 emisyonu arasında uzun dönemli ilişki mevcuttur. Bu nedenle çevre dostu üretim ve tüketim yapısını içerecek ekonomi ve çevre politikalarının uygulanması Türkiye için önem arz etmektedir. Bu kapsamda yenilenebilir enerji kullanımının artırılması, geri dönüşüm bilincinin oluşturulması çevre bozulmasını azaltabilecek önlemler arasında yer almaktadır.

Bu çalışmanın kısıtları verilerin elde edilebilirliği açısından incelenen dönemin 1960-2014 dönemini kapsamasıdır. Aynı zamanda CO_2 emisyonunu etkileyebilecek, ticari açıklıkla birlikte GSYİH, enerji kullanımı, doğrudan yatırımlar gibi faktörlerin modele dahil edilerek analiz edilmesi ileriki yapılacak çalışmalar açısından faydalı olacaktır.

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M/M/1 MULTIPLE WORKING VACATION WITH CATASTROPHES AND UNRELIABLE SERVER

M.Seenivasan[a], S.Chandiraleka[a] and R.Abinaya[b]

[a]*Mathematics Wing- DDE, Annamalai University, Annamalainagar-608002, India.*
[b]*Department of Mathematics, Annamalai University, Annamalainagar-608002, India.*

ABSTRACT

In this paper, we study a Markovian queuing model with Multiple Working Vacation, Catastrophe and Unreliable Server with different service rates. Service time during normal service period and working vacation period are exponentially distribution with parameters μ_1 and μ_2 respectively. Arrival follows Poisson process with parameter λ. If queue length increases during a working vacation period, the server goes to busy period. When a server can breakdown while providing service, and become unavailable to customers. After breakdown, it should be repair and goes to normal service. In this paper also dispute catastrophe, during service an unforeseen event that causes distress or damage is catastrophe. This type of model is examined by using Matrix Geometric Approach to device probability vectors. Using particular parameters, we also obtain some numerical performance measurements.

Keywords: Multiple Working Vacation, Stability Condition, Unreliable Server, Working Vacation, Matrix Geometric Approach, Catastrophe.

AMS 2000 Subject Classification: 60K25; 60K30 and 90B22.

Introduction

Many authors have contributed to the theory of queues with Multiple Working Vacation and Catastrophe with Unreliable Server. In real life situations queuing theory is mostly in use. For example bank, ticket counters, manufacturing system, communication network system, industrial sectors and so on. Ke et al developed many vacation models. In normal vacation server stop his or her service completely but in working vacation he may serve the customer with low service rate. This queuing system has wide range of applications mainly in the casting system, co-operation system, telecommunications, and network system. Y.Tang was analyzed Single Server M/G/1 Queuing System Subject to Breakdown - Some Reliability and Queuing Problems. M/M/1 queuing model with working vacations was investigated by Servi and Finn. Wu et.al discussed M/G/1/multiple working vacation queue. Analysis of GI/M/1 queue with multiple working vacations was studied by Baba. Alfa discussed vacation models in discrete time. Li et.al was introduced M/M/1 queuing model with working vacations and interruption. An M/G/1 G-queue with server breakdown, working vacations and vacation interruption was discussed by M.Zhang et al.

A.D.Banik et al.analyzed GI/M/1/N queue with multiple working vacations-analytic analysis and computation. These queuing model used in manufacturing and service sectors. As well as queuing models where the server may subject to breakdowns and sent to repair. A brief and useful survey about queuing system with more vacations was analyzed by Doshi. Seenivasan et al. indicates Performance analysis of two heterogeneous server queuing model with intermittently obtainable server using matrix geometric method. A Foundation of performance Analysis of vacation and priority systems was explained by Takagi. Working vacations queuing models with multiple types of server breakdowns was introduced by Jain et al. the service facility may have one or more identical servers that are subject to breakdowns and repairs in unreliable queuing systems was explained by Vinod. Seenivasan et al. indicates a retrial queuing model with unreliable server. In this paper we also using catastrophe, A unforeseen event that causes distress or mutilated is catastrophe, during the movement of the system the arrival of the catastrophe will break down the system and at the same time morsel customer to leave the

system instantly.. A catastrophic-cum-restorative queuing model with correlated input for the cell traffic generated by new broadband services was analyzed by Rakesh Kumar.. Chao.X was analyzed A queuing network model with catastrophes and product from solution. Vinodhini et .al introduced Transient solution of a multi-server queue with catastrophes and impatient customer when systems down.

In this paper, we consider an M/M/1 queuing model with Multiple working vacation and Catastrophe with Unreliable server. The customers are served on a first come first serve basis (FCFS). The model has been analyzed using Matrix Geometric approach. The rest of this paper is organized as follows. In section 2, we give the model description. In section 3, The model analyzed using a numerical example and performance measure. The last section contains a brief conclusion.

Model Description

We consider Matrix- Geometric *Approach* for M\M\1 queuing system with Multiple working vacation. The basic assumptions are described as follows.

Customer arrive according to a Poisson processes with rate λ. Service times in the normal working period follows an exponential distribution with parameter μ_2. Upon the completion of a service, if there is no customer in the system, the server starts a vacation, and Vacation duration follows an exponential distribution with parameter Υ. During a working vacation arriving customer are served at a low rate of μ_1 ($\mu_1 < \mu_2$). When a vacation ends, if there is no customer in the queue, another vacation is taken. Otherwise, the server changes service rate from μ_1 to μ_2 and a normal working period starts. The server may breakdown during a normal working period or working vacation period, and breakdowns are assumed to occur according to a Poisson process with rate α_0 or α_1. Whenever the server fails, it is immediately sent for repairs during which the server stops providing service and waits for the repair to complete. Repair time assumed to be exponential distribution with rates either β_0 for working period or β_1 for Normal working period. We assume that inter-arrival times, service times and working vacation times are mutually independent. In addition, the service rule is first come and first service (FCFS).

The catastrophe occurs according to the Poisson process with parameter ζ. The occurrence of a catastrophe destroys all the customer in the system immediately and attack the system. Let $\{K(t),N(t) : t \geq 0\}$ be a Markov process, where K(t) and N(t) be the state of the process at time t.

K(t) denotes the server states in the system and N(t) denotes the number of customer in the system.

$$K(t) = \begin{cases} 0, \text{ if server is in working vacation at time t} \\ 1, \text{ if server is in normal busy period at time t} \\ 2, \text{ if sever is in breaking down at time t} \end{cases}$$

Then K(t) and N(t) are system state. Let Markov process be $\{N(t), K(t), t \geq 0\}$ with state space sorted by lexicographical series as follows: $\Omega = \{(0,0)\} \bigcup \{(l,m); l \geq 1, m = 0,1,2\}$

The transition diagram of the model is shown in figure 1.

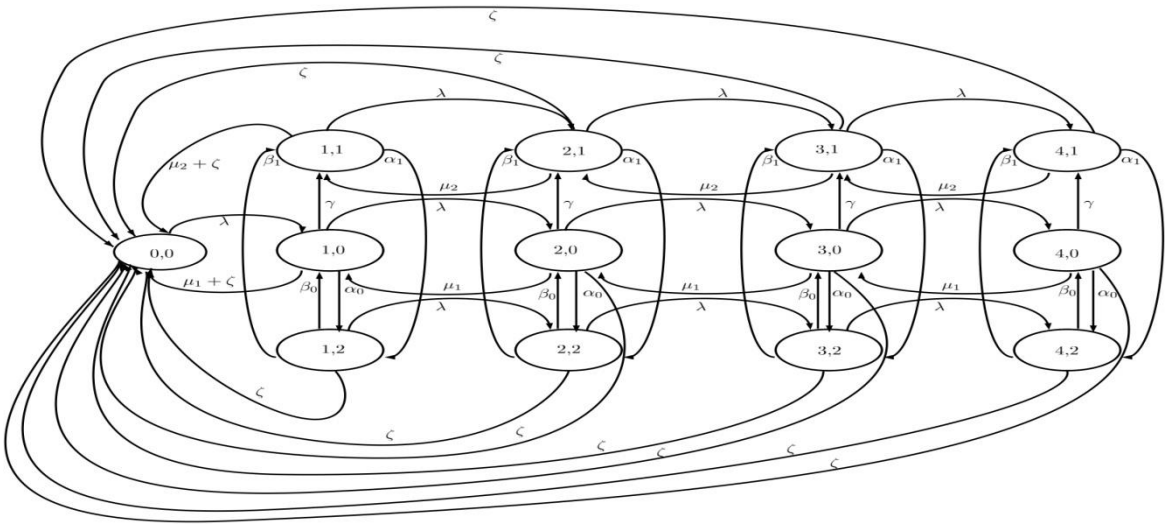


Fig. 1: Transition diagram of the model

Q Matrix (called infinitesimal generator Matrix) is defined as:

$$Q=\begin{pmatrix} A_{00} & A_{01} & \dots & \dots & \dots & \dots & \dots & \dots \\ A_{10} & B_1 & B_0 & \dots & \dots & \dots & \dots & \dots \\ A_1 & A_0 & B_1 & B_0 & \dots & \dots & \dots & \dots \\ A_1 & .0.. & A_0 & B_1 & B_0 & \dots & \dots & \dots \\ A_1 & \dots & \dots & A_0 & B_1 & B_0 & \dots & \dots \\ A_1 & \dots & \dots & \dots & A_0 & B_1 & B_0 & \dots \\ A_1 & \dots & \dots & \dots & \dots & A_0 & B_1 & B_0 \end{pmatrix}$$

; $A_{00}=(-\lambda)$; $A_{01}=(-\lambda 00)$;

$$A_{10}=\begin{pmatrix} \mu_1+\zeta \\ \mu_2+\zeta \\ \zeta \end{pmatrix};\quad B_1=\begin{pmatrix} -(\lambda+\mu_1+\gamma+\zeta+\alpha_0) & \gamma & \alpha_0 \\ 0 & -(\lambda+\mu_2+\zeta+\alpha_1) & \alpha_1 \\ \beta_0 & \beta_1 & -(\lambda+\beta_0+\beta_1+\zeta) \end{pmatrix};$$

$$B_0=\begin{pmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{pmatrix};\ B_2=\begin{pmatrix} \mu_1 & 0 & 0 \\ 0 & \mu_2 & 0 \\ 0 & 0 & 0 \end{pmatrix};\quad A_1=\begin{pmatrix} \zeta \\ \zeta \\ \zeta \end{pmatrix}$$

Let us consider, N and K are stationary random variables for number of customers in the system and states of server respectively.

Now define $\prod_{lm}=\{N=l, K=m\}=\lim_{t\to\infty} p\{N(t)=l, K(t)=m\}$, here l denote number of customers in the system and m denote server state. The stationary probability matrix Π is given by

$$\Pi=(\Pi_0,\Pi_1,\Pi_2,\Pi_3,.....)$$

Where,

$\Pi_0=\pi_{00}$ And

$\prod_i = (\pi_{i0}, \pi_{i1})$ for $i \geq 1$

Π is solved by using $\prod Q = 0$

$$\Pi_0 A_{00} + \Pi_1 A_{10} + \Pi_2 R(I-R)^{-1} A_1 = 0 \quad (1)$$

$$\Pi_0 A_{01} + \Pi_1 [B_1 + RA_0] = 0 \quad (2)$$

$$\Pi_2 B_0 + \Pi_3 B_1 + \Pi_4 A_0 = 0 \quad (3)$$

$$\Pi_{i-1} B_0 + \Pi_i B_1 + \Pi_{i+1} A_0 = 0$$

$\vdots$

$$\Pi_i = \Pi_1 R^{i-1} \text{ for } i \geq 2 \quad (4)$$

Substituting equation (4) in (2)

$$\Pi_0 B_0 + \Pi_1 (B_1 + RA_0) = 0 \quad (5)$$

Now using the conditions for Neuts M.F., Matrix-Geometric Solution in Stochastic Models We has

$$(B_0 + RB_1 + R^2 A_0) = 0 \text{ for } i \geq 2 \quad (6)$$

The normalizing equation is

$$\Pi_0 e + \Pi_1 e + \Pi_2 (1-R)^{-1} e = 1 \quad (7)$$

Here e is unit matrix.

R is minimal solution of matrix non-linear equation

$$B_0 + RB_1 + R^2 A_0 = 0 \quad (8)$$

$R \geq 0$ is an irreducible non-negative matrix of spectral radius less 1. An iterative method used to compute R as keep to $R_0 = 0$

$$R_{n+1} = -B_0 B_1^{-1} - R_n^2 A_0 B_1^{-1} \quad (9)$$

Using the above equation to solve R matrix and check all values of R will monotonically increasing and R will converge to $-B_1^{-1}$ and $-[B_0 + R_n^2 A_0]$ are positive.

Now we derive steady state condition for this model using matrix analytic procedure.

The probability vector Π is partitioned as $\Pi = (\Pi_0, \Pi_1, \Pi_2, ...)$ of the generator matrix from is $B = B_1 + A_0 + B_0$. Then B can be written as

$$K = \begin{pmatrix} -J & \gamma & \alpha_0 \\ 0 & -S & \alpha_1 \\ \beta_0 & \beta_1 & -C \end{pmatrix}$$

$J = \alpha_0 + \gamma + \zeta$

$S = \alpha_1 + \zeta$

C= $\beta_0 + \beta_1 + \zeta$

B matrix is minimal generator. Also unique equations is fulfilled by Π

ΠK=0 and Πe=1 (10)

We have

$$\prod_1 = \delta_0 \prod_0 ; \quad (11)$$

$$\delta_0 = \frac{J\beta_1 + \beta_0\gamma}{S\beta_0}\prod_0$$

Where,

$$\prod_2 = \delta_0 \prod_1$$

$$\delta_0 = \frac{J\beta_1 + \beta_0\gamma}{S\beta_0}\prod_0$$

Now applying $\Pi B_0 e < \Pi A_0 e$ for the QBD process in matrix Q. We have stability condition takes the structure

$$\lambda[\prod_0 + \prod_1 + \prod_2] < \mu_1 \prod_0 + \mu_2 \prod_1 . \quad (14)$$

2.1 Performance Evaluation

The probabilities of the server being present in different states are expressed as

The mean number of customers in the system when the server is in working vacation

$$E(WVS) = \sum_{m=0}^{\infty} m\pi_{m,0}$$

The mean number of customers in the system when the server is in Busy state

$$E(BS) = \sum_{m=0}^{\infty} m\pi_{m,1}$$

The mean number of customers in the system when the server is in Break down state

$$E(BDS) = \sum_{m=0}^{\infty} m\pi_{m,2}$$

The mean number of customers in the system is given by

E(M)=E(WVS)+E(BS)+E(BDS)

Total outcome obtained from the system as

$$\eta = \mu_2 \sum_{m=0}^{\infty} m\pi_{m,0} + \mu_1 \sum_{m=0}^{\infty} m\pi_{m,2}$$

The mean delay is given by $Dt = \frac{E(M)}{\eta}$

Numerical Illustration

Now we present numerical results to the model discussed in the over section. Our objective is to demonstrate the effect of the parameter on the system characteristics. By varying and fixed all other values we find the probability vectors, which is in table 1, table 2, table 3 and table 4 respectively. By using probability vectors performance measure is analyzed.

Example

Let us consider $\lambda = 0.1$, $\mu_1 = 0.7$, $\mu_2 = 0.9$, $\Upsilon = 0.01$, $\alpha_0 = 0.02$, $\alpha_1 = 0.03$, $\beta_0 = 0.1$, $\beta_1 = 0.01$and $\zeta = 0.04$

. We get the

values of R matrix is $R = \begin{pmatrix} 0.10380 & 0.00167 & 0.00850 \\ 0.00291 & 0.12859 & 0.01567 \\ 0.06659 & 0.00969 & 0.40649 \end{pmatrix}$

Table 1 Probability vectors of $\lambda = 0.2$

Π_i	π_{i0}	Π_{i1}	Π_{i2}	Total
Π_0	0.72991			0.72991
Π_1	0.23474	0.00307	0.00017	0.23798
Π_2	0.02439	0.00046	0.00211	0.02696
Π_3	0.00267	0.00009	0.00107	0.00383
Π_4	0.00035	0.00002	0.00046	0.00083
Π_5	0.00007	0.00001	0.00019	0.00027
Π_6	0.00002	0.00000	0.00008	0.00010
Π_7	0.00001	0.00000	0.00003	0.00004
Π_8	0.00000	0.00000	0.00000	0.00001
Π_9	0.00000	0.00000	0.00000	0.00001
Total				0.99994

Now we using matrix R in equations (1) and (2) the vectors Π_1 and Π_2 are obtained. Using the normalization condition $\Pi_0 e + \Pi_1 [I - R]^{-1} e = 1$for the numerical rates from prior, the vector Π_1 is given by $\Pi_1 = (0.23474, 0.00307, 0.00017)$. The remaining vectors Πi's are obtained from the relation $\Pi_i = \Pi_1 R^{i-2}$, $i \geq 2$ and shown in Table.2. In the table column 2, 3 and 4 denotes the three components of Π_i, $i = 0,1,2,3,\ldots$ and the whole values of three components given in the last column. Finally the whole probability is verified as $0.99997 \approx 1$.

Example
Let us consider $\lambda = 0.2$, $\mu_1 = 0.7$, $\mu_2 = 0.9$, $\Upsilon = 0.6$, $\alpha_0 = 0.02$, $\alpha_1 = 0.03$, $\beta_0 = 0.1$, $\beta_1 = 0.01$ and $\zeta = 0.04$.

We get

the values of R matrix is $R = \begin{pmatrix} 0.20570 & 0.00360 & 0.01207 \\ 0.00620 & 0.25297 & 0.02204 \\ 0.01321 & 0.02102 & 0.58025 \end{pmatrix}$

Table 2 Probability vectors of $\lambda = 0.2$

Π_i	$\pi i0$	Π_{i1}	Π_{i2}	Total
Π_0	0.76451			0.76451
Π_1	0.15693	0.00275	0.00922	0.16890
Π_2	0.03346	0.00144	0.00730	0.04220
Π_3	0.00781	0.00062	0.00467	0.01310
Π_4	0.00220	0.00027	0.00282	0.00529
Π_5	0.00081	0.00013	0.00167	0.00261
Π_6	0.00038	0.00007	0.00098	0.00143
Π_7	0.00020	0.00004	0.00058	0.00082
Π_8	0.00011	0.00002	0.00034	0.00047
Π_9	0.00007	0.00001	0.00020	0.00028
Π_{10}	0.00004	0.00000	0.00012	0.00017
Π_{11}	0.00002	0.00000	0.00007	0.00009
Π_{12}	0.00001	0.00000	0.00004	0.00005
Π_{13}	0.00001	0.00000	0.00002	0.00003
Π_{14}	0.00000	0.00000	0.00001	0.00001
Π_{15}	0.00000	0.00000	0.00001	0.00001
Total				0.99997

Now we using matrix R in equations (1) and (2) the vectors Π_1 and Π_2 are obtained. Using the normalization condition $\Pi_0 e + \Pi_1 [I - R]^{-1} e = 1$ for the numerical rates from prior, the vector Π_1 is given by $\Pi_1 = (0.15693, 0.00275, 0.00922)$. The remaining vectors Πi's are obtained from the relation $\Pi_i = \Pi_1 R^{i-2}, i \geq 2$ and shown in Table.2. In the table column 2, 3 and 4 denotes the three components of Π_i, $i = 0,1,2,3,\ldots$ and the whole values of three components given in the last column. Finally the whole probability is verified as $0.99997 \approx 1$.

Example
Let us consider $\lambda = 0.3$, $\mu_1 = 0.7$, $\mu_2 = 0.9$, $\Upsilon = 0.6$, $\alpha_0 = 0.02$, $\alpha_1 = 0.03$, $\beta_0 = 0.1$, $\beta_1 = 0.01$ and $\zeta = 0.04$.

We get the

values of R matrix is $R = \begin{pmatrix} 0.30502 & 0.00580 & 0.01394 \\ 0.00217 & 0.37145 & 0.02520 \\ 0.17544 & 0.02742 & 0.67629 \end{pmatrix}$

Table 3 Probability vectors of $\lambda = 0.3$

Π_i	$\pi i0$	Π_{i1}	Π_{i2}	Total
Π_0	0.67429			0.67429
Π_1	0.20766	0.00360	0.00011	0.21137
Π_2	0.06340	0.00254	0.00306	0.06900
Π_3	0.01990	0.00140	0.00302	0.02432
Π_4	0.00661	0.00072	0.00235	0.00968
Π_5	0.00244	0.00037	0.00170	0.00451
Π_6	0.00105	0.00020	0.000119	0.00244
Π_7	0.00053	0.00011	0.00083	0.00147
Π_8	0.00031	0.00007	0.00057	0.00095
Π_9	0.00019	0.00004	0.00039	0.00062
Π_{10}	0.00013	0.00003	0.00027	0.00043
Π_{11}	0.00009	0.00002	0.00018	0.00029
Π_{12}	0.00006	0.00001	0.00013	0.00020

Π_{13}	0.00004	0.00001	0.00009	0.00014
Π_{14}	0.00003	0.00001	0.00006	0.00010
Π_{15}	0.00002	0.00000	0.00004	0.00006
Π_{16}	0.00001	0.00000	0.00003	0.00004
Π_{17}	0.00001	0.00000	0.00002	0.00003
Π_{18}	0.00001	0.00000	0.00001	0.00002
Π_{19}	0.00000	0.00000	0.00001	0.00001
Π_{20}	0.00000	0.00000	0.00001	0.00001
Total				0.99998

Now we using matrix R in equations (1) and (2) the vectors Π_1 and Π_2 are obtained. Using the normalization condition $\Pi_0 e + \Pi_1 [I - R]^{-1} e = 1$ for the numerical rates from prior, the vector Π_1 is given by $\Pi_1 = (0.20766, 0.00360, 0.00011)$. The remaining vectors Πi's are obtained from the relation $\Pi_i = \Pi_1 R^{i-2}$, $i \geq 2$ and shown in Table.3. In the table column 2,3 and 4 denotes the three components of Π_i, $i = 0,1,2,3,\ldots$ and the whole values of three components given in the last column. Finally the whole probability is verified as $0.99998 \approx 1$.

Example

Let us consider $\lambda = 0.4$, $\mu_1 = 0.7$, $\mu_2 = 0.9$, $\Upsilon = 0.6$, $\alpha_0 = 0.02$, $\alpha_1 = 0.03$, $\beta_0 = 0.1$, $\beta_1 = 0.01$ and $\zeta = 0.04$.

We get the

Values of R matrix is $R = \begin{pmatrix} 0.17869 & 0.03256 & 0.02728 \\ 0.00657 & 0.10739 & 0.02414 \\ 0.01321 & 0.02102 & 0.21758 \end{pmatrix}$

Table 4 Probability vectors of $\lambda = 0.4$

Π_i	$\pi i0$	$\Pi i1$	$\Pi i2$	Total
Π_0	0.54372			0.54372
Π_1	0.21770 0	0.00444	0.00818	0.23032
Π_2	0.08906	0.00419	0.00942	0.10267
Π_3	0.03776	0.00306	0.00839	0.04921
Π_4	0.01697	0.00207	0.00683	0.02587
Π_5	0.00829	0.00137	0.00534	0.01500
Π_6	0.00449	0.00091	0.000410	0.00950
Π_7	0.00269	0.00061	0.00311	0.00641
Π_8	0.000175	0.00042	0.000235	0.00452
Π_9	0.00121	0.00030	0.00177	0.00328
Π_{10}	0.00087	0.00021	0.00133	0.00241
Π_{11}	0.00064	0.00015	0.00100	0.00179
Π_{12}	0.00047	0.00011	0.00075	0.00133
Π_{13}	0.00035	0.00008	0.00056	0.00099
Π_{14}	0.00026	0.00006	0.00042	0.00074
Π_{15}	0.00020	0.00005	0.00032	0.00057
Π_{16}	0.00015	0.00003	0.00024	0.00042
Π_{17}	0.00011	0.00003	0.00018	0.00032
Π_{18}	0.00008	0.00002	0.00013	0.00023
Π_{19}	0.00006	0.00001	0.00010	0.00017

Π_{20}	0.00005	0.00001	0.00008	0.00014
Π_{21}	0.00003	0.00001	0.00006	0.00010
Π_{22}	0.00003	0.00001	0.00004	0.00008
Π_{23}	0.00002	0.00000	0.00003	0.00005
Π_{24}	0.00001	0.00000	0.00002	0.00003
Π_{25}	0.00001	0.00000	0.00002	0.00003
Π_{26}	0.00001	0.00000	0.00001	0.00002
Π_{27}	0.00001	0.00000	0.00001	0.00002
Π_{28}	0.00000	0.00000	0.00001	0.00001
Π_{29}	0.00000	0.00000	0.00001	0.00001
Total				0.99998

Now we using matrix R in equations (1) and (2) the vectors Π_0 and Π_1 are obtained. Using the normalization condition $\Pi_0 e + \Pi_1 [I - R]^{-1} e = 1$ for the numerical rates from prior, the vector Π_1 is given by $\Pi_1 = (0.021770, 0.00444, 0.00818)$. The remaining vectors Π_i's are obtained from the relation $\Pi_i = \Pi_1 R^{i-2}$, $i \geq 2$ and shown in Table.4. In the table column 2, 3 and 4 denotes the three components of Π_i, $i = 0,1,2,3,\ldots$ and the whole values of three components given in last column. Finally the whole probability is verified as $0.99995 \approx 1$.

Performance evaluation

Table 6: Effect of λ on Performance evaluation

λ	0.1	0.2	0.3	0.4
E(WVS)	0.26619	0.29353	0.44747	0.73228
E(BS)	0.00439	0.01027	0.02141	0.06279
E(BDS)	0.01125	0.06445	0.07492	0.25622
E(M)	0.30917	0.35138	0.53333	1.05129
η	0.19558	0.20942	0.33250	0.569107
Dt	0.47632	1.60400	1.79660	1.84726

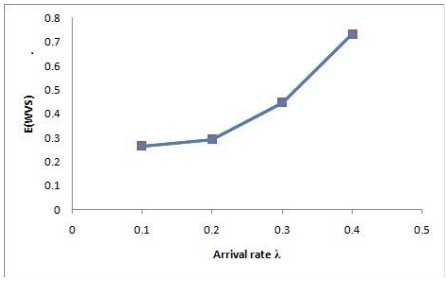
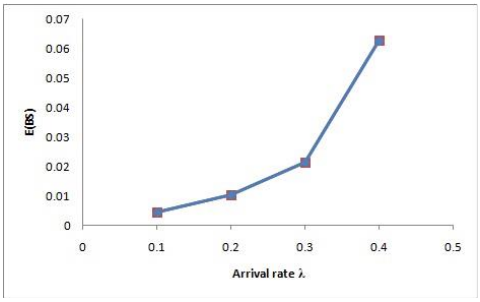


Fig.2Arrival verses mean no.,customer during working vacation



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Fig.3: Arrival verses mean no.,customer during busy period

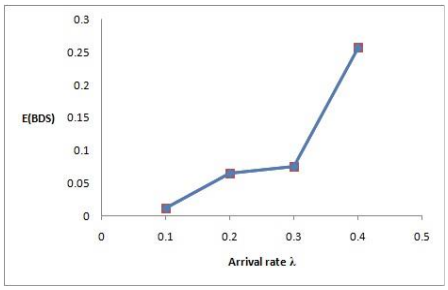


Fig.4: Arrival verses mean no.,customer during breakdown

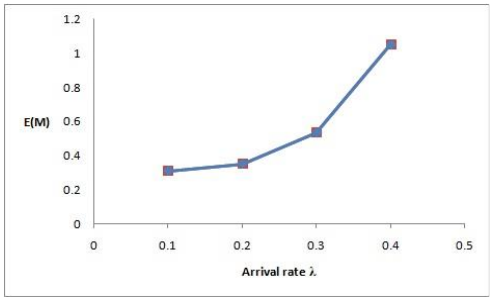


Fig.5: arrival versus whole no., customer in the organization

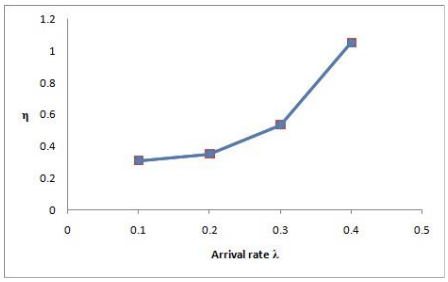


Fig.4: Arrival verses mean no.,customer during breakdown

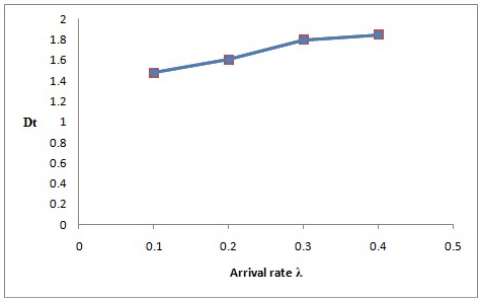


Fig.5: arrival versus whole no., customer in the organization

If arrival rate increasing with parameter λ, Mean number of customer increases when the server is on working vacation, Busy Period and Breakdown as given in figure 2, 3, and 4 respectively and also mean number of customer in the system also increases. If arrival rate increases the outcome and delay time also increases.

Summary

In this paper, we studied Markovian Queuing Model with Multiple Working Vacation and Catastrophe with Unreliable Server. We derived some probability vector using Matrix geometric Approach from that we found performance measurements on the effect of λ.

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IS CROSS-BORDER COOPERATION BETWEEN HUNGARY AND SERBIA IN THE LINE WITH SERBIAN AND EUROPEAN STRATEGIC DEVELOPMENT GOALS?

Nikolina Petrovic, PhD Candidate
Doctoral School of Economics and Regional Sciences, Hungarian University of Agriculture and Life Sciences, Godollo, Hungary

ABSTRACT

Cross-border cooperation program provides an opportunity for the neighboring countries to overcome mutual cohesion problems coming from different areas such as economy, transport and infrastructure, health care, culture, tourism, and environment. Northern part of Serbia is mainly characterized as rural area still in need of significant support regarding its regional development. One of the programs' supports Serbia had been granted since 2007 is Instruments for Pre-Accession which guarantee Serbia to cooperate with its neighbor Hungary, setting up projects mainly to fix socio economic issues (around 60 % of the projects), environment and tourism (30 % of the projects) and infrastructure (10 %). Based on the empirical and desk analysis of almost 300 cross-border projects between Hungary and Serbia, Serbian national strategic development plans, and European policy goal, some of the following conclusions had been brought: the first is, the projects' objectives address general solutions rather than being long-term and more specifically driven. Moreover, cross-border program's objectives are at high or medium extent in the line with national and European strategic development plans what is very promising, but objectives are not firmly embedded in the micro level needs. The second opinion is the cross-border projects in Serbia mainly serve as a tool for overcoming micro socio-economic issues, while significant lack of smart developments is missing which nowadays presents a mandatory aspect of every economic and societal improvements.

Keywords: cross-border cooperation, Hungary-Serbia, regional development.

INTRODUCITON

One of the first formations of the cross-border co-operation was "Euroregion" formed in '50s of the last century with the main aim to strengthen regional economy, ensure and extend social communications, support technology fluctuations, lower operational costs, attract new business activities, create better environmental conditions and ensure healthy development of the cross-border regions. This requires certain planning and tailoring program policies with deep understanding of the regional features and factors influencing development progress. This type of regions is especially sensitive as their physical borders are usually perceived as barriers between countries preventing their cooperation. Some of the issues coming out from there are: low security, insufficient economy and trade, high pollution, undefined land use and flow of border workers (EC, 2015). INTERREG is a programme that supports cross-border integrations with the main aim of providing sustainable and integrated development on local, regional and national level. Serbia certainly can take part in one of those programmes tailored for the Union joiners called IPA *(Instruments for Pre Assession)* programme that was launched in 2007 and starting the first cooperation with Hungary.

Cross-Border Cooperation (CBC) can certainly show positive results (see Table 1), some of the authors documented countries like Poland, Czech Republic, Germany, Spain or Portugal which successfully experienced good practices of CBC, mainly in the fields of growing SME sector, promoting access to the public facilities, supporting tourism and environmental protection. Main idea behind CBC is to bring two bordering regions together, unify local and regional stakeholders with the aim to resolve common issues, target main obstacles and challenges, distribute social, financial, and natural resources in the most efficient way, follow the projects' action plan and concentrate on outcomes to ensure as results improved socio-economic lifestyles and better quality of life. Toca (2013) also agrees that cross-border

cooperation is an association of the countries who agreed to cooperate in order to minimize negative influence of

Table 1: Positive results gained form CBC, the best practices from Europe

Author	The main factors driving Cross Border Cooperation
Krätke (2002)	Encouraging entrepreneurship cooperation between Poland and Germany
Kurowska and Pysz (2016)	SMEs from Poland and Czech Republic find market niches and gain revenues in a faster way rather than getting exchanged knowledge, joint promotional activities, information, companies.
Bufon and Markelj (2010)	Developing tourism and environmental protection in CB area between Austria and Hungary.
Gualda *et.al.* (2011)	CB program shall have an important function in building territorial identity and strengthening social networks.
Raposo *et.al* (2014)	Supporting innovation activities in the supply chain between Poland and Spain.
Zanger *et. al.* (2008)	Building trust between SMEs in German/Saxon and Czech bordering region. As well as involving more local stakeholders as supporter toward building up SME development strategy.
Isakova *et.al.* (2012)	In Ukraine bordering region CBC helped SMEs to strengthen their market and reach out to the better supplies.
Smallbone *et. al.* (2009)	CBC between SMEs from North Macedonia and Greece helped SME sector in North Macedonia to lower export risks, overcoming complications with the customs check, time saving.

Source: Authors' collection

the territorial isolation, set up the framework for enhancing cultural connection, rebuild social connections, and ensure economic centers that would help in bridging centrally strong and peripheral weak regions as per Sousa (2012) "co-operation is a voluntary process in which states, or sub-national territorial units act together in order of getting common benefits".

Cappello *et.al*. (2017) claim that border regions have similar features and resources as other regions. They usually interact through CBC projects as they find similar interests and face similar features created due to sharing same history and culture. Common characteristics are employment, industry, human capital, innovation. In one segment bordering regions precede it is diversity of cultural events which improves quality of life. Negative features are low accessibility, population density, internal trust which can be explained by historical and geographical trust. As CBC regions have peripheral status according to AEBR (*Association of European Border Regions*) they are structurally weak areas with undeveloped transport structure – roads and railways, employment, culture, and demographic density. Cross – border cooperation on regional and/or local level involve building up partnerships across international borders, promote peace, freedom, security, safe environment, human rights, protection of ethnic and national minorities. To achieve that regional economic policy should promote removal of borders, differences in development, and be integrated in the national policies such as agricultural, spatial planning, regional, economic. But it is noticed that regional economic policies are determined by national way of thinking moved toward national centers and political ideas. This causes losses of identity where populations diverse in terms of cultural, linguistic, demographic, and historical features which had been created over centuries despite modern new national borders (aebr.eu).

In case of CBC Hungary-Serbia (CBC HU-SRB) in period between 2007 and 2020 almost 300 projects were launched mainly targeting five dimensions, environmental with the share of 14%, infrastructure – 11%, tourism – 16%, economy – 34% and social – 25%. The main scope of the environmental dimension

is to protect biodiversity, ensure conversation of the natural sites and species, protect agriculture soil, animal husbandry and similar, social dimension has a role to strengthen and built connection between communities and stakeholders on both sides of Hungary and Serbia strengthening language, tradition, culture, including activities related to the health sector. Infrastructure is focused on improvement of basic transportation amenities and cross-border checking points, while tourism dimension is focused on protection of the cultural sites and promo activities of CB area as a tourist destination. In the Table 2 and 3 it can be seen what type of activities each dimension involves.

Table 2: HU-SRB CBC projects' activities in the period from 2007 to 2020 Environmental dimension

Environmental Dimension	
Biodiversity	With the joint activities protection of species and natural sites is performed, conservation of key animal species and fish sites,
Agriculture/Soil/breeds/ crops	Animal husbandry, improving animal health management/ supporting biopharming
Quality of water	Controlling harmful materials in the drinking water
Renewable energy	Biomass production, production of new eco-friendly materials.

Source: Author's Edition, 2021

Table 3: HU-SRB CBC projects' activities in the period from 2007 to 2020 Economy, Social, Tourism and Transport Dimension

Economy Dimension	
Entrepreneurship	Supporting businesswomen in rural areas, specific knowledge-based trainings, promoting ICT,
	Bringing innovation in the agriculture sector by providing better tools for crop management and yield increase, improving production processes and increasing quality of the final products, establishing IT points and industrial parks, InnoLabs,
Clustering	Building cross border cluster networks
Market & Marketing	Branding products
Social Dimension	
Education & lifelong learning	Organizing different types of trainings for gaining better job market skills, improving education of elder people, introduction of courses in the schools and faculties attractive for the job market.
Art workshops	Organizing joint art activities to strengthen networks between communities on both sides of the border.
Healthy lifestyle	Organizing sport activities among young generation and rising awareness about healthier lifestyle.
Rebuilding cultural facilities	Rebuilding theatres, cinemas and youth cultural centers as in towns and villages is present significant lack of such amenities.
Festival & cultural events	Organizing cultural events for promotion of folk, traditional music and crafts, and supporting equality of different cultures.
Improving health sector	Running clinical trials, supplying hospitals with modern medical equipment, introducing take care centers,
Tourism Dimension	
Protection of heritage	Rebuilding and preservation of tourism and heritage sites,
Tourism festival & events, conferences	Promoting cultural value and resources with the aim to strengthen tourism market by organizing promotional activities (conferences, publications, mobile apps, festivals, fairs)
Improving tourist products	Establishing wine routes, valorization of natural resources in the touristic offer, supporting eco-tourism, Tisza routes,

Transport (Infrastructure) Dimension	
Public Transport	Rebuilding vehicle and bike roads
Crossing the border	Rebuilding cross checking points and providing higher security level
Transport security and cross-border crossing	Increasing police security, cross border checking points, detection of the hazardous and prohibited materials.
Water transport	Rebuilding water corridors / Flood protection /
Activities related to the joint strategic planning and strengthening institutional system within the CB area	

Source: Author's Edition, 2021

METHODOLOGY

The paper is based on the empirical and desk analysis, examining research results brought from different authors and examples of cross-border cooperation in the West and Central Europe. Analysis as well included evaluation of the CBC HU-SRB program as one of the oldest CBC cooperation Serbia were involved it, therefore around 300 projects released between Hungary and Serbia in the period from 2007 to 2020 were taken into consideration including newly launched Serbian strategic development plans and European development goals. The selectin of policies was based on selection of the main strategic development plans including National (Serbian) Strategy for Regional Development, Regional (Vojvodina) Development Strategy Program and other policies that align with four main CBC HU-SRB objectives: water management and risk, infrastructure, culture and tourism heritage, competitiveness of the SME sector, and agriculture as it is defines as a cohesion issue in the Northern Serbia by CBC Program.

