

# III. INTERNATIONAL LIBERTY INTERDISCIPLINARY STUDIES CONFERENCE

*January 13-15, 2023 / Miami*



**Edited By**

**Dr. Carlotta Antonelli**

**ISBN: 978-1-955094-38-2**

ISBN 978-195509438-2



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**(THE PROCEEDINGS BOOK)**

**EDITOR**

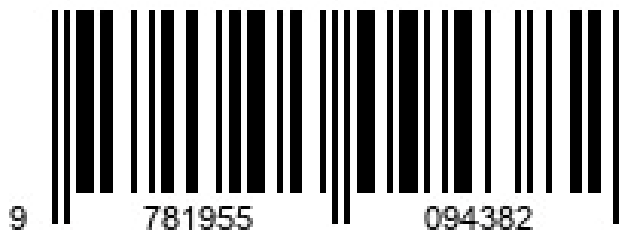
**Dr. Carlotta Antonelli**

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Issued: 21.01.2023

ISBN: 978-1-955094-38-2

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# CONFERENCE ID

## CONFERENCE TITLE

**III. INTERNATIONAL LIBERTY INTERDISCIPLINARY  
STUDIES CONFERENCE**

## DATE and PLACE

**January 13-15, 2023/ Miami**

## ORGANIZATION

**Liberty Academic Book**

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Sudan-1, Macedonia-1, Benin-1, Albania-4, Croatia-1, Cambodia-1, Slovenia-1,  
Saudi Arabia-2, Uganda-3, Serbia-1, India-2, Kosovo-1, Kazakhstan-2, Iraq-1, Colombia-1,  
Romania-2, Georgia-1

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## Conference Program



**LIBERTY**  
Academic Books

**Zoom Meeting ID: 849 0375 0466**  
**Zoom Passcode: 003003**

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III. INTERNATIONAL LIBERTY INTERDISCIPLINARY

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- ❖ 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.

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**Before you login to Zoom please indicate your name surname and hall number,  
exp. H- 1, Rena HUSEYNOVA**

**CONGRESS LANGUAGES: English and All Turkish Dialects**





 <b>14.01.2023</b> <b>Hall-1</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Assistant Prof. Rena HUSEYNOVA

Authors	Affiliation	Presentation title
<b>Assistant Prof. Rena HUSEYNOVA</b>	<i>Azerbaijan State University</i>	IMPROVING THE APPLICATION OF INTELLECTUAL CAPITAL IN PRODUCTION
<b>Emin Shahin oghlu Aslanov</b>	<i>Azerbaijan State University</i>	ANALYSIS OF THE POLICY FOUNDATIONS OF THE FORMATION OF THE MODERN SECURITIES MARKET IN AZERBAIJAN
<b>Dr. Neslihan DERELİ</b>		DIRTY MONEY, MONEY LAUNDERING AND ITS ASPECT OF TAXATION
<b>Bağırzadə Lalə</b>	---	HIDDEN HUMAN PSYCHOLOGY IN "GOD OF THE FLIES"
<b>Leyla DİLEK</b>	<i>Kurtalan District Directorate of National Education Bozhöyük 80. Yıl Primary</i>	ANALYSIS OF INTERJECTION ART IN GAGAUZ LITERATURE IN THE SEMANTIC PERIOD
<b>Kıymet DİRİCAN</b>	<i>Dokuz Eylül University</i>	19th CENTURY AMERICAN ART and THE HUDSON RIVER SCHOOL

(All speakers required to be connected to the session 10 min before the session starts)  
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 <b>14.01.2023</b> <b>Hall-2</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Ivan Pavlovic

Authors	Affiliation	Presentation title
<b>Besnik Jakaj</b> <b>Ervin Toçi</b>	<i>University of Medicine</i>	ADMINISTRATION, MANAGEMENT AND STRATEGIC PLANNING POLICIES OF THE HEALTH SYSTEM - TARGETED RESULTS OF THE HEALTH CARE SYSTEM
<b>Euglent Hoxha</b> <b>Artan Simaku</b>	<i>University Hospital Centre "Mother Teresa"</i>	TREATMENT OF CANCER PATIENTS WITH RADIOTHERAPY AND CHEMOTHERAPY
<b>Minal Sharma</b> <b>Simon Kaweesa</b>	<i>King Ceasor University</i>	TREATMENT OUTCOMES CAUSED FROM DEFAULTING TUBERCULOSIS TREATMENT AND THE FACTORS CONTRIBUTING TO TREATMENT DEFAULT: A CASE STUDY OF TUBERCULOSIS SUFFERERS REPORTING FOR TREATMENT AT MULAGO NATIONAL REFERRAL HOSPITAL, UGANDA
<b>Naun Sinani</b> <b>Enver Roshi</b>	<i>Ministry of Health and Social Welfare</i>  <i>University of Medicine</i>	ORGANIZATION OF HEALTH PRACTICES, BASED ON THE INTERACTIONS AT THE SECONDARY CARE LEVEL, ALBANIA
<b>Sara Ahmed Adam Musa</b> <b>Taha Ahmed Elmukashfi</b>	<i>University of Khartoum</i>	HEALTH PROMOTION EDUCATION PROGRAM EFFECTS ON HEALTH STATUS OF ELDERLY IN GERIATRICS HOMES AT KHARTOUM STATE, SUDAN, 2017; PRE- AND POST- INTERVENTION STUDY
<b>Zekirja Shabani</b> <b>Marigonë Rizani</b>	<i>Candidat at Istanbul University</i>	HISTORY OF PUBLIC HEALTH IN KOSOVO'S VILAYET
<b>DMD Cosoroaba Raluca</b> <b>Prof Denisa Abrudan</b> <b>Edida Maghet</b>	<i>University of Medicine and Pharmacy Victor Babes</i>	RECRUITMENT CHALLENGES FOR DENTAL PRACTICES COVID 19 EDITION
<b>Binuni Rebez E</b> <b>Hemavathi A</b> <b>Venugopal</b>	<i>Rajiv Gandhi Institute</i>	STUDY ON JUVENILE GROWTH PERFORMANCE OF NON-DESCRIPT COUNTRY CHICKEN UNDER INTENSIVE SYSTEM OF MANAGEMENT IN PUDUCHERRY
<b>Ivan Pavlovic</b>	<i>Scientific Institute</i>	AMEBIASIS IN PET DOGS IN BELGRADE AREA DURING 2021
<b>Augusto Peñaranda</b> <b>Lucia C. Pérez-Herrera</b> <b>Sergio Moreno-López</b> <b>Daniel Peñaranda</b>	<i>Universidad de Los Andes</i> <i>Fundación Universitaria</i>	SALUD MENTAL EN PROFESIONALES DE SALUD VS ORLS EN LATINOAMÉRICA DURANTE LA PANDEMIA DE COVID19: UNA EXPLORACIÓN AL PROBLEMA





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 <b>14.01.2023</b> <b>Hall-3</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Prof. Chahid Slimani

Authors	Affiliation	Presentation title
Matea Cvjetkovic	<i>University North</i>	THE ROLE OF TECHNOLOGY IN BUILDING A POST-PANDEMIC TALENT-ORIENTED ORGANIZATION: EMPLOYER BRANDING IN THE DIGITAL ERA
Dr. Phan Thi Yen Dr. Dang Vinh	<i>University of Danang Vietnam - Korea University</i>	IMPACT OF CORPORATE CULTURE - FACTORS PROMOTING SUCCESS
Ly Dai Hung Pham Anh Tuan	<i>Vietnam Institute of Economics Vietnam National University</i>	ECONOMIC GROWTH AND REAL ESTATES IN VIETNAM ECONOMY
Assist. Prof. İlhan DOĞAN Ezgi ÜNAL Prof. Yanqing DUAN Prof. Ram RAMANATHAN Lect. Bernd KLEINHEYER	<i>Istanbul University Bielefeld University</i>	JOB POSTING ANALYSIS TO DISCOVER THE OCCUPATIONAL PROFILES OF DIGITAL TRANSFORMATION MANAGERS
Abdenbi BELGHITI Mohammed BELGHITI Hicham MIZAB	---	MONETARY POLICY AND PRICE STABILITY IN MOROCCO: A STOCHASTIC STUDY
Assoc. Prof. SERKEBAYEVA R.K. Assoc. Prof. KOZHAKMETOVA M. K Assoc. Prof. ILYASSOV D.	<i>Narxoz university</i>	BANKING RISK MANAGEMENT AND ITS IMPACT ON LIQUIDITY
Prof. Chahid Slimani Samah Bouhazama	<i>Sidi Mohamed Ben Abdellah University</i>	BANKER'S VIGILANCE DUTY AND PROTECTION OF MOROCCAN CUSTOMERS' PERSONAL DATA
Kaltume Mohammed Kamsalem	<i>Bayero University</i>	EMPLOYEE EMPOWERMENT AND SERVICE QUALITY DELIVERY: THE MEDIATING EFFECT OF ORGANIZATIONAL CITIZENSHIP BEHAVIOUR AMONG NURSING STAFF
Sheeba Irfan	<i>University of the Punjab</i>	ENDURING LEGACIES OF PARTITION
Alfredo Guatemala Mariano German Martínez Prats Francisca Silva Hernández	<i>Universidad Juárez Autónoma de Tabasco</i>	MODEL OF CONSTRUCTION OF TECHNOLOGICAL CAPABILITIES FOR DIGITAL PLATFORM-BASED SOCIAL TECH STARTUPS





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 <b>14.01.2023</b> <b>Hall-4</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Assoc. Prof. Rashidah Albaqami

Authors	Affiliation	Presentation title
Carlotta Antonelli	<i>University of Rome "La Sapienza"</i>	UNIVERSITY AS A PLACE OF CONSTRUCTION OF THE IDENTITY: OBSTACLES, BEST PRACTICES AND TECHNOLOGIES FOR INCLUSION
Sabika Alisher Dr Anila Fatima Shakil Dr Rabia Abdul Karim	<i>Jinnah University for Women</i>	IMPORTANCE OF INTERNSHIP PROGRAM FOR PROFESSIONAL DEVELOPMENT AMONG STUDENTS AT COLLEGE LEVEL IN PAKISTAN
Assoc. Prof. Rashidah Albaqami	<i>Taif University</i>	FIGURING OUT THE ROLE OF MOTHER TONGUE INTERFERENCE IN MASTERING ENGLISH PHRASAL VERBS AMONG FOREIGN LANGUAGE LEARNERS FROM DIFFERENT FIRST LANGUAGE BACKGROUNDS
Serik Meruert Kadyrova Gulnur Maksatkhanovna Seitova Zhanat Adilbekovna	<i>Eurasian National University</i>	INTERNET-ASSISTED ENVIRONMENT IN TEACHING ENGLISH TO VISUALLY IMPAIRED LEARNERS
Assist. Prof. Dr. Shaista Jabeen Assist. Prof. Dr. Zill E Huma	<i>Govt. Graduate College</i>	IMPACTS OF DOMESTIC VIOLENCE ON FEMALES – A STUDY IN PUNJAB (PAKISTAN)
Olayinka Elizabeth Omotayo	<i>City University</i>	STRESSORS AND COPING MECHANISMS AMONG MOTHERS OF HEARING IMPAIRED CHILDREN IN THE SCHOOL FOR HEARING IMPAIRED, AKURE, ONDO STATE
Dr. Ferenc ADAMOVICH	<i>Târgu Mureş University</i>	THE ROLE OF MULTIMODAL STUDIES FROM THE PERSPECTIVE OF AFFECTIVE MOVEMENT PEDAGOGY IN THE STUDY OF KINESTHETIC REPRESENTATION





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 <b>14.01.2023</b> <b>Hall-5</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Neslihan BALCI

Authors	Affiliation	Presentation title
<b>Assist. Prof. Amber Nawab</b> <b>Lect. Javeria Sheikh</b> <b>Dr. Subia Jamil</b> <b>Lect. Najaf Farooq</b> <b>Bushra Kamali</b> <b>Musharraf Iqbal</b>	<i>Jinnah University for Women</i>	A MEDICAL BURDEN: GLAUCOMA, ITS PREVALENCE AND OUR AWARE COMMUNITY
<b>Khaoula Mkhayar</b> <b>Souad Elkhatabi</b> <b>Samir Chtita</b>	<i>Sidi Mohamed Ben Abdellah-Fez University</i> <i>Hassan II University of Casablanca</i>	DRUG LIKENESS, ADMET AND MOLECULAR DOCKING DYNAMICS STUDIES FOR DISCOVERY ANTI-SLEEP DISORDERS AGENTS
<b>Renzo Guarnieri</b> <b>Rodolfo Reda</b> <b>Alessio Zanza</b> <b>Marco Seracchiani</b> <b>Dario Di Nardo</b> <b>Luca Testarelli</b>	<i>Sapienza University of Rome</i>	PERI-IMPLANT MARGINAL BONE LOSS PROGRESSION AND A-MMP-8 CAN BE CONSIDERED AS INDICATORS OF THE SUBSEQUENT ONSET OF PERI-IMPLANTITIS. A 5-YEAR STUDY PERI-IMPLANT MARJINAL
<b>Aliye Demet DEMİRAG</b> <b>Emrullah FEDAI</b> <b>Mustafa YILDIRIM</b> <b>Gürkan BAL</b>	<i>Yeditepe University</i> <i>Humboldt-Universität zu Berlin</i>	TARGETING THE LXR RECEPTOR IN PANCREAS CANCER: A STUDY IN SILICO
<b>Aliye Demet DEMİRAG</b> <b>Melike OZTURK</b> <b>Mustafa YILDIRIM</b> <b>Gürkan BAL</b>	<i>Yeditepe University</i> <i>Humboldt-Universität zu Berlin</i>	TARGETING INFLAMMATORY RESPONSE IN PROSTATE CANCER: A STUDY IN SLICO
<b>Faisal Sophia Suleiman</b> <b>Amos Ronald Kalukusu</b>	<i>King Ceasor University</i>	ANALYSIS OF ISSUES ASSOCIATED WITH LEGALIZING INDUCED ABORTION AMONG WOMEN OF REPRODUCTIVE AGE IN UGANDA: A SITUATIONAL ANALYSIS AMONG DOCTORS, LAWYERS AND UNIVERSITY MEDICAL STUDENTS.
<b>Sabano Shalom Mary</b> <b>Kaweesa Simon Peter</b> <b>Amos Ronald Kalukusu</b>	<i>King Ceasor University</i>	DETERMINATION OF DRUG-DEFAULTER-RATE AMONG TUBERCULOSIS PATIENTS REPORTING FOR TREATMENT AT MULAGO NATIONAL REFERRAL HOSPITAL, UGANDA
<b>Jasim Mohammed Muhsin</b> <b>Shrooq Ali Hussein</b> <b>Jaleel Samanje</b>	<i>Middle Technical University</i>	CORRELATION OF HTLV-I INFECTION WITH HEART DISEASES AMONG SAMPLE OF IRAQI PATIENTS

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 <b>14.01.2023</b> <b>Hall-6</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Prof. Adil Geybulla

Authors	Affiliation	Presentation title
Dr. Kərimova Rəna Cabbar kızı Vəliyeva Zeynəb Yəhya kızı Ağayeva Asiya Hacı kızı Həsənova Xumar Əliövsət kızı Ələkbərova Mehriban Qəni kızı Yusifova Mətanət Yusif kızı	<i>Azerbaijan Medical University</i>	PHYSIOLOGICAL CHARACTERISTICS OF IRON DEFICIENCY IN THE BODY AND IMMUNE SYSTEM LOWERING LEVELS DUE TO ITS EFFECT
Dr. Kərimova Rəna Cabbar kızı Ağayeva Asiya Hacı kızı Quliyeva Nigar Təryel kızı Dr.İsmayılova Könül İdris kızı Dr. Məşədiyeva Bayramova Səbinə Ənvər kızı Bayramov Adil Allahyar oğlu	<i>Azerbaijan Medical University</i>	PHYSIOLOGICAL, HISTOLOGICAL CHARACTERISTICS OF IRON DEFICIENCY AND ITS CHANGES ON THE ENDOCRINE SYSTEM
Prof. Adil Geybulla	<i>Azerbaijan Medical University</i>	PERSPECTIVES FOR CONTROLLING BIOFILM-FORMING BACTERIA IN INFECTED DIABETIC FOOT SYNDROME
Assoc. Prof. Mahira Amirova Ellada Hüseynova Sabina Guliyeva Firangiz Guliyeva	<i>Azerbaijan Medical University</i>	THE RIGHT RESEARCH METHODS DICTATED BY HISTORICAL EXPERIENCE
L.I. Rustamova F.H. Heydarova T.I. Həjiyeva M.M. Hamzayeva Kh.B Pashayeva J.S.Mammadova	<i>Scientific-Research Institute of Medical Prophylaxis</i>	EPIDEMIOLOGICAL PROFILE OF INFECTION COVID-19 IN CHILDREN POPULATION IN BAKU CITY
Dr. Mehmet Fatih BURAK Asst. Prof. Dr. Polathan KÜSBECİ	<i>Beykent University Cappadocia University</i>	THE EFFECT OF THE METAVERSE ON THE HEALTH SECTOR
Res. Assist. Dr. Asuman ARKAŞ ALKLAY	<i>Dicle University</i>	MORPHOLOGICAL INVESTIGATION OF THE FETAL PERIOD IN SIMMENTAL CATTLE
Res. Assist. Dr. Asuman ARKAŞ ALKLAY	<i>Dicle University</i>	EXAMINATION OF TEXTURES WITH LIGHT MICROSCOPIC DYES; ANATOMY TO HISTOLOGY

(All speakers required to be connected to the session 10 min before the session starts)  
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 <b>14.01.2023</b> <b>Hall-7</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Assist. Prof. Gunratna Sontakke

Authors	Affiliation	Presentation title
Assist. Prof. Dr. Elsadig Hussein Fadlallah Ali Assist.Prof. Dr. Musadhique Kottaparamban Lecturer Mohammed Jabir Kannanchery Kunnath	<i>King Khalid University</i>	MANIFESTATION OF A DYSTOPIAN GOVERNMENT SYSTEM IN ALDOUS LEONARD HUXLEY'S BRAVE NEW WORLD
<b>Dr. Halit ALKAN</b>	<i>Mardin Artuklu University</i>	LINGUISTIC FEATURES IN JAMES JOYCE'S A PAINFUL CASE
<b>Elonora Hodaj</b>	<i>University "Ismail Qemali" Vlore</i>	THE POLITICS OF FICTIONAL LITERATURE: A CROSS-DISCIPLINARY APPROACH
<b>Dr (MC) Hergie Alexis            SEGUEDEME            Dr Orierien Olivier            ABODOHOUI            Dr Koumabe BOSSOUN</b>	<i>Enseignant-Chercheur à            l'Université d'Abomey</i>	CROSSING OVER THE DEMYSTIFICATION OF THE MIRAGE OF CULTURE IN L.P. HARTLEY'S THE GO- BETWEEN
<b>Elizabeta Dimitrova</b>	<i>Ss Cyril and Methodius University</i>	FRAGILE HERITAGE
<b>Assist. Prof. Gunratna Sontakke            Dr Anjali Kurane</b>	<i>Savitribai Phule Pune University</i>	CASTE IN URBAN MILIEU: AN ANTHROPOLOGICAL STUDY IN PUNE CITY, INDIA

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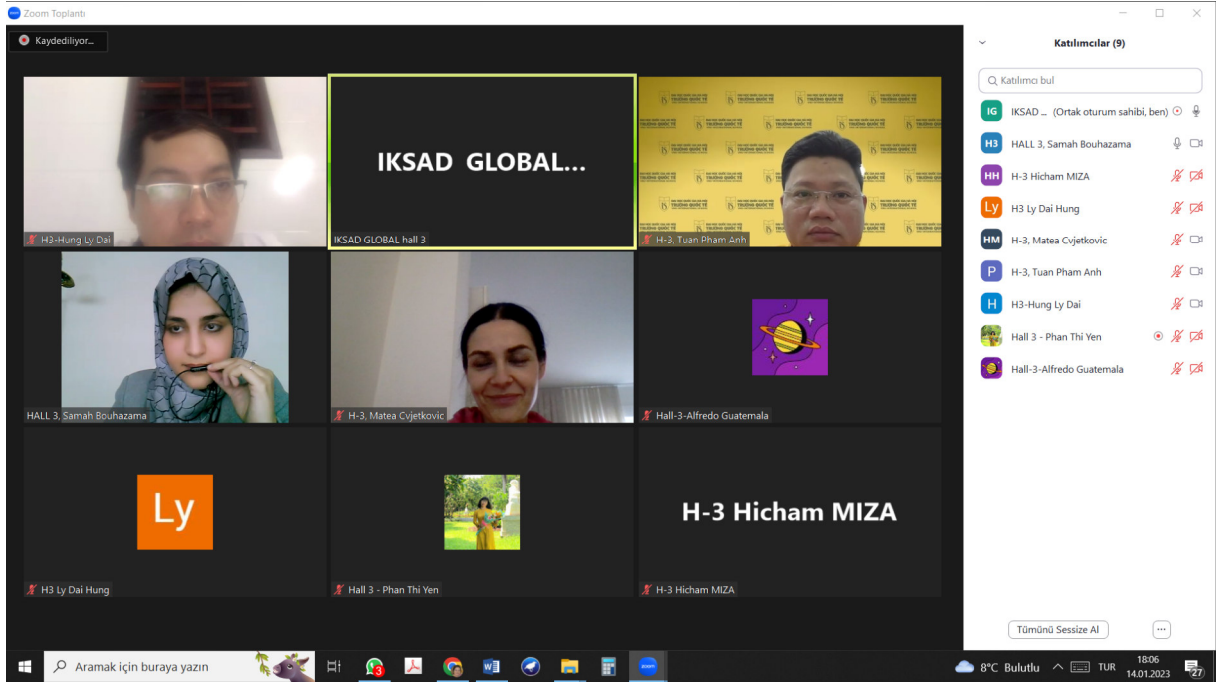
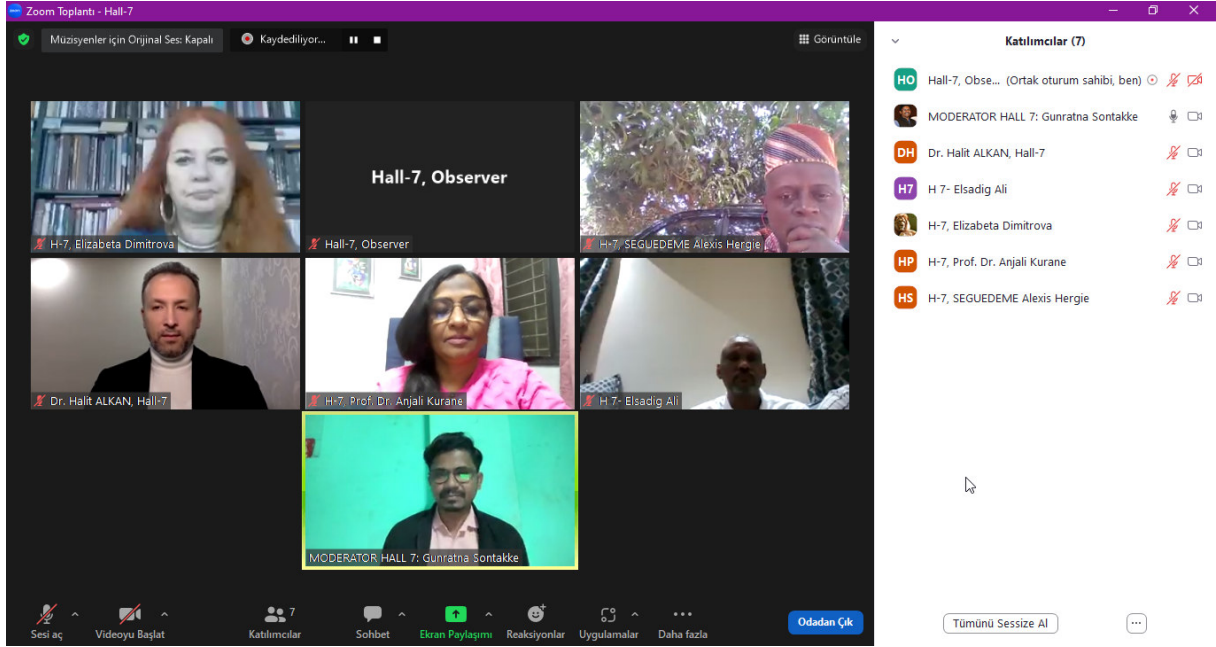
 <b>14.01.2023</b> <b>Hall-8</b>	 <b>Miami Time</b> <b>09<sup>00</sup> : 11<sup>30</sup></b>	 <b>Ankara Time</b> <b>17<sup>00</sup> : 19<sup>30</sup></b>	 <b>ID: 849 0375 0466</b> <b>Password: 003003</b>
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## HEAD OF SESSION: Prof. Dr. Gela Kipiani

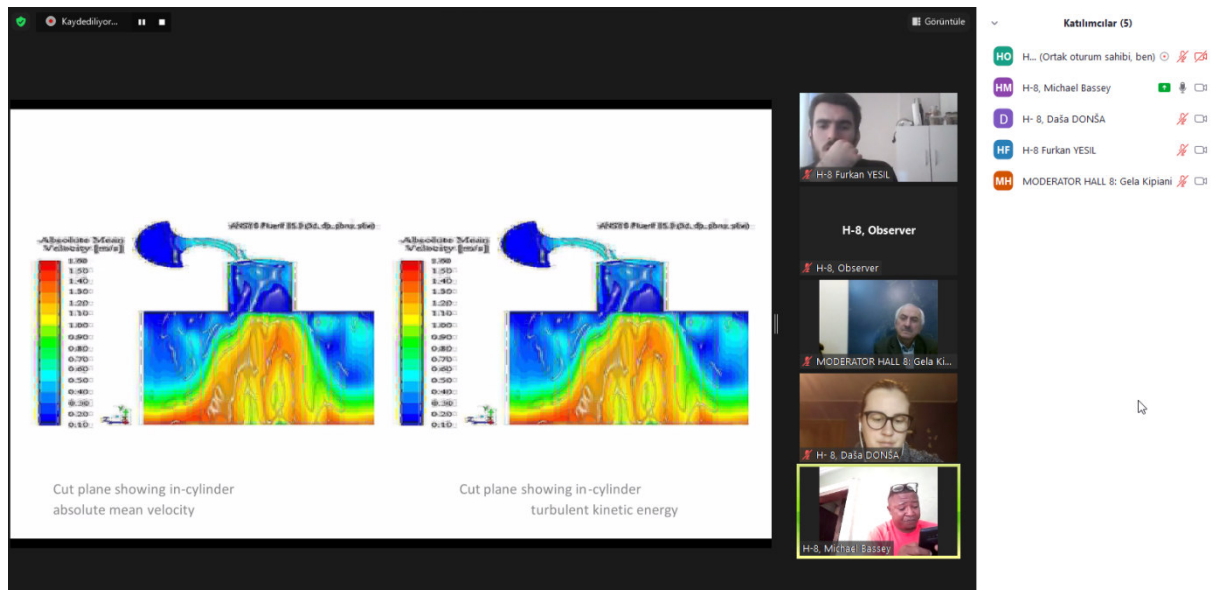
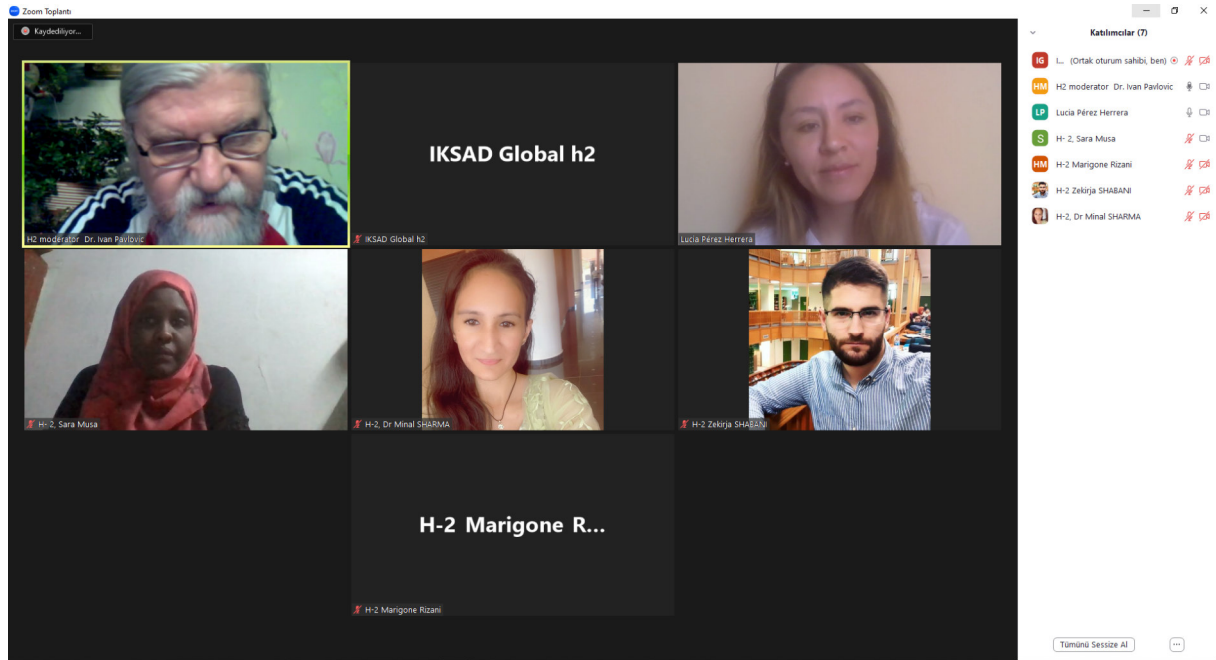
Authors	Affiliation	Presentation title
<b>Furkan Yeşil</b>	<i>Ankara Yıldırım Beyazıt Üniversitesi</i>	IN MICROCHANNEL HEAT EXCHANGER PERFORMANCE ENHANCEMENT WITH FLUIDIC OSCILLATOR INVESTIGATION BY TRANSIENT REGIME
<b>Aniekan Essienubong Ikpe Michael Okon Bassey Victor Okon David</b>	<i>Akwa Ibom State Polytechnic</i>	COMPUTATION OF IN-CYLINDER TRANSIENT THERMODYNAMICS AND VALVE LIFT EFFECTS ON FOUR STROKE RECIPROCATING PISTON INTERNAL COMBUSTION ENGINE
<b>Daša Donša Petra Cajnko</b>	<i>University of Maribor</i>	PROJECTS TO CO-CREATE SCIENCE AND THEIR GROWTH TREND - EMPIRICAL VERIFICATION
<b>Mai Duc Nghia Ho Duc Tuan</b>	<i>Air Force Officer's College Nha Trang University</i>	A SIMULATION STUDY OF COMBUSTION CHARACTERISTICS OF THE CUMMINS DIESEL ENGINE BY KIVA SOFTWARE
<b>Prof. Dr. Gela Kipiani Prof. Dr. Medea Dzotsenidze Prof. Dr. Ketevan Korkia Prof. Dr. Tinatin Magradze</b>	<i>Georgian Technical University</i>	ANTI-SEISMIC MEASURES OF CIVIL CONSTRUCTIONS

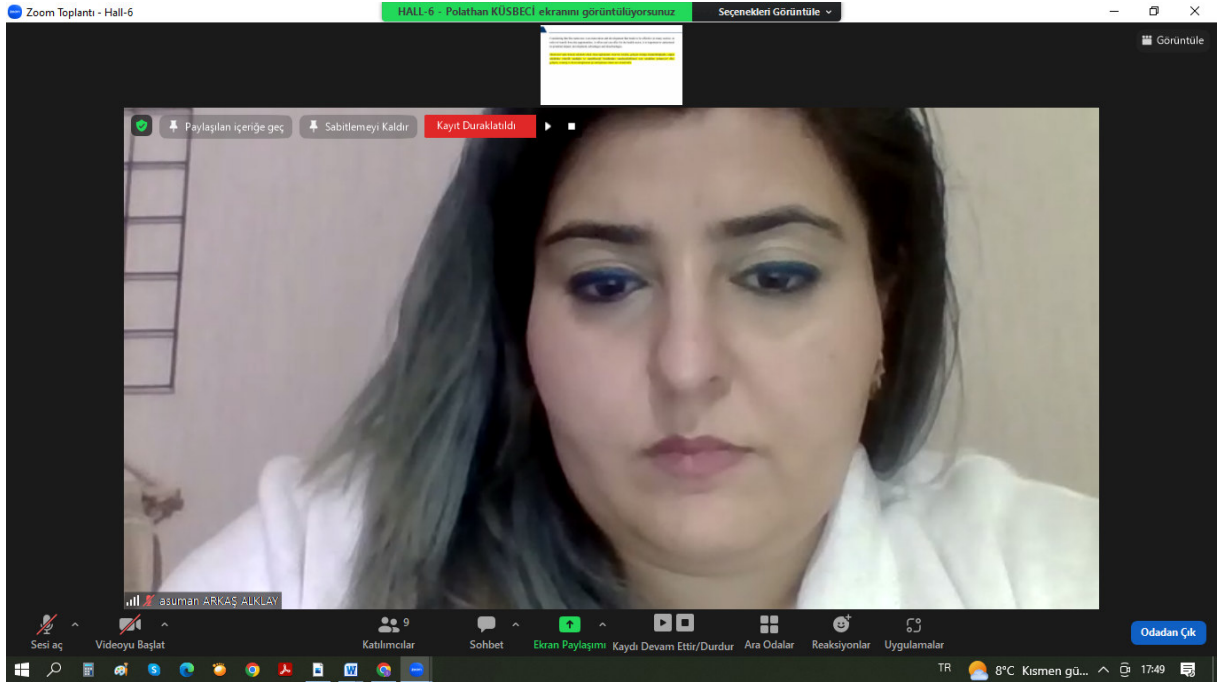
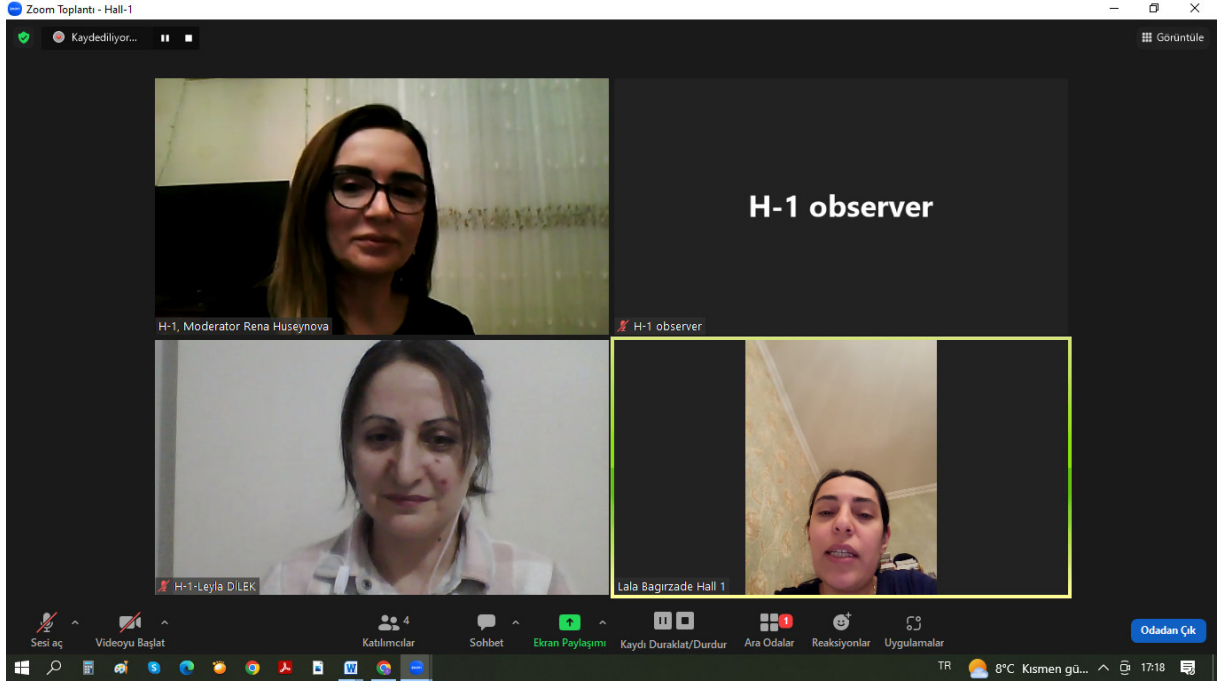
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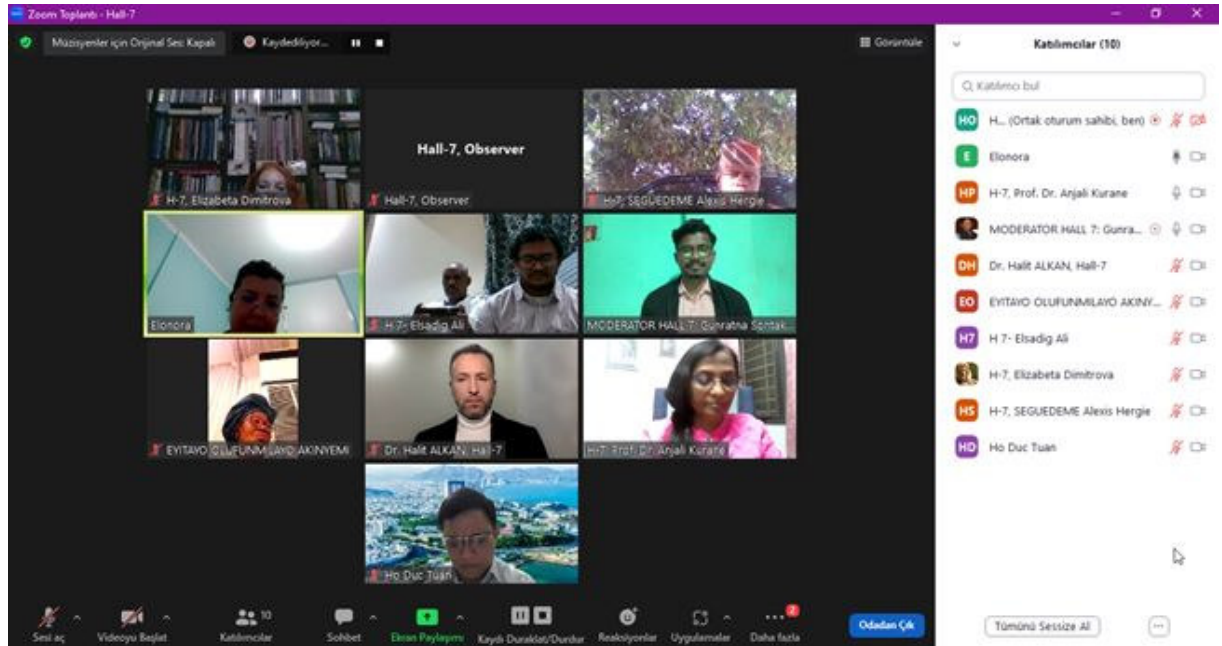
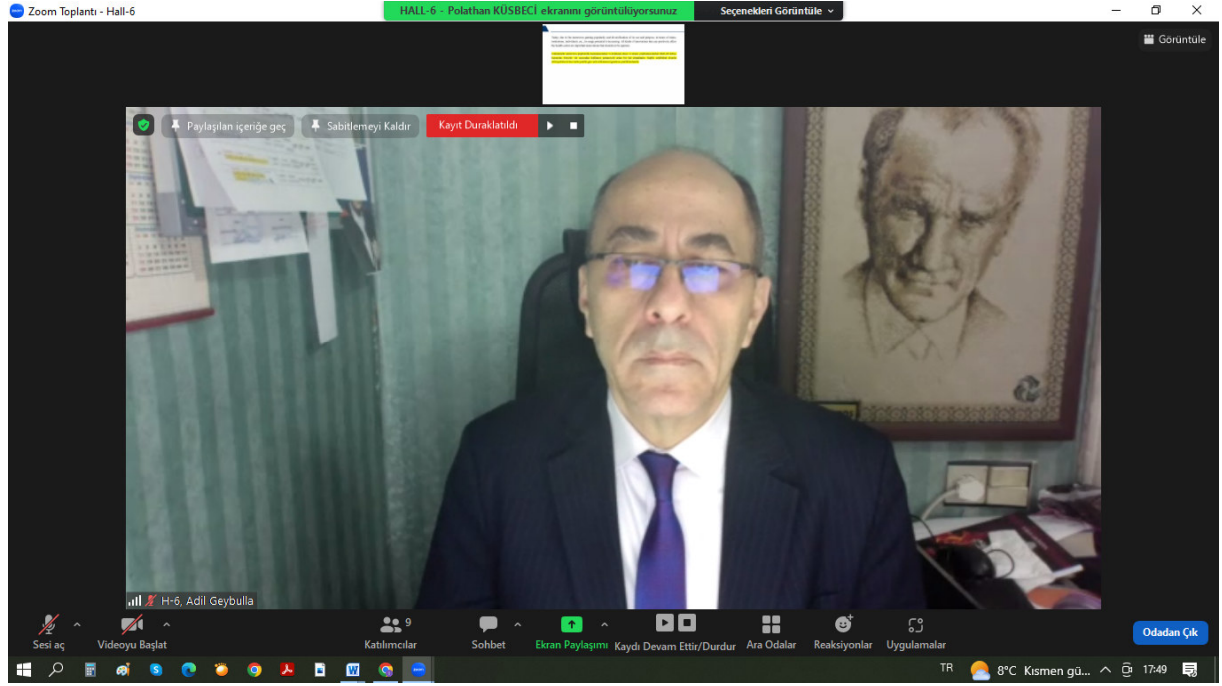
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## IMPROVING THE APPLICATION OF INTELLECTUAL CAPITAL IN PRODUCTION

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### ABSTRACT

This article discusses the current status and importance of the application of intellectual capital in modern enterprises. In particular, the strategies implemented to increase the profit obtained during the management of intellectual capital and its application to production are analyzed from a scientific point of view.

Effective use of intellectual capital allows to increase the competitiveness of enterprises and organizations, to obtain additional income due to unique competitive advantages.

At the same time, the intellectual capital of enterprises is formed in all its life cycles, and the economic function is performed by ensuring the efficiency of economic activity by using knowledge.

The research shows that the creative function of intellectual capital of enterprises serves to spread the knowledge and experience accumulated in enterprises. Its development function acts as a promoter of scientific and technical progress.

A complex approach is required for accurate preparation and implementation of the correct management strategy of intellectual capital of enterprises. For this reason, the formation and development of the intellectual capital of enterprises applied to production in the conditions of the innovation economy is of particular relevance. It should be taken into account that the formation and development of intellectual capital directly depends on the scientific and scientific pedagogical environment necessary for the formation of intellectual capital, mechanisms that create fertile conditions for fundamental and applied research.

**Keywords:** intellectual capital of enterprises, intellectual capital management, commercialization of intellectual capital, technological innovations

### Introduction

The mechanisms of intellectual capital formation and general trends of its reproduction are characterized by three particular stages: knowledge collection, knowledge use and production of intellectual products based on them, distribution and exchange of intellectual products. In addition to the above, certain specific factors affect the formation and development of intellectual capital in the economy of each country, depending on the specific situation.

Accordingly, it should be noted that the level of education in the USA, Germany, France, and Japan is quite high, and in those countries, taking into account the logic of global scientific and technical progress, scientific and technical policy is actively implemented that serves the purpose of achieving sustainable economic growth.

According to the statistics in industrially developed countries 75-80% of GDP growth is due to new knowledge embodied in technologies, equipment and production. The volume of the global science-intensive products market accounts for 2.3 trillion US dollars. The USA, Germany, Sweden, Taiwan, Canada, South Korea, Japan, and some other countries of the European Union have become leading actors from the perspective of technological progress. Electronics, computers, software, telecommunications, manufacture of robotics, information services, carbohydrate processing are at the core of the high-tech.

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In order to achieve the above-mentioned level of development, the annual increase of expenditures on education, human capital, and intangible assets in the USA as the main directions of social and economic development can be indicated. For example, in the USA in 1940, 15% of 18-21-year-old graduates from high school were admitted to colleges, while in the 1990s, this figure was over 60%. Today, 90% of Americans between the ages of 14 and 17 attend high school. In the USA, 560 billion dollars are spent on education, and 60% of these funds are from the state budget. At the same time, the private sector also spends quite a lot of money on training and improving the level of professional training in the United States.

In the American education system, there is a special emphasis on finding talent at home and abroad at all levels of education. The fundamental basis of the US leadership is the country's innovation potential, and the country has developed a multi-level, wide-ranging national innovation system. The strategy of this country is based on scientific and technological leadership. Gaining this position is based on resource provision, efficient institutional base, dynamic improvement of interaction mechanisms of individual elements of the national innovation system, developed system of forecasting scientific and technical progress.

During the surveys conducted by the Economist Intelligence Unit, it was found that 94% of business leaders prefer to be informed about intellectual capital issues. On the other hand, the development of the theory of intellectual capital and the application of its main provisions from theory to practice are also important for increasing the efficiency of production.

Based on the study of the views of T. Stewart, K. Sveby, L. Edwinson, E. Brooking, S. M. Klimov, L. I. Lukchiyev and others, it could be concluded that intellectual capital creates a synergistic effect as institutionalized knowledge, and it is possible to use those effects in production. It should be noted that the following functions attract attention during the application of intellectual capital to production:

- information carrier - collection and exchange of knowledge, skills and information;
- cognition - acquisition of new knowledge;
- transformative and formative - turning knowledge into products of intellectual activity (information services, management rules, etc.);
- scientific-researcher - conducting scientific researches;
- integrative - directing the results of scientific research of various fields to the creation of new products;
- practical - assistance in solving various issues in production, in a specific production field.

On the basis of all the above-mentioned ideas, the economic, creative and developmental functions of the application of intellectual capital to production have been specifically specified and summarized by us (see figure 1):

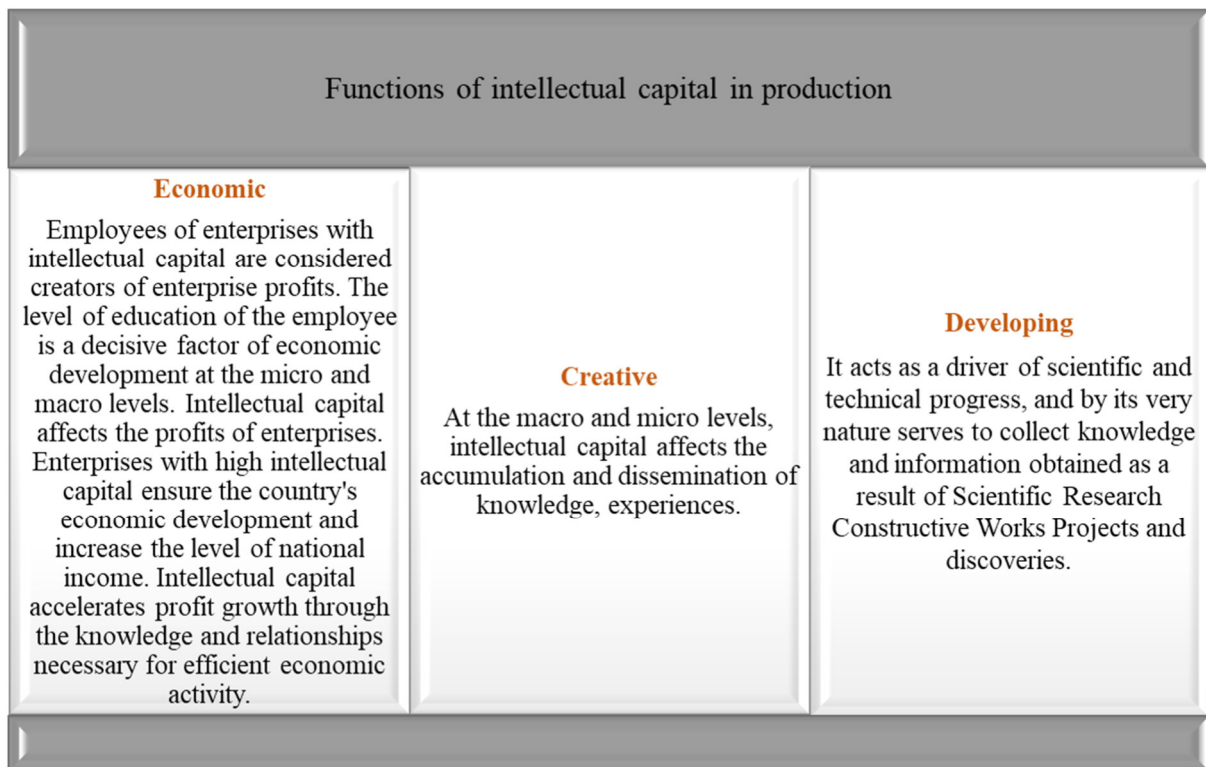
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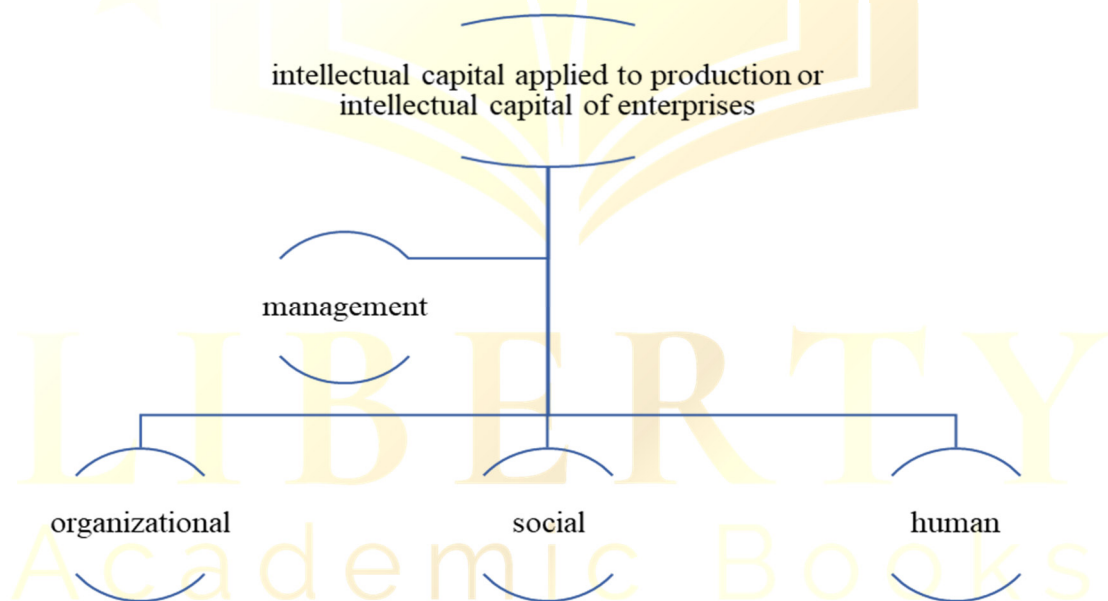
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**Fig. 1.** Functions of intellectual capital in production  
Compiled by the author

It would be appropriate to pay attention to the structure of intellectual capital applied to production. It should be noted that it would be appropriate to add one more element to the structure of intellectual capital proposed in the economic literature by the scholars of economics, such as T. Stewart, L. Edvinson, E. Brooking, etc. Here we are talking about management capital (figure 2).



**Figure 2.** The structure of intellectual capital used in production

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The components of intellectual capital are formed and developed in interaction with each other at all stages of life cycles.

Accordingly, it would be appropriate to pay attention to the content of the elements included in the structure of intellectual capital applied to production.

**Table 2.** The content of the main elements included in the structure of intellectual capital applied to production

<b>Categories</b>	<b>Contents of categories</b>
Human capital	Education, knowledge, habits, skills, motivation, employee's potential that enable the enterprise to earn income during its application in production.
Management capital	Enterprise or production management, management procedures, management decisions that enable income generation.
Social capital	Interaction and relationship between people, structural divisions of enterprises.
Organizational capital	They are organizational factors for the creation of products and act as an organizational structure, system organizations of production, quality, sales, and information technologies.
Intellectual capital	The totality of knowledge, skills, experience of employees at all stages of the life cycle of intellectual capital, organizational and social relations between employees, structural units, managers. In essence, it attracts attention as institutionalized knowledge that is used in production and creates synergistic effects.

**Source:** Nikolaeva Yu.R., Formation of the intellectual capital of an enterprise, Moscow 2013, p. 13

The main place in the management of intellectual capital is the evaluation of its level. Here, solving the task of assessing the quality and quantity of intellectual capital is set as a goal. The solution of this issue is solved according to the basic principles of qualimetry.

Evaluation of the results of intellectual capital management is determined based on the following requirements of qualimetry: usefulness, sufficiency, uniqueness, reliability, integrity, individuality, dynamism, operability, possibility of improvement, globality, reproducibility, economic efficiency, etc.

There is a reciprocal relationship between the increase in the amount of intellectual capital applied to production and its development stages: the value of intellectual capital increases depending on the development stage of the companies where intellectual capital is applied: the amount of intellectual capital also increases during the growth stage or vice versa. Accordingly, it is possible to observe the following relationships between the development stages of enterprises and the growth stages of intellectual capital (see table 2).

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**Table 2.** Stages of development of intellectual capital applied to production

No	Development stages of enterprises	Growth stages of intellectual capital
1.	Establishment of enterprises, production area	Selection and assembly of personnel
2.	Formation of necessary resources for the production area	The process of combining human capital with structural capital
3.	Commencement of production activity	The process of combining human, structural and consumer capital
4.	Exceeding the limit of harmlessness	Intellectual capital is formed
5.	Achieving area averages	Intellectual capital is increasing
6.	Achieving higher than average performance in the field	Intellectual capital is increasing
7.	Bankruptcy of enterprises	Intellectual capital is not efficiently applied (no consumption capital)

The table was compiled by the author

### Findings and Discussion

Our research shows that the issue of improving the methodology of applying intellectual capital to production should be made a little more concrete, and it should be noted that the reproduction of intellectual capital at the level of managers managing enterprises in Azerbaijan is not very well organized. At the same time, the planning of intellectual capital formation and application processes does not go beyond the planning of individual elements of intellectual capital. Here, the action procedures are carried out in the following order:

- budget costs related to the application of intellectual capital (expenditures for software, information and communication technologies of companies) should be agreed upon first;
- in order to increase the level of professional training of personnel and especially to organize the acquisition of new knowledge arising on the basis of the scientific and technological challenges of the time, a cost plan should be drawn up, clarifying the issue of the effect of the acquisition of knowledge on increasing the competitiveness of enterprises, and new calculation methods should be used (because here we are talking about intangibles assets and their separate elements and mechanisms);
- the costs spent on the purchase of intangible assets to be applied to production should be calculated, and a corresponding consumption plan should be developed and prepared.
- marketing and management of intellectual capital should be developed in order to improve the method of managing the application of intellectual capital to production.