DISCUSSION AND RESULTS

Regional cooperation has been raising and finally gained importance after the Lisbon Treaty signed in 2009 as one of the main EU's instruments for territorial cohesion. Territorial cohesion is established to ensure development of the countries, to grow equally according to their national capacities and drive development to the desired direction.

In opinion of Vukomirović (2013) Serbia is one of the EU and the Balkan non-EU countries with the highest rate of regional disbalance. Molnar and Manić (2018) claim that regions in Serbia are constituted with enough potentials and resources to carry out big regional development projects, as they possess good industrial basis, natural resources, human capital, and favorable geographical features. Serbia started working on resolving regional disparities only a decade ago. The Regional Development Strategy 2007 - 2012 was the first introduced strategic development document defining basic regional development priorities and tools for their realizations. The main tree goals were increasing regional competitiveness, lowering regional disparities and deprivation, and rebuilding institutional regional infrastructure. Soon, in 2009 The Law on Regional Development was introduced. For Northern Serbia, Strategy for Regional Development for the period 2014 – 2020 was introduced as a development plan with the following goals: human capital development, development of infrastructure and living standard, sustainable economic growth, developing institutional infrastructure (AP Vojvodine, 2014).

Many authors in the recent years have been investigating regional politics in Serbia, coming up with the main conclusions that regional politics failed, with the freshly introduced national instruments and the gap between regions has not stopped (Devetaković, 2002; Ilić 2015). Serbia was not prepared for the challenges which came together with industrialization, de-organization, and urbanization. At the same time regional policy was ignoring social, geographical, spatial planning aspects (Devetaković, 2002). Additional process of transition Serbia went through harmed regions which were already struggling even more. Authors see accession toward the EU as a positive decision as Serbia would open market especially for the agricultural products and could gain free movement of the labor force. Likewise access

to the IPA would help Serbia in stabilizing contemporary market, increase living standard in the cross - border region and complete initialized institutional and political reforms.

The instruments for cross-border cooperation lay within the national legal frameworks which usually implies with the complex measures and forms, insufficient competences of the infra-national public authorities. There has not been yet any officially established and emerged conceptual process of establishing and managing cross-border cooperation. It depends on many factors such as stakeholder's capacities and readiness level to respond on the challenges that cross-border regions carry with them, as in every region-specific system of stakeholders is present. Authors Boman and Berg (2007) justify that as CB program is relaying on the multiple EU policies stable involvement of parties from the local, regional, and supranational level are desired, as number of parties are coming from different levels the institutional framework and CBC governance should be stronger as managing CBC would be more impactful.

Further the paper presents at what extent the CBC HU-SRB program goals are in the line with National, Regional Strategic Development and EU (CAP, Europe 2020, Europe Green Deal) goals (see Table 3).

Table 4: Assessment level between IPA HU-SRB Program objectives, Serbian Development Strategic goals, and EU Policy goals, 2021.

Objectives	H	M	L
National Strategy for Sustainable Development – strategy covers following objectives protection of natural resources, risk management, impact of industrial sectors on the environment and friendly production processes.	x		
National Strategy for Agriculture Development – strategy is covering agricultural market topic, subsidies, technological development in the agriculture and swift from traditional toward modern production	x		
National Strategy for Tourism Development 2016 – 2025 covers following goals, tourism shall insure economic, ecological, and social development, competitiveness, increase share in the national GDP, and build up tourism image		x	
National Strategy for Research and Technological Development 2021 – 2025, main goals are: high-tech solutions in domain of food production, creative solutions, strengthened technological human capital, creative industry, telecommunication technology.			x
National Strategy for development of SMEs, entrepreneurship, and competitiveness– providing better trainings to the entrepreneurs, sustainable financial environment, simpler administration, and regulations to apply to entrepreneurs, access to the market and rising competitiveness, innovations, support technological growth	x		
Industrial Policy Strategy of the Republic of Serbia from 2021 - 2030: going digital, circular, and low carbon economy, investments, innovation, internationalization, strengthening human capital.			x
Water management strategy in the territory of the Republic of Serbia until 2034, covers water resources, integrated water and land management, water infrastructure management		x	
Cultural Development Strategy of the Republic of Serbia 2020 - 2029	x		
Spatial Development Plan of the Republic of Serbia from 2021 to 2035: energetic infrastructure, renewable source of energy, waste infrastructure, road, and water infrastructure		x	
Development Plan for AP Vojvodina, the plan contains 17 objectives focused on improving socio-economic life, innovations, entrepreneurship, climate and environmental changes, sustainable cities, building peace, partnerships.	x		
Europe 2020: employment, R&D, climate change & sustainability, education, fight against poverty and social exclusion.	x		

Common Agriculture Policy: support competitiveness of agriculture products and forestry, sustainable management of natural resources, balanced territorial development of natural resources and climate, increasing employment and strengthening communities in rural areas.		x	
European Greed Deal: clean and green economy, food systems "farm to fork", sustainable and smart mobility, zero pollutant, increased climate ambition.		x	

Source: Authors' Edition, 2021

High assessment (H) resulted as reaching a match of over 50 %, Medium compliance (M) with the match up 50 % and Low (L) – meaning program activities did not address common objectives (0% match). From the evaluation can be seen that in the major cases the CBC program covers the National, Regional and EU development program goals targeting mainly sustainable development, supporting economy focusing on improving the products especially in the field of agriculture, labor market, small and medium enterprises, cultural diversities, and preservation of traditional and cultural values.

When it comes to the regional strategic development plan CBC HU-SRB goals are matched at the high extent. The document contains 17 goals and CBC program covers almost all of them including building the peace and partnership. Goals coming from the domain of water management, tourism, and spatial development took medium place, however program is barely managing to point out activities toward energy management including low carbon economy, renewable sources of energy, circular economy, green manufacturing.

However, one of the most deserved topics nowadays still missing from the CBC Program is implementation of digital tools, artificial intelligence, machine learning, robotics and automatization, smart developments. Currently CBC HU-SRB program is made of four Axis covering environmental protection, infrastructure development, socio-cultural cohesion, and SME sector but to enhance local and regional stakeholders to improve regional features additional axis embracing high technology should be incorporated. Technology in CBC program could support social sector by enriching digitalized cultural contents, that would support with attractiveness increment of the region and rebuild its identity. Although concept of the smart cities or smart villages from Europe 2020 goals highly relays on the technological developments, it is a concept that shall be implemented in the northern Serbia as there are enough resources, hence shall deserve more attractions in the coming future. Introducing IoT (Internet of Things) devices could help agricultural producers to gain higher income, yield and lower risks, or another practice can be found in the water management to control level of toxins.

Beside expanding CBC HU-SRB Program goals, an important point is cross-sectoral cooperation which unfortunately it is present on the low level. In one hand, with the cross border and cross sectoral approach problems could be accessed in a more concrete and deeper level. As program goals are neither strictly specified nor they are in the extremely high connection with national or EU strategic development goal, adding additional goals addressing cross sectoral cooperation is recommended. On the other hand, defining goals withing CBC program are coming more form the national and/or regional level rather than from the local level as needs of the CB communities were not identified deeply. Serbia is working hard on becoming the EU member therefore synchronization of the policies is priority, thus CBC program is addressing goals which are common for majority of CBC program in Europe, but they are not specified for the CB area of northern Serbia.

CONCLUSION

Serbia took part in the Cross-border cooperation for the first time with Hungary, launching projects since 2007. The main scope of the CBC program is protection of the environment, boosting economy and tourism, improving social features and maintain well infrastructure. CBC objectives are in the line with the National, Regional and EU goals but some of the development aspects are missing like supporting innovations and high-tech, smart villages as well as green economy. The other disadvantage

is CBC program has pretty much defined general objectives, therefore to answer CB community needs they shall be defined in a deeper level addressing clear and unambiguous goals as from the cooperation with Hungary Serbia shall tailor project activities in a way to support educational system, healthcare in rural areas, modernize agriculture and food production, support tourism (eco, wine, rural), environmental protection and facilitate infrastructure as Serbia has an important geographical position, between East and West. Stakeholders from different sectors shall be involved as common development problems could be addressed in a deeper level in a way to help local leaders to identify needs of the CB communities, improve quality of life and built certain level of regional competitiveness.

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MARKOVIAN QUEUEING MODEL WITH SINGLE WORKING VACATION AND FEEDBACK

M. Seenivasan
Mathematics Wing - DDE
Annamalai University, Annamalainagar
Tamilnadu, India.
ORCID Code: 0000-0003-1475-923X

R. Abinaya
Department of Mathematics
Annamalai University, Annamalainagar Tamilnadu, India.

ABSTRACT

In the present study, we examined a Markovian queuing model with feedback and Single working vacation with different service rates. Arrival follows Poisson process with parameter λ. Service time during service period, Service time during vacation period and vacation time are all exponentially distribution with rate μ_b, μ_v and η respectively. During a working vacation, queue length increases the server change the service rate from working vacation to normal working period. After getting a service, incomplete or unsatisfied customer decide to leave the system with parameter β or to continue the system with its compliment β = (1 - β). Customer continuing the system with feedback have join the queue tail and get the service as primary customer. This type of model has been examined using Matrix Geometric Approach to obtain steady-state probability vectors. Some performance measures are also determined.

Keywords: Working Vacation, Single Working Vacation, Arrival rate, Feedback.

1. INTRODUCTION

Queueing systems with SWV and consummate service have acquired importance over the most recent twenty years because of large extent uses mainly manufacturing system, service system, telecommunications, and computer system. In numerous genuine queueing circumstances, after assistance fulfilment, if no customer in the queue, a server goes on a vacation epoch. This type is known as vacation queue. Using survey paper by Doshi (1986) many researchers introduced queueing model with vacations.

Servi and Finn (2002) developed an M/M/1 queueing model upon WV. Wu and Takagi (2003) analysed an M/G/1 queueing model upon MWV. Analysis of GI/M/1 queueing model upon MWV studied by Baba (2005). Server will only take one WV if the queue become null. So, if the queue has no customers when the server come back from SWV, he will idle on the system and wait for the customers to arrive instead of picking up another WV. A multi-server system with an SWV were proposed by Lin and Ke (2009). The use of inactive epoch a M/G/1 model

were studied by Levy and Yechiali (1975). Gelenbe et al (1991) analysed the queues with negative arrivals.

An MGM is the best key for finding the difficult queueing obstacle in queueing theory. Neuts (1978) thought Markov chains with applications queueing hypothesis, which have a grid mathematical invariant likelihood vector. Neuts (1981) determined Matrix Geometric arrangement in stochastic models. Seenivasan et al (2021) studied performance examination of two heterogeneous servers queuing model with an irregularly reachable server utilizing MGM. Seenivasan et al (2021) investigated a retrial queueing model with two heterogeneous servers using the MGM.

In this model we consider a feedback customer where after getting a service the customer may decide get a new service or to leave the system. Amina Angelika Bouchentouf et al studied the M^x/M/1 Bernoulli feedback queue with variant multiple working vacations and impatient customers: performance and economic analysis. The M/M/c retrial queue with Geometric loss and Feedback was investigated by B. D. Choi et al. Rakesh Kumar et al analyzed an M/M/1/N Feedback queueing system with reverse balking.

Our study, deals with an SWV, and feedback in M/M/1 queueing model. In Accordance with FCFS principle customers are served. This model has been analysed using MGM. The excess of this study designated as follows. We providing construction of model in 2nd section. Mathematical illustrations solved in 3rd section. Performance Measure derived in 4th section. And brief conclusion in final section.

2. MODEL DESCRIPTION

Let as assume a single working vacation in a Markovian Queueing model with feedback. The customers show up in line as per Poisson process with parameter λ. They create a queue dependent on her/his request for appearance. At a normal working period, influx customers served at a service rate $\boldsymbol{\mu_b}$, following an exponential distribution. The server starts a WV of arbitrary length at immediate if there is no customer in the system. At the time of WV period, influx customers get service with rate $\boldsymbol{\mu_v}$, following an exponential distribution. If the queue forms, then the server chop and shift its rate from μ_v to μ_b, and it follows anexponential distribution with parameter η, the normal working interval starts. If the queue not formed after the completion of vacation the server waits idle. If not, server starts a normal busy period when a customer arrival occurs. After getting a service, customer decide to leave the system with probability β or continue the system for another service with probability $\bar{\beta}$ where $\beta + \bar{\beta} = 1$. Customer continuing the system with feedback have join the queue tail and get the service as primary customer. The rate transition diagram is given below.

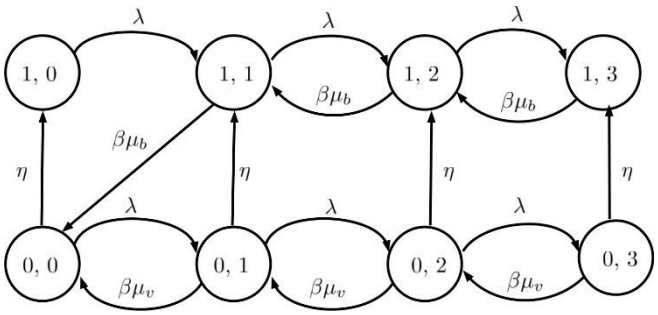


Figure 1: Transition Rate Diagram

Let $\{(k(t), n(t)): t \geq 0\}$ be a MP, where $k(t)$ & $n(t)$ represent state of process at time t respectively.

$k(t) = 0$, when server is on WV

$k(t) = 1$, when server is on normal working epoch &

n(t) denotes total customer presented in the queue.

The QBD process along with state space Ω as follow

$\Omega = (0,0)U(1,0)U(i,j); i = 0,1,2 \,\&\, j = 1,2,\ldots,n \geq 1$

Infinitesimal generator matrix Q is presented below:

$$Q = \begin{pmatrix} A & C & 0 & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ B & D & C & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & E & D & C & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & E & D & \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & \cdots & \cdots & E & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \end{pmatrix}$$

Where,

$A = \begin{pmatrix} -(\lambda+\eta) & \eta \\ 0 & -\lambda \end{pmatrix}; C = \begin{pmatrix} \lambda & 0 \\ 0 & \lambda \end{pmatrix};$

$B = \begin{pmatrix} \beta\mu_v & 0 \\ \beta\mu_b & 0 \end{pmatrix};$

$D = \begin{pmatrix} -(\lambda+\beta\mu_v+\eta) & \eta \\ 0 & -(\lambda+\beta\mu_b) \end{pmatrix};$

$E = \begin{pmatrix} \beta\mu_v & 0 \\ 0 & \beta\mu_b \end{pmatrix}$

We define,

$p_{ij} = \{k = i, n = j\}$; $\lim_{t\to\infty} k(t) = i, \lim_{t\to\infty} n(t) = j$, where j represent total customers presented in the queue & i represent the server state. Probability vector are defined as$P = (P_0, P_1, P_2, \dots)$ and $P_j = (p_{0j}, p_{1j}, p_{2j}), j = 0,1,2,3,4, \dots$ The static probability row matrix is represented by using $PQ = O$.

$$P_0A + P_1B = 0 \quad (1)$$
$$P_0C + P_1D + P_2E = 0 \quad (2)$$
$$P_1C + P_2D + P_3E = 0 \quad (3)$$

.
.
.

$$P_iC + P_{i+1}D + P_{i+2}E = 0 \quad (4)$$

And

$$P_i = P_0R^i \text{ for } i \geq 1 \quad (5)$$

Let us denote rate matrix be R. Using matrix equation [12] it is irreducible non-negative solution.

$$P_0[A + RB] = 0 \quad (6)$$
$$P_0[R^2E + \mathrm{RD} + C] = 0 \quad (7)$$

The balancing mathematical statement is

$$P_0(1-R)^{-1}e = 1 \quad (8)$$

Here 'e' is unit matrix.

From equation (7), the structure of matrices *C*, *D*, *E* is an upper triangular, R is an upper triangular matrix. We get

$$R = \begin{pmatrix} r_{00} & r_{01} \\ 0 & r_{11} \end{pmatrix} \quad (9)$$

The static condition of such a QBD (Quasi-Birth Death), (See Neuts (1981)) can be obtained by the drift condition *PCe*<*PE*

Where the row vector $P = (P_0, P_1, P_2)$ is obtained from the Infinitesimal generator $R = C + D + E$. S is given by

$$R = \begin{pmatrix} -(\alpha_0+\eta) & \eta \\ 0 & -\alpha_1 \end{pmatrix} \quad (10)$$

R is clear and row vector *P* can be shown to be solitary such that *PR*=0 and *Pe* = 1

(11)

From Equation (11),

we have $P_1 = \left(\frac{\eta}{\alpha_1}\right) P_0$

and

$P_0 = \left[1 + \left(\frac{\eta}{\alpha_1}\right)\right]^{-1}$

The static condition takes format

$\lambda[P_0 + P_1] < \beta\mu_b P_1 + \beta\mu_v P_0$

Equation (6) gives the static probability of S.

Once the rate matrix R obtained, the probability vectors P_j's $(j \geq 1)$ are obtained from Eq. (2) and Eq. (6).

3. MATHEMATICAL STUDY

Here, we make mathematical calculation for model given by the segment above. Our goals are to show effect of a parameter on system features. By modifying λ, five illustrations are presented in these sections.

The parameter λ value varies and all other argument values are stabled.

A. Illustration

We take $\lambda = 0.9$, $\mu_b = 3.0$, $\mu_v = 2.5$, $\beta = 0.5$, $\eta = 0.05$ and $R = \begin{pmatrix} 0.4897 & 0.0320 \\ 0 & 0.6000 \end{pmatrix}$

Table I. Probabitity Vectors

P_i	p_{0j}	p_{1j}	Total
P_0	0.3423	0.1102	0.4525
P_1	0.1676	0.0771	0.2447
P_2	0.0821	0.0516	0.1337
P_3	0.0402	0.0336	0.0738
P_4	0.0197	0.0214	0.0411
P_5	0.0096	0.0135	0.0231
P_6	0.0047	0.0084	0.0131
P_7	0.0023	0.0052	0.0075
P_8	0.0011	0.0032	0.0043
P_9	0.0006	0.0020	0.0026
P_{10}	0.0003	0.0012	0.0015
P_{11}	0.0001	0.0007	0.0008
P_{12}	0.0001	0.0004	0.0005
P_{13}	0.0000	0.0003	0.0003
P_{14}	0.0000	0.0002	0.0002
P_{15}	0.0000	0.0001	0.0001
Total			0.9995

By swapping rate matrix R in equation (2) vector P_0 are obtained and normalization equation $\mathbf{P_0[I - R]^{-1}e = 1}$ for the mathematical argument selected previously, row vector P_0 is granted by P_0 $(0.3423, 0.1102)$. More, the balance vector P_j's gained from $P_j = P_0R^j$, $j = 1, 2, 3, \ldots$ and are shown in Table 1. Column 2 and 3 contains the two elements of P_j, $j = 0, 1, 2, \ldots$. Final column constitutes the total of two elements. Total probability was confirmed to be $0.9995 \approx \mathbf{1}$.

B. Illustration

We take $\lambda = 1.0$, $\mu_b = 3.0$, $\mu_v = 2.5$, $\beta = 0.5$, $\eta = 0.05$ and $R = \begin{pmatrix} 0.5297 & 0.0376 \\ 0 & 0.6667 \end{pmatrix}$

Table II. Probabitity Vectors

P_i	p_{0j}	p_{1j}	Total
P_0	0.2975	0.0986	0.3961
P_1	0.1576	0.0769	0.2345
P_2	0.0835	0.0572	0.1407
P_3	0.0442	0.0413	0.0855
P_4	0.0234	0.0292	0.0526
P_5	0.0124	0.0203	0.0327
P_6	0.0066	0.0140	0.0206
P_7	0.0035	0.0096	0.0131
P_8	0.0018	0.0065	0.0083
P_9	0.0010	0.0044	0.0054
P_{10}	0.0005	0.0030	0.0035
P_{11}	0.0003	0.0020	0.0023
P_{12}	0.0001	0.0014	0.0015
P_{13}	0.0001	0.0009	0.0010
P_{14}	0.0000	0.0006	0.0006
P_{15}	0.0000	0.0004	0.0004
P_{16}	0.0000	0.0003	0.0003
P_{17}	0.0000	0.0002	0.0002
P_{18}	0.0000	0.0001	0.0001
Total			0.9994

By swapping rate matrix R in equation (2) vector P_0 are obtained and normalization equation $\mathbf{P_0[I-R]^{-1}e=1}$ for the mathematical argument selected previously, row vector P_0 is granted by P_0 $(0.2975,\ 0.0986)$. More, the balance vector P_j's gained from $P_j = P_0R^j$, $j = 1, 2, 3, \ldots$ and are shown in Table 2. Column 2 and 3 contains the two elements of P_j, $j = 0, 1, 2, \ldots$. Final column constitutes the total of two elements. Total probability was confirmed to be $0.9994 \approx \mathbf{1}$.

C. Illustration

We take $\lambda = 1.1$, $\mu_b = 3.0$, $\mu_v = 2.5$, $\beta = 0.5$, $\eta = 0.05$ and $R = \begin{pmatrix} 0.5664 & 0.0435 \\ 0 & 0.7333 \end{pmatrix}$

Table III: Probabitity Vectors

P_i	p_{0j}	p_{1j}	Total
P_0	0.2521	0.0863	0.
P_1	0.1428	0.0743	0.2171
P_2	0.0809	0.0572	0.1381
P_3	0.0458	0.0607	0.1065
P_4	0.0259	0.0480	0.0739
P_5	0.0147	0.0372	0.0519
P_6	0.0083	0.0284	0.0367
P_7	0.0047	0.0215	0.0262
P_8	0.0027	0.0161	0.0188
P_9	0.0015	0.0120	0.0135
P_{10}	0.0009	0.0089	0.0098
P_{11}	0.0005	0.0066	0.0071
P_{12}	0.0003	0.0049	0.0052
P_{13}	0.0002	0.0036	0.0038

P_{14}	0.0001	0.0027	0.0028
P_{15}	0.0000	0.0020	0.0020
P_{16}	0.0000	0.0014	0.0014
P_{17}	0.0000	0.0011	0.0011
P_{18}	0.0000	0.0008	0.0008
P_{19}	0.0000	0.0006	0.0006
P_{20}	0.0000	0.0004	0.0004
P_{21}	0.0000	0.0003	0.0003
P_{22}	0.0000	0.0002	0.0002
P_{23}	0.0000	0.0002	0.0002
P_{24}	0.0000	0.0001	0.0001
Total			0.9997

By swapping rate matrix R in equation (1) vector P_0 are obtained and normalization equation $\mathbf{P_0[I-R]^{-1}e=1}$ for the mathematical argument selected previously, row vector P_0 is granted by $P_0 = (0.2521, 0.0863)$. More, the balance vector P_j's gained from $P_j = P_0R^j$, $j = 1, 2, 3, \ldots$ and are shown in Table 3. Column 2 and 3 contains the three elements of P_j, $j = 0, 1, 2, \ldots$. Final columnconstitutes the total of three elements. Total probability was confirmed to be $0.9997 \approx \mathbf{1}$.

D. Illustration

We take $\lambda = 1.2$, $\mu_b = 3.0$, $\mu_v = 2.5$, $\beta = 0.5$, $\eta = 0.05$ and $R = \begin{pmatrix} 0.6000 & 0.0500 \\ 0 & 0.8000 \end{pmatrix}$

Table IV. Probabitity vectors

$\boldsymbol{P_i}$	$\boldsymbol{p_{0j}}$	$\boldsymbol{p_{1j}}$	**Total**
P_0	0.2042	0.0723	0.2765
P_1	0.1225	0.0681	0.1906
P_2	0.0735	0.0606	0.1341
P_3	0.0441	0.0521	0.0962
P_4	0.0265	0.0439	0.0704
P_5	0.0159	0.0364	0.0523
P_6	0.0095	0.0300	0.0395
P_7	0.0057	0.0244	0.0301
P_8	0.0034	0.0198	0.0232
P_9	0.0021	0.0160	0.0181
P_{10}	0.0012	0.0129	0.0141
P_{11}	0.0007	0.0104	0.0111
P_{12}	0.0004	0.0084	0.0088
P_{13}	0.0003	0.0067	0.0070
P_{14}	0.0001	0.0054	0.0055
P_{15}	0.0001	0.0043	0.044
P_{16}	0.0001	0.0035	0.0036
P_{17}	0.0000	0.0028	0.0028
P_{18}	0.0000	0.0022	0.0022
P_{19}	0.0000	0.0018	0.0018

P_{20}	0.0000	0.0014	0.0014
P_{21}	0.0000	0.0011	0.0011
P_{22}	0.0000	0.0009	0.0009
P_{23}	0.0000	0.0007	0.0007
P_{24}	0.0000	0.0006	0.0006
P_{25}	0.0000	0.0005	0.0005
P_{26}	0.0000	0.0004	0.0004
P_{27}	0.0000	0.0003	0.0003
P_{28}	0.0000	0.0002	0.0002
P_{29}	0.0000	0.0002	0.0002
P_{30}	0.0000	0.0002	0.0002
P_{31}	0.0000	0.0001	0.0001
Total			0.9989

By swapping rate matrix R in equation (1) vector P_0 are obtained and normalization equation $\mathbf{P_0[I-R]^{-1}e=1}$ for the mathematical argument selected previously, row vector P_0 is granted by $P_0 = (0.2042, 0.0723)$. More, the balance vector P_j's gained from $P_j = P_0R^j$, $j = 1, 2, 3, \ldots$ and are shown in Table 4. Column 2 and 3 contains the three elements of P_j, $j = 0, 1, 2, \ldots$. Final column constitutes the total of three elements. Total probability was confirmed to be $0.9989 \approx \mathbf{1}$.

4. PREFORMANCE MEASURES

Performance measures have been found using steady-state probabilities as given below

If server is idle

$$E(I) = P_0 \qquad (12)$$

If server is WV, then number customers in the system

$$E(V) = \sum_{j=0}^{\infty} jp_{0j} \qquad (13)$$

If the server is normal busy period, then mean number customers in the system

$$E(B) = \sum_{j=1}^{\infty} jp_{1j} \qquad (14)$$

Mean number of customers in the system

$$E(N) = E(I) + E(B) + E(V) \qquad (15)$$

Total Output gained is

$$\delta = \mu_v \sum_{j=0}^{\infty} jp_{0j} + \mu_b \sum_{j=1}^{\infty} jp_{1j} \qquad (16)$$

PERFORMANCE MEASURES

λ	With the effect of λ			
	0.9	***1.0***	***1.1***	***1.2***
E(I)	0.4525	0.3961	0.3384	0.2765
E(V)	0.6430	0.7111	0.7590	0.7632
E(B)	0.5973	0.8812	1.3620	2.2581
E(N)	1.6928	1.9884	2.4594	3.2978
δ	3.3994	4.4214	5.9835	8.6823

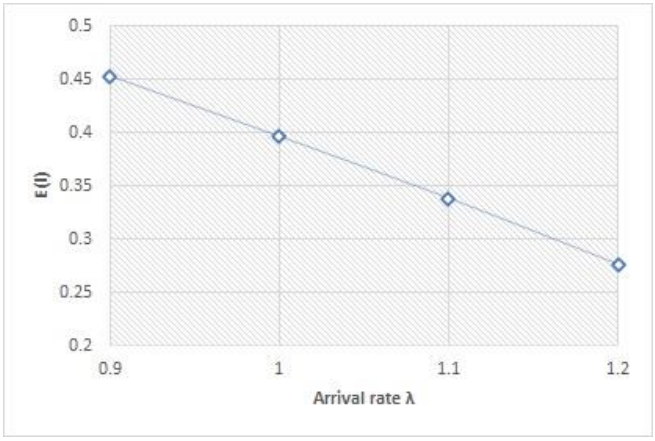


Figure 2: Arrival versus mean no., of customer when server is idle

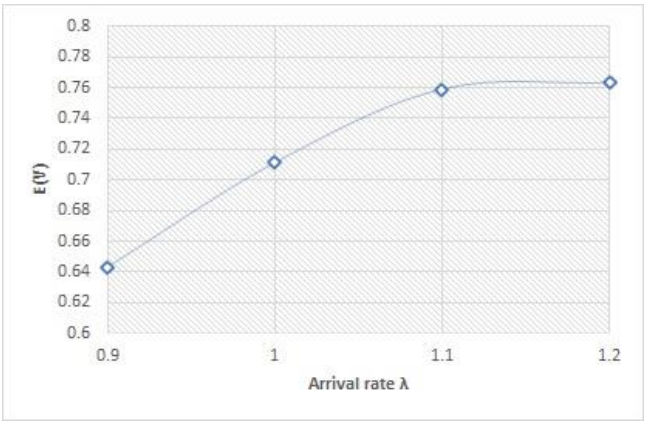


Figure 3: Arrival versus mean no., of customer when server is WV.

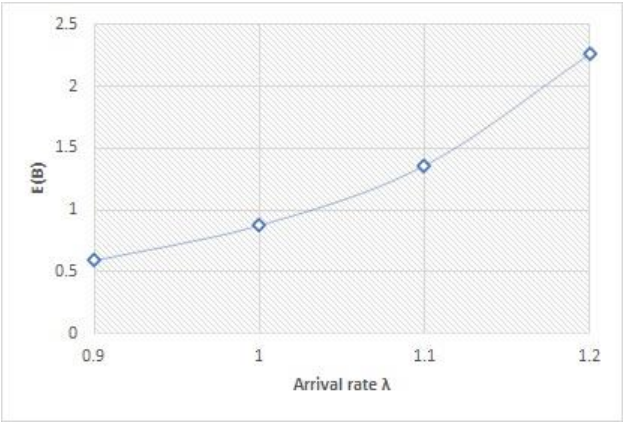


Figure 4: Arrival versus mean no., of customer when server is busy period.

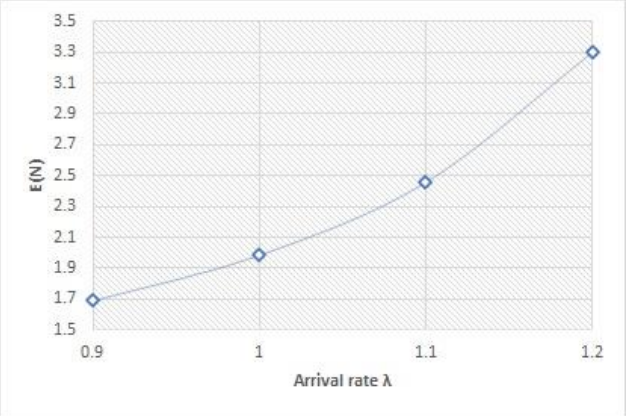


Figure 5: Arrival versus mean no., of customer in the system.

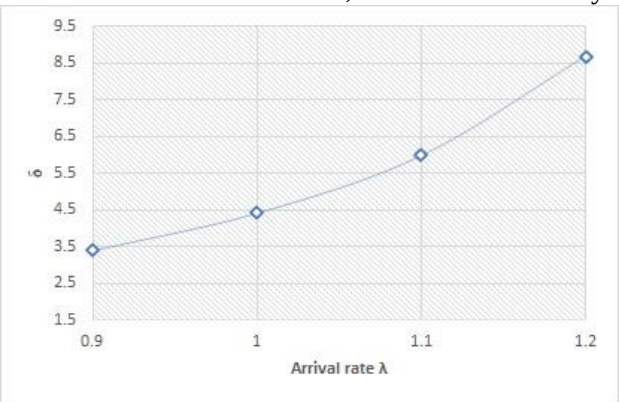


Figure 6: Arrival versus Total output gain.

Out of the above figures, we derived few performance measurements with the effect of λ such as mean no., of customer if server is idle, mean no., of customer if server is on working vacation, mean no., of customer if server is on busy period, mean no., of customers throughout system, output gained from the system respectively. From figure 2 shows that arrival rate increases, mean number of customer if server is idle decreases, figure 3, figure 4, figure 5 and figure 6 shows arrival rate increases, mean no., of customer if server is WV, busy period, mean no., of customers throughout system & total output gained increases.

5. CONCLUSION

In this article, we have studied a different manner of service rates and feedback. We have obtained the static probability row vector by MGM and also, we derived so performance measures with the effect of λ such as mean number of customer if server waits idle, mean number of customer if server is on working vacation, mean no., of customer if server is on busy period, mean number of customers throughout system, output gained from the system respectively.

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3 CS FOR EFFECTIVE ENVIRONMENTAL MANAGEMENT

Dr. G.Latha
Associate Professor
Department of Business Administration
Annamalai University

ABSTRACT

Environment has been defined as the surroundings in which a person, plant or animal lives or operates. All living things depend on the environment for their food, survival and growth. In this course of existence, living things, especially humans, either knowingly or unknowingly cause a lot of damage to the environment. On the other hand, they are also gaining some awareness that the damage caused to the environment returns back to them in a highly multiplied level and ultimately affects their livelihood. Hence an attempt is made in this paper to analyse the 3 Cs, that is, Causes, Consequences and Control measures for effective environmental management. The strategies to be adapted to maintain a safe and healthy environment are also analysed. As it is the right of the young generation to have a healthy environment, selected school children were asked to answer a questionnaire with few open-ended questions prepared to analyse their understanding and awareness about the 3 Cs of environmental management. They were involved in a group discussion to suggest some strategies to overcome environmental problems and maintain safe environment. Results of the study show that air, water, land and noise pollutions, waste management, plastic usage, deforestation, water management systems are some of the environmental issues. Creating awareness about the consequences of environmental issues can bring remarkable changes in solving environmental issues and help for better environmental management system.

Keywords: Environmental problems, causes consequences and control measures, environmental management, safe and healthy environment.

Introduction

Environment has been defined as the surroundings in which a person, plant or animal lives or operates. All living things depend on the environment for their food, survival and growth. Environment is important to us, as it includes everything around us. Living things live in their environment and they constantly interact with the environment and adapt themselves to the changes in the environment. Human-environment interaction refers to the ways we affect the environment and ultimately how we get affected by the environment as a consequence. In this course of existence, living things, especially humans, either knowingly or unknowingly cause a lot of damage to the environment. On the other hand, they are also gaining some awareness that the damage caused to the environment returns back to them in a highly multiplied level and ultimately affects their livelihood. Hence an attempt is made in this paper to analyse the 3 Cs, that is, Causes, Consequences and Control measures for effective environmental management. The strategies to be adapted to maintain a safe and healthy environment are also analysed

Importance of Environmental Issues

Environmental issues have gained importance because of their impact on human living. The damage caused to the environment returns back to them in a highly multiplied level and ultimately affects their livelihood. The major environmental issues include

- Pollution (air, water, land, noise)
- Deforestation

- Solid waste and e-waste Pollution
- Plastic pollution
- Water scarcity
- Rain water wastage
- Climate changes.
- Improper waste management system

Methodology

The objectives of this paper are

- To find out the awareness about the causes and consequences of environmental issues.
- To suggest control measures to overcome these issues and conserve its resources for better environmental management.

As it is the right of the young generation to have a healthy environment, select school students were chosen for the study. The data were collected during Covid-19 lockdown period. The schools were closed and select students residing in Chidambaram, which is a town in Tamilnadu State, India have been selected. The sample size is 35 students studying in Middle and High schools. The respondents were asked to answer a questionnaire with few open-ended questions prepared to analyse their understanding and awareness about the 3 Cs of environmental management. They were involved in a group discussion to suggest some strategies to overcome environmental problems and maintain safe environment. Fishbone diagram (Cause and Effect Diagram) is used to depict the Causes and Consequences of Environmental Issues

Findings

Results of the study show that the respondents identified all types of pollution like air, water, land and noise pollutions, improper garbage disposal, use of plastics, deforestation, lack of rain water harvesting and water management systems and water wastage as some of the environmental issues. Water is polluted due to discharge of untreated sewage and industrial waste, domestic waste water into water bodies. Land is polluted due to pesticides, fertilizers used in agriculture, chemicals used in factories, large usage of non-degradable plastics. Air gets polluted due to vehicle emission, traffic congestion, firewood and biomass burning, industrial smoke. It further leads to change in climatic conditions resulting in extreme weathers affecting agriculture and normal life. It leads to drought and ends in lack of potable water. Use of plastics and improper disposal of garbage leads to soil degradation. Industrialization and modernization lead to air, water, land and noise pollution affecting public health. Deforestation leads to soil erosion, reduced rainfall and imbalanced ecosystem.

Noise pollution is a result of transportation, industrialisation, construction and crackers leading to hearing problems and health issues. Solid waste pollution is created due to disposal of trash and garbage on streets, street corners, open areas and sidewalks. Plastic objects accumulating in the earth's environment affecting the habitat of humans and wildlife is referred to as plastic pollution. Water scarcity results due to wastage of water, scarce rainfall and deforestation. Wastage of rain water is another reason for water scarcity which leads to depletion of underground water. Climate changes are considered to be the most serious environmental issues because of the changes in extreme weather conditions.

The cause and effect of environmental issues is depicted using Fishbone diagram in Figure 1. The 3 Cs, that is, Causes, Consequences and Control measures for effective environmental management is represented in Figure 2.

Figure 1 Fishbone Diagram (Cause and Effect Diagram) showing the Causes and Consequences of Environmental Issues

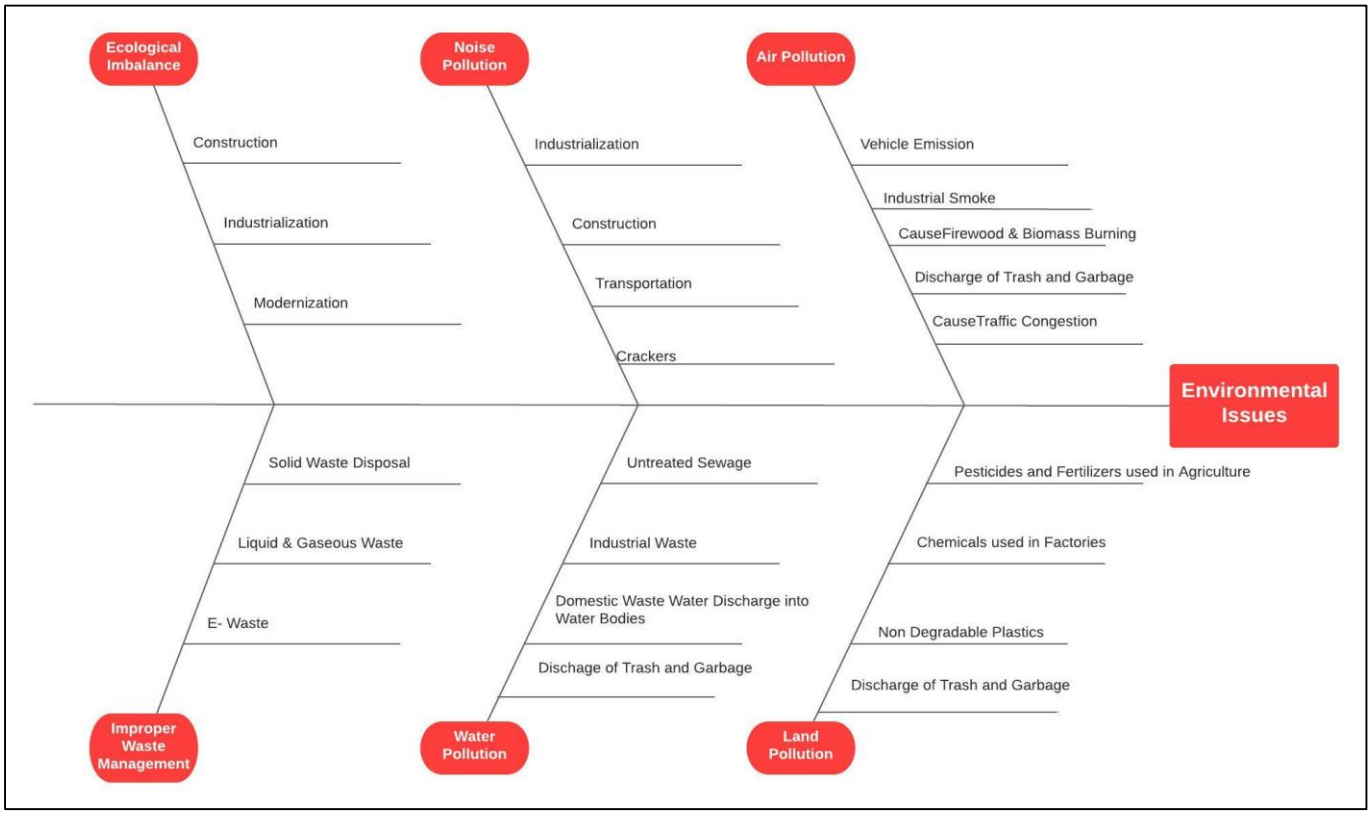
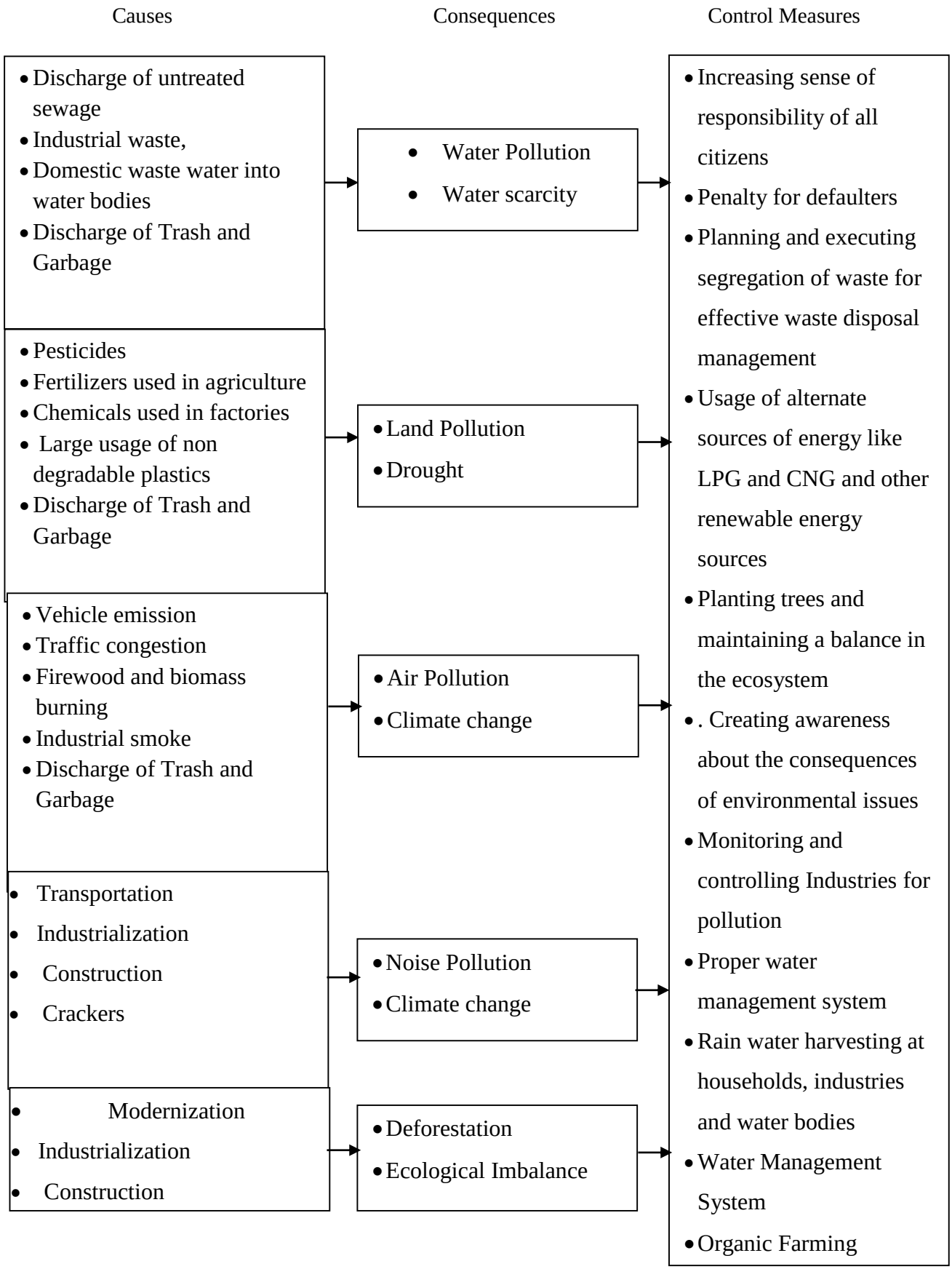


Figure 2 showing the Causes, Consequences and Control Measures of Environmental Management



Suggestions to Overcome Environmental Issues

- The respondents suggested strategies like increasing sense of responsibility of all citizens can bring down all environmental issues.
- Penalty for defaulters can be implemented, as done in many developed countries.
- Government must plan and execute segregation of waste for effective waste disposal management.
- Usage of alternate sources of energy like LPG and CNG and other renewable energy sources not only help to prevent environmental issues but also to conserve rare natural resources for the future.
- Planting trees and maintaining a balance in the ecosystem help to conserve the environment.
- Creating awareness about the consequences of environmental issues can bring remarkable changes in solving environmental issues of the present and creating a healthy environment for the future.

Conclusion

Environment refers to a surrounding or external conditions influencing development and growth of people, animals or plants in the living or working conditions. Environment is important for everyone as they continuously interact with it. Individuals, group, community and organizations interact with the environment in their own ways. Human beings utilise the environment and its resources for their existence, living, growth and development. In this process, humans affect the environment and ultimately get affected by it. The ways in which humans affect the environment are referred to as Environmental issues. These environmental issues are interlinked with each other. The consequences of environmental issues are many which threaten the livelihood and development of all living things. But there is a growing concern and awareness about the ways people affect or damage the environment. In order to save the environment, on the Government side, the official bodies should have a clear vision to conserve the environment and take necessary corrective actions towards achieving it. On the personal side, Individuals as responsible citizens, have to adapt changes in their way of living.

Save environment in the present; the environment will save us in the future.

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EARLY MANAGEMENT OF THE SEVERE FACIAL SOFT TISSUE INJURIES IN LIBYA

Salah Eddin M. Kurdi*° – Hanaa M. Ishtebaa*

Faculty of dentistry- University of Tripoli –LIBYA
Oral & Maxillofacial department – Abuslim Trauma Center

ABSTRACT

The aim of study to assess the treatment of severe soft tissue injuries in maxillofacial region operated in the department of Oral & Maxillofacial Surgery, Omer Ali Asker hospital. In this paper the most common etiology in civilian life, severe soft tissue trauma is often associated with motor vehicle accidents and subsequent injury is usually severe and consists of multiple damage and the most of the patients with severe soft tissue injuries require definite soft tissue rehabilitation with a combined multidisciplinary approach.

Keywords: Soft tissue injuries, maxillofacial region.

Introduction

million traumatic wounds are treated in emergency departments each In the United States over 11 year. Facial lacerations comprise approximately 50% of these wounds (5). Facial injuries impact both function and esthetics. There is often a psychological aspect associated with the injury secondary to patient's concern regarding permanent scarring and subsequent facial disfigurement. According to a recent survey, cosmetic outcome is the single most important aspect of care to the patient (22,7).

The initial examination involves evaluating and stabilizing the trauma patient.

Any life-threatening conditions should be identified and managed immediately (14). The conditions of the airway, breathing, and circulation are examined, followed by a general neurologic assessment with particular attention to cervical spine and cranial injuries (26).

It is important to achieve hemostasis when stabilizing and evaluating the patient who has sustained trauma. Most bleeding will respond to application of a pressure dressing. Occasionally surgical exploration and packing of the wound under general anesthesia may be indicated (6,13).

In rare instances vessels in the neck need to be ligated.

Indiscriminate clamping inside the wound should be avoided because damage to important structures such as the facial nerve or parotid duct may result. It is unusual for bleeding from soft tissue injuries to the face to result in a shock state. Lacerations involving the scalp can occasionally be difficult to control with pressure and require clamping, ligation, orelectrocautery (11,9,10).

In soft tissue injuries not involving the face the length of time from initial injury to treatment is important. Secondary risk of infection increases with the lapse of time (16). Because of the rich vascularity of the face there is no "golden period" for suture repair of facial wounds. In fact healing of facial wounds is unaffected by the interval between injury and repair (1). Patients who are immunized and have received a booster injection within the last 10 years do not require tetanus prophylaxis if the wound is not tetanus prone (20, 3). Following the initial evaluation and resuscitation, injuries to the soft tissues should be evaluated during the secondary survey (25).

Patients sustaining trauma often have associated soft tissue injuries. Facial injuries can be superficial but may extend to involve adjacent structures including bones, nerves, ducts, muscles, vessels, glands, and/or dentoalveolar structures (4).

Associated injuries, including vascular injury, may develop acutely or days after the injury (17,12). A thorough head and neck examination determines the extent of associated facial wounds. Peripheral cranial nerves are commonly involved with lacerations that involve the face. The facial nerve divides the parotid gland into deep and superficial portions. Any injury to the gland should raise suspicion for associated facial nerve injury (11).

There are several protocols for evaluation and treatment of penetrating injuries to the neck, face, and temporal bone. If there is suspicion that deep critical structures have been injured, the appropriate protocol should be followed (23, 8).

Delayed primary closure may be necessary in some instances. Patients who may benefit from a delayed procedure include those with extensive facial edema, a subcutaneous hematoma, or those with wounds that are severely contused and contain devitalized tissue. Secondary revision procedures are usually undertaken months later to allow for scar maturation (21, 19).

Aim--- To assess the treatment of severe facial soft tissue injuries operated in the department of Oral & Maxillofacial Surgery, Aboslim Trauma Center and Omer Ali Asker hospital.



(Fig.1) Young man with severe facial trauma caused by RTA

Materials and methods--- A total study group of 502 patients with severe soft tissue injuries were admitted & operated during 1st May 2005 to 1st November 2011 have been included. The following parameters were recorded: Type and site of trauma, Age, Gender, Type of management & outcome.



(Fig.2) Young man with severe facial trauma



(Fig.3) Young man with severe facial trauma (10 days after the operation)

Results--- Out of 502 patients, 364 were males and 138 females. The age range in 289 patients is from 21 to 30 years, in 111 patients from 11 to 20 years, in 52 patients from 31 to 40 years, in 32 patients is from 41 to 50 years, and from 1 day to 10 years in 18 patients. Road traffic accidents (RTA) has been the most common etiology of soft tissue injuries in 288 patients, gunshot in 125 patients, fighting in 54, sport injury in 23 and full down in 12 patients .

(Fig.4) Female with facial soft tissue trauma-RTA case (before & after the operation)

The region of the soft tissue trauma in 138 patients is frontal area, 82 patients with soft tissue trauma in infraorbital region, 59 patients with soft tissue trauma cheek region, 26 patients with external ear trauma, 16 patients with soft tissue trauma in nasal area, 21 patients with skin defect in maxillofacial area, 66

patients with severe multiple facial soft tissue trauma, 41 patients with soft tissue injury in the neck and 53 patients on the lips.

/

(Fig.5) Patient with trauma of upper lip post RTA, referred from other hospital

/

(Fig.6) Patient with trauma of upper lip immediately after the operation



(Fig.7) Soft tissue trauma on the frontal area



(Fig.8) Soft tissue trauma on the frontal area (has been operated)

Discussion :

Facial soft tissue is more common since the incidence of road traffic accidents is very high. Facial soft tissue injury is given maximum attention because the management is based on both aesthetic and functional aspect. Necrosis of the soft tissue is one of the major complications of deep or massive soft tissue injury. Since orofacial region has numerous blood supplies from branches of facial artery, the end result of treatment is most often positive. Clinical evaluation should be carried out under adequate light source, copious irrigation and hemostasis. Horizontal injury across the facial region is less likely to damage the facial nerve than the vertical injuries. Ideally facial wounds without additional injuries should be repaired as soon as possible. In major trauma requiring the resuscitative measures, the wound can be managed after 4 – 6 hours (2). Local anaesthetics without adrenaline are preferred in such injuries to avoid vasoconstriction which compromises the blood supply to injured area. According to the literature hydrogen peroxide and povidone – iodine should be avoided in fresh wounds since they impede with healing process. The author has quoted that non-ionic detergent minimises inflammatory

response (18). Irrigation removes enough bacteria if used with 7 pounds of pressure per square inch. This pressure is generated by forcefully expressing saline from 35 ml syringe with 18 gauge needle (18). Regeneration of cells occurs from stratum germinatum or basal layer in the epidermis. Regeneration of cells on the face results from both basal layer and epidermal pegs. Epidermal pegs are numerous in the face and hence significant portion of epidermal layer can be removed without scarring. Wounds in the face should be closed in layers to attain anatomic alignment and to avoid dead space. The most common reasons for suture scar or suture mark is closing the wounds under tension and delayed removal. Ideally facial sutures should be removed between post operative days 4 to 6. Pressure dressing should be avoided in devitalised tissues to prevent anaerobic infection (24). Topical antibiotic ointment for post operative use should be discontinued after 7 days to prevent tissue reaction (15). Following are the timings for removal of sutures based on different areas of head and neck, Face / ear – 4 to 6 days Scalp – 6 to 8 days Eyelid – 3 to 5 days and Neck – 5 to 7 days.

Conclusion---

Successful treatment of the patient with facial soft tissue injury requires regular follow up to ensure proper healing of the wound, in order to prevent functional & esthetic facial derangement. The mean age range of the patients from 11 to 30 years (79.7%). Most of the patients with soft tissue trauma often requires individual treatment plan (91%). The most patients presenting to our hospital have multiple injuries involving different organ system, and the care of such patients often requires a significant number of diagnostic studies and operative procedures (79%). Most of the injuries require emergency operative treatment (96%).

In civilian life, severe soft tissue trauma is often associated with motor vehicle accidents and subsequent injury is usually severe and consists of multiple damage (57.4%). Most of the patients with severe soft tissue injuries require definite soft tissue rehabilitation with a combined multidisciplinary approach.

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CHP'DE BÖLÜNME VE MUHARREM İNCE'NİN MEMLEKET PARTİSİ

Arş. Gör. Özgür Bayraktar
Karamanoğlu Mehmetbey Üniversitesi İktisadi ve İdari Bilimler Fakültesi
Siyaset Bilimi ve Kamu Yönetimi
ORCID Code: 0000-0001-9512-6180

ÖZET

2007 yılında yapılan anayasa değişikliği ile cumhurbaşkanın halk tarafından seçileceği kararlaştırılmıştır. Bu bağlamda ilk cumhurbaşkanlığı seçimi 2014 yılında yapılmıştır. Bu seçimde iktidar partisi Adalet ve Kalkınma Partisi'nin (AKP) adayı Genel Başkan ve aynı zamanda Başbakan Recep Tayyip Erdoğan olurken; muhalefetteki Cumhuriyet Halk Partisi (CHP) ve Milliyetçi Hareket Partisi (MHP) ortak bir aday ile yarışa girmeyi tercih etmişlerdir. Bu doğrultuda, CHP ve MHP, kamuoyunda pek tanınmayan, siyasi kimliği çok belirgin olmayan Ekmeleddin İhsanoğlu ismini aday göstermiştir. İhsanoğlu'nun adaylığı ilk başlarda CHP'de tepki uyandırmış ve başka aday çıkartma çabaları gösterilse de parti içi muhalifler alternatif bir aday çıkartamamışlardır. Ağustos 2014'te yapılan seçimlerde Erdoğan %52 oy alırken CHP ve MHP'nin ortak adayı İhsanoğlu, %38, HDP'nin adayı Selahattin Demirtaş ise %9 oy almıştır. Seçim sonrası CHP'de Yalova Milletvekili Muharrem İnce'nin başını çektiği muhalif grup, genel merkeze aday tercihi nedeniyle sert eleştirilerde bulunmuş, ardından toplanan kurultayda İnce, genel başkanlığa aday olmuş fakat seçimi kazanamamıştır. 2018 yılındaki seçimlerde ise geçmişte CHP ile ortak hareket eden MHP, bu sefer AKP'nin adayı mevcut Cumhurbaşkanı Erdoğan'ı desteklemiştir. Bu seçimde CHP, popüler ve siyasi açıdan keskin bir isim olan İnce'yi aday göstermiştir. Seçimde, %30 oy alan İnce, seçim öncesinde ve seçim gününde genel merkez tarafından yalnız bırakıldığını iddia etmiş ve tekrar genel başkan adaylığına soyunmuştur. Bu kurultayda da seçilemeyen İnce, 2019 Yerel Seçimlerinde İstanbul Büyükşehir Belediye Başkanı adayı olmak istermiş fakat aday gösterilmemiştir. Parti yönetime sert eleştirilerde bulunmaya devam eden İnce, Eylül 2020'de "Memleket Hareketi" isimli bir hareket başlatmış, Şubat 2021'de ise CHP'den istifa etmiştir. Ardından İnce, Mayıs 2021'de liderliğini yaptığı Memleket Hareketi'ni "Memleket Partisi'ne" dönüştürmüştür. Bu çalışmada Muharrem İnce'nin CHP içindeki eleştirileri ve parti içi mücadelesi incelenecek, ardından İnce'nin CHP'den kopması ve yeni parti kurma süreci ele alınacaktır.

Anahtar Kelimeler: Muharrem İnce, Kemal Kılıçdaroğlu, CHP, Memleket Partisi

DIVISION IN CHP AND MUHARREM INCE'S HOMELAND PARTY

Res. Asst. Ozgur Bayraktar
KaramanogluMehmetbey University Faculty of Economics and Administrative Sciences
Political Science and Public Administration
ORCID: 0000-0001-9512-6180

ABSTRACT

With the constitutional amendment made in 2007, it was decided that the president would be elected by the people. In this context, the first presidential election was held in 2014. In this election, the candidate of the ruling party Justice and Development Party (AKP) became the Chairman and at the same time Prime Minister Recep Tayyip Erdogan; the opposition Republican People's Party (CHP) and the Nationalist Movement Party (MHP) preferred to enter the race with a common candidate. In this direction, CHP and MHP nominated Ekmeleddin Ihsanoglu, who is not well known in the public and whose political identity is not very clear. Ihsanoglu's candidacy aroused a reaction in the CHP at first, and although efforts were made to nominate another candidate, the opposition within the party could not nominate an alternative candidate. In the elections held in August 2014, Erdogan received 52% of the votes, while CHP and MHP's joint candidate Ihsanoglu received 38%, and HDP's candidate Selahattin Demirtas received 9%. After the election, the opposition group led by CHP Deputy Muharrem Ince criticized harshly because of its choice of candidate to the headquarters. Later, at the congress, İnce

nominated for the presidency, but he could not win the election. In the 2018 elections, the MHP, which acted jointly with the CHP in the past, this time supported the current President Erdogan, the candidate of the AKP. In this election, the CHP nominated İnce, a popular and politically sharp figure. Ince, who received 30% of the votes in the election, claimed that he was left alone by the headquarters before and on the election day, and again attempted to run for the chairmanship. Ince, who was not elected in this congress, wanted to be a candidate for the Istanbul Metropolitan Municipality in the 2019 Local Elections, but was not nominated. Continuing to criticize the party administration harshly, İnce started a movement called the "Homeland Movement" in September 2020, and resigned from the CHP in February 2021. Later, Ince transformed the Homeland Movement, which he led in May 2021, into the "Homeland Party". In this study, Muharrem Ince's criticisms and struggle within the CHP will be examined, and then Ince's break with the CHP and the process of establishing a new party will be discussed.

Keywords: Muharrem Ince, Kemal Kilicdaroglu, CHP, Homeland Party

1. Giriş

1923 yılında kurulan CHP, sadece yedi genel başkan görmüş olsa da defalarca kez parti içi mücadeleye şahit olmuştur. Bu parti içi mücadelelerden birisi de 2014-2021 arasında yaşanan Muharrem İnce-Kemal Kılıçdaroğlu çekişmesidir. 2014 yılında başlayan bu rekabet 2021 yılında İnce'nin CHP'den istifası ve ardından yeni bir parti kurması ile son bulmuştur. Bu çalışmada bu bölünmenin kökenleri, niteliği ve bölünmeye yol açan süreç incelenmiştir. Bunun için öncelikle kısa bir şekilde CHP'nin tarihine, kuruluş felsefesine, geçirdiği evrimlere değinilmiş, ardından İnce ve taraftarlarının Kılıçdaroğlu ile ekibine yönelttikleri eleştirilerinin kökenleri analiz edilmiştir. CHP'deki bölünmenin tohumlarının aslında 2010 yılında Kılıçdaroğlu'nun Genel Başkan olmasıyla atıldığı söylenebilir. Kılıçdaroğlu'nun Genel Başkan olması partide sadece isim bazlı değil, zihniyet bazlı da bir değişim başlatmıştır. Bu nedenle Kılıçdaroğlu'nun Genel Başkan seçildiği Mayıs 2010'daki Kongre'nin öncesi ve sonrasındaki süreç detaylı olarak ele alınmış, Kılıçdaroğlu sonrasındaki partideki değişim analiz edilmiştir. Ardından 2014 yılındaki Cumhurbaşkanlığı Seçimi'nde siyasi kimliği zayıf olan bir ismin aday gösterilmesi ve CHP'deki parti içi muhalefetin Genel Merkez'e eleştirileri incelenmiştir. 2018'deki seçimlerde de Genel Merkez'e 2014 yenilgisini hatırlatan tabanın, politik kimliği güçlü birini aday göstermesi için parti yöneticilerine baskı yapması işlenmiştir. Son olarak da aday gösterilen İnce'nin, Genel Merkez tarafından "yalnız bırakıldığı" iddiası ile başlayan ve kopuşa giden süreç ele alınmıştır.

2. Kurultaylar ve Genel Başkanlar Bağlamında CHP'nin Tarihsel Süreci

Cumhuriyet Halk Partisi (CHP) ilk olarak *Halk Fırkası* ismiyle Mustafa Kemal Atatürk liderliğinde 9 Eylül 1923 tarihinde kurulmuştur. Daha sonra fırkaya üyesi 158 milletvekili 29 Ekim 1923'te Cumhuriyet'i ilan etmiş ve Atatürk'ü de Türkiye Cumhuriyet'inin ilk Cumhurbaşkanı olarak seçmiştir. Halifeliğin kaldırılması başta olmak üzere çeşitli konularda muhalif görüşler belirten milletvekillerinin Kasım 1924'te *Terakkiperver Cumhuriyet Fırkası* adıyla yeni bir parti kurmaları üzerine Halk Fırkası da bu duruma tepki olarak adına Cumhuriyet kelimesini eklemiş ve böylece *Cumhuriyet Halk Fırkası* adını almıştır. 1935 yılında ise Dil Devrimi'nin doğrultusunda fırka kelime parti ile değiştirilmiş ve *Cumhuriyet Halk Fırkası* adı yerini *Cumhuriyet Halk Partisi'ne* bırakmıştır. Daha sonra 1937 yılında CHP'nin altı oku (Cumhuriyetçilik, Milliyetçilik, Halkçılık, Devletçilik, Laiklik, Devrimcilik), Anayasa'ya eklenmiş, bu ilkeler Cumhuriyet'in temel özellikleri olarak tanımlanmıştır.

10 Kasım 1938 tarihinde hem Cumhurbaşkanı hem de CHP'nin Genel Başkanı olan Mustafa Kemal Atatürk'ün vefat etmesi üzerine 11 Kasım 1938'de olağanüstü toplanan Türkiye Büyük Millet Meclisi (TBMM), CHP Malatya Milletvekili İsmet İnönü'yü Cumhurbaşkanı olarak seçmiştir (Cumhuriyet, 12.11.1938). İnönü, 26 Aralık 1938'de CHP'nin *Değişmez Genel Başkanı* olarak seçilmiş, Atatürk ise *Ebedi Şef* ilan edilmiştir. 14 Mayıs 1950'de düzenlenen Genel Seçimler sonucunda CHP'nin 27 yıllık tek parti iktidarı sona ermiştir. Demokrat Parti'nin (DP) kazandığı seçimlerin ardından TBMM'de Cumhurbaşkanlığı Seçimi yapılmış ve Celal Bayar Türkiye Cumhuriyeti'nin 3. Cumhurbaşkanı

seçilmiştir. 22 Mayıs 1950'de görevi Bayar'a devreden İnönü, CHP Genel Başkanı olarak ana muhalefet partisi lideri olarak siyasete devam etmiştir. 1954 ve 1957 yıllarındaki seçimlerde muhalefette kalmaya devam eden CHP, 1961 yılında yapılması planlanan seçimlere hazırlanırken 27 Mayıs 1960 tarihinde bir grup subay tarafından darbe gerçekleştirilmiş ve yönetime el konulmuştur. Askeri yönetim tarafından DP kapatılmış, pek çok DP'li tutuklanmış, Başbakan ve iki bakan idam edilmiştir. 15 Ekim 1961'de yapılan seçimlerde CHP, %36,7 ile birinci parti olmasına rağmen tek başına hükümeti kuracak kadar sandalyeye sahip olamamıştır. Kapatılan DP'nin devamı olarak görülen iki partiden birisi olan Adalet Partisi (AP), %34,8; DP'nin diğer ardılı Yeni Türkiye Partisi (YTP), %13,7 oy almıştır. Seçimlerin ardından İsmet İnönü Başbakanlığında kurulan CHP-AP Hükümeti (26. Hükümet) hem CHP'nin hem de Türk Siyasal Hayatı'nın ilk koalisyon hükümeti olmuştur.

12 Mart 1971 tarihinde ordunun bir muhtıra ile siyasete tekrar müdahale etmesi CHP'nin de kaderini derinden etkilemiştir. Muhtıra sonucunda Başbakan Süleyman Demirel istifa etmek zorunda kalmış, yerine CHP'den istifa ettirilip bağımsız görünümü verilen CHP Kocaeli Milletvekili Nihat Erim getirilmiştir. Bu durum askeri müdahaleye kesinlikle karşı olan CHP Genel Sekreteri Bülent Ecevit ile müdahaleye ılımlı kalan İsmet İnönü arasındaki iplerin gerilmesine neden olmuştur. Askeri müdahalenin CHP'ye ve kendisinin başlattığı "Ortanın Solu" Hareketine karşı yapıldığını öne süren Ecevit, Genel Sekreterlikten istifa edip İnönü'ye karşı muhalefete başlamıştır. Bu mücadele sonucunda hem parti örgütünde hem toplumda büyük destek toplayan Ecevit, 6 Mayıs 1972 tarihli CHP 5. Olağanüstü Kurultayı'nda İnönü'ye karşı CHP Genel Başkan Adayı olmuş ve seçimi kazanmış, Atatürk ve İnönü'den sonra CHP'nin 3. Genel Başkanı seçilmiştir. Ecevit'in Genel Başkanlığı altında girilen ilk Genel Seçim 1973 yılında gerçekleşmiştir. Altı okundan, halkçılık okunu daha fazla ön plana çıkaran, kendisini Ortanın Solu'nda konumlandıran Ecevit'li CHP, 14 Ekim 1973 tarihinde yapılan seçimlerde %33 oy ile birinci parti olmayı başarmıştır (Gülbay, 2019: 336, 337).

12 Eylül 1980'de yapılan askeri darbe sonucunda ordu yönetime el koymuş ve tüm partiler kapatılmıştır. Tüm partilerin liderlerinin ve yöneticilerinin hapsedildiği ve siyasetten men edildiği bu dönemde askeri yönetim 1983 yılında yapılacak Genel Seçimler için sadece üç partiye geçit vermiştir. Bunlardan birisi soldaki siyasetçilerin toplandığı, solcu seçmene yönelik olarak kurulan Halkçı Parti (HP) olmuştur. Bir diğer sol parti olan Erdal İnönü'nün kurduğu Sosyal Demokrasi Partisi (SODEP) ise askeri rejimden onay alamadığı için 1983 Seçimlerine katılamamıştır. 3 Kasım 1985'te ise bu iki parti Sosyal Demokrat Halkçı Parti (SHP) ismi altında birleşmiştir. 19 Haziran 1992'de, darbe sonrası kapatılan eski partilerin tekrar açılabilmesinin önü açılmış ve 9 Eylül 1992'de CHP tekrar açılmış ve kurultayda Deniz Baykal Genel Başkan seçilmiştir. Böylece Deniz Baykal, CHP'nin 4. Genel Başkanı olmuştur (Zürcher, 2012: 301). CHP de açıldıktan sonra solda üç parçalı bir yapı oluşmuştur: Bülent Ecevit'in liderliğindeki Demokratik Sol Parti (DSP), Erdal İnönü'nün SHP'si ve Baykallı CHP.

Mart 1994 Yerel Seçimlerinde sol, parçalanmanın bedelini ağır ödemiştir; sol partiler hem toplamda 1989 Yerel Seçimlerine oranla %11 oy kaybetmiş hem de elinde bulundurduğu büyükşehir belediyeleri kaybetmiştir. Bunun üzerine sol seçmende birleşme talebi iyice belirginleşmiş fakat Ecevit bu duruma yanaşmamıştır, yapılan uzun görüşmeler sonucunda 18 Şubat 1995'te SHP kendisini feshetmiş ve CHP'ye katılmıştır. Bu kurultayda Genel Başkan seçilen Hikmet Çetin, bu görevi 11 Eylül 1995'te Deniz Baykal'a devretmiştir. Nisan 1999 Seçimlerinde sol oyların çoğunluğunun DSP'de toplanması üzerine CHP %8,7 ile baraj altı kalmış, Baykal hezimetten kendisinin sorumlu olduğunu belirtip 22 Nisan 1999 tarihinde Genel Başkanlıktan istifa etmiştir. 23 Mayıs 1999'da toplanan 9. Olağanüstü Kurultay'da Altan Öymen Genel Başkan seçilmiş ve 30 Eylül 2000 tarihindeki 10. Olağanüstü Kurultay'da Baykal tekrar Genel Başkanlığa dönmüştür (Ahmad, 2010: 120-131).

3 Kasım 2002 Seçimlerine Baykal liderliğinde giren CHP, %19,3 oy almış, Adalet ve Kalkınma Partisi (AKP) ise %34 oy toplayarak tek başına iktidar olmuştur. 2004 Mart Yerel Seçimlerinin ardından CHP'de parti içi tartışmalar had safhaya çıkmıştır. İstanbul Şişli'de %65 oy alan Mustafa Sarıgül, Baykal'ın halktan koptuğunu iddia ederek Anadolu illerini gezmeye başlamış ve CHP'yi iktidar yapacağını vaat etmiştir. Sarıgül'ün bu davranışları ve söylemleri Baykal ve Genel Merkez tarafından tepkiyle karşılanmış, Temmuz 2004'te kurultay toplanması kararlaştırılmıştır. Bu kurultayda Baykal, delegelerden güvenoyu talep etmiş ve 781 oy alan Baykal, Sarıgül'e parti içinde halen güçlü olduğunu göstermiştir. Yine de Baykal'a itirazlarını devam ettiren Sarıgül 29 Ocak 2005 tarihli 13. Olağanüstü

Kurultay'da Genel Başkan adayı olmuştur. Çok gergin başlayan kongrede sandalyeler havada uçuşmuş, salona çağrılan çevik kuvvet polisinin olayları yatıştırmasının ardından zorluklarla yapılan oylamalar sonucunda Baykal 674, Sarıgül 460 oy almıştır (NTV Arşiv, 30.01.2005). 24 Mart 2005 tarihinde CHP Yüksek Disiplin Kurulu, Sarıgül'ü "Kurultayı arbede ortamına çevirdiği" gerekçesiyle partiden ihraç etmiştir. 2007 yılında yapılan seçimlerde AKP %47 oy alırken CHP %20 oy alabilmiş, fakat yoğun eleştiriler alan Baykal, Genel Başkanlık'tan istifa etmeyeceğini belirtmiştir. 2008 yılının Nisan ayında düzenlenen kurultayda Samsun Milletvekili Haluk Koç ve Umut Oran Genel Başkan adayı olacaklarını söylemiş fakat gereken imzayı toplayamadıkları için bu kurultaya Baykal tek aday olarak katılmıştır.

3. Kılıçdaroğlu'nun Genel Başkanlık Dönemi ve Kılıçdaroğlu-İnce Rekabeti

Pek çok kurultaydan galip çıkan Deniz Baykal'ın Mayıs 2010'da toplanacak olan 33. Olağan Kurultayı'nda da tek aday olarak seçilmesi beklenirken, Türk Siyasal Hayatı'nı derinden etkileyen bir gelişme yaşanmıştır. Baykal olduğu iddia edilen bir kişinin gizlice çekilmiş görüntüleri kurultaya kısa süre kala internete yüklenmiş, bir süre sessiz kalan Baykal, partiye zarar vermemek için Genel Başkanlıktan istifa ettiğini duyurmuştur. 22 Mayıs 2010 tarihinde toplanan kurultayda bir süredir kamuoyunda popülerliği artan İstanbul Milletvekili ve CHP Grup Başkanvekili Kemal Kılıçdaroğlu Genel Başkan seçilmiştir.

Kılıçdaroğlu, 2009 Seçimleri öncesinde medyada oldukça sık yer almış, bu görünürlüğü sayesinde önce İstanbul Büyükşehir Belediye Başkan Adayı olmuş, ardından da CHP Genel Başkanı olmuştur. 29 Mart 2009 tarihinde düzenlenen Yerel Seçimlerde CHP'nin İstanbul Büyükşehir Belediyesi Başkan Adayı olan İstanbul Milletvekili Kemal Kılıçdaroğlu, katıldığı canlı yayınlarda AKP'li isimlerle tartışmış ve söz konusu kişilerin yolsuzluk yaptıklarını belgelerle kanıtlamış ve kamuoyunda dürüstlük sembolü olarak anılmaya başlamıştır. Kılıçdaroğlu, ayrıca CHP'ye oldukça mesafeli olan İslami cemaatler de dahil her kesim ile görüşmeye, konuşmaya, fikir alışverişi yapmaya hazır, ılımlı bir porte çizmiştir (Eligür, 2009: 480-482). Fakat oluşan bu olumlu havaya rağmen CHP adayı İstanbul'da galip gelememiştir. Yine de Kılıçdaroğlu, önceki seçimlere göre oldukça büyük bir başarı yakalamış, partisinin 2004'teki seçimlerde %28,9 olan oy oranını %37'ye çıkarabilmiş fakat AKP adayı Kadir Topbaş, %44,7 ile birinci olmuştur. Bu seçim ile tüm ülkede tanınmaya başlayan, yıldızı parlayan ve hem ülke çapında hem de CHP tabanında büyük sempati toplayan Kılıçdaroğlu, bir yıl sonra Mayıs 2010 yılında CHP Genel Başkanı seçilmiştir (Tosun, 2010: 33-35).