Of course, in order to achieve successful results in the directions mentioned above, it is necessary to solve a number of tasks. Here we are talking about solving the following issues:

- accurate identification of the consumers of intellectual capital applied to production and especially of enterprises is required. The mentioned consumers can be new or traditional consumers and they can be entrepreneurs (shareholders), investors, insurers, customers, employees, intermediaries, suppliers. The current situation related to the needs of intellectual capital consumer and their preferences should be clarified;

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- the main principles in the application and use of intellectual capital, the goals set for strategic and tactical, short, medium and long-term perspectives must be chosen correctly, at the same time, the value of the intellectual capital should increase so that it can meet those goals and requirements, and special programs should be developed that serve to increase the quantitative and qualitative indicators;
- the structural and type components of intellectual capital should be formed in such a way that they are further increased in the process of their application to production, and relevant works are carried out in a systematic and complex manner (here we are talking about creating new jobs, solving the problem of employment and development of carriers of intellectual capital, more precisely, constantly improving their professional training level, opportunities to build a career, as well as increasing the diversity of high-tech applications, modern software, trademarks, brands, etc.);
- another important task is the correct determination of the pricing mechanism for the components and structural elements of the intellectual capital (i.e. wages of staff included in various categories, the cost of licenses, know-how, the cost of software projects, the services of internal consultants, the budget of insurance programs, the cost of brands, etc.);
- advertising and presentation events should be held in order for intellectual capital to gain popularity in the market, etc.

#### Results

Another complex and urgent issue in the practice of intellectual capital management is the management of the use of intellectual capital for commercial purposes. Because the successful solution of the mentioned problem creates conditions for obtaining the final positive results of innovation and investment activities in science-intensive enterprises. One fact should be specially taken into account that the problem of commercialization of intangible assets is identified with the commercialization of intellectual property. However, the commercialization of intellectual property means the involvement of intellectual activity in the economic cycle, or the use of it in private economic activity.

However, we believe that the commercialization of intellectual capital should be understood as the use of internal and external intellectual assets of enterprises to obtain income and profits. For this reason, income is obtained here, indirectly, by organizing the business process more efficiently. On the face of it, the circulation of intellectual property and the use of intellectual assets are similar.

Accordingly, it should be noted that the external manifestations of the use of intellectual assets are as follows:

- investment of intellectual assets in the charter capital of other enterprises;
- franchising of intellectual assets;
- leasing of intellectual assets;
- transfer of rights over intellectual assets through license agreements;
- selling intellectual assets.

As it can be seen, in order to include intellectual assets in commercial and economic circulation, their values should be determined by market prices. The mentioned evaluation operations are very complex and difficult issues.

Observations of theoretical and practical importance regarding the application of intellectual capital to production show that in the modern era, at the stage of post-industrial development, it is necessary to choose the most correct version of the intellectual capital management strategy, which includes the principles, goals and objectives, methodology and functions of intellectual capital management.

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The main goal here is to achieve the transformation of intellectual capital into corporate assets that are difficult to imitate in the market and, most importantly, have no analogues. All this enables the transformation of enterprise and company employees, personnel knowledge and powers, brands, technological innovations, new business models into intangible assets, and obtaining competitive advantages in the intellectual property market.

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## ANALYSIS OF THE POLICY FOUNDATIONS OF THE FORMATION OF THE MODERN SECURITIES MARKET IN AZERBAIJAN

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### Summary

Every culture and nation's financial system depends heavily on the securities market. Giving economic subjects access to financial services is one of the key elements in the growth of the contemporary national economy. It is inevitable that the securities market will play a part in gaining access to financial resources. It should be emphasized that one of the most crucial economic variables for the expansion and growth of the country's economy is the establishment and effective operation of the securities market in Azerbaijan. When comparing the Azerbaijani securities market to those in other nations, it is clear from an analysis of its growth how young it is. However, it should be emphasized that the recent rapid economic growth in our nation and the structural changes successfully implemented by President Ilham Aliyev of the Republic of Azerbaijan have laid significant political foundations for the growth of this industry.

Furthermore, the country's leadership's policies for economic diversification and the growth of the non-oil sector have laid a number of key foundations for the development of this industry. It is significant to note that President of the Republic of Azerbaijan Ilham Aliyev approved the State Program "Development of the Securities Market in the Republic of Azerbaijan in 2011-2020" in 2011, which is crucial for the development of this field, when analyzing the political foundations of the formation of the securities market. The key objectives for Azerbaijan in this sector are to boost market participation, raise market liquidity for securities, as well as establish values based on openness and corporate ethics in the execution of transactions. The efforts made in this regard have laid the groundwork for significant advancement in this area.

Increased market awareness, an explanation of the sector's primary advantages to the market's major participants, and the launch of the Baku Stock Exchange's Listing Advisory Program are just a few of the noteworthy developments in the sector's development during the past few years. In this article, the political underpinnings of the development of the contemporary securities market in Azerbaijan were examined, and the primary political underpinnings of the Azerbaijani securities market were identified. It should be emphasized that the development of this subject was greatly influenced by the economic reforms implemented by President Ilham Aliyev.

**Keywords:** President Ilham Aliyev, Securities market, Azerbaijan, Economic growth, Economic reforms

### Introduction

Oil and gas resources in the Republic of Azerbaijan started to become significantly more significant to the growth of the country's economy after it attained independence in 1991. Azerbaijan negotiated agreements in 1994 with international oil firms about the production of Azerbaijani oil, and these agreements allowed Azerbaijan to sell its oil and gas in global markets and make sizable profits (Hoffman, 1999, p. 8). Additionally, over the past ten years, Azerbaijan's economic reform agenda has come to emphasize the growth of the non-oil sector and the diversification of the economy (Babayev, 2020).

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In particular, the frequent changes in the price of oil in the global market, as well as the developing trends in the international economy and politics make the broad economic reform agenda an important part of the state policy for Azerbaijan (Babayev, 2019, p.537). It should be underlined that the state is committed to implementing these changes, and they are currently being sustained for the full development of the economy. In Azerbaijan, reforms pertaining to the growth of several significant sectors are successfully ongoing. These essential sectors cover the development of regional transportation corridors, information technologies, and support for small and medium-sized businesses, among others (İsmailzadə və Babayev, 2020, p. 79; Babayev, 2020, p.92).

In addition, it should be noted that the reforms carried out under the leadership of President İlham Aliyev include the development of the country's financial subjects. It is very important to note that the development of the country's financial sector plays an important role in the formation of a sustainable economy (Babayev and Hacıyev, 2019, p. 312-219). Duisenberg (2001, p. 1) writes that the financial system, which includes financial markets, instruments, and institutions, ensures that financial resources are channeled from those with excess funds to those with a shortage of funds through direct, market-based financing or indirect, bank-based financing. Securities market is one of the forms of financial market.

As a result, the development of this industry, which is important for economic growth, requires special attention. It should be noted that the volume of the securities market, which is part of the global financial markets, is increasing day by day. Currently, the volume of securities sold in these markets is trillions of dollars. It is important to note that the total value of the US stock market alone is \$30 trillion and the total value of the bond market is \$40 trillion. There are a number of main factors that attract investors and issuers (bond issuers) to these markets (Babayev R, 2020). One of the main advantages of such markets for investors is the liquid markets. That is, the capital invested by the investor is not invested in any property, but in securities. When the investor and the individual who buys the security need money, they can quickly sell the security on the stock exchange.

In addition, the security does not wear out physically and its maintenance does not require additional costs (Babayev R, 2020). On the other hand, companies can use their securities as collateral when taking a loan from a bank. The general advantages of issuing securities to companies are recognition of companies in national, regional or global financial markets, as well as increasing the efficiency of their activities. By developing the state financial markets, it creates favorable conditions for the growth of the non-oil sector, as well as the development of entrepreneurial activity.

#### **Securities Market**

A security is a financial commodity that can be traded. The term securities is used to describe any financial instrument, but the legal meaning of the term varies depending on different legal systems (Bansal, 2017, p. 46). Bansal notes (2007, p.48) that the securities market is a part of the financial market, and in this market, securities are bought and sold on the basis of supply and demand among the subjects of the economy. Stock markets, bond markets and derivative markets can be cited as forms and examples of the securities market.

As for the forms of the securities market, primary and secondary markets are used for the exchange of securities. Primary securities markets are markets in which market participants, for example, governments and businesses, issue new securities for trading. Secondary securities markets are markets where previously issued securities are traded by market participants. In other words, secondary securities markets exist for the exchange of used securities (Glen and Madhavan, 1998, p. 2).

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We live in a time where different people make different investments. Along with the financial sector and the state budget, securities are one of the most important options for financing the economy in international practice (Mammadov, 2008, p. 29-40).

By increasing the interest in the mobilization of financial capital, the securities market provides a prospective (future-oriented) and profitable redistribution of financial resources among various sectors and areas of the economy. Considering all this, it is very important to develop the securities market in Azerbaijan. It should be noted that the organization of this sector has the ability to influence the solution of these problems, which directly affect the current economy of the country. Taking into account that the securities market plays an important role for the economy, the government of Azerbaijan is implementing major reforms in this area.

#### **The current situation of the securities market in Azerbaijan**

After gaining independence in 1991, oil and gas have been the leading sectors of Azerbaijan's economy. However, in the last 10 years, the main goal of Azerbaijan has been to diversify its economy. One of the important goals of the government of Azerbaijan is to develop all sectors of the economy and reduce the economy's dependence on oil revenues in order to build a stable economy. Under the leadership of the President of the Republic of Azerbaijan, Ilham Aliyev, numerous reforms are being carried out in the direction of economic diversification, development of agriculture, regional transport corridors and support of ownership.

Thus, one of the ways to solve the liquidity problem of the economy is to strengthen the securities market in Azerbaijan. In order to develop this field, the President of the Republic of Azerbaijan Ilham Aliyev approved the State Program "Development of the securities market in the Republic of Azerbaijan in 2011-2020" in 2011. As a result of the implementation of the State Program "Development of the securities market in the Republic of Azerbaijan in 2011-2020", great support was given to the development of the securities market (E-law, 2011).

The approved document states that the Securities market is a series of economic relations reflecting the issuance and circulation of securities among market participants. Securities are the main object of the securities industry. At the same time, the document states that the securities market is one of the most relevant markets in the current market economy. The strategic document is the main document prepared by the government of Azerbaijan, which explains the definition of the securities market in Azerbaijan, and is one of the main strategic documents that plays an important role in the formation of the main political basis of the formation of the securities market in our country. As for the legislative framework of the securities market in Azerbaijan, this sector is regulated by the Law of the Republic of Azerbaijan "On the Securities Market".

It is significant to highlight that trading in stocks, corporate and governmental bonds, as well as derivatives based on currencies and commodities, is currently possible in Azerbaijan. There are dealers that compel the primary market participants to purchase certain corporate bonds and various derivatives at any time on the domestic market, which is a factor that promotes supply and demand. Simplifying documentation and speeding up account opening procedures are only two of the steps and initiatives Azerbaijan has taken to draw in foreign investors. The growth of this industry will be accelerated in the future by specific tax and transparency improvements. In order to raise awareness, it is also advised that the government launch another awareness effort in this area.

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The State Program "Development of the securities market in the Republic of Azerbaijan in 2011-2020" approved by the President of the Republic of Azerbaijan Ilham Aliyev in 2011 considered a number of measures for the development of the sector, which included the mobilization of temporary free financial resources for certain investments, the world formation of market infrastructure that meets the standards, development of secondary market of securities, determination of ownership relations, improvement of market mechanism and management system, provision of real control of fund capital based on state regulation, reduction of risks for investments, formation of portfolio strategy, development of pricing, as well as prospective development directions includes forecasting (E-qanun, 2011, p-2-4).

In general, the most sold investment instrument in the securities market of Azerbaijan is defined as bonds of the State Oil Company of the Republic of Azerbaijan (SOCAR). These securities are SOCAR bonds issued by the State Oil Company. These bonds are designed for the domestic market. SOCAR Bonds account for more than 76% of transactions in the Azerbaijan bond market (Banco.az, 2017). The growth of the capital markets can be seen as a result of President Ilham Aliyev's solid and long-term economic strategy in Azerbaijan. Thus, by ensuring the diversity of financial instruments and the depth of financial markets, the development of the securities market, which is a key component of the state's financial policy, broadens the scope of the non-oil economy.

Currently, the interest of the companies operating in the public and private sector in Azerbaijan to the securities market is increasing day by day. It would be important to note that the issue of bond securities of the Azerbaijan state-owned "AzerGold" (a state-owned gold company) through an initial public offering is a clear example of this. The bonds offered by "AzerGold", one of the leaders in the field of precious metals in the non-oil industry, create conditions for the diversification of the company's financial resources and directing its resources to new projects, the development of the country's securities market, as well as profitable and reliable investment opportunities. This, in turn, gave the company the opportunity to make low-risk, high-yield profits against the background of the negative impact of the coronavirus pandemic on the world economy.

In addition, citizens - individuals and legal entities will have the opportunity to contribute to the development of the national economy and mining industry with "AzerGold" bonds. Both institutional (banks, insurance companies, investment companies) and individual investors (individuals) will earn 4% per annum by purchasing AzerGold bonds from the initial public offering market. The nominal value of the bonds is 100 US dollars, the maturity is 3 years, and the volume is 20,000,000 dollars. Bonds are sold at an auction at the Baku Stock Exchange. Interest is paid quarterly to investors four times a year. These conditions are currently considered one of the most favorable offers for the country's financial market (Babayev, 2020). Some of the work done towards the development of this sector in recent years includes increasing market awareness, explaining the advantages of the sector to key issues, as well as establishing the Listing Advisory Program of the Baku Stock Exchange.

#### **Analysis of the Political Foundations of Securities Market Formation**

In Azerbaijan, the first stock market institute was founded in 1991. At the same time, a new phase in the development of the securities market began in 1991 as a result of the Cabinet of Ministers of the Republic of Azerbaijan's decision "On the issuing of short-term government bonds." Thus, the initial legal foundation for the stock market was established as a result of the privatization process's start in 1996. As a result, on July 14, 1998, the Republic of Azerbaijan's government approved the "On the Stock Market" law.



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The State Committee on Securities under the President of the Republic of Azerbaijan was founded on December 30, 1998, serving as a regulatory body. All these phases resulted in the establishment of the Republic of Azerbaijan's first stock market regulatory framework in 1998–1999, encouraged the growth of commercial and governmental securities, and thereby strengthened the foundation for the market's future development.

The Baku Stock Exchange market was established in 2000 by 19 of the top banks and financial institutions in the nation using private cash. This was the committee's first move and had a significant impact on the institution's economic growth and the recruitment of foreign direct investments. On September 1, 2000, the first trading transaction was noted, which mostly involved a security issued by the government. But beginning in 2001, more businesses in the private sector started to sell their shares, which gave the industry a strong foundation, financial security, and demand (Mammadov, 2008, pp. 29-40).

The law titled “State Program for the Development of the Securities Market in the Republic of Azerbaijan in 2011-2020,” which was adopted by President Ilham Aliyev, will affect how the country's stock market develops in the next years. Authorities from the government continue to administer this initiative since it is still necessary (Babayev R, 2020). Since it was signed on May 16, 2011, the program's primary objectives have been to raise the securities market to an international level, automate the synchronization of the local market with the global market, increase the services provided to clients, and establish a securities market at a modern level (E-law, 2011, p. -5-8). Three phases of implementation comprised the state program.

The first phase, which spanned the years 2011 through 2014, saw government officials concentrate on creating securities market tools at the institutional level in order to compete with the global market.

The nation is currently working to complete meeting the requirements of the securities market and opening its borders to foreign trade. The laws and modifications put into effect under the direction of the President of the Republic of Azerbaijan, Ilham Aliyev, make this abundantly evident. It can be seen that the government has set the securities market as one of its improvement priorities in the development concept “Azerbaijan 2020: a vision of the future” that was signed by the President in 2012. The institutional development of the market, the growth of corporate investments and the development of supporting instruments, the improvement of market transparency, and other objectives were mostly accomplished during this time. It is significant to highlight that every objective stated during this time period has been accomplished.

The second phase, which spans the years 2015 to 2017, focuses primarily on regional development and expansion. As an issuer at the time, SOCAR had a significant impact on the movement of securities. The third stage, which actually began in 2018 and is still going on, is distinguished by an increase in the securities market's cyclicity and the entry of more active players. During that time, SOCAR issued a further bond with a face value of \$1000 for a term of five years, yielding 5% to the bondholder. The local populace had little trouble purchasing the bonds that SOCAR had issued. As a result, SOCAR discovered a local funding source without really contacting foreign financial institutions. As a result, each person of the nation contributed to the local financing of SOCAR and earned 5% of the proceeds.

#### Results

Development of financial markets in the country leads to effective use of existing economic resources. The development of the securities market provides ample opportunities for companies to finance both large and private projects, as well as to attract debt funds. Also, the value of securities is formed based on information about the issuer of securities.

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In this case, the development of the financial security market leads to a more efficient allocation of resources and the adoption of efficient investment (capital investment) decisions. This factor determines the superiority of the securities market circulation over the banking sector. Thus, the need for companies to disclose information leads to the dissemination of this information and making investment (capital investment) decisions more efficient. Banks receive the information themselves and make their decisions based on this information. Financial securities also respond to the efficiency of companies and actually control the management of companies.

The following positive results can be noted while evaluating the results achieved in the establishment of the securities market of Azerbaijan. The necessary trading infrastructure has been established, which is now quite efficient and developed even compared to the most mature markets. Professional intermediaries and their employees are quite competitive and able to perform their functions efficiently. The legislation is detailed and meets the best international standards. However, in the coming years, more educational work should be done regarding the market participants, and the transparency of the sector should be increased. The establishment of the Baku Stock Exchange and the implementation of reform programs in the sector are promising.

However, as mentioned earlier, the financial securities market in Azerbaijan has not been able to fully realize its potential, despite the fact that SOCAR bonds are the most popular product. Although a training center on financial markets was established by the previous Financial Markets Control Chamber of the Republic of Azerbaijan, the center failed to achieve its goal in terms of increasing awareness of financial markets, especially the securities market, and was closed as a result. There is a need to bring this sector to the attention of the government within the current reform agenda.

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**“MİLÇƏKLƏRİN TANRISI” ƏSƏRİNDƏ GİZLƏDİLMİŞ İNSAN  
PSIXOLOGİYASI HIDDEN HUMAN PSYCHOLOGY IN “GOD OF THE FLIES”**

**Bağırzadə Lalə**

**ÖZET**

Villiam Golding İngilis ədəbiyyatının önə çıxan adlarından biri olmuşdur. Əsərləri ilə daim insan psixologiyasının dərininə işıq salan yazıçı 1954-cü ildə “Milçəklərin Tanrısı” romanını qələmə almışdır. Romanı ilk vaxtlar heç bir nəşriyyat qəbul etməmişdir, lakin kitab çap olunar-olunmaz yazıçıya böyük şöhrət gətirmişdir. Romanda cəmiyyətdəki problemlərin insanların qüsurlarından yarandığını, hətta keçici xarakter daşdığına dair məsələlər önə çəkilmişdir. Yazar bu əsərində uşaqların davranışında əslində böyüklərin barbar davranışlarına güzgü tutmuşdur. 6-12 yaş aralığındakı uşaqları müharibədən uzaqlaşdıran təyyarə qəzaya uğrayar və insan tərəfindən kəşf edilməmiş, cənnət kimi gözəlliyə malik bir adaya düşürlər. Əsərdə Ralph demokratik, Jack avtoritar, Simon spiritüel, Roger vəhşi qüvvənin, Donuzcuk isə intellektual gücün simvoludur. Donuzcuğun Roger tərəfindən öldürülməsi, vəhşi qüvvənin intellektual güc üzərindəki hakimiyyətinin göstəricisidir. Yazar bununla barbarlığın hələ də öndə olduğuna diqqət çəkmək istəmişdir. Golding bu romanı Nasizm siyasətinə qarşı olaraq yazmışdır. Onun düşüncələrinə görə insanları içlərindəki vəhşiliyin ortaya çıxmasından qorumağın əsas yolu onları müəyyən qanunlar içərisində yaşatmaqdır. Normaların yox olmağı insanlar arasındakı iqtidar hissənin ortaya çıxmasına səbəb olmuşdur. Romanın sonunda Ralphın digər uşaqlar tərəfindən öldürülməyə çalışılmağı, demokratik düşüncənin nə qədər az olduğuna işarə edilmişdir.

**Açar sözlər:** güc, liderlik, roman, qorxu, daxili psixologiya.

**HIDDEN HUMAN PSYCHOLOGY IN “GOD OF THE FLIES”**

**ABSTRACT**

William Golding was one of the prominent names of English literature. The writer, who constantly explores human psychology with his works, wrote the novel "The Lord of the Flies" in 1954. At first, the novel was not accepted by any publishing house, but the book brought great fame to the unpublished writer. In the novel, the problems in the society are caused by the defects of people, and even they are transient. In this work, the author has actually mirrored the barbaric behavior of adults in the behavior of children. A plane carrying children between the ages of 6 and 12 away from the war crashes and they land on an undiscovered island of paradise-like beauty. In the work, Ralph is democratic, Jack is authoritarian, Simon is spiritual, Roger is a symbol of brute force, and Piglet is a symbol of intellectual power. Roger's killing of the pig is an indication of the power of brute force over intellectual power. The author wanted to draw attention to the fact that barbarism is still ahead. Golding wrote this novel against the policies of Nazism. According to his thoughts, the main way to protect people from the emergence of brutality in them is to make them live within certain laws. The disappearance of norms leads to the appearance of power anger among people. At the end of the novel Ralph is tried to be killed by the other children, it is pointed out how little democratic thinking there is.

**Keywords:** power, leadership, novel, fear, inner psychology.



William Golding İngilis ədəbiyyatının önə çıxan adlarından biri olmuşdur. Əsərləri ilə daim insan psixologiyasının dərininə işıq salan yazıçı 1954-cü ildə “Milçəklərin Tanrısı” romanını qələmə almışdır. Romanı ilk vaxtlar heç bir nəşriyyat qəbul etməmişdir, lakin kitab çap olunar-olunmaz yazıçıya böyük şöhrət gətirmişdir.

Romanda cəmiyyətdəki problemlərin insanların qüsurlarından yarandığını, hətta keçici xarakter daşdığına dair məsələlər önə çəkilmişdir. Yazar bu əsərində uşaqların davranışında əslində böyüklərin barbar davranışlarına güzgü tutmuşdur. 6-12 yaş aralığındakı uşaqları müharibədən uzaqlaşdıran təyyarə qəzaya uğrayar və insan tərəfindən kəşf edilməmiş, cənnət kimi gözəlliyə malik bir adaya düşürlər. Kimsəsiz ada da bir müddət sonra uşaqlar öz qanunlarını qoymağa başlayar və bununla da necə vəhşiləşdiklərinin şahidi olarıq. Golding uşaqların simasında böyükləri kiçildərək necə mənəviyyatsız-laşdıqlarını göstərmək üçün distopya yaratmışdır. Əsər insanın heç bir zaman dəyişməyən, sadəcə olaraq gizlədilməyə çalışılan pisləyə yönələn meylinə həsr olunmuşdur. Lakin yazıçı yalnız bunu göstərməyə çalışmamış, həm də onun həlli yolları barədə də düşüncələrini qələmə almışdır. Goldingə görə insanın mənəvi pisləklərdən uzaqlaşmasının yolu mədəniyyətə qovuşmağıdır. O, yaxşılıq və pisləyin insan üzərində təsirlərini göstərmək üçün əsas iki obraz seçmişdir. Bu obrazlardan yaxşılığı təmsil edən Ralph və pisləyin təcəssümü olan Jackdir. Lakin roman içində Ralph və ya Jackı tamamilə yaxşı və pis deyər adlandıra bilmirik. Romanın əsas qəhrəmanları bunlar olsalar da, əsərdəki heç bir pislə bilməyən Simon və pisləklə şeytani belə geridə qoyacaq olan Roger əsas qütbləşmə hesab oluna bilər.

Digər bir önəmli mövzu isə güc və liderlikdir. Bu gücün ilk göstəricisi dənizqabığıdır. Dənizqabığını ilk tapan “Donuzcuk” ləqəbli uşaq olur və daha əvvəldə belə bir qabıq gördüyünə görə onu necə istifadə etmək lazım olduğunu bilir. Donuzcuk “bu dənizqabığı kimdə olsa, söz haqqı da onda olmalıdır.” ideyasını ortaya atır. Bundan sonra uşaqlar özünə bir lider seçməyə məcbur olurlar. Bu zaman dənizqabığı Ralphın əlində olar və bunun təsiri ilə uşaqlar Ralphı özlərinə lider seçirlər. Dənizqabığı kimdədirsə, danışmaq haqqının onda olması adadakı demokratik fikirlərin var olduğunu göstərir.

Ada digər güc simvolu Donuzcuğun eynəyidir. Çünki onun vasitəsilə ocaq yandırılırlar və bu da ilk olaraq Ralphın ağına gəlmişdir. Donuzcuğu yanında tutaraq Ralph bu gücü əlində saxlamışdır. Lakin liderlik ruhu təkcə Ralphda deyil, həm də Jack bu liderliyə maraqlıdır. Romanın sonlarına yaxın Donuzcuğu öldürüb, eynəyi oğurlayaraq Ralph üzərində bir hakimiyyətə malik olur. Jack eynəyi ovladığı donuzları bişirmək üçün oğurlayır, bu hərəkəti ilə duman vasitəsilə xilas olma ümidi olan uşaqların da ümidlərini əlindən almış olur. Berlenin dediyi kimi “Güc dünyəvidir. Hər kəs böyük ya da kiçik ölçüdə, qısa ya da uzun bir zaman ərzində onu əlində tutmağa çalışır”. Biz bunu romanda bütün obrazların simasında görürük. Hər biri güc sahibi olmaq ruhundadır, lakin bu savaşa daha güclü olanlar önə çıxdı. Əsərdə Ralph demokratik, Jack avtoritar, Simon spiritüel, Roger vəhşi qüvvənin, Donuzcuk isə intellektual gücün simvoludur. Donuzcuğun Roger tərəfindən öldürülməsi, vəhşi qüvvənin intellektual güc üzərindəki hakimiyyətinin göstəricisidir. Yazar bununla barbarlığın hələ də öndə olduğuna diqqəti çəkmək istəmişdir.

“Milçəklərin tanrısı” romanını daha yaxşı anlamaq üçün hər bir obraza ayrılıqda və bir-biri ilə qarşılıqlı münasibətdə nəzər yetirmək lazımdır.

### Ralph

Adadakı ən böyük uşaqlardan biridir və roman boyu liderliyini davam etdirir. Donuzcuğun ağıl sayəsində öz hakimiyyətini qoruyurdu. Romanda Ralph daha çox əxlaq cərəvəsində liderlik etdiyi üçün daim diqqət mərkəzində olmuşdur. Mədəni davranışları, demokratik sistem qurması, uşaqlara bərabər şəkildə yanaşması oxucuda vəhşilik içərsində belə insanlığın var olduğuna ümid bəslətməkdir. Ralph düşükləri adadan xilas olmağın yolunu axtaran və böyük ümidi olan obrazdır. Lakin yenə də qərarlı deyil. Çünki adada canavarın var olduğunu biləndə qorxuya qapılır və bəzən səhvlər edə bilər. Jack avtoritar siteminə qarşı çıxmaması, hətta yeri gəldikdə liderliyi buraxmaq istəməyi, bununla belə Jackın qəbiləsinə qoşulmağı və Simona edilənlərə qarşı çıxmamağı, əslində pisliyə məğlub olmağın nə qədər rahat olduğunu göstərməkdədir.

### Jack

Güc baxımından Ralphın ən böyük rəqibidir. Pisliyi təmsil edən Jack uşaqları öz diktatorluq sistemi ətrafında toplamaq istəyindədir. Jackın qrupunda olan uşaqlar əslində onun kimi pisliyin tərəfdarları deyillər, sadəcə olaraq gücsüzdürlər. İnsanın yaradılış şəkli elədir ki, hər zaman zəif xarakterlər idarə olunmağa meyilli olurlar. Bu uşaqlar da zəiflik, aclıq və digər səbəblər ucbatından Jackın qrupuna daxil olmuşdurlar. Jack roman boyu dinamik inkişafda olmuş və əsərin sonuna doğru bir vəhşiyyə çevirilmişdir. İlk donuz ovunda balaca donuzu vurmağa ürəyi gəlməyən Jack zamanla artıq daha da qəddarlaşır. İkinci ov zamanı balalarının yanında ana donuzu öldürməsi Jack və Rogerin əsl simasını açır. Romanda bəzən Jack Hitler rejminin təmsilçisi kimi də göstərilməkdədir. O daxilən nə qədər qəddar olduğunun fərqiindədir və üzünə çəkdiyi boyalarla bir növ şəxsi kimliyindən gizlənməyə çalışmaqdadır. Uşaqların canavar əhvalatına inanlardan ilki Jack olmuşdur. Çünki o öz içindəki canavardan xəbərdardır və belə bir şeyin var olmağına inanır. Simonun, Donuzcuğun ölümünə səbəb olması, Ralph etdiklərinə, əsasən, Jackın simasında pisliyin necə hakimiyyət əldə edə biləcəyini görürük.

### Donuzcuk

Emosional və gücsüz olan bu uşaq adadakı yoldaşları içində ən intellektual olanıdır. Fiziki görünüşü baxımından digər uşaqlar tərəfindən hər dəfə təhqir olunan Donuzcuk, heç kimin görə bilmədiyi təhlükələri duymaq iqtidarındadır. Lakin Ralph xaric digər uşaqlar tərəfindən çoxda ciddiyyə alınmamaqdadır. Dənizqabığını tapan, ocağı yandırmaq, sığınacaq tikmək kimi məntiqli fikirlərin hamısı Donuzcuk tərəfindən irəli sürülmüşdür.

### Simon

Bu obraz romanın ən mistik və bənzərsizidir. Ralph və Jack arasındakı güc savaşında tərəf tutmayan yeganə obrazdır. Simon yaxşılığın bütünlənmiş bir nümunəsidir. Sipiitual hissələrə malik Simonu bəzi tədqiqatçılar roman içində İsa peyğəmbərin obrazı kimi dəyərləndirirlər. Miləçəklərin tanrısının nə olduğunu bilən və canavarın var olmadığını dərk edən tək obraz Simondur. O “bizdən başqa canavar yoxdur” deyərək insanlığın necə bir xəstəliyə düşər olduğunu göstərir. Canavarın əslində insanların içindəki pislik olduğunu dərk edən Simon bunu uşaqlara xəbər vermək üçün dağdan enir və onu canavar hesab edən uşaqlar tərəfindən öldürülür.

## Roger

Uşaqlar içərisində ən cəsurdur. O özünü göstərmək üçün liderlərə ehtiyac duymayan sadist ruhlu bir obrazdır. Qəddarlıq etmək üçün ən kiçik hadisə belə hərəkətə keçməsi üçün səbəb ola bilər. İlk başlarda kiçik uşaqlara qarşı zorbalıq etməyə çalışsa da, cəmiyyətdəki əxlaq davranışları üzündən bundan yayınar, amma zamanla bütün mənəvi kimliyini itirər və amansız birinə çevirilər.

## Milçəklərin tanrısı

Canavarın varlığına inanan Jack və digər uşaqlar ovladıqları donuzun başını bir mızrağa keçirib ona hədiyyə olaraq təklif etdiklərini düşünərək meşəyə qoyarlar. Buna da Milçəklərin tanrısı adı verilər. Qədim inanışa görə cəhənnəm hökmdarı, donuz mələyinin şefi Baalzebub, yəni milçəklərin tanrısı olaraq adlanırmış. Milçəklərin tanrısının insan nəfsini, kibrimini bəsləyən pisliliyi simvolizə etdiyi düşünülməkdədir. Goldingin anlatmağa çalışdığı insanın içindəki pisliliyin şeytanla birgə yaşadığını göstərməkdir.

Uşaqlar içində yalnız Simon Milçəklərin tanrısının nə olduğunu anlayır. Onunla qarşılaşdığına, Milçəklərin tanrısı ona gülərək, “ Sən bilirdin deyilmi? Sizlərin bir parçası olduğumu bilirdin? Hər şeyin baş vermə səbəbi mənəm. Bunu bilirdin deyilmi?” deyər. Bununla da Simon canavarın var olmadığını sadəcə içimizdə yaşadığını yenidən dərk edər. Uşaqların canavar bildiyi varlıq isə ölü bir paraşütdür.

“Milçəklərin tanrısı” əsərində uşaqların düşünüldüyü kimi bir mələk qədər təmiz olmadığını, onların da müstəqil bir insan olduğunu və nə qədər çalışılsa da, bəzi duyğuların yox edilə bilmədiyinin yazıçı tərəfindən çatdırıldığını görürük. Əsərdə canavar insanın içindəki qəddarlıq, milçəklər isə uşaqlardır.

Bu roman oxucular tərəfindən daim sevilərək oxumaqdadır. Son illərdə dünyada müharibələrin yenidən başlaması bu əsərə olan münasibətin yenidən aktivləşməsinə səbəb olmuşdur. Romanın mövzusu məşhur filosof Şopenhauerin bu sözləri ilə səsləşməkdədir:

“Əslində insan vəhşi və qorxunc bir heyvandan başqa bir şey deyil. Biz onu əhliləşdirilmiş və təmkinli bilirlik, buna sivilizasiya deyirik. Ona görə də hərdən onun əsl mahiyyəti üzə çıxsın, dəhşətə gəlirik. Qanunun və asayişin buxovları və zəncirləri boşaldıqda özünü bütün çılpalığı ilə, amansız qəddarlığı ilə ortaya qoyur. Gündəlik həyatda kiçik miqyasda və tarix səhifələrində geniş miqyasda üzə çıxdığı kimi, hər bir insanda böyük bir hüriyyətlə hüquq və ədalətin sərhədlərini pozan böyük bir eqoizm vardır. Avropada qəbul edilən güc balansına ehtiyac, insanın yanında zəif bir insan görün kimi dərhal onun üstünə atılan ov heyvanından heç bir fərqi olmadığını göstərmirmi? Gündəlik münasibətlərdə də belə deyilmi? Məncə, varlığın daimi iztirabları ilə getdikcə daha da acılaşan yaşamaq istəyi, başqalarına əziyyət verməklə öz dərini yüngülləşdirmək axtarışdır. Amma bununla da insan öz içindəki əsl qəddarlığı, pisliliyi getdikcə daha çox qidalandırır. Buna aşağıdakı müşahidəni də əlavə etmək olar: Kanta görə, materiya ancaq genişlənən və daralan qüvvələrin qarşılıqlıması ilə yaşaya bildiyi kimi, insan cəmiyyətləri də ancaq qorxu ilə nifrət və ya qəzəb toqquşmasında özünü saxlaya bilər...”

Golding bu romanı Nasizm siyasətinə qarşı olaraq yazmışdır. Onun düşüncələrinə görə insanları içlərindəki vəhşiliyin ortaya çıxmasından qorumağın əsas yolu onları müəyyən qanunlar içərisində yaşatmaqdır. Normaların yox olması insanlar arasındakı iqtidar hissənin ortaya çıxmasına səbəb olmuşdur. Romanın sonunda Ralphın digər uşaqlar tərəfindən öldürülməyə çalışılmığı, demokratik düşüncənin nə qədər az olduğuna işarə edilməkdir.

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## GAGAUZ EDEBİYATINDA NİDÂ SANATININ SEMANTİK PERİYOTTA ANALİZİ

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### ÖZET

Yazınsal olgunun semantik düzleminde reaksiyona giren duygu ve düşünce eksenini, söz sanatları basamağında işlenerek betim kuşağında özgün bir izlenim yaratmaktadır. Bu nedenle sanatçının düş merceğinden yansıyan bürünsel motifler, sanatsal imajın sıra dışı sesletimini odağa taşımakta, gramatikal ögenin imgelem potansiyelini açığa çıkarmaktadır. Hayal izleğini sanat vektörüyle birleştiren bu estetik dizge, düşsel boyutta beliren gizil örüntülere lirik ve otantik bir ivme kazandırmaktadır. Polisemi yapıyı güçlendiren söz konusu özgün tasarımı, edebi sanatlar dairesinde şekillenen nida sanatı ile harmanlanmaktadır. Böylece anlatım mekanizmasına âhenk ve heyecan yüklenmekte, söylem piramidi estetik katmanda yeniden inşa edilmektedir.

Çalışmada coşkun hislerin anlamsal bileşimini simgeleyen nida sanatına vurgu yapılmış, armoni yelpazesindeki saklı ifadeye dikkat çekilmiştir. Yorumsal güç aracılığıyla çözümlenen bu kinestetik desen metin bağlamında anlamlandırılmıştır. Gagauz literatürüne özgü taranan metinler seslenme unsuru doğrultusunda incelenmiş, doküman analizi metoduyla irdelenmiştir. Araştırmaya yönelik teorik açılımın veri kapsamı anlambilim süzgecinden geçirilmiştir.

Çalışmada etkin bir seslenişin hissel yoğunluğunu işleyen nida sanatının, ünlem veya ünlem değerindeki sözcükler vasıtasıyla acı, öfke, üzüntü ve korku gibi duygusal izdüşümleri kişilere ya da kişileştirilen varlık, olay ve olgulara hissettirdiği görülmüştür. Teşhis ve tekrar sanatıyla kimi zaman aynı çizgide konumlanabilen bu aktif birimde dilin estetik bir görünüm sergilediği tespit edilmiştir. Düş ile gerçeğin birleşim noktasında yoğun bir coşkuyla iletilen bu aktif sesleniş, dilin anlam ve sembolik gücünü işleme yetisini görünür kılmıştır. Sanatçının duygu şemasındaki heyecanın yükselişe geçtiği an'ı sembolize eden nida, hitabet ögesini anlam dağarcığında tekrar dizayn etmiştir. Semantik periyoda coşkun ve estetik bir sınır çizilemek adına, görünüm itibarıyla tekrar sanatına çağrışımsal bir yönelim arz ettiği, buna karşın işlevsel açıdan bütünüyle farklı bir donanıma sahip olduğu belirlemiştir. Düşünsel önermenin aktif iletimini sağlayan nida sanatı, Gagauz edebiyatına güç ve derinlik katarak anlatıma estetik bir renk katmıştır.

**Anahtar Kelimeler:** Gagauz edebiyatı, nida sanatı, semantik, estetik, analiz.

### ANALYSIS OF INTERJECTION ART IN GAGAUZ LITERATURE IN THE SEMANTIC PERIOD

#### ABSTRACT

The axis of emotion and thought, which reacts on the semantic plane of the literary phenomenon, is processed at the level of rhetoric, creating a unique impression in the descriptive generation. For this reason, the prosodic motifs reflected through the artist's dream lens bring the extraordinary pronunciation of the artistic image into focus, revealing the imagination potential of the grammatical element. This aesthetic system, which combines the theme of imagination with the vector of art, gives a lyrical and authentic impetus to the hidden patterns that appear in the imaginary dimension.

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The original design, which strengthens the polysemy structure, is blended with the art of interjection, which is shaped in the department of literary arts. Thus, harmony and excitement are loaded into the expression mechanism, and the discourse pyramid is reconstructed in the aesthetic layer.

In the study, the art of interjection, which symbolizes the semantic combination of exuberant feelings, was emphasized, and attention was drawn to the hidden expression in the harmony spectrum. This kinesthetic pattern, which is analyzed through interpretive power, is interpreted in the context of the text. The scanned texts specific to the Gagauz literature were examined in line with the addressing element and were examined with the document analysis method. The data coverage of the theoretical perspective for the research has been filtered through semantics.

In the study, it has been seen that the art of interjection, which processes the emotional intensity of an effective call, makes emotional projections such as pain, anger, sadness and fear to people or personified entities, events and phenomena through exclamation or exclamatory utterances. It has been determined that the language exhibits an aesthetic appearance in this active unit, which can sometimes be positioned in the same line with the art of diagnosis and repetition. This active appeal, conveyed with intense enthusiasm at the junction of dream and reality, made the language's ability to process meaning and symbolic power visible. Interjection, which symbolizes the moment when the excitement in the artist's emotional scheme rises, has redesigned the element of rhetoric in its meaning. Therefore, in order to draw an exuberant and aesthetic boundary to the semantic period, it has been revealed that it has an associative orientation to the art of repetition, but it has a completely different equipment in terms of functionality. The art of calligraphy, which provides the active transmission of intellectual proposition, has added an aesthetic color to the expression by adding strength and depth to Gagauz literature.

**Keywords:** Gagauz literature, the art of interjection, semantics, aesthetics, analysis

#### GİRİŞ

Şiirsel üslubun duygu atmosferinde beliren coşku, heyecan, sitem, merak ve şaşkınlık tarzındaki tinsel motifler ile genellikle “ey, hey, ya” türündeki sesleniş örüntüleri nidâ sanatını işaretlemektedir. Ancak ünlemsel desenler olmadan da seslenme eylemi gerçekleşebilmektedir. Nidâ; olay, olgu, düş ve sezgileri coşkun bir dille yansıtan, söylemi ahenk düzleminde görünür kılan aktif ve yaratıcı bir desenleme işlemidir. Nidâ unsuru aracılığıyla betimlenen dizgeler sanatçının his periyodunun yoğun etkileşimini sembolize etmektedir. Seslenme sanatının esas gayesi, anlatım dokusuna estetik güç ve heyecan yüklemektir. Düşünce tablosundaki his şeridini sağlamlaştıran nidâ, sanatsal tepkimeyi etkin kılmaktadır. Coşku ögesinin doruğa vardığı an'ı resmeden sanatçı, nidâ sanatının retorik yörüngesinden ilham alarak anlam yelpazesini çok katmanlı yapıya dönüştürmektedir.

Nazımda veya nesirde; korku, sevinç, şaşkınlık, acı, öfke gibi güçlü duyguları ifade etmek gayesiyle başvuru olan heyecana bağlı bir edebi sanat (Köklügiller, 2009: 231) olan nidâ; anlatıma güç kazandırmak için okuyucuya ya da odağındakilere seslenmedir (Karadağ, 2000: 228). Nidâ; cümlelerin anlam ve akışını kuvvetlendirmek, vurguyu sağlamlaştırmak, ruhun heyecan ve hüznelerini yansıtmak amacıyla yapılan seslenme sanatıdır (Elgün, 2000: 180). Daha doğrusu muhatapın ilgi ve dikkatini çekebilmek adına, onunla iletişim kurmayı talep etmektir (Akt. Maral, 2019: 6). Nidâ; “ey, hey” gibi ünlemlerle ya da olumlu ve olumsuz fiillerin emir şekilleriyle seslenmektir. Buna karşın seslenilen varlık her zaman insan olmayabilir (Tanç, 2006: 15). Nidâ denildiğinde akla her ne kadar seslenme edatları gelse de edat olmadan da nidâ yapılabilir (Selçuk, 2017: 1040).

## BULGULAR

Gagauz edebi metinlerinden elde edilen verilerin semantik periyottaki analizi, nidâ sanatının görünüm düzleminde şu şekilde yansımıştır:

### 1.

**Ey**, Ata, gel da bak benim milletimâ –  
o da senin gibi kula, maavi gözlü,  
senin gibi girgin, derin köklü,  
emin basmaz, hodul hem pak üzlü,  
senin gibi o! **Hey**, Oguz oolu,  
Sana büünkü peetim, türküm,  
benim Ulu Atam, Ulu Bobam, Atatürküm...

(Zanet, 2021: 8)

Sanatçı; Türkiye Cumhuriyeti'nin kurucu lideri Ulu Önder Mustafa Kemal Atatürk'e hitap ederek, ona olan sevgi, saygı ve özlem duygusunu nidâ sanatının coşkun ritmiyle dile getirmektedir. Şiirde “ey” ve “hey” ünlemesiyle Ata'ya sesleniş, sanatçının heyecanını yansıtırken, aynı zamanda söz ve anlam evrenine coşkun ve estetik bir renk katmaktadır.

### 2.

**Ya**, karımca, gel bizâ,  
Hızlı-hızlı kon sözâ.  
Sözümüzü sän kestir.  
Gözâlimizi ayır!

(Zanet, 1998: 241)

Şiirde; “Ya” ünlemesiyle karıncaya seslenen şair, teşhis (kişileştirme) sanatının estetik yörüngesinden ilham almıştır. Nidâ sanatının otantik atmosferiyle kuşatılmış olan dörtlükte, şairin etkili bir söylem yaratarak ifadeye güç ve âhenk yüklediği görülmüştür.

### 3.

**Ha** buyurun, dostlarım,  
Kalmasın filcan yarım.  
Ko gençlâr olsun mutlu,  
Uşaklarda – bereket,  
Yaşamakta – büyük kısmet,  
Evleri varlık dolu!

(Zanet, 2018: 280)

Şair, “ha” ünlemiyle dostlarına hitap etmekte, iyi dilek ve temennilerini sanatsal düzlemde yansıtmaktadır. Nidâ ögesi aracılığıyla semantik düzlemi varsıl bir katmana taşıyan şair, duygu dağarcığını estetik doğrultuda yeniden dizayn etmektedir.

4.

- “ Kara hem aar sonsuzluktan,  
**Yaratıcı**, kurtar beni,  
Bil, dayma te ozamandan  
Şannayacam hep bân Seni;

**Göktâ Saabi**, istâ bendân  
Neyi istârsân – yok hiç paa,  
Zerâ ömür kaynaa da sân,  
ölüm verân da sân, Allaa;

(Zanet, 2018: 403-404)

Şair, dua teminin anlam yelpazesinden yansıttığı duygu yoğunluğunu, nidâ sanatının coşkun donanımıyla harmanlamıştır. Böylelikle anlatım mekanizmasına güç ve âhenk yüklemiş, dilek ve isteklerini kutsal otoriteye içten bir dille arz etmiştir. Doğrudan Allah’a yönelen şair, O’ndan yardım istemiş ve yine O’na sığınmıştır. “Yaratıcı” ve “Göktâ Saabi” hitapları vasıtasıyla şiirsel yapının güçlendiği, sanatçının iç dünyasındaki heyecan ögesinin dışa vurumunun gerçekleştiği görülmüştür.

5.

**Kimsin- neysin**, gururlu sevdam?  
Okadar sesli cana girân,  
Duygulu türküylân aktaran,  
İçimi, hem soluumu verân...

(Bujilova, 2019: 61)

Şiirde; “kimsin-neysin” ibaresiyle seveda unsuruna hitap eden şair; istifham (soru sorma) sanatını estetik reaksiyonla işleyerek etkileyici bir söylem temin etmektedir. Soru sorma sanatı ile seslenme sanatının sanatsal etkileşimi sonucu his ve heyecanın görüngü düzleminin zenginleştiği görülmektedir. Şair, seveda kavramının kapsam alanını tasvir ederken nidâ sanatının güç potansiyelinden faydalanmaktadır.

6.

**Êh**, sesläyin lafımı:  
Severim bân tarafımı,  
Onda solumak kolay,  
Çiçekli bütün dolay.

Açık onun buludu –  
Yaşamanın umudu.  
Geceleri ay-aydın,  
Benizi ayın baygın.

Yıldızları pak ateş,  
Nasıl kırmızı aşes,  
Benizsiz, duruk suyu,  
Topraan benizi koyu.

(Tukan, 2010: 28)



Şair; “Êh” nidâsıyla muhataplara seslenmekte, ardından var olan durumu arz etmektedir. Dolayısıyla burada seslenme unsurunun değil, sonrasında ifade edilen ya da vurgulanan hususun ön planda olduğu belirmektedir. Şiirde; nidâ sanatıyla renklenen şiirsellik, şairin içten üslubuyla birleşerek estetik bir bağdaşım sergilemektedir. Şair ilk etapta dinleyicilerin kendisine kulak vermesini istemektedir. Bu isteğinin pekişmesi için nidâ sanatının heyecan ögesine başvurmuştur. Daha sonra yaşadığı yer hakkında tasviri bir evren yaratarak odak noktasını canlı kılmaktadır.

7.

**-Ha bä**, çoban, otlatsana koyunnarı,  
Deredä hem sulasana sän onnarı.  
-Of, of, yaamurlar da yaayıyor,  
Of, of, malcaazlar da yıslanıyor.

**-Ne korkêrsın kendini suukladağan mı,  
Ne o boyun tatlı, ergin şekerdän mi?**

-Of, of, ilişmääz o yaamurlar,  
Of, of, ko annatsın bayırlar.

(Filioglu, 2005: 111)

İlk dörtlükte “ha bä” nidâsıyla çobana seslenen şair; ondan, koyunları otlatmasını ve onlara gereken bakımı yapmasını istemektedir. Bunun için elini çabuk tutmasını, çünkü yağmur yağdığını ve malların ıslandığını endişeli bir dille haber vermektedir. İkinci dörtlükte ise istifham sanatıyla bağdaşım kuran şair, hitabet unsurunu soru sorarak işlemektedir. Çobanın söz konusu durum karşısında hissedilen pasifliğinin şairin kızgın bir üsluba yönelmesine sebebiyet verdiği görülmektedir.

8.

**Selâm**, topraam, keskin sesli,  
Ne günnerin senin geldi –  
Kâmil tükü gibi oldun,  
Umutlarmı hep doydurdun!

(Kösä, 2011: 5)

Şiirde “selâm” nidâsıyla toprağa hitap eden şair, heyecana dair bir anlam sanatı olan seslenme sanatına gönderme yapmıştır. Teşhis sanatıyla estetik tepkimeye giren nidâ sanatı, şairin coşkun ruh halini betimlemiştir. Vatan temiiyle aynı katmanda buluşan toprak izleği, umut aşıl原因 yönüyle de dikkati çekmiştir.

9.

**-Ah**, mari Nadi, sän miysin?  
**Kalk**, mari Nadi, oruç tutulıy.  
-Nasıl kalkayım, mamu ma?  
Başım kalkarsa, güüdäm kalkmıy,  
Güüdäm kalkarsa, başım kalkmıy.

(Gaydarcı, 2018: 29)

Şiirde kızına seslenen bir annenin sevgi ve şefkat unsurlarıyla bütünleşen seslenişi konu edilmektedir. “Ah” ve “kalk” nidâsıyla gün yüzüne çıkan his vektörü, odak noktasındaki gizil duyguya etki ederek söylemi estetik yönde aktivize etmektedir.

10.

**Sus**, benim sert, korkunç acım,  
Ko sessiz zeatlensin canım  
O bitki ana kadar,  
Açan sonsuzlaa geçâr!

(Karagançu, 2015: 151)

Şiirde “sus” emir ögesi vasıtasıyla soyut bir kavram olan acı temine hitap eden şair, tinsel bir dalgalanmanın estetik yankısını aktarmaktadır. Bıkkınlığın, kabullenmenin, boş vermişliğin, hüznün, sitemin iç içe geçtiği hissel yoğunluk, nida sanatının estetik aynasından yansıtılarak anlatıma lirik bir ivme kazandırmaktadır. Şair; içindeki hüzne seslenerek kendi acizliğini, güçsüzlüğünü gerekçe gösterip yaşama sevincinin ve umudunun tükendiğini dile getirmektedir.

11.

**Hey**, bulut, **hey**, bulut,  
Ver bizâ bir büyük umut:  
Kırlara – gözâl yaamur,  
Tekneyâ – kaba hamur,  
Fırına da – somuncuk, –  
Sevinsin kızçaaaz, çocuk  
Hem ana, hem da boba,  
Hem da çatlamış soba.

Hepsinâ uzun ömür  
Hem da büyük kısmet götür!

(Kuroglu, 2011: 86)

Şair, buluta seslenerek ondan umut, bereket, mutluluk, kısmet ve uzun ömür dilemektedir. Tekrar sanatıyla bütünleşen nidanın anlam çerçevesinde etkileyici ve otantik bir anlatım yansıtmaktadır. Dolayısıyla iyi dilek ve temennilerle inşa edilen şiirsel oluşum, şairin duygu ve düşünce periyodunu estetik bağlamda desenlemektedir.

## SONUÇ

Sanatçının estetik düşlemine vurgulayan nidâ sanatı, edebi eserin âhenk şemasını yaratı düzlemine aktararak onu yeniden inşa eder. Nidanın kullanım alanına etkileyen ünlemlerin varlığı, söylemi güçlendirerek anlam yelpazesini polisemi yapıya taşır. Nidâ, her ne kadar “ey, hey, ya, ah” türünden ünlemlerle estetik reaksiyona girse de ünlem olmaksızın da yaratı alanında etkin rol üstlenebilir. Bu tarz hitap etme eylemi zengin çağrışımların ve motiflerin oluşum sürecine sanatsal bir ivme kazandırır. Söz sanatları yörüngesinde beliren estetik çarkın anlam kapsamı, sanatçının düş potansiyeline etki ederek coşkun sesletimleri açığa çıkarır. Vokal ve edatların tekrar sanatıyla olan tepkimesi ise aliterasyon ve asonans grafiğinin estetik yönlü çizelgede görünür kılınmasını sağlar. Böylece âhenk vektörünün sanat düzleminden sıra dışı geçişi sağlanarak imgesel koordinatların yaratış işlemi gerçekleşir. Nidâ sanatının çok yönlü işlevsel açılımı aracılığıyla sanatçının gizil his örüntüsü orijinal ekseninde aktifleşerek betim evreninden yansır. İşlevsel yapının anlam şeridinde beliren istek, yalvarış, hüznün, öfke ve meydan okuma tarzındaki tinsel izdüşümler nidâ unsurunun sanat platformunda işlenerek estetik bir çağrışım dizayn eder. Bu kinestetik reaksiyon ile somut ve soyut kavramlar nidâ çatısı altında birleşerek ruhsal devinimlerin coşkun iletimi vurgulanır.

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Çalışmada retorik bağlamda tasvirlenen nidâ sanatının, sanatkârın saklı izleniminin ve tinsel heyecanının yansıtıcı yüzeyi olarak Gagauz şiirsel metinlerinde sıkça kullanım sergilediği, edebi eserin söz varlığına ve semantik boyutuna derinlik, güç ve âhenk yüklediği görülmüştür. Dolayısıyla nidâ ögesinin yalnızca ünlem ve edat bileşiminin ortak paydasından ibaret olmadığı, aynı zamanda eserin gizil doğrultudaki zengin ve orijinal evrenin lirik ve otantik görüngüsü olduğu tespit edilmiştir.

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## 19th CENTURY AMERICAN ART and THE HUDSON RIVER SCHOOL

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### ABSTRACT

Founded in 1776, The United States of America aimed at development and growth with the influence of the Industrial Revolution in the 19th century. It has land where it will provide the necessary natural resources for its industrial structuring. The 'West' is seen as a place of opportunity waiting to be discovered, where a new life will begin, both for Americans and those who want to immigrate to America, in cultural and sociological terms.

He said that these periods, which Bruce Kuklick (1720-1868) described as the age of Pragmatism in America (with speculative thought), were critical, healing and distinctive features of the cultural products of American civilization. The Hudson River School was the first indigenous painting school in the United States. The Hudson River School is independent and high nationalistic. The geographical richness of the American continent can be seen in the Hudson River School Paintings. Especially the Hudson River School paintings are the documents of the plain natural beauties of the American continent. American painting style Thomas Cole (1801-1848) and his artists reflect American landscapes; "Everything in the nature of this country is new to art". Thomas Cole was born in England and painted images of the Hudson River Valley after immigrating to the United States at the age of 17. Cole is a founder of the New York Apollo League. The union, which gives prints to anyone who buys tickets by selling pictures through lottery drawings, offers the opportunity to collect works of art to a large segment of the population across the continent. It was later renamed the American Art Association. Its administrators took on the task of establishing a 'national art school' themselves. They declared that being inspired by ancient sculptures and European old masters goes against the spirit of time. In this research, it is aimed to analyze the works of Hudson River School and 19th century American painters.

**Keywords:** 19th Century American Culture, Hudson River School, Luminsist.

## 19 YÜZYIL AMERİKAN SANATI ve HUDSON NEHRİ OKULU

### ÖZET

1776'da kurulan Amerika Birleşik Devletleri, 19. yüzyıla birlikte, Sanayi Devriminin de etkisiyle kendi gelişimini ve büyümeyi hedeflemiştir. Endüstriyel yapılanması için gerekli doğal kaynakları sağlayacağı arazilere sahiptir. 'Batı' kültürel ve sosyolojik boyutta hem Amerikalıların hem de Amerika'ya göç etmek isteyenlerin yeni bir hayatın başlayacağı keşfedilmeyi bekleyen fırsat olarak görülmektedir. 1776'da kurulan Amerika Birleşik Devletleri, 19. yüzyıla birlikte, Sanayi Devriminin de etkisiyle kendi gelişimini ve büyümeyi hedefledi. Endüstriyel yapılanması için gerekli doğal kaynakları sağlayacağı arazilere sahiptir. 'Batı' kültürel ve sosyolojik boyutta hem Amerikalıların hem de Amerika'ya göç etmek isteyenlerin yeni bir hayatın başlayacağı keşfedilmeyi bekleyen fırsat diyarı olarak görüldü. Bruce Kuklick'in (1720-1868) Amerika'da Spekülatif düşünceyle Pragmatizm çağı olarak nitelendirdiği bu dönemlerin, Amerikan medeniyeti kültürel ürünlerini eleştirel, iyileştirici, ayırt edici nitelikte olduğunu söylemiştir. Hudson Nehri Okulu, Amerika Birleşik Devletleri'ndeki ilk yerli resim okuludur. Hudson Nehri Okulu bağımsız ve son derece milliyetçidir.

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Hudson Nehri Okulu Resim sanat eserlerinde Amerikan kıtasının coğrafi zenginliği görülmektedir. Özellikle Hudson Nehri Okulu resimleri, Amerika kıtasının yalın doğa güzelliklerinin belgesi niteliğindedir. Amerikan resim stili Thomas Cole (1801-1848) ve Amerikan manzaralarını yansıtan sanatçıları; “bu ülkenin doğasındaki her şey sanat için yenidir” görüşündedir. Thomas Cole, İngiltere’de doğmuştur ve 17 yaşında ABD’ye göç ettikten sonra Hudson Nehri Vadisinin görüntülerini resmetmiştir. Thomas Cole, New York Apollo Birliğinin kurucularındandır. Piyango çekilişiyle resim satarak bilet alan herkese baskılarını veren birlik, tüm kıtada nüfusun geniş bir kesimine sanat eseri toplama imkânı sunmaktadır. Daha sonra Amerikan Sanat birliği adını almıştır. Yöneticileri ‘Ulusal bir sanat okulu’ kurma işini kendileri üstlenmiştir. Antik heykeller ve Avrupalı eski ustalardan ilham alınmasının zamanın ruhuna aykırı düşüğünü’ ilan etmişlerdir. Bu araştırmada Hudson Nehri Okulu ve 19. Yüzyıl Amerikan resim sanatçılarının eserlerinin çözümlenmesi hedeflenmiştir.

**Anahtar Kelimeler:** 19. yüzyıl Amerikan kültürü, Hudson Nehri Okulu, Luminsist

#### GİRİŞ

American artists have equated keeping up with the times with keeping up with their own country. Artists of the Hudson River school used anthropomorphic symbols or symbolic personifications of nature. The Hudson River School was the first indigenous painting school in the United States. It is independent and extremely nationalistic. National art is in the act of developing its own country. American artists, who wanted to do different things from Europe, took a train journey to Europe to return. The artist who most effectively started an art movement appealing to the growing nation is Thomas Cole. Having painted landscapes along the Hudson River in the 1820s. Cole met Turner in London in 1832. He encountered the almost all-encompassing epic art of Turner who he used for a historical account of the rise and fall of empire expressed in the cycle of five visionary landscapes (Bell J. 2007, p.331). The forms and meanings that have an important source in the allegorical images of 17th and 18th century emblems or books are anthropomorphic. Symbolism is important in a historical context. The Hudson River helps bring out the complexity and sophistication of school painting. Such a school of work revives an important artistic tradition.

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### Thomas Cole (1801-1848)



**Figure 1.** Thomas Cole, *The Ages of Life: Youth* 1842 Oil on canvas, 134 x 195 cm National Gallery of Art, Washington <https://www.nga.gov/collection/art-object-page.52451.html>

Artists who reflect American landscapes have an edge over all other artists because everything in the nature of this country is new to art. Cole was born in England and painted images of the Hudson River Valley after immigrating to the United States at the age of 17. He is a co-founder of the New York Apollo League. By selling pictures in lottery drawings, this association gave prints to anyone who bought a ticket, and provided a large segment of the population across the continent with the opportunity to collect works of art. It was later renamed the American Art Association. Its administrators took on the task of establishing a 'national art school' themselves. They declared that taking inspiration from ancient sculptures and European masters 'contrary to the spirit of the times' (Fleming J., Honor H. (2016, p. 674). Thomas Cole; "My attention is often drawn to the view of action and the expressions of surrounding objects, especially trees. This is due to the fact that trees somewhat resemble the human form. There is an expression of compassion in the intertwined branches of the trees. "Exposing them to challenges and upheavals reveals a thousand original characters fighting for existence or supremacy." Cole used the meaningful presence of anthropomorphic symbols to underline the formal and symbolic end of his life's journey. Cole painted a stormy, cloud-covered landscape. In the landscape of rocks and trees split by the storm, the tree expresses the pain of the traveler. Cole dramatically increased anthropomorphic expressions in his final paintings. In *The Voyage of Life* series, Cole has skillfully used emblems as natural landmarks to express travel. Cole wrote of Childhood: "The dark cave is symbolic of our earthly origin and mysterious past... The pink light of the morning, the lush flowers are symbols of the joy of early life" (Sweeney J.G. 1988).

With the death of Thomas Cole in 1848, seniority at the Hudson River School passed to Asher B. Durand (b. 1796), but it is the younger generation who will bring the most important innovations and advances in the following years. The oldest of the group is John Frederick Kensett (b. 1816), but all major artists are older than him: Martin Johnson Heade (b. 1809).

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Thomas Worthington Whittredge (b. 1820), Jasper Francis Cropsey (b. 1813), George Inness (b. 1825), Frederic Edwin Church (b. 1826), Jervis McEntee (b. 1828), and Albert Bierstadt (b. 1830) They have depicted many different geographical areas with various stylistic approaches and influences. Still, their commitments and methods are similar enough to be seen as a "school" (Avery K.J., Kelly F. 2004).

Cole paints a stormy, cloud-enclosed landscape in *Manhood*; Here, bare cliffs soar approaching in terrifying light, demonic forms floating in the air, and rocks and trees shattered by the storm are allegorically depicted. In this painting, the rocky hills that were at a gentle rest in childhood are tense with fear and are expressed as if they were tortured. The rocky head in the center looks down the cliff to the boiling waterfall into which the traveler will enter. On the right, a tree twisted in agony indicates the traveler's suffering. The faces of suicide, intemperance, and death, as Cole puts it, "the temptations that engulf people in their greatest distress," are outlined in the clouds. The last painting in the series, *Old Age*, depicts the traveler entering a scene where he contemplates a vast midnight ocean. Behind him, the now battered and the rock, resembling a collapsed skull, reflects the old man's weathering.

Old Stone Face has a tremendous influence on the imagination of Cole, who is probably already aware of the emblem image and is looking for ways to revive and humanize America's wilderness landscapes.



**Figure 2.** Thomas Cole, *The Course of Empire: Destruction*, 1836, Oil on canvas, (84.5 × 160.7 cm) <https://www.metmuseum.org/art/collection/search/692371>

During the last decade of his career, Cole significantly increased the use of anthropomorphic emblems and enhanced their role in creating the expression of emotions. Cole's last work, *The Cross in the Wilderness*, of 1845, particularly reveals his evolving technique (Sweeney J.G. 1988).



































































































































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## JOB POSTING ANALYSIS TO DISCOVER THE OCCUPATIONAL PROFILES OF DIGITAL TRANSFORMATION MANAGERS

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### **ABSTRACT**

In today's economies, where international competition is gaining momentum, it is an important fact that the need for qualified personnel is increasing day by day. As a matter of fact, while new professions are emerging with Industry 4.0, this process causes an increase in human capital investments of enterprises. Digital transformation management, which will take part in the process of "managing" the digital transformation process of businesses, is an example of these new professions. This research aimed to discover the current competency/competence demands and job descriptions of the personnel who will work in the field of digital transformation management in the Turkish, German and UK labor market through job postings analysis. In line with the objectives of the research, active postings on career sites such as Kariyer.net, isbul.com, indeed.com, jobware.de and yourfirm.de between 15 June 2022 and 30 October 2022 were analyzed. Keywords such as digital transformation specialist, digital transformation officer, and digital transformation manager, were used in this analysis process. The postings mentioned in the research were analyzed with MaxQDA 2022 Pro, to reveal the education profile, job descriptions, professional competence demands and personality characteristics/features sought by employers in their personnel. As a result of the study, in which more than 200 job postings were analyzed by text mining, it was understood that the job descriptions of digital transformation managers in Turkey, Germany and England were largely similar, while personal and professional competencies differed greatly for all three countries. Accordingly, in line with the requested professional competencies, knowledge of digitalization tools and processes in the UK, project management, change management and digital leadership knowledge have come to the fore. The results showed that in Germany, knowledge of agile-scrum methodologies and digital leadership came to the fore. In Turkey, on the other hand, it has been seen that the prominent feature is limited to having knowledge about project management processes.

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Analyzing the company's digitalization needs and managing corporate relations came to the fore as a common result for all three countries when the job descriptions expected from the personnel with the aforementioned qualifications were examined. On the other hand, while managing the company's digitalization and technology-based projects, came to the fore, in the business areas in the UK; following the data-based business of the company, managing research and trend tracking, and managing customer relations came to the fore in Germany.  
**Keywords:** Digital Transformation, Digital Transformation Management, Job Posting Analysis



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## MONETARY POLICY AND PRICE STABILITY IN MOROCCO: A STOCHASTIC STUDY

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### Summary

In an economic environment, economic agents have the necessary information to form their consumption, production and/or investment decisions. However, as soon as an abnormal increase in the general price level appears, their behaviour becomes irrational, due to a high level of uncertainty. This is why price stability becomes a major concern of all central banks through monetary policy.

Monetary policy refers to all actions taken by the monetary authorities and the central bank to modify monetary and financial conditions (De Mourgues, 1988). The final objective of monetary stability is attributed to monetary policy, namely: price stability, i.e. the reduction of inflation, as well as the preservation of purchasing power in order to promote growth and full employment.

Price stability is therefore generally recognised as one of the essential contributions of monetary policy to macroeconomic stability and its major concern. This approach, which is largely consensual, is one of the dominant paradigms of recent economic thinking.

The flow of work during the 1970s led to the emergence of two types of monetary policy whose principle is based on nominal anchoring to intermediate variables such as the exchange rate and monetary aggregates. These are the exchange rate targeting and monetary aggregate targeting policies.

In this respect, BAM's strategy has long since begun to revolve around a quantified definition of price stability, which gives money a leading role through the establishment of growth standards for the money supply.

Regardless of the nature of intermediate targets, the pursuit of a quantified price stability objective is difficult to implement because of the lagged and imperfect control of inflation, especially in developing countries.

Our study aims to provide some answers to the following question: *What is the impact of monetary policy on price stability in Morocco?*

**Keywords:** monetary policy, money supply, inflation, price stability, gross domestic product

## BANKING RISK MANAGEMENT AND ITS IMPACT ON LIQUIDITY

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### ABSTRACT

The government support of the banking and financial services sector has always been an important issue of the immediate response to crises. The severe recent global crisis in 2008 revealed a number of problems of banking system in Kazakhstan, primarily in the risk management system of commercial banks. The main aim of this study is to investigate the importance of bank risk management and its impact on liquidity. The bank liquidity can be influenced by changing the maturity structure of assets. In practice, it is obvious from the formation and management of the investment portfolio by means of the step effect. However, these are only theories and approaches, to which a bank may be directed in its activity at the discretion of its management and depending on the changing market situations. In summary, this study reflects that first of all commercial banks face the problem of determining the mechanism of quantitative assessment and the practical application of liquidity management methods.

**Keywords:** bank risk management, liquidity management, stabilization of the financial market.

### 1.INTRODUCTION

The current state of Kazakhstan's economy is notable for a large number of factors that are not sufficiently favorable for the banking sector. A range of factors has a decisive influence on bank stability, among which the primary one is liquidity: growth of long-term investments, increase in the share of overdue debt, outflow of funds from accounts, etc. All these factors are directly or indirectly reflected in the change in the bank's payment flows and, as a consequence, affect the value of its liquidity position.

The concept of "liquidity of a commercial bank" means the bank's ability to ensure timely and full implementation of its debt and financial obligations to all counterparties, which is based on the permanent maintenance of objectively necessary ratio between its three components: the bank's own capital, borrowed and allocated funds.

In banking theory and practice, liquidity is understood as a "reserve" or a "flow". Liquidity as a "reserve" includes determining the level of a commercial bank's ability to meet its obligations to clients at a certain specific moment by changing the assets' composition in favor of their highly liquid lines due to unused reserves available in this area.

Liquidity as a "flow" is analyzed in terms of dynamics. This involves an assessment of the commercial bank's ability to change the existing unfavorable liquidity level over a certain period or to prevent the deterioration of the achieved objectively necessary liquidity level through the effective management of the relevant assets and liabilities, attracting additional borrowed funds, increasing the financial stability of the bank by increasing revenues.

Therefore, liquidity is one of the key concepts in banking activities, it forms the basis of the reliability and stability characteristics of banking institutions. Not being related to the main direct goals of banking activity, such as making a profit, investment organization, liquidity management is one of the internal indicators of management efficiency in banking activity. Maintaining the appropriate level of bank liquidity allows the bank to remain solvent at all times, thereby creating indispensable conditions for achieving the main objectives of banking activities and sustainable development of the national economy. [1]

The concept of bank liquidity is very closely associated with the idea of market liquidity and, above all, the financial one, where the bank operates. Therefore, the more capacious, stable, diverse, and competitive the market is, the more the bank's liquidity concept expands. In the coming years, Kazakhstan's banks are predicted to face high risks associated with a reduction in capitalization given the stagnation in the economy.

## 2. OVERVIEW OF BANK RISK MANAGEMENT IN KAZAKHSTAN

The banking sector of Kazakhstan has 21 banks with a State share in the banking sector's capital of less than 5%. In the structure of banking assets of the republic, loans take 50.9%; securities portfolio – 20.7%; cash, refined precious metals and correspondent accounts – 10.5%. [2] And credit risk is still the main cause of banks' difficulties, and more than 80% of the contents of banks' balance sheets are devoted, as a rule, to this aspect of risk management. In reality, the bank is primarily faced with the problem of determining the mechanism of quantitative assessment and practical application of liquidity management methods.

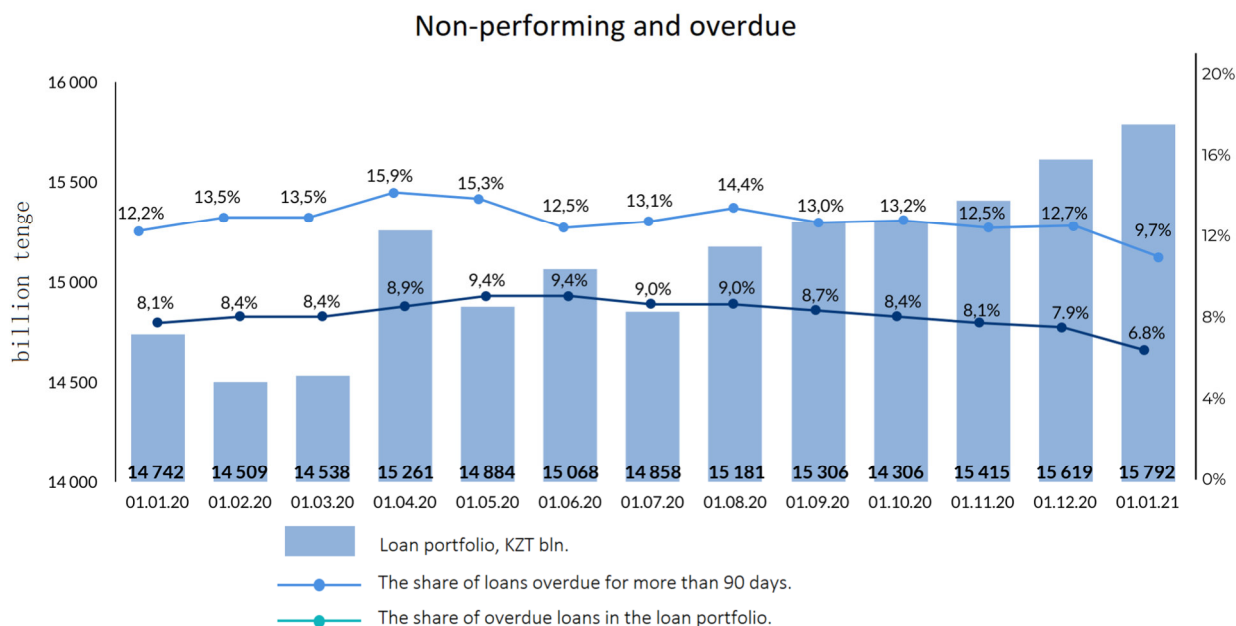


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According to the regulatory reporting of STBs.

**Figure 1.** Distribution of non-performing and overdue loans by second-tier banks

Note: [3]

In the portfolio of loans to individuals the level of NPL 90+ made 5.4%, in the portfolio of loans to small and medium businesses - 11.9%, in the portfolio of loans to legal entities - 5%. Significant loan deferrals were granted during the lockdown period. Lending to legal entities decreased by 1.5% in 2020, while lending to small businesses, on the contrary, increased by 19.3%. This was facilitated by the state programs for the development of small and medium-sized businesses. In this regard, the real quality of the loan portfolio may change by the end of the year. As a country – exporter of oil and other mineral resources receiving revenue in U.S. currency, the country has a high degree of dollarization of the economy, which brings additional risks and can lead to destabilization of the financial stability of banks. The dollarization level was 35.4% at the end of July 2022. [3]

Historically, the high practice of concentrating banking resources on certain sectors and borrowers has increased credit risks in the banking sector. The decrease in external demand and commodity prices had a negative impact on the economy. Together with GDP reduction and sharp devaluation of the national currency – tenge, it led to a worsening of borrowers' solvency. The dynamics of the banking sector indicate that conventional retail deposits are becoming less and less interesting for the population. As a result, competition within the banking segment is increasing, which makes it more important to implement innovative technologies and services in order to attract new clients and ensure financial stability.

Due to the high degree of dollarization of the economy, there are additional risks to the financial stability of banks. The rate of nominal credit growth in Kazakhstan will ultimately depend on the degree of the tenge depreciation and the rate of inflation; the money stock will increase in 2022 (forecast) by 3.1% compared to 2021. [4] The following measures have been taken to control inflation: increase of the National Bank rate from 10.25% to 16.75% [5] during 2022; increases in interest rates on deposits in tenge; increase in interest rates on loans.



But this is not enough, it is also necessary to provide soft loans to finance infrastructure projects to prevent emergencies at thermal power plants (TPPs) and water utilities in order not to sharply increase the cost of their services, which can lead to an increase in inflationary processes.

Due to a significant decrease in the income of the population, new retail loans are expected to replace loans with maturity, resulting in the retail loan portfolio will still remain stable in absolute terms. According to the authors, the near zero growth, the decline in real GDP (4.3% growth in 2021 against the expected 3% growth in 2022) [6], and the sharp depreciation of the tenge together with the weak payment culture and low incomes in the country will unavoidably lead to deterioration in the solvency of borrowers, among other things. The historically high concentration on certain sectors and borrowers in international comparison is another factor contributing to increased credit risk in Kazakhstan's banking sector.

The most significant deterioration in asset quality indicators and the resulting creation of additional reserves is likely to be observed in banks whose lending rates have been in double digits in recent years, as their loans begin to become due under unfavorable operating conditions.

### 3. BANKING LIQUIDITY MANAGEMENT IN KAZAKHSTAN

Liquidity management mechanism cannot exclude risks completely, as new internal and external influencing factors must be constantly analyzed on a permanent basis. That is why the forecast of future cash flows of the bank is built with a certain probability, and with the increase of time horizon, the reliability of decision results decreases. For example, it is necessary to calculate the potential reconsideration of the discount rate in the external borrowing markets.

In the absence of strategic changes in the bank management, as well as significant changes in external factors, extrapolation is possible - the transfer of the existing initial structure of assets, liabilities, return on investments, and the cost of resources to future periods. First of all, it concerns such macroeconomic factors as changes in the refinancing rate of the Central Bank, inflation, exchange rates of major currencies in relation to the previous year, and no dumping on credit rates - attracting the client base by reducing the interest rate in the long term.

Stabilization of the financial market today is a move away from the direct support of banks and support of borrowers – the population, small and medium businesses (SMBs). The support measures are defined as: no penalties and fines on overdue payments of the principal debt and (or) interest on the bank loans and (or) microcredit contracts to individuals and legal entities, whose financial condition became worse as a result of the emergency (consequences of COVID). Thus, more than 1,8 million citizens have received a respite for payments of 245,6 billion tenge, and 11,7 thousand SMB subjects – for the amount of 147,8 billion tenge [7]. However, for the banks, this means losses from uncollected bank interest.

Indirect support of commercial banks by the Government is expressed in operational measures for the participation of banks in the lending and financing of economic sectors, when resources allocated by the Government are accumulated in bank accounts, thus increasing their liquidity. For example, preferential financing of operating assets under the program of the National Bank is envisaged in the manufacturing industry.

A bank can be financially liquid if its assets are transferable or can be sold to other creditors or investors. Consequently, bank liquidity can be influenced by changing the maturity structure of assets. In practice, this is represented in the formation and management of the investment portfolio by means of the step effect.

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But these are only theories and approaches, to which the bank may be oriented in its activity at the discretion of its management and depending on the developing market situation. In reality, the bank, first of all, faces the problem of determining the mechanism of quantitative assessment and the practical application of liquidity management methods.

Maximum liquidity can be achieved by maximizing balances in cash and correspondent accounts in relation to other assets. But exactly in this case, the bank's profit is minimal. Profit maximization does not require storing funds, but using them to make loans and investments. Since this requires keeping cash on hand and balances on correspondent accounts to a minimum, profit maximization threatens the continuity of the bank's fulfillment of its obligations to clients.

#### CONCLUSION

The essence of banking liquidity management is therefore a flexible combination of opposing requirements of liquidity and profitability. The target function of liquidity management by a commercial bank is to maximize profit with mandatory compliance with economic standards established and determined by the bank itself.

Approaches based on the indexes dynamics prove to be more effective in practice than approaches that imply static data under study and provide only probabilistic estimates of changes in the bank's indexes in the future without a breakdown by time intervals. In assets management, the bank should focus its attention on the increase of profitability of operations as a whole and on the return on individual operations, in particular. In liabilities management, the bank should use the analysis method of liabilities placement according to their terms, which allows the bank to manage its liabilities, forecast and change their structure depending on the level of liquidity ratios, implement a reasonable policy in the field of accumulation of resources, influence the solvency, monitor the equity/raised capital ratio and analyze the deposit base of the bank.

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## **BANKER'S VIGILANCE DUTY and PROTECTION of MOROCCAN CUSTOMERS' PERSONAL DATA**

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### **Abstract**

Property inequality between the credit consumer and the credit institution puts the banker in a privileged position which certainly requires him to be careful and vigilant in order to detect the apparent irregularities in the transactions that he is asked to carry out. At the same time, this position allows him to collect very important confidential information that frequently falls within the sphere of consumer privacy. Through each economic transaction the user of a credit card reveals to a third party who does not ask for its opinion, personality, plans and future expenses in view of its overall social situation.

After the Banking Law of 14 February 2006, which consolidated the initial guidelines of the Law of 6 July 1993, Law no. 103.12 on credit institutions and similar entities was adopted to further strengthen the decision-making and control powers of Bank Al-Maghrib (Central Bank) as well as prudential measures and risk prevention rules. This increase in the decision-making and control powers of Bank Al-Maghrib is justified by the increasing risks and the need to prevent them as well as monitor and control other actors in the sector. Among these prudential regulations, one obligation for bankers is particular relevance to us; it is the vigilance duty, which applies to any transaction whose economic cause or legitimacy is not obvious.

**Keywords:** CREDIT INSTITUTIONS; BANK AL-MAGHRIB; VIGILANCE DUTY, CONSUMER, PERSONAL DATA; PRIVATE LIFE, DIGITAL;

### **Introduction**

After the Banking Law of 14 February 2006, which consolidated the initial guidelines of the Law of 6 July 1993, Law no. 103.12 on credit institutions and similar entities has been designed to further increase the decision-making and control powers of Bank Al-Maghrib, as well as to put prudential measures and risk prevention rules. This increase in the decision-making and control powers of Bank Al-Maghrib is justified by the increase in risks and the need to prevent them and to monitor and control other actors in the sector. Among these prudential rules, an obligation for bankers is interesting for us; it concerns the duty of vigilance which concerns any transaction whose economic cause or lawfulness is not apparent.

The obligations of the banker are numerous and diverse and they are from legal origin or jurisprudence creations. Obligations and duties such as bank secrecy or the duty to be vigilant, and also principles specific to banking law such as the principle of non-interference.

However, the autonomy of banking law in relation to the general theory of contracts often complicates any attempt to distinguish between obligations and principles born primarily of banking practice. There is typically a difference between a prudential duty of vigilance<sup>1</sup>, which requires from the banker to make sure that his responsibility is avoided, and a duty of vigilance obligation, which requires him to make sure that the transactions he is requested to handle don't display any anomalies. A duty that can lead the banker to carry out additional investigations to choose the behavior adapted to the situation (Boucard, 2002). The case-law has enabled clarification of the duty of vigilance on the basis of the apparent anomaly criterion. In Morocco, we can also discover a duty of vigilance with legal origins in the banking law and the circular number 36 issued by Bank Al-Maghrib on December 24th, 2003. Some authors, like Mr. Vézian, claim that this responsibility of vigilance comes from a banking practice established in the interest of the banker who defends himself against dishonest consumers, in the benefit of his own customers, and ultimately in the benefit of the general public. We are talking about a duty to ensure the "security of banking instruments" (Boucard, 2002).

The banker's privileged position certainly requires him to be cautious and vigilant (I) in order to detect the apparent anomalies in the transactions which he is asked to carry out and to make every effort to avoid the occurrence of injury, but at the same time it allows him to collect very important confidential information that often falls within the sphere of the privacy of individual customers (II).

### **1. A privileged and vigilant banker.**

The opening of a bank account is above all an opportunity for the interests of banks and their clients to intersect and for the duty to provide information and the right to inform to be a guarantee in good faith in this important transaction with complex effects. The banker is then required to exercise the duty of vigilance in order to collect all pertinent data regarding the client's capacity, identity, activity, and assets. Each customer's information, including for natural persons, such as name, number of official identification document, actual address, occupation, etc., is established in an account opening form<sup>2</sup>.

According to Article 1 of Bank Al-Maghrib Circular No. 36 of December 24th, 2003: "credit institutions must put in place the necessary procedures to enable them to:

- identify and have in-depth knowledge of their clients;
- monitoring and surveillance of customer transactions, particularly those with a high degree of risk;
- Maintain and update documentation related to clients and the transactions they perform.

Additionally, they must also instruct and train their staff in the techniques of detecting and preventing unusual or suspicious operations"<sup>3</sup>.

A bank account is initially identified by a RIB, which is a bank details. This is a string of numbers that serves as national bank account identifier. This is a series of numbers constituting a national bank account identifier. This identifier enables bank customers to communicate their banking domiciliation to debtors or creditors, as well as to meet the automatic processing requirements arising from the development of interbank exchanges.

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<sup>1</sup> Also known as the duty of supervision and the duty of prudence.

<sup>2</sup> For legal persons or entities: name, legal form, activity, address of registered office, tax identifier number etc.

<sup>3</sup> The client will be given a printout to fill out and a sample signature card with information on the client's identification and signature templates that must serve as the foundation for the banker's control. The bank will issue a checkbook, a bank card, etc. at the client's request and in accordance with the services provided.



Thanks to the computer and digital tools, the bank details facilitate all the routine operations performed by customers and their establishments. There is also the Bank Account Statement, which allows for a chronological record of all client transactions<sup>4</sup>. These statements<sup>5</sup> must include the following information: the period for which they are prepared; the corresponding initial and final balances; and a description of each transaction that includes the document references used for its execution (check number, etc.).

This information allows credit institutions to monitor all transactions that represent a risk. Bank Al-Maghrib imposed vigilance in the fight against suspicious and unusual operations and sources<sup>6</sup>. Circular no. 36 of Bank Al-Maghrib requires them to determine client risk profiles<sup>7</sup> and classify them according to categories related to them. This involves taking into account and recording the following data: the customer's country of origin; the origin of the funds; the nature of the activity performed; the nature of the transactions performed; the account history.

This duty of vigilance, which is obviously important, combined with each banker's primary goal, namely profit, reveals a precise profile of the "good customer," who must ultimately be honest and creditworthy<sup>8</sup>, and which is part of the banks' risk and profit prevention policy. A realistic observation that seems to contradict this expressed desire for banking and democratization of access to basic financial services to the disadvantaged.

## 2. A transparent and exposed client.

Bankers and other professionals are expected to share a duty to inform with their clients, businesses, and individuals. The real disparity between these two contracting parties justifies this pre-contractual obligation of information, which falls primarily on the professionals and stems from the fact that the professional frequently has information that the client does not, and especially because the client's ignorance is frequently legitimate (Sinay-Cytermann, 1996). However, these obligations of information and advice are difficult to harmonize with the rules of banking law, appearing to be a nuisance (Boucard, 2002). Professionals have put in place stringent procedures that allow them to be fully informed about the client's financial situation, solvency, and seriousness. Clients are frequently asked to provide an extremely detailed record and to complete a survey that goes beyond personal data and privacy.

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<sup>4</sup>It is a table with two sections:

- The debit part, where all cashier withdrawals, check payments, debit notices, transfers, payments for bank services, and credits are recorded.
- The credit part: where all transactions pertaining to banking services and any bank credits are recorded. This includes all payments made by or on behalf of the customer, such as cash payments, transfer receipts, etc.

<sup>5</sup> Article 2 of Circular B.A.M No. 4/G/ 98 of 5 March 1998 specifies precisely the information that the statement must contain for each transaction, namely the description, the amount, the obligor or creditor direction of the amount, the execution date, the value date, the interest rate actually applied in the case of a credit transaction or an interest-bearing deposit transaction, the method of calculating interest, the exchange rate applied in the case of a foreign currency transaction, the nature of each fee charged, the nature and amount of each charge and tax levied.

<sup>6</sup> According to Article 15 of Bank Al-Maghrib Circular No. 36 of December 23, 2003 on due diligence, unusual or suspicious transactions are those that:

- "-do not appear to have any economic justification or apparent lawful purpose;
- relate to amounts that are out of proportion to those normally paid by the customer;
- occur under unusual conditions of complexity"

<sup>7</sup> The identification elements of each client are kept for 10 years.

<sup>8</sup> Who has the possibility to pay his debts and to respect his financial commitments.

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Certainly, bankers and credit professionals may argue that the reason for collecting, storing, and processing this information is nothing more than strict adherence to a policy imposed by the country's monetary authorities of assessing the risks of default and litigation that each candidate would present when accessing the product, as well as a duty to be vigilant. In fact, this information enables professionals to identify the best possible guarantee and thus engage the customer in a risk-management policy.

To identify the concept of "privacy" and thus which information should be subject to special protection, it is necessary to first understand the criteria advanced by the researchers<sup>9</sup>. The first criterion takes into account the nature of the data, to discriminate against the most sensitive information (example: political and religious opinions)<sup>10</sup>. The second criterion is concerned with the information's purpose, whether legitimate or not and therefore can't infringe on a person's privacy as the information is used for a suspicious purpose. Finally, the third criterion considers the technological nature of information processing during the data storage, exploitation, and processing phases. Thus, in terms of security, it requires the development of various technical processes that necessitate the assistance of computer scientists:

- Arrangements allowing access to information only after identity verification;
- Information jamming devices;
- Programmed verification of the validity of user operations;
- Automatic printing by the computer of a business log displaying the identity of the information requester, etc.

---

<sup>9</sup>Several texts refer to the notion of the right to respect for privacy:

- According to Article 12 of the 1948 Universal Declaration of Human Rights: "No one shall be subject to arbitrary interference in his or her private life, family, home or correspondence, nor to any interference with his or her honour or reputation".

- According to Article 8 of the European Convention on Human Rights of 4 November 1950: "every person has the right to respect for his private and family life, his domicile and correspondence..."

<sup>10</sup> Professor BING of the University of Oslo has identified 400 pieces of information that need to be protected, including identity, family relationships, health, lifestyle etc.,

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These criteria are extremely valuable today, when technical advancements in data storage<sup>11</sup>, processing, and communication have the potential to strip the right to customer privacy protection from its content.

Article 160 of Law 103.12 authorizes Bank Al-Maghrib on its own initiative or at the request of professional associations to set up and manage a credit risk centralization service whose purpose is to make available to credit institutions and similar entities, financial information useful for managing their risks to companies and individuals. This service centralizes the provision of credit information and rating services. Service data may only be retained for five years from the date of repayment of the credit. The president of Bank Al-Maghrib then determines by circular, after consulting the Committee of Credit Institutions, the terms under which these services will be provided and the conditions of access to the information they hold. Bankers and credit experts keep records of information about every customer in files. Files contain information about the client's assets and lifestyle, which poses a serious threat to their privacy. Indeed, it is easy from data, relating to the client's wealth, to deduce other information that goes beyond the pure financial object. Their actualization, accumulation, and potential for instantaneous transmission create control over the subject, who is also susceptible to error and abusive uses. We must not forget also the case of a few credit forms, such as the payment card, through which we can discover the usual behaviors of an individual by the pace of his purchases.

As a result, as Marc HENRY points out, the example is “the purchase of fuel using a credit or debit card: the statement of the various purchases, their location, their time, and their amount are repeated month after month on a bank account statement, creating a monthly record of much of our cross-country travel” (Henry, 1989).

The goal of Morocco's legal arsenal on the protection of personal data is to impose strict rules on computer scientists and anyone else who has access to automated data.

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<sup>11</sup>Some definitions are required:

-“**Processing**” means all the computer operations implemented at each stage of the development and operation of the files.

-“**Automated**”: any file (processing) that is not exclusively manual is automated. The term “automated” has been used rather than “computerized” to broaden the scope of the targeted treatments and easily incorporate any future technology.

-“**Nominative information**”: is nominative any information in which the name of a person is contained or any element that makes it possible to identify him exclusively and surely (telephone number, e-mail, etc.)

-“**Sensitive data**”: within the meaning of the law “Liberty and digital” they are:

- personal data relating to health or sexual life;
- information relating to an identity check;
- judgments or judgments condemning the infringement.
- the exercise by a borrower of its right of withdrawal;
- professional information.

Sensitive data are defined by the United Nations guidelines adopted in 1990 as data likely to give rise to unlawful or arbitrary discrimination, including information on racial or ethnic origin, colour, sex life, philosophical or other political opinions, such as membership in an association or union.

-“**An information bank**” means a centre where information relating to one or more fields is accumulated from various sources, either individual or aggregated, without determining a priori all the uses which will be made of it. This is in order to make them available to a certain number of users without a suitable form, as soon as possible.

- “**Automated Data Processing System (ADPS)**” is: “any assembly consisting of one or more processing units, memory units, software, data units, output input units, and links that contribute to a particular result, that assembly being protected by security devices”. (Linant De Bellefonds & Hollande, 1998).

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1) The Constitution of the Kingdom of Morocco.

- “Everyone has the right to privacy”, Article 24 of Moroccan Constitution.

- According to Article 27 of Moroccan Constitution “... The right to information may be limited only by law, in order to ensure the protection of all matters relating to national defense, the internal and external security of the State, as well as the privacy of individuals, to prevent the infringement of the rights and freedoms set forth in this Constitution...”

2) Law No. 09-08 concerning the protection of natural persons with regard to the processing of personal data<sup>12</sup>.

This law created, among other things, a National Commission for the Control of the Protection of Personal Data (NCCPPD). It also aims to harmonize Moroccan law with the European Union legislation on the processing of personal data, integrating the same European and French principles, namely:

- Processing of personal data that, depending on the purpose, must have a defined purpose and a finite implementation period;

- Only information necessary for achieving the specified goal must be handled;

- Depending on how sensitive they are, the processing must be the subject of a declaration or an authorization request;

- Secure processing is required;

- The parties involved must be informed and have a mention in how their data is used;

- To ensure adherence to the law, a National Commission for the Control of the Protection of Personal Data (CNDP) is established.

3) Decree 2-09-165 of May 21st 2009 adopted for the application of Law No. 09-08 on the protection of natural persons with regard to the processing of personal data.

4) Law No. 53-05 on the electronic exchange of legal data, promulgated by Dahir No. 1-07-129 on November 30th, 2007.

This law establishes the guidelines that must be followed when exchanging legal data electronically, determining whether documents created on paper and electronically are equivalent, and using electronic signatures. It also sets up the rules that must be followed by electronic certification service providers and the recipients of the issued electronic certificates, as well as the legal framework that will apply to transactions made by these parties.

J. P. LEMASSON’s conclusion is frightening. After all, when faced with bankers, even our cultural and artistic tastes through bookstores or theatres frequented paid by a bank card, suddenly become transparent, because through each economic transaction the user of a credit card reveals to a third party who does not ask for its opinion, personality, plans and future expenses while also taking into account its overall social situation (Lemasson, 1988).

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## EMPLOYEE EMPOWERMENT AND SERVICE QUALITY DELIVERY: THE MEDIATING EFFECT OF ORGANIZATIONAL CITIZENSHIP BEHAVIOUR AMONG NURSING STAFF

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### Abstract

The current study examines how employee empowerment (personal value and impact) influences the delivery of services quality (SQD). The study focused in particular on the mediating effects of organizational citizenship behaviour (OCB) on the link between (EE), personal value, and impact on (SQD). A total of 368 survey questionnaire were distributed to the nursing employees working in the public hospitals in Nigeria. SEM-PLS was employed to carry out a statistical analysis. The findings of the study reveal that EE (personal value and impact), and (OCB) significantly affect SQD. The findings also indicate that (OCB) mediates the link between SQD and personal value, impact, and SQD. These findings' implications for practice and future study are examined along with how the accepted hypotheses are supported. The results of this study shed light on the influence of employee personal value and its effect on SQD. Public hospitals should therefore concentrate on recognising, comprehending, and implementing employee empowerment to improve employee nurses' capacity to achieve higher SQD.

**Keywords:** Impact, Personal Value, Organizational Citizenship Behaviour, Service Quality Delivery

### 1. Introduction

Workers believe themselves as having control over the organization and view this as an enriching aspect of their work. Employees feel empowered to make judgments while carrying out duties and accountable for any unsafe actions related to the assignments. It has been shown that employees are more committed to the organization as a whole when they are free to make any decision on their own initiative with the organization's support (Alsharari, Al-Rwaily & Alsharari, 2017; Sepahvand, *et al.*, 2017). Employees have the chance to participate and feel psychological ownership for their acts and the results of their activities, which helps them feel a sense of belonging. These emotions develop interest and engagement in workers. (Nascimento, Porto & Kwantes, 2018; Ariza-Montes, *et al.*, 2017).

Human resource management (HRM) has functioned as a unit of employees in the form of HR or workers as part of a company's assets to better understand the life of an organization, whether it is a commercial sector or a public sector (Fajar & Soeling, 2017). The nature of organizational citizenship is crucial to the development of an organization. OCB can have an impact on an organization's success since it encourages teamwork and boosts group productivity. Employees who assist one another do not need to request assistance from the employer, this liberates the leader up to focus on other important tasks (Tayal, *et al.*, 2022; Bhatti, Ju & Akram, 2019; Alkahtani, 2015). In today's extremely competitive world, businesses are emphasizing areas that can provide them a competitive edge, and OCB is one such area. Growing employee productivity and organizational performance is thought to be largely dependent on the practice of organizational citizenship (OCB) (Rahman & Chowdhuri, 2018; Bizri, 2018; Chelagat, *et al.*, 2015). OCB has grown in especially in the present era of globalization, particularly with the rise of several worldwide firms. Every management company needs its employees to exhibit high OCBs.

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These actions are advantageous to the organization as a whole. The qualities of citizenship in a person are welcome in such a setting at any institution. The success of the organization as a whole is promoted by OCB, not just for one given group (Fasanmi, 2018).

The performance of a business organization depends on the provision of high-quality service, which also depends on the dedication of the organization's employees. Service quality (SQ) plays a significant role in the service sector (Ratnayaka, Kumara & Silva, 2020; Desfitrina, Zulfadhli & Widarti, 2019; Osman, Mohamad & Mohamad, 2015). Organizations often distinguish out from rivals due to the quality of their products and services (Lee & Kang 2019; Hermawan, Basalamah & Plyriad, 2017; Pahi, Abdhamid & Moin, 2017; Yeo, Thai & Roh, 2015). In today's corporate world, where firms must be faster and offer higher-quality service, having a proactive team is essential (Alsharari, Al-Rwaily & Alsharari, 2017; Al-Ababneh, 2016). Surveys conducted throughout the world have revealed differing levels of client satisfaction with the provision of health care in industrialized and developing nations. The survey respondents' satisfaction levels varied from 22% to 95% (Zarei, *et al.*, 2018). Numerous studies have outlined various factors that affect the quality of hospital services, including lengthy wait times, clinic overcrowding, unfriendly staff, and a lack of medication (Yesilada & Direktor 2017; Emelumadu & Ndulue, 2012; Sreenivas & Babu, 2012). This was part of the reason a large number of timing population (60–70%) around the globe uses private healthcare institutions to address their health needs in which many of them are developing nation. One of the causes driving more people to utilise private health facilities than public ones is a negative perception of the quality of the services provided in public hospitals (Tawana, *et al.*, 2019; Haskins, *et al.*, 2017).

Nigeria is specifically dealing with issues related to declining public health care sector service quality performance on both an internal and external level. Although providing health care services is essential, Nigerian healthcare is plagued by persistent inefficiency. Despite a considerable budget allocation to improve healthcare delivery, particularly at the point where healthcare professionals and patients interact, the sector's goals are still mostly unfulfilled (Osakede, 2019; Amole, *et al.*, 2015). It is obvious that patients who received substandard care in the public hospital will view it negatively. Its service delivery quality may be significantly impacted by this, which in turn affects its corporate image. Poor service delivery is evident when patient complaints and ineffective complaint handling have an impact on the standard of the provided services. Thus, it is crucial to comprehend the push-pull dynamics that affect the decisions of health professionals to remain or leave, as well as successful retention strategies. These elements include salary, the standard of healthcare facilities, and the workload of healthcare professionals (Douglas, Raban & Westbrook, 2017).

Despite this empirical evidence of the link between SQD and EE, the research' inability to adequately explain the concepts of personal value, employee impact, and SQD in the context of public hospitals was attributed on a shortage of prior literature. The investigation of OCB's mediating role in the link between SQD, employee impact, and personal value has received little attention. It is possible to hypothesize that when an employer provides its employees authority, those people will act responsibly. However, poor SQ might result from low OCB toward the organisation and low empowerment. Therefore, there is gap of knowledge on the effect of personal value and employee impact on SQD and mediating the role of OCB in developing countries, specifically Nigeria, the public sector and in other open settings.

Moreover, the role of OCB has been identified as an important factor that can enhance organisational success, such as quality service delivery (Ratnayaka, *et al.*, 2020; Christensen & Whiting, 2018; Stephen, *et al.*, 2015).

The mixed results, inconsistency, or even the absence of a relationship between the exogenous and endogenous components lead to the emergence of the mediating variable. One can infer that the mediating variable is employed to enhance, weaken, or even establish a relationship. Inducing factors are those whose variation affects the strength or direction of the association between an exogenous and an endogenous variable. In this study, the OCB construct was employed as a mediating factor to determine whether or not it strengthens the positive effects of employee personal value, employee impact, and influence on SQD. In fact, investigating the OCB construct as a mediator could maximise researchers' theoretical comprehension and offer them empirical evidence on how OCB might be a potential mediator. Consequently, this study intends to examine the effect of EE on SQD and mediating the role of OCB on the relationship between personal value, employee impact and SQD in the Nigerian public hospitals.

## 2. Literature Review, Theoretical Framework and Hypotheses Development

### 2.1 Personal value and SQD

Values explain several levels and play a major role in leading organisations (Anjum, Karim & Bibi, 2014; Bourne & Jenkins, 2013). Personal values are described as broad, trans-situational, meaningful goals that serve as a human's compass in life. The actions and behaviours of individuals are impacted by these characteristics of values. Values are first and foremost preferences for what is thought to be significant and good; they stand for the objectives that an individual consider desirable. Furthermore, values act as a potent catalyst for action. Individuals choose to act in a way that advances their fundamental values and achieves the goals that motivate them. Second, personal values are mental representations of primary motivating factors (Sagiv & Roccas, 2017; Nascimento, Porto & Kwantes, 2018). Therefore, it is applicable over time and in different situations. A person who places a strong emphasis on interests and career goals is likely to use these values as a guide when selecting a profession, preparing for this choice (such as investing time and effort in training), and finally acting at work (such as working overtime and applying for promotions when possible). Numerous studies have examined into how national values affect individuals and organizations (Nascimento, *et al.*, 2018; Ariza-Montes, *et al.*, 2017; Arieli, Sagiv & Cohen-Shalem, 2016; Anjum, Karim & Bibi, 2014; Boer & Fischer, 2013; Sagiv *et al.*, 2011). Based on this argument, the following hypothesis is proposed:

H<sub>1</sub>: *Personal value is significantly related with SQD*

### 2.2 Impact and SQD

According to Krishna (2017), impact was defined as whether or not employees felt they could change their organisation for the better. In other words, impact refers to the extent to which personnel have the ability to affect organizational strategy, administrative decisions, and operational outcomes. Impact is defined by Spreitzer (1995) as the belief that a single employee may have an impact on the system in which they are entrenched. According to Farzaneh *et al.* (2014), "impact" describes the degree to which behaviour is perceived to matter in terms of achieving the task's goal and producing the desired outcomes in a person's task environment. Impact cognition differs from competency cognition, which is the belief that one could accomplish if offered the opportunity (Yeo *et al.*, 2015; Zeglat, Aljaber & Alrawabdeh, 2014; Elizabeth & Zakkariya, 2013). Findings from Degago (2014) demonstrated a positive and significant relationship between employee SQ and the impact of empowerment. EE has a substantial impact on employee satisfaction and SQ (Ukil, 2017).



A further study by Gazzoli, Hancer, and Park (2016) showed that empowerment significantly affected how customers perceived SQ. According to Ölçer's (2015) findings, employee impact had a favourable, significant impact on JS. The following hypothesis is therefore formulated:

H<sub>2</sub>: *employee Impact is significantly related with SQD*

### **2.3 Organizational Citizenship Behaviour and SQD**

OCB is defined by Organ (2012) as voluntary behaviour, individual initiatives, and decisions that are not directly related to the organization's formal reward structure but that, taken together, can increase organisational effectiveness. OCBs are a collection of alternative workplace behaviours that go above and beyond the minimal standards of one's position (Jahangir, Akbar & Haq, 2014). According to Bolino et al. (2012), OCB is defined as employee behaviour that goes above and beyond what is required by the formal reward system, without anticipating benefits or recognition, and facilitates organisational operation. Helping others, agreeing to do extra work, and abiding by workplace policies are just a few examples of the behaviours that make up OCB (Agustiningsih, Thoyib & Noermijati, 2016; Pickford & Joy, 2016).

For predicting future customer behaviour and its effects on a company's financial results, service quality has shown to be one of the most useful concepts (Karatepe, Yavas & Babakus, 2005). Many studies argued that providing high-quality service is one of the key tactics for a company's survival. It is hardly surprising that many scholars have devoted themselves to understanding the underlying characteristics and antecedents of service quality given its significance (Yeo, et al., 2015; Karatepe, Yavas & Babakus, 2005; Yoon & Suh, 2003; Parasuraman et al., 1991). There are numerous research that examine the association between OCB and SQ globally (Ratnayaka, et al., 2020; Desfitrina, et al., 2019; Jain & Rizvi, 2018; Christensen, & Whiting, 2018; Husin, Chelladurai & Musa, 2012; Yoon, & Suh, 2003). There have been similar studies in Africa and examined the relationship between SQ and OCB (Nazar, 2016; Waheed, Abbas & Malik, 2018; Boroh, Bahron & Nasser, 2018). Nursing staff members' interactions with patients are equally significant from a relationship perspective. The behaviour of employees during service interactions and their relationships with SQD are the main issues of this study. Employees in the service encounter are performers rather than workers, and the client's perception of the service quality is greatly influenced by the employee's behavioural performance. In light of the aforementioned justifications, the following hypothesis is suggested:

H<sub>3</sub>: *OCB is significantly related with SQD*

### **2.4 Mediation of OCB with Employee Empowerment and SQD**

Service is by its fundamental nature is performance, therefore unlike the quality of tangible items, SQ is greatly influenced by the interactions that contact staff members have with clients, their co-workers, and their organization. This suggests that, in addition to the activities specific to a certain position, extra-role activities like OCBs may have a significant influence in determining the level of service quality (Christensen, & Whiting, 2018; Cho & Johanson, 2008). Additionally, the quality of the service could be improved by the contact employee's voluntary ideas as a boundary spanner. In order to ensure that their organizations function well and provide excellent customer service, service providers should pay closer attention to the discretionary and voluntary actions of their contact staff (Ratnayaka et al., 2020; Christensen & Whiting, 2018).

In accordance with a number of studies, employees' confidence in their capacity to reason and take appropriate action will be impacted by their perception of their leadership as finally giving them the authority to assess and decide how to handle certain situations. As a result, an employee will be happy since their supervisors trust them to produce improved service quality (Ababneh *et al.*, 2017; Bello, Bello & Ifegbu, 2017; Buttigieg & Dey Gauci, 2016). The findings show that service quality indirectly affects how EE and customer satisfaction are related. Consequently, employees will be more positive, committed, and confident in their ability to complete their tasks, as well as more passionate about serving customers. Furthermore, they will be able to react to client needs more promptly and will be given encouragement to solve problems in challenging situations. The following study hypothesis was developed in light of the aforementioned earlier empirical research:

H<sub>4</sub>. (OCB) mediates the relationship between personal value and SQD.

H<sub>5</sub>. (OCB) mediates the relationship between employee impact and SQD.

### 2.5 Theoretical Framework

The Resource Based View Theory (RBV) contends that organizations have a remarkable collection of resources, and that their ability to acquire and use them effectively opens up new opportunities for them to deliver greater value (Barney, 1991). The RBV viewpoint focuses on internal resources where employees' contributions are to deliver attractive service delivery that will support the organization accomplish its main goals (Hitt, Xu & Carnes, 2016). Employees can influence the effectiveness of an organization's service delivery by its impact on their co-workers and organizational structures that give employees the power to direct how their tasks are carried out. Through enhancing their human capital, this strategy will have an impact on employees' attitudes (Cabello-Medina, et al., 2011). RBV also emphasizes on the notion of a superior value proposition to employees. The theory clarifies the framework by focusing on people specifically, nurses as a source of advantage (and as the organization's primary drivers of SQD). RBV is specifically utilized in this framework to explain the link between OCB, SQD, employee impact, and employee personal value. This suggests that in order for healthcare service to be effective and efficient, hospitals must take advantage of their workforce by providing employees the psychological empowerment they need to reach their full potential. However, Figure 1 below shows how the study's conceptual framework was depicted.

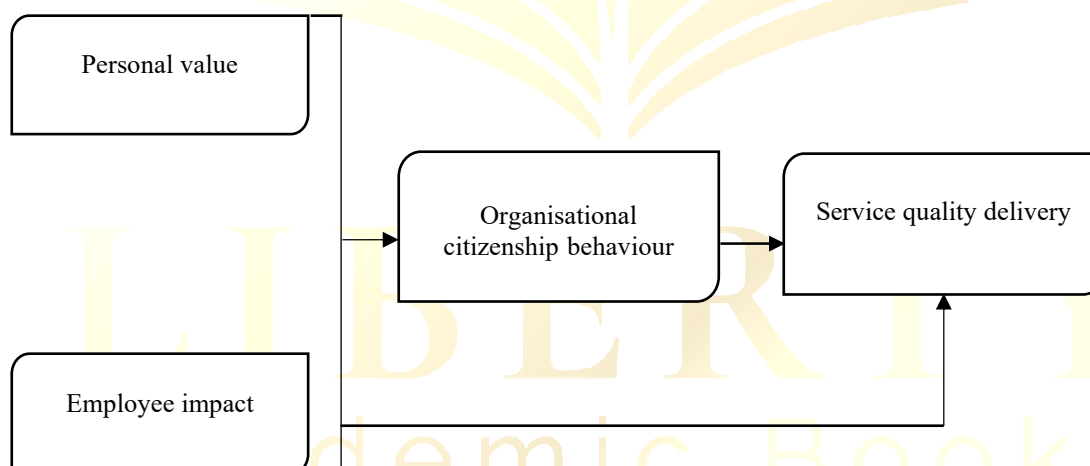


Figure 1: Conceptual Model

### 3. Method

#### 3.1 Sample and Data Collection

The positivist research paradigm was used in concert with quantitative research techniques to meet the purposes of the present study (Hair *et al.*, 2017; Sekeran & Bougie, 2013). The researchers therefore distributed a self-administrated questionnaire. The questionnaire's items are closed-ended questions that classify behavioural differences according to their relevance on a five-point scale. Additionally, the proposed model as shown in Fig. 1 is investigated utilising structural equation modeling as part of the current study. A descriptive correlational survey was used for this research. The population of the study is made up of 8,263 nurses who were obtained from the planning and statistics Department of the Ministry of Health in the north-western States as of June 30, 2022. In this study, the researcher distributed or apportioned the study sample to reflect every stratum of the study population without any bias, giving each respondent in the population an equal chance of being selected.