2010 yılında Kılıçdaroğlu ile birlikte CHP'de laiklik vurgusu bir nebze geri çekilmiş, ekonomi merkezli halkçı söylemler ön plana çıkmıştır. Kılıçdaroğlu'nun ilk kez, Genel Başkan seçildiği Mayıs 2010 Kurultayı'nda yaptığı konuşmada dile getirdiği "Yeni CHP" vurgusu ve yeni yönetim kadrosu partide kimi eleştirileri beraberinde getirmiştir. Kılıçdaroğlu ile ekibini eleştirenler, "Yeni CHP" ifadesinin kabul edilemez olduğunu, bu söylemin partiyi köklerinden koparacağını ve Atatürkçülüğün unutulacağını öne sürmüştür. İki ekip arasındaki ipler özellikle Kasım 2010'da gerilmiş, örgütlerde büyük hakimiyeti bulunan Genel Sekreter Önder Sav da oldukça sert açıklamalarda bulunarak Kılıçdaroğlu'nu, Atatürkçülük üzerinden eleştirmiştir. Baykal'ın istifası sonrasında Kılıçdaroğlu'nun delegelerden destek almasının yolunu açan ve Önder Sav'ın da parti içi muhalefete katılmasıyla birlikte Kılıçdaroğlu ile ekibine özellikle Atatürkçülük üzerinden yapılan eleştirilerin yoğunluğu artmıştır. Sav, CHP'yi içerideki ve dışarıdaki düşmanların eskitemediğini, partiye kısa bir süre önce genel başkan olan Kılıçdaroğlu'nun da eskitemeyeceğini söylemiş, CHP'nin ekseninin kaymasına izin vermeyeceklerini ve partinin omurgasını kimseye eğdirtmeyeceklerini belirtmiştir. Sav, "Kılıçdaroğlu, istediği kadar yeni desin; CHP, Mustafa Kemal Atatürk'ün kurduğu CHP'dir. Önümüzdeki süreç CHP'nin kimliğini tartışmayı açanlarla partinin ilkelerinden vazgeçmeyenler arasında bir mücadeleye sahne olacaktır. Bu mücadelede bizim duruşumuz açıktır. Son zamanlarda tartışmaya açılan laiklik ilkesine arkadaşlarımla beraber sahip çıkacağız. CHP'nin bu kimliğini pazara çıkarmaya kimsenin gücü yetmeyecektir." demiştir. Sav, CHP'yi "Yeni CHP" olarak tarif edenlerin ısrarlarını sürdürmeleri halinde genel başkan seçimli bir kurultaya gidileceğini ifade etmiştir (Cumhuriyet, 04.11.2010: 10). Kılıçdaroğlu, Önder Sav'ın "Yeni CHP" merkezli eleştirilerine, Cumhuriyet (04.11.2010: 11) gazetesine verdiği söyleşide cevap vermiş ve bu ifade ile yeni bir yönetim anlayışını kastettiğini, kurumsal kimliğe saygı duyduğunu ve partiyi eskitme gibi bir amaçlarının olmadığını belirtmiştir. 18 Aralık 2010'daki kurultaya kadar parti

içi gerginlik giderek artmış ve bu kurultayda Kılıçdaroğlu, Sav ve ekibini tamamen liste dışında bırakmıştır (Cumhuriyet, 19.12.2010: 9).

Atatürkçülük üzerinden Kılıçdaroğlu'na eleştiriler ilerleyen yıllarda da devam etmiş; 2014 Cumhurbaşkanlığı Seçimleri sonucunda CHP Grup Başkanvekili ve Yalova Milletvekili olan Muharrem İnce'nin Twitter üzerinden başlayan parti içi muhalefeti, 2021'de İnce'nin CHP'den ayrılışı ile son bulmuştur. CHP ve MHP'nin Ekmeleddin İhsanoğlu'nu ortak aday göstermesi ve çatı adayın seçimi kaybetmesi üzerine CHP Grup Başkanvekili Muharrem İnce, Twitter üzerinden yaptığı açıklamada, Atatürk'ü terk edenin başarılı olamayacağını, kuruluş felsefesinden uzaklaşan, solu yok sayıp çareyi sağda arayan CHP'nin bu sonucu hazırladığını belirtmiştir. (Aydınlık, 12.08.2014: 9). Daha sonra altı milletvekili (İzmir Milletvekili Birgül Ayman Güler, Ankara Milletvekili Emine Ülker Tarhan, Eskişehir Milletvekili Süheyl Batum, Uşak Milletvekili Dilek Akagün Yılmaz, İstanbul Milletvekili Nur Serter ve Mersin Milletvekili İsa Gök) bir basın toplantısı düzenlemiş ve Olağanüstü Kurultay çağrısında bulunmuştur (Aydınlık, 13.08.2014: 10). Cumhurbaşkanlığı Seçiminden sonra yaşanan parti içi gerginlikler neticesinde Genel Merkez, Olağanüstü Kurultaya gitmek zorunda kalmıştır. Bu kurultayda Kılıçdaroğlu'na karşı Muharrem İnce aday olmuş fakat seçilememiştir (Hürriyet, 06.09.2014: 16). 5 Eylül 2014 tarihinde düzenlenen kurultayda Kılıçdaroğlu, 740 oy almış, İnce ise 415 oyda kalmıştır. Kurultayda yaptığı konuşmada İnce, Kılıçdaroğlu'nu partiyi Atatürk ilkelerinden uzaklaştırarak sağa yaklaştırmakla suçlamıştır (Sözcü, 06.09.2014: 10). 3-4 Şubat 2018'de yapılan 36. Olağan Kurultay'da bir kez daha aday olan İnce bu sefer 447 oy almış, fakat Kılıçdaroğlu 790 oy alarak İnce'yi tekrar mağlup etmiştir (Sözcü, 04.02.2018). 4 yıl sonra, Haziran 2018'deki Cumhurbaşkanlığı Seçimleri sonrasında Muharrem İnce ve taraftarları bir kez daha Kılıçdaroğlu'na ve Genel Merkez yönetimine karşı muhalefete geçmiştir.

4. 2018 Cumhurbaşkanlığı Seçimi ve İnce'nin Partiden Kopuşu

2014 yılındaki yenilgiyi CHP içinden olmayan birinin aday gösterilmesine bağlayan parti içi muhalefet, 2018'deki seçimlerde CHP'li kimliği ağır basan birinin partinin Cumhurbaşkanı adayı olması gerektiğini savunmuştur. Parti tabanından gelen yoğun baskılara daha fazla direnemeyen Kılıçdaroğlu, 4 Mayıs 2018 tarihinde Muharrem İnce'nin Cumhurbaşkanlığı Adaylığını "Gel bakalım Sayın Muharrem İnce" sözleriyle duyurmuştur. Kürsüye gelen İnce, yaptığı ilk konuşmada 50 bin avukatın cübbelerini arabalarında hazır tutmalarını, seçim gecesi her an onları YSK önüne çağırabileceğini belirtmiştir (Hürriyet, 04.05.2018). Seçim süreci boyunca pek çok ilde büyük ve coşkulu mitingler düzenleyen Muharrem İnce 24 Haziran günü %30,6 oranında oy alarak seçimi kaybetmiştir. Partisi CHP %22 oy alırken, İnce'nin CHP'den %8 daha fazla oy alması dikkat çekmiştir (BBC, 25.06.2018). Seçim sürecindeki heyecanına ve YSK önünde mücadele verme sözüne rağmen seçim akşamı herhangi bir açıklama yapmayıp sadece gazeteci İsmail Küçükkaya'ya "Adam Kazandı" şeklinde mesaj göndermesi büyük tepki çekmiştir. Ertesi gün CHP Genel Merkezi'nde basın toplantısı düzenleyen İnce, yenilgiyi kabul ettiğini belirtmiştir (Sözcü, 25.06.2018). Daha sonra Kılıçdaroğlu'na eleştirilerde bulunan parti içi muhalefet Genel Başkan seçimli bir kurultay toplanması istemiyle delegelerden imza toplamaya başlamış, Muharrem İnce de partide bir değişimin olması gerektiğini, Genel Merkez'in bir an önce kurultay toplaması gerektiğini belirtmiştir (TRT Haber, 30.07.2018). Parti içi muhalifler hedefledikleri imza sayısına ulaşamamış ve Genel Merkez de Mart 2019 Yerel Seçimlerini öne sürerek kurultay yapmaya yanaşmamıştır.

Genel Merkez'le arası giderek açılan İnce 4 Eylül 2020 tarihinde Sivas'tan "Bin Günde Memleket Hareketi" isimli bir hareket başlatmış ve "Biz bölen değiliz, yeni bir yol açanız." sözleriyle CHP'yi bölmek için yola çıkmadığını belirtmiştir (BBC, 04.09.2020). Bir süre çeşitli il ve ilçe ziyaretleri gerçekleştiren İnce, 8 Şubat 2021'de CHP'den istifa ettiğini duyurduğu toplantıda CHP'nin Atatürk ilkelerinden uzaklaşan bir tabela partisine dönüştüğünü belirtmiş, ABD'den demokrasi dilenen, Atatürk diyemeyenlerle yolunu ayırdığını ifade etmiştir (Sözcü, 08.02.2021). İllerdeki örgütlenmelerini büyük oranda tamamlayan İnce ve ekibi 17 Mayıs 2021 tarihinde "Memleket Partisi" isimli partilerini kurmuşlardır (Habertürk, 17.05.2021). Böylece 2014 Cumhurbaşkanlığı Seçimleri sonrasında başlayan

İnce-Kılıçdaroğlu rekabetinde kazanan Kılıçdaroğlu olmuş, parti içinde daha fazla hareket imkânı kalmayan Muharrem İnce partiden istifa etmek zorunda kalmıştır.

5. Sonuç

"Kurultaylar Partisi" olarak da anılan CHP, kurulduğu tarihten günümüze kadar pek çok Olağan ve Olağanüstü Kurultay düzenlemiştir (2021 itibariyle 37 Olağan, 18 Olağanüstü Kurultay). 1923 yılında kurulmasına rağmen CHP, kısa süre vekaleten edenler hariç sadece yedi genel başkan görmüştür. Diğer partilere oranla Genel Merkez'e ve Genel Başkan'a eleştirilerin daha çok yapılabildiği, görece parti içi demokrasinin işlediği bir parti olmasına rağmen kurultaylarda genellikle statüko korunmuş, parti içi muhalefet kongrelerde başarı elde edememiş, genel başkanlar delegelerden güven tazeleyerek mücadelelerden galip çıkmıştır. Sadece Mayıs 1972'de toplanan kurultayda Genel Başkan İnönü, parti içi muhalefetin lideri olan Ecevit'e karşı kaybetmiş, bu kongre hariç diğer kongrelerde çoğunlukla Genel Merkez kazanan taraf olmuştur. Mayıs 2010'da Genel Başkan seçilen Kılıçdaroğlu da uzunca bir süre parti içi muhalefetle mücadele etmiş fakat her seferinde galip gelmiştir. İlk seçildiğinde Genel Sekreter Önder Sav'ın yardımıyla kendisine direnen Baykal yanlısı il ve ilçe yönetimlerinden tek tek kurtulan Kılıçdaroğlu, bir süre sonra parti tabanının desteği sayesinde Sav'ı da saf dışı bırakmış, Sav ve ekibini yönetimden uzaklaştırmayı başarmıştır. "Yeni CHP" ifadesiyle geçmişteki katı Atatürkçülük yerine ılımlı bir portre çizen Kılıçdaroğlu, laiklik ağırlıklı söylemden daha halkçı bir söyleme geçiş yapmıştır. Partiyi sağ seçmene yaklaştırmaya çalışan Kılıçdaroğlu, 2014 Cumhurbaşkanlığı Seçimlerinde MHP ile iş birliği yaparak Ekmeleddin İhsanoğlu'nu çatı aday olarak göstermiş fakat CHP-MHP ortak adayı seçimi kaybetmiştir. İhsanoğlu'nun aday gösterilmesini eleştiren CHP Grup Başkanvekili ve Yalova Milletvekili olan Muharrem İnce, bu seçimden sonra Kılıçdaroğlu'na karşı parti içi muhalefet başlatmıştır. 2014 ve 2018 yıllarındaki kurultaylarda iki kez Kılıçdaroğlu'na karşı aday olan İnce, iki kurultayda da önemli derecede oy toplamış fakat galip gelememiştir. Ardından Haziran 2018 Cumhurbaşkanlığı Seçimlerinde CHP'nin Cumhurbaşkanı Adayı olarak gösterilen İnce, seçimleri kaybetmiştir. Seçim sonrasında yaptığı açıklamalarda kendisinin hem seçim öncesindeki süreçte hem de seçim gecesinde Genel Merkez tarafından yalnız bırakıldığını öne süren İnce, Genel Başkan seçimli Olağanüstü Kurultay toplanmasını talep etmiştir. Parti içi muhalefetin imza toplama süreci sonuçsuz kalmış, gitgide hareket alanı azalan İnce ve ekibi 2021'de CHP'den ayrılarak Memleket Partisi isimli bir parti kurmuştur. CHP'nin Atatürk ilkelerinden, laiklikten ve halktan koptuğunu iddia eden İnce, Memleket Partisi'nin ülkenin tüm değerlerini kucakladığını belirtmiştir. CHP'de yaşanan bu kopuş, Atatürkçülüğü öne çıkaran, laiklik vurgusunu daha çok yapan kanat ile ekonomik ve sosyal konuları öne çıkaran Kılıçdaroğlu ekibinin mücadelesinin bir ürünü olarak görülebilir. Kılıçdaroğlu'na muhalif olan parti içi kanat pek çok kez girişimlerde bulunmuş fakat tüm bu hamlelerinde başarısız olmuş, Kılıçdaroğlu gün geçtikçe partiye daha fazla hâkim olmaya başlamıştır. Çok büyük bir seçim yenilgisi almadığı ya da kendi isteğiyle bırakma kararı vermediği sürece Kılıçdaroğlu'nun CHP Genel Başkanlığına devam edeceği söylenebilir.

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ISOLATION, CHARACTERIZATION AND EFFICACY STUDIES OF A POTENTIAL PLANT GROWTH PROMOTING RHIZOBACTERIA - *Pseudomonas fluorescens* FROM TOMATO RHIZOSPHERE SOILS

Jayachitra.J And P. Sivasakthivelan
Department of Agricultural Microbiology
Faculty of Agriculture, Annamalai University
Annamalai Nagar – 608 002, Tamil Nadu – India

ABSTRACT

In view of increasing environmental pollution with the deterioration of soil health and excessive use of chemical fertilizers for increasing the crop productivity, in this present study A total of seven bacterial isolates bacteria were isolated from the rhizosphere of Tomato fields in Cuddalore district of Tamil Nadu. The isolates were identified by morphological and biochemical characterization, and it is identified as *Pseudomonas fluorescens*. All the seven isolates exhibited IAA, Siderophore HCN production. Among the seven isolates PGPR 1 increased germination percentage, root and shoot length of Tomato seeds. Thus, the use of PGPR as 'bio fertilizers' is a novel approach to replace chemical fertilizers and pesticides for sustainable agriculture in India.

Keywords: PGPR, Plant vigour index, Germination, and *Pseudomonas fluorescens*

INTRODUCTION

Microbial communities are abundantly found in the rhizosphere and in the area that is under the influence of root and its close vicinity. The rhizosphere gives support to many active microbial populations capable of exerting beneficial, neutral, or detrimental effects on plant growth (Latour *et al.*, 1996). Plant growth promoting rhizobacteria (PGPR) are a heterogeneous group of bacteria that can be found in the rhizosphere, at root surfaces and in association with roots, which can improve the quality of plant growth directly or indirectly. In last few decades a large array of bacteria has reported to enhance plant growth (Ahmad et al, 2008). The direct promotion by PGPR entails either providing the plant with a plant growth promoting substances that is synthesized by the bacterium or facilitating the uptake of certain plant nutrients from the environment. The indirect promotion of plant growth occurs when PGPR lessen or prevent the deleterious effect of one or more phytopathogenic micro-organisms.

These mechanisms can be active simultaneously or independently at different stages of plant growth. PGPR have been reported to directly enhance plant growth by a variety of mechanisms: fixation of atmospheric nitrogen, solubilization of minerals such as phosphorus, production of siderophores, and synthesis of plant growth hormones i.e. Indole-3- acetic acid (IAA), gibberellic acid, cytokinin's, and ethylene. Indirect mechanisms involve the biological control of plant pathogens and deleterious microbes, through the production of antibiotics, lytic enzymes, hydrogen cyanide, catalase and siderophore or through competition for nutrients and space can improve significantly plant health and promote growth, as evidenced by increase in seedling emergence, vigour and yield. After N_2 fixation, Phosphate (P) solubilization is very important plant growth promoting activity. PGPR provide different mechanisms for suppressing plant pathogens. They include competition for nutrients and space (Elad and Baker, 1985; Elad and Chet, 1987), antibiosis by producing antibiotics viz., pyrrolnitrin, pyocyanine, 2, 4- diacetyl phloroglucinol (Pierson and Thomashow, 1992). There has been much research interest in PGPR and there is now an increasing number of PGPR being commercialized for crops. The absence of pesticides and the more complex organic rotations likely promote existing populations of these beneficial bacteria. However, it is also possible to inoculate seeds with bacteria that increase the availability of nutrients, including solubilizing phosphate, potassium, oxidizing sulphur, fixing nitrogen, chelating iron and copper.

The specific mechanism involved in PGPR-elicited enhanced nutrient uptake was recently proposed by Adesemoye *et al.*, (2009). One of the most common ways that PGPR improve nutrient uptake for plants is by altering plant hormone levels. This changes root growth and shape by increasing root branching, root mass, root length, and the amount of root hairs. This leads to greater root surface area, which in turn, helps it to absorb more nutrients. Ramamoorthy *et al.*, (2001) reported that PGPR increase germination percentage, seedling vigour, root and shoot growth, total biomass of plants, seed weight, early flowering grains, fodder and fruit yields, that can serve as a source as 'bio' fertilizers (Boddey and Dobereiner, 2000). Inoculation of plants with *Azospirillum* could result in significant changes in various growth parameters, such as increase in plant biomass, nutrient uptake, tissue N content, plant height, leaf size and root length of cereals (Bashan et al, 2004). In the present study work, main objective of research was isolation and characterization of PGPR to explore direct and indirect mechanism of PGPR and determine the effects on germination percentage, root length, shoot length and vigour index on tomato.

MATERIALS AND METHODS

Isolation of *Pseudomonas sp*

Isolation of *Pseudomonas* was made from rhizosphere of Tomato fields in Cuddalore district of Tamil Nadu. The 10g of rhizosphere soil samples was taken and suspended in sterile distilled water and it was serially diluted 10^{-6}. One ml of soil suspension from aliquot dilutions (10^5 to 10^6) was aseptically added to sterile Petri plates containing twenty ml of sterile medium and incubated at 28±2^{0}C for 48 h. After incubation, well separated individual colonies with yellow green and green blue, white pigments were marked and detected by viewing under UV light. The individual colonies were picked up with sterile loop and transferred to fresh King's B slants and the pure cultures so obtained were stored in refrigerator at 4^{0}C for further use.

Morphological characterization

Pure cultures of the selected isolates were streaked on King's B agar Petri plates separately for colony development. The individual colonies were examined for shape, size, structure of colonies and pigmentation.

Biochemical tests for *Pseudomonas* sp

For the identification of Pertain biochemical tests were conducted according to Bergey's Manual for Determinative Bacteriology (Breed *et al.*, 1989)

Gram staining

A loopful bacterial culture was transferred on a clean slide and a smear was made which was air dried and heat fixed. The smear was flooded for one min. with ammonium oxalate crystal violet. Excess strain was poured off and the slide was washed in a gentle stream of water. Lugol's iodine solution was applied and allowed to remain for one min. decolorized with 95 per cent ethyl alcohol. The smear was washed in gentle stream of water and counter stained with safranin for 30 seconds. The Gram negative cells appeared red in colour and Gram positive cells appeared violet in colour (Cyrabree and Hindshill, 1975).

Starch hydrolysis

Filter paper was dipped in a dry old culture suspension and was placed on Petri dishes containing starch agar medium and incubated for two days. The plates were than flooded with one per cent iodine solution. A colourless halo around the growth and blue colour in the rest of the plates showed utilization of starch by the microorganism (Stolpe and Godkeri, 1981).

Gelatin liquefaction

Filter paper discs were dipped in a day-old culture suspension and were placed on Petri dishes containing gelatin nutrient agar medium. The Petri dishes were incubated at 30^{0}C for two days and then

flooded with 12.5 per cent HgCl2 solution. The development of yellow halo around the growth indicates utilization of gelatin (Stolpe and Godkeri, 1981).

Fluorescent pigment

The test tubes containing sterilized Kings B medium were inoculated with the isolate of *Pseudomonas sp.* incubated for five days and observed. Yellowish green, fluorescent pigment observed under UV light (365 nm) indicated positive results.

Estimation of IAA

Indole acetic acid (IAA) in the methanol fraction was determined by employing Salper reagent (Gordon and Paleg, 1975). To 1.5 ml of distilled water in a test tube 0.5 ml of methanol residue was mixed, four ml fresh Salper reagent was rapidly added, kept in complete darkness for one hour and read in spectrophotometer at 535 nm. From a standard curve prepared with known concentration of IAA, the quantity of IAA in the filtrate was calculated (1 division =0.307 µg of IAA)

Extraction of siderophore from the medium

The spent culture fluid was separated from the cells by centrifugation at 7000 rpm for 15 min. The supernatant was concentrated to one fifth of the original volume by the flash evaporation at 45^0C. Catechol type phenolates were extracted with ethyl acetate from the culture supernatant twice with an equal volume of solvent at pH 2.0. The ethyl acetate layer was removed and evaporated to dryness and the residues were dissolved in a minimum quantity of distilled water, while hydroxamate types were measured from the untreated culture supernatant.

HCN production

Production of HCN was determined as per Wei *et al*. (1996). Bacteria were grown on TSA supplemented with 4.4g/l of glycine, white filter paper strips soaked in picric acid solution (2.5 g of Na2CO3 and 1 lit. of water) were placed in the lid of each Petri dishes, sealed with parafilm and incubated for two to three days at 28±20C. After incubation HCN production was indicated by the presence of a coloured zone around the bacteria

Effect of P. fluorescens on plant growth promotion (in vitro)

Preparation of inoculum of the antagonists The isolates of P. fluorescens was grown in conical flasks (250 ml) containing 100 ml of King's B broth for 48 h. on a rotary shaker (150 rev min^{-1}) at 28 ± 2^0C. Cells were removed by centrifugation at 8000 rpm for 10 min. at 40C and washed in sterile water. The pellet was resuspended in small quantity of sterile dist. water until to obtain bacterial colonies of 10^8 cfu/ml measured by dilution plate technique

Seed treatment with antagonist

Seeds of Tomato (PKM - 1) were surface sterilized with two per cent sodium hypochlorite for 30 sec., rinsed in sterile dist. water and dried overnight. One gram of seeds was soaked for 2 h. in ten ml of antagonist inoculum taken in Petri dish and added with 100 mg of carboxyl methyl cellulose (CMC).

Plant growth promotion (in vitro) Roll Towel Method

Plant growth-promoting activity of the PGPR isolates was assessed based on the seedling vigour index by the standard roll towel method (ISTA, 1993). Twenty-five Tomato (25) seeds treated with antagonist were kept over the pre-soaked germination paper. The seeds were held in position by placing another pre-soaked germination paper strip over it and gently pressed. The sheets along with seeds were then rolled and incubated in growth chamber for 10 days. Three replications were maintained for each treatment. The root length and shoot length of individual seedlings were measured and the per cent germination of seeds was also calculated. The seedling vigour index was calculated by using the formula as described by Abdul Baki and Anderson (1973).

Vigor index (VI) = (Mean root length + Mean shoot length) × Germination (%)

Table 1: Cultural characteristic of different isolates of *Pseudomonas fluorescens*

Isolates	Cell shape	Colony type	Colour of the colony	Type of growth	Pigmentation (Under UV light)
PGPR - 1	Rod	Circular	Yellowish white	Fast	Green
PGPR - 2	Rod	Circular	Yellowish white	Fast	Green
PGPR - 3	Rod	Circular	Yellow	Fast	Green
PGPR - 4	Rod	Circular	Creamy	Fast	Green
PGPR - 5	Rod	Circular	Creamy	Fast	Dull green
PGPR - 6	Rod	Circular	Creamy	Fast	Dull green
PGPR - 7	Rod	Circular	Creamy	Fast	Dull green

Table: 2 Biochemical characterizations of different *Pseudomonas* isolates of plant growth promoting rhizobacteria

	PGPR 1	PGPR 2	PGPR 3	PGPR 4	PGPR 5	PGPR 6	PGPR 7
Gram Staining	-	-	-	-	-	-	-
Gelatin liquefaction	+	+	+	+	+	+	+
Catalase	+	+	+	+	+	+	+
Oxidase				+	+	+	+
Starch Hydrolysis	-	-	-	-	-	-	-
IAA production (µg/ml)	3.6	3.0	2.9	3.4	3.2	3.0	2.7
Siderophore	0.86	0.80	0.78	0.84	0.83	0.79	0.74
HCN Production	8.13	7.72	7.52	7.98	8.00	7.63	7.35
Tentatively Identified as	*Pseudomonas fluorescens*	*Pseudomonas fluorescens*	*Pseudomonas fluorescens*	*Pseudomonas fluorescens*	*Pseudomonas aeruginosa*	*Pseudomonas aeruginosa*	*Pseudomonas aeruginosa*

Table 3: Plant growth promoting activity of *P. fluorescens* isolates on Tomato (PKM-1) by Roll Towel Method

Isolates	Root length (cm)	Shoot length (cm)	Germination percentage (%)	Plant vigour index
PGPR - 1	11.00	7.25	85.00	1551.1
PGPR - 2	10.40	6.60	78.00	1343.3
PGPR - 3	10.00	5.00	73.00	1095.5
PGPR - 4	10.70	6.90	82.00	1408.2
PGPR - 5	09.50	4.80	72.00	1030.6
PGPR - 6	10.20	6.10	77.00	1255.4
PGPR - 7	09.20	4.70	65.00	903.57
Control	08.00	4.69	60.00	761.40

A total of seven bacterial isolates were isolated from the rhizosphere soil of Tomato fields from Cuddalore district of Tamil Nadu. these seven isolates were identified by morphological and biochemical characterization. The results of the biochemical tests performed for the identification of the native isolates of *P. fluorescens* showed that all the isolates produced similar results such as gram staining (negative), starch hydrolysis (negative), gelatin liquefaction (positive), catalase test (positive), oxidase test (positive) and fluorescent pigmentation (positive).

All the isolates showed positive results in IAA, Siderophore, hydrogen cyanide production. The seven isolates produce yellowish green to dull green pigmented colonies, Among the seven isolates PGPR - 1 recorded highest IAA (3.6), Siderophore (0.86) hydrogen cyanide production (8.13) followed by PGPR – 4, PGPR – 5, PGPR – 2, PGPR - 6 and PGPR - 3. The lowest production of IAA (2.7), Siderophore (0.74) hydrogen cyanide production(7.35) was observed in isolate PGPR - 7.

Fluorescence is an important trait for identification, characterization and grouping of fluorescent pseudomonads (Brown and Lowbury, 1968). In this study, all the seven identified gram-negative Pseudomonas isolates were found to be green fluorescent on King's B medium under ultraviolet light at 365 nm. The biochemical tests i.e gelatin liquefaction, starch hydrolysis, catalase test, oxidase test, IAA production, siderophore production and hydrogen cyanide production further confirmed the isolates to be P. fluorescens as reported by earlier workers (Tiwary *et al.*, 2007; Reddy *et al.*, 2007; Prasanna kumar *et al.*, 2009; Prakash Nathan *et al.*, 2011).

Plant growth promotion

Plant growth promoting activity of P. fluorescens isolates on Tomato (PKM-1) was studied by Roll Towel Method and the results were given in the Table - 3. Among the seven isolates The isolate PGPR - 1 (1551.0) recorded the highest plant vigour index followed by PGPR - 5 (1408), PGPR - 2 (1343.0), PGPR - 6 (1255.0), PGPR - 3(1095), PGPR - 5 (1030) and PGPR - 7(903.5) The lowest vigour index(761.40) was observed in control. The culture filtrates of selected isolates also increased the germination of rice seeds and induced the plant growth promotion under in vitro conditions. Among the seven isolates PGPR - 1 recorded the maximum germination per centage, increased the shoot length: root length and vigour index. The growth promoting substance produced by *P. fluorescens* might have exerted a synergistic action and enhanced the growth promotion of Tomato. *Pseudomonas spp.* were reported to produce amino acids, salicylic acid and IAA (Sivamani and Gnanamanickam, 1988; O'Sullivan and O'Gara, 1992) which might have improved the plant growth.

Conclusion

This study resulted in obtaining 7 fluorescent pseudomonads from the Tomato rhizosphere soil samples collected from Cuddalore Districts of Tamil Nadu. All isolates exhibited IAA, Siderophore HCN production. Among the seven isolates PGPR 1 increased germination percentage, root and shoot length of Tomato seeds. Thus, the use of PGPR as 'bio fertilizers' is a novel approach to replace chemical fertilizers and pesticides for sustainable agriculture in India.

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PRESENT CONDITIONS IN THE VISUALS OF THE FOOD-BASED DIETARY GUIDELINES: EXAMPLES FROM AROUND THE WORLD

Nazan AKTAŞ[1] Penbe Merve ÖNER[2]

[1, 2] Selcuk University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Konya, Turkey
[1]ORCID Code: 0000-0002-5400-6104
[2]ORCID Code: 0000-0002-7242-4369

ABSTRACT

Ensuring the sustainability of a healthy diet is of great importance from the point of view of community health. Thus, country-specific food and nutrition-based guidelines were established by the health authorities. This study aims to update the previous review of food and nutrition-based guidelines done by Aktaş and Özçelik in 2012 and re-evaluated the number of food groups, characteristics of visuals, portion sizes, physical activity, liquid consumption and sustainable eating recommendations given in the food-based dietary guidelines (FBDGs). This review was prepared depending on secondary data. Data was obtained from the websites of institutions such as FAO and EUFIC and earlier studies. The data obtained for the year after 2012 with keywords such as "FBGDs, Food Groups (FGs), food guide, visual samples" were categorized according to the review criteria.In this study FBDGs of the countries were analyzed. The FBDGs of the different countries FGs showed differences in terms of visual characteristics. The number of FGs of 13 countries, including Turkey, was 5, while in Greece it was 12. Conceptual visuals are preferred in Canada and Sweden. The USA's "my-plate" like guidelines observed in Canada, Mexico, Argentina, China, Lithuania, Poland, Switzerland, and Indonesia. There were differences in the grouping of FGs-such as nuts, seeds, fruits, and vegetables. The average portion recommendations for fruits and vegetables varied between countries such as Japan, Taiwan, Ireland, and China. Tips related to healthy eating, meal planning, fluid consumption, and physical activity were given. Compared to the collected data in 2012, it has been shown that there was a disposition towards plate charts in 2021, which indicated a global trend of the changed approaches about food and nutrition policies of the countries. It is concluded that evidence-based science is the role of the predecessor task of international organizations in joint recommendations on nutrition globally. However, the differences caused by policies related to health and nutritional status, dietary habits, food diversity, and food ecology might be ensured to meet in a common denominator with the global joint efforts.

Keywords: FBDGs, dietary guidelines, visuals, figures

Introduction

Maintaining health and preventing diseases can be ensured with the adaptation of sufficient and balanced nutrition and an active lifestyle are considered to be the two main components of sustaining health (WHO, 2003). Whilst health problems associated with inadequate and unbalanced nutrition, such as protein-energy malnutrition, vitamin A, iodine, and iron deficiencies, continue to be the main nutritional problems in some parts of the world, there is observed a rapid increase of the non-communicable chronic diseases correlated with overnutrition such as obesity, Type II diabetes, hypertension in other parts of the world (WHO/FAO, 1996; Keyou et. al., 2007). On the other hand, the covid-19 pandemic also underlined the importance of healthy eating (Sarıtaş, et. al., 2020). Even though throughout history, families, and communities have often been informed by the health authorities about nutrition, the formal dimension of nutrition education based on the findings of nutritional science, and cultural eating patterns are thought to occur with the beginning of the publishment of the Food Guides by the health authorities (Contento, 2011). The visuals of FBDGs are easy to understand, science-based guides that give a positive message about healthy eating and lifestyle and whose purpose is to protect individuals from all forms of poor nutrition by providing healthy nutrition. FBDGs are an essential resource for the preparation of basic nutrition education and communication (Aktaş, 2011; FAO, 2021;).

The visual charts of FBDGs are recommended to be presented in a categorized manner for a better understanding of society. In addition, FBDGs provides a practical explanation of healthy eating recommendations, amount daily food portion consumption, and presented in a categorized manner for a better understanding of the society through visual expressions (Murphy & Barr, 2007; Yoshiike et. al., 2007; Aktaş, 2011; Kızıltan, 2015; TÜBER, 2015; FAO, 2021).

In the dissemination of scientifically based nutrition information in society, nutritional guides are important educational tools and are often used to help people understand the principles of nutrition (WHO/FAO, 1996; Painter, et. al. 2002). The organizations such as the World Health Organization (WHO) Food and Agriculture Organization (FAO), publish FBDGs for the development of nutrition policies in the communities which play an important role in societies healthy eating habits (Willett & McCullough 2008; WHO, 2003). These guidelines contain recommendations on nutrients, food groups, and dietary patterns and provide the necessary recommendations to the general public to maintain health and protect against chronic diseases. The main goal of the nutrition guidelines can be summarized as the development of a healthy diet, making healthy food choices easier, providing science-based nutrition, preparing meals that are associated with health problems, and helping contribute to efforts aimed at their prevention (Yoshiike, et. al., 2007). In the preparation of FBDGs, WHO and FAO take part as auxiliary organizations in the development, revision, and implementation of member states in accordance with scientific evidence. FAO and WHO have been promoting FBDGs concept since the International Nutrition Conference held in 1992. At this conference, strategies and actions aimed at improving nutritional well-being and nutrient consumption were defined for the whole world, the "Nutrition Action Plan" prepared after the conference was presented to countries as a "World Declaration" and signed by 159 states (FAO & WHO, 1992). The need for FBDGs arose from the challenges of globalization, urbanization, changes in lifestyle, and food provision. The Purpose of the FBDGs is to provide the daily nutritional requirement by consuming certain portions from various food groups in accordance with the principles of adequate and balanced nutrition (Aksoy, 2007). Some of the presumed purposes of the FBDGs were presented in the Box 1 below (Aktaş, 2011; FAO, 2021).

Box 1. Some of the presumed purposes of the FBDGs

Improving healthy eating
Facilitating healthy food choice
Dissemination of scientifically based nutritional information
Contributing to studies aimed at preventing health problems related to nutrition
Helping with meal planning
Contributing to the development of ecological and sustainable eating habits

FBDGs to help consumers understand the principles of nutrition, nutrition and the Prevention of health problems related to contribute to the development of healthy nutrition and healthy food selection and meal planning. All these factors, on the one hand, have led to the loss of eating habits and traditional food culture, and on the other hand, have led to the increase of marketing products with low nutritional value. This situation has also revealed the importance of the need for simple and practical guides that will allow societies to elect healthier options for most countries also have interactive web pages, brochures, posters, handouts and other information resources for health and nutrition professionals and consumers (FAO, 2021). This study aims to update the previous review of food and nutrition-based guidelines done by Aktaş and Özçelik in 2012 and re-evaluated the number of food groups, characteristics of visuals, portion sizes, physical activity, liquid consumption and sustainable eating recommendations given in the food-based dietary guidelines (FBDGs).

Material and Method

This review was prepared depending on secondary data. Data was obtained from the websites of institutions such as FAO and EUFIC and earlier studies. The data obtained for the year after 2012 with keywords such as "FBGDs, Food Groups (FGs), food guide, visual samples" were categorized according to the review selection criteria, which indicated the necessity of the visuals of the official FBDGs for each country. Portion size, physical activity, and liquid consumption recommendations of the FBDGs were re-evaluated. In addition, attention was also drawn to FBDGs based on sustainable eating habits and recommendations for restricting animal products aimed at reducing greenhouse gas emissions.

Results and Discussion

FBDGs listed in Figure 1 and sorted by continent as in FAO's website (FAO, Food-based dietary guidelines, 2021). It was found that the FGs of the countries differed in terms of visual characteristics and FGs and the number of FGs in FBGDs ranged from 4 to 13. When the FBGDs of 47 countries were analyzed, it has been shown that 13 of the countries used 5, 17 of the countries used 6, 1 of the countries used 8, 3 of the countries used 9, 1 of the countries used 12, 1 of the countries used 13 Food Groups. Moreover, it was found that the number of FGs in the FBGDs of thirteen countries, including Turkey, was 5, while in France it was 13, and in the FBGDs of Canada and Sweden, the concept of meals was used instead of FGs. It has been observed that similar examples of the nutrient plate used in the United States, as well as Canada, Mexico, Argentina, China, Lithuania, Poland, Switzerland, and Indonesia, were used in June 2011, replacing the nutrient pyramid in the United States. However, water consumption and physical activity were also underlined in the updates of the guides. In this study, it was also found that there are differences in the grouping of nutrients contained in FBGDs. Fruits and vegetables are given as separate groups, as well as a single group. Oilseeds can be included in the group of legumes, as well as in the meat-egg group. FGs of the FBGDs were represented with different colors, green, vegetable group, Fruit Group servings of red and pink colors of the preferred daily amount recommended to be consumed in some countries (e.g., Japan, Taiwan, and China) and showed that there are differences in the number of servings take place in FBGDs. In addition to FGs, healthy eating, meal pattern, fluid consumption, and physical activity tips were found to be included in FBGDs. BR when examined in terms of visual characteristics, the pyramid of 22 countries, the plate-circular chart of 15 countries, the traditional figures of 8 countries (e.g., China, Japan, Saudi Arabia, Qatar, etc.), while the other 2 countries made it to my list in the form of rectangular posters.