A total of 368 nursing personnel were selected from the overall research population in accordance with the sample size requirements established by Krejcie and Morgan (1970). A total of 310 of the 368 questionnaires that were administered to the study respondents completed and returned were utilised as part of the data collection process. Additionally, the present study used the (PLS-SEM) through Smart-PLS version 4.0.8.7 to test the proposed hypotheses of the study in addition to the SPSS version 27.0 to analyze the respondents' profiles and preliminary analysis.

#### 3.2 Measures

This research was developed to analyse nursing employees' perceptions of the offered SQD on its own and to take into account the association with personal value, employee impact and OCB variable. In accordance with the structured model proposal, EE (personal value and employee impact) is measured using a combination of Spreitzer (1995) and Kankanhalli, Tan and Wei (2005) questions with five items each. The items reflect to the extent to which employees believe that leaders have entrusted them the power to evaluate and make decisions as well as their perspective of aiding other employees through information sharing. Eight items adapted from Williams and Anderson (1991) are utilised in the present study to measure OCB. The extent to which an employee voluntarily participates in activities that enhance the success of the organisation is described as OCB. In order to measure SQD, eight items from Ekinci (2001) were adapted. These criteria were used to gauge how well nursing personnel could assist clients, their ability to meet demands, and how well they could make use of the physical resources at their disposal.

#### 3.3 Common Method Variance

Data in this study is subject to CMV as all the measurement in this study was self-reported. To ascertain whether common method bias is a problem, the Zero-constrained test and Harmon's single factor procedure were both applied. The fact that Harmon's single factor only contributed to 12.3% of the total variance shows that common technique bias is not a problem. Overall, Harmon's single factor explained less than 45% of the variance. Furthermore, comparisons between the zero-constrained and unconstrained common factor models were made. The fact that the chi-square difference was found to be insignificant provides more proof that there is no issue with CMV in this research.

#### 4. Results and Discussion

Figures 2 and 3 illustrate how the study model was tested using SmartPLS 4.0. The current study used bootstrapping of 5000 samples and 310 cases to determine the t-values, the standard error of the estimate, and the significance of the relationship. According to Henseler, et al. (2015), PLS predicts moderator effects more accurately through estimating for the inaccuracy that weakens correlations and improves the theory's validity.

##### 4.2 Assessment of Measurement Model

The convergent validity test assesses the degree to which different items measuring the same concept agree with one another. The research subsequently identified the discriminating validity (DV), which is defined by low correlations between the measurement of interest and the measurements of other variables and suggests that the measure does not represent other factors. Evaluating DV was achieved by comparing the squared correlations between the constructs and the extracted variance (Henseler, et al., 2015; Hair, et al., 2014). In Figure 2 and Table 1 the inter-item consistency of the measurement items was evaluated using the Cronbach's alpha coefficient.

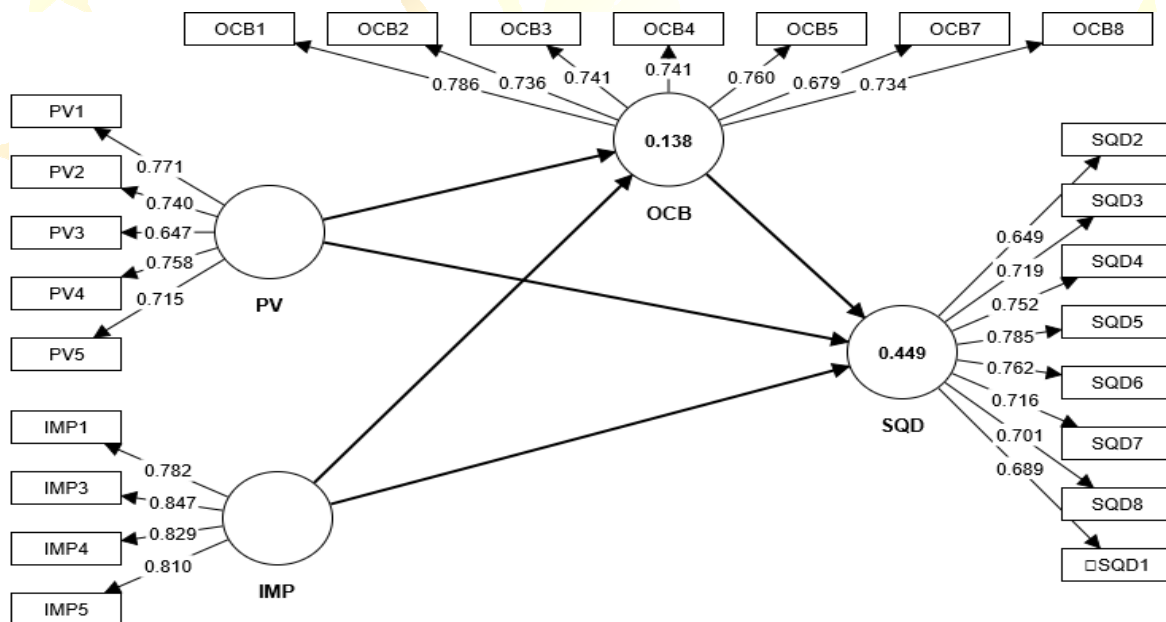


Figure 2: Measurement model



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**Table 2: Items Loadings, Composite Reliability and Average Variance Extracted**

Constructs and Items	loadings	Cronbach's Alpha	CR	AVE
PV1	0.771	0.776	0.849	0.529
PV2	0.740			
PV3	0.647			
PV4	0.758			
PV5	0.713			
IMP1	0.782	0.838	0.890	0.668
IMP2	Deleted			
IMP3	0.847			
IMP4	0.829			
IMP5	0.810			
OCB1	0.786	0.863	0.894	0.548
OCB2	0.736			
OCB3	0.741			
OCB4	0.741			
OCB5	0.760			
OCB6	Deleted			
OCB7	0.679			
OCB8	0.734			
SQD1	0.689	0.870	0.897	0.522
SQD2	0.649			
SQD3	0.719			
SQD4	0.752			
SQD5	0.785			
SQD6	0.762			
SQD7	0.716			
SQD8	0.701			

**Note:** PV=personal value; IMP = employee impact; OCB =Organisation Citizenship Behaviour; SQD= Service Quality Delivery

**Table 3: Fornell-Larcker criterion**

	IMP	OCB	PV	SQD
IMP	0.817			
OCB	-0.006	0.740		
PV	-0.033	0.372	0.728	
SQD	-0.163	0.516	0.565	0.723

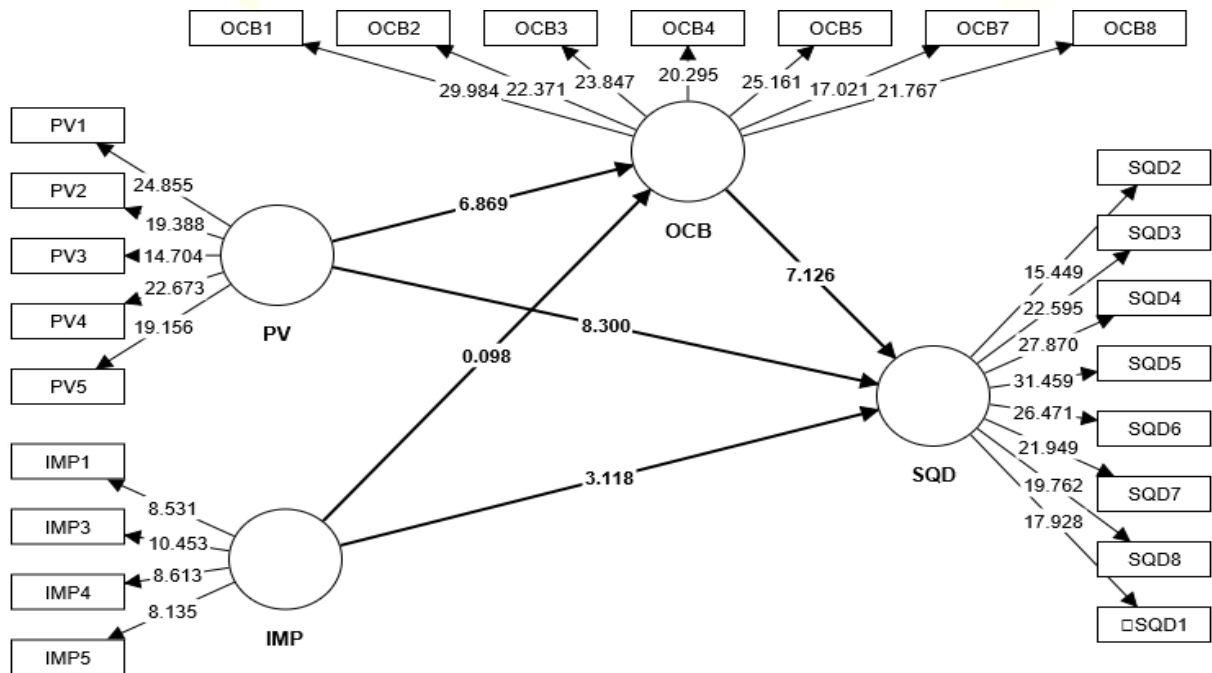
#### 4.3 Goodness of fit

A diagnostic approach was used to evaluate the model's goodness of fit (GOF) (Hair, et al., 2014). GOF demonstrate the efficiency of the model structures by describing how often the suggested structured model fits a set of observations. Small (0.02), medium (0.25), and large (0.36) are the parameters for assessing the outcomes of the GOF analysis (Hair *et al.*, 2014). The GOF value of 0.25 in the current study validates the proposed model of the relationship between the research's constructs, showing that the model performs reasonably well.

Additionally, as shown in Figure 2, the outcomes of testing the measurement model reveal that personal value (PV) and employee impact (IMP) account for 44.9% ( $R^2 = 0.449$ ) of the variance of (SQD). 13.8% ( $R^2 = 0.138$ ) of the variance of OCB is explained by PV and IMP.

#### 4.4 Assessment of Structural Model

The research hypothesis served as the foundation for evaluating the relationship between the PV, IMP, OCB, and SQD constructs. The model's t-values were estimated using a bootstrapping method.



**Figure 3: Structural paths**

**Table 3: Results of Direct and Indirect Structural Model**

Relationship	Paths	Beta coefficient	Standard error	t-statistics	p-values	Decision
Direct	PV → SQD	0.427	0.051	8.300	0.000	Supported
	IMP → SQD	0.147	0.047	3.118	0.002	Supported
	OCB → SQD	0.356	0.050	7.126	0.000	Supported
	PV → OCB	0.372	0.054	6.869	0.000	Supported
	IMP → OCB	0.016	0.061	2.098	0.040	Supported
Indirect	PV → OCB → SQD	0.133	0.028	4.779	0.000	Supported
	IMP → OCB → SQD	0.012	0.022	2.096	0.042	Supported

**Note:**  $p < **p < .01$ ;  $***p < .001$ . PV=personal value; IMP = employee impact; OCB =Organisation Citizenship Behaviour; SQD= Service Quality Delivery

The models direct influences on the constructs also demonstrate that PV, IMP, and SQD have a significant positive relation ( $\beta = 0.427$ ,  $t = 8.30$ ,  $p < 0.000$ ) and ( $\beta = 0.147$ ,  $t = 3.11$ ,  $p < 0.002$ ) (H 1 & 2). Thus hypothesis 1 and 2 are supported. Similarly, OCB had found to be significantly related with SQD ( $\beta = 0.356$ ,  $t = 7.12$ ,  $p < 0.000$ ) as shown in Table 3. Thus hypothesis 3 is supported. However, this indicates that the three developed direct hypotheses were supported.

Additionally, the mediating effect with variance accounted for (VAF) was examined. Using OCB as mediating factor, a statistical relationship between PV and SQD was established, as shown in Figure 3 and Table 3 ( $\beta = 0.133, t = 4.77, p < 0.000$ ). With a VAF value of 25%, which is higher than 20%, it was discovered that OCB partially mediates the link between PV and SQD, thus supporting H4. Table 3 further demonstrated that OCB significantly mediates the link between IMP and SQD ( $\beta=0.012, t=2.09, p < 0.042$ ) (H5), with calculated VAF of 29%, indicating that OCB has a partial mediating effect on the link between IMP and SQD. Additionally, as suggested by Tabachnik and Fidell (2007), the VIF values specifically range from 1.00 to 1.05, which all fall below 10. However, PLS provides another VIF in structural model to further validate and prevent results from being misleading (Hair *et al.*, 2017). Depending on the amount of linkages involved, the VIF in the structural model compares exogenous and endogenous constructs. The results of the present study demonstrate that VIF is not a problem using all the applicable thresholds of 3.3, 5 and 10.

#### 4.5 Discussion

The findings of the current study suggested that H1 and H2 supported that personal value and employee impact have a significant effect on (SQD) and on (OCB). The findings are in line with previous empirical studies (Hemmati *et al.*, 2018; Al-Ababneh *et al.*, 2017; Lin *et al.*, 2017; Ariza-Montes, *et al.*, 2017; Sorthaix & Lönnqvist, 2014; Degago, 2014; Fernandez & Moldogaziev, 2012;). The most likely explanation for this outcome is that if employees feel empowered and leaders offer them the freedom to evaluate and decide how to handle unpleasant situations, this will reflect on the employees' self-assurance in their own capacity for thought and action. However, this will impact positively on the level of their SQD as they experience high confidence and trust, leading them to exert additional effort to provide greater service quality. Additionally, it is likely that the degree of SQD is positively increased by friendly communication, information exchange, and collaboration among employees in organisations, which boosts each individual employee's personal value. Furthermore, the findings support the link between OCB and SQD (H3). The findings are also consistent with previous studies of Ratnayaka *et al.*, (2020), Husin, *et al.*, (2012), Yoon and Suh, 2003) and Bienstock, *et al.* (2003). Another explanation may be due of other unique characteristics of the workplace, such as employee willingness to contribute to the success of the organisation, which could have a significant effect on SQD when the assigned task is being carried out. Given that (OCB) has a significant effect on personal value, employee impact, and SQD, this research findings confirm the mediating effect of (OCB) (4 & 5). The widely established hypothesis, which is founded on the presumption that employees' behavior may have significant effect on employee's effectiveness.

#### 5. Conclusion and Implication

The personal values and employee impact was discovered to have an important role in contributing to the SQD among nursing staff in the public hospital. This shows that these factors associated with specific behaviours and decisions. The findings clearly demonstrated that, above and beyond well-established variables like personality traits and satisfaction, individual employee values and impact have an effect on OCB and SQD. The study also discovered that an individual's likelihood of engaging in acts of citizenship may be positively or negatively influenced by how well their values align with those of their colleagues. The findings demonstrate that the OCBs of nursing staff have a considerable impact on SQD.

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According to this finding, OCBs have an effects that go beyond just improving organizational effectiveness economically. Furthermore, this study established that OCB partially mediates the link between the employee personal value, impact and SQD.

This demonstrates that nursing employees can still perform well and of a high calibre under the supervision of less supportive or participative management. The results of the current study do indeed show that when nurses believe that their employers trust them and offer them the authority to make decisions about the job, their efforts might improve. Additionally, when staff feel more at ease at work, they will be more willing to provide excellent service. Furthermore, individuals who have favourable attitudes about interactions with co-workers, access to necessary tools for the task, and teamwork tend to be more satisfied at work, which has a significant impact on nursing workforces' attempts to deliver higher-quality service. In general, the current investigation establishes the link between the constructs and shows how implementing an empowering attitude and upholding a positive work environment in service organizations can increase (OCB) and therefore strengthen service quality efforts among nursing personnel.

There are various theoretical implications of the current study. Through integrating SQD with employee personal values and employee impact and taking into account the mediating influence of (OCB) in the study framework, which has not been completely studied in prior studies, the current study adds to the body of literature in the health sector. Prior research has focused on managerial practices, the work environment, and a number of behavioural and attitude components, but none of these variables have been examined in the context of the nursing employee SQD literature. The study's first theoretical contribution is that it filled a gap where most prior research had only explored at the relationship between the workplace and various behavioural characteristics. By examining nursing employees' perceptions in the setting of Nigerian hospitals, the current study bridges this gap through demonstrating that personal value and impact have a significant influence on employee efforts related to SQD. Furthermore, considering the context of Nigerian public hospitals, this study is one of a select few that empirically explored OCB with SQD.

#### ***5.1 Limitations and Suggestion for Further Study***

There are issues with the existing research. The study had a sample size restriction. The sample for this study is confined to Nigerian public hospital nurses. The fact that SQD served as the study dependent variable is another limitation. Despite the fact that SQ is a crucial study construct, there are extremely important dependent variables dimension that can be employed. However, other forms of employee empowerment may be included as well as demographic elements including race, work experience, and educational background as a moderating variable in other studies. The research has some limitations, which presents several potential for further research. The findings, however, establish the groundwork for further study that should consider different industries and explore how much a diversity of EE may be implemented through OCB to affect organizational operations and improve performance and service delivery. Finally, the study is based on the subjective judgment of the nursing employee on the measures of service delivery and OCB of the Nigerian public hospitals. A more objective measurement of the factors might be used in future studies. Second, as data were only gathered from Nigerian public hospitals, the findings may not be generalisable to other industries. Therefore, further study may replicate and broaden this study to include other industries in Nigeria.



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## ENDURING LEGACIES OF PARTITION

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### Abstract

This research paper is finding the legacies with respect to ethnic and religious nationalism, state construction, and conflicting trajectories with concerning to democratic consolidation. In August 1947, after three hundred years the subcontinent left by the Great Britain. Subcontinent divided into two states before the separation of East Pakistan (Bangladesh). Many features is definable with the reference to the legacy of the 1947 partition. Across South Asia the provincial governments panicked at the prospect of absorbing trainloads of refugees, especially at a time of endemic food shortages and fragile social peace. The research has analyzed the data under subjective approach using the qualitative method of research. The research has adopted the descriptive method of research. They had to be cajoled, bribed and ordered to take responsibility for quotas of displaced. Subcontinent partition continues to be looked upon as a humane tragedy in terms of massive destruction. Still its legacy continues to affect the nation building process In the Sub continent. Nevertheless, its legacy still continues to affect the nation -building process in the subcontinent.

**Keywords:** legacy, ethnic, nationalism, democratic consolidation, refugees, abduction,



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## MODEL OF CONSTRUCTION OF TECHNOLOGICAL CAPABILITIES FOR DIGITAL PLATFORM-BASED SOCIAL TECH STARTUPS

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### **Abstract**

Technological social enterprises are economic entities with a dual purpose: social impact and financial sustainability. These organizations are different because technology plays an important role in increasing innovation performance and social impact. The development of digital platforms by social tech startups is an area of opportunity due to its ease in reducing transaction costs and improving performance. However, in the absence of the right technological capabilities, sustainable performance cannot be generated. The creation of technological social enterprises depends on organizational capacities, organizational identity, technological benefits, financing mechanisms, the influence of the context, and the conditions of institutional entrepreneurship. There is a large gap in technological social entrepreneurship in Latin America, so efforts must be redoubled to create digital platform-based social tech startups. In the context of Latin America, it is necessary to identify the factors that participate in the construction of technological capacities that allow social enterprises to create value proposals that use technology to achieve their objectives. The literature on this topic is still in its infancy and studies are lacking in the region, so this research is important to promote the startup ecosystem. This study focuses on research for a conceptual model to build technological capabilities in digital platform-based social tech startups. It is approached from the qualitative research paradigm, through a systematic review of the literature to determine the factors that influence the development of these capabilities in social tech startups. The results allow the elaboration of a conceptual model for future research for developing digital and technological capacities for social tech startups in Latin America.

**Keywords:** Technological Capabilities, Digital Platforms

## UNIVERSITY AS A PLACE OF CONSTRUCTION OF THE IDENTITY: OBSTACLES, BEST PRACTICES AND TECHNOLOGIES FOR INCLUSION

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### Abstract

The paper critically investigates Italian university policies of inclusion of students with disabilities. Starting from a review of the literature on the role of universities as places of inclusion and confrontation with diversity ([2], [24]), the proposal analyzes the inclusion strategies of the three main Roman Universities: La Sapienza, Tor Vergata, and RomaTre. Through a mixed methods approach, the contribution analyzes secondary data provided by the universities and interviews administered to the operators of the dedicated services, addressing monitoring barriers, facilitation mechanisms, transition processes from high school, and the approach to non-manifest forms of disability.

The preliminary analysis of data shows that inclusion policies are inadequate or struggle to engage students. Students with disabilities do not make up 4% of the total; furthermore, the higher the level of university education, the lower their presence. The interviews confirm that digital technologies play a central role in terms of deterritorializing university activities [42], but they are still a long way from being personalized according to potential users [41].

We second the current literature in arguing that inclusion policies in Italian universities require a greater commitment of institutions with the building of an inclusive community that allows for the active participation of all students. We therefore argue for universities to promote a culture of disability, offering safe spaces and opening up to a confrontation based on the recognition and enhancement of individual diversity [6], without falling into mere welfarism [31].

**Keywords:** barriers, service evaluation, students with disabilities, technology, university inclusion.

### Introduction

The Universal Declaration of Human Rights [27] states: "Education shall be directed towards the full development of the human personality and the strengthening of respect for human rights and fundamental freedoms" (Art. 26). In this regard, the Convention on the Rights of Persons with Disabilities [28] enshrines the obligation to ensure equal access and treatment to university education and vocational training for people with disabilities.

Since the beginning of the 21st century, Italian universities present themselves as increasingly plural places. In fact, universities have to deal with issues related to gender, ethnic, religious, linguistic and cultural diversity [2], as well as how to include students with disabilities or Specific Learning Disorders (SLDs) [26]. These, in particular, have become in the last decade a significant part of the Italian student population [5]. Thanks to law no.17/1999 [16] on the guarantee of "specific technical and didactic aids [...] as well as the support of specialised tutoring services", the active participation of university students with disabilities or SLDs could be achieved de iure and de facto. However, the organisational autonomy of each university in this matter - 'within the limits of its own budget' - appears to be an aspect that is not free of criticalities in actually providing for the provisions of the law and is therefore worthy of investigation.

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This project proposal therefore intends to assess, from a comparative perspective between the three main universities in Rome, how university policies on services and teaching for students with disabilities or SLDs favour the development of relational practices based on the principles of inclusive education [22]. In this perspective, the realisation of the shift from the concept of accessibility to that of inclusion in the university environment [6] cannot be separated from the study of interpersonal relationships among peers and with faculty members, further clarifying what the empirical evidence in the literature on the topic has found. In fact, university inclusion of students with disabilities is strongly correlated with the presence of meaningful relationships with peers and faculty members, as well as the affective-emotional component, which is an essential part of the teaching and learning process [23]. It is possible to provide a description of the concept of social inclusion by referring to the New Dictionary of Social Service [4]: in noting the complexity inherent in the concept, the dictionary refers to its exact opposite, suggesting that for a more in-depth study of the subject, reference should be made to terms such as marginality and social exclusion. The latter is made to correspond to the lack of access to basic resources, therefore, it is possible to say that social inclusion is represented by the production of new policy mechanisms aimed at reducing or eliminating conditions of marginality.

Research on university inclusion of students with disabilities has focused on specific issues in different national contexts. In an examination of university policies in European countries, Riddell [34] shows that states with a strong welfare regime and a less selective education system are actually more successful in university inclusion of students with disabilities.

As pointed out by Oliver and Barnes [26], disability studies in academia began to develop in the 1970s coinciding with the growth of social claims by movements and associations of people with disabilities. This aspect, in particular, has been emphasised by Powell and Pfahl's [32] study, according to which intellectual discourses and the role of activists facilitate the development in a multidisciplinary and global perspective of disability studies, refining critical dialogue and social and political construction on the concepts of disability and 'abnormality'. In the following decades, the scholarly discussion on the increasing university participation of 'non-traditional groups' - among which it is possible to include students with disabilities - has progressively expanded [36], giving rise to a strand of research investigating the experiences of these students in the university context [24].

#### **Disability in classical sociological discourse**

According to Madera [3]: "The encounter with disability is somehow always an encounter with the unknown, with the stranger in our minds". According to the structural-functionalist approach of Parsons [30], the disabled person, like the sick person, should recognise his or her condition and strive to re-establish a situation of normality. The theoretical framework of the sick role becomes problematic from the moment when, in the presence of chronic disability, the person is unable, despite recognising his or her condition, to re-establish a condition of equilibrium. In this sense, the subjective dimension is thus drastically reduced to a problem of conformity to role expectations. In fact, the subject seeks to conform his action to models that are deemed desirable by members of society, therefore, "there is no action except as an effort to conform to norms" [29].

The functionalist approach has the limitation of over-socialising the condition of the disabled person, emphasising the social representation associated with the condition of disability in a negative way. For functionalists, the social identity of the disabled person is nothing more than a construction in which bio-physiological elements are classified on the basis of cultural factual parameters.



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In contrast to the structural-functionalist approach, interactionists, mainly with Erving Goffman's theory [14], define the disabled person not as one who simply does not conform to his or her role, but as one who carries a social stigma arising from an established stereotype in the community to which he or she belongs. This latter aspect can also be found in Becker's [1] 'labelling theory', which understands disability as a condition that becomes oppressive for those who experience it personally and, therefore, if on the one hand the person with a disability is 'labelled', on the other hand it is themselves who perceive their condition as deviating from the norm. Social interactionism therefore leaves a fundamental space for the subject in question that Parsons [30], with his previous theory, did not recognise, but which nevertheless leads the disabled person to a condition of break with the society of reference. In any case, it is possible to make a methodological criticism of the interactionist theoretical framework because it does not take into account the influence of the social structure on the actions of persons with disabilities, since it focuses essentially on the micro-social world. In any case, it is useful to bear in mind Schütz's analysis [37], which shows on the one hand how meanings are continually renegotiated by social actors, and on the other hand how these same meanings are affected by established stereotypes in society.

#### **Methodology**

Strictly speaking, we specify that the research design is based on the mixed methods approach [20], articulated in four main phases: background research, in which the aim is to verify the existence of a database per Athenaeum, contextually carrying out a mapping of services through focused interviews [21] with the dedicated office employees; design of a semi-structured web survey administered to students with disabilities and SLDs; monivariate, bivariate and multivariate analysis of data by regression models [10]; focus groups [8] for policy suggestions in a voluntary way. The study aims to assess the status of the dedicated services in the individual universities investigated, providing evidence on the concept of inclusion and related aspects, collecting the voices of the personnel involved and the opinions of the students to whom the service is addressed, with the final aim of producing an improvement proposal.

The preliminary analysis of data shows that inclusion policies are inadequate or struggle to engage students. Students with disabilities do not make up 4% of the total; furthermore, the higher the level of university education, the lower their presence.

These preliminary considerations help us to open a reflection on the concept of inclusive education and its implementation in Italy and the best practices that can be adopted to realise it.

#### **Discussion**

The concept of "inclusive education" consists of "an educational philosophy and practice that tend to improve the learning and active participation of all students in a common educational context" [22]. In this sense, inclusion must aim at a profound improvement in the quality of life for the individual and the community [18]. These are processes that together imply work in the direction of a profound transformation of educational agencies, culture and society itself. Indeed, the university community, through dialogue between students with disabilities and administrators, can facilitate and improve conditions for its members [32].

In his review of contemporary literature on university inclusion of students with disabilities, Morña [22] identifies three distinct and specific strands of investigation.

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The first is concerned with the experiences of students with disabilities and the barriers and facilitating mechanisms; the second focuses on the processes of educational transition from high school to university; and the third is ultimately concerned with the concerns related to the unravelling of non-manifest forms of disability.

With regard to barrier studies, the negative attitudes of university members are indicated as the main obstacle to the integration of the student into the university community; specifically, the perception of a prejudicial relationship on the part of the teaching staff is found, from the learners' testimonies [25]. From students' experiences, difficulties also emerge regarding the accessibility of facilities and services, as well as their relationship with technological resources ([7], [38]). In contrast, there are few studies on facilitators supporting students with disabilities: facilitators include family, friendship networks, as well as learning support tools ([35], [39]).

A further area of research has turned its attention to the transition process from secondary school to university. Scholars consider this transition to be a very critical one, capable of influencing students' future choices about dropping out or progressing to university. A key aspect concerns relationships and the quality of social support, as these can significantly affect the experience of students with disabilities in the university environment [19]. A factor of success in transition processes also relates to the disabled student's ability to manage their individual abilities and technical skills [13].

The last strand of investigation identified by Moriña [22] concerns the choice of whether or not to disclose one's disability, in cases where it is not immediately apparent. In another study, the same author [24] notes how students with non-manifest disabilities perceive that academic staff and peers question the veracity of their disability as invisible. The choice to show up can be emotionally taxing and only occurs in the presence of meaningful relationships, or where it is required in order to access financial benefits [33]. Overall, the perception of one's 'hidden' disability is linked to the concept of 'normality' and may lead the student not to reveal their identity in order to avoid unequal treatment [35].

Accessibility and its barriers: technology as a facilitator

The university, being one of the main spaces of social life, can contribute to breaking down the material and immaterial barriers that exclude the disabled person. These, in fact, by limiting the disabled person's right to participate in activities, contribute to feeding discriminatory conditions. In this regard, Marisa de Picker's [9] considerations on the difficulties of access to scientific conferences can be extended to multiple aspects of daily life that the student with disabilities faces. The lack of accessibility to venues and the persistence of discrimination and stigma, however, are not the only impediment for a person with disabilities. Technology, in fact, if conceived as a facilitator but designed only on the basis of the characteristics of able-bodied users, can also be an obstacle factor. In this sense, as Tsatsou [41] found, the inclusion of people with disabilities can be facilitated by the use of digital technologies. The author, in particular, emphasises how these help to alleviate stigma in several ways:

- helping them in performing daily tasks and assisting them in overcoming difficulties related to their condition;
- allowing them to connect with those who have the same type of disability, which increases their sense of belonging and improves their social integration
- facilitating processes of self-identification and confidence in communicating with others mediated by technology.

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This view is also shared and found in Valentini [42], who emphasises how the use of digital technologies is a prerequisite for the development of concrete solutions, since these "break down boundaries and create a new deterritorialised space that can be accessed by a broader range of users than that represented by traditional students" [42]. In fact, the author continues, deterritorialisation "creates the prerequisites for carrying out actions and accessing services related to university teaching and training from different places: from home, from the workplace, from other centres that do not coincide with the university's premises, such as decentralised centres" [42]. In conclusion, it would be appropriate to rethink technology on the basis of the concept of Universal Design, i.e. "an approach to the design of technologies that pays more attention to the concept of universal usability: buildings and tools should be conceived, designed and constructed in order to be usable by everyone" [12].

In this sense, it is necessary to consider the university community as an environment of interaction in which the identity of the disabled person is constructed and to investigate how prejudice and discrimination against students with disabilities represent an obstacle to their full inclusion. At the same time, it is hypothesised that university policies on services aimed at the integration of people with disabilities or SLDs - understood therefore as positive actions to reduce inter-group discrimination and foster a comfortable environment - may produce ambivalent effects. In fact, these may contain "in germ the cues for a reversal of perspective, which from the anti-discriminatory strategy and the egalitarian ideal risk opening the door to the most extreme differentialism" [31].

#### **Quality of services and education: principles and good practices**

Following the concepts expressed in the previous paragraph, special attention should be paid to the evaluation of the quality of the services [40] offered in the various universities in Rome. Considering the provision of services for students with disabilities is necessarily to take into consideration the subject as a whole, where "the very vision of disability, illness or health, is oriented towards a systemic view, considering the process of disability or illness a dynamic process" [12]. The quality criteria to be considered when designing services include: participation (active involvement of the user in defining the intervention objectives); personalisation (adaptation to the needs of the user); accessibility (full use of the service offered, with particular regard to reaching the physical location where the service is located). These criteria form the basis of the so-called 'service quality tree' model [11], which was developed to implement public service improvement. From this perspective, in fact, it is the awareness of the existence of a service that determines the demand-need and it is the offer that drives the demand in the sense of a specific need. For this reason, "unexpressed demands or demands not channelled towards the service, which therefore do not find a response in the service offer, act as frustrated needs (independently of the awareness of the subject)" [12]. The construction of service quality, therefore, is achieved through specific interventions on both organisation and behaviour, involving both staff and students with disabilities in the upgrading project. The dynamics of the interventions must therefore rebalance the demand and supply of services, that is, promote an integrated service to the person considered in his or her individuality. In Italy, following the framework law for the implementation of the integrated system of interventions and social services [17], the institution of the individualised project for differently-abled persons marks a turning point in terms of the recognition of the subject's needs and requirements, which become a starting point for redesigning the service. Therefore, the personnel involved in the provision of the service should have adequate skills and aptitudes in the planning and management of personal services.



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Currently, in fact, this selection is linked to objective criteria (such as rankings and qualifications) that do not provide any guarantee of their specific competence. In particular, the provisions of the law have not directly affected teaching support services for students with disabilities, unlike many European countries (United Kingdom, Benelux, Germany, Spain) and the United States, where specific services are provided by specialised personnel, working in teams within coordinated structures that offer adequate support in terms of resources and tools [15]. It can be argued that, to date, this process has not been fully realised, as sustained by Powell and Pfahl [32], due to cognitive and cultural beliefs about 'normal' abilities and selection processes that prevent academic institutions and disciplines from opening up to the knowledge, experiences and perspectives of students, staff and faculty with disabilities.

As argued by Chiang [6], universities play a key function in both implementing services and recognising a culture of disability by emphasising the following aspects:

- providing safe and welcoming spaces for students with disabilities and their peers;
- emphasising the positive aspects of disability related to human diversity;
- educating the university community on non-discrimination;
- connecting the university and the local community through shared programmes.

The planning of interventions to support university inclusion must necessarily take into account the complexity of the context of intervention in order to avoid providing fragmentary responses to the beneficiaries of the services. To make this happen, it is appropriate to adopt an interdisciplinary perspective, which is embodied in a "design capable of reconstructing around the need what has generated it and the best way to deal with it, not so much and not only in view of its satisfaction, but in the perspective of a real increase in the subject's human development that is coherent, harmonious and integral" [12]. Universities must, therefore, draw up policies, develop support programmes and provide services to prepare students for a future perspective that sees them as active members of society.

#### Conclusions

No real conclusions will be presented here, since the research project is still in progress, however, considering the innovativeness of the theme investigated, especially in the Italian scientific scenario, it is possible to affirm that the realisation of the research project will bring significant improvements both on a theoretical and pragmatic level. Focusing on the inclusion of persons with disabilities and SLDs has a double objective: on the one hand, to produce a concrete proposal for the improvement of the services offered by the universities in Rome, involving the students themselves, intended as privileged observers of the services they use and of the relational dynamics in which they are immersed; on the other hand, to understand the role played by the various types of disabilities and SLDs with respect to variables such as gender, educational background and social origin.

In this perspective, the final aim of this research project is to act as a useful tool for the design of guidelines for the development of policies and services for the university inclusion of people with disabilities and SLDs.

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## IMPORTANCE OF INTERNSHIP PROGRAM FOR PROFESSIONAL DEVELOPMENT AMONG STUDENTS AT COLLEGE LEVEL IN PAKISTAN

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### ABSTRACT

This research study emphasized on the significance of internship as a vital element of productive learning vis-à-vis the perception of students regarding as a tool for professional development in the real-work scenario with practical skills. The main objective of this study is to highlight the importance of internship for students to develop connections between learning into practice i.e. course work and work place as well as to create career prospects and employment opportunities for students. The study also aims to obtain in depth understanding of how internship is supported by various stakeholders. The method that was used in this study was descriptive method. The population of study was consisted of students and teachers of public colleges in Karachi. Those 80 students and 20 teachers from 10 colleges were selected as sample for the data collection by using questionnaire. The data collected by the respondents were studied and analyzed through SPSS; it was found through the results that there is a strong association between academic success and internship program regarding future professional expansion among students and it helps them to hone in on further choices within the concern field. On the other hand due to the lack of internship opportunities they confront various challenges and barriers while progressing towards career path. In the light of results, recommendations were also presented regarding initiation of internship program as an essential part of academic program as well as to overcome the gaps within internship program to acquired maximum benefits and professional skills among students for productive life.

**Keywords:** Internship, Professional, Students, College

### INTRODUCTION

Education is a constant need of human beings. It is through education that the character of human beings is created and fulfilled, and it is through education that the difference between human beings and animals becomes noticeable and it reaches the hidden secrets of the universe and recognizes its real creator.

Islam has placed great emphasis on education and training. Its importance can be gauged from the fact that the first revelation that was revealed in Qur'an was also related to knowledge. The development of man and the prosperity of society are not the result of nature, but the result of man's constant efforts and they are achieved to the extent that man demonstrates his abilities through education. Education is not something that can be acquired merely as a skill or to be used only for mental development but encompasses all aspects of human life. Guarantee of the welfare of the society.

The main purpose of education is to give social coherence to the individual by developing his mental, emotional, moral, and physical development.



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At the same time, the purpose of education is to bring harmony in the society by developing the moral, emotional, mental, and physical development of the individual and collectively for the progress of the country. In this regard, along with education, vocational training institutes are also engaged, and various programs are organized during the educational process and students are provided opportunities to participate according to their interest and tendency. Among these programs internship program is very effective for students' future success.

Therefore, internships are conducted at different levels of education, especially at the college level, so that the students can effectively apply the knowledge and information acquired in their practical life. An internship is a program/training that is required at school, college and university level but it becomes an essential need for students' academic and professional progress at college as it is an initial step towards their practical life.

At this stage, if the internship training is provided to the students according to their aptitude and interests, they will have the opportunity to learn and enhance their professional skills and abilities with ease in choosing a profession. This will help them to choose the subject according to their abilities in time and will save the student from getting lost. In addition, if a student wants to go into a field, he will be assessed in time how much skill and expertise he has in that field.

The prosperity and improvement of human society depends on the fact that most of the society is affluent and capable of living in society through being well matched with society. And it's feasible when people are socially skilled. Because the major aim of education is to create cognizance in the character and construct new necessities and adjustments to build the persona and the position of the character to enable the fantastic compatibility in the society. Not only those students are able to get like-minded with society, but they can additionally pay full attention to social development. Therefore, educational institutions have a large accountability to pay full interest not solely to the physical, mental, emotional, but also social improvement of the individual by way of making use of curricular & co-curricular activities as well as to ensure the holistic development of college students via an application for teachers, students, curriculum and co-curricular activities, guidance, and counseling. Apart from all this, another aspect viewed as fundamental and obligatory in the current educational process is referred to as "internship training".

At college level education is very important because at this level students have an awareness and opportunities to choose his interesting field. For the fulfillment of college and students' requirements, an internship program is useful for both. As most of the students step into their practical life so here internship support a lot to them to be aware of what career will be appropriate for them according to their ability and tendency so that they can make new developments/advances in the concern profession as well as the innovation and exchange in the profession by taking the route of development in it. All these things require robust guidance, and that preparation is nicely provided via the internship program.

An internship is important due to the fact it can provide them with new abilities and opportunities that you would not receive. Internships give awareness about how to study and engage with experts in an administrative center setting, and enhance imperative tender skills like time management, organization, adaptability, problem-solving and team work. Students figure out the career they want and attain professional experience while studying. That's the reason behind why internships are necessary when figuring out a career. As an example, if one comprehends himself as an elementary school teacher, but after finishing a two-week internship, he realizes that you enjoy caring for your college students more than attempting to instruct them on a lesson plan.

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This helps you determine that you choose to pursue pediatric nursing. Its first-hand coaching and if interns make a mistake at their internship, they can learn how to address it, but extra importantly, move forward from it.

There is additionally a magnificent need for an internship program at this stage that prepares the college students for the occupation while they are analyzing and does no longer want any training for the job at the end of education. At the same time, schooling is the supply to introduce internships regarding essentials of the profession. Students have a range of technical and professional abilities. Internship training affords possibilities to practice these abilities and capabilities to society. Each student demonstrates his or her ability. Guidance is given to make use of this potential and supplied through the internship program.

Besides, due to the rapid changes and innovation in every society, professionals are also modified in accordance with individual and society requirements. Therefore changes in these professions need to be introduced to the new era with information about new professions, exclusive techniques used in the professions. Giving them extra statistics about the students' occupation is also necessary to avail possibilities for advancement in new professions. In this regard, the need for internships has emerged as apparent. As it helps students in selecting the profession in accordance with their aptitude and interest. Students must be delivered to their objective and pick out the career they choose to pursue so that high quality effects can be achieved.

This is a program through which college students will not solely understand about the profession however also when they go for training, they will recognize about the occupation, its nature, requirement they will understand to associated profession. They will be properly conscious of development opportunities. That is, in which career he can get many opportunities for development, whether he can go beforehand in this occupation or not. Beside it the certificates issued at the end of the internship training ensures employment for college students' help to develop contacts with professionals. On the other side, professionals encourage those students who have a certificate of internship training. Here the need for internships is extra emerging.

Internship program for students offered a unique platform that provides them knowledge, experiences and guidance about the most up to date information about various professions. It promotes the development of the students and also gives a chance to do more improvement and enhancement in their professional skills. It supports the building of a shared vision of successful working as students become more engaged, motivated and active to achieve equality outcomes in their careers. Due to the importance of internship programs, it is necessary that it should be conducted at college level as it gives a hand on experience for students who want to update their knowledge in professions and fulfill the new trends of today's professional demand.

#### **AIMS OF THE STUDY**

This research aimed to,

- To highlight the importance of internship programs for professional development among students at college level.
- To assess the extent to which internships help students to benefit from their technical abilities and skills during their studies.
- To expand the interval of training to the potential extent to remove poverty and unemployment within society.

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- To what extent internship training opportunity is provided equally among students.
- To justify the importance of internship in furthering students' education and career regarding individuality among them.
- To emphasize the importance of internships for the promotion of economic and social cohesion at the national level.
- To determine what elements students and organization need to bring to achieve a successful internship program.

**INTERNSHIPS PROGRAMS IN DIFFERENT COUNTRIES:**

The majority of nations run internship programs for their students or young people. These nations export their citizens' professional expertise. These programs are run differently in different nations. We'll briefly touch on a few nations.

<b>ENGLAND</b>	The chances of success are practically boundless in England because the country is home to only extremely powerful and well-known businesses. Some very well-known and significant businesses have mandated internships. Additionally, from the start, students receive training through internship programs to hone their professional abilities in the fields of architecture, art, design, fashion, mime, business, and banking.
<b>ARGENTINA</b>	In this area, there are also huge cities in addition to forests, mountains, and waterfalls. In business, mining, communications, and other fields, there are numerous opportunities. At various educational levels, internship programs and related initiatives are run to train students in these disciplines
<b>CHINA</b>	The number of talented people in the world's most populous country has not decreased. On the list of large cities are Beijing, Shanghai, Guangzhou, and others. The world has been introduced to numerous innovative technologies by China. The economy of this nation appears to be expanding at the highest rate in the globe. In China, pupils receive physical and occupational training along with schooling from the very beginning, and rural areas contribute significantly to a stronger economy.
<b>AUSTRALIA</b>	In Australia, we experience the excitement and wonder of other cultures. The internship program is offered in every profession, including business, law, tourism, and lucrative industries like conservation
<b>CHILE</b>	If you go to Chile and want to push the boundaries and experience culture in a way that deviates from the standard. Opportunities for internships are available here in any field, so far as that is concerned
<b>NEW ZEALAND</b>	In fact, this nation's neighbor is significantly different culturally. Here, guidance and special internship possibilities are offered. Young people are getting more and more training chances to develop their talents and careers
<b>SPAIN</b>	Spanish people enjoy a good standard of living. Delicious cuisine and other Spanish historical attractions can be found here. There are several chances for tourism. Students may apply for internships in a variety of industries, including business, tourism, and education, at this location
<b>INDIA</b>	India, a neighboring country, too offers internships in a number of fields. Consider India for voluntary work experience in a worthwhile career if you're looking for a foreign internship site. India is a nice environment for this kind of internship if the student is studying medicine. It offers chances and experiences

### **INTERNSHIP IN PAKISTAN:**

There are initiatives ongoing in Pakistan to offer internship programs that are relevant to contemporary culture. A quality education system is definitely the foundation for a country's growth and wealth as well as the source of a people with better morals. It is also true that the educational process only contributes to success and prosperity when it secures students' futures. And only by integrating education with practical training will this be made achievable. There are many ways to receive this training, with internship training coming in first. Basically, the concept of internship is evident if we consider Pakistan in terms of various professional natures such as training is mandatory after B.ED; House Job is mandatory after M.BA etc. Degrees are not awarded without an article ship even after ACCA. There are numerous instances of this, all of which are professional in nature. With the exception of the Aga Khan Institute that offers regular internship training to its higher secondary students. Additionally, there is nothing about internships in Pakistan's educational policies; nevertheless, if we look at the following policies and opportunities in a similar way, they do have some provisions that promote vocational training such as;

#### **First National Education Commission 1959:**

1. After middle school, students should be directed from general education to professional technical one and after tenth grade, they should be admitted in polytechnic institutes.
2. Three years from the duration of courses in vocational schools. Polytechnics and technical institutes should be set up where supervisors should be trained.

#### **Educational Policy 1970:**

1. Provide vocational training for students who do not attend secondary schools.
2. The trend of general education in our country is high. The ratio of general and scientific, technical and vocational education should be increased from 20 to 40 by providing scientific, technical and vocational education facilities.

#### **Educational Policy 1972 to 1980:**

1. Secondary and higher education should also be linked to the nature and extent of economic development and should be closely linked to employment opportunities.
2. Additional seats will be provided in technical and vocational education. For technical or professional students, 3500 extra points will be set at matriculation and 1600 at intermediate level.

#### **National Educational Policy 1992 to 2000:**

1. Technical and vocational educational institutions will be established in rural areas. A National Testing Service for Admissions will be set up which will work for universities, professional institutes and higher education.
2. Increase the number of facilities of technical and professional institutions.
3. Vocational and technical training subjects will also be included in the curriculum.

#### **National Educational Policy 1998 to 2010:**

1. Students will be specially prepared for vocational training.
2. If we look at the education system from an educational and professional point of view, we do not see any significant effort at the government level regarding internships. And the work that is being done has not yielded significant results. This can be done with existing programs and activities.

- Youth Development Program by Benazir Bhutto Shaheed.
- Youth Development Program by Maryam Nawaz



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Vocational training opportunities are also being provided to the youth in the name of these programs and have also been organized to train various professions. Here are some highlights of these programs.

**Youth Development Program by Benazir Bhutto Shaheed:** The specific objectives of conducting this program are as follows.

1. It enhances employment related skills and abilities among the youth through public and private sector training in Sind.
2. Preparing to tackle poverty in urban areas.
3. Periodic survey of the program to meet and check national and international employment and certification requirements.
4. To train human resources in Sind to meet the needs of the public and private sector in the local and international market.
5. Unemployed youth should be provided stipends for various types of employment so that they can earn income.
6. To provide quality training and certification to the unemployed youth and “on-job training” by the public and private sector through professional and technical institutes.
7. Establishing a link between the workplace and the local and international job market through training so that individuals can explore self-employment opportunities and facilities.
8. Encouraging compliance with the Industry Apprentices Ordinance 1962 and its rules/regulations 1966.
- 9.

**Youth Development Program by Maryam Nawaz:** Under this scheme, students will receive around 50,000 interns. The interns of the program will receive training in public and private institutions of the country according to their education. Students of religious schools will also be included in the skill development program in consultation with HEC. Top interneers will be awarded certificates. Toofar, 25,000 young people from all around the nation—including those in Gilgit-Baltistan and Azad Kashmir—have benefited from the Youth Development Program through training in about 100 trades. The youth of Pakistan are talented. In addition to helping their families, youth often aspire to advance their nation. Youth participating in the development program are awarded scholarships based on their merit. In The provinces, similar schemes were already being planned for launch. Each youth received a monthly stipend of Rs.2000 in the program's first phase, but in the second phase, they will earn Rs.2500, while those who belong in federally administered tribal areas would receive Rs.3,000.

**AIOU Islamabad:** In addition to these two programs, Allama Iqbal Open University also offers short-term courses and internships. However, while these programs are rather successful from a professional standpoint, they are not given equal opportunity to be used to their full potential. On the contrary, the Aga Khan is providing invaluable services in this area at the private level.

**Aga Khan Internship program:** The Aga Khan School offers its students with access to a variety of programs and technology for the same goal of promoting quality and skill. The Aga Khan Higher Secondary School offers a number of courses in a variety of subject areas while keeping in mind the demands of the students in both their academic and professional livelihoods.

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The Aga Khan Internship Program is a unique program in Pakistan for higher secondary students. It is the organization that offers its higher secondary students internship opportunities and training. Its goals are;

1. To review teacher feedback on the need for a mentoring program at the secondary level.
2. Explain the urgent need for a secondary educational guidance program in schools.
3. Present practical recommendations and suggestions for the inclusion of guidance in the educational system at the secondary level.

This internship helps students in the selection of career paths with acquiring professional relationships, gaining experience, and not only that, but it also helps in securing employment after graduation. Aga Khan Higher Secondary School has many contacts at companies that take in Aga Khan Interns. The internship training provided at our higher secondary school or level, according to teachers at various Aga Khan Higher Secondary Schools, helps students in identifying their careers and securing those careers. The Advisory Unit assists students in satisfying their needs and achieving their objectives, including education. All of the students at Aga Khan Higher Secondary School have the chance to take part in the internship training that is offered. Interns receive guidance so they can choose their own courses of study and careers. Students are required to continuously give feedback. For this program, there is a check-and-balance process. Annual reports are written by monetary teams. In view of which, new strategy and planning are made. The Aga Khan Higher Secondary School's internship program benefited almost 3000 students. The foundation for students' professional development is established by these internship programs. Their professional life is based on the foundation of this. Along with choosing their schooling, students also choose their profession on time. As a result, they are able to adapt to a particular profession and are proven to be sources of progress both individually and collectively. Some organizations in our nation and overseas are also supporting the Aga Khan for the internship program. Which additionally offer financial assistance after completing internships in businesses; students provide feedback and contribute fresh, innovative ideas, which is very advantageous to the company.

**PM Youth Internship Program 2022:** The PM Youth Internship Program 2022 in Pakistan is open for only Pakistani Applicants who want to enhance their knowledge or polish their skills. Students who have finished their Bachelors may apply for the Fully Funded PM Youth Internship Program. The Federal Government is going to provide a PM Youth Internship with starting from to at least 150,000 educated youngsters. The Internship is open to students from Pakistan only. The goal of the Youth Internship Program is to support the country's jobless youth. The PM Young Training Scheme is open to educated jobless youth from all provinces and areas, including Gilgit-Baltistan, Azad Jammu and Kashmir, FATA, and the Islamabad Capital Territory. According to the Prime Minister's Youth Education Plan, Ministry of Inter-Provincial Coordination, Interns are placed in federal ministries, industries, banks, divisions, provincial departments, corporations, and various private and public institutions for 12 months and get a stipend of 30,000 per month. Students who have completed 16 years of school, or Matric or FSC, are eligible for this internship. The Youth Internship Program does not charge a registration fee.

Prime Minister Imran Khan offers Jobs in marketing, finance, food technology, law, engineering, public administration, and business are available. One of the best aspects of this internship is that they also award a monthly stipend of 30,000 per month to the students.

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The major goal of this internship is to train Pakistan's educated young by providing them temporary jobs in both the private and public sectors. This internship gives a monthly stipend of 30,000 to the students.

**Sindh School Teaching Intern Jobs 2022:** Government of Sindh School education & literacy department has announced school teacher interns program in 2022 under STIP (Sindh teaching interns program). Applications are invited from males and females to teach 11 and 12th classes and Learn the Art of Teaching with excellent salary packages. Total vacancies are 1200 Male / Female in the subject of Physics= 240, English= 240, Chemistry= 240, Mathematics= 120, Pakistan Studies= 60, Zoology= 60, Urdu=60, Botany= 60, Sindhi= 60, Islamiyat= 60. Required Qualification: Master's degree second division or Equivalent qualification by HEC recognized Institutes. Age limits till 43 years for both i.e. male and females. Selection shall be done by District Selection Committee for Interns (DSCI) according to the weight age=80% on the basis of marks obtained In Master's Degree and 20% On the basis of interview. Selected candidates will get Rs.60, 000 per month stipend.

**Importance of Internship Program:** The importance of internship programs for professional development among students cannot be denied at any stage especially at college level. Internship programs provide practical approaches to the students regarding their career paths. As a result, it helps in making progress toward better professions with required demands of working places.

The importance of internships at the higher secondary level is also a result of the ability to select a course of study that interests the student and fulfills his/her aptitude for a future job. Due to such importance it is necessary that every educational institute should provide this opportunity to their students.

**Elements:** If your institution does not provide internships, you could be losing out on some astonishing talent at a low cost. According to estimates, 20 to 25 percent of newly employed workers participate in internship programs. Internship programs are a component of recruitment strategies used by businesses to meet their goals. This youthful talent is eager to get experience and is prepared to put in a lot of effort to do so. In general, interns seek out real-world experiences that will put their skills to use and provide them with challenging work. They want to put to the test everything they have learned in school.

Colleges and universities created internship programs to provide students with practical work experience as part of their degree program. Schools and businesses collaborate to place students in real-world settings where they can learn essential skills. Today's businesses use internship programs to find potential and hire new employees. As part of a succession plan, this might be a practical strategy to hire people and find talent. Organizations use interns to finish tasks that could have otherwise been difficult to complete or that have been delayed indefinitely. The internship process can evaluate a student's aptitude, skill set, and workplace socialization. A formal, management procedure, and allocated resources are necessary for an internship program to be successful in both attracting new interns and overseeing those who have already applied.

#### Major hypothesis:

- The importance of the internship program will be due to the promotion of technical and professional skills among students at the higher secondary level.

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**Minor hypothesis:**

1. It will be due to expand the interval of training to the potential extent to remove poverty and unemployment within society.
2. It will highlight the needs of internships for the promotion of economic and social cohesion at the national level.
3. It will be helpful for students to provide awareness regarding professional requirements and solutions of problems within the working place.
4. It will enable the students to develop understanding between further education and career regarding individuality among them.
5. It will facilitate the education institutes to provide better opportunities to students for successful future life as per globalized perspectives.
- 6.

**RESEARCH METHODOLOGY:** Descriptive method of study is used in this study. Population of study is consisted of Students and Teachers of Public Colleges of Karachi. 80 students and 20 teachers are selected at random. Data is collected through questionnaire. Descriptive technique of the study consisted of percentage and frequency analysis of demographic characteristics of the participants and central tendency measurement of their responses, whereas statistical technique comprised of scale analysis including normality and reliability tests. Reliability of the questionnaire was tested using Cronbach's alpha, and normality was evaluated employing univariate and multivariate normality of skewness and kurtosis. Each variable of the questionnaire was assessed using 5-point Likert scale, where 1 is strongly disagree, 2 is disagree, 3 is neutral, 4 is agree and 5 is strongly agree.

**DATA COLLECTION:** Data is collected from 10 different public sector colleges of Karachi which are as follows,

1. Sir Syed Govt. Girls College Nazimabad
2. Govt. College for Women, Block-J, North Nazimabad
3. Govt. Premier Girls College, Block-H, North Nazimabad
4. Women's Degree College Nazimabad
5. H.I. Usmania Govt. Girls College Nazimabad
6. Govt. Degree College for Women Block-L, North Nazimabad
7. Govt. College for Women Block-M, North Nazimabad
8. Abdullah Govt. College for Women Block-U, North Nazimabad
9. Govt. Degree Girls College Block-K, North Nazimabad
10. Govt. Girls Degree College Gulberg

The data was collected in May and June 2022.

**FINDINGS & DISCUSSION:** Percentages, Means, Standard Deviation and Z test is used to find out the results.

**Table 1:** Comparison of opinion of College Students and Teachers regarding the importance of Internship program

Group	N	Mean	S.D	Z -Value
Teachers	20	51.3	4.3	1.09
Students	80	49.6	3.2	

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Table 1 shows that the z value equal to 1.09 which is less than the tabular value equal to 1.96 at 0.05 level of alpha. This shows that the teachers have more positive attitude towards internship programs in college.

**Table 2:** Comparison of opinion of male teachers v/s female teachers regarding the importance of Internship program

Group	N	Mean	S.D	Z –Value
Male	8	39	1.32	1.51
Female	12	61	6.9	

Table 2 shows that the z value equal to 1.51 which is less than the tabular value equal to 1.96 at 0.05 level of alpha. This shows that there is insignificant difference between the opinion of male and female teachers. This means that female teachers are more concerned about the importance of internship programs.

### CONCLUSION

Internship program has very strong position in college studies. Teachers and students both know the importance of internship and are very clear about attending an internship to apply the theory in practical terms. It is also clear that as compare to students teachers are more concerned about the application of internship programs.

### RECOMMENDATIONS

- It is necessary to provide appropriate guidance for various types of programs, seminars, workshops in educational institutions, through internship program especially in colleges, to give advance information and skills about professions to the students. So it will be helpful to overcome unemployment in the society as well as people can be helped to lead a prosperous and better life in the society.
- It is recommended to initiate internship awareness campaign among students.
- Workshops can be given to students.
- College management should arrange internship opportunities for students.

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### FIGURING OUT THE ROLE OF MOTHER TONGUE INTERFERENCE IN MASTERING ENGLISH PHRASAL VERBS AMONG FOREIGN LANGUAGE LEARNERS FROM DIFFERENT FIRST LANGUAGE BACKGROUNDS

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#### **Abstract**

Foreign language learners often encounter challenges in mastering English phrasal verbs. The current study attempts to determine the extent to which learners' mother tongue facilitates or hinders mastering the target forms among EFL learners from different L1 backgrounds. English belongs to the Germanic language family and shares some common features with other members of the language family, e.g., German has detachable prefix verbs, e.g., *warten auf*, in a way resembling the English phrasal verb, e.g., *wait for*. On the other hand, other language families such as Romance languages, e.g., Spanish and Semitic languages, e.g., Arabic, rely heavily on single word-verbs, e.g., *esperar* in Spanish and *yāntāzr* in Arabic. For this purpose, three experimental groups of intermediate EFL learners took part in the current study: Arabic-speaking learners of English ( $n=8$ ), Spanish-speaking learners of English ( $n=8$ ), German-speaking learners of English ( $n=8$ ), and a control group of British English speakers ( $n=8$ ). To elicit the learners' comprehension and production, the researcher developed a task, in which a total of 30 test items were included: a. phrasal verb targets ( $n=10$ ), e.g., *hold back*, b. one of the single word-verb alternatives ( $n=10$ ), e.g., *pause* and c. 10 fillers. The participants have to interpret the meanings of the target forms given in a list of movie titles exhibited through movie posters (i.e. comprehension), and then they were instructed to put them in appropriate contexts (i.e. production). The findings showed that German learners outperformed Spanish-speaking and Arabic-speaking learners of English in mastering English Phrasal verbs in both comprehension and production. While the performance of the German-speaking learners of English was not significantly different on both forms, Arabic-speaking and Spanish-speaking learners of English performed significantly better on one word-verbs owned to their mother tongue interference. The study concludes with some pedagogical implications.

**Keywords:** Arabic, English, frequency, German, one-word verbs, phrasal verbs, proficiency, Spanish



## INTERNET-ASSISTED ENVIRONMENT IN TEACHING ENGLISH TO VISUALLY IMPAIRED LEARNERS

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### Abstract

The benefit of the Internet usage has completely changed and globalized the views of educators, as the learning equipments offered through the network are gradually becoming more reliable for all learners, including visually impaired students. This article will consider methods for working with students with visual impairments using the internet-assisted tools.

**Keywords:** approaches, educational opportunities, foreign language teaching, internet-assisted environment, rational methods, visually impaired learners.

### 1. INTRODUCTION

Nowadays, the Internet is gaining immense popularity in foreign language teaching and more and more educators and learners are embracing it. Using the internet brings the 'real world' into the classroom and gives the students an opportunity to explore learning in a different way. The internet-assisted environment provides teachers and students regardless of its social and recreational purposes, as it also provides a field for teaching and learning the English language. Using the net gives students control over their learning, enabling them to go at their own pace and choose their paths according to their individual needs, which may also be motivating.

At the same time all teachers face the problem of using the global network in order to further improve the content of training based on the use of modern technologies. The internet offers new opportunities in learning English that were previously unknown. These include: inclusion of online materials in the content of the lesson; assistance in conducting individual searches of students on the project work; development and improvement of students' reading skills using online materials of various levels; development of students' writing skills as a result of mutual correspondence; formation of word stock with the help of modern dictionaries of a foreign language; finding data on the culture, social and economic situation of other countries through the network, learning to analyze them, etc. [1] The development of the internet has revolutionized and globalized the view of teachers, as the teaching tools offered through the network have gradually become more reliable.

The use of the internet for educational purposes is of great help to all students, including visually impaired students. Ensuring equal rights and equal opportunities for a learner with disabilities is a priority in the field of modern education. Teaching visually impaired learners English is a difficult task, but knowledge of the language expands the educational opportunities of such people, allowing them to become part of the global educational environment and feel socially adapted in society.

The situation with teaching visually impaired is complicated by the fact that the current approaches, methods and means of teaching foreign languages (interactivity, modular training) are based on visibility, graphic symbols; pedagogical didactic materials in this area are very limited. [2] Thus, it is quite obvious that it is necessary to search for new approaches to creating rational methods of teaching visually impaired learners.

## 2. MATERIALS AND METHODS

Currently, the issue of inclusive education is relevant and is often discussed among teachers and social workers. One particular aspect of education system is the education of people with disabilities, particularly, sensory disabilities, such as visual or hearing impairment, which decrease learning opportunities of students. Social workers and organizations of the blind and visually impaired seeks to increase the availability of teaching foreign languages and considers it as a factor in the social and professional integration of adults with serious visual impairments into the life of modern society. The educational institutions, in particular, focused their efforts on how to improve the qualifications of teachers of foreign languages working with this category of students.

People with sensory disabilities introduce new challenges to educational institutions, since they must have the resources and the know-how to integrate these various types of students. Students with sensory disabilities require special pedagogical strategies to ensure that they assimilate all of the information provided in the classroom. The problem is that many teachers lack adequate training in addressing the needs of this population or the time to transform learning materials and strategies to meet the needs of these students. As a result, the classroom environment is often not appropriate for these students and they tend to leave educational institutions with low achievements or even completely drop out from the school system [3]. Education also has the potential to affect children's health by influencing their ability to advocate for themselves, manage chronic health conditions, and navigate complex medical, insurance, and social service systems during childhood and later in life. [4]

The problems of teaching visually impaired learners can be achievable and possible with internet-assisted tools. During the research we faced with unique innovative method of teaching English to visually impaired learners by means of the talking tactile tablet developed by the United Kingdom's Royal National College for the Blind in Hereford in conjunction with a software company based in the United States. The device was originally developed for educational purposes but is adaptable for other uses. [5] Accordingly, Prof. Dr., Abdullah Coşkun considered this as a concept of using talking tactile technology T3, as a vehicle for teaching English. The talking tactile is a specially made Braille-free tactile diagram that is placed on a pressure sensitive surface. T3 is a touch sensitive device providing instant audio feedback from tactile layouts known as overlays that are diagrams with raised lines and textures explored by finger touch. It uses a combination of touch, sound and learn systems called audio-haptic pedagogy through the creation of tactile diagrams carrying layers of information that can be vocal, musical or other audio sounds. Touching the tactile diagram engages an audio file that can carry up to 10 layers of information. When the overlay is touched the pressure pad is activated and the information for that point is spoken. The device is attached to a standard computer via a USB connection and the program CD giving the operator access to a library of information on any pre-selected subject by moving around the surface area and applying touch pressure. [6]. In many countries where the Talking Tactile Tablet is used, it is valued as a teaching tool, giving opportunities to the teachers while working with visually impaired learners, as well as to the learners who require special needs.

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In my practice of working with students with visually impaired learners I use listening and speaking tasks with feedback methods.

I introduce students to the lesson objectives, the learning outcomes, then with the help of 'five-stroke method, i.e, word – pause – word – pause – translation (removal of phonetic difficulties, memorization of words and translations)' we listen, repeat many times and memorize new words of the lesson. After learning new words, we discuss the topic of the lesson; the students share their knowledge about the topic using the Q & A method. This method develops students' ability to ask and answer the questions correctly. Listening to the audio text helps the students to understand the new lesson better. Then the learners ask questions to each other according to the text. In this regard 'Think-pare-share' method is suitable to broaden their mind and further understanding of the topic. During the lessons students like singing songs that also helps them to learn and memorize the English words and word combinations. At the end of the lesson we always conclude with some methods of feedback, like 'Already knew – have learnt - want to know' table; 'three-two-one' (the 3 most liked moments, 2 moments that you want to use in your work, 1 moment that motivates you to ask a question); 'ladder of success', etc.

Some of my students are learning English by themselves with the help of Internet App 'Duolingo'. They say it helps them to enhance their knowledge and be suited to be competitive in the society. There are some other Internet Apps, such as:

- 'HelloTalk', which helps to talk to native speakers;
- 'Easyten', which helps to master by ten words daily;
- 'ListeningDrill', which helps to listen to video clips with subtitles;
- 'Learn English by listening', which helps to listen to audio course of learning English, listen to history and various kinds of stories;
- 'Listenup.Reallyenglish', which helps to listen to real interviews with native English speakers from different countries by difficulty levels;
- 'Mosalingua', which helps to listen and repeat the words, after which the App checks the students' pronunciation. [7]

Another sites and portals:

- 'Newsy' – an entertainment and information portal with many different materials for practicing listening skills. The portal is available for use by students with high level of language knowledge. However its materials can be used, for example, to search for a familiar reference words;
- 'ELLLO' – useful primarily for teachers, as it offers a number of audio and video English lessons. However, learners can also find a lot of useful materials here, for example, radio stores, etc. All materials of the site are available for online work.
- 'Macmillan for young learners' – The site is a training program offering developed audio materials for learning English by learners with an elementary level. The site is useful and interesting for both the teacher and the junior student. This is a good resource for ideas and additional audio materials;
- 'Listen wisely' – the site presents a selection of audio materials on various topics. It is useful for learners to train listening skills and vocabulary extentions;
- 'English Daily' – a dictionary that helps learners work on new words and idiomatic expressions online. As an introductory material to understand how to use words in context, a large number of authentic English language texts, such as news articles, jokes, stories are published on the site;

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- 'English with pleasure' – Variants of English grammar tests and exercises to improve vocabulary are offered for the students. There are many different tasks on the same topic, so it will be convenient for the teacher to check the completion of tasks by giving a similar test;
- 'Educational technologies (Good iPad apps for Visually Impaired Students) – The resource offers a selection of useful applications for the iOS operating system. With their help, the learners can develop knowledge and skills of English. Also on this site there are applications that a teacher can use to simplify the work of a visually impaired student in the classroom, for example, an application in which you can download the text of the assignment from a handout so that the learner does not have to ask classmates to read it;
- 'Strange News Stories' – the site is aimed at practicing reading skills at home to prepare for work in the classroom and for further practice of conversational skill with classmates, since any text involves a discussion. Video recordings are presented as an illustration of the material from YouTube;
- 'ESL Blues' is another resource for practicing grammar rules for students. In addition, the site presents tests that allow the teachers to monitor the progress of the students at different stages of learning. Performing the same test at the beginning of the topic study and at the end of the study will help to see how well the material was mastered;
- '5 minute English' – Short 5-minute lessons will allow a student with the peculiarities and development of vision not to waste time on additional study of the material at home, but, at the same time, they will fully help to prepare for the lesson, since each lesson consists of a theoretical and practical part, there audio and video materials;
- 'Dave's ESL Café' – the site was developed by Dave Sperling, a teacher of English as a second language. On this resource, Sperling publishes a lot of theoretical material with various examples, and to consolidate his knowledge, he offers to take several tests on the studied material. It seems to us that this approach is convenient, since in case of questions during the test, the student can always re-read and re-listen to the theoretical material again, get acquainted with the samples of the task successfully execute it.

### **3. RESULTS AND DISCUSSION**

As a result of class work that was held two times a week, the group's actions were monitored, knowledge of learners has is enlarged using the Internet tools, they succeeded mainly in understanding words, understanding speech by listening, focusing on answers, the ability to ask the right questions, give the right answers, express opinions, share thoughts, discuss, perform group, pair and individual work, give feedback, summarize the results in the form of learning outcomes.

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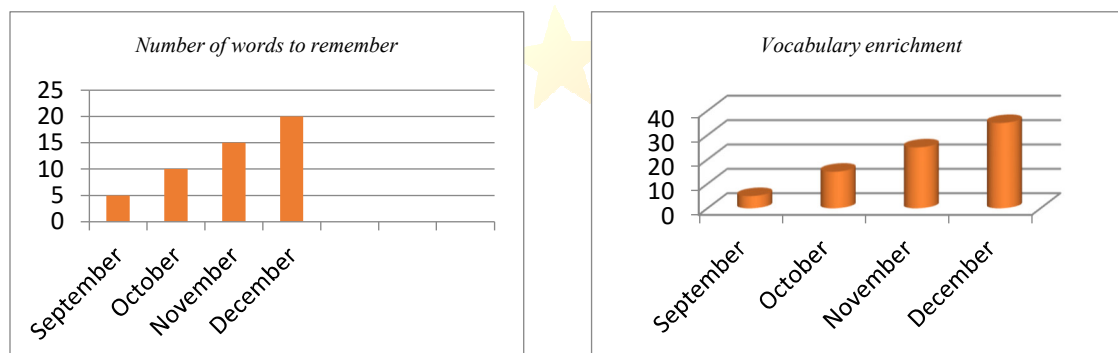
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The following picture shows the number of words the learners had to remember every week and the vocabulary enrichment, i.e., how they dealt with the task:



In order to achieve results and improve the level of knowledge in the process of teaching visually impaired students, teachers must realize the importance of using information technologies in educational activities.

Teachers play a fundamental role in the task of promoting students' well being and in creating conditions for learning. They can also contribute to students' health by guiding them in the use of resources that enhance their residual vision and preserve their visual function. Access to assistive technology provides independence to students with visual impairment by enhancing their communication, mobility, and environment control. In many cases, use of technology is the only way people with communication difficulties can connect to the external world. [9]

#### 4. CONCLUSION

Thus, the effectiveness of teaching a foreign language to students with visual impairments can also be improved through pre-rehabilitation in the field of mobility, daily activities and social communication, which will give confidence in actions and improve their orientation in the new educational environment. [10]

We believe that the presence of an Internet environment in schools and other educational institutions can contribute to the integration of visually impaired students, facilitating the completion of school assignments and social interaction in the school environment. The use of assistive technologies allows visually impaired students to better adapt to normal learning processes and academic fields. This gives these students access to the same source of information that their peers use. With the help of a computer, a visually impaired or blind student can communicate with other schools through databases, stores, libraries, etc. They can consider new work opportunities, as well as explore the Internet, as well as its many possibilities, using special programs for students with visual impairments.

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**IMPACTS OF DOMESTIC VIOLENCE ON FEMALES –A STUDY IN PUNJAB  
(PAKISTAN)**

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**Abstract**

Domestic violence is violence committed by someone in the victim's domestic circle. This includes partners and immediate family members. The term domestic violence is used when there is a close relationship between the offender and the victim. There is usually a power gap between them. The victim is dependent on the offender. Domestic violence can take the form of physical, sexual or psychological abuse. According to an estimate, approximately 70 to 90% of Pakistani women are subjected to domestic violence. Various forms of domestic violence in the country include physical, mental and emotional abuse. Some common types include honor killing, spousal abuse including marital rape, acid attacks and being burned by family members. Spousal abuse is rarely considered a crime socially unless it takes an extreme form of murder or attempted murder which could range from driving a woman to suicide or engineering an accident frequently the bursting of a kitchen stove.

The objective of this mix method research is to find the impacts of domestic violence on females of Punjab. The sample size will consist of 100 females from different districts of Punjab Pakistan. The data will be collected using survey through interviews and questionnaire. In Conclusion, the legislation regarding domestic violence at Government level and its outcomes will be described. This study aims to find out the impact of domestic violence in Pakistani society and cohere it with our social norms and values.

**Keywords:** Domestic violence, females, impacts, Punjab, types

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## STRESSORS AND COPING MECHANISMS AMONG MOTHERS OF HEARING IMPAIRED CHILDREN IN THE SCHOOL FOR HEARING IMPAIRED, AKURE, ONDO STATE

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### Abstract

**Background:** Stress is a major health-related problem among mothers of hearing impaired persons. There is however dearth of information about the level of stress and coping mechanisms among this population especially in urban settings. This study, therefore, focused on the determination of the level of stress, type of stressors and coping mechanisms among mothers of hearing impaired.

**Methods:** The study was a cross-sectional survey. All 250 mothers of hearing impaired children in the school for the hearing impaired in Akure who consented to participate were recruited into the study. The instruments for data collection were: a Focus Group Discussions (FGD) guide and a standardized structured questionnaire which focused on mother's knowledge of what constitutes a hearing challenge, perceived stressors associated with the management of their children's disability and different coping styles they adopt. The mothers' stress scores measured with a four-point scale were in respect of the typology of stressors induced by the following: nature of disability, burden of child's disability; financial; family and community; and psychological factors.

**Results:** The participants' mean age was  $45.5 \pm 18.5$  years. The overall mean stress score was  $82.6 \pm 17.5$  with mean stress scores by typology been the highest ( $24.4 \pm 6.6$ ). ( $p < 0.05$ ). The coping strategies employed by mothers were: verbal expression of dissatisfaction (complaint) (43.3%); acceptance (30.1%); expression of anger (17.2%); seeking for social support (5.3%) and avoiding the situation (4.1%). Mothers used a combination of all these coping styles in the course of managing their children.

**Conclusion:** Main stressors affecting participants were vulnerability of children to sexual abuse, onset of puberty and irrational behaviours of the children. The most widely employed coping strategy was verbal expression of dissatisfaction (complaint). It is recommended for mothers of children of hearing impaired to employ strategies such as counseling, social support, peer-education and resource-linking needed to ameliorate their stressors.

**Keywords:** Coping mechanism, hearing impaired children, Motherhood, stress

### 1. Introduction

#### 1:1 BACKGROUND TO THE STUDY

Physical growth of children occurs rapidly early in development. Rapid growth is a signal that the organism is passing through a sensitive period that may well have both immediate and long-term implications [1].

The right of the parents to the custody, care and upbringing of their children is one of most basic rights of our civilization. The emphasis upon the importance of the home unit in which children are brought up by their natural parents is part of the great humanizations of African civilization [2].

Children with disabilities have dependency behaviours to meet their needs [3]. These dependency behaviours can be a source of stress for families, especially parents of children with disabilities [4],[5].

The parents or caregivers of children with disabilities face different set of problems and needs to adopt different coping skills that help to ameliorate, modify or manage a stressful events or crisis situations. Parents of today face many challenges, including maintaining their own health and happiness in order to be able to facilitate their children's optimal physical, emotional, and social growth. However, parents are often unable to handle the pressure of everyday life and may therefore suffer from stress, anxiety, and/or other psychological reactions. Having a child with disability often poses specific challenges for the parents [6],[2]. Parents' reactions vary in intensity and can include disappointment, guilt, grief, sorrow, helplessness, and fear about the degree of disability and the unknown future [1],[7],[8],[9],[10].

Among all family members, mothers are the most affected by a child's disability [11],[12],[13],[14],[15]. They generally assume more responsibilities for the child [16], spend most of their daily time with the child [17], and tend to take a more active role in caring for a child with disability than fathers [11],[18]. Several studies have documented stress, depression, and anxiety among mothers of children with disabilities [14],[19],[20],[21],[22],[23],[24]. Level of psychological distress have been linked to the extent of a child's disability [25],[26], such as the degree of motor impairment, speech difficulties, intellectual impairment, feeding problems, poor toilet training, limited self-care skills, and behavioural problems, as well as the presence of epilepsy [27]. Coping with chronic conditions poses a special hardship for patients [28]. This hardship affects not only the patient, but also people who are directly involved in caring for the patients. Women have many roles: spouse, mother, caregiver, friend and/or worker [16]. Mothers on whom the physical and psychological strains of caring for children with disabilities devolved are often very severely affected [22]. Mothers, in addition to their child caring role, home making duties and jobs outside the home, constantly bear the burden of looking after their affected children and feel the stress generated by the illness condition more than any other member of the family [24]. The effects of these burdens on the mother's healthstatus and well being can therefore not be over-emphasized in the face of her role in the management and care of children the hearing impaired [24].

When taking responsibility for another person's actions, changes occur in one's life over which we have little or no control and this responsibility is a major stressor [20]. While many studies researched at the stressful effects of chronic illnesses of those who suffer such disabilities, less is known about the effects on their caregivers, especially, mothers in developing countries.

At the end of this study, it is hoped that stress factors and coping mechanisms experienced by mothers of children of hearing impaired in relation to the care of their children's disabilities would have been observed and known.

## 2. METHODS

This study used a cross-sectional study design based on sample size of 250 mothers of children of hearing impaired out of the 285 pupils enrolled for 2021/2022 session in the School for the Hearing Impaired in Akure.

A total number of 250 mothers who consented were recruited for the study using convenience sampling method. The children aged between 6-18 years.

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Focus Group Discussion (FGD) Guide was developed and pretested so that it is culturally related to the local population. Twenty (20) FGDs were conducted; four (4) in each level of education-Primary 1, 2, 3 and 4 and two (2) sessions each in Primary 5 and 6. This allowed to learn directly from the mothers which areas they perceived stressful and how they have been coping in the management of their children's disabilities.

A set of pretested, semi-structured questionnaire was administered to the mothers and it was divided into three sections; section A consisted of demographic questions, section B was on the perceived stress factors while section C was on the coping mechanisms employed in the course of managing their hearing impaired children.

The Statistical Package for the Social Sciences (SPSS) version 22.0 was used to analyze the data. Descriptive statistics were used for participants' socio demographic characteristics. Continuous variables were reported as means and standard deviations, and categorical variables as proportions (n) and frequencies (%) and the FGDs were analyzed using thematic approach where important themes generated from the discussions among mothers in various groups were noted for correlation of findings from the questionnaire.

### **3. RESULTS AND DISCUSSIONS**

A total of 250 mothers representing 87.7% of the total number of enrolled pupils for the 2021/2022 session in the study areas were surveyed.

The participants' ages ranged between 18 years and 65 years with mean age of  $45.5 \pm 18.5$  years. Their levels of education were; no formal education- 31.6%; Arabic-4.0%; primary-19.2%; secondary-22.4%; and tertiary-22.8%. Overall, the prevalence of stress among participants was low (42.0% ); 12.8% of respondents were on borderline while 45.2% had high stress levels. The level of stress by age groups were as follow: 15-24years (1.6%); 25-34 years (18.4); 35-44years (45.2%); 45-54years (24.8%); 55-64 years (8.4%); and 65-74 years (1.6%), ( $p < 0.05$ ). The mean stress score by levels of education were; no formal ( $77.3 \pm 16.1$ ); primary ( $83.7 \pm 16.5$ ); secondary ( $81.5 \pm 16.0$ ) and tertiary ( $87.9 \pm 18.8$ ) and their differences were significant.

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*Table 3.1 shows the distribution of participants' demographic characteristics (N=250)*

s/n	Demographic Characteristics	Frequency	Percentage(%)
1	<b>Age [in years]</b>		
	15-24	4	1.6
	25-34	46	18.4
	35-44	113	45.2
	45-54	62	24.8
	55-64	21	8.4
	65-74	4	1.6
	Total	250	100
2	<b>Level of Education</b>		
	No formal education	79	31.6
	Arabic	48	4.0
	Primary	10	19.2
	Secondary	56	22.4
	OND	17	6.8
	HND	22	8.8
	College of Education	8	3.2
	University	10	4.0
	Total	250	100
3.	<b>Ethnic Group</b>		
	Yoruba	212	84.8
	Igbo	22	8.8
	Hausa	10	4.0
	Others (Ebira, Ijaw, Efik)	6	2.4
Total	250	100	
4	<b>Religion</b>		
	Christianity	161	64.4
	Islam	87	34.8
	Traditional	2	0.8
Total	250	100	
5	<b>Type of marriage</b>		
	Monogamous	168	67.2
	Polygamous	82	32.8
Total	250	100	
6	<b>Marital status</b>		
	Single	28	11.2
	Married	199	79.6
	Divorced	8	3.2
	Separated	6	2.4
	Widow	9	3.6
Total	250	100	
7	<b>Occupation</b>		
	Business Woman/ Trader	136	54.4
	Civil Servant	76	30.4
	Artisan	29	11.6
	Housewife/Unemployed	7	2.8
	Private Firms	2	0.8
Total	250	100	

### 3.1 KNOWLEDGE OF STRESS AND PERCEIVED STRESS FACTORS

The overall mean stress score was  $82.6 \pm 17.5$ . The mean stress scores by typology of stressors were: child ( $24.4 \pm 6.6$ ); family and community ( $15.1 \pm 5.3$ ), school ( $12.9 \pm 4.1$ ); psychological ( $11.2 \pm 3.5$ ); financial ( $11.0 \pm 3.6$ ); and the least was disability ( $8.6 \pm 3.4$ ).

**Table 3.2: Comparison of Mean Stress Scores Among the Six Categories of Stress Factors**

s/n		N	Minimum score	Maximum score	Sum	Mean	Std. Dev.	F	P-value
1.	Child factors	250	12.00	46.00	6109.00	24.44	6.63	7962.47	0.000
2.	Financial factors	250	6.00	22.00	2752.00	11.01	3.64		
3.	Disability factors	250	5.00	25.00	2159.00	8.64	3.42		
4.	Family and community factors	250	8.00	40.00	3781.00	15.12	5.30		
5.	School factors	250	8.00	32.00	3215.00	12.86	4.10		
6.	Psychological factors	250	6.00	26.00	2791.00	11.16	3.51		
	<b>Total</b>	<b>250</b>	<b>45.00</b>	<b>161.00</b>	<b>20807.00</b>	<b>82.58</b>	<b>17.54</b>		

#### 3.1.1 ANALYSIS OF COPING STRATEGIES

From the quantitative data, the most widely employed coping strategy by the mothers of children of hearing impaired in the course of caring and managing their children's disability was verbal expression of dissatisfaction (complaint) (43.3%), this was followed by acceptance (30.1%), anger (17.2%), seeking for social support: from husbands, family members, and community people at large (5.32%), and the least was avoid (4.1%). Mothers used a combination of all these coping styles in the course of managing their children of hearing impairment as seen in table 3.3

**Table 3.3: Coping Strategies employed by the Mothers of the Hearing impaired children**

Stressors	Coping Strategies										Total
	Acceptance	%	Complain	%	Anger	%	Avoid	%	Social support	%	
Child's factors	98.3	8.3	1351	12.0	394	3.5	131	1.2	193	1.7	3000
Financial factors	358	3.2	632	5.6	146	1.3	52	0.5	62	0.6	1250
Disability factors	445	4.0	583	5.2	338	3.0	71	0.6	63	0.6	1500
Family and community factors	678	6.0	816	7.3	377	3.4	55	0.5	74	0.7	2000
School factors	501	4.5	962	8.6	356	3.2	79	0.7	102	0.9	2000
Psychological factors	470	4.2	522	4.6	326	2.9	78	0.7	104	0.9	1500
<b>Total</b>	<b>3383</b>	<b>30.1</b>	<b>4866</b>	<b>43.3</b>	<b>1937</b>	<b>17.2</b>	<b>466</b>	<b>4.1</b>	<b>598</b>	<b>5.3</b>	<b>1125</b>

“Multiple responses



#### 4. CONCLUSION

The objectives for this study were to identify, document perceived stressors and coping mechanisms that are related to the measure of the stress levels of mothers of children of hearing impaired children in caring and managing their children disability. The resulting scores computed from mothers' response to the 45-item stress factors, stress scores were found to vary and was found that stressors concerned with child, family and community and school stressors elicited the highest mean stress scores. Psychological and financial stressors held middle ground, while stressors associated with the disability factor scored the lowest. While disability sources of stress may be better tolerated in mothers, they may give rise to higher overall levels of stress. Monogamous family setting proved less stressful than either polygamous or single mother households. Stress scores was also higher among older mothers (>35 years) and those mothers whose hearing impaired child was at least of school age. The increasing level of stress, as maternal age increases was postulated to explain the observed contrast with the assertion by some researchers that age and maturity improve mother's ability to cope effectively. Main stressors affecting participants were vulnerability children sexual abuse, onset puberty and irrational behaviors children.

The study concluded with a look at the different ways mothers approach stressful situations. This study chose major strategies-acceptance, complaint, anger, avoidance social support. The fact that a mother is unlikely to abandon her disabled child explained why most take to complaining in all the six categories of stressors. Multiple responses for each category, as well as use of different coping mechanisms for different stressors, made it impossible to isolate a unique or overall coping style for each mother. This study recommended that, future research should be done to document level of stressors and coping strategies of fathers or other family members, such as siblings and the extended family in the management of their children's disability.

#### ACKNOWLEDGEMENT

My special thanks goes to the Almighty God for His mercy, help, wisdom and knowledge for the successful completion of this study. I sincerely appreciate all mothers of children of hearing impaired who participated in this study. I am also indebted to Mr. Emmanuel and Mr. Adeniran for transcribing and administration of questionnaires. My appreciation also goes to Prof. Francis Bamidele, Provost, City University, Cambodia for the proof reading and his immeasurable contribution to this article.

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## THE ROLE OF MULTIMODAL STUDIES FROM THE PERSPECTIVE OF AFFECTIVE MOVEMENT PEDAGOGY IN THE STUDY OF KINESTHETIC REPRESENTATION

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### Abstract

This study investigates the difference between the cognitive and the affective background of body-conscious and skill-level movement execution. It seeks to answer why body awareness can be crucial in learning new movements. What is the difference between the underlying brain activity, the resulting movement, and the muscle activity associated with the movement? I would like to present this system of relationships through my own system of affective movement pedagogy, which is linked to conscious body movement and is crucial in this context in several ways.

The body-conscious workflow can also affect the way we use our imagination to recall or observe a movement that we have practiced before in the rehearsal room. In general, a movement is evoked with the dominance of visual representation. Often, we see ourselves and our surroundings from the outside or from our own perspective, as we visualise the movements in our imagination. When we use kinaesthetic representation, we recall muscle activity associated with a movement that we have memorized during body-conscious movement learning.

My suggestion is that actors and some movement researchers are also looking for natural behaviour, which is the question I as well am looking for an answer to. Researchers want the test subject to behave naturally while performing tasks with sensors on his or her body under laboratory conditions, as this is the situation when accurate results are obtained. In the theatre, directors are looking for situations in their realistic productions where the actor on stage in front of the audience behaves naturally as if no one is watching and he or she is not on the stage at all. I use affective movement pedagogy to explore the relationship between movement and emotions in an attempt to find answers to both problems.

In this paper I present some dance-related research areas where digital tools for movement data mining can be used effectively. Among these, I highlight the motion capture technique and the EMG tool, which can be used to collect data on movement and to draw conclusions that cannot be ascertained with the naked eye by the dance teacher. I then identify the areas in which I would like to carry out future research. I highlight the importance of affective movement pedagogy, which will have to be proven. Studies show that brain structure and activity associated with dance training can provide rich and diverse areas of research. By gathering and systematising research directions, a new university subject can be established: kinematics, with an associated practical curriculum. The research-related kinematics laboratory that I would like to build could be instrumental in advancing the science of dance as an artform. The results of the research may be relevant not only to the field of dance, but also theatre or public education, and may open up opportunities for international cooperation.

**Keywords:** affective, movement, pedagogy, training, psychophysics, psychophysiology

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The aim of this study is to present the potential innovative role of my affective movement pedagogy system<sup>1</sup> I examine how the technique relates to movement learning and why it might be important in both dance and theatre training, as well as automatic emotion recognition. I can prove these relationships by using measurement tools to examine and analyze the movements created with the help of affective movement pedagogy, by collecting as much data as possible about the movement. Some of the data are related to the external properties of the movement and some to its internal properties. By aggregating the data, a complex picture of the movement can be built up, which can be analyzed retrospectively to draw in-depth, objective conclusions. The key issue of the study is to examine the difference between body-conscious and skill-level movement. The study seeks to answer why body awareness can be a determinant of movement learning and to pinpoint the difference between the underlying brain activity, the resulting movement and the muscle activity associated with the movement. I would like to present this relational system through affective movement pedagogy, which is crucial in our context in several ways.

There are two ways, for example, to create the simple movement of raising the arm into a high position with the palm facing forward. One possibility is to perform the arm raising movement without any deeper thinking. This is a skill-level movement. The other possibility is that there is an inner awareness associated with performing this simple movement. In this case, while we raise the arm, we become aware of lines of force. For example, stretching from the shoulder with the fingernails, stretching from the armpit with the fingertips, stretching with the little finger from the outer edge of the ribs, etc. This leads to a different mental state, movement, and muscle activity. Muscles are activated along the lines of force and become involved in the movement. This is what we call body aware movement. In this study, I examine the properties of different movement executions from its various aspects.

The aim of affective movement pedagogy is to create natural movements, excluding the extra tension created by thoughts and will. This goal, I hypothesize, can be achieved through body-conscious work. The practices of affective movement pedagogy<sup>2</sup> are linked to body-conscious movements, as we focus our attention on proprioceptive sensations and the lines of force associated with the movements, as in hatha yoga, thus avoiding distractive thoughts. As a first step in the process of affective movement pedagogy, we focus our attention inward during yoga class, so we eliminate the space for other thoughts. Maintaining this state for a longer period will bring us closer to an emotion-free state, i.e., the neutral state. If our aim is not to work with the neutral state, but to “pre-tune” an emotional state, we start to build up the physiological properties of that emotion. The reason why body awareness is linked to the exercises is that we do not focus on the target emotion itself, but on the activation of the muscles and lines of force that are specific to that emotion. First, we reproduce the facial expression typical of the emotion in question, as we concentrate on the positioning of the facial muscles. Next, the physiological properties of the selected emotion are approached with the “spinning” exercises adapted from functional training, also using the techniques of body-conscious work. E.g., in the case of anger, blood flows to the arms, preparing the body for hitting.<sup>3</sup> Therefore, I use repetitive movements where the sympathetic autonomic nervous system is activated, and the arm activity is emphasized.

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<sup>1</sup> Adamovich Ferenc: *Affektív mozgáspedagógia*, In: *Theatron* 16, 2 (2022) online journal, 70.

<sup>2</sup> *Affektív mozgáspedagógia – A diih érzelmének gyakorlatai a Tesla Teátrumban tartott workshop alapján*. In: Színház és Néző. Eds.: Burkus Boglárka, Tinkó Máté. Published by the National Association of Doctoral Students, Department of Literary Studies, Budapest, 2019. 8.

<sup>3</sup> Bányai Éva – Varga Katalin (eds.): *Affektív pszichológia*. Budapest, Medicina Könyvkiadó, 2014. 359.

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Once a high heart rate is achieved, we continue to perform tasks where there is a high level of emotion-related activity, e.g., the “bunny hop” or the “Spiderman walk”. Finally, the breathing phases are added to the movement. Having attuned to the emotion, we then observe the proprioceptive sensations in the arms in a standing position and from this we build up kernels of movement by guiding attention, from which we trigger movement arcs. Since we are not concentrating on coordinating the position of our body parts during the exercises, but rather on proprioceptive sensations, kinesthetic representation will come to the fore and movements will appear as consequences.

The body-conscious work process can also affect the process of using our imagination to recreate or observe a previously practiced movement in the rehearsal room. We usually recall movements under the dominance of visual representation. We often see ourselves and our surroundings from the outside or from our own perspective, as we visualize the movements in our imagination. In contrast, when we use kinesthetic representation, we recall the muscle activity associated with the movement, which was committed to memory during the body-conscious movement learning.

Not only can a newly learned movement rise to skill-level if practiced a lot, but so can a complex choreography. As the movement becomes rises to skill-level in the learning process, the brain uses ever less energy to perform the movement, so distraction creeps in, which can increase the risk of injury. Of course, the goal is not to make every movement body-conscious, but there may be interesting possibilities here that I would like to explore.

I would like to illustrate the difference between skill-level and body-conscious movement with an exercise I encountered at a Lecoq training in London.<sup>4</sup> In one exercise we had to walk around the room and then Jos Houben<sup>5</sup>, who was leading the training, told us to sit down. He then asked us, “do you remember how you sat down?”. Most of us, including me, did not. We then repeated the exercise after everyone had observed exactly where their hand touched the ground and then which parts of their body followed in the process of movement. Now, by focusing our attention on our body and proprioceptive sensations, we could remember the movement sequence of sitting down accurately, and even verbalize how the movements were performed.

This example raises the question of whether the movement and position of sitting down was performed in a different way than at the skill level. The sequence of movements was probably not markedly different from the previous one, and from the outside the two may have looked similar. However, when the movement is reproduced after a body-conscious execution, it becomes more precise, because the reference points associated with the proprioceptive sensations are formed, which are then followed through the observed points and activities.

Similarly, when we practice the asanas in yoga class, we also become conscious of different lines of force. Because we are performing simple movements or statically holding out an asana, we can divert our attention to something else. Such a focus point might be, for example, in a simple arm lift, stretching from the heel with your fingertips to activate the muscles through which the line of force passes. Once this has been performed, we will then have the opportunity to become aware of a new line of force.

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<sup>4</sup> Adamovich Ferenc: *A természetes mozdulatok megjelenésének lehetőségei Lecoq technikájában és az affektív mozgáspedagógiában használt referenciapontok alapján*. In: XII. [Tánc és kulturális örökség](#). VII. Nemzetközi Táncudományi Konferencia a Magyar Táncművészeti Egyetemen 2019. november 15–16 [XII. Dance and Cultural Heritage. Seventh International Conference on Dance Studies at the Hungarian University of Dance Arts, 15-16 November 2019]. Ed.: Lanszki Anita, series editor: Bolvári-Takács Gábor, PhD, university professor, Hungarian University of Dance Arts, Budapest, 2019.

<sup>5</sup> Jos Houben is an actor, director and headmaster of the Jacques Lecoq International Theatre School.



The aim is to achieve full body awareness, involving the muscles whose activation is necessary for the development of the asana in the movement, thus implementing the principle of optimal effort.

In the process of learning a complex choreography, we may find that we have almost no opportunity to focus our attention on lines of force or other focal points, because then there is a high chance of getting distracted from the sequence of the movements, like the footballers who had to pay attention to the point where their foot touched the ball while performing a slalom with it.

### 1. The process of movement learning

I will now talk about the role that body awareness can play in movement learning. As a practicing dance artist, I consider the ability to pay attention while working as one of the most important skills. It is through attention that we learn a simple movement, or a complex sequence of them, when we work by “copying” and following the instructions of the dance-master in front of us.

We can distinguish two phases in the learning process. One is the learning phase in which we learn a new movement. At this stage, a lot of attention is still needed to execute the movement, followed by the second, practice phase. As we practice, the movement gradually becomes a skill. Then ever less attentional activity is required to perform the movement, so our freed attentional capacity can give way to other factors.

The question of affective movement pedagogy is what we pay should attention to while learning or performing the movement. Working in a body-conscious way with a focus on kinesthetic representation, we will not concentrate our attention on copying the movement of the foot or arm in imitation of the dance-master, but on reproducing the muscular activities. If we want to move in a body-conscious way, we need to break down the movement into lines of force and proprioceptive focal points. Research should also be conducted into the movements that can be learned with this technique and its limitations. Needless to say, in the case of a multi-complex movement, which is dynamic, fast, and requires a lot of effort, we cannot always work with lines of force and focal points.

Another important question may be how building on the kinesthetic representation associated with body-aware movement changes the process of movement learning. In this area of research, I would like to replicate and further develop the research that examines the memory of a professional ballet dancer in terms of how many joint positions he or she can memorize compared to a layperson.<sup>6</sup>

### 2. The role of multimodal studies

The reason why we need to collect as much data as possible on the evolving movements is to allow us to analyze and do research. To obtain accurate data and a three-dimensional image of the external properties of motion, digitization technology is needed. The kinematic data of the movement describe in numbers the position of the initial body position and the data related to the movement, including the joint angles and acceleration. The motion capture technique, as one of the most widely used techniques for depth movement tracking, is the most important tool for our purpose. Another technique is based on the kinect system, which is cheaper but produces less accurate results.<sup>7</sup>

<sup>6</sup> Ramsay, J. R., & Riddoch, M. J. (2001): Position-matching in the upper limb: professional ballet dancers perform with outstanding accuracy. *Clinical rehabilitation*, 15(3), 324-330.

<sup>7</sup> Pfister, Alexandra, et al.: “Comparative abilities of Microsoft Kinect and Vicon 3D motion capture for gait analysis.” *Journal of medical engineering & technology* 38.5 (2014): 274-280.

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Of course, there are increasingly many ways for researchers to digitize movement. The latest software options are now capable of creating a three-dimensional image from a standard video through multiple filters and even classifying them via LSTM.<sup>8</sup>

The system can be supplemented with a force plate, which is used to measure which part of the body and foot is under pressure at different stages of the movement, obtaining vector images of them.<sup>9</sup> E.g., during a ballet class when practicing the *sauté*, you can use this tool to detect if the weight is not equally distributed between the two legs. In these situations, we compensate for the deficit by over-tightening the muscles. The information obtained from the three tools mentioned above can already be used to effectively differentiate ballet training in this case, thus optimizing performance and preventing injuries. Otherwise, these small mistakes, which are often invisible to the naked eye, may remain hidden from the dance-master conducting the training.

If we want to analyze the movement in more depth, it is important to obtain information on the state of the muscles, which is already linked to the study of the internal properties. In this case, we need to add a wireless electromyography device to the equipment, so that we can obtain information on the state of the muscles during movement. In one experiment, the motion capture tool was supplemented with EMG. The subjects were hospital nurses who were being tested to see what forces and muscle activity were involved in transferring a patient from a bed to a chair. The aim was to create the most efficient sequence of movements, avoiding injury and pain from incorrect posture.<sup>10</sup>

These data can be supplemented with data obtained from the study of other internal properties such as respiration, skin temperature, heart rate or brain activity. There are specific tools for measuring each of these components, most of which can be used even during the movement and provide accurate data.

Multimodal analysis provides detailed data on the different stages of the movement, allowing a wide range of analyses. All these tools are non-invasive, i.e., they do not require any intervention, and are equipped with wireless technology, so the subject can move freely. These tools are suitable for clinical studies in dance and theatre environments, in a purpose-built kinematics laboratory.<sup>11</sup>

What areas would I research using multimodal studies?

- a. Movement analysis to assess the ideal range of movement and for preventive and rehabilitation purposes.
- b. Comparing the difference in formal, physiological and brain activity between skill-level and body-conscious movements, thereby defining the dimension of kinesthetic representation associated with the movement.
- c. Finding the lines of force in body-conscious movements that allow the whole body to be involved in the movement.
- d. Identifying the movement patterns associated with basic emotions as we record and analyse body-conscious movement patterns developed through affective movement pedagogy. Then we can teach an LSTM system, which then automatically classifies the movements according to a set of rules.

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<sup>8</sup> Carrara, Fabio, et al.: "LSTM-based real-time action detection and prediction in human motion streams." *Multimedia Tools and Applications* 78.19 (2019): 27309-27331.

<sup>9</sup> Caderby, Teddy, et al. "Measuring foot progression angle during walking using force-plate data." *Applied Mechanics* 3.1 (2022): 174-181.

<sup>10</sup> Hellmers, Sandra, et al.: "Posture and Mechanical Load Assessment During Patient Transfers." *SN Computer Science* 3.5 (2022): 1-13.

<sup>11</sup> Fig. 1.

### 3. Why kinematic data can be important for dance as an artform

In relation to movement analysis in the field of dance art, one important goal can be the development of ideal ranges of motion for selected movements. By storing kinematic data using several patterns, we can build a database of a movement, which can be used to define reference values associated with a range of movement. The ideal reference range in the database can be compared with the movements performed by the dancers, to obtain an accurate statistic of the advantages and disadvantages associated with the movement of the dancer under study. The aim is not to replicate an “ideal” movement, but to look at the points that determine the movement, e.g., in a jump, the position of take-off and landing, the dynamics of the movement or the position and acceleration of the body parts in relation to each other, the weight distribution. Of course, each dance artist has different talents and abilities, which the system takes into account.

In this connection, there is a relevant study on how the motion capture tool is used in sports.<sup>12</sup> It examines the pitching technique of a baseball player. They highlight key stages in the movement and project them onto a range of motion defined by a large sample database. This clearly reveals the position of the different parts of the body in relation to each other and their speed, e.g., the arriving foot position. The data can then be used to differentiate the athlete’s training.

From a dance art perspective, we can find basic movements in any formal language, ballet, modern or even folk dance, where we can identify advantages and disadvantages from the analysis of kinematic data. For example, while practicing the *sauté*, we can detect that the right calf or thigh is not tight enough, predisposing the dancer to lose balance. In such a case, the training should include exercises that focus on raising awareness of the thigh-tightening muscles. From the experience gained so far and from the analysis of hitherto conducted studies, I conclude that we can also attempt to identify movement types or movement qualities based on the data obtained from multimodal studies.

I would like to research three types of movement:

- a. *Movements performed with partial body awareness.* Here, we could mainly look at skill-level movements that are either intense, dynamic movements or repetitive movements that require a lot of effort but do not have a single-level dynamic arc, e.g., jumps.
- b. *Movements performed with full body awareness.* Motions which consist of more simple movements can be included in this category. I am thinking of movements which can be repeated continuously, light movements without significant changes in the dynamic arc, or movements which can be performed in a uniform manner, i.e., precisely defined by lines of force, e.g., lifting an arm, or extending a leg.
- c. *Movements performed at skill level.* I include movements performed without body awareness in this category.

### 4. The role of brain imaging in dance studies

Brain imaging data can be used to infer the brain activity associated with different movements. A synthesis study<sup>13</sup> details current research directions covering the basic functions related to dance as an art form. It can be seen that the studies do not include an examination of body-conscious movements and kinesthetic representation.

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<sup>12</sup> Boddy, Kyle J., et al.: “Exploring wearable sensors as an alternative to marker-based motion capture in the pitching delivery.” *PeerJ* 7 (2019): e6365.

<sup>13</sup> Basso, Julia C., Medha K. Satyal, and Rachel Rugh: “Dance on the brain: enhancing intra-and inter-brain synchrony.” *Frontiers in Human Neuroscience* 14 (2021): 584312.



This is confirmed by the results of imaging techniques that researchers are using to study the brain structure and activity associated with dance training as a separate area. The brains of dancers with an average of  $15.3 \pm 5.2$  years of training were compared with non-dancers and it was found that the cortical thickness (grey matter thickness) of the dancers' brains was greater in the upper temporal regions. Furthermore, gray matter thickness showed a positive correlation in the accuracy of dance imitation, rhythm synchronization, and melody discrimination.<sup>14</sup> In addition, it is observed that the foot regions of the primary somatosensory and motor cortex have a larger volume of grey matter in ballet dancers.<sup>15</sup> Overall, these results indicate that dance training leads to structural brain changes primarily in sensory and motor regions, as well as in the connections between regions. This provides faster communication and increased coordination between critical brain areas involved in dance expression.

I also consider research on the neural activities associated with or influenced by kinesthetic representation in the execution, observation and recall of movement to be a rich and decisive area of research. In one experiment, for example, scientists used EEG signals to study the clenching of a hand into a fist.<sup>16</sup> Here, too, they observed different brain activity for kinesthetic and visual representation (motor imaging). When using kinesthetic representation, the focus of brain activity was near the sensorimotor hand area, while visual motor imagery did not show a clear spatial pattern.

Since outward and inward attention are associated with different types of brain activity, there is a possibility that the two types of movement execution may also produce different learning outcomes. Inward attention can result in the dominance of kinesthetic representation, while outward attention may lead to the dominance of visual representation.

Research questions related to brain imaging:

- a. Results from movement-related brain imaging studies and kinematic data can help us confirm or refute the hypothesis that kinesthetic representation is presumably related to body-conscious movement.
- b. What is the impact of body-aware movement on movement learning? What difference does it make if we rely not on kinesthetic properties but on the visual representation used in the observation associated with execution?

### **5. Steps of research related to the system of affective movement pedagogy**

a. It must be demonstrated by measurements whether the neutral state is established by controlling attention.

It should also be shown by measurements whether affective movement pedagogy can produce the physiological changes that are characteristic of adequate emotion.

b. It should be established whether physiological activity characteristic of emotion is preserved during movement built from proprioceptive sensations.

Behind every interaction or action, there is an emotional background that influences our behavior and thus our expressions. The emotional background of action and expression do not always coincide, especially in artificially created situations, e.g., a theatrical situation, where we reproduce reality. This difference in emotional charge causes extra tension.

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<sup>14</sup> Karpati, F. J., Giacosa, C., Foster, N. E. V., Penhune, V. B., and Hyde, K. L. (2017): Dance and music share gray matter structural correlates. *Brain Res.* 1657, 62–73. doi: 10.1016/j.brainres.2016.11.029

<sup>15</sup> Meier, J., Topka, M. S., and Hänggi, J. (2016): Differences in cortical representation and structural connectivity of hands and feet between professional handball players and ballet dancers. *Neural Plast.* 2016:6817397. doi: 10.1155/2016/6817397

<sup>16</sup> Neuper, Christa, et al.: "Imagery of motor actions: Differential effects of kinesthetic and visual-motor mode of imagery in single-trial EEG." *Cognitive brain research* 25.3 (2005): 668-677.

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It is important to create gestures without tension, because then we can develop expressions or gestures that are different from those used in social interactions. If we can prove that an emotional state is indeed created through movement, then we can study a much wider range of movements. Affective movement pedagogy reproduces the physiological properties of emotion and builds movements by focusing on proprioceptive sensations. In other words, it does not try to analyze the movement, but seeks to pinpoint the inner state and proprioceptive sensations that are linked to the emotion. Keeping the body-conscious process, we build up movements from the “pre-tuned” emotional state, whose properties we examine.

At the same time, we can also examine the emotional background from which we derive the movement. With the help of affective movement pedagogy, we can start from a neutral state or by “tuning into” a specific emotional state. Using the kinematic data of the movement and the associated muscle tensions, we can accurately determine the differences between movements associated with various emotions. A good example is the software-based digitization system developed from videos about walking, which is an automatic emotion recognition model. It recognizes four emotions from walking with 78% accuracy: neutral, anger, sadness, and joy.<sup>17</sup> This study also uses the LSTM. The peculiarity of this study is that the samples were recorded with a conventional camera, so the subjects were not equipped with any sensors, and therefore we cannot speak of clinical conditions of the study. Furthermore, facial expressions were not considered.

Related to this is my suggestion that both the theatre and the researchers are looking for the same natural state, the question I am looking for the answer to as well. Researchers want the test subject to behave naturally while under laboratory conditions, as this is when accurate results are obtained. Similarly, in the theatre, directors seek a situation where actors behave naturally in front of the audience as if no one is watching them in their realist productions. Using affective movement pedagogy, I try to find answers to both problems.

## 6. Conclusion

In this study, I have presented several dance-related research areas where digital tools for gathering data related to movement can be used effectively. Among these, I highlighted the motion capture technique and the EMG tool, which can be used to collect data on movement and draw conclusions that cannot be based on observation with the naked eye by the dancing-master. I then identified the various areas in which I would like to carry out future research. I emphasized the importance of affective movement pedagogy, which is to be proven. Studies show that brain structure and activity associated with dance training can provide a rich and diverse area of research. By gathering and systematizing research directions, a new university subject can be established: kinematics, which is accompanied by practical study material. The role of the kinematics laboratory can be decisive in promoting the development of the scientific nature of dance studies. The results achieved in these research areas may be relevant not only to the field of dance as an art form, but also to theatre or public education, and may open up opportunities for international cooperation.

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<sup>17</sup> Randhavane, Tanmay, et al.: “Identifying emotions from walking using affective and deep features.” *arXiv preprint arXiv:1906.11884* (2019).

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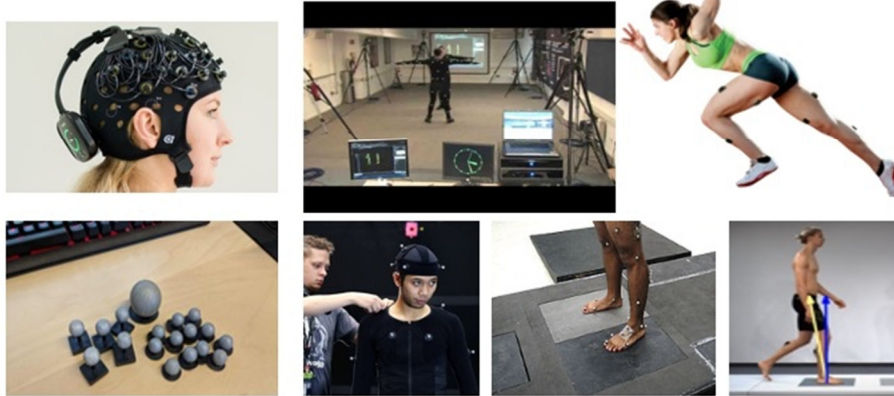
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Image attachment

**Fig. 1.** Instruments that can be useful in a kinematics laboratory for dance artists

Eszközök, amelyek hasznosak lehetnek egy  
kinematikai laboratóriumban táncművészeknek



Top row from left to right: fNirs, kinematics lab, EMG sensors

Bottom row from left to right: motion sensors, motion sensors on clothing, motion sensors on body and forceplate device, gait analysis with forceplate device and EMG



## A MEDICAL BURDEN: GLAUCOMA, ITS PREVALENCE AND OUR AWARE COMMUNITY

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### ABSTRACT

**Objective:** Glaucoma is now becoming one of the major causes of blindness. The major leading cause of this disease worldwide progression is the less knowledge and lacking of awareness. The main objective of this research was to observe the awareness level among Karachi population and also to evaluate the level of agony from glaucoma and what proportion is at risk of developing it to predict its prevalence at a local level.