Most guides that have been created by countries all around the world shared many c. In this manner, many emphasize diversity, encourage increased consumption of plant foods (especially vegetables and fruits), as well as restrict the intake of fats, salt, and sugar. It has been observed that vegetables are usually shown in green, and fruits are shown in red. Although it has been noted that the preference of the rainbow in the figures of the Canada's FBDGs coincides with the recommendation to eat in different colors, so that diversity in nutrition can be achieved. Nevertheless, all FBDGs contain original features that address the needs of their country's population. According to a study conducted in 47 countries in the World Health Organization Europe Region in 2002, countries included nutritional diversity in their dietary guidelines; daily bread and cereal intake recommendations ranged from 2-4 servings/day to 8-10 servings while in many countries vegetable and fruit intakes ranged 3-5 servings to 5-9 servings per day. Furthermore, in most of the countries 30 minutes of physical activity recommended, while daily fat intake suggested to be less than 30% of the daily energy intake and saturated fat was suggested to be less than 10% of the total fat intake (Murphy and Barr, 2007; Yoshiike et al., 2007; TÜBER, 2015; FAO, 2021). Moreover, it has been observed that unlike in 2012, in Iceland, China, Indonesia and, Switzerland, FBDGs have been prepared in accordance with dietary needs that are likely to change specific to different populations.

Conclusion

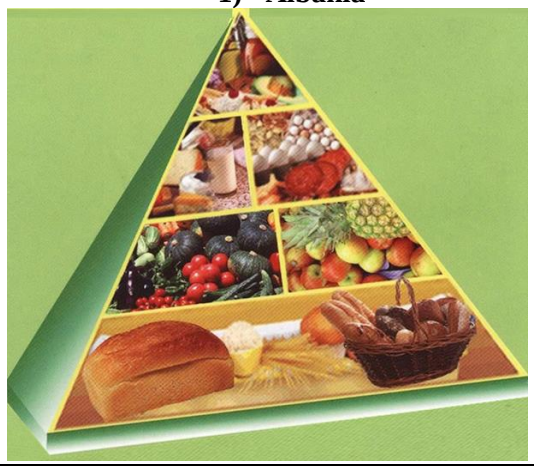
It is concluded that evidence-based science is the role of the predecessor task of international organizations in joint recommendations on nutrition globally. However, the differences caused by

policies related to food, dietary habits, and cultural characteristics might be ensured to meet in a common denominator with the global joint efforts.

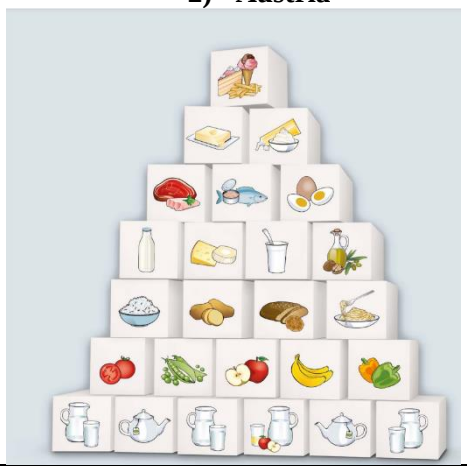
There has been significant progress in attempts by countries to develop and update FBDGs for various purposes, such as informing their populations about healthy eating and food choice. These initiatives will be useful in terms of reference resource use in nutrition communication and consultation of all relevant stakeholders, especially dietitians.

Figure 1. FBDG images of 47 countries around the world

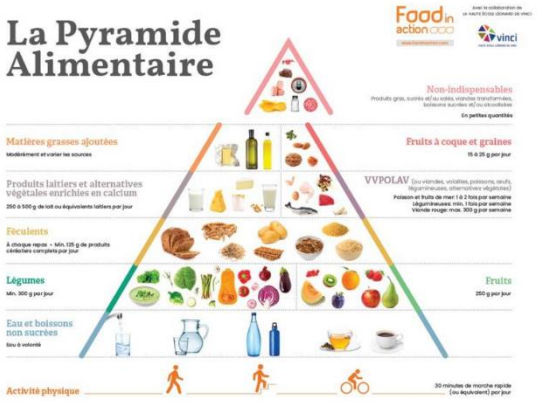
1) Albania



2) Austria



3) Belgium



4) Bosnia and Herzegovina



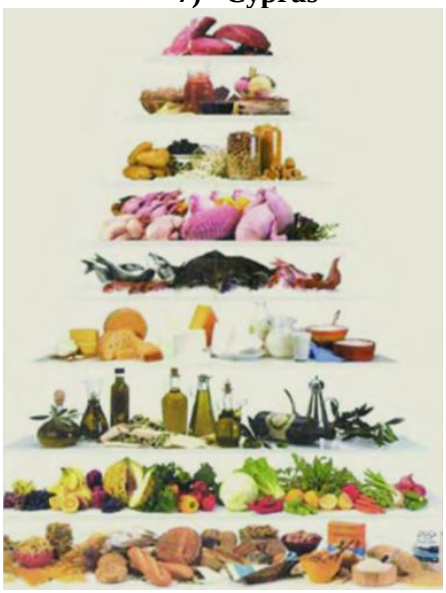
5) Bulgaria



6) Croatia



7) Cyprus



8) Denmark



9) Estonia



10) Finland



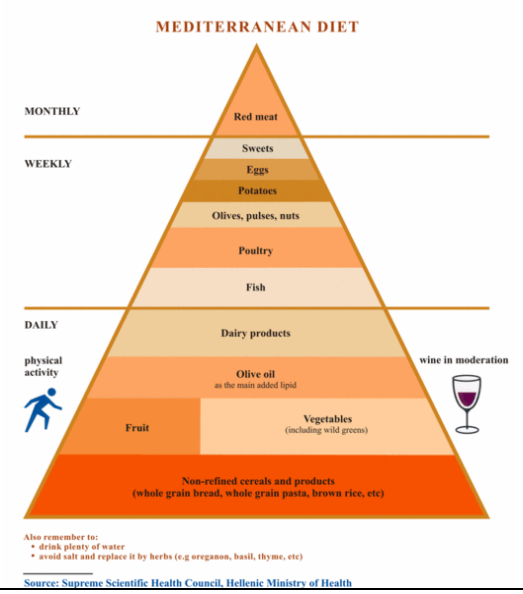
11) France



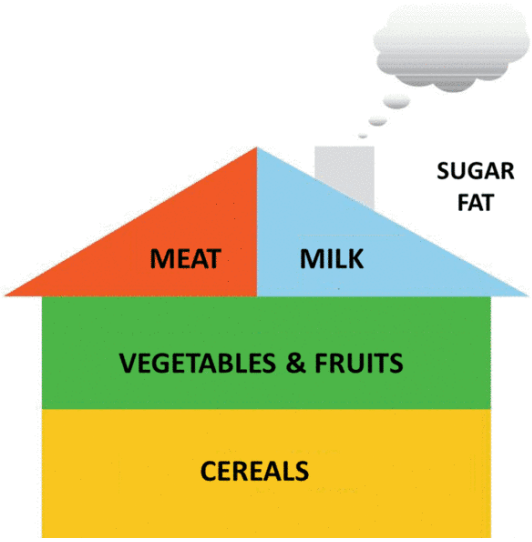
12) Germany



13) Greece



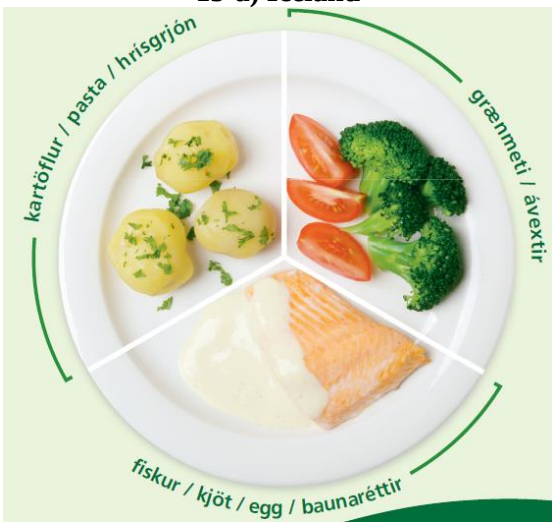
14) Hungary



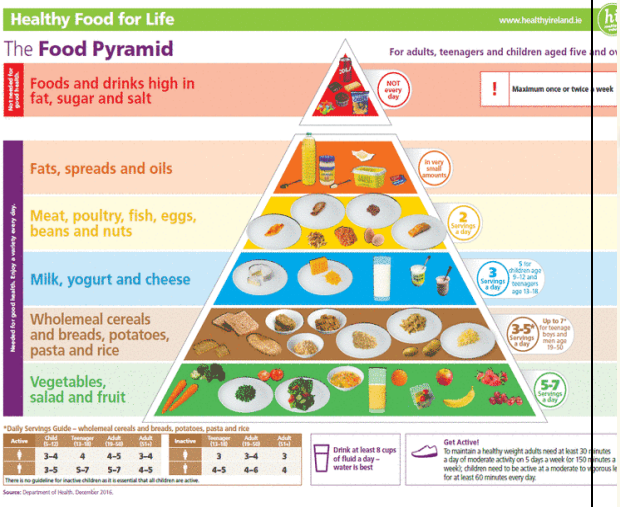
15) Iceland



15-a) Iceland



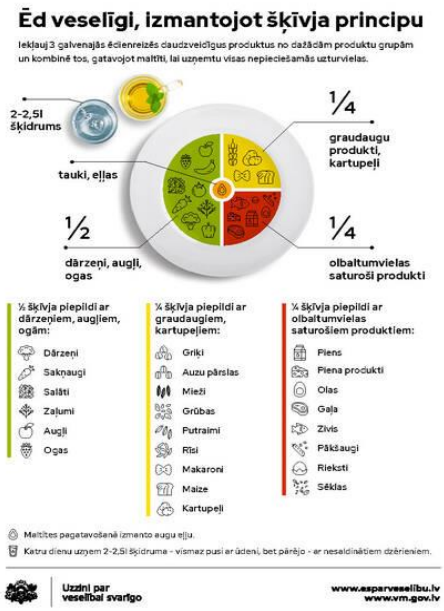
16) Ireland



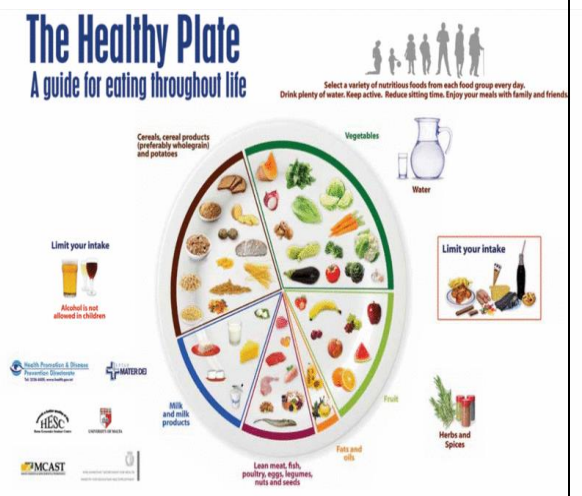
17) Israel



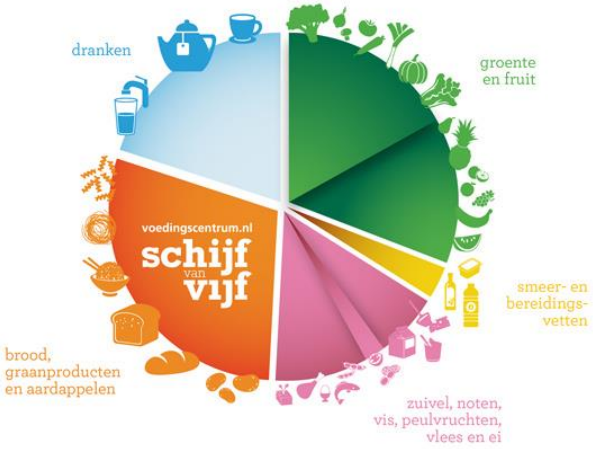
18) Lithuania



19) Malta



20) Netherlands



21) Poland



22) Portugal



23) Romania



24) Slovenia



25) Spain



26) Sweden



27) Switzerland



27-a) Switzerland



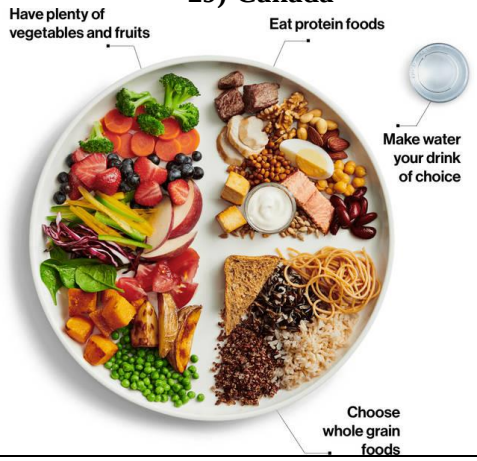
27-b) Switzerland



28) Turkey



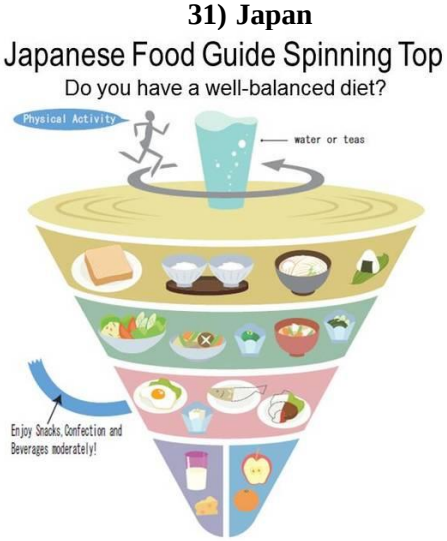
29) Canada



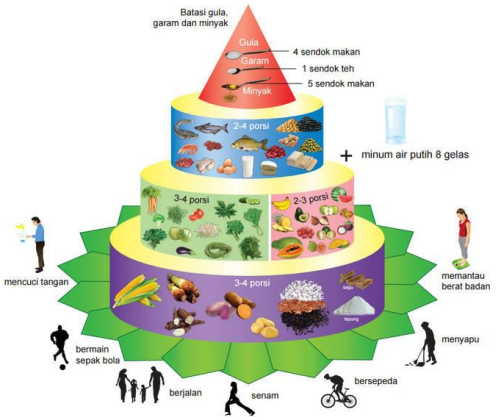
30) USA



31) Japan



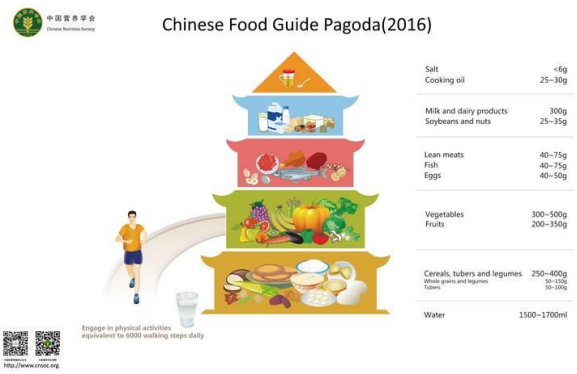
32) Indonesia



32-a) Indonesia



33) China



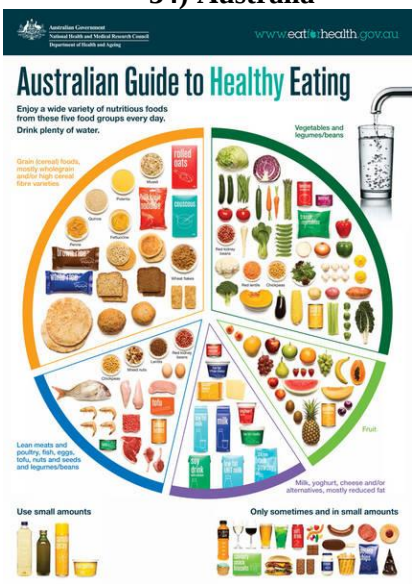
33-a) China



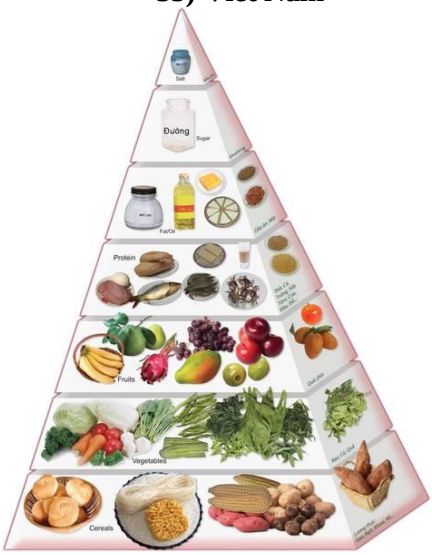
33-b) China



34) Australia



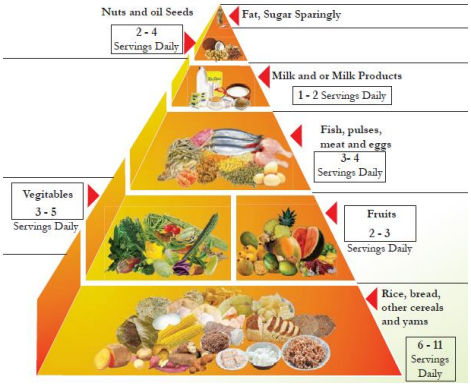
35) Viet Nam



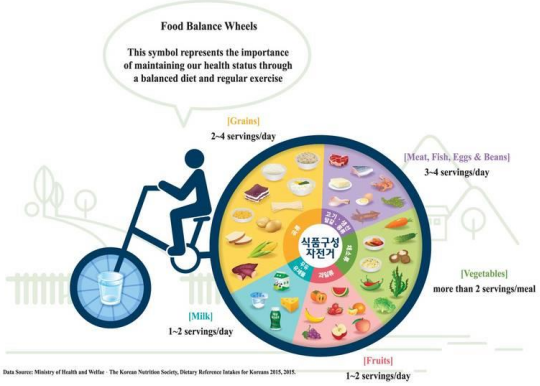
36) Tailand



37) Sri-lanka



44) Republic of Korea



38) Philippines



39) Saudi Arabia



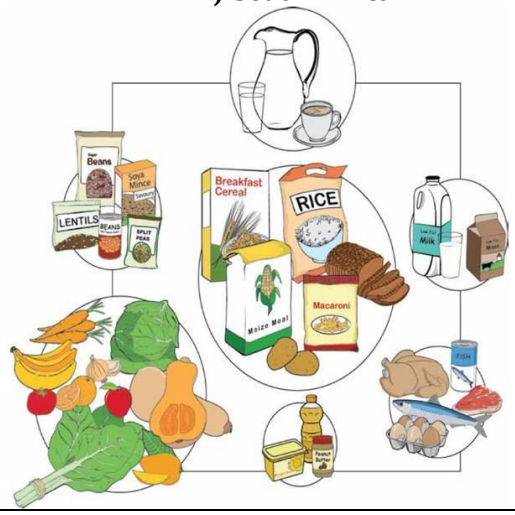
40) United Arab Emirates



41) Qatar



42) South Africa



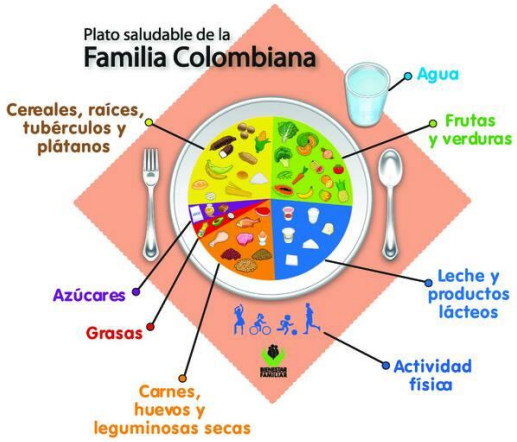
43) Namibia



44) Argentina



45) Colombia



46) Mexico



47) Venezuela



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TASK SCHEDULING IN FOG-INTEGRATED CLOUD ENVIRONMENT

Satveer Singh[1]*, Deo Prakash Vidyarthi[2]

[1]Jawaharlal Nehru University, Research Scholar, School of Computer and Systems Sciences, New Delhi, India

[2]Jawaharlal Nehru University, Professor, School of Computer and Systems Sciences, New Delhi, India

ABSTRACT

Fog computing, an emerging technology, extends the Cloud computing services within the network edge's in the close vicinity of the request generation. It can improve network bandwidth usage, respond faster to real-time requests generated by the Internet of Things, and provide heterogeneous resource services. Resource management has always been an important area of research ever since Cloud came into existence. Its importance and complexity increase further while considering Fog as it has to handle real-time requests. A substantial amount of work is done in resource allocation of real-time and non-real-time requests on Fog and Cloud separately. However, many available provisioning methods ignored the user side parameters such as deadline, request size, etc. In this work, we propose a resource allocation approach named Parameter Matching of Real-time and Non-real time Applications (PMRNA) using parameter values given by the user and resource information collected in the form of a matrix by the broker. The parameters considered for real-time request handling are request size and deadline, and for non-real-time requests are processing element(PE), RAM size, and bandwidth (BW) capacity. Fog resource information is collected as the processing capacity of fog nodes, and VM configuration (for PE, RAM, and BW) is organized in three matrices as cloud resource information. The proposed approach of resource allocation for Fog-integrated Cloud is to be evaluated in CloudSim simulator by simulating several combinations of real-time and non-real-time requests; and varying Fog and the Cloud resource configuration. The performance study of the proposed approach will be evaluated in terms of average execution time, average delay, average turn-around time and resource utilization of real-time and non-real-time requests in the integrated environment of Fog and Cloud.

Keywords: Fog Computing, Cloud Computing, Internet of Things (IoT), Real-time task, and non-Real-time task.

INTRODUCTION

With the growing age of Information Technology (IT), the amount of raw data is growing and so its requirement for fast computation. Cloud computing, as a business model in the online delivery of IT services, has supported it at the backend. The reach of IT benefits such as computation of processes, data storage, and network-based services had extended. Cloud paradigm has helped a lot in computing. But, cloud-based services may need more time to respond and are sometimes not feasible for requests which require ultra-low latency. Vast data generation, demands for low-latency, high-bandwidth, and geographical dispersion strains new technology to remove the limitations of the Cloud. Fog computing, initially discussed by CISCO, addresses these challenges as mentioned above. It fills the space between the Cloud and IoT connected on the network by enabling computing, storage, and networking infrastructure within the network edge's close vicinity.

Fog computing uses a three-tier architecture that sits between the Cloud and the Internet of Things. Both Cloud and Fog systems employ distributed computing, however Cloud is more centralized than Fog in comparison. Datacenters (DCs), which are fixed and operated by DC owners, are used in the Cloud computing model. However, with the Fog computing architecture, any device having computational or storage capacity (such as a router, switch, or other network device) might be a Fog device (Tordera et al. 2016). Because of the heterogeneity of Fog devices, there are several resource owners in the Fog computing architecture. They are causing problems with resource supply approaches in the Fog computing paradigm rather than the Cloud computing paradigm.

Resource management is crucial for business models like Cloud and Fog, as their success depends on the efficiency of their resource provisioning methods. Its importance increases even more in IoT environments, which generates real-time and sometimes non-real-time data. The parameters like the deadline, request size, number of cores, memory, etc., provided by the user, plays a vital role in the accomplishment of a better resource allocation policy and Quality of Service (QoS) in terms of response time, execution time prediction, and resource availability. But some downsides in such an architecture are as follows, which have been recognized in (Naha et al. 2020). The Authors of (Naha et al. 2020) proposed a resource allocation and provisioning method considering the dynamic changes in users' requirements without including parameters from the user side in a Fog-Cloud integrated environment. And, also the provisioning algorithm is designed only for smart vehicle systems.

Moreover, a substantial amount of work is done in resource allocation of real-time and non-real-time requests on Fog and Cloud separately. But, a centralized broker policy in the integrated environment of Cloud and Fog can handle both the requests together, need attention. With this, we mean a resource allocation policy of the centralized hybrid broker capable of handling both real-time requests generated by the IoT devices and non-real-time requests for cloud datacenters. It will lead to minimizing the complexity of separate request handlers in Fog-Cloud integrated architecture. The broker will have the information of the Cloud and Fog resources in the broker database and user requests with parameter values to make resource allocation easier.

In this paper, we proposed a centralized hybrid broker policy PMRNA (Parameter Matching of Real-time and Non-real time Applications) for resource allocation, which uses parameter values given by the user and collects resource information in the form of a matrix, unlike the work done in (Naha et al. 2020), which doesn't have any provisioning of parameter values from the user side. The objectives are to minimize the response time of the IoT requests, reduce average execution time, delay, turn-around time and better resource utilization at both Fog and Cloud layers.

This paper is organized in the following manner: Section 2 describes the related work whereas section 3 defines the framework of the proposed model. Conclusion and future work are discussed in the section 4.

RELATED WORK

In this section, we state the research gaps.

The authors developed a resource allocation approach for parallel jobs constituted of a group of separate tasks in their work (Shi, Zhang, and Robertazzi 2017). Their goal with their allocation approach is to reduce Job Completion Time and Energy Consumption. To tackle single work scheduling, they created three algorithms: Task Placement and Resource Allocation (TaPRA) and its simplified counterpart TaPRA-fast. To schedule multiple jobs online, they also propose an online scheduler named Online TaPRA (OnTaPRA). In addition, the authors presented a TIMER-Cloud for resource allocation of time-sensitive applications in their publication (Begam, Wang, and Zhu 2020). Prioritize user requests depending on their deadlines and resource requirements (like VM with operation time). They suggest three methods for prioritizing based on heuristics: a) The Time-sensitive Resource Factor (TSRF) allocates user requests based on the deadline provided and the efficiency of resource usage; b) The Dominant Share (DS), an extension of TSRF, allocates the most demanded resources by request for balanced resource usage; and c) A unified k-EDF (Earliest Deadline First) scheme integrates EDF and TSRF/DS to meet the request deadline and improve resource utilization.

The research (Liu et al. 2018) provides an evolutionary computing model that intends to improve energy usage by reducing the number of active physical servers by assigning unused servers. They create an ACS-based strategy with local search for order exchange and migration (OEM), effectively reducing the number of active servers. They used their algorithm OEMACS to arrange different-sized virtual machines on homogeneous and heterogeneous servers in the Cloud. The research (Faragardi et al. 2018) provides a resource provisioning approach that is capable of allocating real-time periodic requests in cloud datacenters while being energy conscious. Their provisioning strategy, which is favored for big datacenters, outperforms RT-OpenStack in terms of energy usage, number of used servers, and average

utilization. The RT-OpenStack is a variant of OpenStack that is time-predictable. The authors suggested a Delay-based Workload Distribution (DBWA) method to address the problem of energy-efficient and delay-guaranteed workload allocation across local edge servers, neighbor edge servers, and Cloud servers in (Guo, Li, and Guan 2019). The DBWA algorithm was created using the Lyapunov drift-plus-penalty theory. The authors suggested the First of Maximum Loss method in their article (Liang et al. 2020) to get minimal energy consumption of Cloud clusters by distributing resources using a loss comparison rule. If the cluster size and number of requests are larger, this form of scheduling is more precise. The suggested scheduling approach outperforms the Max-Min, Min–Min, Suffrage, and E-HEFT algorithms in terms of performance. They were able to achieve the shortest average completion time, load balance, and energy usage.

In (Jamil et al. 2020), the authors suggested a Fog computing scheduling approach for scheduling requests generated by Internet of Things devices on Fog nodes to achieve lowest latency and network use. In terms of latency and network use, their scheduling technique outperforms FCFS. Their scheduling approach was tested using the iFogSim simulator. Similarly, the Lyapunov drift plus-penalty function is employed as a scheduling strategy to distribute the Fog nodes in the study (Mukherjee et al. 2020). They execute the maximum number of jobs in the shortest amount of time possible by offloading work to underutilized fog nodes for greater resource usage. In the event of various request delay-deadlines, their scheduling strategy works better. The authors of (Li et al. 2019) take into account task heterogeneity such as task type and deadline. Offloading, buffering, and resource allocation were presented as three simultaneous techniques for allocating the Fog resource. The task offloading mechanism prioritizes activities according on their importance, such as laxity time, deadlines, and projected execution times. At the Fog layer, the buffering process reorders incoming requests based on their laxity time and projected execution time. Finally, in order to avoid task starvation, resource allocation is based on Lyapunov drift. The authors obtain excellent task completion throughput while minimizing task starvation. The authors suggest a Task Classification and Virtual Machines Categorization (TCVC) approach to enhance static (Max-Min) job scheduling strategies based on task priority in their work (Aladwani 2019). Incoming requests are assigned a high, medium, or less critical status dependent on the health of the patient. To investigate the influence of the suggested technique on the Max-Min algorithm, the total execution time, waiting time, and end time are taken into account.

For a multitier Fog architecture, a solid service placement technique is proposed in (Tran et al. 2019) that supports IoT services like intelligent transportation systems. Their proposed service provisioning method is effective in terms of Fog resource utilization, latency, energy consumption, load on the network, and overall operational cost. The authors presented a UbiComp system consisting of Edge, Fog, and Cloud computing layers to compute periodic tasks within a set deadline in their publication (Saraswat et al. 2020). To reduce energy usage, a proportion of each incoming request is estimated to assign at each tier. The results of the experiments indicate how data amount, deadline, network architecture, and sensor type affect the system's reaction time, energy usage, and accuracy. The authors devised and put an intelligent and adaptable learning-based task scheduling method between the IoE layer and Fog nodes in (Murtaza et al. 2020) to assign time-sensitive IoE jobs between the IoE layer and Fog nodes. Their suggested scheduling strategy, which is based on an analysis of request needs, delivers an available Fog node and is superior in terms of energy usage and service quality.

To solve the challenge of providing deadline-based dynamic user requirements, the authors suggested a method that uses resource ranking and provisioning resources in a hybrid and hierarchical form in their work (Naha et al. 2020). Processing power, bandwidth capacity, and reaction time are the three factors used to rate resources. With an increasing number of application submissions, the experimental findings show that their approach surpasses previous algorithms in terms of overall data processing time, instance cost, and network delay.

The main contribution of this paper is the optimal allocation of Fog and Cloud resources simultaneously by designing a centralized hybrid broker policy PMRNA. The prime objectives are to minimize the response time of the IoT requests, reduce average execution time, reduce delay, and better resource utilization at both Fog and Cloud layers. The critical challenge is the heterogeneity of the Fog nodes.

This work converges both the Fog and Cloud resources for allocation using a centralized hybrid broker policy, which is a challenge due to the dynamic behaviour of user requirements and uncertainty of fog nodes. Prior research articles have not considered resource allocation using a hybrid broker in the Fog-integrated Cloud architecture. It is challenging to allocate resources for both real-time and non-real-time simultaneously.

THE PROPOSED MODEL

The centralized hybrid broker is the mediator between the service providers (like Fog and Cloud infrastructure) and the service consumer (like IoT generated requests, requests for computation or storage), which works based on a predefined service level agreement (SLA). Requests generated for real-time processing are placed at the Fog layer, and requests without any time deadline are forwarded towards Cloud datacenters. As we know, the Fog nodes are limited in capacity and nearer to the client; hence, they are responsible for real-time data handling, which has low latency requirements. On the other hand, the Cloud datacenters are used to process requests with high computation and storage requirements. The workflow of our proposed approach is depicted in Figure 6.

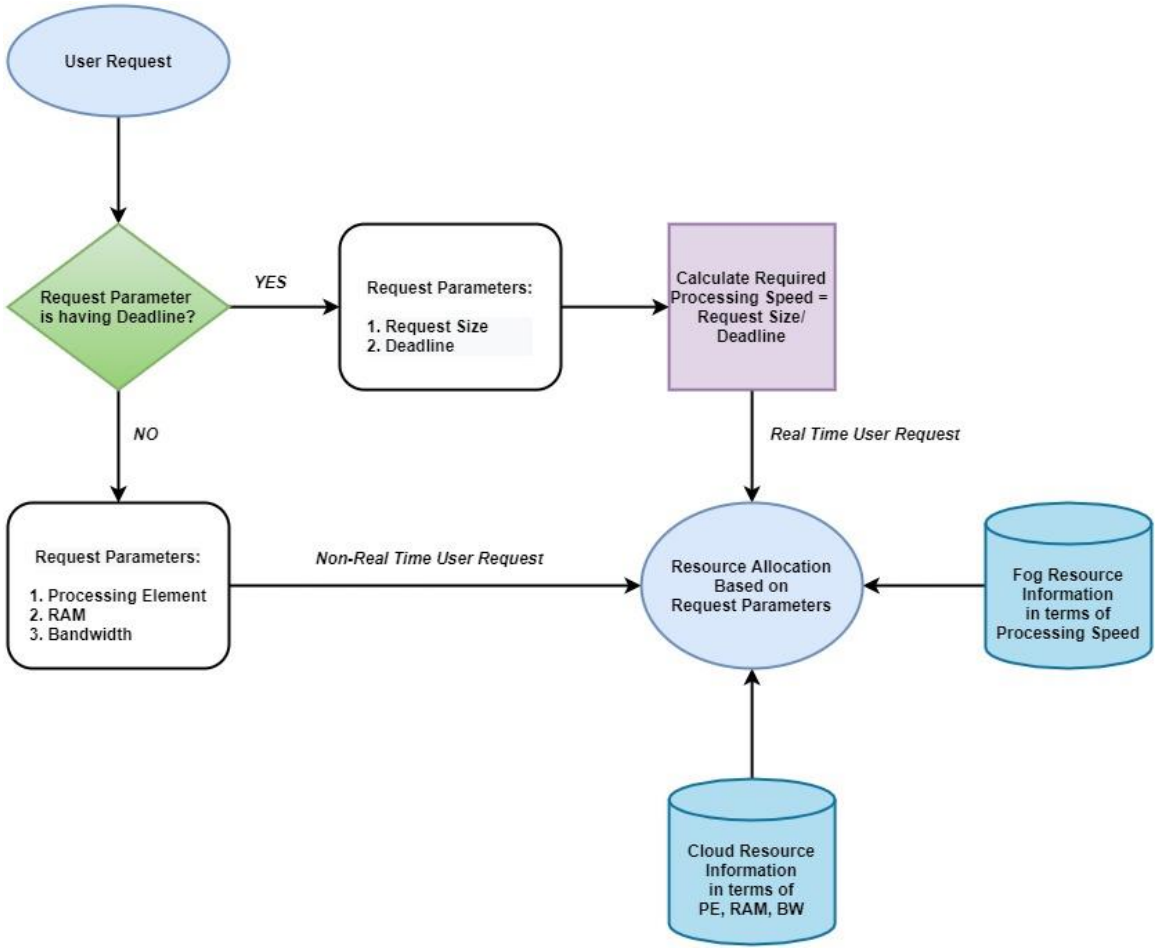


Figure 6. Process Flow of the Proposed Model

The deadline parameter of a user request will differentiate it into real-time and non-real-time. Initially, a real-time request has two parameter values: request size and the deadline. The deadline parameter indicates the maximum time in which the real-time request needs to be completed. The required processing capacity by a real-time request is calculated with the help of the parameters mentioned above in figure 1. Based on the estimated processing capacity, the broker will select an appropriate Fog node

with the same processing capacity for mapping. Whereas non-real-time requests have three parameter values: number of processing elements (PE), RAM size, and bandwidth (BW) capacity. The centralized hybrid broker has information of both resource types, i.e., Fog resources and Cloud resources. The centralized hybrid broker will allocate real-time requests to the Fog node and non-real-time requests to Cloud VM's based on the parameter values.

The System Model

Figure 7 shows the proposed system model for Fog-integrated Cloud architecture. Users' requests are first submitted to a centralized hybrid broker with respective parameter values. The centralized hybrid broker manages information of both requests and resources.

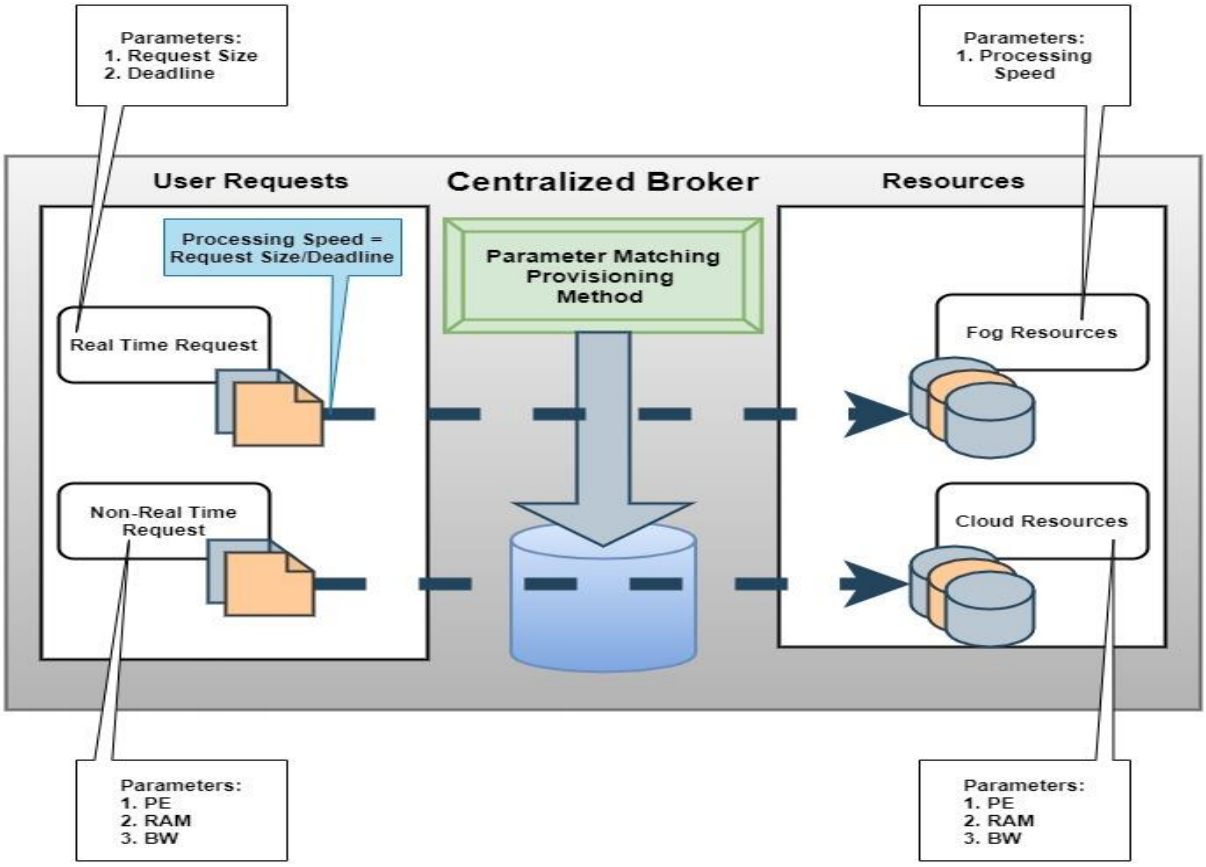


Figure 7. The System Architecture

The real-time request will forward to the Fog node, which has the required processing capacity to process the request within the deadline. The centralized hybrid broker will collect the Fog resource information in the form of the processing speed of a Fog node. The processing speed of a Fog node is based on its number of cores because they are directly proportional to each other. The memory parameter for real-time requests is ignored in our model because of its lower requirement. Non-real-time requests will pass to the Cloud datacenter for processing based on the information of VM parameters. The centralized hybrid broker work on the provisioning of perfect parameter matching, which will lead to better available resource utilization avoiding any under/over utilization of resources. It also ensures minimum request failure by allocating resources to the request based on their exact requirements.

The Algorithm

The centralized hybrid broker will consider the following steps to map the resources in the Fog-integrated Cloud architecture.

Step 1: In the first step, the broker will check the parameter of an incoming request and categorize it into real-time and non-real-time. If a user request has deadline as a parameter, the broker will consider it a real-time, otherwise non-real-time request.

Step 2: In the case of a real-time request, the broker will estimate the required processing capacity to execute the request within the deadline by using request size and deadline parameters. After getting the processing capacity required by request, the broker will map the real-time request to the Fog node with the same processing capacity by referring to the information matrix of Fog nodes.

Step 3: Else, the non-real-time request will map to the virtual machine with the same configuration of the parameter value of PE, RAM, and BW.

The Cloud and Fog resources will update when allocated and get freed after processing to solve inconsistency in information matrices.

Broker Algorithm for Resource Mapping

Resource provisioning in Fog-integrated Cloud is challenging because of the simultaneous allocation of real-time and non-real-time user requests. We have allocated real-time and non-real-time requests using the IF-ELSE statement in our approach. If an incoming request has deadline as a parameter. In that case, the broker will check the information matrix of Fog resources referring to their processing capacity in matrix MF[i][k], here "i" represents the processing capacity of Fog node "k". For example, if a real-time request having parameter values; request size 1Million instructions and the deadline is 1second to complete, then the required processing capacity is calculated as request size/deadline, i.e., i=1 MIPS. The broker will choose a Fog node with the processing capacity of 1MIPS using the Fog information matrix and map the request to the respective Fog node k=2 (let).

Algorithm 1: Broker Algorithm

Input:

- Parameter values of request size, deadline, p (Number of PEs), r (RAM size), b (Bandwidth capacity) given by the user.
- VM's configuration in terms of p, r, b.
- Fog node's configuration in terms of i (Processing capacity/speed).

Output: A map between fog nodes/VMs and user requests

Begin

- Initialize request_completed ← False
- Initialize matrix M_F [i][k] for information of Fog resources // M_F [i][k]: Information matrix of Fog node with its processing speed
- Initialize matrix M_P [p][k], M_R [r][k], M_B[b][k] for information of Cloud resources // M_P [p][k]: Information matrix of VM with its processing element, M_R [r][k]: Information matrix of Fog node with its RAM size, M_B[b][k]: Information matrix of Fog node with its bandwidth capacity
- If (user request is having deadline as parameter)
- For number of fog nodes k = 0 to n-1 // n: Number of Fog nodes, k: Fog Node id
- If (M_F [i][k] == 1)
- allocate fog node k to user request
- End If
- End For
- End If
- Else
- For number of VMs k=0 to m-1 // m: Number of VMs, k: VM id
- If (M_P [p][k] ==1 && M_R [r][k] ==1 && M_B[b][k] == 1)
- allocate VM k to user request
- End If
- End For
- Call Updation of resource and request

End

In the case of a non-real-time request, the broker will check the information of Cloud resources in three matrices of PE, RAM, and BW. The matrix $M_P[p][k]$ denotes the information matrix of PE resources of Cloud datacenter, here "p" represents the number of processing elements having by the virtual machine (VM) "k". The matrix $M_R[r][k]$ represents the information matrix of RAM size; here, "r" is the RAM size of VM "k". And, the matrix $M_B[b][k]$ denotes the information matrix of BW capacity, here "b" is the BW capacity of VM "k". For example, a non-real-time request has the parameter values PE=1, RAM=2046, BW=100. The broker will choose a common VM id by referring to the information matrices M_P, M_R, and M_B; and map the request to VM with the same parameter values.

Update Algorithm

The update algorithm **2** is responsible for eliminating the inconsistency of allocated and available resources by maintaining resource information in the form of matrices.

The matrix $M_F[i][k]$ is representing information of Fog nodes (k=0 to n-1) with processing speed i and Table 2 shows the possible processing speed of the Fog nodes.

$$M_F[i][k] = \begin{array}{c} \\ i=0 \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{cccccc} k=0 & 1 & 2 & 3 & .. & n-1 \end{array} \\ \begin{bmatrix} 1 & 0 & 1 & 0 & .. & 0 \\ 0 & 1 & 0 & 0 & .. & 0 \\ 0 & 0 & 0 & 1 & .. & 0 \\ 0 & 0 & 0 & 0 & .. & 1 \end{bmatrix} \end{array}$$

Here,
i represents processing speed of Fog node k and 1/0 represents availability and unavailability of Fog node

Figure 8. Representation of Resource Information Matrix of Fog Nodes

Table 1: Possible Processing Speed of a Fog Node

i	0	1	2	3
Processing speed	250 MIPS	500 MIPS	1000 MIPS	2000 MIPS

Similarly, in Figure 9, the matrix M_P, M_R, and M_B represents the information of PE, RAM and BW of VM (k=0 to m-1) at Cloud datacentre respectively.

$$M_{P/R/B}[p/r/b][k] = \begin{array}{c} \\ p/r/b=0 \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{cccccc} k=0 & 1 & 2 & \ldots & m-1 \end{array} \\ \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

Here,
p, r, b represents PE, RAM, BW capacity of VM k and 1/0 represents availability and unavailability

Figure 9. Representation of Resource Information of Cloud

In the Figure 8 and Figure 9, the matrix values 1 and 0 represents the availability and unavailability of resources respectively. Table 3 shows the possible values of PE, RAM, and BW capacity of a VM at Cloud datacentre.

Table 2: Possible Number of PE, RAM Size and BW Capacity of VMs

p/r/b	0	1	2	3
Processing element (p) in cores	1	2	4	8
RAM size (r) in Bytes	1024	2046	4096	8192
Bandwidth capacity (b) in mbps	100	200	300	500

The above-mentioned matrices of Fog and Cloud resources will be updated in case of allocation and de-allocation as per algorithm 2. When a resource is allocated to a user request, the respective value of resource will be turned from 1 to 0 and vice-versa after request completion.

Algorithm 2: Updation of resource and request

Input:

- M_F, M_P, M_R, M_B.
- User requests

Output: Updated matrices and requests

Begin

- If (user request is having deadline as parameter)
- If (request_completed == True)
- MF[i][k] ←1
- End If
- Else
- MF [i][k] ← 0
- Else If (request_completed == True)
- MP [p][k] ←1, MR [r][k] ←1, MB[b][k] ←1
- Else
- MP [p][k] ←0, MR [r][k] ←0, MB[b][k] ←0

End

In the case of real-time requests, the matrix M_F[i][k] value 1 will be 0 when the request is allocated a Fog node and 0 to 1 when freed. Similarly, when the request is non-real-time, the matrices M_P[p][k], M_R[r][k], and M_B[b][k] value 1 will turn into 0 and 0 into 1, in case of allocation and de-allocation respectively.

CONCLUSION AND FUTURE WORK

A novel idea of task scheduling has been introduced in this work. The proposed work takes care of both real-time and non-real-time tasks for its allocation in Fog-integrated Cloud architecture. It considers various performance metrics to study the performance of the proposed method. It also considers the full utilization of both fog and cloud resources. We are in process of conducting the experiments so that our proposed model can be well justified. For this, a well-known simulator CloudSim is being utilized.

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PRODUCTION OF WASTE GRASS ADDED GEOPOLYMER INSULATION BOARD

İsmail Demir
Afyon Kocatepe University, Engineering Faculty
Department of Civil Engineering Afyon.
ORCID Code: 0000-0001-8493-0309

Cüneyt Doğan
Afyon Kocatepe University, Engineering Faculty
Department of Civil Engineering Afyon.
ORCID Code: 0000-0002-6662-8381

ABSTRACT

Portland cement causes global warming and environmental pollution due to the high carbon emissions caused by the fossil fuels used in its production. The cement industry is responsible for about 5% of total CO2 emissions worldwide, which is the main cause of global warming. The use of geopolymer concrete instead of Portland cement concrete offers a viable solution to environmental problems to reduce CO2 emissions and conserve natural resources. For this purpose, intensive researches are carried out on the use of geopolymer mortars as an alternative material instead of cementitious mortars. Geopolymer concrete is an innovative type of concrete produced by the alkali activation reaction of inorganic molecules. In this study, metakaolin was used as a solution-prepared alumina/silicate source, which provides activation with sodium silicate and sodium hydroxide, in order to produce environmentally friendly insulation material. In the study, it was aimed to create a fibrous and light body by adding waste grass in certain proportions to the geopolymer mortar prepared in a fluid consistency. The light-textured geopolymer mortar samples poured into the moulds were cured in an oven at 65°C for 8 and 24 hours. The physical and mechanical properties of the samples were evaluated by examining them. As a result, the conditions for the production of waste grass added geopolymer insulation board were determined.

Keywords: Metakaolin, Geopolymer, Waste Grass, Insulation Material.

ATIK ÇİMEN KATKILI GEOPOLİMER YALITIM LEVHASI ÜRETİMİ

ÖZET

Portland çimentosu, üretiminde kullanılan fosil yakıtların neden olduğu yüksek karbon emisyonu nedeniyle küresel ısınmaya ve çevre kirliliğine yol açmaktadır. Çimento endüstrisi, küresel ısınmanın ana nedeni olan dünya çapındaki toplam CO_2 emisyonunun yaklaşık %5'inden sorumludur. CO_2 emisyonunu azaltmak ve doğal kaynakları korumak için Portland çimentosu betonu yerine geopolimer betonun kullanılması, çevre sorunlarına uygun bir çözüm sunar. Bu amaçla, çimentolu harçların yerine, geopolimer harçların kısmen alternatif bir malzeme olarak kullanımı konusunda yoğun araştırmalar yürütülmektedir. Geopolimer beton, inorganik moleküllerin alkali aktivasyon reaksiyonu ile üretilen yenilikçi bir beton türüdür. Bu çalışmada, çevre dostu yalıtım malzemesi üretmek amacıyla sodyum silikat ve sodyum hidroksit ile aktivasyonu sağlayan çözelti hazırlanmış Alümina/silikat kaynağı olarak metakaolin kullanılmıştır. Çalışmada akıcı kıvamda hazırlanan geopolimer harç içerisine belli oranlarda atık çimen katılarak lifli ve hafif bir bünye oluşturmak amaçlanmıştır. Kalıplara dökülen hafif bünyeli geopolimer harç numuneleri 65°C sıcaklıkta 8 ve 24 saat süreyle etüvde kür edilmiştir. Numunelere fiziksel ve mekanik özellikleri incelenerek değerlendirilmiştir. Sonuç olarak atık çimen katkılı geopolimer yalıtım levhası üretimi koşulları belirlenmiştir.

Keywords: Metakaolin, Geopolimer, Atık Çimen, Yalıtım Malzemesi.

GİRİŞ

Portland çimentosu, inşaat malzemelerinin üretimi için dünyanın en çok kullanılan bağlayıcısıdır. İyi mekanik özelliği, nispeten düşük maliyeti, iyi dayanıklılığı ve hammaddelerin mevcudiyeti nedeniyle Portland çimentosu harcı birçok uygulamada tercih edilmektedir. Bununla birlikte, Portland çimentosu üretiminin doğal yaşam alanlarının ve fosil yakıtların tükenmesi, yüksek CO_2 üretimi ve diğer sera gazı emisyonları açığa çıkarmak gibi önemli dezavantajları vardır (Sakulich, 2011). Sera gazı emisyonlarına ilişkin artan farkındalıklara rağmen, küresel birincil enerji arzı büyük ölçüde fosil yakıtlara dayanmaktadır. Bu nedenle, daha temiz ve daha enerji verimli teknolojilere ihtiyaç kaçınılmazdır.

Geopolimerler, ileri teknolojik özelliklerin yanı sıra inşaat amaçları ve mühendislik uygulamaları için düşük üretim enerjisi tüketimi ile karakterize edilen yenilikçi bir seramik malzeme sınıfını temsil eder. Geopolimerler genellikle düşük atık gaz emisyonlu ucuz ve çevre dostu sentetik prosedürlerle elde edilir (Provis et al., 2010).

Geopolimer ilk olarak Davidovits tarafından 1972'de icat edilmiştir (Davidovits, 2011). Silika-oksijen tetrahedron ve köprü oksijen ile bağlanmış alüminyum-oksijen tetrahedrondan oluşan amorf üç boyutlu bir ağ yapısına sahip yeni bir alüminosilikat inorganik polimerdir (Hu et al., 2020). Aktif alüminosilikat öncülü ve alkali aktivatörün geopolimerizasyonu ile oluşturulan malzeme, üstün mekanik özellik, yüksek dayanıklılık, asit ve termal direnç, düşük maliyet ve CO_2 emisyonu avantajlarına sahiptir (Wan et al., 2017). Genel olarak, küresel çimento endüstrisinin yıllık CO_2 emisyon miktarı %5-%7'ye ulaşmıştır ve üretim sürecinde ton klinker başına yaklaşık 1800 MJ enerji gerekmektedir (Rashad and Zeedan, 2011). Çimento ile karşılaştırıldığında, geopolimerler %60-%80 daha düşük karbon ayak izine sahiptir (Benhelal et al., 2013). Bu üstün özellikler, geopolimeri duvar blokları, kaplamalar, bağlayıcılar, tehlikeli madde kapsülleme, yanmaz malzemeler, acil onarımlar gibi farklı alanlarda yaygın olarak uygulanmasını sağlar (Fu et al., 2020). Teorik olarak, silika-alüminyumca zengin malzemeler geopolimerler için hammadde olarak kullanılabilir, bu nedenle silika-alüminyum bileşenleri içeren kısmi katı atıklar geopolimerizasyon potansiyeline sahiptir. Ayrıca, bir ton çimento üretimi başına salınan CO_2 ile karşılaştırıldığında, katı atık bazlı geopolimerler daha düşük CO_2 emisyonları ve kaynak tüketimi anlamına gelirken, çevre dostu olması nedeniyle geleneksel çimentonun umut verici ikamesi olarak kabul edilir. Bu yoğun kaynak gerektiren endüstri, katı atıkların büyük ölçekli geri kazanımını/yeniden kullanımını da mümkün kılar. Sonuç olarak, geopolimerlerin benzersiz yapısı nedeniyle katı atıkların geopolimer sentezi ve tehlikeli atıkların bertarafı konusunda önemli araştırmalar yapılmıştır (Hertel and Pontikes, 2020).

Geopolimerizasyon, çözünme, çökeltme, yeniden düzenleme, jelleşme ve polikondenzasyon aşamalarına ayrılabilen karmaşık bir süreçtir. Bununla birlikte, bu aşamalar, geopolimerin oluşumu sırasında neredeyse aynı anda meydana gelir ve spesifik süreci ayırt etmek zordur. Yukarıda bahsedilen mekanizma N-A-S-H jel sistemine aittir. Ayrıca, uçucu kül ve yüksek fırın cürufu gibi yüksek kalsiyumlu öncül olduğunda C-A-S-H jeli üretilecektir (Singh et al., 2015).

Hizmette olan binaların enerji verimliliği giderek artan bir endişe haline geldiğinden, yüksek ısı yalıtımı sunan malzeme arayışı, modern inşaat ve yapı endüstrisinin giderek artan bir hedefi haline gelmiştir. Alternatif bağlayıcılardaki ve bu bağlayıcılara dayalı ürünlerin mühendisliğindeki son gelişmeler, bağlayıcı olarak geopolimer kullanan beton imalatını meydana getirmiştir. Geopolimerler, esas olarak alkali hidroksit ve/veya reaktif bir alüminosilikat, özellikle metakaolin veya uçucu külün silikat aktivasyonu yoluyla üretilen karmaşık bir malzeme sınıfıdır. Geopolimer betonun yeniliği, tüm yaşam döngüsü boyunca çevre dostu malzeme imkanı sunan, üretiminden bina işletimine kadar enerji verimli malzemeler geliştirmeye yönelik bir yaklaşım yaratır (Duxson et al., 2007).

Geopolimerler üstün termal ve dayanıklılık özellikleri sergilerler ve aynı zamanda doğaları gereği gevrektirler, çekme ve eğilme yüklemelerine karşı zayıf direnç gösterirler, bu nedenle çeşitli yapısal

uygulamalar için uygun değildirler. Araştırma çalışmaları, sünekliklerini ve çekme gerilmelerine karşı dirençlerini artırmak için geopolimerlerin sentetik ve doğal liflerle güçlendirilmesine odaklanmıştır (Silva et al., 2020). Kolaylıkla partiküllere dönüşebilen kenevir, şeker kamışı, bambu, jüt, sisal, deniz kabukları, hindistan cevizi kabuğu, çeltik samanı gibi lingo-selülozik doğal lifler yapı malzemelerinde pekçok uygulama alanı bulan organik malzemelerdir. Doğal lifler genel olarak sentetik liflerden daha düşük yoğunluğa sahiptir ve çoğu sentetik muadillerinden %30-50 daha düşük yoğunlukludur (Beckwith, 2008). Ayrıca yenilenebilir, geri dönüştürülebilir, biyolojik olarak parçalanabilirler ve esneklik, yüksek özgül mukavemet ve yüksek özgül modül gibi mekanik özellikler gösterirler (Low et al., 1995). Ayrıca, geçtiğimiz birkaç on yıl boyunca, tarım makinelerindeki hızlı gelişmeler, büyük miktarlarda tarımsal atık meydana getirmektedir (Karade, 2010; Shafigh et al., 2014; Pacheco-Torgal and Jalali, 2011). Bu çalışmada, çevre dostu yalıtım malzemesi üretmek amacıyla sodyum silikat ve sodyum hidroksit ile aktivasyonu sağlayan çözelti hazırlanmış Alümina/silikat kaynağı olarak metakaolin kullanılmıştır. Çalışmada akıcı kıvamda hazırlanan geopolimer harç içerisine belli oranlarda atık çimen katılarak lifli ve hafif bir bünye oluşturmak amaçlanmıştır.

MATERYAL VE METOD

Malzeme

Bu çalışmada kullanılan atık çimen kesildikten hemen sonra havadar bir ortamda kurumaya bırakılmıştır ve kürekle karıştırılarak çürümesi engellenmiştir. Çalışmada kullanılan metakaolinin kimyasal ve fiziksel özellikleri Tablo 1'de sunulmuştur. SiO_2 ve Al_2O_3 toplamı %95,61 olarak belirlenmiştir. Alkali çözeltide sodyum silikat, sodyum hidroksit ve su şehir şebeke suyu kullanılmıştır. Cam suyu olarak adlandırılan sodyum silikatın ($Na_2O.2SiO_2.2H_20$) molar kütlesi 128.13 g/moldür. Sodyum hidroksit (NaOH) minimum %99.0 saflıkta ve molar kütlesi 39.997 g/mol'dür. Çalışmada kullanılan metakaolin ve lif kaynağı olan çimenin resmi Şekil 1'de sunulmuştur.

Tablo 1. Metakaolinin kimyasal ve fiziksel özellikleri.

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	LOS	Özg. ğ.	Özg. yüz (m^2 /kg)
50,85	44,76	0,36	0,02	0,04	0,16	0,04	0,85	2,61	8450



Şekil 1. Çakışmada kullanılan metakaolin ve lif kaynağı çimen.

Numunelerin Hazırlanması ve Karışım Oranları

Sodyum hidroksit manyetik karıştırıcı yardımıyla suda çözündükten sonra çözünme reaksiyonuyla artan sıcaklığın oda sıcaklığına düşmesi beklenmiştir. Devam eden karıştırma işlemine sodyum silikat ilave edilmiştir. Hazırlanan alkali çözeltiye farklı oranlarda sırasıyla metakaolin ve atık çimen eklenerek

homojenlik elde edilene kadar karıştırılmıştır. Taze geopolimer beton 30x30x5 cm'lik kalıplara dökülmüştür. Kalıplama işlemiyle birlikte numuneler, alkali çözelti ile ıslatılan sıva filesine sarılmıştır. Ardından, etüvde 8 ve 24 saat sürelerde 65 °C sıcaklıkta kür edilmiştir. Numunelerin şematik hazırlanışı Şekil 2'de sunulmuştur.



Hazırlanan alkali çözelti karıştırma haznesine konmuştur.



Alkali çözeltiye metakaolin ilavesi ile karıştırma işlemi başlamıştır.



Atık çimen ilavesi ile karıştırma işlemi devam edilmiştir.



Karıştırma işlemi sonrası kalıplama işlemi başlamıştır.



Yüzeyi düzeltilen numune sıva filesi ile örtülmüştür.



Etüvde 24 saat süreyle 65 °C sıcaklıkta kür edilmiştir.

Şekil 2. Numunelerin hazırlama süreci.



Şekil 3. Çimen lifinden geopolimer yöntemi ile üretilen yalıtım plakası (30x30x5 cm).

Üretilen atık çimen kullanılarak üretilen yalıtım plağının birim ağırlığı 185 Kg/m^3 olarak belirlenmiş olup bu değer inşaat sektöründe ticari olarak kullanılan taşyünü yalıtım plağına uyum göstermektedir.

DENEY SONUÇLARI VE TARTIŞMA

Kür sürecini tamamlamış deney örneklerin kuru birim ağırlıkları ölçülmüştür. Buna göre üretilen geopolimer yalıtım plağının kuru birim ağırlığı 185 Kg/m^3 olarak belirlenmiştir. Örneklerin ısıl iletkenlik ölçümleri HFM-100 Isı akısı tekniğine göre EN 12667, ISO 8301 ve ASTM C518 Standartlarına uygun olarak ölçülmüştür. Buna göre geopolimer yalıtım plağının ısı iletkenlik katsayısı (λ): 0,058 W/m.K olarak belirlenmiştir. Bu sonuç yalıtım plağının çevreci ve sürüdürülebilir bir ürün olarak üretilebileceğini göstermektedir.

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GEOPOLYMER CONCRETE TECHNOLOGY

Muhammet Elmalı[1*], İsmail Demir[2]
[1]Afyon Kocatepe University, Engineering Faculty
Department of Civil Engineering Afyon, Turkiye.
ORCID Code: 0000-0003-2281-6126

[2] Afyon Kocatepe University, Engineering Faculty
Department of Civil Engineering Afyon, Turkiye.
ORCID Code: 0000-0001-8493-0309

ABSTRACT

In this study, articles about the production and properties of geopolymer concrete, which is a new concrete technology, were searched. In 1978, Joseph Davidovits developed new inorganic polymeric materials with cement properties and used the term "Geopolymer" for these materials. Portland cement (PC) industry continues to grow rapidly with the increasing needs of urban development. Greenhouse gas released to the environment during PC production is a serious environmental problem. Since PC is not used as a binder in the production of geopolymer concrete (GB), it has the potential to reduce greenhouse gas emissions from the concrete industry by 80%. In geopolymer production, alkaline solutions must be activated to produce polymeric Si-O-Al bonds with a solution of silica and alumina. Alkaline activation, often referred to as geopolymerization, is defined as a chemical process that replaces glassy components in well compacted and cementitious composites. It has been proposed that an alkaline liquid can be used to dissolve silicon (Si) and aluminum (Al) in by-product or geological source materials such as fly ash and rice husk ash to produce binders. Strong alkaline solutions such as sodium hydroxide (NaOH), potassium hydroxide (KOH), play an important role in dissolving Si and Al oxides. PC concrete presents serious problems in terms of durability. Many reinforced concrete structures therefore show severe deterioration long before their intended service life. Studies have shown that the geopolymer has excellent properties such as high early strength, low shrinkage, high resistance to sulfate attack, corrosion, freezing and thawing.

Keywords: Geopolymer, alkali activation, industrial waste, durability, physical and mechanical properties.

GEOPOLİMER BETON TEKNOLOJİSİ

ÖZET

Bu çalışmada yeni bir beton teknolojisi olan geopolimer betonun üretimi ve özellikleri ile ilgili makaleler taranmıştır. 1978'de Joseph Davidovits, çimento özelliklerine sahip yeni inorganik polimerik malzemeler geliştirmiş ve bu malzemeler için "Geopolimer" terimini kullanmıştır. Portland çimentosu (PC) endüstrisi, kentsel gelişimin artan ihtiyaçları ile hızla büyümeye devam etmektedir. PC üretimi sırasında çevreye salınan sera gazı ciddi bir çevre sorunu olmaktadır. Geopolimer beton (GB) üretiminde PC bağlayıcı olarak kullanılmadığından beton endüstrisinden kaynaklanan sera gazı emisyonlarını %80 oranında azaltma potansiyeline sahiptir. Geopolimer üretiminde silika ve alüminadan oluşan bir çözelti ile polimerik Si-O-Al bağları üretmek üzere alkali çözeltiler aktive edilmesi gerekmektedir. Genellikle geopolimerizasyon olarak adlandırılan alkali aktivasyonu, iyi sıkıştırılmış ve çimento özellikli kompozitlerde camsı bileşenleri değiştiren kimyasal bir işlem olarak tanımlanmaktadır. Bağlayıcı üretmek için uçucu kül ve pirinç kabuğu külü gibi yan ürün veya jeolojik kökenli kaynak materyallerdeki silikon (Si) ve alüminyum (Al) çözmek için alkali bir sıvının kullanılabileceği önerilmiştir. Sodyum hidroksit (NaOH), potasyum hidroksit (KOH), gibi güçlü alkali çözeltiler, Si ve Al oksitlerin çözünmesinde önemli bir rol oynamaktadır. Yapılan çalışmalar geopolimerin yüksek erken mukavemet, düşük büzülme, sülfat saldırısı, korozyon, donma ve çözülmeye karşı yüksek direnç gibi mükemmel özelliklere sahip olduğunu göstermiştir.

Anahtar Kelimeler: Geopolimer, alkali aktivasyonu, endüstriyel atık, dayanıklılık, fiziksel ve mekanik özellikler.

GİRİŞ

1978 yılında Joseph Davidovits çimento özelliklerine sahip yeni bir anorganik polimerik malzemeler geliştirmiş ve bu malzemeler için "Geopolimer" terimini kullanmıştır. Geopolimer, alkali aktif beton veya inorganik polimer beton olarak da bilinmektedir. Portland çimentosu (PÇ) endüstrisi, kentsel gelişimin artan ihtiyaçları sonucu hızla büyümeye devam etmektedir. PÇ üretimi esnasında çevreye salınan sera gazı dışında, PÇ betonu dayanıklılık konusunda ciddi problemler ortaya koymaktadır. Birçok betonarme yapı bu nedenle amaçlanan hizmet ömürlerinden çok önce ciddi bozulmalar göstermektedir (Mehta, 1997). Geopolimer beton (GB) üretiminde, bağlayıcı olarak PÇ kullanılmadığından beton endüstrisinden kaynaklanan sera gazı emisyonunu %80 azaltma potansiyeline sahiptir. GB ile PÇ betonu arasındaki temel fark bağlayıcıdır. Düşük kalsiyumlu kaynak malzemede bulunan silikon ve alüminyum oksitler, GB'u oluşturmak için iri agregaları, ince agregaları ve diğer reaksiyona girmemiş malzemeleri birbirine bağlayan geopolimer harcını oluşturmak için alkali sıvı ile reaksiyona girmektedir. PÇ betonunda olduğu gibi iri ve ince agregalar GB kütlesinin yaklaşık %75-80'ini oluşturmaktadır. Agregaların, boyut, şekil ve mukavemet gibi özelliklerinin etkisi PÇ betonunda olduğu gibi kabul edilmektedir (Lloyd and Rangan, 2009). Geopolimerler, zeolitlerle aynı alüminosilikat ailesine ait olan sentetik minerallerdir, ancak zeolitlerden farklı olarak, esasen amorf polimerlerdir. GB'un çeşitli kısa ve uzun vadeli özelliklerinin test verileri ve büyük ölçekli güçlendirilmiş GB elemanlar üzerinde yapılan testlerin sonuçları, GB'un altyapı çalışmalarında kullanılabilecek beton ürünler üretmek için çok uygun olduğunu göstermektedir. Geopolimerin mekanik özelliklerini incelemek için birçok araştırma yapılmıştır. Bu araştırmalarda, Geopolimerin yüksek erken mukavemet, düşük büzülme, donma ve çözülmeye karşı yüksek direnç, sülfat saldırısı ve korozyona direnç gibi mükemmel özelliklere sahip olduğu gösterilmiştir (Davidovits, 1987, Davidovits et. al,, 1999, Sofi et. al,, 2006). 21. yüzyılda geopolimerler, mükemmel özellikleri ve yüksek performansları nedeniyle geleneksel yapı malzemelerinin yerini alabilecekleri düşünülmektedir (Davidovits, 1984, Davidovits, 2002).

MATERYAL VE YÖNTEM

Davidovits (1988), geopolimer üretmek için, sanayi yan ürün materyaller (UK, yüksek fırın cürufu, pirinç kabuğu külü, vb.) veya jeolojik kökenli kaynak materyalden gelen silikon (Si) ve alüminyum (Al) ile reaksiyona girmek için alkali bir sıvının kullanılabileceğini önermiştir. Yapılan çalışmalar sonucunda, Sodyum hidroksit (NaOH), potasyum hidroksit (KOH) gibi güçlü alkali çözeltiler, Si ve Al oksitlerin çözünmesinde önemli bir rol oynadığı görülmüştür (Davidovits, 1991, Davidovits, 1994, Lyon et. al,, 1997, Xu and Deventer, 2000, Xu and Deventer, 2002, Gordon et. al,, 2005, Weng and Sagoe-Crentsil, 2007, Duxson et. al,, 2007). Geoplimerlerin basınç dayanımları üzerinde önemli bir etkiye sahip olan aktivatörün, ideal konsantrasyonu geopolimerin mukavemetini arttırmaktadır. Geopolimerlerin kürleme sıcaklığı ve sertleşme süresi numunelerin basınç dayanımını etkileyen diğer değişkenlerdir (Davidovits, 2002, Sagoe-Crentsil and Weng, 2007, Walton et. al,, 2001). Geopolimerler, 100 ^{0}C'nin altında sıcaklıklarda sertleşen güçlü ve dayanıklı çimento esaslı malzemeler grubuna girmektedir (Davidovits, 1994, Lyon et. al,, 1997, Duxson et. al,, 2007). Son yıllarda, bu malzemelerin inşaat mühendisliğinin yanı sıra diğer birçok endüstri dalındaki geniş potansiyel uygulamaları nedeniyle bu alana yönelik araştırmalar artmıştır.

Materyal

Geopolimer üretmek için birçok hammadde kaynağı kullanılmıştır. Gelişim sürecinin ilk evrelerinde kaolinit, geopolimer sentezinde yaygın olarak kullanılmıştır (Davidovits, 1984, Davidovits, 2002, Davidovits and Sawyer, 1984, Barbosa et. al,, 2005). Daha sonraki araştırmalar, kalsine killer (Kong et. al,, 2007, Yunsheng et. al,, 2010). endüstriyel atıklar (örneğin uçucu kül (van Jaarsveld, 2000, Temuujin et. al,, 2010, Chindaprasirt et. al,, 2009, Hardjito and Shaw Shen, 2012), cüruf (Wang et. al,, 1994, Cheng and Chiu, 2003), atık cam (Badanoiu et. al,, 2015), bakır madeni artıkları (Ahmari and Zhang, 2012) gibi) ve diğer birçok doğal ve yapay silikoalüminat (örneğin Zeolit) (Villa et. al,, 2010),

saf Al_2O_3–$2SiO_2$ tozu (Zheng et. al,, 2015), magnezyum içeren mineraller (Kenneth et. al,, 2013), gibi) diğer hammaddeler üzerinde yapılmıştır. Geopolimer üretiminde kullanılan kaynaklar, alümina (Al_2O_3) ve silika (SiO_2) açısından zengin alüminosilikatlar, yerkabuğunda bol miktarda bulunabilirler. Bu hammadde kaynakları, bağlayıcı sistemde Al^{3+} ve Si^{4+} iyonlarının önemli bir kaynağı olarak geopolimer oluşumunda önemli rol oynamaktadır. Tercihen hammadde kaynağındaki Al_2O_3 ve SiO_2 bileşiklerinin %70'den fazlası reaktif amorf fazda olmalıdır (Cioffi et. al,, 2003, Davidovits, 1991), Uçucu kül, metakaolin ve yüksek fırın cürufu, geopolimerizasyon sürecinde en yaygın kullanılan hammaddelerdir (Duxson and Provis, 2008).

Uçucu Kül (UK)

UK, termik santrallerinden elde edilen ve çimento katkısı olarak kullanılan puzolanik özelliklere sahip endüstriyel bir atıktır. UK içindeki SiO_2 ve Al_2O_3, PÇ'nin hidratasyonu sonucu oluşan kalsiyum hidroksit ile reaksiyona girerek puzolanik reaksiyon başlatmaktadır. Bu nedenle PÇ, UK ile belli oranlarda ikame edilerek kullanılabilir (Rattanasak and Chindaprasirt, 2009). Geopolimerler, genellikle düşük sıcaklıklarda aktive edilen UK ile sentezlenir. Bu bölümde, UK bazlı geopolimer beton üzerinde yapılan kapsamlı çalışmaların bir özeti sunulmuştur. Bakharev (2005) UK kullanılarak üretilen geopolimer numuneler %5 asetik asit ve sülfürik asit çözeltilerine maruz kaldığında dayanıklılığı hakkında araştırma yürütmüştür. Kütle değişimi, basınç dayanımı, reaksiyon ürünleri ve mikro yapısal değişiklikleri ana parametreler olarak incelenmiştir. Sonuç olarak, geopolimer malzemeler asit solüsyonlara maruz kaldığında PÇ ile üretilen numunelerden daha üstün performans göstermiştir. Bununla birlikte, sodyum silikat ve sodyum hidroksit veya potasyum hidroksit karışımı aktivatör ile hazırlanan bazı geopolimer malzemelerde önemli ölçüde mukavemet düşüşü gözlenmiştir. Gözlenen bozulma, alüminosilikat polimerlerin asidik ortamda depolimerizasyonuna ve bazı durumlarda önemli bir mukavemet kaybına yol açan zeolit oluşumuna bağlanmıştır. En iyi performans, sodyum hidroksit ile hazırlanan ve yüksek sıcaklıkta kürlenen geopolimer malzemede gözlemlenmiş, bu da bu malzemede oluşan daha stabil çapraz bağlı alüminosilikat polimer yapısına atfedilmiştir. Tho-in et. al. (2012) tarafından UK bazlı geopolimerler kompozitlerin uzun vadeli özelliklerini değerlendirmek için yapılan çalışmada, geopolimer kompozitlerin mükemmel dayanıklılık özelliklerine sahip olduğunu göstermiştir. Daniel et. al. (2006) tarafından UK bazlı geopolimer harcın ve PÇ betonun yüksek sıcaklıktaki davranışını incelemek için bir araştırma yapılmış, UK/aktivatör oranı azaldığında, basınç dayanımının da azaldığı belirlenmiştir. Çalışmada, yüksek sıcaklık altında daha uzun kürleme süresinin geopolimer harcın mukavemet performansına dikkate değer etkisinin olmadığı ortaya koyulmuştur. UK/aktivatör oranı ve aktivatör çözeltisindeki sodyum silikat/potasyum hidroksit oranının yüksek sıcaklık performansı için en önemli parametre olduğu sonucuna varılmıştır. Albitar et. al. (2017) UK ve granüle kurşun cürufu (GKC) kullanılarak üretilen GB'lerin performansını, PÇ betonunu referans alarak dayanıklılık özellikleri karşılaştırılmıştır. Tüm beton numuneleri dört farklı kimyasal solüsyonda (%5 sodyum klorür, %5 sodyum sülfat, %5 sodyum sülfat, %5 magnezyum sülfat, %3 sülfürik asit) dokuz ay bekletilmiştir. Bu süre sonunda, kütle değişimi, basınç mukavemeti, yarmada çekme mukavemeti, eğilme mukavemeti, su emme ve gözeneklilik değişimi değerlendirilmiştir. Ayrıca ıslatma-kurutma ve donma-çözünme döngülerinin kütle kaybı ve basınç dayanımı üzerindeki etkisi de araştırılmıştır. Sonuçlar genel olarak, GB'un dayanıklılık performansının, PÇ betonundan daha üstün olduğunu göstermiştir. Çeşitli UK türlerinin geopolimer kaynak malzemesi olmaya uygunluğu Fernandez ve Palomo (2003) tarafından incelenmiştir. Palomo et. al. (1999) UK bazlı geopolimerler üretiminde sodyum hidroksit ve sodyum silikat kombinasyonun kullanılması araştırılmıştır. Sonuçlar, alkali sıvının mekanik mukavemeti etkileyen ana faktör olduğunu ve sodyum hidroksit ve sodyum silikat kombinasyonunun yüksek basınç dayanımı sağladığını göstermiştir. Songpiriyakij et. al., (2010) UK bazlı geopolimerde en yüksek basınç dayanımını elde etmek için optimum SiO_2/Al_2O_3 oranının 15.9 olduğunu belirlemişledir. Swanepoel and Strydom (2002) UK, kaolinit, sodyum silikat ve NaOH çözeltisi karıştırılmasıyla üretilen geopolimer malzemeler üzerinde testler yapılmıştır. Çalışmada, önce toz malzemelerin kuru karıştırılması, ardından alkali çözeltinin eklenmesi daha sonra belirli bir süre daha karıştırılması önerilmiş, geopolimer hamurun viskozitesinin zamanla arttığı gözlenmiştir. Sonuçlar hem kürleme sıcaklığı hem de sertleşme süresinin basınç dayanımını etkilediği, optimum dayanımın 48 saat süreyle 60 °C ile edilmiştir. Jaarsveld et. al., (2003) yüksek miktarda CaO içeren UK kullanılarak, özellikle

erken yaşlarda kalsiyum-alüminat-hidrat ve diğer kalsiyum bileşiklerinin oluşumu ile daha yüksek basınç dayanımının elde edilebileceğini göstermiştir. Chindaprasirt et. al., (2007) makul miktarda alümina ve silika içeren yüksek kalsiyum uçucu külün geopolimer karışımında temel malzeme olarak kullanılabileceği önerilmiştir. Kristiawan (2011) tarafından yapılan çalışmada, C sınıfı UK bazlı GB üzerinde incelemeler yapılmıştır. 8 M sodyum hidroksit ve 0,2 ve 0,3 su/bağlayıcı oranı ile hazırlanan GB'un priz süresi sırasıyla 14 ve 21 saat olmuştur. S/b artması priz süresinin uzamasına neden olmuştur. Yapılan karşılaştırmada C sınıfı UK esaslı GB'un priz süresi PÇ hamurundan daha yüksek olduğu gözlenmiştir.