**Place and duration of study:** Residents of different localities of Karachi belonging to different age groups, gender, class, and caste. The study duration was around 6 months.

**Study Design:** Our study is based on cross-sectional survey to determine the major aim of the research.

**Material and method:** The survey form consist of the questionnaire including general individual information like gender, age, and educational status, and also includes the awareness level about glaucoma along with their suggestion regarding glaucoma suffering ratio and the risk factor. Statistical method was used to analyse data.

**Result:** In this general survey, five hundred participants were involved and collected from the different areas of Karachi population. Awareness level and prevalence of individual with glaucoma is 55% and 10.4% respectively. Through positive family history, an education and performing an eye test, awareness was greatly influenced prior to overdo. The common source of information was seemed to be the media. Higher education was the best source of knowledge whereas the proportion of glaucoma occurrence was significantly related to increasing age.

**Conclusion:** Encouraging the sources to provide awareness with accurate content for the population through practical means like media seem to be best in opposing blindness from glaucoma.

**Keywords:** Glaucoma, awareness about Glaucoma, Glaucoma risk, and population of Karachi.

## 1. INTRODUCTION

Glaucoma is now becoming one of the major global health problems, dominating by different healthcare organizations worldwide like the World Health Organization (WHO) [1]. It is an eye disorder caused due to presence of several factors and may be inherited or not [2]. Mostly researchers emphasize that damage to optic nerve causing incurable blindness due to presence of specific gene [3]. The late glaucoma presentation signs when it became incurable mostly due to two main reasons:

- Ignorance on initial mild symptoms appearance.
- Poor awareness among population [4].

Glaucoma is a threatening eye disorder but if it is diagnosed earlier so that it can be treatable efficiently [5]. Some glaucoma suffering patients are usually linked with more than one symptom [7]. Secondary causes of glaucoma include lens-induced, uveitis, neo-vascular, or traumatic [8]. Acute Glaucoma symptomized as coloured halos, redness of cornea, and headache whereas usually halos (coloured) are also related with OAG [9].

Glaucoma diagnoses include detection of PEX deposits (pseudo exfoliation) material as white flakes presence in eye iris [10]. Reduction in the pressure (ocular pressure) is included in the effective treatment methods for glaucoma [11]. Glaucoma drugs include carbonic anhydrase inhibitors, beta-adrenergic antagonist (usually known as beta-blockers), and prostaglandin analogues are commonly prescribed for glaucoma treatment [12]. In addition, laser surgeries are also used for glaucoma management [13, 14].

The high prevalence of glaucoma was reported in Pakistan (regardless of specified age) is mainly because of the late diagnosis of cataract, lack in managing diseases like diabetes, and uveitis, and increased use of steroidal drugs [9, 13]. The one most useful and effective way with safety profile for management of glaucoma in Pakistan is Trabecutectomy, surgically reducing ocular pressure [15-17].

The overall reported prevalence of glaucoma in the United State, population about 40 years and older aged was 2.1% [11,15,18]. The range of population suffering from any type of glaucoma or can be effected is increasing day by day at global level, the reports from all over world have predicted this situation, we see today's figure like in China the prevalence has increased around 3.6% comparing their data with Caucasian population [16]. Many Australian studies has reported that lack of awareness is exposing us to late representation of this disease and leading us towards painless vision diminishing level. Global level of glaucoma has shown increase prevalence up to 3.54% in elderly population notably, comparing Africans and Asians both has shown significant increase in cases as the years are passing [17].

The rationale of study we consider, is that, the prevalence of glaucoma of any kind is bound to increase, one of the major reason is lack of awareness, secondly our lifestyle is also promoting its prevalence as well, increase use of smart phones, televisions, laptops and related gadgets are seriously affect our eye health. Mainly this is a painless loss of vision, so, most people are mainly don't take it in consideration and assume that increasing age is effecting it, where they have no knowledge regarding how and what factors are contributing in it.

### **1.1 Purpose of Study:**

The aim and objective for our study is to analyse the proportion of awareness among Karachi (Pakistan) population in spite-of focused on particular age group including all ages as children, young and elderly in both genders [19, 20]. As observed through worldwide data the prevalence of this disease is increasing at concerning level, so to consider it we have designed a study to evaluate the prevalence of this disease in our local residents among Karachi. The study along with prevalence also focuses on evaluating its awareness and finding methods of how we can expand it, as we believe lack of awareness is leading towards increase in its prevalence.

## **2. MATERIAL & METHOD:**

The proposed method represents a cross sectional survey, executed on a general public. The collected data through this survey, includes the sample of 500 individuals of population from different areas of Karachi.

### **2.1 STUDY DESIGN**

The form based on the questionnaires that are categorized into three appendices:

#### **2.1.1 Appendix 1:**

Includes general demographics of individuals like age, gender and educational status.

#### **2.1.2 Appendix 2:**

In this section, the included questions are the percentage of awareness or not about disease, the understanding of person about glaucoma like what do you think of glaucoma, the causes, signs and symptoms and the method of treatment of this disease, whether you think it is that severe to cause either life-threatening conditions or not.

#### **2.1.3 Appendix 3:**

This section includes, analysing the risk of glaucoma in an individual whether it is present or not. This is done by successfully determining the certain lifestyle factors which shows relation in selected individuals such as: the exposure time to electromagnetic radiations through electronic devices to the eyes. The devices which are used are laptop, television, mobile phone; or the individual has been suffering from certain disease like hypertension, diabetes, and thyroid gland diseases that can lead to develop glaucoma disease. Because in hypertension, the accommodation of fluids occurs in body's different parts due to the increased blood volume.

The data which is collected at above is used to determine the awareness level of glaucoma disease in population and also the amount of population which is at risk of this disease.

### **2.2 INCLUSION CRITERIA**

The selection of the individuals for this study was done easily as the survey design to be flexible regardless of any certain factors. The individuals of Karachi's general public were selected randomly regardless of their gender, age, race, occupation, caste, resident area and health factors.

### **2.3 EXCLUSION CRITERIA:**

No exclusion criterion is made as this study is flexibly designed.



#### **2.4 STATISTICAL ANALYSIS:**

*2.4.1 For sample sizing:* The confidence interval analysis of sample size at 95% was done by including overall population of Karachi and then Z-test was performed. The sample size includes 389 individuals. The survey was conducted on 500 individuals to avoid chances of any error.

*2.4.2 Analysis of Data:* For data analysis we have followed descriptive statistical analytical and graphs and charts statistical software were used.

#### **2.5 ETHICAL APPROVAL:**

The conduction of this research is according to the declaration principles.

### **3. RESULT**

As the estimation of the proportion of awareness among people regarding glaucoma disease is the main objective of our study so the collection was done to get the best information regarding glaucoma from general public. All important contents which are necessary for the knowledge about glaucoma were covered in the survey form.

As the objective of our study was to estimate the proportion of glaucoma awareness among people so we collected the best information about glaucoma from general population. Survey forms covered all content that was important for glaucoma knowledge. Total of the 500 individuals who participated in the quiz, 100 people of them were aged below 20 years whereas 288 people them were aged between 20-40 years and the rest of the 112 peoples were aged above 40 years.

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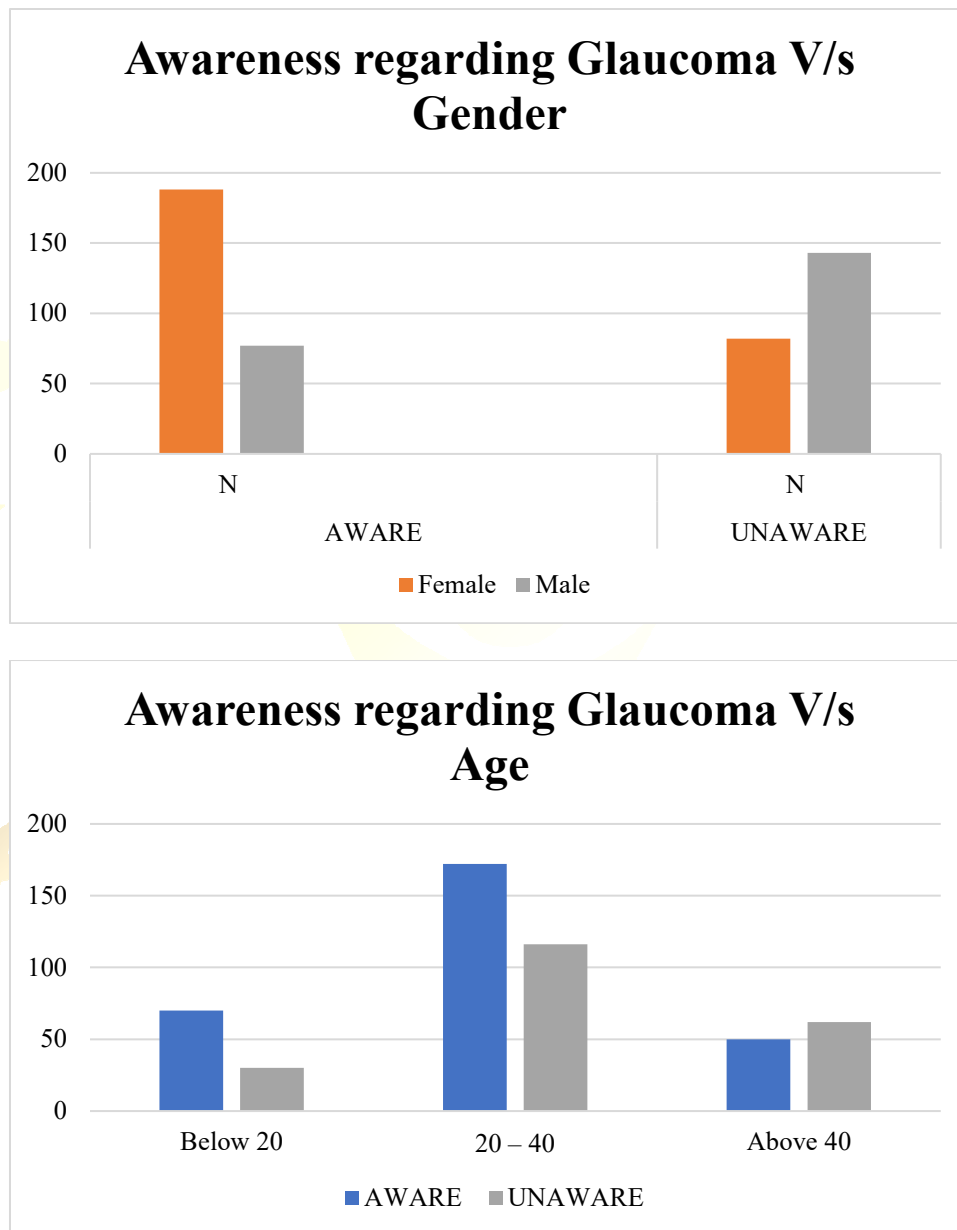
**TABLE 1: Demographic characteristics of Survey participant**

S. No.	Demographic Features	N	%age
<b>1</b>	<b>Sex</b>		
	Male	230	46.00
	Female	270	54.00
<b>2</b>	<b>Age</b>		
	Below 20	100	20.00
	20-40	288	57.60
	Above 40	112	22.40
<b>3</b>	<b>Qualification</b>		
	Uneducated	32	6.40
	Matriculation	56	11.20
	Intermediate	160	32.00
	Graduation	187	37.40
	Post-graduation	65	13.00
<b>4</b>	<b>Glaucoma patient</b>		
	Yes	52	10.40
	No	448	89.60
<b>5</b>	Have other disease (HTN, diabetes, thyroid)	110	22.00
<b>6</b>	In contact with high light intensity	26	5.20
<b>7</b>	Have positive glaucoma family history	94	18.80
	Maternal	40	42.55
	Paternal	54	57.45

Total of little over 500 people were examined from which approximately 89.60% said that they didn't suffer with glaucoma whereas 10.40 % of people showed the presence of glaucoma on examination. It is also seen that the family history of glaucoma condition was not significantly associated with its diagnosis. After examining family history of a sample size containing little over the 500 people it is shown that 18.8% knows about their family history of glaucoma, in which 42.55% people from their maternal side shows the positive result with glaucoma and whereas about 57.45% people shows a positive result of glaucoma from paternal side; hence it is greater than from the maternal side (Table 1).

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Figure 3 a & b: The Awareness of people about Glaucoma according to Gender and Age



(Figure 1) The quiz includes males and females of 140 and 110 respectively. So, the men are slightly more than the women. The results of this survey showed that 40 males out of 140 and 100 females from 110 shows the awareness regarding glaucoma or they have heard it previously. The results also showed that 49.26% have an eye problem while the remaining about 51.56% haven't even undergone through any eye test.

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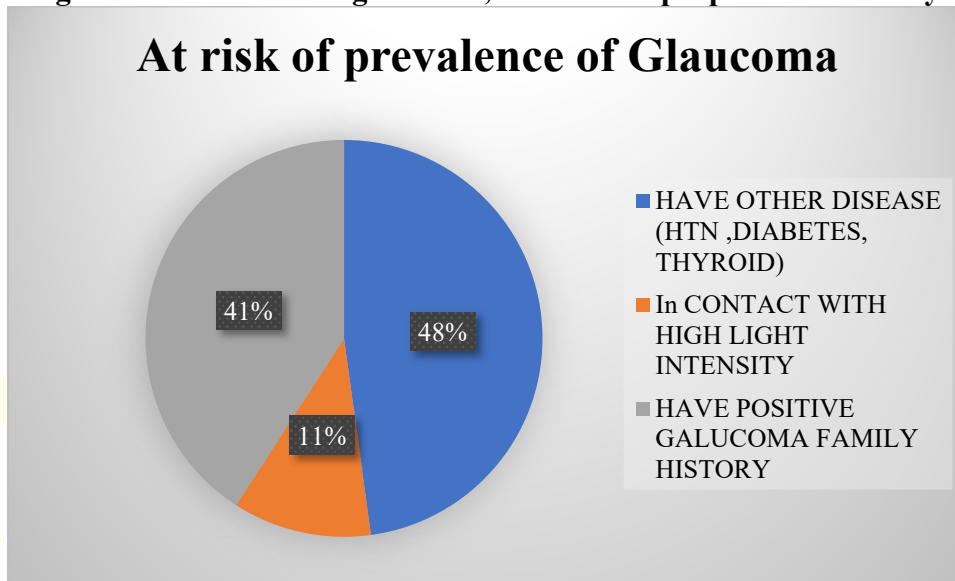
**TABLE 2: Awareness of Glaucoma evaluated with respect different attributes**

S. No.	Characteristics	Aware		Unaware		Total	
		N	(%)	N	(%)	N	(%)
<b>1</b>	<b>Gender</b>						
	Female	188	69.6	82	30.4	270	100
	Male	87	37.8	143	62.2	230	100
<b>2</b>	<b>Age</b>						
	Below 20	70	70.0	30	30.0	100	100
	20 – 40	172	59.7	116	40.3	288	100
	Above 40	50	44.6	62	55.4	112	100
<b>3</b>	<b>Qualification</b>						
	Uneducated	3	9.4	29	90.6	32	100
	Matriculation	23	41.1	33	58.9	56	100
	Intermediate	100	62.5	60	37.5	160	100
	Graduation	124	66.3	63	33.7	187	100
	Post-graduation	30	46.2	35	53.8	65	100
<b>4</b>	<b>Eye check up</b>						
	Yes	180	48.4	192	51.6	372	100
	No	67	52.3	61	47.7	128	100
<b>5</b>	<b>Family history</b>						
	Yes	61	59.8	41	40.2	102	100
	No	212	53.3	186	46.7	398	100

Only about 59.8% people were completely sure having a positive family history for glaucoma. The people who are doing graduation programs have shown more likely to have knowledge as 66.3% individual in that category have sound information regarding glaucoma comparative to people who are categorized as uneducated. (Table 2)

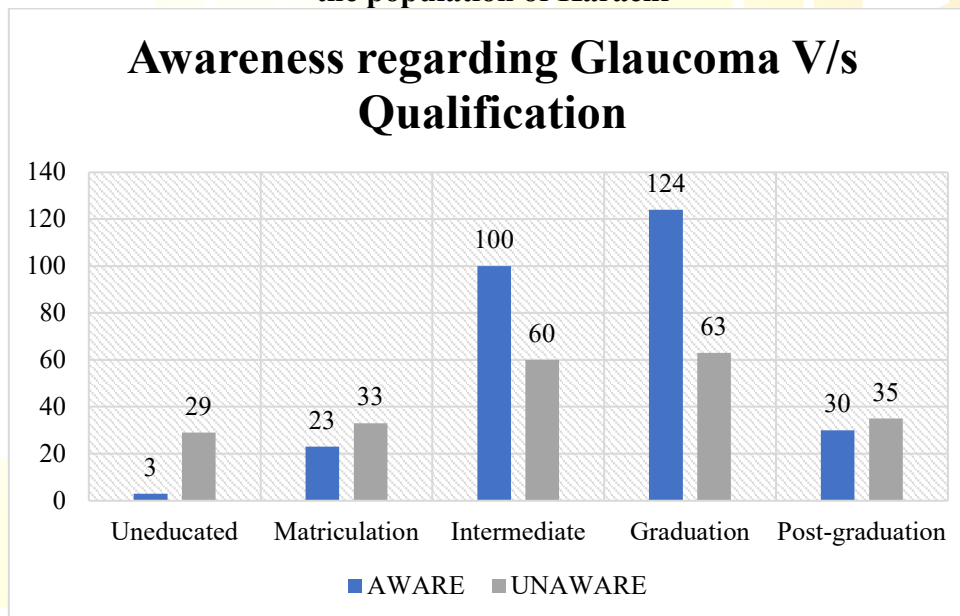
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Figure 2: Prevalence of glaucoma, in different people of our society.



The status of occupation plays an important role for the health of eye and its related problems. Several eye diseases can cause by the continuous use of the light with high intensity. In this survey form, the intensity of light has been examined by its exposure and the results which have obtained have shown that 48% works in light with high intensity therefore, few risk factors can be caused in developing eye disorder of any type. (Figure 2)

Figure 4: According to qualification level, awareness level regarding Glaucoma among the population of Karachi



Mostly peoples were unaware about glaucoma and some are completely unaware that loss of vision due to glaucoma is irreversible. Level of education and occupational status were directly associated with knowledge of glaucoma. Out of the 500 participated individuals the proportion of glaucoma in the study population was 9.6%.

The proportion significantly increased with increasing age, which also matches the global reports regarding glaucoma that the risk of glaucoma increases with age [16]. While 56% individuals are aware about the disease and 44% are unaware about it; of the total sample of population. (Figure 3a, 3b)

#### 4. DISCUSSION

Glaucoma disease is considered as one of the major health problems that causing burden for worldwide [1]. This disease is cause due to the involvement of various or multiple factors (multifactorial) and it may also be a genetically inherited or not [2].

Considering all causing factors, the data was collected among the random general public of Karachi to estimate the sensitivity of this global issue. The individuals were selected to estimate the common individuals awareness regarding this disease, its societal prevalence, and what possible factors may aid in the dominance of this disease. The Z-test was applied to select the sample size on the Karachi's total population that is about of 20 million with confidence interval of 95% and about 389 individuals sample size is obtained, considering chance of error in mind the sample was extended to a little over of 500, which comprises of 280 and about 220 females participated.

Recently in our research we have observed that about 48 people (9.6%) out of 500 were the glaucoma patient in Karachi and due to many causes like age, development of any other disease, family history and having a work environment that can push an individual towards development of glaucoma is fairly average. Although in our society most of the individuals from educated background or having any eye disease family history are aware about glaucoma but the prevailing factor still high to a certain extent, as the global data represents as well, due to our lifestyle changes, work environment changes and other factors [17]. There are many prevailing factors behind this whole scenario, that can influence any individual to development of any eye disorder including glaucoma, the factors taken using data and reference of global perspective including factor are: 4.8% working in environment where continuous exposure by high light intensity of computers, laptops, cell phones, and different other lights, 18.8% have a positive family history background for glaucoma, people usually does not go for regular eye check-up even with home remedy treating eye infection is also very common in our society, confined to fact that most have positive family history to eye disorders that they does not care or enough educated to take a medical care in curing their problem; other risk that involves in its prevalence include Hypertension, Diabetes, Thyroid disease; the overall result is 15.06% which is a under seeing problem for the population.

If we discuss about overall Pakistan population it is shown that the prevalence of blinding was 2.7% according to National Health Survey of 2003, it has been officially reported [9], while according to our study it has been observed that approx. 9.4% patients with glaucoma either in one eye or both in Karachi which is a biggest concern, the reports has proved it. The number of glaucoma patient worldwide is 64300000 (64.3 million), which are assumed to be increasing in future and become 76000000 (76.0 million) in 2020 and 111800000 (111.8 million) in 2040 [11].

Comparing our data to different international level data, the cases overall representing glaucoma positive case in local population represents approx. 9.60%. Although the numbers are not high but when comparing it to global level, including China almost 3.6% is the prevalence factor [16] south East Asia the factor of prevalence is around 5.55%, in central Asia the factor regards is almost 5% [21]. When comparing such data among Asian our numbers seem very alarming.



In our exploration, the prevalence of glaucoma increases with age, due to work environment where light exposure is high, due any co-morbidity like diabetes, hypertension etc. this exploration matches the global reported data as well [2, 4 & 16]. Although the according to our findings, glaucoma positive cases, does not show high proportion in which both genders including males and females are involved but it's more prevailing in males as compared to females, according to our findings, while mostly people with it are in general aware about glaucoma. This data is shows very similar pattern when comparing it to global data where many countries like India, USA, China, South Korea, Australia, UK and many more has reported similar condition.

The generalize ability of the results obtained from this study may be inconclusive because of the one limitation of this study, that it was conducted on outreach population (limitation of the study). Even so, people who participated belong to various demographic and different backgrounds of education and some of the results have been contributed in this study with national survey conclusion. The significant facts have been obtained from the results which are used for planning of public health measure to control the glaucoma in terms of target population, content and medium.

## 5. CONCLUSION

In whole world, glaucoma is blindness causing prevailed disease when it became worse, we can decrease its prevalence among local population by educating our population about the disease and spreading awareness among them, further on by creating medium where they can have easy access regarding the treatment facilities. Additionally, educational programs must be arranged to enhance understanding of the indications for this disease by ophthalmologists and other medical staff, basic knowledge regarding this disease should be spread, this although not a life-threatening disease, but can effect quality of life, to promote this factor of a better quality of life is for all, we should take step in spreading awareness on the subject of it because lack of awareness is majorly responsible for increase in prevalence. We have to arrange for providing free treatment to the poor or needy people by establishing the health camps in their towns and provide free examination and also provide awareness about the disease of glaucoma.

## Conflicts of interest

Between author or any other person there are no conflicts of interest.

## Acknowledgment

We wish to pay our gratitude to our organization Jinnah University for Women, for supporting us fully in this entire study.

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**DRUG LIKENESS, ADMET AND MOLECULAR DOCKING DYNAMICS STUDIES  
FOR DISCOVERY ANTI-SLEEP DISORDERS AGENTS**

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**Abstract**

Often, sleep disorders are severe, obstruct a patient's recovery, and degrade their quality of life. Identifying new anti-Sleep Disorders agents is therefore extremely important. To discover potential hits, molecular docking and MD simulation are used. Structure-based drug design also provides insight into how ligands behave in computational settings. In order to visualize and analyze protein-ligand complexes at the atomic level, docking tools are used. Molecular dynamics simulations demonstrate the stability of molecules within receptor cavities. 20 Compounds of Cannabis sativa L plants were screened against orexin as part of this study. For the purpose of detecting molecules with properties suitable for future drug development, we have set up an ADMET and Druglikeness study. Cannabis sativa L compounds were docked to the orexin receptor and their binding affinities were examined. Cannabis compounds screened showed higher binding affinities and energies towards targeted receptors. The MD simulation study is applied to the most stable compounds and shows that docked complexes for orexin receptors are stable. This cannabis has anti-Sleep Disorders properties that can be repurposed in the futur. Considering the results of these in-silico experiments, further investigation into their anti-sleep properties is warranted.

**Keywords:** Cannabis, Sleep Disorders, Drug likness, ADMET, molecular docking, molecular dynamics

**PERI-IMPLANT MARGINAL BONE LOSS PROGRESSION AND A-MMP-8 CAN BE CONSIDERED AS INDICATORS OF THE SUBSEQUENT ONSET OF PERI-IMPLANTITIS. A 5-YEAR STUDY**

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**What is known:**

It has documented that dental implant with a high degree of early marginal bone (MBL) loss are likely to achieve additional increased MBL during function. Moreover, it has been speculated that an early increased MBL might be a predictive factor for the subsequent onset peri-implant inflammatory diseases.

**What this study adds:**

The present study showed that, after 5 years of function, implants with increased MBL rates at 6 months after loading are likely to achieve additional high values of MBL. No statistically significant relationship between MBL progression and the onset of peri-implantitis was found, whereas high MMP-8 levels, 6 months after loading, could have the distinct ability to predict the onset peri-implantitis.

**Abstract**

The aim of this retrospective study was to investigate the relationship between the amount of early bone remodeling, the marginal bone loss (MBL) progression, and the peri-implant sulcular fluid concentration of active metalloproteinase-8 (a-MMP-8) and incidence of peri-implantitis during 5 years of implant function.

**Materials and Methods:** Clinical and radiographic documentation at implant placement (T0), at restoration delivery (TR) at 6 months (T1), at 2- (T2) and at 5-years (T5) post-loading were retrospectively collected. MBL levels/rates (MBLr) and peri-implant sulcular fluid levels/rates of a-MMP-8 were assessed at TR, T1, T2, and T5. Implants were divided into two groups: group 1 with peri-implantitis (P+) and group 2 without peri-implantitis (P-). A multi-level simple binary logistic regression, using generalized estimation equations (GEE), was used to assess the association between each independent variable and P+. Receiver Operating Characteristics (ROC) curve was used to evaluate an optimal cut-off point of T1 MBL degree and a-MMP-8 level to discriminate between P+ and P- implants.

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**Results:** A total of 80 patients receiving 80 implants [39 implants with a laser-microtextured collar surface (LMS) and 41 implants with a machined collar surface (MS)] were included. Periapical radiographs and a software package were used to measure MBL rates. Peri-implant sulcular Implant fluid samples were analyzed by a chairside mouth rinse test, (ImplantSafe<sup>®</sup>), in combination with a digital reader, (ORALyzer<sup>®</sup>). Twenty-four implants (6 with LMS, and 18 with MS) were classified with P+. No statistically significant association was found between the amount of early bone remodeling, MBL progression, MBLr, and incidence of peri-implantitis. Implants with a-MMP-8 levels >15.3 ng/mL at T1 presented significant influence on the probability of P+.

**Conclusion:** The amount of early. marginal bone remodeling cannot be considered as indicators of the subsequent onset of P+, whereas high a-MMP-8 levels, 6 months after loading, could have the distinct ability to predict P+.

**Keywords:** Implants; MMP-8; Peri-Implantitis; Prognosis; Marginal Bone Loss; MBL; Periodontal Indices.



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## TARGETING THE LXR RECEPTOR IN PANCREAS CANCER: A STUDY IN SILICO

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### **ABSTRACT**

Pancreatic ductal adenocarcinoma (PDAC) cancer is one of the cancers with high mortality and morbidity, and it is the eighth cause of cancer-related deaths worldwide. PDAC has a poor prognosis due to its aggressive nature, late diagnosis, and lack of effective therapeutic options for advanced disease. The high mortality has led to the search for other factors that contribute to the treatment. Recent advances in cancer metabolism have revealed many potential therapeutic targets for cancer therapy. Metabolic reprogramming, a strategy used by cancer cells to adapt to rapid proliferation, is recognized as a novel feature of cancer. Extensive research has revealed that there is increased glycolysis, glutaminolysis, nucleotide and lipid synthesis in cancer cells. The nuclear receptor liver X receptor (LXR) as a cholesterol sensor is an important factor regulating cholesterol homeostasis. LXRs, namely LXR $\alpha$  and LXR $\beta$ , are nuclear receptors that regulate the transcription of genes involved in cholesterol, glucose, lipid metabolism and inflammatory responses. LXRs have also emerged as a target for PDAC, and LXR ligands have been shown to exert antiproliferative effects in many cancers, particularly pancreatic cancer. Inhibition of LXR has been shown to inhibit cell proliferation and increase sensitivity to chemotherapy.

In this study, LXR $\alpha$  and LXR $\beta$  inhibitory ligands, which are thought to play a prognostic role in PDAC, were investigated by molecular docking method with Schrödinger program. Polydatin,  $\beta$ -Sitosterol, and Baicalein showed potent inhibition of LXR-alpha and LXR-beta in this study (Figure 1). Polydatin,  $\beta$ -sitosterol, and baicalein molecules were used to evaluate the interaction/insertion mechanisms between the proteins LXR-alpha and LXR-beta receptors, which is important in pharmaceutical research, using the Schrödinger program. Their binding affinities and the amount of interaction they contributed were calculated using the Discovery Studio application. The ligand analysis matched to their binding affinity was conducted using the PyMOL tool. We were able to assess the stability of insertion by taking into account the active site, different kinds of interactions, and bond lengths of the target receptor.

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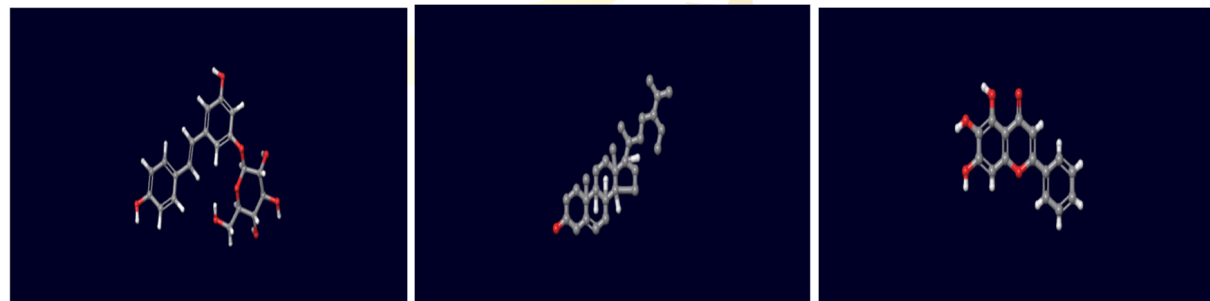
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The drug affinities and ADMET properties of the compounds polydatin,  $\beta$ -sitosterol, and baicalein were also investigated in order to estimate pharmacokinetic profiles.

**Keywords:** LXR, Polydatin, Molecular docking, Schrödinger program, ADMET.



**Polydatin**

**$\beta$ -Sitosterol**

**Baicalein**

**Figure1:** 3D molecular structure of Polydatin,  $\beta$ -Sitosterol, and Baicalein.

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## TARGETING INFLAMMATORY RESPONSE IN PROSTATE CANCER: A STUDY IN SLICO

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### ABSTRACT

Prostate cancer is among the most common cancers in men worldwide, with an estimated 1,600,000 cases and 366,000 deaths annually. Androgen deprivation therapy (ADT) is a usual first-line option for men with advanced prostate cancer, but the vast majority eventually progress while taking ADT. This condition is called castration-resistant prostate cancer (CRPC). The mechanisms driving the progression from androgen-dependent (hormone-sensitive or castration-sensitive) prostate cancer to CRPC are still largely unclear, although it is thought to be central to continued androgen receptor signaling despite depletion of circulating androgens and androgen receptor blockade. Systemic inflammation is thought to play a role in the formation and progression of prostate cancer. The presence of a systemic inflammatory response has been shown to independently predict poor long-term cancer outcome in patients with prostate cancer. In this study, ligands that inhibit RXR-alpha and RXR-beta receptors as targets of inflammatory response in prostate cancer were investigated. This role of RXR-alpha and RXR-beta in prostate cancer makes it a therapeutic target. In this in silico study, ligands that would inhibit RXR-alpha and RXR-beta were investigated. In this study, we showed that Kaempferol, Formononetin and Luteolin (Figure1) inhibited RXR-alpha and RXR-beta with high efficiency. Kaempferol, Formononetin and Luteolin molecules were used in this study to analyze the interaction/insertion mechanisms between the proteins RXR-alpha and RXR-beta receptors, which is significant in pharmaceutical research with Schrödinger program. The Discovery Studio program was used to calculate their binding affinities and determine how much of an interaction they contributed to. The PyMOL program was used to perform ligand analysis corresponding to their binding affinity. Knowing the target receptor's active site, types of interactions, and bond lengths allowed us to interpret the stability of insertion. Furthermore, Kaempferol, Formononetin and Luteolin molecules drug affinities and ADMET characteristics were examined for the purpose of estimating pharmacokinetic profiles.

**Keywords:** RXR-alpha, RXR-beta, Molecular docking, Schrödinger program, ADMET.

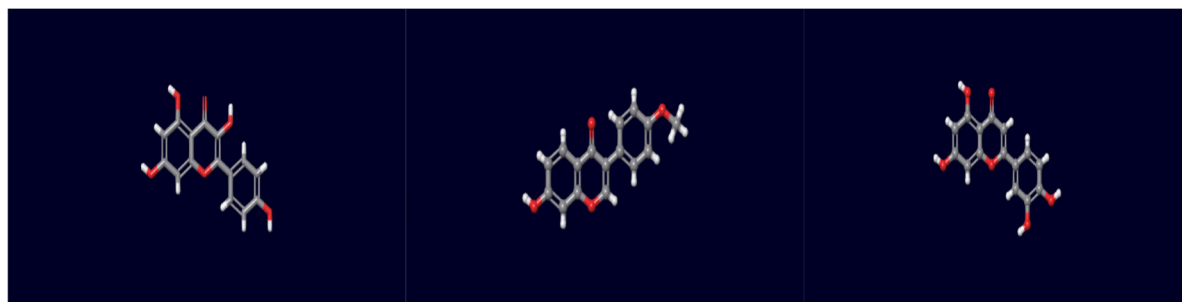


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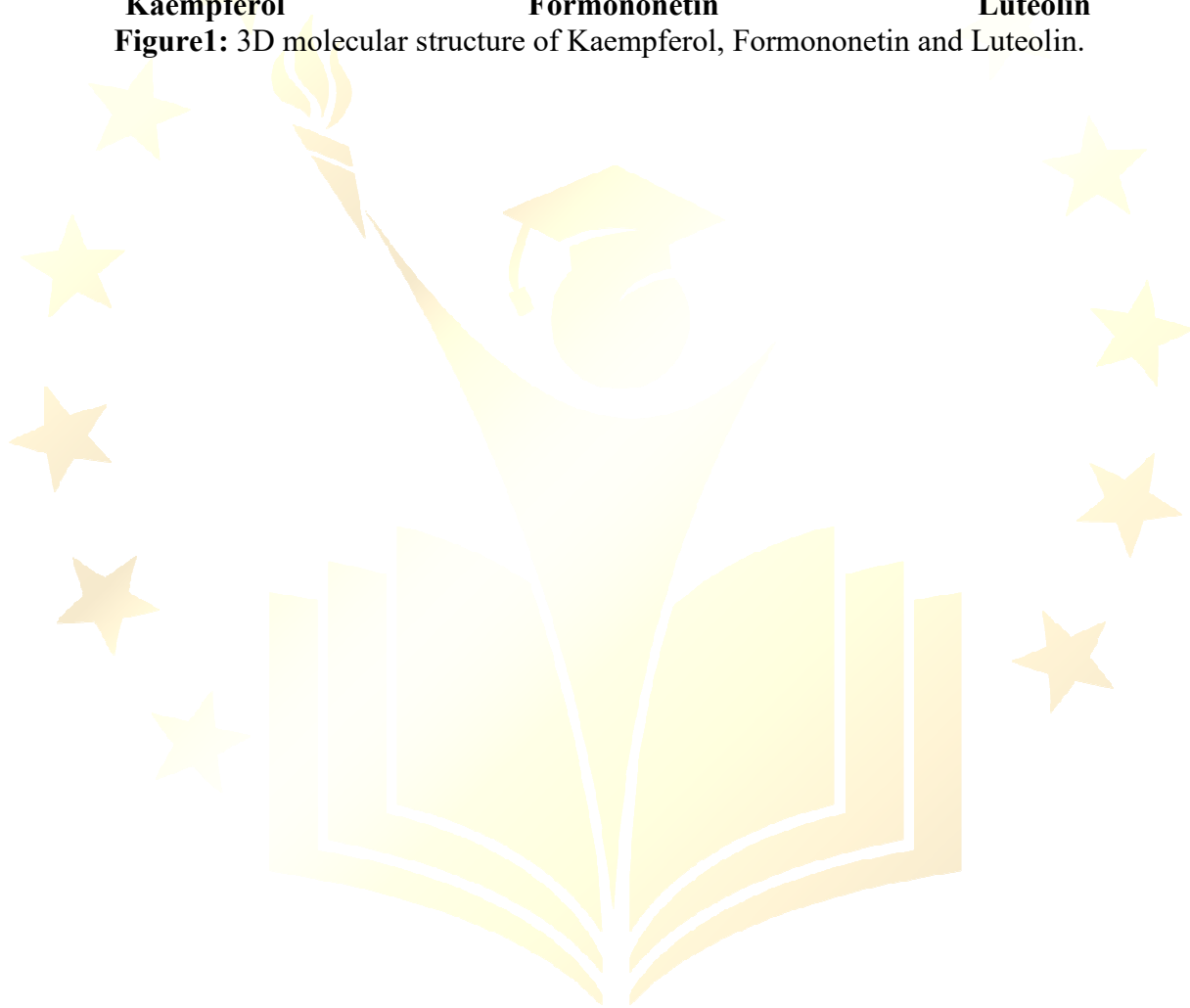


**Kaempferol**

**Formononetin**

**Luteolin**

**Figure1:** 3D molecular structure of Kaempferol, Formononetin and Luteolin.



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**ANALYSIS OF ISSUES ASSOCIATED WITH LEGALIZING INDUCED ABORTION  
AMONG WOMEN OF REPRODUCTIVE AGE IN UGANDA: A SITUATIONAL  
ANALYSIS AMONG DOCTORS, LAWYERS, AND UNIVERSITY MEDICAL  
STUDENTS**

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**Abstract**

This study investigated issues associated with legalizing induced abortion among women of reproductive age in Uganda. Due to the restrictive abortion laws, women opt for clandestine abortions which are usually unsafe. The study aimed to: (a) determine the level of awareness of doctors, medical students, and lawyers on the current laws and policies on induced abortion (b) investigate the insight of doctors, medical students, and lawyers on the advantages of legalizing induced abortion and (c) evaluate the insight of doctors, medical students, and lawyers on the barriers to legalizing induced abortion. The study found that there was a significant gap in the knowledge of the laws and policies on abortion in Uganda among doctors, medical students, and lawyers (Sig=0.000, P-value < 0.05). Legalizing induced abortion was viewed to have the advantage of reducing maternal mortality by 59% of the variance while it was further viewed to reduce abortion complications by 15% of the variance. The most significant barrier to legalizing induced abortion in Uganda is religious organizations which contribute 49% of the variance and few policymakers publicly articulating being in favor of liberal abortion laws contributed 22% of the variance. The most significant barrier to the implementation of abortion laws is the laws being too complicated (41% of the variance) accompanied by a failure to inform the public, health workers, and government officials what a new law entails (24.1% of the variance). The insights of the respondents on legalizing induced abortion predicted an 80.5% of variance towards the medics' willingness to perform an induced abortion, while it predicted a 65.9% variance towards the lawyers' willingness to launch a constitutional challenge. It was concluded that there is a significant gap in the knowledge of doctors, medical students, and lawyers on the current laws and policies on induced abortion.

**Keywords:** Induced Abortion, legalizing Induced Abortion, Abortion Laws & Policies, Maternal Mortality

**1. INTRODUCTION**

Abortion is the expulsion or extraction of an embryo or fetus weighing 500 g or less when it is not capable of independent survival **Hata! Başvuru kaynağı bulunamadı..** The age of viability varies within the countries depending on the social and medical conditions in which the infant is born. In developing countries, such as Uganda, infants of less than 28 weeks of gestation without neonatal intensive care have a 95% probability of dying **Hata! Başvuru kaynağı bulunamadı..** Abortion may be spontaneous or induced. Induction of abortion is the deliberate termination of pregnancy either by medical or surgical method before the viability of the fetus which may be legal/ medical termination of pregnancy or illegal **Hata! Başvuru kaynağı bulunamadı..** Illegal abortion is also known as criminal abortion or unsafe abortion. Unsafe abortion is a procedure performed either by persons lacking the necessary skills or in

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an environment lacking minimal medical standards, or both **Hata! Başvuru kaynağı bulunamadı..**



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Induced abortion is a very safe procedure when performed according to WHO guidelines, however, legal restrictions, stigma, cost, lack of resources, and poor health system accountability limit the availability, accessibility, and use of quality abortion care services **Hata! Başvuru kaynağı bulunamadı..**

About 73 million induced abortions take place worldwide each year **Hata! Başvuru kaynağı bulunamadı..** 61% of all unintended pregnancies and 29% of all pregnancies end in induced abortion. Around 45% of all abortions are unsafe, of which 97% take place in developing countries **Hata! Başvuru kaynağı bulunamadı..** During 2010–2014, an estimated 8.2 million induced abortions occurred each year in Africa **Hata! Başvuru kaynağı bulunamadı..** In Uganda in 2013, an estimated 314,304 induced abortions occurred. The national abortion rate was 39 abortions per 1,000 women aged 15–49 **Hata! Başvuru kaynağı bulunamadı..** Every year, 4.7–13.2% of maternal deaths can be attributed to unsafe abortion. In developed regions, it is estimated that 30 women die for every 100 000 unsafe abortions while in developing regions, the number rises to 220 deaths per 100 000 unsafe abortions **Hata! Başvuru kaynağı bulunamadı..**

An estimated 93% of women of reproductive age in Africa live in countries with restrictive abortion laws **Hata! Başvuru kaynağı bulunamadı..** The proportion of unsafe abortions is significantly higher in countries with highly restrictive abortion laws than in countries with less restrictive laws **Hata! Başvuru kaynağı bulunamadı..**

The Ugandan Constitution, in Article 22, item 2 states: "No person has the right to terminate the life of an unborn child except as may be authorized by law." Hence, the constitution anticipated that there should be instances in which the termination of pregnancy should be permitted and prescribed that such instances should be laid out by the law, however, since the enactment of the Constitution in October 1995, the Parliament has not created a law to prescribe instances in which a person can be permitted to terminate a pregnancy. **Hata! Başvuru kaynağı bulunamadı..** Nevertheless, the Penal Code Act of Uganda, which commenced on 15 June 1950, provides for criminal sanctions to several aspects of abortion and, in the absence of any other law, it is the authority on instances in which abortion is or is not permitted **Hata! Başvuru kaynağı bulunamadı..** Section 141, 142, 143, and 212 of the Penal Code Act provide for the offenses relating to abortion while Section 224 provides for a defense against prosecution for an offense relating to abortion **Hata! Başvuru kaynağı bulunamadı..** It states in Section 141, "Attempts to procure abortion", that any person who, with intent to procure the miscarriage of a woman whether she is or is not with child, unlawfully administers to her or causes her to take any poison or other noxious thing, or uses any force of any kind, or uses any other means, commits a felony and is liable to imprisonment for fourteen years, Section 142 states that an attempt by a woman to procure an unlawful abortion is punishable by imprisonment of seven years, and Section 143 states that anyone who aids a woman (by supplying drugs or other ways) in performing an unlawful abortion can be imprisoned up to three years **Hata! Başvuru kaynağı bulunamadı..**

The Ugandan government itself acknowledges that the law on termination of pregnancy contains a life and mental and physical health exception and the importance of access to safe termination of pregnancy services and issued guidelines that specify who can obtain these services **Hata! Başvuru kaynağı bulunamadı..** The 2006 National Policy Guidelines and Service Standards for Sexual and Reproductive Health and Rights provide for access to abortion services in cases of severe maternal illnesses threatening the health of a pregnant woman such as severe cardiac disease, renal disease, severe pre-eclampsia and eclampsia, severe fetal abnormalities which are not compatible with extra-uterine life such as molar

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pregnancy and anencephaly, cervical cancer, HIV-positive women requesting for termination and cases of rape, incest, and defilement **Hata! Başvuru kaynağı bulunamadı..**

The criminalization of abortion in Uganda has had the effect of restraining health workers from providing safe abortion services for fear of prosecution which in turn has led to the inability of women to access the services **Hata! Başvuru kaynağı bulunamadı..**



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As a result, women who decide to abort usually resort to untrained and usually unskilled practitioners who practice in illegal and hidden clinics and often provide unsafe abortion procedures that result in a high rate of complications and sometimes death. Unsafe abortions are estimated to cause 21% of all maternal deaths in Uganda **Hata! Başvuru kaynağı bulunamadı..**

Ensuring that females have access to abortion care that is evidence-based, which includes being safe, respectful, and non-discriminatory, is fundamental to meeting the Sustainable Development Goals (SDGs) relating to good health and well-being (SDG3) and gender equality (SDG5) **Hata! Başvuru kaynağı bulunamadı..** Unless Sub-Saharan governments act to prevent avoidable maternal deaths from unsafe abortion, they will be hard-pressed to meet the United Nations SDG target (in Goal 3) of reducing the maternal mortality ratio to fewer than 70 maternal deaths per 100,000 live births by 2030 **Hata! Başvuru kaynağı bulunamadı..**

The issue of induced abortion in Uganda can be framed within two main discourses: one prominent discourse is religious and put forward by representatives of the Catholic movement, emphasizing the sanctity of the life of the fetus while the other discourse focuses on human rights aspects, that is to say, the right to life of the unborn child on the one hand and on the other hand women's rights to health **Hata! Başvuru kaynağı bulunamadı..**

## 2. MATERIALS AND METHODS

A descriptive correlational study design was used. The target population for the study was 200 among whom it selected 131 respondents including 36 doctors, 80 medical students, and 15 lawyers using the Krejcie & Morgan method of 1970. The doctors were selected purposively; the medical students were selected using a simple random sampling technique while a snowball sampling technique was used to arrive at the lawyers for the study. Data was obtained using a structured questionnaire which was administered to the respondents and retrieved once they had completed it. The data from the retrieved questionnaire was entered and analyzed using SPSS version 20. To ensure validity, a pilot study was done on some of the participants before the final version of the questionnaires to check if there was a need to change or rephrase any questions and also to probe possible bias and filled questionnaires were routinely checked to ensure completeness. To ensure reliability, Cronbach's alpha was calculated in SPSS which had values of 0.783(all 27 items were retained), 0.728(all 27 items were retained), and 0.735(2 items were deleted) for doctors, medical students, and lawyers respectively meaning that the internal consistency was acceptable. Ethical considerations were made and an approval letter to carry out the study was obtained from the King Ceasor University research and ethical committee, official permission was secured from the authority of the hospital and the advocate firm, names of study participants were not included, voluntary recruitment was done and informed consent was signed.

## 3. RESULTS AND DISCUSSION

### 3.1 Social-demographic Characteristics

The results showed that 52 (36.69%) of the participants were between 20-24 years of age, 42 (32.06%) were between 25-29 years, 13 (9.2%) were between 30-34, 13 (9.2%) were between 35-39 and 8.3% were above 50 years of age. 73 (55.73%) of the respondents were male and 58(44.27%) were female. 53 (40.46%) of them were protestants, 33 (25.19%) were Muslims, 25 (19.08%) were Catholics, 6 (4.58%) were atheists, 2(1.53%) were Hindu while 12 (9.16%) identified as others; 9 of them indicated that they were "born again Christians", 2 of them indicated that they were "seventh day Adventists" while 1 of them left the space blank.



### 3.2 Level of awareness of doctors, medical students, and lawyers on the current laws and policies on induced abortion among women of reproductive age in Uganda.

The Ugandan Constitution, in Article 22, item 2 states: "No person has the right to terminate the life of an unborn child except as may be authorized by law." 13.89% of doctors and 13.75% of medical students didn't know what it states but all lawyers knew. The Ugandan Constitution allows abortion if the procedure is authorized by the law but does not state the exact circumstances, leaving room for legal provisions and interpretations **Hata! Başvuru kaynağı bulunamadı.** 72.22% of doctors, 75% of medical students, and 20% of lawyers didn't know that the instances in which the termination of pregnancy should be permitted were not laid out by the law.

According to a Guttmacher Institute report of 2018, an estimated 314,300 induced abortions took place in 2013 in Uganda **Hata! Başvuru kaynağı bulunamadı.**, and therefore it is expected that medical workers perform them in clandestine environments. In this study, it was determined that there were significant gaps in the knowledge of the punishments according to the penal code act of Uganda which commenced on 15 June 1950: 70% of the doctors, 81.25% of medical students, and 20% of lawyers didn't know the punishment for an individual who with intent to procure the miscarriage, unlawfully administers to a pregnant woman or causes her to take any poison or other noxious thing or uses any force of any kind, 72.23% of the doctors, 90% of medical students and 6.67% of lawyers didn't know the punishment of a woman who attempts to procure an unlawful abortion and 66.67% of the doctors, 78.75% of medical students and 6.67% of lawyers didn't know the punishment of an individual who aids a woman in performing an unlawful abortion.

A study revealed that over 75% of all abortions in sub-Saharan Africa, Uganda inclusive, are unsafe due to restrictive abortion laws and abortion-related deaths are largely preventable if patients receive timely appropriate care such as post-abortion care (PAC) **Hata! Başvuru kaynağı bulunamadı.** PAC is always legal, and medical personnel have an ethical duty to provide it **Hata! Başvuru kaynağı bulunamadı.** and in this study, it has been determined that 8.34% of doctors, 6.25% of medical students, and 52.34% of lawyers didn't know that providing PAC is not criminalized. With doctors and future doctors thinking that providing PAC is criminalized, they may not provide it which increases the risks of abortion-related deaths and complications. With lawyers thinking that providing PAC is criminalized, it increases the chances of medical personnel being wrongfully detained and hesitating to provide the same in the future. In a study, healthcare providers' bad attitude when caring for women in need of PAC was discussed and patronizing and judgmental behavior was said to be more common towards women with suspected induced abortion which affected the quality of care **Hata! Başvuru kaynağı bulunamadı.**

Healthcare providers who treat women for post-abortion complications are forbidden by law from interrogating their patients or reporting them to the authorities **Hata! Başvuru kaynağı bulunamadı.** However, in this study, it has been determined that 13.34% of doctors, 28.75% of medical students, and 13.34% of lawyers didn't know that. In the case that the doctors and future doctors report their patients to authorities, they breach confidentiality which they are sworn to, and consequently decrease the trust patients have in doctors and fear of being reported prevents other women and girls from seeking medical attention they need for life-threatening abortion complications. Lawyers not knowing this can lead to doctors being wrongfully implicated for not reporting a patient who had an induced abortion.

Complementary sources of criteria, such as ministerial guidelines or codes of medical ethics, can also guide the implementation of the law **Hata! Başvuru kaynağı bulunamadı.** The Ministry of Health through the 2006 and 2012 National Policy Guidelines and Service



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Standards recommended that in some instances the woman or girl should be assisted to terminate the pregnancy.



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Unfortunately, in this study it has been determined that a significant number of doctors, medical students, and lawyers aren't aware of these instances; severe maternal illness threatening the health of a pregnant woman (25.01% of doctors, 12.5% of medical students and 53.34% of lawyers), severe fetal abnormalities which are not compatible with extra-uterine life (5.56% of doctors, 10% medical students and 46.67% of lawyers), cervical cancer (55.56% of doctors, 71.25% of medical students and 60% of lawyers), HIV-positive women requesting for termination (77.78% of doctors, 90% of medical students and 53.33%) and cases of rape, incest, and defilement (50.01% of doctors, 45% of medical students and 53.33% of lawyers). Due to a lack of this information, a female who qualifies for a lawful abortion may not be able to access one resulting in one seeking an unsafe abortion or undergoing avoidable difficulties.

Table 1 below shows the results of a regression analysis run to determine the extent to which the level of awareness of each law or policy on induced abortion had an effect on the total computed variable for all of them. The significance of the constant, the total computed variable was Sig=0.000, P-value < 0.05. It was found that the level of awareness of each law or policy, except the level of awareness of severe fetal abnormalities which are not compatible with extra-uterine life being an instance in which induced abortion is permitted, are significant predictors of the total computed variable for all of them with P-values < 0.05. The adjusted R square values of the significant predictors ranged from 0.025 to 0.424 (2.5% to 42.4% of the variance).



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**Table 3:** Regression analysis of the level of awareness of current laws and policies on induced abortion

Law or policy	Adjusted R Square	P-value
The Ugandan Constitution, in Article 22, item 2 states: "No person has the right to terminate the life of an unborn child except as may be authorized by law."	0.30	0.027
The instances in which the termination of a pregnancy should be permitted were not laid out by the law.	0.384	0.000
According to the penal code act of Uganda which commenced on 15 June 1950, the punishment for an individual who, with intent to procure the miscarriage, unlawfully administers to a pregnant woman or causes her to take any poison or other noxious thing, or uses force of any kind is imprisonment for fourteen years	0.414	0.000
According to the penal code act of Uganda, the punishment for a woman who attempts to procure an unlawful abortion is imprisonment for seven years.	0.275	0.000
According to the penal code act of Uganda, the punishment for an individual who aids a woman (by supplying drugs or other ways) in performing an unlawful abortion is imprisonment for up to three years.	0.320	0.000
Providing post-abortion care is criminalized in Uganda.	0.086	0.000
When a doctor meets a patient with post-abortion complications, they should interrogate them and/or report them to the authorities.	0.025	0.039
Severe maternal illness threatening the health of a pregnant woman is an instance in which induced abortion is permitted.	0.042	0.011
Severe fetal abnormality which is not compatible with extra-uterine life is an instance in which induced abortion is permitted.	0.002	0.252
Cervical cancer is an instance in which induced abortion is permitted.	0.254	0.000
HIV-positive women requesting termination is an instance in which induced abortion is permitted.	0.424	0.000
Cases of rape, incest, and defilement are an instance in which induced abortion is permitted.	0.269	0.000

### 3.3 Insight of doctors, medical students, and lawyers on the advantages of legalizing induced abortion among women of reproductive age in Uganda

In this study, 75% of doctors, 73.75% of medical students, and 73.34% of lawyers were of the opinion that induced abortion should be legalized in Uganda.