Metakaolin (MK)

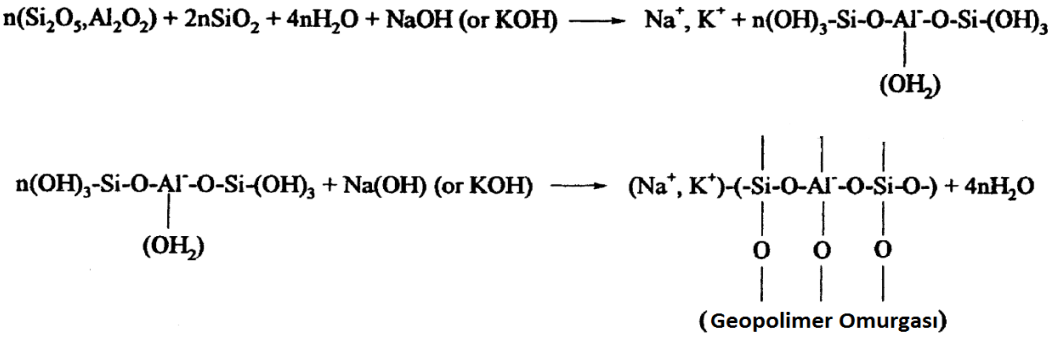
MK, kaolinit kilinin kalsinasyonu ile elde edilen susuz bir alümino-silikattır. Amorf yapısı nedeniyle alkali solüsyon veya su varlığında kalsiyum hidroksit ile aktive edildiğinde çok büyük bir reaktif potansiyele sahiptir (Murat, 1983, Murat and Comel, 1983, Ambroise et. al,, 1985). Geopolimer üretiminde esas olarak MK'in kullanılmasının nedeni, homojen kimyasal ve fiziksel özellikleri ile büyük miktarda elde edilebilen yaygın endüstriyel mineral olmasıdır. MK aynı zamanda PÇ'ye kıyasla çevre dostudur ve üretimi çok daha düşük kalsinasyon sıcaklığı gerektirmektedir. Portland çimentosundan %80-90 daha az CO_2 yayar (Davidovits, 1994). UK kullanılarak hazırlanan geopolimer malzemelerin özelliklerine göre MK kullanılarak hazırlanan geopolimer malzemelerin üstün dayanım ve dayanıklılık özelliklerine ilişkin daha çok araştırma vardır (Davidovits, 1984, Davidovits, 1984, Davidovits, 1994). Barbosa et. al., (2000) MK'in geopolimer üretimi için olası bir kaynak malzeme olduğu gösterilmiştir. Kaynak malzeme olarak MK'i kullanan Teixeira et. al., (2002) taze geopolimer harcının karıştırılırken çok sert ve kuru hale geldiğini, yüksek viskozite ve kohezif yapı sergilediğini, yerçekimi tipi karıştırıcı yerine cebri karıştırıcı tipinin kullanılmasını tavsiye etmişlerdir. Karıştırma süresindeki artış taze geopolimer harcın sıcaklığını artırmış dolayısıyla işlenebilirliği düşürmüştür. İşlenebilirliği artırmak, viskozite ve kohezyonu azaltmak için katkı kullanılması önerilmiştir. Chen and Chiu (2003) YFC ve MK bazlı geopolimer harcın priz süresini araştırmıştır. Taze geopolimer harcın sertleşme süresi, Vicat iğnesi kullanılarak hem oda sıcaklığında hem de yüksek sıcaklıkta ölçülmüştür. Sonuçlar; ilk katılaşma süresinin daha kısa (15-45 Dk.) olduğunu göstermiştir. Rovnaník (2010) kürleme sıcaklığının (10, 20, 40, 60 ve 80 ^{0}C) ve süresinin, alkali aktifleştirilmiş MK malzemesinin basınç ve eğilme dayanımı, gözenek dağılımı ve mikro yapısı üzerindeki etkisini analiz etmeyi amaçlamıştır. Sonuçlar, taze karışımın yüksek sıcaklıklarda işlenmesinin mukavemet gelişimini hızlandırdığını ancak 28 günlük mekanik özelliklerin, ortam sıcaklığında veya daha düşük sıcaklıkta işlem gören karışımlar için elde edilen sonuçlarla karşılaştırıldığında kötüleştiğini göstermiştir. Ayrıca mekanik özelliklere yansıyan artan sıcaklık, gözenek boyutunu ve kümülatif gözenek hacmini artırma eğilimini ortaya çıkarmıştır. Elimbi et. al., (2011) kaolinit killerinin en uygun kalsinasyon sıcaklığını belirlemeyi amaçlamıştır. Bu amaçla, 450 ve 800 °C sıcaklık aralığında kalsine edilmiştir. Elde edilen amorf malzemeler, priz süresi, doğrusal büzülme ve basınç dayanımları belirlenerek karakterize edilen geopolimer harçları üretmek için güçlü bir alkali çözelti içinde çözündürülmüştür. Priz süresi sonuçları; 450 °C' de kalsine edilen kilden üretilen geopolimer harcının priz süresi çok uzun (21 gün sonra bile kolaylıkla işlenebilme), 500-700 °C arasında kalsine edilmiş kilden üretilen için, priz süresi artan sıcaklıkla süre azalmış (30-140 dakika), 700 °C'nin üzerinde ise priz süresi artmaya başlamıştır. Geopolimer örneklerinin 28 günlük doğrusal küçülme 700 ^{0}C civarında en düşük değerine ulaşmış, bunu üzerindeki sıcaklıkta doğrusal küçülme artmaya başlamıştır. Sertleşmiş geopolimer numunelerin basınç dayanımı 11,9-36,4 MPa arasında sonuçlar vermiştir. Literatürde, geopolimer üretiminde birçok araştırmacının çeşitli sıcaklıklarda kalsine kaolinit killerine sahip çalışmalar yapmıştır. Davidovits and Davidovits (1988) kaolinit kilini sırasıyla 500, 650, 700 ve 750 °C'de, Palomo et. al. (1992) 600-700 °C sıcaklık aralığını, Cioffi et. al. (2003) 500, 550, 650 ve 750 °C'de, Zhang and Sun (2006) 700 °C'de, Zibouche et. al. (2009) 800 °C'de kalsine etmiştir. Chareerat et. al. (2006) kaolinit kilini 2, 4 ve 6 saat boyunca 400, 500, 600, 700 ve 800 °C sıcaklıkta kalsine etmiş ve en iyi kalsinasyon sıcaklığının 600 °C olduğu sonucuna varmıştır. Geopolimer üretimi açısından kaolinit killerinin kalsinasyonu için en uygun sıcaklığın 600-700 °C arasında olduğu görülmüştür.

Yüksek Fırın Cürufu (YFC)

YFC, metallerin veya metal içeren cevherlerin, eritildikten sonra oluşan, oksitler ve silikatlar içeren, düşük yoğunluğundan dolayı yüzeyde biriken yan ürün olarak tanımlanmaktadır (Ünal et. al., 2014). PÇ'nin YCF ile ikame edilmesi, kimyasal etkilere karşı daha iyi performans, daha yüksek basınç dayanımı taze betonun daha iyi işlenebilirliği ve maliyeti azaltma gibi çeşitli faydalar sağlamaktadır (Provis and van Deventer, 2009). Kürklü (2016) çalışmasında bağlayıcı ve agrega olarak YFC kullanımı ile geopolimer harç üretimi araştırılmış, oda sıcaklığında kür ile geopolimer harç üretiminde YFC agrega ve bağlayıcı kullanımının mümkün olduğu iddia edilmiştir. Marjanović et. al. (2015) farklı nispette UK ve YCF bağlayıcı olarak kullandıkları çalışmada en yüksek basınç dayanımını tamamen YFC içeren numunelerde elde edilmiştir. Xu et. al. (2014) geopolimer içerisinde YFC kullanımının hidratasyon ısısını yükselttiğini, basınç dayanımı ve priz süresine müspet katkı yaptığını gösterilmiştir. Park and Kim (2014) UK ve YCF farklı nispette hazırlanarak elde edilen geopolimer numunelerde basınç dayanımının arttığı, karbonatlaşma derinliği arttıkça basınç dayanımının azaldığı belirtilmiştir. Bagheri and Nazari (2014) geopolimer üretiminde agrega olarak YCF kullanılmış ve YFC'nin kullanılması erken yaşlarda yüksek mukavemet kazanılmasında etkili olmuştur. Literatüre bakıldığında bağlayıcı olarak YFC kullanılarak üretilen geopolimer ile ilgili genel olarak daha az çalışma olduğu görülmektedir.

Yöntem

Geopolimerlerin sentezi polikondensasyon ile gerçekleşir ve çeşitli siliko-alüminatlardan başlayabilir. Davidovits (1991),(1989),(1993), Palomo et. al., (1992) ve Barbosa et. al., (2000) alkali metal (Na veya K) silikat ile reaksiyona girerek geopolimerleri elde etmek için MK'i kullanmışlardır. Alternatif olarak Ikeda et. al., (1998), Jaarsveld and Deventer (1999), Phair et. al., (2000), Xu and Deventer (2000) ve Xu et. al., (2001) geopolimerlerin birçok ham silikoalüminattan başlayarak elde edilebileceğini göstermiştir. Geopolimerlerin sentezine ilişkin reaksiyonlar Şekil 1' de sunulmuştur.



Şekil 7. Geopolimerlerin sentezi (Xu and Deventer, 2000)

Geopolimer üretmek için silika ve alüminadan oluşan bir çözelti ile polimerik Si-O-Al bağları üretmek üzere alkali çözeltiler aktive edilmesi gerekmektedir (Daniel et. al., 2006). Genel olarak geopolimerizasyon olarak adlandırılan alkalin aktivasyonu, iyi sıkıştırılmış ve çimento özellikli kompozitlerde camsı bileşenleri değiştiren kimyasal bir işlem olarak tanımlanmaktadır. Hammadde taneciklerinin geopolimerizasyon sırasında malzemelerde bulunan belirli bir miktarda silika ve alüminadan oluşan çözünme ile yüzey hidrolizini arttırmak için güçlü bir alkali ortam gereklidir. Bu ortam, aktivatörler olarak adlandırılan tekli veya kombine alkalin çözeltileri ile elde edilebilir (Davidovits, 1984). MK ve UK yüksek oranda amorf silika ve alümina içerir ve genellikle bunları çözmek için alkalin çözeltisi ile karıştırılır. Silikat, alkali çözeltiyle temas ettiğinde silikatlar çözünmeye başlar. MK ve UK geopolimerlerin üretiminde kaynak malzeme olarak kullanılabilir çünkü geopolimerizasyon esas olarak alümina-silikat zincirine dayanmaktadır. Bununla birlikte, alkali çözeltisinin tipi ve konsantrasyonu kaynak malzelemelerin çözeltisinde önemli bir rol oynar. Al_3^+ ve Si_4^+ iyonlarının sodyum hidroksit içindeki çözünürlüğü potasyum hidroksit çözeltisinden daha yüksektir (van Jaarsveld, 2000, Temuujin et. al., 2010). Bu nedenle, NaOH'nin geopolimerlerin yapısı ve basınç dayanımı üzerinde önemli bir etkisi vardır (Chindaprasirt et. al., 2009). Si, Al ve diğer iyonlar NaOH ile temas ettiğinde çözünmeye başlamaktadır. Çözünme miktarı, NaOH konsantrasyonuna ve

çözünme süresine bağlıdır (Davidovits, 1991). NaOH konsantrasyonu, çözünme sürecinin yanı sıra geopolimer sistemin sulu fazın nihai yapısındaki katı tanelerin bağlanmasını etkilemektedir (Chindaprasirt et. al., 2009). Hazırlanan karışım, oda sıcaklığında veya belirli bir sıcaklıkta kürlemeye tabi tutulabilir. Alüminosilikat reaktif malzemeler güçlü alkali çözeltiler içinde çözülür ve serbest SiO_4 ve AlO_4 tetrahedral yapı formları oluşturmaktadır. NaOH, cam suyu ile birlikte kullanıldığında, geopolimer malzemenin basınç dayanımı, sadece NaOH kullanılandan daha yüksek sonuçlar vermiştir. Bunun nedeni, cam suyunun, Si içeriğinin daha yüksek olduğu için reaksiyon ürünlerini arttırması ve daha fazla mekanik güç sağlamasıdır (Criado et. al., 2005). Geopolimer oluşumunun reaksiyonuna geopolimerizasyon reaksiyonu denilmektedir. Geopolimer oluşumu, Şekil 2'deki katı ve sıvı karışımlarını içerir. Katı, uygun oranda yüksek reaktif silika ve alümin içeren toz formunda alüminosilikat kaynaklar, sıvı ise oldukça konsantre bir alkali çözeltidir (Yun-Ming et. al., 2016).

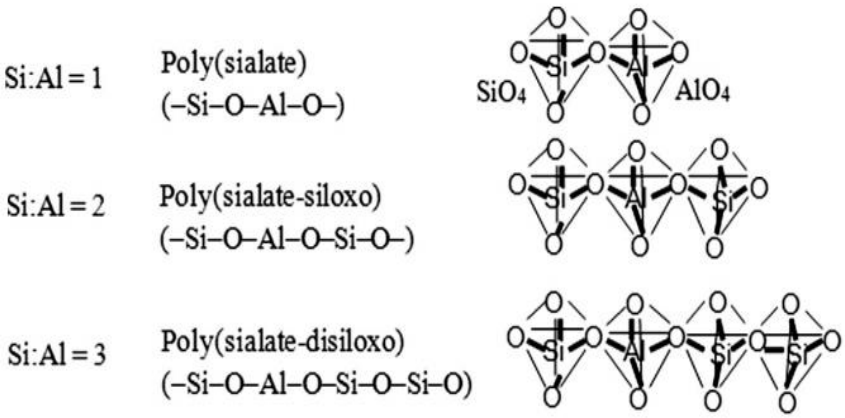


Şekil 8. Geopolimer oluşumu katı ve sıvı karışımlarını (Yun-Ming et. al., 2016)

Geopolimer yapısının önerilen terminolojisi, geopolimerleri Si/Al oranlarına bağlı olarak Şekil 3'de gösterilen poli (sialat), poli (sialat-silokso) ve poli (sialat-disilokso) şeklinde üç temel forma ayırmaktadır (Davidovits, 2002). Geopolimer, üç boyutlu Si-O-Al polimerik ağları ile amorf veya yarı kristal yapıya sahiptir. SiO_4 ve AlO_4 tetrahedral, alternatif olarak tüm oksijen atomlarını paylaşarak, IV kat koordinasyonunda Al ile bağlanmaktadır (Davidovits, 1991, Provisi et. al., 2005). Bu, IV kat koordineli Al'de negatif bir yük bırakır ve daha sonra Na^+, K^+, Li^+, Ca^{2+}, Ba^{2+}, NH^{4+} ve H_3O^+ gibi katyonlarla yük dengelenmektedir. Yapının nötrlüğünü korumak için katyonların varlığı önemlidir (Khale and Chaudhary, 2007). Bununla birlikte, bir yük dengeleme rolü sağlamanın yanı sıra, son ürünün yapısal bütünlüğünü belirlemek için katyon ilavesinin çok önemli olduğu düşünülmektedir. Saidi et. al. (2013), yaptıkları çalışmada Na^+ iyonunun geopolimerlerin kırılganlığını etkilediğini göstermişlerdir. Geopolimerlerin ampirik formülü Eşt. 1'de verilmektedir (Yun-Ming et. al., 2016):

$$M_n(-(SiO_2)_z - AlO_2).wH_2O \quad (1)$$

Burada; M, K^+, Na^+ veya Ca^{2+} gibi katyonlar; n, polikondensasyon derecesi; z, 1, 2, 3 değeri ve w bağlama suyu miktarını göstermektedir.



Şekil 9. Geopolimerlerin Si/Al oranlarına bağlı olarak üç temel form (Davidovits, 2002)

Molar Oranı

GB'un basınç dayanımı ve işlenebilirliği, geopolimer harç üretimi için kullanılan malzemelerin oranlarından ve özelliklerinden etkilenir. Araştırma sonuçları (Hardjito and Rangan, 2005) şunları göstermiştir:

- Sodyum hidroksit çözeltisinin daha yüksek konsantrasyonu (molar cinsinden), GB'un basınç dayanımını artırmaktadır.
- Kütlece daha yüksek sodyum silikat/sodyum hidroksit çözeltisi oranı, GB'un daha yüksek basınç dayanımı ile sonuçlanmaktadır.
- Karışımın su içeriği arttığında taze GB'un çökme değeri artar. Süper akışkanlaştırıcılar işlenebilirliğin iyileştirilmesine yardımcı olabilir.
- H_2O-Na_2O molar oranı arttıkça, GB'un basınç dayanımı azalır.

Alonso and Palomo (2001) tarafından MKin alkalin aktivasyonunu etkileyen değişkenlerin kalsiyum hidroksit varlığı ile araştırılması için çalışma yapılmıştır. Aktivatör çözeltisi konsantrasyonunda, 10 moların üzerine çıkışın iyon türlerinin stabilitesi ve iyon hareketliliğinden dolayı alkalin polimerinin oluşumunda bir gecikmeye neden olduğu ve böylece eğilme mukavemetinde bir azalmaya neden olduğu sonucuna varılmıştır. Barbosa et. al., (2000) çalışmada karışımda bulunan oksitlerin molar bileşiminin polimerizasyon süreci ve kullanılan su içeriği üzerindeki etkileri araştırılmıştır. Kaynak malzeme olarak 6 saat boyunca 700°C'de kalsine edilen MK kullanılmıştır. Araştırmada, poli (sialat-silokso) polimerinin optimum oluşumunu Na_2O/SiO_2 oranı 0.25 ve H_2O/Na_2O oranı 10 olarak belirlenmiştir. Sodyum içeriğinin, sodyum karbonat oluşturabilen ve polimerizasyon işlemini bozabilecek fazlalık yapmadan yapı içindeki yük dengesi gereksinimlerini karşılamak için yeterli miktarda olduğu gözlenmiştir. Yazarlar, reaksiyonu seyreltmek veya daha çözünür bileşenleri süzmek ve reaksiyon bölgesinden uzaklaştırmak için fazla suyun etkisinin olabileceğini iddia etmiştir. Hardjito et. al., (2008) alkalin aktivatörünün konsantrasyonu arttıkça, geopolimer harcın basınç mukavemetinin de arttığını ortaya koymuştur. Görhan and Kürklü (2014) nihai ürünün özellikleri üzerindeki polimerizasyonun neden olduğu değişiklikler, farklı NaOH konsantrasyonlarında farklı sıcaklıklarda ve farklı kürleme sürelerinde geopolimer harçlara kür uygulanarak araştırılmıştır. NaOH konsantrasyonunun geopolimer harçları üzerindeki etkisini belirlemek için sodyum silikat çözeltisi ile birlikte üç farklı NaOH konsantrasyonu (3 M, 6 M ve 9 M) molaritesi kullanılmıştır. Sonuç olarak, NaOH konsantrasyonundaki artışa bağlı olarak geopolimer harçların basınç dayanım değerleri artmıştır. Elde edilen mukavemet değerleri göz önüne alındığında, optimum NaOH konsantrasyonu 6 M olduğu görülmüştür. Chindaprasirt et. al., (2007) daha yüksek mukavemetli geopolimer üretmek için optimum sodyum silikatın sodyum hidroksit oranının 0.67 ila 1.00 aralığında olduğu bulunmuştur. Bu arada, 10 ile 20 M arasındaki NaOH konsantrasyonu, mukavemet üzerinde küçük bir etki sağlar. Su, GB'da normal beton kadar önemli rol oynar. Geopolimerde suyun kullanılması işlenebilirliği iyileştirmek içindir, ancak kürleme işlemi sırasında suyun yüksek sıcaklıkta buharlaşması nedeniyle betondaki gözenekliliği artıracaktır (Sathia et al., 2014).

Kürleme Sıcaklığı

Geopolimerin sertleşme süresi, alkali çözeltinin bileşimi ve alkali sıvının kütlece uçucu küle oranı gibi birçok faktöre bağlıdır. Bununla birlikte, kürleme sıcaklığı geopolimer için en önemli faktördür. Kür sıcaklığı arttıkça betonun priz süresi kısalmaktadır (Chanh et. al., 2008). Kürleme işlemi sırasında, GB'un polimerizasyon süreci devam eder. Sıcaklığın artması nedeniyle, polimerizasyon daha hızlı hale gelir ve beton, prizden sonraki 3 ila 4 saat içinde %70 dayanım kazanabilir (Kong and Sanjayan, 2008). Geopolimerlerin yapısı, kür sıcaklığına bağlı olarak amorf veya kristal olabilir. Amorf yapılı polimerler 20-90 °C arasındaki sıcaklıklarda elde edilirken, kristal yapıdaki polimerler 150-200 °C'de arasındaki sıcaklıklarda elde edilir. Kristal geopolimerlerin yapısı, zeolitin yapısına çok benzemektedir (Davidovits, 1991). Jaarsveld et. al., (2002) yüksek sıcaklıkta hızlı kür işleminin çatlamaya neden olduğu ve geopolimerin fiziksel özellikleri üzerinde olumsuz etkiler yaratabileceği sonucuna varmışlardır. Palomo et. al., (1999) tarafından yapılan bir araştırmada, kürleme sıcaklığı, sertleşme süresi, çözelti/UK oranı ve yüksek aktivatörlü UK, alkali aktivasyonunun geopolimerin mekanik özellikleri üzerindeki etkilerini araştırmıştır. Araştırmalarından, aktivatör UK oranının etkisinin önemsiz olduğu ve kürleme sıcaklığının artmasının UK aktivasyonunu hızlandırdığı sonucuna varmışlardır. Hardjito et. al., (2008), yaptığı çalışmada 28 günlük en yüksek basınç dayanımı 65 °C sıcaklıkta 1 gün boyunca kürlenen örneklerden elde edilmiştir. Görhan and Kürklü (2014) farklı NaOH konsantrasyonlarında (3 M, 6 M, 9 M) farklı sıcaklık (65 ve 85 °C) ve farklı kür sürelerinde (2 saat, 5 saat, 24 saat) uçucu külden geopolimer harç örnekleri üreterek fiziksel ve mekanik özelliklerini araştırmışlardır. Elde edilen mukavemet değerleri göz önüne alındığında, optimum kürleme sıcaklığı ve optimum NaOH konsantrasyonu 85 °C ve 6 M olduğu görülmüştür. Yapılan çalışmalar 40 ve 95 °C arasındaki sıcaklıklarda geopolimerizasyon işlemi gelişebileceği ve yüksek basınç dayanımı sağlanabileceğini göstermiştir (Swanepoel and Strydom, 2002, Chindaprasirt et. al., 2007, Bakharev, 2005, Panias et. al., 2007). Kürklü (2016) çalışmasında YFC kullanılarak en az enerji tüketimi ile geopolimer harç üretiminde etüv kürü yerine oda sıcaklığında kür gerçekleştirilmesi amaçlanmıştır. İki farklı likit/bağlayıcı oranı (1, 0,7), dört farklı alkali aktivatör oranı (2:1, 1:2, 3:0, 0:3) kullanılmıştır. Sonuç olarak, oda sıcaklığında kür edilmiş geopolimer harç üretiminin mümkün olduğu, en yüksek eğilme dayanım değeri (5.1 MPa) 2:1 oranında alkali aktivatör ve l/b oranın 0.7 olduğu harçlarda elde edilmiştir. En yüksek basınç dayanımı değeri (29.1 MPa) 3:0 oranında alkali aktivatör ve l/b oranın 0.7 olduğu harçlarda elde edilmiştir

DURABİLİTE

PÇ, inşaat uygulamalarında yaygın olarak kullanılan bağlayıcıdır. Uzun süre PÇ betonu, çok az veya hiç bakım gerektirmeyen çok dayanıklı bir malzeme olarak kabul edildi. Ancak asitler ve sülfatlar gibi kimyasal saldırılara karşı olan direncinin yeterli olmadığı görülmüştür. PÇ betonunun alkali yapısı nedeniyle asit saldırısına savunmasız olduğu bilinmektedir. Çimento hamurunun bileşenleri asitlerle temas sırasında parçalanır, bunun en belirgin olanı kalsiyum hidroksitin çözünmesidir. Araştırmalar, PÇ betonun bozulmasının, çimento hidratasyon ürünleri ile sülfat içeren çözeltiler arasındaki reaksiyonlar nedeniyle gerçekleştiğini ortaya çıkarmıştır (Pacheco-torgal, 2008). Asit saldırısında çimento kompozitlerin, asitler tarafından hidratlanmış silikat ve alüminyum fazlarının ayrıştığı ve kalsiyum hidroksitin çözündüğü bilinmektedir. Bu durumda kompozitlerin ciddi şekilde hasar gördüğü, mukavemetini kaybettiği ve hızla bozulduğu görülmüştür (Bakharev, 2005, Davidovits, 1991). Yapılan çalışmalar, geopolimerlerin yüksek erken mukavemetleri ve çevre dostu olmalarının yanı sıra düşük sünme, düşük büzülme, asit ve sülfat saldırılarına karşı iyi direnç gibi birçok mükemmel özellik sergilediğini ve PÇ ile üretilen betonlara olası alternatiflerden biri olabileceğini göstermiştir (Davidovits, 1991, Davidovits, 1994, Rangan, 2004, Rangan and Wallah, 2005). Birçok araştırmacı (Changgao and Ruihua, 1997, Blaakmeer, 1994, Xincheng et. al., 1999), YFC, UK ve UK-YFC karışımlarının aktive edilmesiyle üretilen geopolimer harçların, PÇ'na büyük oranda geçen asit direnci gösterdiğini ortaya koymuştur. Rostami and Silverstrim (1996), Silverstrim and Rostami (1997) uçucu külleri kimyasal olarak aktive ederek "CAFA" (Kimyasal aktive edilmiş UK) adı verilen alkali ile aktive olan bir materyal geliştirdiler. CAFA betonunun sülfürik, nitrik, hidroklorik ve organik asitler gibi asitlerin kimyasal saldırılarına karşı direncinin PÇ betonunkinden çok daha iyi olduğu iddia edilmektedir. Ariffin et. al. (2013), harmanlanan UK ve palmiye yağı külü (PYK) kullanılarak

hazırlanan geopolimer 18 aya kadar %2 sülfürik asit çözeltisine maruz kaldığında betonun dayanıklılığına ilişkin araştırma yapılmıştır. GB'un bir yıldan fazla bir süre %2 sülfürik asit çözeltisine maruz kaldığında performansı PÇ betonundan üstün olduğu görülmüştür. Bu üstünlük GB'da oluşan daha stabil çapraz bağlı alüminosilikat polimer yapısına atfedilmiştir. Geopolimerlerin, PÇ betona göre iyi bir aderans mukavemetine sahip olduğu gösterilmiş, bu nedenle üstün aşınma direncine sahip iyi malzeme olduğu öne sürülmüştür (Hu et. al., 2008), UK bazlı geopolimerler, sülfat saldırılarına direnç (Wallah et. al., 2005, Song et. al., 2005), gibi belirli alanlarda PÇ betona göre üstün performansa sahiptir. Ayrıca, geleneksel betona göre daha düşük sünme (Wallah et. al., 2004) ve büzülme (Hardjito et. al., 2004) değerine sahiptir. Geopolimerlerin, seramik benzeri özelliklerinden dolayı genellikle yüksek sıcaklıklarda geleneksel betonlardan daha iyi performansa sahip oldukları düşünülmektedir (Bakharev, 2006, Comrie and Kriven, 2004). Sıradan PÇ betonları genellikle çoğu normal uygulama için yeterli yangın direnci sağlar. Ancak PÇ betonun dayanımı, kimyasal ve fiziksel değişiklikler nedeniyle yüksek sıcaklıklarda azalır (Crozier and Sanjayan, 1999). Ayrıca, geleneksel betonun yangın anında dökülmesi ile beton örtüsünün katman katman hızlı bir şekilde kaybolması potansiyel olarak beton içindeki ana donatıların yangına maruz kalmasına neden olur (Sanjayan and Stocks, 1993). Bu nedenle hem yüksek sıcaklıkta mukavemet kaybı hem de dökülme direnci açısından iyi ateş direncine sahip olan alternatif bir bağlayıcı belirlemek için çaba gösterilmiştir (Davidovits, 1991, Cheng and Chiu, 2003). Cheng and Chiu (2003), YFC ile 10 mm kalınlığında panel olarak ürettikleri GB'u 1100 °C'lik bir aleve maruz bırakmışlar, 35 dakika sonra karşı yüzde sıcaklık 350 °C'nin altına düşmüştür. Geopolimer ürünler mühendislik uygulamaları için büyük bir potansiyele sahip olduğundan inşaat amaçlı imal edilebilir.

SONUÇ

Üretiminde yüksek oranda karbon emisyonu oluşturan çimento yerine alkali çözeltilerin bağlayıcı olarak kullanılması ve endüstriyel atıkların hammadde olarak kullanımı GB'ye hem çevreci hem de ekonomik bir ürün özelliği kazandırmaktadır. GB'nin kısa ve uzun vadeli fiziksel ve mekanik özellikleri GB ürünlerin üretimi için uygun olduğunu göstermektedir. Ancak yüksek mukavemet değerleri sağlamak için kür sürecinde yüksek sıcaklık gerekmesi yerinde uygulamaları zorlaştırmaktadır. GB'nin daha çok prefabrik uygulamalar, dış cephe kaplamaları, altyapı ürünleri gibi uygulamalarda daha uygun olabileceği düşünülmektedir. Geopolimerler, basit üretim süreci, düşük enerji tüketimi, endüstriyel atıkların etkin kullanımı ve sera gazı emisyonunun azaltılması gibi cazip özelliklere sahiptir. Bunula birlikte geopolimer ürünlerin pratikteki performanslarını etkileyen birçok faktör vardır. Hammaddelerin çeşitliliği nedeniyle, bazen tutarlı sonuçlar elde etmek zordur. Halen çok sayıda araştırma yapılmış olmasına rağmen, reaktivite indeksi, priz süresi, kuruma büzülmesi ve alkali-agrega reaksiyonları gibi konuların uygulamayı kolaylaştırmak için daha fazla araştırmaya ihtiyacı vardır.

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A STUDY ON MECHANIC CHARACTERISTICS OF NANOFIBER STRUCTURES OBTAINED BY EGG ALBUMEN/POLY (CAPROLACTONE) MIXED WITH BENZALKONIUM CHLORITE

Nuray Öz CEVİZ[1*], Metin YÜKSEK[2],Derya Saltık ÇİRKİN[3]

*[*1]Marmara University, Vocational School of Technical Sciences, Textile, Clothing, Footwear and Leather, İstanbul, Türkiye.*
ORCID Code: 0000-0002-9670-6176
[2]Marmara University, Faculty of Technology, Textile Engineering, İstanbul, Türkiye.
ORCID Code 0000-0002-4893-8837
[3]Institute of Pure and Applied Sciences, Marmara University, Faculty of Technology, Textile Engineering, İstanbul, Türkiye.
ORCID Code: 0000-0002-5968-9362

ABSTRACT

Egg and Egg Albumen (EA), biologically high in protein and containing balanced fatty acid composition, with its rich vitamin, mineral and phospholipid content are excellent nutritional sources recommended for postoperative recovery as well as treatment of burns and serious injuries. Poly (caprolactone) (PCL) is known as a potential raw material for cell development in nanofiber materials manufactured with biopolymer. With this material, it is possible to prepare a tissue scaffold structure with appropriate mechanic and structural characteristics, effective in infusion of different cell types. Benzalkonium chlorite (BAC) on the other hand is a kind of antimicrobial cationic surface active agent that contains a powerful protective against gram positive bacteria and highly preferred in wound dressings.

This study presents results obtained by mixing EA, PCL and BAC solutions at different concentrations with electrospun nanofiber structures. The microfiber structures developed exhibit a proper formation. The aim was to obtain optimum results through mechanical measurements. The thickness and strength measurements of the samples were conducted, and SEM images were reviewed. When results were analyzed, the solution (S1) that was prepared with 2:1 (PCL/EA) yielded the best mechanic properties. The sample's vertical strength was measured as 3,693 MPa and horizontal strength as 4,970 MPa, and thicknesses of 0,021 and 0,025 mm were obtained respectively. When BAC was mixed with the solution, (Poly (Caprolactone) 2:1 EA + 1.0% BAC), the best mechanical properties were observed in sample S2 (Vertical 2,297 MPa and horizontal 2,680 MPa). The samples prepared, with addition of egg albumen and BAC, are considered highly usable as nanofiber wound dressings in treatment of burns.

Keywords: Electrospinning, egg albumen, benzalkonium chloride, nanofiber.

BENZALKONYUM KLORİT KATKILI YUMURTA AKI/POLİ (KAPROLAKTON) İLE ELDE EDİLEN NANOFİBER YAPILARIN MEKANİK ÖZELLİKLERİNİN İNCELENMESİ

Nuray Öz CEVİZ[1*], Metin YÜKSEK[2],Derya Saltık ÇİRKİN[3]

*[*1]Marmara Üniversitesi, Teknik Bilimler MYO, Tekstil, Giyim, Ayakkabı ve Deri Bölümü, İstanbul, Türkiye.*
ORCID Code: 0000-0002-9670-6176
[2]Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü, İstanbul, Türkiye.
ORCID Code: 0000-0002-4893-8837
[3]Fen Bilimleri Enstitüsü, Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü, İstanbul, Türkiye.
ORCID Code: 0000-0002-5968-9362

ÖZET

Biyolojik değeri yüksek protein ve dengeli yağ asidi kompozisyonu içeren, zengin vitamin, mineral ve fosfolipide sahip yumurta ve yumurta akı (EA), bireylerin ameliyat sonrası iyileşme, yaşanan her türlü yanık ve ağır yaralanmaların tedavisi için tavsiye edilen mükemmel bir besin kaynağıdır. Poli (kaprolakton) (PCL)'un, biyopolimer esaslı olarak üretilen nano lif materyallerde, hücre gelişiminde olası bir hammadde olduğu bilinmektedir. Bu malzeme ile uygun mekanik ve yapısal özellikler sahip, farklı hücre tiplerini aşılamada etkili doku iskelesi (scaffold) bir yapı hazırlamak olasıdır. Benzalkonyum klorit (BAC) ise yara örtülerinde en çok tercih edilen ve Gram-pozitif bakterilere karşı güçlü bir koruyucu içeren bir tür antimikrobiyal katyonik yüzey aktif maddedir.

Bu çalışma, nanofiber yapıların elektroçekim yöntemi ile EA, PCL ve BAC solüsyonlarının farklı konsantrasyonlarda karıştırılması ile elde edilen sonuçları kapsamaktadır. Oluşturulan mikrofiber yapılar düzgün bir oluşum sergilemektedir. Mekanik ölçümler yapılarak optimum değerlerin elde edilmesi hedeflenmiştir. Numunelerin kalınlık ve mukavemet ölçümleri yapılmış, SEM görüntüleri incelenmiştir. Sonuçlar değerlendirildiğinde, 2:1 (PCL/EA) hazırlanmış olan solüsyonun (S1) en iyi mekanik özellikleri gösterdiği görülmüştür. Numunenin dikey mukavemeti 3.693 MPa ve yatay mukavemeti 4.970 MPa olarak ölçülmüş ve sırasıyla 0.021 ve 0.025 mm kalınlık değeri elde edilmiştir. Elde edilen çözeltiye BAC karıştırıldığında ise (Poli (kaprolakton) 2:1 EA + % 1.0 BAC) en iyi mekanik özellikleri sağlayan numune S2 olmuştur (Dikey 2.297 MPa ve yatay 2.680 MPa). Hazırlanan numunelerin yumurta akı ve BAC katkısı ile birlikte yanık tedavisinde nanofiber yara örtüsü olarak kullanılabileceği düşünülmektedir.

Anahtar Kelimeler; Elektroçekim, yumurta akı, benzalkonyum klorür, nanofiber.

1. GİRİŞ

Birçok alanda olduğu gibi, elyaf üretiminde de nano ölçekli malzemelerin üretiminin hızla arttğı görülmektedir [1]. Nano ve mikro boyuttaki lifleri üreterek son derece küçük gözenekler, yüksek filtrasyon ve mükemmel mekanik özellikler elde edilebilmekte ve bu üretim için kullanılan yaygın yöntem olarak ise elektroçekim görülmektedir [2-5]. İlk olarak 1934 yılında Formhals tarafından patenti alınarak [6] geliştirilen elektroçekim yöntemi üç bileşen ile lif üretmektedir; pipet veya küçük çaplı iğne ile bir kılcal boru, bir yüksek voltaj tedarikçisi ve bir metal toplama alanı. Hem doğal hem de sentetik malzemelerin kolayca çalışılmasına izin veren bu sistemde yaklaşık 100 farklı malzemenin çalışıldığı bilinmektedir ve bu yöntemde makine, hazırlanan solüsyon ve çevresel faktörler büyük önem taşımaktadır [7].

Yumurta, insanların hem zihinsel hem de bedensel gelişimi için inanılmaz kuvvetli bir hayvansal protein kaynağı olarak tüketilmekte, bu şeçkin gıda maddesi içerisindeki protein biyolojik değer bakımından %95'lik sindirilebilme özelliği ile ilk sırada yer almaktadır [8, 9]. Besin değerinin yanında özellikle alternatif tıp alanında yanık tedavisinde de kullanılan yumurta akının, yara iyileşmesinde ilerleme gösterdiği bilinmektedir [10-12]. Yanıklarda yaranın derinliği ve genişliği yaralanmanın ciddiyetini ortaya koyarken, meydana gelen yanığa 60 yıllık bir İngiliz geleneği olan soğuk su ile temastan sonra yumurta akı uygulamak, yumurta akında bulunan ve vitamin dolu bir plasenta (etene) olan kollajen ile dokuların tamamen yenilenmesini sağlamaktadır [13, 14].

Kaprolakton monomerinden oluşan polikaprolakton polimeri biyo-polimer grubunda olup, özellikle yara iyileştirmede yapılan deneysel çalışmalarda yaranın tedavisinde sağladığı belirgin faydalar ile yara örtücü materyallerde kolaylıkla kullanılabilmektedir. Hücre gelişiminde olası bir hammadde olan polikaprolakton, mekanik ve yapısal özellikleri ile nano lif boyutunda üretilerek, değişik hücre türlerinin aşılanmasına uygun olan doku iskelesi (scaffold) yapı hazırlanmasında da uygulanabilmektedir. Bu sayede elde edilen yapı hücre çoğalmasına yardımcı olmaktadır. Aynı zamanda bu nanolifli doku iskelelerinin hazırlanması sırasında farklı biyo-aktif materyaller de eklemek (büyüme etkeni ve bağışıklık sistemini baskılayıcı ilaçlar gibi) mümkündür [15-17].

C_8 ile C_{18} uzun alkil zincirleri ile kuaterner amonyum bileşimlerine (QAC's) ait bir tür anti-mikrobiyel katyonik yüzey aktif madde olan Benzalkonyum klorür (BAC), çeşitli cerrahi, jinekolojik, ürolojik, dental ve oftalmolojik müdahaleler sırasında ağrı giderimi için kullanılan etkili bir bakterisittir. Organik tuzlar gibi davranan ve çözeltilerde iyonize olan BAC, elektroçekimlere katılarak yara sargı materyallerinde etkili olacağı düşünülmektedir [18, 19]. Gram-pozitif bakteriler başta olmak üzere birçok bakteriye karşı anti-mikrobiyel aktivite göstermektedir[20]. Dolayısı ile hastane ve gıda işletmelerinin yanı sıra kişisel bakım ürünlerinde de biyosit olarak yaygın bir şekilde kullanılmaktadır. Çevre dostu olan BAC, tıbbi tekstil ürünlerinde de yara örtülerinde tercih edilen bir malzemedir [21].

BAC içeren membranların elektroçekim metodu ile üretilerek antibakteriyellik aktivitelerinin incelendiği birçok çalışma literatürde mevcuttur [22-25]. Fakat yumurta akının membran olarak üretilmesi ve antibakteriyellik çalışmaları henüz ivme kazanmamıştır. Literatürde, Rathna vd (2011), %20 konsantrasyona kadar olan saf EA' nın viskoelastisite yetersizliği nedeniyle nanolif üretmedeki problemlerini ortaya koymuşlar ve EA' yı başka bir çözelti ile harmanlamanın gerekliliğinden bahsetmişlerdir. Yaptıkları çalışmada EA ile PVA' yı harmanlayarak, FTIR, DSC, XRD ve gel-electroforez ile elde ettikleri yüzey özelliklerini ortaya sunmuşlardır [26]. Chiu vd (2012), yüksek yüzey fonksiyonel grup yoğunluğu, yüksek gözeneklilik ve 3D nano iplikçik yapısı ile yumurta akı ve zayıf asidik poliakrilonitril kullanarak elektroçekim teknolojisi ve alkali hidroliz işlemi uygulamış ve nanolif yapı elde etmişlerdir [27]. Zhao (2016), doğal protein kaynağı olan yumurta akını katkı maddesi olarak nişastayı kullanarak elektrospun yüzey eldesinde kullanmıştır [28]. Wongsasulak vd. (2010), yumurta akı ve selüloz asetat karışımlı çözeltiler ile elektrospun yüzey elde etmiş ve SEM, FTIR sonuçlarını değerlendirmiştir [29].

Bu çalışmada, yumurta akı ve poli (kaprolakton) kullanılarak hazırlanan çözeltiye farklı oranlarda BAC ilave edilerek elde edilen yüzeylerin mukavemet değerleri ölçülmüş, SEM görüntüleri analiz edilmiş ve irdelenmiştir.

2. MATERYAL VE METOD

2.1 Materyal

Yüksek protein değerine sahip toz yumurta akı (EA), Dr. Gusto, EA' yı ve PCL' yi çözmek için kullanılan %100'lük Formik asit Merck firmalarından temin edilmiştir. 1,145 g/mL yoğunluğa sahip PCL ise Aldrich Chemistry firmasından satın alınmıştır. Benzalkonyum klorit (BAC) ise Kimetsan firmasından temin edilmiş olup, kimyasal ürünler alındığı gibi kullanılmışlardır.

2.2. Metod

2.2.1. EA/PCL/BAC Elektroçekim Çözeltisinin Hazırlanması

EA, Formik asit ile çözündürüldükten sonra, sulu (PCL) 2:1 (EA) çözeltisi 4 saat boyunca düşük devirde karıştırılarak hazırlanmıştır. Homojen bir çözelti oluşturulduktan sonra eğirme solüsyonlarını üretmek için çeşitli miktarlarda BAC eklenmiş olup, elektroçekim çözeltilerinin son konsantrasyonları Tablo 1'de listelenmiştir.

Tablo 1: Elektroçekim için çalışılan çözeltilerin son konsantrasyonları.

Numune	EA (%)	PCL (%)	Benzalkonyum Klorid (%)
S1	33,3	66,6	0
S2	33,3	66,6	1.0
S3	33,3	66,6	2.0
S4	33,3	66,6	5.0

2.2.3. Elektroçekim

Elektroçekim işlemi için 10 ml' lik plastik enjektörler PCL / EA / BAC çözeltiler ile doldurulmuştur. Nanofiber yapıyı üretmek için Inovenso NE300 Nanospinner model elektroçekim cihazı kullanılmıştır. Enjektör ve silindirik kolektör arasında yüksek elektrik alanını üretmek için yüksek voltajlı bir güç uygulanmıştır. Toplayıcının yüzeyi yağlı kâğıt ile kaplanarak üretim gerçekleştirilmiştir. Elektroçekim işleminin ayarlanmış parametreleri Tablo 2' de listelenmiştir.

Tablo 2: Elektroçekim parametreleri

Parametre	S1	S2	S3	S4
Uygulanan Voltaj (kV)*	31	31	32	32
Besleme Hızı (ml/h)	0,4	0,4	0,3	0,3
Silindirik döner toplayıcının hızı (rpm)	100	100	100	100

* Uygulanan voltaj, çözelti iletkenliğine göre ayarlanmıştır.

2.2.4. Viskozite ve çözeltilerin iletkenliği

Polimer çözeltilerin viskoziteleri, 100 rpm' de S21 iğli viskozimetre (Brookfield DV-E Viskozimetre, ABD) cihazı, polimer çözeltilerin iletkenlikleri ise iletkenlik cihazı ile (WTW Cond 3110, Almanya) ölçülmüştür. Bütün ölçümler oda sıcaklığında gerçekleştirilmiştir.

2.2.5. Nanofiber yapıların morfolojisi

Elektroçekimden elde edilen nanofiber yapıların morfolojisi SEM görüntüleri (JEOL JSM-5910 LV, Japan) incelenerek analiz edilmiştir.

2.2.6. Mekanik Testler

Elde edilen tüm nanofiber membranlar mekanik testlerin yapılabilmesi için 50x10mm (en x boy) kesilerek hazırlanmıştır. Bu membran yapıların mekanik özelliklerinin belirlenebilmesi için Instron 4411 Universal test cihazı kullanılmıştır. Piston hızı 30 mm/dk, yük 50N ve çeneler arası mesafe 30mm olarak ayarlanmıştır.

Nanofiber membranların kalınlığı bir Mitutoyo marka dijital kalınlık ölçüm komparatörü ile ölçülmüştür.

3. BULGULAR

3.1. Viskozite ve çözeltilerin iletkenliği

Tüm çözeltilere ait viskozite ve iletkenlik değerleri Tablo 3'te gösterilmektedir.

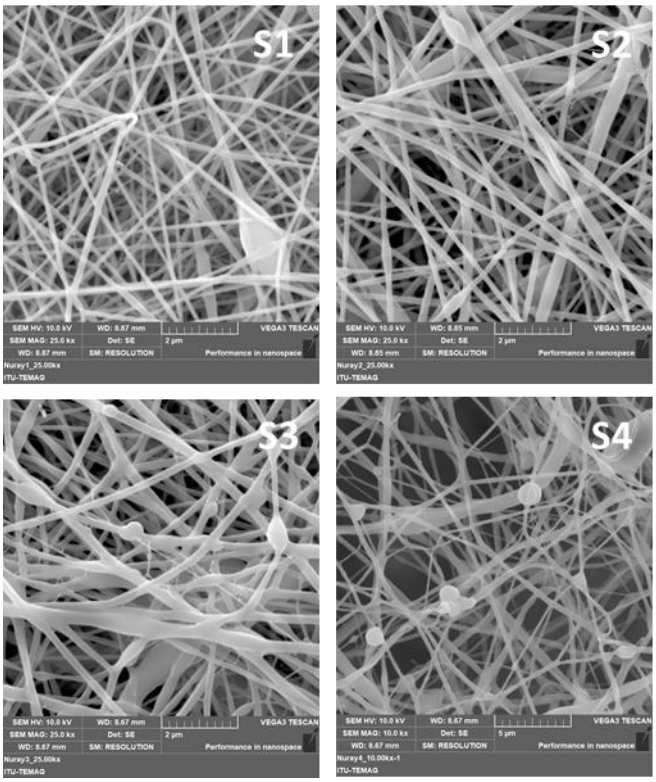
Tablo 3: Viskozite ve çözeltilerin iletkenliği

Numune	Çözeltinin viskozite değerleri (cP)	Çözeltinin iletkenlik değerleri (mS/cm)
S1	105	2,44
S2	119,5	2,85
S3	109,5	3,20
S4	109	4,18

Tablo 3'te görüldüğü üzere, çözelti viskoziteleri BAC konsantrasyonu arttıkça lineer olmamakla birlikte artış göstermiştir. BAC eklenmeyen PLC/EA çözeltisinin viskozite değeri ise en düşüktür. Buna karşın hazırlanan çözeltilerin iletkenlik değerleri ise BAC konsantrasyonundaki artışa paralel olarak artış göstermiştir. Dolayısı ile en yüksek BAC konsantrasyonundaki çözelti en fazla iletkenlik değerine sahiptir.

3.2. Nanofiber yapıların morfolojisi

Elektroçekim nanofiberlerin morfolojileri SEM görüntüleri incelenerek analiz edilmiştir.



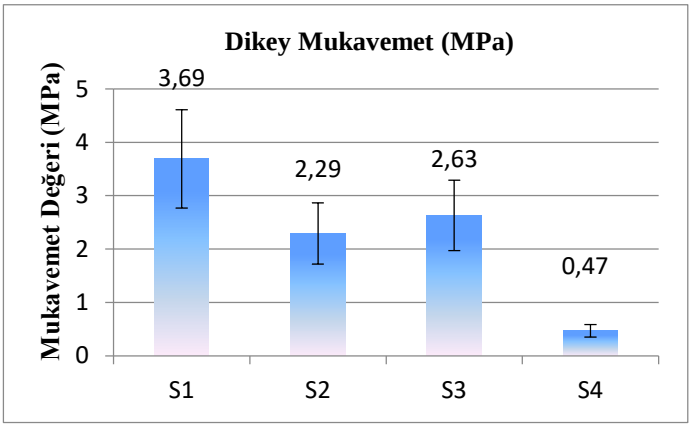
Resim 1: S1-S4 numunelerinin SEM görüntüleri.

S1 – S4 yapılarındaki liflerin çapları incelendiğinde sırası ile 0.1-0.2 µm, 0.1-0.4 µm, 0.1-1 µm ve 0.2-1 µm olarak ölçülmüştür. BAC konsantrasyonunun ilavesi, mikrofiber yapıların çaplarını etkilemiştir.

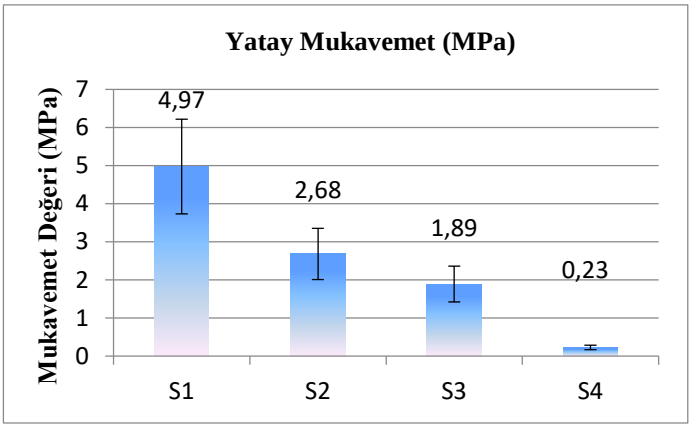
En yüksek lif çapı ortalama değerleri S4 numunesinde %5 BAC konsantrasyonunda gözlemlenmiştir. Ortalama en ince lif çapı değerleri ise S1 (0.1-0.,2 µm) yapısında gözlemlenmiştir.

3.3. Mekanik Testler

EA/PCL/BAC nanofiber membranların dikey ve yatay mukavemet değerleri ölçülmüştür. Değerler Grafik 1 ve Grafik 2' de görülmektedir.



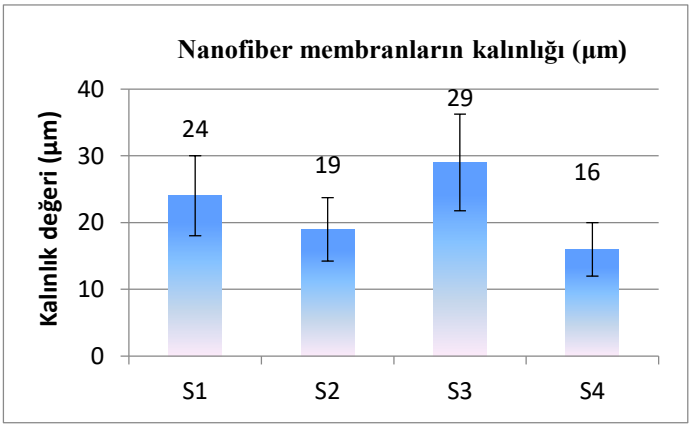
Grafik 1: Nanofiber membranların ölçülmüş dikey mukavemet sonuçları



Grafik 2: Nanofiber membranların ölçülmüş yatay mukavemet sonuçları

En yüksek dikey ve yatay mukavemet sonuçları BAC eklenmemiş membranda elde edilmiştir (S1). PCL/EA çözeltisine BAC eklendikçe genel olarak hem dikey hem de yatay mukavemette azalma görülmektedir. Yalnızca S3 numunesinin dikey mukavemet sonucunda bir miktar artış görülmektedir.

Nanofiber membranların kalınlık değerleri de ölçülmüştür (Grafik 3).



Grafik 3: Nanofiber membranların kalınlık değerleri

En kalın membran yapı S3'de (29 µm) gözlenmiştir. Membranlar arasındaki değişken kalınlık değerleri sebebiyle BAC konsantrasyonunun kalınlığa etki etmediği düşünülmektedir.

4. SONUÇ

Bu çalışmada, EA/PCL/BAC sulu çözeltilerine nanolif yapısı üretmek için elektroçekim işlemi uygulanmıştır. BAC ile birlikte antibakteriyel özelliklerini geliştirebilmek için membran yapılar üzerine çalışılmıştır. Çözeltilerin viskozitelerinde ve iletkenliklerinde BAC konsantrasyonundaki artışa paralel olarak artış saptanmıştır. En yüksek viskozite değeri S2 numunesinde görülürken, iletkenlik değeri S4 numunesinde saptanmıştır.

EA/PCL/BAC sulu çözeltilerinin elektroçekim işlemi uygulanarak elde edilen membranları, 0.1-1 µm lif çapı ile homojen yapıda ve yoğun nanolif dağılımına sahiptir. Nanoliflerin en yüksek dikey ve yatay dayanımları S1' e ait olup, dayanım sıralaması S1>S2>S3>S4 olmuştur. BAC konsantrasyonun ilavesi ile numunelerin kalınlık değerleri arasında ise herhangi bir etki görülmemiştir. Elde edilen yapılar daha sonraki aşamalarda gram negatif (E. coli ve P. aeruginosa) ile gram pozitif (B. subtilis ve S. aureus) bakterilerine karşı dayanımları açısından incelenmeye uygundur. Lif çekimi esnasında lif çekim çözeltisine ilave edilen antibakteriyel malzemelerin, sağlık için tehdit oluşturacak çeşitli mikroorganizmalara karşı koruyuculuk sağlayacağı düşünülmektedir. Yapının nanoliflerden oluşması yüzey alanında daha fazla bağ yaparak doku oluşturabilmesine olanak sağlayacaktır. Yine yapı içerisine yedirilen yumurta akı sayesinde elde edilen membranların yara ve yanık tedavisinde daha çabuk iyileşme sağlayacağı düşünülmektedir.

Bu çalışma, literatürde yumurta akı ile poli (kaprolakton) sulu çözeltisine BAC ilave edilerek yapılan ilk çalışma olması sebebiyle literature katkı sağlayacak özgün bir çalışmadır.

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ON MULTIMODE INFINITE QUANTUM SYSTEMS

Muna Tubani and Mabrouka Alfaghi
Department of Mathematics, University of Tripoli, Libya

ABSTRACT

The paper contains an investigation of the notion of multimode infinite systems. We introduced Bargmann analytic function for two systems. The formalism of Harmonic oscillator in one-mode systems has been studied. The formalism of Harmonic oscillator in two-mode systems has been studied. brief introduction to Husimi functions is giving. The onemode Bargmann functions have been studied. The multimode Bargmann functions have been introduced. The zeros of Bargmann analytic function of one variable and of two variables are considered. A The Bargmann functions have exactly q zeros. The motion of the zeros μ_n are considered.

1 Introduction

The basic structure of two mode systems are given.

We consider the of Bargmann representation in the complex plane. The Bargmann function is very important kind of analytic functions [1, 2, 3] in the complex plane [4, 5, 6] has been used to consider of various models [7, 8, 9, 10, 11, 12, 13]. The analytic Bargmann functions $f(z)$ have exactly q zeros which subjected to the constraint.(33). The zeros of Bargmann functions itself the zeros of Husimi function. The growth of an analytic function $f(z)$ is givin by the order ρ and type σ [14, 15, 16, 17]. The analytic Bargmann function $f(z)$ has q zeros. Various examples have been given.

2 Harmonic oscillator in one-mode systems

Let H_q be the Hilbert space with number eigenstates $|n\rangle$ and let x; p are the position and momentum operators. We consider a harmonic oscillator corresponding the Hamiltonian:

$$H = \frac{1}{2}(x^2 + p^2) \tag{1}$$

The creation and annihilation operators $a, a^\dagger$ are givin by:

$$a = \frac{x+ip}{\sqrt{2}}; \quad a^\dagger = \frac{x-ip}{\sqrt{2}}; \tag{2}$$

where

$$aa^\dagger |n\rangle = n|n\rangle, \quad [a, a^\dagger] = 1; \tag{3}$$

$$a^\dagger |n\rangle = (n+1)^{1/2}|n+1\rangle;$$

$$a|n\rangle = n^{1/2}|n-1\rangle; \tag{5}$$

We intoduce the displacement operators $D(z)$ as following

$$D(z) = \exp(za^\dagger - z^* a); \quad z = (x+ip)/\sqrt{2}. \tag{6}$$

We itroducer the coherent states

$$|z\rangle = \exp\left(-\frac{1}{2}|z|^2\right)\sum_{n=0}^{\infty}(n!)^{-1/2} z^n |n\rangle. \tag{7}$$

where

$$a|z\rangle = z|z\rangle; \tag{8}$$

and its position representation is

$$f_z(x) = \pi^{-1/4} exp(-\frac{x^2}{2} + \sqrt{2}zx - zz_R); \quad z = z_R + iz_I. \tag{9}$$

The inner product of two coherent states $|z_1\rangle$ and $|z_2\rangle$ is

$$\langle z_1 | z_2 \rangle = exp(-\frac{1}{2}|z_1|^2 - \frac{1}{2}|z_2|^2 + z_1 z_2^*). \tag{10}$$

3 Husimi functions

If we let $|\psi\rangle$ be an arbitrary state, the Husimi function is defined by

$$Q(\alpha) = \frac{|\langle \alpha | \psi \rangle|^2}{\pi} \tag{11}$$

with

$$\int_C d^2\alpha Q(\alpha) = 1 \tag{12}$$

The Husimi function of the coherent state $|\beta\rangle$

$$Q(\alpha) = \frac{1}{\pi}|\langle \alpha | \beta \rangle| = \frac{1}{\pi} exp(-|\alpha - \beta|^2), \tag{13}$$

The Husimi function of the number state $|n\rangle$

$$Q(\alpha) = \frac{1}{\pi}|\langle \alpha | n \rangle| = \frac{1}{\pi} exp(-|\alpha|^2)\frac{|\alpha|^{2n}}{n!}. \tag{14}$$

4 Harmonic oscillator in two-mode systems

Let $H_q = H_1 \otimes H_2$ be the two-mode Hilbert space. We consider the two-mode orthonormal basis

$$|n, m\rangle = \left[\frac{H_n(x)e^{\frac{-1}{2}x^2}}{\sqrt{\pi}\,2^n n!}\right]\left[\frac{H_m(x)e^{\frac{-1}{2}x^2}}{\sqrt{\pi}\,2^m m!}\right] \tag{15}$$

where H_n is the Hermite polynomials.

Let a_2, $a_2^\dagger$ be the creation and annihilation operators in two-mode systems:

$$a_2 = 1 \otimes a, a_2^\dagger = 1 \otimes a^\dagger, \quad [a_2, a_2^\dagger] = 1. \tag{16}$$

The displacement operators are defined as

$$D_2(z) = \exp(za_2^\dagger - z^* a_2), \quad z = (x + ip)/\sqrt{2}. \tag{17}$$

We consider the coherent states

$$|z_1, z_2\rangle = \exp\left(-\frac{1}{2}(|z_1|^2 + |z_2|^2)\right)\sum_{n=0}^{\infty}\frac{z_1^n z_2^m}{\sqrt{n!\,m!}}|n, m\rangle. \tag{18}$$

The state $|f\rangle$ can be analyzed in above basis **15** as follows

$$|f\rangle = \sum_{n,m} f_{nm} |n,m\rangle, \quad \sum_{n,m} |f_{nm}|^2 = 1$$
$$|f\rangle^* = \sum_{n,m} f_{nm}^* |n,m\rangle$$
$$\langle f|^* = \sum_{n,m} f_{nm} \langle n,m|. \tag{19}$$

5 Bargmann analytic representation of one variable

We cosider a normaliezed state $|f\rangle$

$$|f\rangle = \sum_{n=0}^{\infty} f_n |n\rangle; \tag{20}$$

The Bargmann representation of the state $|f\rangle$ is

$$f(z) = \sum_{n=0}^{\infty} \frac{f_n z^n}{\sqrt{n!}} \tag{21}$$

Which satisfying the condition [7]

$$f\left[z + 1/\sqrt{2}\right] = e^{(q\pi(\frac{1}{2}+z\sqrt{2}))} f(z);$$
$$f\left[z + i/\sqrt{2}\right] = e^{(q\pi(\frac{1}{2}+z\sqrt{2}))} f(z). \tag{22}$$

The scalar product $\langle f|g\rangle$ is given by

$$\langle f|g\rangle = \int_C [f(z)]^* g(z) exp(-|z|^2) \frac{dz_R dz_I}{\pi}$$
$$= \sum_n f_n^* g_n \tag{23}$$

Now we inroduce the creation and annihilation operators as following [1,18]

$$a \to \alpha^* \exp(z\alpha^*); \quad a^\dagger \to z\exp(z\alpha^*) \tag{24}$$

Hence there Bargmann representations are

$$a \to \partial_z; \quad a^\dagger \to z. \tag{25}$$

6 Bargmann analytic representation of two variable

The Bargmann analytic representation of the state $|f\rangle$ is given by

$$f(z_1,z_2)=\exp\left(\frac{|z_1|^2+|z_2|^2}{2}\right)\langle f^*|z_1,z_2\rangle$$
$$=\sum_{n,m} f_{nm}\frac{z_1^n z_2^m}{\sqrt{n!\,m!}}; \quad (26)$$

which is an entire function.

The scallar product of the two states $\langle f|g\rangle$ is given by

$$\langle f|g\rangle=\int[f(z_1,z_2)]^* g(z_1,z_2)\exp(-(|z_1|^2+|z_2|^2))\frac{d^2z_1}{\pi}\frac{d^2z_2}{\pi}. \quad (27)$$

see [19]

We can represent the creation and annihilation operators [19] as following

$$a_1\to\partial_{z_1},\quad a_2\to z_2$$
$$a_1^\dagger\to\partial_{z_1},\quad a_2^\dagger\to\partial_{z_2}. \quad (28)$$

6.1 The growth of Bargmann analytic functions of one variable

The growth of an entire function $f(z)$ is described by the order ρ and type σ [14, 15, 16, 17, 18]:

$$\rho=\lim_{R\to\infty}\sup\frac{lnlnMax\ (r)}{lnr},\ \sigma=\lim_{R\to\infty}\sup\frac{lnMax\ (r)}{r^\rho}, \quad (29)$$

where $|f(z)|\le Max(x)$ and on $|z|=r$.

- The Bargmann analytic representation of the number state $|n\rangle$ is

$$f(z)=\frac{z^n}{\sqrt{n!}},\rho=0 \quad (30)$$

- The Bargmann analytic representation of the coherent state $|\alpha\rangle$ is

$$f(z) = exp(\alpha z - \frac{1}{2}|\alpha|^2), \rho = 1, \sigma = |\alpha| \tag{31}$$

6.2 The growth of two variables Bargmann functions

We describ the growth of the Bargmann function $f(z_1, z_2)$ by the order ρ and type σ [14, 15, 16, 17, 18].

let $Max(r)$ be the maximum value of $f(z_1, z_2)$ on the shere $\sqrt{|z_1|^2 + |z_2|^2} = r$. As $|z_1|^2 + |z_2|^2 \to \infty$ the function grows as following

$$|f(z_1, z_2)| \approx e^{[\sigma(|z_1|^2 + |z_2|^2)^{\rho/2}}$$

see [19].

We can now derive the Bargmann analytic representation of some quantum states as examples.

- The Bargmann analytic representation of the number state $|n, m\rangle$ is

$$f(z_1, z_2) = \frac{z_1^n z_2^m}{\sqrt{n!m!}}, \rho = 0 \tag{32}$$

It is of order 0.

- The Bargmann analytic representation of the coherent state $|\omega_1, \omega_2\rangle$ is

$$f(z_1, z_2) = \exp(\frac{-(|\omega_1|^2 + |\omega_2|^2)}{2}) e^{\omega_1 z_1} e^{\omega_2 z_2}. \tag{33}$$

7 Zeros of Bargmann analytic functions of one variable

We use the notation μ_n for zeros of $f(z)$, i.e. $f(\mu_n) = 0$. Let ℓ be the boundary of the fundamental domain of analyticity, $S = [0, 1/\sqrt{2}] \times [0, 1/\sqrt{2}]$. We consider the integrals

$$\oint_\ell \frac{dz}{2\pi i} \frac{f(z)'}{f(z)}; \quad \oint_\ell \frac{dz}{2\pi i} \frac{f(z)'}{f(z)} z. \tag{34}$$

$\oint_\ell \frac{dz}{2\pi i} \frac{f(z)'}{f(z)}$ gives the number of zeros of the Bargmann analytic function

bounded by contour ℓ.

$\oint_\ell \frac{dz}{2\pi i} \frac{f(z)'}{f(z)} z$ gives the sum of these zeros.

The Bargmann analytic functions $f(z)$ have q zeros [7, 8].

$$\oint_\ell \frac{dz}{2\pi i} \frac{f(z)'}{f(z)} = q. \tag{35}$$

And the integral

$$\oint_\ell \frac{dz}{2\pi i} \frac{\partial_z f(z)}{f(z)} z = 2^{-3/2} q(1+i); \tag{36}$$

giving the sum of the zeros μ_n of $f(z)$ [7, 8].

The q zeros of the Bargmann analytic functions subjected to the constraint

$$\sum_{n=1}^{q} \mu_n = 2^{-3/2} q(1+i). \tag{37}$$

The zeros of Husimi function are the same zeros of Bargmann function $f(z)$. The Weierstrass-Hadamard factorization allows the reconstruction of entire functions from their zeros [2, 18]. We presume that the zeros of $f(z)$ are known, and subjected to the constraint of Eq. (33). The Weierstrass-Hadamard reconstructs the Bargmann functions $f(z)$ as following [2]

$$f(z) = z^m \prod_{n=1}^{q} \exp(Q_p(z) E(\mu_n, d); \tag{38}$$

where

$$E(\mu_n, d) = (1 - \frac{z}{\mu}) \exp\left(\frac{z}{\mu} + \frac{z^2}{\mu^2} + \ldots + \frac{z^d}{\mu^d} \right); \tag{39}$$

m is the pluralism of the zero, $Q_p(z)$ is polynomial of degree p and $d > 0$

We consider the polynomial

$$f(z) = \sum_{n=0}^{14} \frac{f_n z^n}{\sqrt{n!}}, \tag{40}$$

The coefficients f_n are given in Table. 1.

i	$f_i(0)$	i	$f_i(0)$	i	$f_i(0)$
0	0.1-0.2i	5	0.3-0.2i	10	0.1-0.1
1	0.3+0.3i	6	0.9-0.03i	11	-0.1+0.2
2	0.3+0.2i	7	0.3+0.01i	12	0.2+0.3i
3	0.01-0.3i	8	0.1+0.01i	13	-0.01-0.1i
4	0.1-0.01i	9	0.1-0.2i	14	-0.01+0.1i

Table 1: The coefficients f_n of function in Eq.(36)

In Fig.1 we plot the zeros of the polynomial of Eq.(39) .

The q zeros of the analytic functions $f(z)$ depends on the distribution of the coefficients $f_0, f_1,\ldots, f_n$. This coefficients subjected to the constraint

$$\sum_{n=0}^{q} f_n^2 = 1, \tag{41}$$

which comes from the normalization.

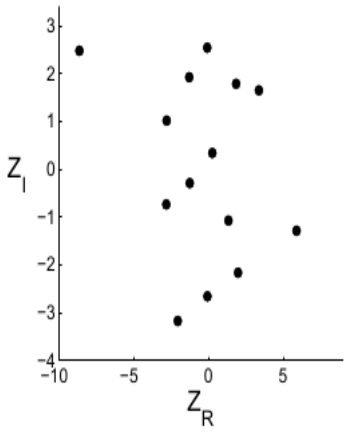


Figure 1: The distributions of zeros of function $f(z)$ of Eq. (39). The $|F(t)\rangle$ at $t = 0$ is described through the coefficients f_n in Eq.1

8 Motion of the zeros

Using the Hamiltonian H the state $|f(0)\rangle$ at $t = 0$ evolves at time t into

$$|f(t)\rangle = \exp(itH)|f(0)\rangle, \tag{42}$$

the corresponding zeros also evolves in time.

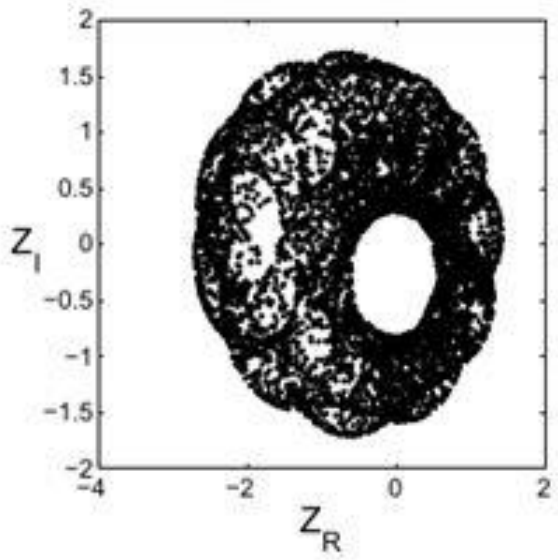
Let

$$\mu_0(0) = -0.1-1.2,\ \mu_1(0) = -1.1-0.4i,$$
$$\mu_2(0) = -0.7+0.8i,\ \mu_3(0) = 0.3+0.96i, \tag{43}$$

be the zeros at $t = 0$ and let

$$H = \begin{bmatrix} 1 & i & 0 & 0 & 0 \\ -i & 2 & 0 & 0 & 0 \\ 0 & 0 & 3 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \tag{44}$$

be the Hamiltonian with eigenvalues $0.38,1,1,2.3$, in the following figure we plot the motion of these zero



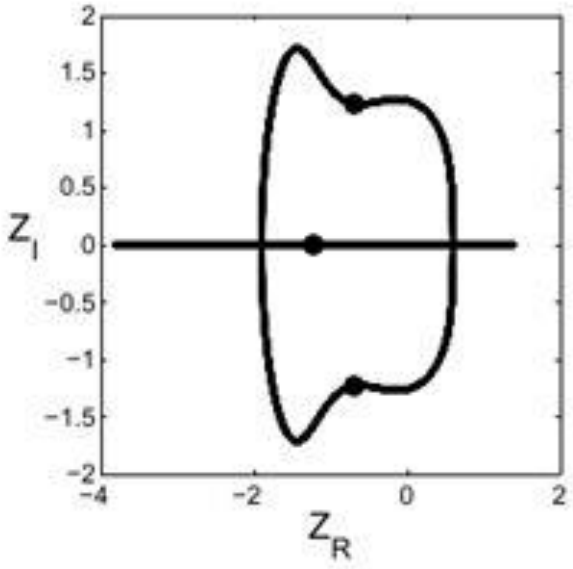
Let

$$\mu_0(0) = -0.7+1.2i,\ \mu_1(0) = -0.7-1.2i,$$
$$\mu_2(0) = -1.2, \tag{45}$$

be the zeros at $t = 0$ and let

$$H = \begin{bmatrix} 1 & i & 0 & 0 \\ -i & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \tag{46}$$

be the Hamiltonian with eigenvalues $0,1,1,2$ We seen that the zeros of the function with real coefficients are real or appear as complex conjugate pairs and draw symmetric graph with respect to the z_r axis. Here we found numerically that the motion of the zeros also draw symmetric graph with respect to the z_r axis. In the following we plot the motion of this zeros.



9 Zeros of Bargmann analytic functions of two variable

We use the notation (μ_n, ν_n) for the zeros of $f(z_1, z_2)$, If (μ_n, ν_n) is a zero of the Bargmann function $f(z_1, z_2)$ then $|\mu_n, \nu_n\rangle$ is orthogonal to $| f^* \rangle$.

The number state

$$f(z_1, z_2) = \frac{z_1^n z_2^m}{\sqrt{n!\,m!}}. \tag{47}$$

has the zero $(\mu_n, \nu_n) = (0.0)$ with pluralism $n+m$.
We consider the function

$$f(z_1, z_2) = \sum_{n,m=0}^{1} \frac{z_1^n z_2^m}{\sqrt{n!\,m!}}., \tag{48}$$

where the coefficients $f_{n,m}$ are

$$H = \begin{bmatrix} 0.5147 - 0.3337i & 0.2203 - 0.2139i \\ 0.9354 - 0.6228i & -0.0599 - 0.3751i \end{bmatrix} \quad (49)$$

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