Legalizing induced abortion would reduce maternal mortality (91.67% of doctors, 92.5% of medical students, and 60% of lawyers agreed). This was the most agreed advantage by doctors and medical students probably due to understanding of the complications and through experience.

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A law don in Uganda, a keynote speaker at a Public Dialogue convened to hold a discussion about Abortion and the Legal Framework that governs it in Uganda, recommended legalizing Abortion in Uganda because the laws in place are controversial, adding that this will enable access to safe legal abortion and he stated that it would help reduce on the high maternal morbidity and mortality in Uganda **Hata! Başvuru kaynağı bulunamadı..**

Legalizing induced abortion would reduce abortion complications (91.66% of doctors, 82.5% of medical students, and 86.66% of lawyers agreed). This was the most agreed upon advantage by doctors and lawyers and quite highly by medical students as well. These complications may include severe bleeding, abdominal and genital injury, incomplete abortion, sepsis, and other long-term complications such as pelvic inflammatory disease, ectopic pregnancy, vesicovaginal fistulae, urinary incontinence, uterovaginal prolapse, and infertility. A study estimated that each year 85,000 women or 15 of every 1,000 women aged 15–49, are treated for complications from induced abortion, and treatment of abortion complications consumes scarce medical and health resources **Hata! Başvuru kaynağı bulunamadı..**

Legalizing induced abortion would reduce the cost of the provision of PAC services (80.58% of doctors, 65% of medical students, and 40% of lawyers agreed). This was most agreed to by doctors probably because of the hands-on experience with such patients and least agreed to by lawyers probably because they are not as aware of the costs of medical services. PAC is estimated to cost nearly US\$14 million annually in Uganda **Hata! Başvuru kaynağı bulunamadı..** Findings from two studies suggest that almost half of the health system cost of treating post-abortion complications is borne by women and their households which can impact households' economic well-being **Hata! Başvuru kaynağı bulunamadı..**

Legalizing induced abortion would lead to improved women's education, participation in the labor market, and positive contribution to GDP growth (61.11% of doctors, 43.75% of medical students, and 46.67% of lawyers agreed). Unintended pregnancy is a pregnancy that is either unwanted or mistimed **Hata! Başvuru kaynağı bulunamadı.** and it may lead to dropping out of school and early marriage consequently leading to decreased female education and employment **Hata! Başvuru kaynağı bulunamadı..**

Legalizing induced abortion would reduce the impacts of unwanted pregnancy on the child (86.11% of doctors, 86.25% of medical students, and 66.67% of lawyers agreed). Unwanted pregnancy leads to inadequate prenatal care, drug use during pregnancy, premature and low-birth-weight infants that are also less likely to breastfeed and take routine vaccinations, and increased risks of physical and mental health problems in these children.

Table 2 below shows the results of an exploratory factor analysis on the advantages of legalizing induced abortion in Uganda. Reducing maternal mortality was the most significant advantage, contributing 59.192%  $\approx$  59% of the variance. Additionally, reducing abortion complications contributes 15.460%  $\approx$  15%, reducing the cost of the provision of post-abortion care (PAC) services contributes 11.324%  $\approx$  11%, improving women's education, participation in the labor market and positive contribution to GDP growth contributes 9.354%  $\approx$  9% and reducing impacts of unwanted pregnancy to the child contributes 4.671%  $\approx$  5% of the variance.

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**Table 4:** Factor analysis of advantages of legalizing induced abortion in Uganda

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Reducing maternal mortality.	2.960	59.192	59.192	2.960	59.192	59.192
Reducing abortion complications.	.773	15.460	74.651			
Reducing the cost of the provision of post-abortion care (PAC) services.	.566	11.324	85.975			
Improving women's education, participation in the labor market, and positive contribution to GDP growth.	.468	9.354	95.329			
Reducing impacts of unwanted pregnancy on the child.	.234	4.671	100.000			

### 3.4 Insight of doctors, medical students, and lawyers on barriers to legalizing and implementing laws on induced abortion

Religious organizations (97.23% of doctors, 97.25% of medical students, and 93.33% of lawyers agreed). This was the most agreed upon barrier by all three study groups. Religious forces which argue that abortion is akin to murder are able to set moral standards and contribute to the stigma of abortion. Eighty percent of the Ugandan population is Christian, of which almost half belong to the Catholic Church which has a strong influential control **Hata! Başvuru kaynağı bulunamadı..** Other faiths share a similar view and Uganda is highly rooted in religion as the biggest predictor for moral values. In this study, it was also noticed that all doctors and medical students except one medical student who wouldn't be willing to perform induced abortion on a patient who asks for it stated religious reasons as did all lawyers who wouldn't be willing to launch a constitutional challenge against the anti-abortion laws in Uganda.

Few policymakers in Uganda publically articulate being in favor of more liberal abortion laws (83.33% of doctors, 72.5% of medical students and 40% of lawyers agreed). In a study it was seen that advocacy by highly placed national politicians or dignitaries helps to overcome the difficulties inherent in reforming abortion laws, for example, Mauritius reformed its law in 2012, in part due to the involvement of a Mauritian-born member of the monitoring body that is tasked with ensuring compliance with the CEDAW (Convention on the Elimination of All Forms of Discrimination against Women) Committee **Hata! Başvuru kaynağı bulunamadı..** Few Ugandan lawyers are willing to launch a constitutional challenge against the anti-abortion laws (86.11% of doctors, 67.5% of medical students, and 40% of lawyers agreed). In this study, 80% of lawyers would be willing to launch a constitutional challenge against the anti-abortion laws. Recently, in the USA, a state constitutional challenge to Georgia's abortion law was filed with the hope of amending the abortion laws **Hata! Başvuru kaynağı bulunamadı..**

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Few women are willing to be involved in a test case (61.12% of doctors, 36.25% of medical students, and 33.33% of lawyers agreed).



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The best example of the success of test cases is the Roe v. Wade court case of 1973 in the USA. It is the central court decision that created the abortion law in the USA (until it was overturned in 2022) where the Supreme Court ruled that women had a constitutional right to abortion and also set up a framework in which the woman's right to abortion and the state's right to protect potential life shift. “Jane Roe” was a fictional name used to protect the identity of the plaintiff; a pregnant single woman who brought a class action challenging the constitutionality of the Texas criminal abortion laws **Hata! Başvuru kaynağı bulunamadı..**

Table 3 below shows the results of an exploratory factor analysis on the barriers to legalizing induced abortion in Uganda. Religious organizations are the most significant barrier, contributing 48.965%  $\approx$  49% of the variance. Additionally, there are few policymakers in Uganda publically articulating to be in favor of more liberal abortion laws and this contributes 22.091%  $\approx$  22% of the variance. The study further reveals that the few Ugandan lawyers willing to launch a constitutional challenge against the anti-abortion laws are a serious barrier which contributes 17.368%  $\approx$  17% of the variance. Also, a few women are willing to be involved in a test case and this contributes to 11.575%  $\approx$  12% of the variance.

**Table 5:** Factor analysis of barriers to legalizing induced abortion in Uganda

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Religious organizations	1.959	48.965	48.965	1.959	48.965	48.965
Few policymakers in Uganda publically articulate to be in favor of more liberal abortion laws	.884	22.091	71.057			
Few Ugandan lawyers willing to launch a constitutional challenge against the anti-abortion laws	.695	17.368	88.425			
Few women willing to be involved in a test case	.463	11.575	100.000			

The law on abortion in Uganda is too complicated for the authorities to enforce (50% of doctors, 45% of medical students, and 26.67% of lawyers agreed). The ambiguity of the abortion laws and policies often causes medical providers to be reluctant to perform an abortion for any reason, out of fear of legal consequences even though the penalties do not apply to the provision of legal abortions **Hata! Başvuru kaynağı bulunamadı..**

Failure to inform the public, healthcare providers, and government officials about what a new law entails (69.45% of doctors, 72.5% of medical students, and 46.67% of lawyers agreed). This was the most agreed barrier by medical students and lawyers. A study stated how the experience of Zambia shows, in the absence of public information campaigns and the new legal services being out in the open, decades may pass before this information reaches all interested parties **Hata! Başvuru kaynağı bulunamadı.** and in this study, significant



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knowledge gaps were seen among doctors, medical students, and lawyers which is most likely much less than the general public.



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Laws that require authorization from multiple physicians (75% of doctors, 55% of medical students, and 26.67% of lawyers agreed). In Uganda, where there are shortages of physicians, such requirements are impractical, especially in rural areas and therefore it can block women’s access to safe abortions. For example, the relatively liberal Zambian law requires three physicians, one of whom must be a specialist, to sign off on a non-emergency legal abortion despite the country’s having fewer than 12 physicians per 10,000 inhabitants as of 2018 **Hata! Başvuru kaynağı bulunamadı..**

Unregulated conscientious objection (83.34% of doctors, 56.25% of medical students, and 46.67% of lawyers agreed). This was the most agreed-to barrier by doctors and lawyers and the second most agreed-to barrier by medical students. Overuse of conscientious objection can shrink the pool of personnel who are available to perform a legal service, in this case, induced abortion. In this study, 27.78% of doctors and 41.25% of medical students wouldn’t be willing to perform induced abortion on a patient who asks for it, assuming it was legalized and all these would most likely object conscientiously. To combat this, in South Africa, the law specifies that only the person who would be performing the abortion is allowed to opt-out of doing so however public sector health units often have to hire private nurses to replace staff who illegally opt out of participating in an abortion **Hata! Başvuru kaynağı bulunamadı..**

Table 4 below shows the results of an exploratory factor analysis on the barriers to implementing abortion laws. The law on abortion in Uganda being too complicated for the authorities to enforce is the most significant barrier, contributing 40.898%  $\approx$  41% of the variance. Additionally, there is a failure to inform the public, healthcare providers and government officials about what a new law entails and this contributes 24.137%  $\approx$  24% of the variance. The study further reveals that laws that require authorization from multiple physicians contribute 22.097%  $\approx$  22% of the variance and unregulated conscientious objection contributes 12.868%  $\approx$  13% of the variance.

**Table 6:** Factor analysis of barriers to implementing abortion laws

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
The law on abortion in Uganda is too complicated for the authorities to enforce	1.636	40.898	40.898	1.636	40.898	40.898
Failure to inform the public, healthcare providers, and government officials about what a new law entails	.965	24.137	65.035			
Laws that require authorization from multiple physicians	.884	22.097	87.132			
Unregulated conscientious objection	.515	12.868	100.000			

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A total of 69.45% of doctors and 58.75% of medical students agreed that they would be willing to perform induced abortion on a patient who asks for it, assuming it was legalized while 2.78% of doctors were neutral while a total of 27.78% of doctors and 41.25% of medical students disagreed. All those who disagreed stated religious reasons for doing so except for an atheist who stated that he considered it morally wrong as it involved taking a life. A total of 80% of lawyers agreed that would be willing to launch a constitutional challenge against the anti-abortion laws in Uganda while a total of 20% disagreed. All those who disagreed stated religious reasons for doing so.

Table 5 below shows the results of regression analyses that were run to determine whether the insight on legalizing induced abortion had an effect on the willingness of doctors and medical students to perform an induced abortion, assuming it was legalized, and on the willingness of lawyers to launch a constitutional challenge against the anti-abortion laws in Uganda. It was found that insight on legalizing induced abortion is a significant predictor of doctors' willingness to perform one; Sig=0.000, P-value < 0.05 and an adjusted R square value of 0.364 meaning that insight on whether induced abortion should be legalized contributes to 36.4% of the variance, medical students' willingness to perform one; Sig=0.000, P-value < 0.05 and an adjusted R square value of 0.441 meaning that insight on whether induced abortion should be legalized contributes to 44.1% of the variance and lawyers' willingness to launch a constitutional challenge against the anti-abortion laws in Uganda; Sig=0.000, P-value < 0.05 and an adjusted R square value of 0.659 meaning that insight on whether induced abortion should be legalized contributes to 65.9% of the variance.

**Table 7:** Regression analyses run to determine whether the insight on legalizing induced abortion had an effect on the willingness of doctors, medical students and lawyers to act.

Study group	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	P-value
Doctors	0.618 <sup>a</sup>	0.382	0.364	0.98718	21.041	0.000 <sup>a</sup>
Medical students	0.669 <sup>a</sup>	0.448	0.441	1.02123	63.323	0.000 <sup>a</sup>
Lawyers	0.827 <sup>a</sup>	0.683	0.659	0.74729	28.066	0.000 <sup>a</sup>

#### 4. CONCLUSION

In conclusion, it has been determined that there are significant gaps in the knowledge of doctors, medical students, and lawyers regarding the current laws and policies on induced abortion among women of reproductive age in Uganda (Sig=0.000, P-value < 0.05). The majority of the respondents (75% of doctors, 73.75% of medical students, and 73.34% of lawyers) were of the opinion that induced abortion should be legalized in Uganda and all the advantages of doing so were agreed to in different percentages as were all the barriers of legalizing and implementing laws on induced abortion. The majority of the medics (69.44% of doctors and 58.75% of medical students) would be willing to perform induced abortion on a patient who asks for it, assuming it was legalized and the majority of the lawyers (80%) would be willing to launch a constitutional challenge against the anti-abortion laws. From the study findings, it was recommended that Uganda's abortion law and policies should be clarified, the knowledge of Uganda's abortion law among the health professionals, the judicial system, and women of reproductive age should be improved, the abortion law and policies should be taught to medical and law students in University and they should be advocacy that unites a broad coalition of national actors from the legal, medical and rights perspectives to reform the abortion laws in Uganda.

## ACKNOWLEDGEMENT

First and foremost, praises and thanks to the Almighty God, for giving me knowledge, wisdom, strength, ability, and opportunity to undertake this study and complete it successfully. I would like to thank the administration of the facilities I carried out this study for allowing me to conduct this study and all participants of this study. I would also like to express my gratitude to the director of research at King Ceasor University for his valuable advice, commitment, and precious time spent guiding me in completing this manuscript and proofreading it.

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**DETERMINATION OF DRUG-DEFAULTER-RATE AMONG TUBERCULOSIS  
PATIENTS REPORTING FOR TREATMENT AT MULAGO NATIONAL  
REFERRAL HOSPITAL, UGANDA**

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**Abstract**

The study investigated the drug defaulter rate among tuberculosis patients that reported for treatment at Mulago National Referral Hospital, Uganda. It targeted a population of 85 tuberculosis patients who were admitted at the time when the study was conducted and selected 69 participants based on the Fleiss' formula of 2003. The specific objectives of the study included (a) to evaluate the underlying factors associated with defaulting on medication among tuberculosis (T.B) patients receiving treatment (b) to determine the defaulter rate among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda; and (c) to investigate the already existing interventions being implemented to minimize the defaulter rate among T.B patients. The data were collected using standardized questionnaires administered to patients with their full consent and also with the full consent of the patient's care takers. The main findings were that; defaulting on medication among tuberculosis patients was much associated with: a patient perception that adherence was not necessary, side effects of the anti-tuberculosis medication, deterioration of patient's condition while on treatment, no change in condition while on treatment and the patient being in a state of chronic illness. Additionally, patients who mixed both conventional medicines (therapeutic medicines) in combination with herbal drugs (medical pluralism) exhibited a high drug defaulter rate as compared with their counterparts and when the condition of some tuberculosis sufferers improved, the use of drugs surprisingly was stopped among some patients. The drug defaulter rate was found to be 31.8% and the mostly implemented intervention to control tuberculosis was the directly observed therapy (DOT). The study recommended that; healthcare workers ought to reinforce Directly Observed Therapy and adherence counselling to ensure adherence to treatment among patients. Health workers also ought to closely monitor the patients and intervene whenever necessary.

**Keywords:** Defaulter Rate, Health Outcomes, Tuberculosis Disease

**1. INTRODUCTION**

Mulago National Referral Hospital is the main treatment centre and has the highest number of tuberculosis patients in Uganda. Some Patients on T.B treatment in Mulago National Referral Hospital have been observed to default against the treatment regimen. Defaulting against tuberculosis medication is greatly associated with increased risk of drug resistance, tuberculosis relapse, treatment failure and death.



Previously, drug resistance arising from patients defaulting against tuberculosis medications was reported as one of the leading causes of morbidity and mortality rates among tuberculosis patients. For this reason, programs such as DOT have been put in place to fight against increasing number of patients defaulting tuberculosis medications under Mulago National Referral Hospital. However, due to coronavirus disease 2019 (COVID-19) lock down, programs to prevent patients from defaulting against tuberculosis medication were at stand still and besides this, financial support from donors has recently declined. This has resulted into an increase in drug-defaulter rate and resistance to tuberculosis drugs among patients under treatment. This study therefore was aimed at investigating the rate of defaulting on tuberculosis medications among patients reporting for treatment at Mulago National Referral Hospital.

## 2. METHODOLOGY

Data were obtained using questionnaires administered to patients with their full consent for those patients that were literate. For illiterate patients, questionnaires were also used and data obtained through interviews with full consent of the patient in the presence of a witness.

### 2.1 Sample Size

It was determined using Fleiss' formula.

$$N_{\text{Fleiss}} = \frac{[z_{\alpha/2} \sqrt{(r+1)P(1-P)} + z_{\beta} \sqrt{rP_0(1-P_0) + P_1(1-P_1)}]^2}{r(P_0 - P_1)^2} \quad (1)$$

Where,

$\alpha$ : is the probability of type 1 error

$\beta$ : is the probability of type 2 error

$P_0$ : is the proportion of disease in population 1

$P_1$ : is the proportion of disease in population 2

$r$ : is the ratio of population 2 to population 1

$N_{\text{Fleiss}}$ : is the required sample size for the population 1 using Fleiss formula

$$P = \frac{P_0 + rP_1}{r+1} \quad (2)$$

$\alpha$ : was 0.05,  $\beta$ : was 0.2,  $P_0$  was 1.0,  $P_1$  was 2.0 and  $r$  was 1

Using Fleiss formula, 69 participants were required for the study.

### 2.2 Inclusion Criteria

Were participants:

- 20 years and above.
- Receiving treatment or who received treatment for at least one month.
- History of defaulting T.B treatment for at least two months.
- Either male or female.

Participants aged 20 years and above were chosen because these were more cooperative and understood the purpose of the study better than those below the age of 20.

Default is defined as a treatment interruption of two consecutive months or more after at least one month on treatment [1]. Therefore, participants with a history of defaulting treatment for at least two consecutive months and had received treatment for at least one month were selected.

Male and female participants were selected to get a variety of answers in the questionnaires.

### 3. STUDY RESULTS

**Table 8: Total Variance Explained**

Component	Extraction Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %
1	18.139	43.187	43.187
2	6.731	16.026	59.213
3	5.390	12.834	72.047
4	3.745	8.917	80.964
5	2.969	7.070	88.034
6	2.441	5.812	93.846
7	1.935	4.608	98.454

Table 1 shows results of factor analysis. Factor analysis was run, and it was found that; component 1 (chronic illness) contributed 43% of the variance towards non-adherence hence 43% of the patients with chronic illness defaulted treatment, component 2 (other remedies) contributed 16% of the variance to non-adherence thus 16% of the patients who used other remedies other than what was prescribed defaulted treatment, component 3 (adherence not necessary) contributed 13% of the variance towards non-adherence hence 13% of the patients with a patient perception that adherence was not necessary defaulted treatment, component 4 (side effects) contributed 9% of the variance towards non-adherence hence 9% of the patients who experience side effects while on treatment defaulted, component 5 (condition improved) contributed 7% of the variance towards non-adherence thus 7% of the patients whose condition improved while on treatment defaulted, component 6 (condition worsened) contributed 6% of the variance towards non-adherence thus 6% of the patients whose condition worsened while on treatment defaulted and component 7 (same condition) contributed 5% of the variance towards non-adherence thus 5% of the patients whose condition remained constant while on treatment defaulted. The rest of the factors did not contribute to any percentage of the variance to non-adherence.

**Table 9: Skipped Medication**

		Frequency	Percent
Valid	Strongly Agree	7	10.1
	Agree	15	21.7
	Neutral	8	11.6
	Disagree	8	11.6
	Strongly Disagree	31	44.9
	Total	69	100.0

Table 2 shows the choices selected by participants who took part in the study on the statement of skipping to take T.B medication. Of the 69 (100.0%) participants that took part in the study, 31 (44.9) % strongly disagreed to have skipped taking their medication, 15 (21.7%) agreed that they skipped taking their medication, 7 (10.1%) strongly agreed that they skipped taking their medication, 8 (11.6%) disagreed to having skipped taking their medication. Only 8 (11.6%) were neutral on this.

**Table 10: Directly Observed Therapy**

	<b>Frequency</b>	<b>Percent</b>
Agree	<b>8</b>	<b>11.6</b>
Neutral	<b>8</b>	<b>11.6</b>
Disagree	<b>7</b>	<b>10.1</b>
<b>Valid Strongly Disagree</b>	<b>30</b>	<b>43.5</b>
No Idea	<b>16</b>	<b>23.2</b>
<b>Total</b>	<b>69</b>	<b>100.0</b>

Table 3 shows the choices selected by participants who took part in the study on the statement of whether their healthcare providers carried out Directly Observed Therapy. Out of 69 (100.0%) participants who took part in the study, 8 (11.6%) participants agreed to the statement that their healthcare providers carried out Directly Observed Therapy. 8 (11.6%) participants were neutral on the same. 7 (10.1%) participants disagreed. 30 (43.5%) participants strongly disagreed. However, only 16 (23.2%) participants had no idea.

#### **4. DISCUSSION AND CONCLUSION**

##### **4.1. Discussion of Results**

This study set out with the aim to determine the defaulter rate among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda; to evaluate the underlying factors associated with defaulting on medication among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda; and to investigate the already existing interventions being applied/ implemented to minimize the defaulter rate among T.B patients. It was found that the defaulter rate among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda was 31.8%; a sum of the percentage of participants that agreed and strongly agreed to the statement that they skipped taking their medication. Of the 69 (100.0%) participants that took part in the study, 31 (44.9) % strongly disagreed to have skipped taking their medication, 15 (21.7%) agreed that they skipped taking their medication, 7 (10.1%) strongly agreed that they skipped taking their medication, 8 (11.6%) disagreed to having skipped taking their medication. Only 8 (11.6%) were neutral on this. This defaulter rate is higher than the defaulter rate found by Salles, et al., [1] and Okuja [2] in studies conducted in Rio de Janeiro city, Brazil and in Amai Community Hospital, Amolatar District respectively. In Rio de Janeiro city, Brazil the defaulter rate was 8% to 25% while in Amai Community Hospital, Amolatar District the defaulter rate was 17.7%. The underlying factors associated with defaulting on medication among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda included the following; patient perception that adherence was not necessary, side effects of the anti-tuberculosis medication, deterioration of patient's condition while on treatment, no change in condition while on treatment and the patient being in a state of chronic illness, mixing both conventional medicines (therapeutic medicines) in combination with herbal drugs (medical pluralism) and stopping the use of drugs when condition improves. Some of these factors were similarly found in other studies. Guillén, et al., [3], it was found out that one of the factors that contributed to defaulting was the treatment's adverse effects. According to Salles, et al., [1] found out that one of the strongest predictors of defaulting from treatment in Brazil was adverse effect. According to a study conducted by Sanchez, et al., [4] factors associated with treatment default included medication side effects and perception that treatment was inefficient.

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In a study conducted in Yemen by Ammar, et al., [5] it was observed that the main reasons for defaulting to treatment were; improvement of condition during treatment, use of herbal medications, no benefit from medication, worse health conditions with treatment, side effect associated with treatment and belief that T.B could be treated without medication. Nirmalya, et al., [6] observed that commonly cited reasons for default were adverse effects of drugs. According to a study conducted by Lindtjörn & Shargie [7] it was found out that the main determinants of defaulting treatment were feeling better and drug side effects which led to drug resistance, relapse, death and prolonged infectiousness. In a study conducted by Ahmed, et al., it was found out that seeking traditional healers and side effects of drugs were causes of defaulting. Muture, et al., [8] observed that use of herbal medication and drug side effects contributed to patients defaulting their anti T.B medication. Nuwagira, et al., [9] observed that drug adverse effects contributed to patients defaulting their anti T.B medication. In a study conducted by the African Health sciences, it was further revealed that one out of ten admitted patients defaulted on T.B medication which affected the performance of the drug leading to the development of multi-drug resistant T.B strain among patients [10]. In a study conducted by Nakibirige [11] it was observed that worsening of the condition when on medication and medication side effects contributed to defaulting of anti-T. B medication by patients. In a study conducted by Okuja [2] it was observed that the risk factors and reasons for non-adherence were; feeling better after short period of treatment which in turn led to development of multi drug resistant tuberculosis (MDR-T. B). Olwortho [12] found out that drug side effects contributed to defaulting of T.B medication in northern Uganda. The already existing intervention being applied/ implemented to minimize the defaulter rate among T.B patients is Directly Observed Therapy, however, not every patient gets this done.

#### 5. CONCLUSION

From this study it was concluded that the drug-defaulter-rate among tuberculosis patients receiving treatment from Mulago National Referral Hospital, Uganda was 31.8%

It was also found that the underlying factors associated with defaulting on medication among T.B patients receiving treatment from Mulago National Referral Hospital, Uganda included the following; patient perception that adherence was not necessary, side effects of the anti-tuberculosis medication, deterioration of patient's condition while on treatment, no change in condition while on treatment and the patient being in a state of chronic illness, mixing both conventional medicines (therapeutic medicines) in combination with herbal drugs (medical pluralism) and stopping the use of drugs when condition improves.

The already existing intervention being implemented to minimize the defaulter rate among tuberculosis patients was Directly Observed Therapy.

The researcher recommended that healthcare workers ought to reinforce Directly Observed Therapy and adherence counselling to ensure adherence to treatment among patients. Health workers also ought to closely monitor the patients and intervene whenever necessary.

#### ACKNOWLEDGEMENTS

I would like to extend my special thanks of gratitude to my supervisors Dr. Kaweesa Simon Peter and Dr. Amos Ronald Kalukusu for the guidance rendered during the research period as well as Mr. John W. Osire, Dr. Moses Khedi, Dr. Kwiri Stephen, Dr. Amorioit Margaret Grace Khedi and Kwiri Sam Khedi Tukei for their support during the research period.



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### CORRELATION OF HTLV-I INFECTION WITH HEART DISEASES AMONG SAMPLE OF IRAQI PATIENTS

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#### **Abstract**

Objective: Studies in virology have looked into the potential link between human T-lymphotropic virus Type I (HTLV-I) infection and cardiovascular disease (CVD), but their findings had been diverse. In order to update the above potential association between HTLV-I seropositivity and its possible role to trigger cardiovascular events, the current study established to examine the interaction between these variables and some other biomarkers, including lipid profiles, D-dimer (fibrin degradation fragment protein), and CRP, which had been assessed and estimated in two different age groups. Methods: By using the method of enzyme-linked Immunosorbent assay, the CRP levels, D-dimer protein, and HTLV1 antibody titers of two study groups (65 participants) with age ranges of 26 to 61 were assessed. Results: Interestingly, the HTLV-I seropositivity was with a strong significant association with D-dimer, HDL-C, LDL-C and Triglyceride levels ( $p < 0.001$ ) with high titer of serum HTLV-I antibodies ( $24.08 \pm 11.03$ ) in patients suffering from the heart issues comparing to the controls ( $8.57 \pm 6.10$ ). Furthermore, multiple linear regression test suggested that HTLV-I seropositivity levels were associated with variation in D-dimer and Triglyceride levels. Conclusion: It was determined that people with cardiovascular illness had greater seropositivity levels of HTLV-I, which was ultimately linked to abnormalities in lipid profiles.

**Keywords:** CRP, D-dimer, HTLV-I, lipids profile.



## VÜCUT VE BAĞIŞIKLIK SİSTEMİNDEKİ DEMİR EKSİKLİĞİNİN FİZYOLOJİK ÖZELLİKLERİ ETKİSİ NEDENİYLE DÜŞÜRÜCÜ SEVİYELER

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### **ÖZET**

Kalsiyum, fosfor, potasyum, magnezyum ile birlikte demir de insan vücudunun işleyişi için önemlidir. Demir, kan yapımında ve hemoglobin oluşumunda yer alır, onsuz beyin dokuları ve iç salgı bezleri ve ayrıca tüm vücut oksijen ile beslenemez, ancak her zaman demir eksikliği vardır. Demir eksikliği vücutta oldukça yaygındır. . Sonuç olarak kan hastalıkları gelişir, güç azalır, genel ruh hali bozulur ve cilt doğal olmayan bir şekilde solgunlaşır. Ayrıca, bu element bağ dokusu üretiminde kullanılır, bağışıklık sistemi hücrelerinin sentezine ve beyin impulslarının vericilerinin üretimine katılır. Hayvan vücudu yaklaşık %0.01 demir içerir. Demir, hematopoez ve hücre içi değişim süreçlerinde vazgeçilmezdir. Demirin yaklaşık %55'i eritrositlerin hemoglobininde, %24'e kadarı kasların renk maddelerinde bulunur ve %21'e kadarı karaciğer ve dalakta rezerv olarak depolanır.

**Anahtar Kelimeler:** Demir Eksikliği, Fizyolojik Özellikler, Bağışıklık Sistemi

### **PHYSIOLOGICAL CHARACTERISTICS OF IRON DEFICIENCY IN THE BODY AND IMMUNE SYSTEM LOWERING LEVELS DUE TO ITS EFFECT**

### **ABSTRACT**

Along with calcium, phosphorus, potassium, magnesium, iron is also important for the functioning of the human body. Iron is involved in blood production and hemoglobin formation, without it the brain tissues and internal secretion glands, as well as the whole body, cannot be supplied with oxygen, but there is always a lack of iron.

Iron deficiency is quite common in the body. As a result, blood diseases develop, strength decreases, the general mood deteriorates, and the skin becomes unnaturally pale. Also, this element is used in the production of connective tissue, participates in the synthesis of cells of the immune system and in the production of transmitters of brain impulses. The animal body contains about 0.01% iron. Iron is indispensable in hematopoiesis and intracellular exchange processes. About 55% of iron is included in the hemoglobin of erythrocytes, up to 24% is included in the color substances of muscles, and up to 21% is stored for reserve in the liver and spleen.

**Keywords:** Iron Deficiency, Physiological Characteristics, Immune System

## GİRİŞ

Demir kan hemoglobininde ve kaslarda bulunur. En çok hayvansal ürünler ile meyve ve sebzelerde bulunur. İnsan vücudundaki demirin yarısından fazlası kan hemoglobininde bulunur. Demir, manyetik alana sahip bir metaldir. Elemental anemi, insan diyetinde demir eksikliği olduğunda ortaya çıkar. Demir, bir dizi enzim olan fotosentez için gerekli maddelerin bileşimine dahil edilir. Demir eksik olduğunda klorofil oluşumu yavaşlar (Strai S.K.S., Bomford A., McArdle H.I., 2010). Kalsiyum, fosfor, potasyum, magnezyum ile birlikte demir de insan vücudunun işleyişi için önemlidir. Demir, kan yapımında ve hemoglobin oluşumunda yer alır, onsuz beyin dokuları ve iç salgı bezleri ve ayrıca tüm vücut oksijen ile beslenemez, ancak her zaman demir eksikliği vardır. Demir eksikliği vücutta oldukça yaygındır. . Sonuç olarak kan hastalıkları gelişir, güç azalır, genel ruh hali bozulur ve cilt doğal olmayan bir şekilde solgunlaşır. Ayrıca, bu element bağ dokusu üretiminde kullanılır, bağışıklık sistemi hücrelerinin sentezine ve beyin impulslarının vericilerinin üretimine katılır (Pasricha S.R., Flecknoe-Brown S.C., Allen K.J. et al., 2002). Hayvan vücudu yaklaşık %0.01 demir içerir. Demir, hematopoez ve hücre içi değişim süreçlerinde vazgeçilmezdir. Demirin yaklaşık %55'i eritrositlerin hemoglobininde, %24'e kadarı kasların renk maddelerinde bulunur ve %21'e kadarı karaciğer ve dalakta rezerv olarak depolanır (Kerimova R.C., İskenderova Z.Ş., Əzizova Ə.N., Rzayeva S.C., Ələkbərova M.Q., 2022).

Kanın rengini sağlayan, oksijeni bağlama ve iletme yeteneğinin yanı sıra demirdir. Eritrositler akciğerlerden tüm vücuda oksijen taşır ve vücuttan karbondioksiti uzaklaştırır. Oksijen güçlü bir oksidandır, ancak hemoglobin tam olarak içindeki demir nedeniyle oksijeni taşıyabilir. İnsan organizmasında demir içeren enzimler vardır. Ayrıca vücudun ihtiyacı olan demir içeren maddelerin oluştuğu ferritin adı verilen bir protein kompleksi de vardır. Üç değerlikli demir iyonları, kompleks transferrin proteini yardımıyla vücutta transfer edilir (Moreau JM, Girgis DO, Hume EB, Dajcs JJ, Austin MS., 2001). Demir, enerji salınımında, enzimatik reaksiyonlarda, bağışıklık fonksiyonlarında ve kolesterol metabolizmasında önemli rol oynar. Bir insan 70 gr ağırlığında iken vücutta 4.2-5 gr demir bulunur. Yaşlı bir kişinin günde 10-20 mg demire ihtiyacı vardır (Moreau JM, Girgis DO, Hume EB, Dajcs JJ, Austin MS., 2001).

Kanda demir eksikliği olduğunda anemi oluşur. En sık görülen anemi, eski çağlardan beri anemi olarak adlandırılan demir eksikliği anemisi'dir. Anemi, esas olarak demir içeren hemoglobin eksikliğinden kaynaklanır. Hemoglobin oksijeni vücut bölgelerine taşıyan maddedir. Yani vücut demir almazsa hemoglobin azalır ve bu da vücut bölümlerinin oksijen beslenmesinde sorunlara neden olur. Sağlıklı bir insanın vücudunda 5 gram demir olması gerekir. Yüzde 70'i kanda, geri kalanı ise kemik iliği, karaciğer ve dalakta bulunuyor. Demir, kanın kırmızı pigmenti olan hemoglobine dahildir (Серов В.Н., Шаповаленко С.А., 2008). Hemoglobinin ana işlevi vücuda oksijen sağlamak ve karbondioksiti vücuttan uzaklaştırmaktır.

Ancak hemoglobin, karbon monoksit ile yok edilemez bir bağ oluşturma yeteneğine sahiptir. Bu olduğunda, hemoglobin hücrelere oksijen taşıma ve vücuttan karbondioksiti çıkarma yeteneğini kaybeder. Karbon monoksit zehirlenmesi işte böyle başlar (Johnson-Wimbley T.D., Graham D.Y., 2011) Sağlığı etkileyen tüm hayati süreçler kırmızı kan hücrelerine bağlıdır. Kırmızı kan hücreleri mikroskobik parçacıklardır. Bu küçük hücreler, her molekülü 1 demir atomu içeren ortalama 280 milyon hemoglobin molekülü içerir. Yani toplamda 1 milyardan fazla demir atomu var. Bildiğimiz gibi kırmızı kan hücreleri kemik iliğinde yaratılır, oradan kana girerek dolaşıma girer, sonra dalak ve karaciğerde parçalanarak demirlerini o organlara verirler. Bomford A., 2002).

Demir sadece kırmızı kan hücrelerinin oluşumu için değil, aynı zamanda kas fonksiyonu ve çoğu metalloenzimin oluşumu için de gereklidir. Eritrositler akciğerlerden tüm vücuda oksijen taşır ve vücuttan karbondioksiti uzaklaştırır. Oksijen güçlü bir oksidandır, ancak hemoglobin tam olarak içindeki demir nedeniyle oksijeni taşıyabilir. İnsan organizmasında demir içeren enzimler vardır. Vücut için gerekli diğer demir içeren maddelerin oluştuğu ferritin adı verilen bir protein kompleksi de vardır (Серов В.Н., Шаповаленко С.А., 2008). Ferritin proteini, demirin bağırsaklardan emilmesinde ve vücutta depolanmasında büyük role sahiptir (Pasricha S.R., Flecknoe-Brown S.C., 2010). Demir, başta apoferritin ile birlikte karaciğer olmak üzere vücutun çeşitli dokularında bulunur. Kandaki demir miktarı arttığında karaciğerde apoferritin protein sentezi hızlanır ve bu sayede karaciğer hücreleri rezerv için demir depolama imkanına sahip olurlar. Burada sentezlenen apoferritin, bağırsak yolundan geçen üç değerlikli Fe iyonları ile birleşir; bu demirin bağırsaklardan emilmesini sağlar. Böylece karaciğerdeki apoferritin-ferritin sistemi, bir demir deposu işlevini yerine getirir ve ayrıca kandaki demir miktarının kararlı bir şekilde korunması için koşullar sağlar (Рухляда Н.Н., Гасымова Д.М., 2014).

Kansızlığın gelişimi, vücutun organlarına ve dokularına oksijen sağlayan kırmızı kan hücrelerinin bozulmasına neden olan çeşitli süreçlere dayanır (Коноводова Е.Н., Докуева Р.С.-Э., 2011). Anemi aşırı koşullardan kaynaklanmaz, yavaş gelişir, kural olarak demir eksikliğinden etkilenir. Bu element, kırmızı kan hücrelerinin bir parçası olan hemoglobin proteininin oluşumu için gereklidir ve oksijen molekülleri ona yapışır. Hemoglobin seviyesi düşükse, normal sayıdaki kırmızı kan hücreleri gaz değişimini uygun seviyede tutamaz. Demir tedavisi seçimi, yalnızca demir eksikliğine kazanılmış anemi eşlik ediyorsa uygun bir yaklaşım olarak kabul edilir. Demir depoları 2-3 ay içinde tükenir ve kazanılmış aneminin gerçek derecesi ancak bu dönemden sonra net olarak ortaya çıkar. Vücuttaki demir eksikliği ciddi bir patolojik durum olarak kabul edilir ve bu durum insanlarda birçok hastalığın ortaya çıkması için elverişli koşullar yaratır. Demir, kan bileşiminin en önemli unsurlarından biridir. Hemoglobin oluşumunda yer alan demir, kırmızı kan hücrelerinin bir bileşenidir. Hemoglobin oksijeni vücut bölgelerine taşıyan maddedir. Vücutta demir eksikliği varsa, bu daha az kırmızı kan hücresi olduğu anlamına gelir. Bu durumda kandaki hemoglobin seviyesi düşer ve dokular yeterince oksijen alamaz. Ayrıca demir bağışıklığı güçlendirir, metabolik süreçlere katılır, fiziksel ve zihinsel çalışmanın verimliliğini artırır, vücuda enerji sağlar (Strai S.K.S., Bomford A., McArdle H.I., 2002).

### **Bağışıklık sistemi**

Bağışıklık sistemi, çeşitli enfeksiyöz ajanlara karşı vücutun spesifik olarak korunmasını sağlayan, vücutun önemli sistemlerinden biridir. Doğuştan kronik hastalıklar, enfeksiyonlar, yaşam tarzı ve beslenmede yapılan hatalar gibi değiştirilemeyen faktörler bağışıklık sisteminin zayıflamasına neden olabilir. Bağışıklık sisteminin zayıflamasının başlıca nedenlerinden biri az ve dengesiz beslenmedir.

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Karbonhidrattan zengin, proteinden fakir, fazla kilolu ve zayıf besinler başlıca etkenlerdir. A, B, C, E, D vitaminleri, selenyum, demir, çinko ve karotenler bağışıklık sisteminin karmaşık reaksiyonlarını hızlandırır. Bunlardan birinin eksikliği vücudumuzu dış etkenlere karşı hassas hale getirir. Alkol tüketimi, sigara, radyasyona maruz kalma, probiyotik eksikliği, kalitesiz uyku, iyi dinlenememe, aşırı stres yükü, sık antibiyotik kullanımı bağışıklığın zayıflamasında rol oynayan başlıca nedenlerdir (Pasricha S.R., Flecknoe-Brown S.C., Allen K.J. et al.,2010). Birçok eksiklik ve hastalık bağışıklık sistemimize zarar verebilir veya bozabilir. Vücudumuzun enfeksiyonla savaşmasını zorlaştıran ilaçlar var. Bazı sağlık sorunları, bağışıklık sistemimizin sağlıklı hücrelere saldırmasını veya bizi zararlı mikroplardan korumasını engelleyebilir. Her insanın havaya, suya, güneşe, uykuya, her türlü dengeli beslenmeye ihtiyacı vardır ve stresten uzak durmak önemlidir. Bağışıklık sisteminin en önemli ihtiyacı oksijendir. Hipoksi tüm sistemlerimiz için zararlıdır. Oksijenin önemli bir örneği ateroskleroz ile ilgilidir. Ateroskleroz aynı zamanda bir bağışıklık sistemi hastalığıdır. Damar duvarında mikropsuz iltihaplanma ile başlar. Oksijensiz bir ortam, zararlı yağların birikmesine yol açar. Mümkün olduğunca oksijence zengin ortamlarda bulunmak mikroplarla karşılaşma sıklığını azaltır ve güçlü bir bağışıklık sağlar. Bir diğer önemli faktör de iyi uykudur. Çünkü serotonin uyku sırasında salgılanır ve bu hormon T-lenfosit adı verilen özel hücre grubumuzun daha iyi çalışmasını sağlar. Sağlıklı ve güçlü bir bağışıklık sistemi için güneş ışığı ve D vitamini olmazsa olmazdır. Yani normal ve sağlıklı beslenme, oksijen, güneşli ortam ve iyi uyku - tüm bunlar bağışıklık sistemini güçlendirir (Kerimova R.C., Rzayeva S.C.,Əzizova Ə. N.,Cəfərova Q.K.,Ələkbərova M.Q.,2022).D vitamini sadece kemik sağlığı için değil, aynı zamanda güçlü bir bağışıklık sistemi için de önemlidir. Çeşitli süreçlerde bağışıklık sistemimizi harekete geçirir ve yönetiminde kilit işlevleri yerine getirir. D vitamini düzenleyici etkisi sayesinde vücudu kendi bağışıklık sisteminin hatalı saldırılarına karşı koruyarak otoimmün hastalıklar ve kronik iltihaplanma riskini azaltır. D vitamini eksikliğinden dolayı T hücrelerimiz ve diğer antikörlerimiz yeterince aktive olamamakta, kanımızda ve dokularımızda mikroplar iyi tespit edilip yok edilememektedir. D vitamini kaynağımız yıl içinde tükendiğinde, bağışıklık sistemimizi zayıflatır ve hastalanmaya ve gribe yakalanmaya daha yatkın hale geliriz (Kerimova R.C.,İskəndərova Z.Ş.,Əzizova Ə.N.,Rzayeva S.C.,Ələkbərova M.Q.,2022).

D vitamini, kendi üretebildiğimiz ve depolayabildiğimiz ender biyofaktörlerden biridir. Bu nedenle D vitamini aslında bir vitamin değil, bir hormondur. Güneş ışığı hormonu olarak da bilinir - çünkü öncüsü güneş ışığına maruz kaldığımızda cildimizde kolesterolden üretilir. Karaciğerdeki dönüşümden sonra karanlık kış ayları için yağ dokumuzda depolanabilir. Bağışıklık sistemi ihtiyaç duyduğunda, böbrekler tarafından aktive edilir ve ardından bağışıklık sisteminin normal işleyişine katılır. Ek olarak, kış aylarında güneş radyasyonu birkaç ay boyunca çok zayıftır, bu nedenle kuzey enlemlerinde UV-B radyasyonu artık Dünya'ya ulaşmaz. Yani kendi D vitamini üretimimiz sonbahar ve ilkbahar arasında hemen hemen durur (.Smith JL,m2003). Vücudun günlük demir ihtiyacı erkekler için 10 mg, kadınlar için 20 ve çocuklar için 4-18 mg'dır.Hamileler için günlük norm 30-35 mg olmalıdır.Demir eksikliği birçok vücut sürecini etkileyen tehlikeli bir faktördür. Cildin durumunu önemli ölçüde etkiler ve daha sonra oksijen değişimi ve hücre beslenmesinin ihlali olarak kendini gösterir. Vücudun böyle bir zayıflığının arka planına karşı, kişi artan yorgunluğa, anemiye, bağışıklık sisteminin zayıflamasına ve hastalıklara maruz kalır (Kerimova R.C., Rzayeva S.C.,Əzizova Ə. N.,Cəfərova Q.K.,Ələkbərova M.Q.,2022).

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## DEMİR EKSİKLİĞİNİN FİZYOLOJİK, HİSTOLOJİK ÖZELLİKLERİ VE ENDOKRİN SİSTEM ÜZERİNDEKİ DEĞİŞİMLERİ

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### **ÖZET**

Demirin biyolojik sistemlere katılımı uzun zamandır bilinmektedir. Demir insan vücuduna ağırlıklı olarak bitkisel besinler ve et ile girer. İnsan vücudundaki demir miktarı 3-4 gram olup, vücuttaki diğer tüm geçiş metallerinin toplam miktarından fazladır. Vücudun demir rezervinin %65-70'i hemoglobinde, %15'i ise karaciğer, dalak, kemik iliği ve böbreklerde yoğunlaşmıştır. Geri kalanı plazmada protein sentezi ve oksidasyon-redüksiyon reaksiyonlarında yer alır. Vücuttaki fazla demir normalde ferritin adı verilen proteinin bileşiminde yer aldığından toksik etkisi ortadan kalkar. Vücutta demir eksikliği olduğunda ferritinin içerdiği demir iyonları uzaklaştırılır ve kullanılır. Ancak demir miktarı fazla olduğunda ferritin molekülleri yapılarını kaybederek birbirleriyle birleşerek hemosiderin haline gelirler. Ferritin moleküllerinin bir elektron mikroskopunun ancak 100.000 ve daha yüksek büyütmelerinde tespit edilebildiği kesin olarak belirlenmiştir.

**Anahtar Kelimeler:** Demir Durumu, Fizyolojik, Histolojik Özellikler, Endokrin Sistem

## PHYSIOLOGICAL, HISTOLOGICAL CHARACTERISTICS OF IRON DEFICIENCY AND ITS CHANGES ON THE ENDOCRINE SYSTEM

### **ABSTRACT**

The participation of iron in biological systems has been known for a long time. Iron enters the human body mainly with vegetable foods and meat. The amount of iron in the human body is 3-4 grams, which is more than the total amount of all other transition metals in the body. 65-70% of the body's iron reserve is contained in hemoglobin, 15% is concentrated in the liver, spleen, bone marrow and kidneys. The rest is involved in protein synthesis and oxidation-reduction reactions in plasma.



Since the excess of iron in the body is normally included in the composition of the protein called ferritin, its toxic effect is eliminated. When there is a lack of iron in the body, the iron ions contained in ferritin are removed and used. However, when the amount of iron is high, ferritin molecules lose their structure and combine with each other and become hemosiderin. It has been precisely determined that ferritin molecules can only be detected at 100,000 and higher magnifications of an electron microscope.

**Keywords:** Iron Status, Physiological, Histological Characteristics, Endocrine System

## GİRİŞ

Demirin biyolojik sistemlere katılımı uzun zamandır bilinmektedir. Demir insan vücuduna ağırlıklı olarak bitkisel besinler ve et ile girer. İnsan vücudundaki demir miktarı 3-4 gram olup, vücuttaki diğer tüm geçiş metallerinin toplam miktarından fazladır. Vücudun demir rezervinin %65-70'i hemoglobinde, %15'i ise karaciğer, dalak, kemik iliği ve böbreklerde yoğunlaşmıştır. Geri kalanı plazmada protein sentezi ve oksidasyon-redüksiyon reaksiyonlarında yer alır. Vücuttaki fazla demir normalde ferritin adı verilen proteinin bileşiminde yer aldığından toksik etkisi ortadan kalkar. Vücutta demir eksikliği olduğunda ferritinin içerdiği demir iyonları uzaklaştırılır ve kullanılır. Ancak demir miktarı fazla olduğunda ferritin molekülleri yapılarını kaybederek birbirleriyle birleşerek hemosiderin haline gelirler. Ferritin moleküllerinin bir elektron mikroskobunun ancak 100.000 ve daha yüksek büyütmelerinde tespit edilebildiği kesin olarak belirlenmiştir (Krishnaswamy G, Ajitawi O, Chi DS. ,2006). Vücutta normal kırmızı kan hücrelerinin üretimi için demir gereklidir. Demir, hemoglobinin en önemli elementidir.

Hemoglobin vücutta oksijen taşıyan kırmızı kan hücrelerinde bulunan bir protein bileşimidir. Vücutta demir eksikliği anemiye, mikrositlere ve kırmızı kan hücrelerinin hipokromatik olmasına neden olur. Vücutta fazla demir girmesi sonucu organlarda ve organlarda demir bileşiklerinin birikmesi dokularda meydana gelebilir, bunun sonucunda karaciğer, kalp ve pankreasa zarar verebilir. Normalde demir vücutta besinler yoluyla girer. Daha sonra karaciğer tarafından üretilen transferrin vasıtasıyla vücutta taşınır. Taşınan demirin %70'i kırmızı kan hücrelerinde hemoglobin ile birleştirilir. Geri kalanının çoğu ferritin veya hemosiderin olarak depolanır. Miyoglobin ve bazı enzimler gibi diğer proteinlerin üretimi için az bir miktar kullanılır. Akut veya kronik kan kaybı, hamilelik ve yetersiz demir alımı sırasında kanda demir eksikliği bulunabilir. Demir takviyesi alımı aşırı olmamalıdır. Özellikle çocuklarda aşırı demir takviyesi kullanımı demir zehirlenmesine neden olur (Guermontprez P, Valladeau J, Zitvogel L, Théry C, Amigorena S, 2002).

Demir metabolizmasının ihlali farklı derecelerde meydana gelir. En hafif vaka, vücutta yeterli fonksiyonel demir olmasına rağmen, ek demir rezervlerinin olmamasıdır. Bu aşamada serum demir düzeyi normal olmasına rağmen ferritin düzeyi azalacaktır. Demir eksikliği arttıkça tüm demir depoları tükenir ve vücut demir taşınmasını hızlandırmak için daha fazla transferrin üretmeye başlar. Transferrin ve demir bağlama özelliği artar, serum demiri azalır. Bu aşama ilerledikçe, daha az kırmızı kan hücresi üretilir. Demir eksikliği anemisinde kırmızı kan hücrelerinin sayısı azalır ve birçok hücre normalden daha solgun ve küçük görünür. Bir seferde çok fazla demir alındığında demir zehirlenmesi meydana gelir. Nadir görülen bir durum olmasına rağmen, ebeveynleri demir takviyesi kullanan çocuklarda daha sık görülür. Demir zehirlenmesi bazı durumlarda ölümcül olabilir (Rua R, McGavern DB. , 2015).

İnsan vücudunda birçok madde sentezlenir ancak demir vücut tarafından üretilmediği için besinlerle alınması gerekir. Bu makro besinin kaynağı hayvansal ve bitkisel besinlerdir. Yetişkin bir insan vücudunda yaklaşık 3,5 gram demir bulunur. Sadece saf formda değil, kombinasyonlarda da bulunur.

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Makro besinlerin çoğu hemoglobin ve eritrositler tarafından temsil edilir - bunlar hücrelere oksijen taşıyan bileşiklerdir. Makro besinlerin bir kısmı kaslarda, karaciğerde ve dalakta bulunan protein bileşikleri şeklinde depolanır (Серов В.Н., Шаповаленко С.А., Флакс Г.А., 2008). İşlevsel demir bileşiklerinin parçalanmasından sonra açığa çıkan elementin çoğu yeniden kullanılır. Demiri hematopoietik organlara iletmek için, makro besinlerle bileşikler oluşturan taşıma proteinleri kullanılır. Bu bileşiklere serum demiri denir.

İnsan vücudundaki toplam demir miktarı cinsiyete, kiloya ve yaşa bağlı olarak iki ila yedi gram arasında değişir. Bu madde saf haliyle vücutta bulunmaz, çok zehirlidir, bu nedenle demir kana girdiğinde çoğu proteinlerle birleşir. Demirin geri kalanı anında hemosiderin veya ferritine dönüştürülür, dokularda rezerv olarak depolanır ve vücutta demir eksikliği olduğunda oradan atılır. Vücudun kendisi demir üretmez, yiyeceklerden gelir, demir Bağırsaklarda emilir. Daha sonra demir kanın sıvı kısmı olan plazmada bulunur (Johnson-Wimbley T.D., Graham D.Y., 2011). Mikro elementin yaklaşık yüzde sekseni, eritrositlerin bir bileşeni olan hemoglobinin bir parçasıdır. Burada demir, oksijen ve karbondioksiti hemoglobine bağlamaktan sorumludur. Demir akciğerlerdeki oksijeni bağlar. Daha sonra eritrositlerin içerdiği hemoglobinde hücrelere gider, oksijeni onlara aktarır ve karbondioksiti kendisine bağlar. Bundan sonra eritrosit, demir atomlarının karbondioksitten kolayca ayrıldığı akciğerlere gönderilir. İlginçtir ki demir, ancak hemoglobin içinde bulunduğu gazları bağlama ve ayırma yeteneği kazanır. Demirin yaklaşık yüzde onu, miyokard ve iskelet kaslarında bulunan miyoglobinde bulunur. Miyoglobin oksijeni bağlar ve depolar. Vücut oksijen açlığı yaşamaya başlarsa, bu gaz miyoglobinden çıkarılır, kaslara gider ve diğer reaksiyonlara katılır. Bu nedenle, herhangi bir nedenle kasın herhangi bir yerine giden kan akışı bozulursa, kas bir süre daha oksijen almaya devam eder (Johnson-Wimbley T.D., Graham D.Y., 2011).

Ayrıca demir, diğer maddelerin bir parçasıdır ve onlarla birlikte hematopoez, DNA, bağ dokusu üretimine katılır. Lipid metabolizmasına, oksidatif reaksiyonlara katılır, karaciğer tarafından zehirlerin detoksifikasyonunu düzenler, enerji metabolizmasını düzenler (Rua R, McGavern DB., 2015). Birçok metabolik süreçte yer alan hormonların sentezi için tiroid bezinin demire ihtiyacı vardır. Hamilelikte demirin rolü önemlidir, bebeğin vücut dokularını oluşturmak için kullanılır. Vücuttaki demir eksikliğinin sinir sisteminin çalışmasını olumsuz etkilediği uzun zamandır bilinmektedir, çünkü bu element beyin hücreleri arasındaki sinyallerin iletilmesinde görev alır. Demir vücudun hastalıklara karşı direncini artırır, yorgunluğu giderir. Bu nedenle, demir eksikliği ile kişi genellikle zayıf hisseder (Kerimova R.C., Rzayeva S.C., Əzizova Ə.N., İskəndərova Z.Ş., Bayramov A.A., Təhməzov E.F., 2022).

Kadın vücudundaki demir miktarı erkeklere göre daha azdır. Üreme çağındaki kadınlarda demir konsantrasyonu adet dönemine bağlıdır. Dönemin ikinci yarısında bu elementin göstergeleri en yüksek değerlere ulaşır, adet sonrası seviye büyük ölçüde düşer, bu da adet sırasında kan kaybıyla ilişkilidir. Hamilelik sırasında vücuttaki demir miktarı aynı seviyede olmalıdır. Aynı zamanda vücudun demir ihtiyacı artar ve bu nedenle hamilelik döneminde besinlerle yeterli miktarda demir sağlamak gerekir. Bunun nedeni, bu eser elemente sadece annenin vücudu tarafından değil, bebeğin de gelişiminin belirli bir aşamasında ihtiyaç duymasındadır, çok hızlı bir şekilde büyük miktarlarda almaya başlar, bu nedenle hamilelik sırasında özel bir diyet izlenmelidir. ve aynı zamanda özel vitamin ve mineral müstahzarlarının kullanılması tercih edilmelidir. Bu sayede hamilelik sırasında vücuda gerekli tüm maddeler sağlanır. Doğumdan sonra hamilelikte olduğu gibi acil demir ihtiyacı ortadan kalkar (Alminen SJ, Gueimonde M, Isolauri E., 2005).

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Kandaki demir konsantrasyonu birçok nedene bağlıdır. Demir vücudu farklı şekillerde terk eder - dışkı, idrar ve hatta tırnaklarda ve saçta. Bu nedenle vücutta demir yoksa birçok organın çalışmasında bozukluklar olur. ve sistemler. Bu nedenle eser elementlerin eksikliği aşağıdaki belirtilerle anlaşılır: artan yorgunluk, halsizlik hissi, yorgunluk, artan kalp hızı, nefes darlığı, sinirlilik, baş dönmesi, migren, vb (Kərimova R. C., Məşədiyeva S. Ə., Bayramov A. A., Yusifova M. Y., 2020). Çoğu durumda, demir metabolizması bozuklukları yetersiz beslenmeden kaynaklanır. Örneğin, vejeteryanlarda, süt ürünleri diyeti uygulayan kişilerde ve ayrıca yağlı yiyecekleri sevenlerde eksiklik not edilir. Ayrıca açlık grevi sırasında vücutta daha az demir bulunur. Diyeti düzelttikten, vitamin ve mineral preparatları aldıktan sonra konsantrasyonu normale döner. Vücuttaki az miktarda demir, vücudun bu elemente olan ihtiyacındaki artıştan kaynaklanıyor olabilir. Bu öncelikle iki yaşın altındaki çocuklar, ergenler, hamilelik ve emzirme dönemindeki kadınlar için geçerlidir. Bazen demir eksikliği stresli durumlara ve sinir sisteminin bozulmasına neden olabilir (Kərimova R. C., Rzayeva S. C., Əzizova Ə. N., İskəndərova Z. Ş., Bayramov A. A., Təhməzov E. F., 2022). Demir eksikliği çeşitli hastalıklara neden olabilir: Bağırsaktaki eser elementlerin normal emilimini engelleyen gastrointestinal sistem hastalıklarının neden olduğu anemi. Gastrit, enterit, enterokolit, mide ve bağırsaklardaki çeşitli tümörler, ince bağırsağın veya midenin bir kısmının çıkarılması ameliyatı İltihabın varlığı, pürülan-septik ve diğer enfeksiyonlar, osteomyelit, miyokard enfarktüsü, demir içeren pigment hemosiderin miktarında artış. Kronik böbrek yetmezliği veya bu organın diğer hastalıklarına bağlı olarak böbreklerde eritropoietin hormonunun sentezinde sorun olması (Kərimova R. C., Məşədiyeva S. Ə., Bayramov A. A., Yusifova M. Y., 2020).

Kadınlar arasında demir metabolizması, sürekli değişen hormonal arka planın etkisi altında devam eder, bu nedenle kadınlarda kandaki serum demir oranı biraz hafife alınır ve esas olarak menstrüasyon nedeniyle yaklaşık 10.7-21.5  $\mu\text{mol} / \text{l}$ 'dir. Plazma Fe içeriği de hamilelik sırasında önemli ölçüde azalabilir. Bu nedenle hamilelik sırasında bu gösterge 10.0  $\mu\text{mol} / \text{l}$ 'den düşük olmamalıdır (Krishnaswamy G, Ajitawi O, Chi DS. ,2006).

Erkeklerde, hücrelerdeki ferritinin azalmasına genellikle alkollü içeceklerin ve ikame maddelerinin kötüye kullanılmasının arka planında ortaya çıkan karaciğer hastalıkları neden olur. Erkeklerde normal serum demir seviyesi 14.0 ile 30.4  $\mu\text{mol} / \text{l}$  arasındadır.

Çocukların kanındaki Fe içeriği yaşa, kiloya ve boya göre değişir. Yalnızca anne sütü ile beslenen bir yaşın altındaki çocuklarda hemoglobinde hafif bir azalma olur. Bu gerçek endişe verici değildir çünkü heme demir adı verilen madde bebeklerin vücudunda sınırlıdır. Bir yaşına kadar olan çocuklarda serum Fe normu 7-18  $\mu\text{mol} / \text{l}$ 'dir ve daha büyük çocuklarda bu rakam 9-21  $\mu\text{mol} / \text{l}$ 'ye ulaşabilir (Alminen SJ, Gueimonde M, Isolauri E. ,2005).

Bu elementin asıl görevi oksijenin taşınması ve depolanmasıdır. Eritrositlerin oluştuğu hemoglobinin temelidir. Bu element, solunum sırasında oksijen moleküllerini bağlamaya izin verir, bu da vücudun herhangi bir yerine aktarılmasına izin verir. Yardımı ile doymuş kırmızı kan hücreleri vücutta dolaşarak kasları, organları ve dokuları besler. Aynı zamanda vücuda zararlı olan karbondioksiti de uzaklaştırır. Oksijeni korumak için demire de ihtiyaç vardır. Buna dayanarak kas çalışması sırasında oksijenin birikmesinden ve dağılımından sorumlu olan miyogloblin çalışır. Demir metabolizmada önemli rol oynar. Bu işlemlerde kullanılan enzimler, çalışmalarını demire dayandırır. DNA sentezinde kullanılır ve bu nedenle hücre bölünmesi ve büyümesi için gereklidir. Bu element olmadan protein metabolizması imkansızdır - vücutta önemli bir süreçtir (Guermont P, Valladeau J, Zitvogel L, Théry C, Amigorena S, 2002).



Buna dayanarak vücuttaki birçok metabolik süreci düzenleyen hormonların sentezi üretilir. Ayrıca bu element bağ dokusu üretiminde kullanılır, bağışıklık sistemi hücrelerinin sentezine ve beyin uyarılarının iletilicilerinin üretimine katılır. Demir, insan vücudu için önemli bir elementtir, çünkü birçok süreçte yer alır. Oksijenin, birçok hormonun ve hücre sentezinin, metabolizmanın ve diğer görevlerin taşınması ve depolanması için temel oluşturur. Demir eksikliği, birçok vücut sürecini etkileyen tehlikeli bir faktördür. Cildin durumunu önemli ölçüde etkiler ve daha sonra oksijen değişimi ve hücre beslenmesinin ihlali olarak kendini gösterir. Vücudun böyle bir zayıflığının arka planına karşı, kişi artan yorgunluğa, anemiye, bağışıklık sisteminin zayıflamasına ve hastalıklara maruz kalır (Reid G, Jass J, Sebulsy MT, McCormick JK, 2003).

Demir vücutta esas olarak gıda yoluyla girer. En yüksek içeriğe sahip yiyecek et, yani sığır eti olarak kabul edilir. Bu element açısından zengin diğer besinler karaciğer, balık, karabuğday, fasulye, yumurtadır. Taze bitkilerde ve diğer bitki gıdalarında bulunan C vitamini, demirin optimal emilimini destekler. Kural olarak, yiyeceklerle birlikte gelen miktarın % 10-15'i asimile edilir. Emilim duodenumda gerçekleşir. Bu nedenle, genellikle düşük serum demiri, bağırsak yolunun çeşitli patolojilerinin sonucudur. Konsantrasyonu ayrıca dalakta, bağırsaklarda, kemik iliğinde depolanan demir miktarına ve vücuttaki hemoglobinin sentezine ve parçalanmasına da bağlıdır. Fizyolojik demir kaybı dışkı, idrar, ter, tırnak ve saç yoluyla gerçekleşir.

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## PERSPECTIVES FOR CONTROLLING BIOFILM-FORMING BACTERIA IN DIABETIC FOOT SYNDROME

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### **Abstract**

The results of local antibacterial and systemic antibiotic therapy in 84 patients with infected (especially biofilm-forming bacteria) diabetic foot syndrome are summarized. Complications and non-traumatic amputations can be prevented by joint application of local treatment (opening of pus, postural drainage, effective sanitation, tamponade of pus cavities with aqueous antiseptics) and systemic selective antibiotic therapy carried out in the shortest possible time.

**Keywords:** Diabetic Foot Syndrome, local antiseptic treatment, systemic antibiotic therapy, bacterias, forming biofilm

### **Introduction**

The selection of a rational antibacterial treatment in the case of infected Diabetic foot syndrome (DFS) is important for the prevention of non-traumatic amputations and other dreaded complications. It is known that along with diabetic neuropathy and angiopathy, the virulent flora causing intoxication weakens the local tissue immunity, leads to the inactivation of the factors that make up the body's natural resistance (immunoglobulins, leukocyte shaft, phagocytic complex, complement system, lysozyme). Therefore, the fight against infectious complications during DFS does not give the desired result in a number of cases (4,6,7).

### **Aim**

The main goal of the study is to determine an effective and optimal antibacterial treatment scheme by determining the multiresistant spectrum and sensitivity to antibiotics of bacteria capable of forming a biofilm and showing persistence in the body during infected DFS.

### **Material**

During the last 5 years, the results of examination and treatment of 84 patients with ulcerated and infected DFS against the background of type II diabetes were summarized. Samples were taken from patients for culture and sensitivity to antibiotics during evacuation of pus. The spectrum of resistance and sensitivity of bacteria capable of forming biofilm (especially *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Citrobacter sp.*, *Klebsiella oxytoca*, *Proteus sp.*) was studied. BBL Sensi-Disc discs were used to determine antibacterial sensitivity, and in addition, their agar isolates were tested in biocoating flora with resistance to vancomycin and methicillin (1,7).

### **Results**

Screening for antibiotics and antiseptics was carried out as a regular procedure, taking into account the fact that the bacteria involved in the infection of wounds during DFS and forming a biocover layer are either monovariant or in the form of a microbial association and are resistant to antibacterial treatment.

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High sensitivity of bacteria with the ability to form a biofilm to linezolid, vancomycin and imipenem (in various combinations) was determined in the studied DAS patients during the treatment process. High sensitivity to vancomycin, tabromycin and meropenem was determined in Gram-positive strains.

In all cases, as the initial stage of the antibacterial treatment complex, an important measure is the opening of purulent cavities and pockets, necroectomy, postural drainage of pus, and effective sanitation. During sanitation, in addition to working with various broad-spectrum antimicrobial effective antiseptics (dioxide, decasan, pyrrolidine iodine derivatives - betadine, silver preparations), pus deposits were washed under spurt of sterile physiological solution of NaCl and filled with gauze swabs soaked with antimicrobial agents.

Taking into account the possibility of rapid reproduction of microbes in the hyperglycemic tissue environment, we consider it more appropriate to carry out healing and wound dressing 2-3 times a day in the first days. In the exudative period, the application of procedures that prevent postural drainage - antimicrobial creams, ointments and gels to the wound is not considered appropriate. Because these medicinal forms prevent the drainage and ventilation of the wound and prevent the elimination of microbes as much as possible.

The presence of a complex anatomical structure of the foot, the presence of pus, sometimes represented by several types of microbial flora, in various pockets (tendon beds and between them, synovial sacs in the osteomyelitic zone, as well as abscess cavities that cannot be adequately drained) require rational systemic antibiotic therapy along with debridement and local antibacterial treatment. is necessary (2,3,5).

Therefore, we consider local antimicrobial and systemic antibiotic therapy an important and indispensable component in the treatment of all infected diabetic feet.

Experience shows that the prolongation of the healing process of wounds against the background of long-term antibiotic therapy is explained by their secondary contamination with methicillin-resistant *Staphylococcus aureus* and, in the case of gangrene, with obligate anaerobes. Therefore, it is very important to instruct DAS patients with open wounds receiving outpatient treatment on appropriate preventive measures.

The frequent presence of *Pseudomonas aeruginosa* among antibiotic-resistant flora during DAS should not be overlooked.

The study of wound exudate in one of every 5-6 patients in the conducted examinations shows that the infectious process is represented by mixed flora (2 or more, including aerobic-anaerobic). During the fight against mixed flora, attention was paid to the application of more sensitive antibiotics in combination and the selection of the optimal scheme that serves to maintain their therapeutic concentration in the blood. All the flora represented in the pus samples taken from different pockets of the foot were ensured to be the target of antibiotics.

Optimal choice of antibacterial treatment during the first 5 days leads to reduction of purulent process and localization of infiltration, reduction of septic condition and intoxication and, accordingly, significant improvement of the clinical condition of patients. Shortening the exudative phase of wounds, early reparation is important in preventing further complications and especially amputations.

The monitoring and evaluation of the treatment process is based on the composition of the peripheral blood (in particular, leukoformula, CRP), visual, anatomical and functional indicators of the foot, the determination of the septic index and the dynamics of clinical symptoms.



### Conclusion

Thus, the results of our research show that the approach to infectious complications in DAS patients should be individualized. However, the main principles of antibacterial treatment are, on the one hand, local treatment, maximum emptying of pus reservoirs in a short period of time, postural drainage, effective sanitation, antiseptic gauze-tamponade, and on the other hand, systemic selective and rational antibiotic therapy.

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## THE RIGHT RESEARCH METHODS DICTATED BY HISTORICAL EXPERIENCE

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### **Abstract**

As early as the 7 th century, the Almighty Sent down to humanity the Sacred Revelation, which is a guiding star for many serious scientists who make their discoveries based on the knowledge provided by the Creator: so, in the Qur'an, Allah Has already Reported that immortality is impossible. In addition, Anticipating modern achievements in science, He Pointed to the exoskeleton of the ant, which is rich in silicon (Si), used in glass production: so that the ant does not crush like the rest insects, but breaks like glass. Quran's unquestionably undeniable data and an impeccable methodology helps scientists to avoid wasting time and money. As for modern medicine and the methodology of its teaching in the post-Soviet space, it is terrible in that experiments are performed on live animals without anesthesia. The fact is that the universities of this territory lack the subject of "bioethics", which is so necessary to prevent damage to living beings, both people and animals. And these students, and then doctors lack compassion, as happened with Ryazan University graduate Zori Balayan. Ripping off the skin from living children, he watched them die bleeding, and even without a twinge of conscience, because subsequently he published a book titled " In the name of Jesus" in Beirut. The same can be said about the forced organ harvesting from prisoners in Chinese prisons, especially from Uyghurs. This suggests that although the subject "bioethics" is taught in China, there is an urgent need for independent control over the implementation of the code and the doctor's oath "Noli nocere!". Due to the violation of the methodology of teaching medical subjects in the above regions, ugly deviations from the norm of behavior occur in society on the part of those whose vocation is to protect people's health. Nevertheless, these doctors are not ashamed to commit a crime that is inappropriate not only for a doctor, but even for an ordinary citizen, so it's high time for scientists around the world to unite in the fight against never before seen atrocities committed by people in white coats. For this reason, we touch on points especially important to pay attention to in the medical personnel training, as well as information sources should be trusted when choosing the scientific research direction - in general and in particular.

**Keywords:** bioethics; The Holy Quran; immortality; methodology

## EPIDEMIOLOGICAL PROFILE OF INFECTION COVID-19 IN CHILDREN POPULATION IN BAKU CITY

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### ABSTRACT

The fact that the Covid-19 infection, which became a pandemic in 2020 with its spread throughout the world, is widespread in the children's population and causes serious complications is no longer in doubt (N. Chekhlabi et al., 2020; E. Samara et al., 2020; N. Krajcar et al., 2020; O. Irfan and others, 2020; E. Mekskina, 2020; V. Nikiforov and others, 2020). According to numerous literature data (J. Ludvigsson, L. Liguoro, 2020) in the first year of the pandemic, Covid-19 among children was characterized by a mild course and very few lethal outcomes.

However, in the second year of the pandemic, the picture has changed a bit. From this point of view, the analysis of the epidemiological profile of the disease with Covid-19 in the pediatric population may be important.

**Material and methods.** A retrospective analytical epidemiological analysis of the incidence of Covid-19 among the child population was conducted in Baku from March 2020 to August 2021, age groups and seasonal dependence were investigated as an epidemiological profile. The absolute number of cases of Covid-19 among children was obtained from [www.koronavirus.info.az](http://www.koronavirus.info.az).

Qualitative indicators were expressed as the mean value and its standard error, and discrete indicators were expressed as extensive (in %) and intensive (in %, per 100,000 people) indicators of morbidity.

Differences obtained at  $p < 0.05$  were considered statistically significant.

**Results.** During the epidemiological analysis period (March 2020 - August 2021), the cumulative number of cases of Covid-19 among children in Baku was 23338 (absolute number). In 2020, during the 10 months of the pandemic, there were 4,876 children, and 2 epidemic waves, clearly visible in the intra-year dynamics of disease intensity indicators, were observed in July and December (in July -  $122.9 \pm 4.5$  children per 100,000 children and in December  $335.3 \pm 11.9$  children per 100,000 people).

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During the 10 months of 2020, children aged 0-9 made up 5% of those infected with Covid-19, and children aged 10-18 made up 6%. The seasonal profile of the incidence of Covid-19 in the pediatric population showed a high incidence rate in the autumn season -  $725.8 \pm 11.2$  per 100,000 people. During the 8 months of 2021 (January-August), when monitoring the monthly dynamics of Covid-19 infection in the children's population in Baku, high morbidity rates were recorded in the 0-9 age group in April (1722 people) and August (2401 people). In the 10-18 age group, the maximum level of morbidity was determined in April (3444 people) and August (4803 people), and the lowest number of morbidity in 8 months occurred in June (61 people in the 0-9 age group and 121 people in the 10-18 age group) being).

Of course, annual data analysis is needed to explain the observation of high morbidity rates with Covid-19 among children in the spring and summer seasons.

But visually, a 2-wave trend is observed. Comparing the results of the analytical epidemiological analysis with the literature data, it was found that the profile of the epidemic process during the Covid-19 infection among children is similar to the picture observed in other countries. Thus, in the Moscow region of the Russian Federation, the staged and wavelike course of the infection of Covid-19 among children, the two-wave nature of the disease in Croatia, and the fact that children are more infected in family homes. According to Swiss researchers, 8% of children under 16 years of age are infected, and according to French and Australian researchers, children are not the main transmitters of Covid-19. Children aged 10-19 make up 7% of those infected with Covid-19 in Pakistan.

**Keywords:** Covid-19 infection, epidemiological profile, pediatric population



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## THE EFFECT OF THE METAVERSE ON THE HEALTH SECTOR

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### ABSTRACT

Today, due to the metaverse gaining popularity and diversification of its use and purpose, in terms of states, institutions, individuals, etc., its usage potential is increasing. All kinds of innovations that can positively affect the health sector are important innovations that should not be ignored. Considering that the metaverse is an innovation and development that tends to be effective in many sectors, in order to benefit from the opportunities, it offers and can offer for the health sector, it is important to understand its potential impact, development, advantages and disadvantages. In this study, it is aimed to investigate the effect of the metaverse in the health sector in the light of studies in the international literature by researching the Web of Science, Scopus, Pubmed, Google Scholar indexes. As a result of the examination carried out for this purpose, it has been determined that the studies in the literature are mostly reviews, letters to the editor and similar studies, and there are few empirical and experimental studies yet. In addition, the metaverse of the studies in the literature is mental, psychological, cardiovascular, eye, tooth, mouth, etc. potential impact on health, medical therapy, rehabilitation, psychotherapy, telepresence, smart health, experience-based health, etc. It has been understood to have many potential effects, such as its potential effect on supporting health issues, its potential effect on disease prevention, its potential effect on providing outpatient care, its potential effect on effective collaboration and knowledge sharing, its potential for advanced visualization for medical databases, its potential effect on improving health education of physicians and patients. In addition studies in the literature shows that there are a lot of potential impacts of the metaverse on psychological, cardiovascular, eye, dental, oral health etc. as well as on medical therapy, rehabilitation, psychotherapy, telepresence, smart health, experience-based health and similar issues, and on prevention of diseases, and on providing outpatient treatment, and on effective collaboration and knowledge sharing, advanced visualization, and on medical databases, and on improving health education of physicians and patients.

**Keywords:** Metaverse, Health, 3D, Virtual World

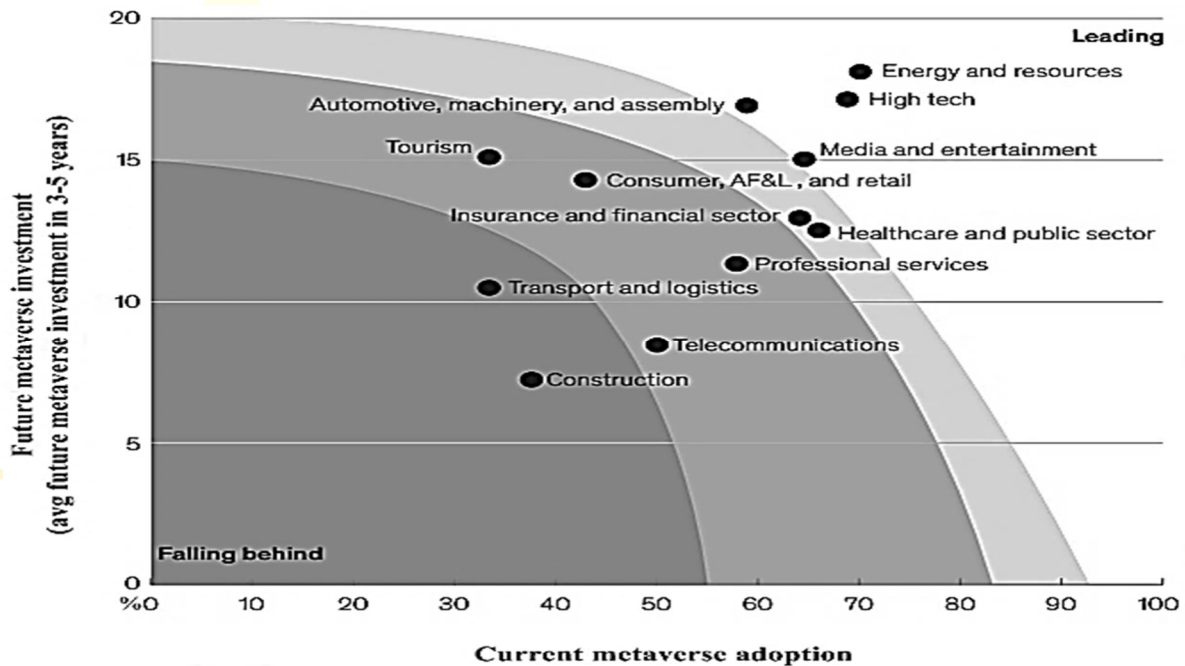
### 1. INTRODUCTION

The technology sector, like most other sectors, includes constant changes and developments. From past to present, many technological innovations have been developed that can significantly affect people's lives. The metaverse contains many potentials that will become clearer over time and that can affect people's lives. With the technological developments obtained in recent years, the metaverse has become more applicable (Chakraborty, 2022).

The metaverse includes the real world depicted in the virtual world (Zhang et al., 2023, p. 299). The metaverse enables interaction in a realistic and separate world simulated outside the physical world, in the medium, by making use of "virtual and augmented reality" technologies through created "avatars" and "holograms" (Dwivedi et al., 2022, p. 2).



Technologies that support the metaverse include AI, interactivity (e.g., virtual reality (VR), augmented reality technology (AR), extended reality (XR), mixed reality technology, blockchain, game (e.g., 3D modeling, real-time rendering), network (e.g., 5G, 6G, cloud computing) and internet of things (C. W. Lee, 2022, p. 2; Wei, 2022, pp. 330-331). Sectors such as education, marketing, health and tourism are among the sectors that fall under the influence of the metaverse (Akour et al., 2022, p. 12; Dwivedi et al., 2022, p. 2). Figure 1 shows current the metaverse adoption and future the metaverse investment distribution.



**Figure 1.** Current the metaverse adoption and future the metaverse investment distribution

**Source:** McKinsey and Company (2022, p. 21)

McKinsey and Company (2022) report is examined, it is understood that energy and resources, high tech, media and entertainment, insurance and financial sector, healthcare and public sector are among the sectors that started and adopted the metaverse initiatives and that have the potential to invest in the metaverse in the future. According to the Grand View Research (2022) market report, the global metaverse market size is estimated to be US\$38.85 billion in 2021. It is expected to expand at a compound annual growth rate (CAGR) of 39.4% from 2022 to 2030, and the metaverse's estimated revenue in 2030 is projected to reach 678.8 billion USD.

Metaverse, “was originally coined by science fiction author Neal Stephenson in his 1992 novel “Snow Crash”; in it, he describes the Metaverse as a virtual world composed of unique environments, each with a specific purpose: to entertain, socialize, educate, and more” (Pimentel et al., 2022, p. 2). Games and virtual environments such as “Fortnite”, “Second Life”, “VRChat” and “Roblox” are considered to be the predecessors of the meta-universe (Dwivedi et al., 2022, p. 2). The metaverse is a platform where a large number of users can come together in a digital virtual medium, and includes where different experiences can be obtained and simultaneous interactions can be realized. the network (Akour et al., 2022, p. 1). The metaverse includes four key technical features. These are (Madiega et al., 2022, p. 2);

- **“Realism”**: Containing realism that can make people perceive themselves as exactly in that environment,

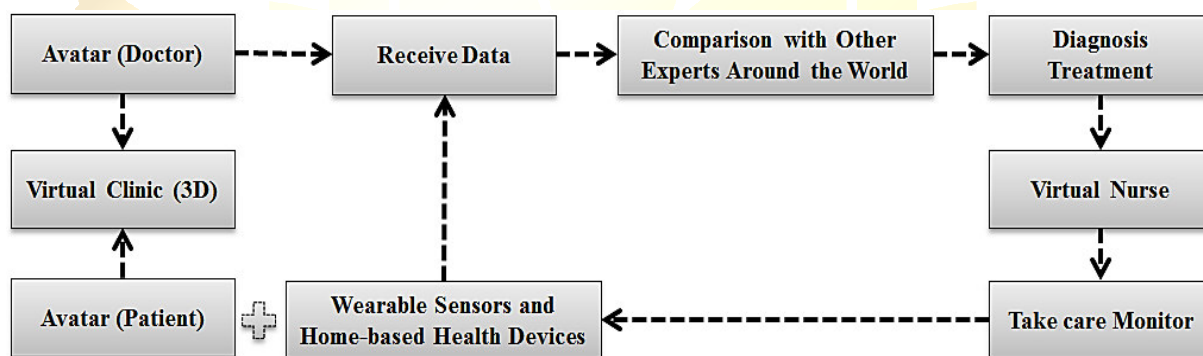


- **“Ubiquity”**: Being able to access virtual spaces through appropriate digital devices with a virtual identity,
- **“Interoperability”**: Enabling many different systems and platforms to interact and communicate with each other,
- **“Scalability”**: By utilizing the existing network architecture, it can provide a good user experience to users who have multiple access to metaverse environment.

The metaverse has the potential to significantly improve and redesign the experience between doctor and doctor, doctor and patient and others in health (Walcott, 2022). Understanding this potential for development and change is understood to be among issues of importance to academics, healthcare professionals, governments and others. Some studies in the literature have been carried out on the effect of the metaverse in various sectors such as advertising (Kim, 2021; Taylor, 2022) and education (Hwang & Chien, 2022; López-Belmonte et al., 2022). In this study, it is aimed to examine the effect of the metaverse in the health sector in the light of studies in the international literature.

## 2. THE EFFECT OF METAVERSE IN THE HEALTH SECTOR

The metaverse can provide interaction between patients and doctors in a virtual environment that carries reality, does not require the use of written text records, and ensures the follow-up of personal and clinical health data (Ahmadi Marzaleh et al., 2022). With “Meta-medicine”, everyone will be able to define a “digital identity” by utilizing the technology of digital twins. “Digital avatars” can be created according to the characteristics of patients' personal health information, reports and etc. Doctors and patients will be able to interact with these created avatars on this virtual platform without any restrictions (Sun et al., 2022, p. 54). Figure 2 shows the possible change of doctor-patient relationship with the metaverse.



**Figure 2.** Possible change of doctor-patient relationship with the metaverse  
**Source:** Petrigna and Musumeci (2022, p. 7)

Web of Science, Scopus, Pubmed and Google Scholar indexes were researched and the effect of the metaverse on the health sector was examined within the scope of studies in the international literature. In some studies in the literature, a general analysis has been made and it has been concluded that the metaverse has new opportunities and effects that are likely to provide for health services (Ahmadi Marzaleh et al., 2022; Bansal et al., 2022; Bhugaonkar et al., 2022; Curtis & Brolan, 2022; C. W. Lee, 2022; R.-A. Lee, 2022; Mejia & Rawat, 2022; Wang et al., 2022; Wiederhold & Riva, 2022).

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These possible opportunities and effects of the metaverse for health services include improving the quality of healthcare services, increasing patient satisfaction, preventing diseases, improving cost-effectiveness and accessibility, developing new educational tools and forms by using the metaverse infrastructure to improve medical education and communication skills of medical students and clinicians, obtaining outpatient treatment opportunities by using body sensor networks, providing realistic interaction between patients, doctors, objects, and reducing the need for physical documents and paper (Ahmadi Marzaleh et al., 2022; Bhugaonkar et al., 2022; Mejia & Rawat, 2022; Wang et al., 2022).

In some studies, In some studies, examinations were made specifically for health areas. Among these studies are effects of the metaverse on mental health (Benrimoh et al., 2022; Cerasa et al., 2022; Huang et al., 2022; Ifdil et al., 2022; Situmorang, 2022a, 2022b; Usmani et al., 2022; Zhou et al., 2022), possible effects of the metaverse on cardiovascular health (Mesko, 2022; Skalidis et al., 2022), possible effects of the metaverse on eye health (Tan et al., 2022), possible effects of the metaverse on oral and dental health (Albujeer & Khoshnevisan, 2022; Sailer, 2022).

The potential opportunities and effects of the metaverse for mental health include providing opportunities such as "avatar therapy", "virtual reality assisted therapy", "teletherapy" (Benrimoh et al., 2022), more effective prevention of Alzheimer's, cognitive decline (Zhou et al., 2022), more effective diagnosis and treatment etc. (Usmani et al., 2022). The potential opportunities of the metaverse for cardiovascular health include being able to explain the functioning of the cardiovascular system in three dimensions in education, conducting case discussions among doctors, bringing doctors and patients together with a digital avatar, and sharing digital medical data with the doctor more effectively etc. (Mesko, 2022). The potential opportunities that the metaverse may provide for eye health impacts include "the ability to create avatars for realistic consultations", "to provide personalized care", "to enable potential clinical applications in therapeutics, diagnostics and education" etc. (Tan et al., 2022). Among the possible opportunities and effects of the metaverse for oral and dental health are the ability to monitor oral health from home, the convenience of software to make appointments, and the pre-testing of treatment targets in the virtual world (Sailer, 2022).

In some studies, more specific investigations were made. Among the possible effects of the metaverse mentioned in these studies on the health sector are that with the transition from information-based communication to experience-based health communication, users will now be able to actively experience (Plechata et al., 2022) and interact with the consequences of their behavior, and that with "rapid tele-psychotherapy" for mental health services, with "rapid tele-psychotherapy" for mental health services , single session music therapy can be done (Situmorang, 2022a), with the use of schema therapy in the metaverse, which is used in the treatment of personality disorders, patients' schema modes can be reshaped, resulting in adaptive and more inclusive interaction with the real world (Yin et al., 2022), and users will be able to support effective collaboration and knowledge sharing in virtual teams (Yu et al., 2012), they will be able to develop telesurgery opportunities in health 5.0 (the metaverse supported) (Bhattacharya et al., 2022), they will be able to offer some opportunities such as "experience-based, effective education, interactive learning" for nursing (Damar & Turhan Damar, 2021), they will have some possibilities to provide 3D interaction for bioinformatics and work in various bioinformatics visualization scenarios (Taylor & Soneji, 2022), cognition experience can be increased and psychoemotional and social abilities can be developed with immersive social environments (Calabrò et al., 2022), and patient counseling can be improved (Anwer et al., 2022).

In some other studies, it has been concluded that the use of the metaverse in education may have effects (Huh, 2022; Hwang & Chien, 2022; Iwanaga et al., 2022; Kye et al., 2021; López-Belmonte et al., 2022; Park & Park, 2022). The potential opportunities that the metaverse may provide for education include opportunities for personalization in education, virtual interaction, instant translation of educational materials into different languages, providing students who do not have the opportunity to attend classes in a physical environment, the opportunity to attend classes in a virtual environment, providing education opportunities that cannot be experienced in a physical environment, etc. (Hwang & Chien, 2022; López-Belmonte et al., 2022).

In addition, some studies such as examining the development of the metaverse literature in the fields of medicine, nursing, public health, midwifery, and dentistry (Damar, 2022), and bibliometric examination of the research trends of emerging technologies in the health the metaverse are included in the literature (Chen & Zhang, 2022).

In some quantitative and experimental studies, which are found to be few in number for now, in the literature; Huang et al. (2022) found that metaverse-based virtual reality sports experiences had a significant positive effect on mental health in their study on Chinese athletes. In the research by Iwanaga et al. (2022) they conducted on 282 participants, consisting of anatomy educators, at the annual meeting of the American Association of Clinical Anatomists 2022, there were 64 people whose questionnaires were answered. Of these 64 people, only 43 were aware of the term metaverse. They concluded that only 6 of the 43 participants (9.4%) used the metaverse to teach anatomy. Shah, Hameed, et al. (2022), in their pilot study with 10 participants aged 64 to 82, concluded that the use of the metaverse-based games supports the participation of the elderly in physical exercise. Shah, Karlsen, et al. (2022) conducted a study with 14 other participants between the ages of 60 and 88, in the metaverse-based exercise game, the participants were divided into 2 individual and collaborative groups. They concluded that collaborating participants achieved higher intrinsic motivation than individual participants in terms of effort, pleasure, physical effort, and usefulness. In the study by Zhang et al. (2023), it has been understood that attribute-based encryption plays an important role in ensuring the security and efficient sharing of data in metaverse health services, with the simulated experiment they carried out.

### 3. CONCLUSION

In this study, the effect of the metaverse on the health sector was examined in the light of studies in the international literature by researching in Web of Science, Scopus, Pubmed and Google Scholar indexes. In the studies, the potential of the created metaverse virtual environments to support patient education and medical education, mental, psychological, etc. It is understood that it may have many potential effects such as the potential to support the solution of problems, medical therapy, rehabilitation, psychotherapy, the potential to provide telepresence, and the possibility of providing advanced visualization for medical databases (Mozumder et al., 2022, p. 260; Sun et al., 2022, p. 55). Thinking that some of them can integrate into the health sector with their full potential also makes us think that the metaverse has important opportunities for the health sector.

In the metaverse environments, differences are important on concerns about data security and privacy, high costs due to new technology and difficulties in convincing users to use these services, the possible need to provide technical support for the installation and use of the technology, disputes between healthcare providers in their willingness to acquire the metaverse technology, health care quality between countries with and without metaverse technology (Ahmadi Marzaleh et al., 2022; Grand View Research, 2022, p. 792; Mesko, 2022, p. 2649). Studies should be carried out on the aspects of the metaverse that are considered to be disadvantageous, and if solutions are provided, these disadvantages should be minimized in the future, and even an advantageous situation can be achieved. Regarding the mentioned cost problem, it can be predicted that a decrease in the prices of the metaverse equipment may be seen in favor of the segments (health education students, patients, etc.) who may have difficulty in purchasing this technology due to the increase in the production and supply of metaverse technology used in health. In addition, if the governments decide to use the metaverse extensively in the health sector, it is thought that the necessary technological infrastructure and support activities can be provided free of charge to the elderly and individuals with insufficient purchasing power, within the framework of the social state agreement for the cost problem. In the event that sensitive patient information is disclosed due to a security vulnerability, an irreparable loss of trust may occur for the metaverse in healthcare. For this reason, it is important to take the necessary precautions at the highest level and to protect the sensitive personal health information of the patients before there is a situation such as the disclosure of patient information regarding the cyber security risks that are stated as a disadvantage.

The experience offered by “Meta-medical” can be further enhanced with technologies such as “human sensors (ReSkin)”, “organ chips”, “organa-noids”, “holographic lenses (HoloLens 2)” (Sun et al., 2022, p. 56). With the continuation of technological developments, it can be understood that the potential of the metaverse to affect the health sector can be further increased in the future.

In the future, the effects of the metaverse, which is mentioned in this study in the light of the studies in the literature, on the health sector can be investigated empirically. Research can also be conducted on how to optimally benefit from the potential advantages of the metaverse in the health sector and how to minimize its disadvantages.

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## SİMENTAL IRKI SIĞIRLARDA FETAL DÖNEMİN MORFOLOJİK OLARAK İNCELENMESİ

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### ÖZET

Ruminantlar, implantasyon ve plasentasyon süreçlerinde yoğun bir hücresel proliferasyon gösteren ve orta düzeyde invaziv bir plasentaya sahiptir. Embriyonik ve fetal ölümler et ve süt sığırcılığı işletmelerinde hem ekonomik hem de biyolojik verimliliği olumsuz etkileyen kritik problemlerdir. Döl verimi, sığırcılık işletmelerinde hem ekonomik hem de biyolojik verimliliği etkileyen en önemli faktördür. Başarılı bir sığır yetiştiriciliği, yetiştirmede kullanılan erkek ve dişilerin döl verimlerinin yüksek olması ile mümkündür. Döl verimine etki eden birçok faktörün etkili olduğu tespit edilmiştir. Bunlardan biri de fetal anomalilerdir. Bu sebeple fetal gelişim evreleri anatomik açıdan önem arz etmektedir. Simental ırkı hayvanlar yüksek oranda hem et hem de süt verimine sahip olduklarından ötürü bölgemizde en çok tercih edilen sığır türlerinden biri olmaktadır. Bu amaçla Simental ırkı sığırlarda fetal gelişimi 3 trimester'a ayırarak morfolojik olarak inceledik. Çalışmamızda Diyarbakır ili mezbahanelerinden elde edilen 12 tane fetus kullanıldı. Bu fetuslar 1., 2. ve 3. Trimester olarak gruplandırıldı ve her grupta 4 tane fetus herhangi bir disseksiyon işlemi yapılmadan incelendi. Yapılan incelemeler sonucunda fetuslarda herhangi bir anomali tespit edilmedi.

**Anahtar Kelime:** Simental, Sığır, Fetus, Fetal Geişim, Anatomi

## MORPHOLOGICAL INVESTIGATION OF THE FETAL PERIOD IN SIMMENTAL CATTLE

### ABSTRACT

Cattle have a moderately invasive placenta with intense cell proliferation during implantation and placentation. Embryonic and fetal deaths are critical problems in meat and milk cattle that await both economic and adverse effects of childbirth. Progeny accumulation is the most important factor in cattle breeding investment, both economically and at birth. A successful cattle breeding is possible with high fertility of males and females used in breeding. It has been determined that many factors affecting the progeny nests are effective. One of them is fetal anomalies. The fetal developmental stages of these lives are important in the anatomical load. Simmental breed animals are one of the most preferred cattle breeds in our region, as they have both meat and milk owners at a high rate. For this purpose, we divided the fetal development into 3 trimesters in Simmental cattle and examined them morphologically. In our study, the situation of 12 fetuses obtained from the slaughterhouses of Diyarbakır province. These fetuses were grouped as 1st, 2nd and 3rd trimesters, and any dissection procedure of 4 fetuses in the group was examined. As a result of the examinations, no anomaly was detected in the fetuses.

**Keywords:** Simmental, Cattle, Fetus, Fetal Development, Anatomy

## IŞIK MİKROSKOBİK BOYALARLA DOKULAR; ANATOMİDEN HİSTOLOJİYE

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### ÖZET

İncelenecek biyolojik materyalin yapısal öğelerini, canlılık özelliğini taşıdığı evreye en yakın olacak şekilde koruyup sabitleştirmek ve materyalin temel yapı taşlarını anlamak asıl amaçtır. Biyolojik materyali canlı olarak incelemenin mümkün olmadığı durumlarda materyali korumayı sağlamak; herhangi bir kimyasal ajan ya da karışım ile tespit (fiksasyon) ederek veya yapıyı düşük derecede ve kısa sürede dondurarak yapmak mümkündür.

Histolojide alınan doku örnekleri uygun fiksasyon ve takip işlemlerinin ardından parafine veya plastik gömme ortamlarına gömülerek blok haline getirilir. Parafin bloklardan alınan kesitler (3-5 µm) ışık mikroskobu ile incelenirken, elektron mikroskopik ön incelemede kullanılan plastik yarı ince kesitler (0,2-2 µm) ışık mikroskobu ile, ince kesitler (80 nm) ise transmisyon elektron mikroskobu (TEM) ile incelenir. Böylece anatomik olarak macro boyutlarda incelenebilen dokuları bu şekilde micro boyutlarda incelemek mümkün olmaktadır. Bu çalışmada bu metodları detaylı bir şekilde incelemeyi amaçladık.

**Anahtar kelime:** Anatomi, Histoloji, Işık Mikroskobu

## EXAMINATION OF TEXTURES WITH LIGHT MICROSCOPIC DYES; ANATOMY TO HISTOLOGY

### ABSTRACT

The main aim is to protect and fix the structural elements of the biological material to be examined in a way that is closest to the stage in which it carries the vitality feature and to understand the basic building blocks of the material. To protect the biological material in cases where it is not possible to examine the biological material live; It is possible to fix the structure with any chemical agent or mixture or by freezing the structure at a low temperature and in a short time.

Tissue samples taken in histology are blocked by embedding in paraffin or plastic embedding media after appropriate fixation and follow-up procedures. Sections taken from paraffin blocks (3-5 µm) were examined with a light microscope, while plastic semi-thin sections (0.2-2 µm) used in electron microscopic preliminary examination were examined with a light microscope, and thin sections (80 nm) were examined with a transmission electron microscope (TEM). is examined. Thus, it is possible to examine the tissues that can be examined anatomically in macro dimensions in micro dimensions. In this study, we aimed to examine these methods in detail.

**Keywords:** Anatomy, Histology, Light Microscope

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**MANIFESTATION OF A DYSTOPIAN GOVERNMENT SYSTEM IN ALDOUS  
LEONARD HUXLEY'S *BRAVE NEW WORLD***

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**Abstract**

The paper focuses on the dystopian vision of government as depicted in Aldous Leonard Huxley's *Brave New World* which was written in 1931 and published in 1932. This extraordinary work is considered a dystopian novel. Huxley wrote nearly 50 books which include fictional and non-fictional works. Generally, dystopia exists in the abuse of power, manipulation, exploitation, and injustice in man's attempt to attain an ideal society. This paper deals with how dystopian literature represents the imperfections of those seemingly utopian societies in Huxley's *Brave New World*. Largely set in a futuristic World State, populated by genetically modified inhabitants and an intelligence-based social hierarchy. It shows how people fall victim to the dystopian government policy and its games, exposing peoples' lives to danger and even death. In brief, it shows the slow decay of life and self as reflected in dystopian literature which portrays a frightening vision of a revolutionary world, generally controlled by knowledge and a dictatorial ruling government that uses any possible means to utilize iron-handed power over its people. Huxley's *Brave New World* predicts enormous scientific progressions in reproductive technology, psychological manipulation, classical conditioning, and sleep learning that are joined to make a dystopian society.

**Keywords:** Dystopia, Dystopian Literature, Huxley, Brave New World, Sleep Learning, American Literature

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## A STYLISTIC ANALYSIS OF *A PAINFUL CASE* \*

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### Abstract

The style of an author is provided by effective matching between his/her thoughts and selection of linguistic items. Stylistic analyses involve both the study of style and the study of how effects and meanings are produced by a literary text. Stylistics, therefore, relates linguistic facts (linguistic descriptions) to meaning (interpretation) to show evidence for an interpretation of a text. This study analyses James Joyce's *A Painful Case* in the aspect of stylistic features. The short story is about a platonic affair between a married woman and an isolated man, the breaking off of the affair, and its aftermath. The analysis of the short story begins with a general interpretation. Its significant stylistic features are pointed out in terms of lexis, grammar, figures of speech, cohesion and context. The short story's title foreshows the cause of the inner conflict of the main character and deals with the theme of isolation. The opening paragraph of the short story consists only of declarative sentences. Joyce uses simple past tense in order to confirm compatibility with the figural narrative situation he used. In terms of the syllable-length of words, the selected passage contains mostly two-syllable words. Lexical repetitions direct one's attention to the negative feeling such as loneliness. The passage bases upon implicit connections of meaning which are strengthened by repeat of words from the same semantic field. The use of free indirect speech and a detailed description about the room reveals the main character's state of soul. The domain is indoor surroundings, and the tenor is formal. The 3<sup>rd</sup> person narrator takes the reader beyond the usual aspects of life through epiphany. Mr Duffy feels remorse about Mrs Sinico's death and realizes that his pursuit of control and order has caused only to his loneliness. Emotional paralysis of Mr Duffy compels him into a lifelong loneliness. This study shows how the formal stylistic features are used as the basis for inferring the short story's meaning and effect.

**Keywords:** James Joyce, linguistic features, style, stylistic

### 1. INTRODUCTION

Style in language states a thought in various ways based on connotations; thus, it is a characteristic of an author's character that distinguishes the author from other ones (Üstün Kaya, 2009: 6). Crystal states that "style is seen as the (conscious or unconscious) selection of linguistic features from all the possibilities in a language" (1987: 66). Considering literary arts as a unity in which expression and thought are combined, Hough points out that language is "the dress of thought", and style is the fashion of that dress (1969: 3). An analysis of style shows the artistic principles highlighting the author's selection of language. Wales expresses that each author has his/her own stylistic features of language and therefore, style is synonymous with language (1990: 436). Language is important for the presentation of a theme that the author has decided for his/her work. Style is an important characteristic of the author's personality and each author has a linguistic fingerprint (Leech & Short, 1981: 82).

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\* This book chapter is an extended study of abstract paper entitled "Linguistic Features in James Joyce's *A Painful Case*" presented orally at the 3<sup>rd</sup> International Liberty Interdisciplinary Studies Conference on January 13-15, 2023 in Miami, USA.



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The style of an author is provided by effective matching between his/her thoughts and his/her selection of linguistic items.

The subject matter of stylistic analyses are literary texts; thus, stylistics can be considered as “the study of literary discourse from a linguistic orientation” (Widdowson, 1975: 3). Robey defines stylistics as “the branch of literary studies that concentrates on the linguistic form of a text” (1982: 54). *Longman Dictionary of English Language and Culture*<sup>1</sup> describes stylistics as “the study of style in written or spoken language”. Stylistic analyses involve both the study of style and the study of how effects and meanings are produced by a literary text. Stylistics focuses on the scientific study of the style of a specific author in his works. Stylistic analysis shows the relationship between the artistic function and specific linguistic units in literary texts. The analysis focuses on the causes of author’s choice of language while mentioning his/her feelings and ideas. In general, “the linguistic study of different styles is called stylistics” (Chapman, 1973: 13). As all authors have their own way to express their feelings and thoughts, every text has its author’s own stylistic features. Turner mentions that “style is the man himself” (1973: 23). Since a human being is considered to be an output of the society, his/her written work must reflect his/her socio-political experience. Thus, the author himself/herself is considered as “style” and there is a powerful relation between manner and matter. Hough believes style to be an aspect of meaning that shows the characteristics of an author (1969: 8). In other words, style shows the attitudes of an author in a text since “style is the man” (Lodge, 1966: 50); style is the author himself/herself. The style of an author shows his/her psychology as a human being and his/her literary personality as an author. In short, style and stylistics can be explained as follows:

Style is a way in which language is used. [...] Therefore style consists in choices made from the repertoire of the language. [...] Stylistics or the study of style has typically been concerned with literary language. Literary stylistics is typically concerned with explaining the relation between style and literary or aesthetic function. [...] Stylistic choice is limited to those aspects of linguistic choice which concern alternative ways of rendering the same subject matter. (Leech & Short, 1981: 38-39)

Stylistics is regarded as the linguistic characteristics of a particular text, and thus, literary texts are studied to reveal an author’s literary discourse through his/her personal use of language. Stylistics provides the opportunity to identify the distinctive characteristics of a literary text “and to specify the generic and structural subdivisions of literature” (Bradford, 1997: xi). Literary stylistics explains the relation between artistic function and language. Short expresses that stylistics answers the questions of how a literary text influences the readers’ mind with a fictional world and how they understand the style of a literary text (2006: 2). Stylistics aims to explain the sentient agreement on a text by showing the relations of a text with historical, social and personal contexts. Therefore, if style is the output of a relationship between language and its users and of social situation, stylistics is a part of language and sociolinguistics that is studied in relation to society (Chapman, 1973: 11). Verdonk mentions that readers are “active agents” instead of “passive receptacles” and always competent on “producing their own representations” (2002: 77). A stylistic analysis of a literary text involves the description of scenes, the use of dialogues, the use of passive and active voice, the use of specific language registers, and the distribution of sentence lengths. Stylistics, therefore, relates linguistic facts (linguistic descriptions) to meaning (interpretation) to show evidence for an interpretation of a text. Stylisticians try to discover both what a text signifies and how it comes to signify what it does (Short, 1996: 5-6).

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<sup>1</sup> <https://www.ldoceonline.com/dictionary/stylistics>

### ***1.1. Theoretical Framework***

Literary works come into existence through the use of language's units in the particular ways of authors. A detailed analysis or an interpretation of a literary text can be succeeded through stylistic and linguistic analyses. According to Short, stylistics does not explain everything in a literary work, he states:

The detail of stylistic analysis means that it can only be applied sensibly to short texts or extracts of longer texts, leaving plenty of other aspects of texts in need of exploration, as well as the relations between literary texts and the personal, historical and social contexts of their production and reception. (2006: 5)

Norm, deviation and foregrounding are three major principles of stylistics: Norm is a formed pattern within a literary text that is concerned with language's linguistic levels such as lexical structure, phonology, grammar and graphology. General norm, lexical norm and authorian norm are the different types of norms.

Deviation is the violation of language's accepted order. Deviation is a way to foreground the use of language in narration. It can be categorized such as deep structure deviation and surface structure deviation. Deep structure deviation means semantic deviation which includes something odd in a word/a phrase's meaning. Surface structure deviation involves deviations such as lexical, phonological, graphological, grammatical (syntactic), and dialectal. Lexical deviation occurs when an odd lexical item is taken into the text or when a word is over-used in a text. Phonological deviation is the violation of an ordinary language's accepted sound patterns such as using 'pal' instead of 'friend'. Graphological deviation focuses on the violation of rules in relation to capitalization and punctuation marks. Grammatical (syntactic) deviation breaks grammar rules of a language. Dialectal deviation occurs when, for example, an Indian character uses the dialect of an Italian.

Foregrounding is the deviation of accepted literary and linguistic norms. Foregrounding is formed through repeating a phrase or word in order to highlight a certain situation. There are two types of foregrounding such as non-deviational and deviational foregrounding. The non-deviational foregrounding ensures an emphasis within language use. Scenes, repeated words or speech acts draw readers' attention because they imply meaning in deeper structure whereas the deviational foregrounding is seen when the readers are alerted to the violation in the deep structure.

Leech and Short categorize the stylistic analyses into four groups such as grammatical, lexical, figures of speech, and cohesion-context relation in the literary style of a text (1981: 69). Grammatical category is about the general characteristics of sentence structures. It examines sentence complexity, sentence types, clause structures, clause types, verb phrases and noun phrases. For the grammatical category, syntax as a stylistic feature is essential; for example, the arrangement of the phrases and the grouping of the forms into phrases. For lexical category, the focal point is the general word choice of showing its grammatical relationship because lexical form is related to the words' syntactic function and the meaning in a literary work. Lexical category includes the author's selection of words and their meanings. The emphasis is on words such as nouns, verbs, adverbs, and adjectives. The incidence of characteristics in figures of speech are foregrounded "by virtue of departing in some way from general norms of communication by means of the language code; for example, exploitation of regularities of formal patterning, or of deviations from the linguistic code" (Leech & Short, 1981: 78). These deviations show the clues to the author's particular use of language. This category includes figures of syntax and rhetoric, and the basic figures such as simile, irony and metaphor are examined. Lexical and grammatical schemes focus on parallelism and repetitions, and on the rhetorical effect of the anti-climaxes and climaxes.

The analysis of phonological schemes concerns about the phonological patterns of rhyme, assonance and alliteration, the use of consonant and vowel sounds; and interaction of phonological characteristics with meaning. Cohesion and context relation deals with both the internal and external organization of a story. Cohesion is the aspect in which sentences are connected. It is the internal organisation of a literary text. Context is a part of a text assuming a social relation between reader and author, character and character, and a share point by participants of knowledge and assumption, and it is also the external relations of a literary text (Leech & Short, 2007: 64). This category focuses on the narration and its role in the plot of a literary text. There are two kinds of narration in prose: 1<sup>st</sup> person narrator and 3<sup>rd</sup> person narrator. The 3<sup>rd</sup> person narration seems much more “objective” than 1<sup>st</sup> person narration because it is not attached to a particular character’s viewpoint. In fact, 3<sup>rd</sup> person narrator is omniscient. 3<sup>rd</sup> person narrator (author) knows everything and tells the truth whereas 1<sup>st</sup> person narrator (a character) is unreliable.

This study analyses James Joyce’s *A Painful Case* in the aspect of stylistic features. Irish author James Joyce (1882-1941) is a famous novelist, poet, and short stories author in the early twentieth century. Joyce joined the Royal University to study English, Italian, and French where he got a Bachelor of Arts degree in 1902. During his life, Joyce wrote articles about Irish subjects, translated Irish works into other languages and worked as a lecturer. Joyce wrote reviews on books for Dublin’s newspapers and mastered multiple languages and literature extensively (Ellmann, 1982: 75). He wrote a collection of lyric poems, a collection of short stories, and five novels. *Dubliners* (1914) is a collection of fifteen short stories. It presents Dublin to the world in a realistic way referring to people of Dublin of different ages, sexes, and social classes through the characters that Joyce narrates in the stories. Generally, the stories are a commentary on the cultural, social, economic, political, moral and religious conditions that trapped the Irish people in Dublin in the early twentieth century. The theme *Dubliners* presents from the beginning of the first story to the end is “paralysis or living-death” (Tindall, 1959: 3). *A Painful Case* is one of the fifteen short stories in the collection titled *Dubliners*.

*A Painful Case* is about a platonic affair between a married woman and an isolated man, the breaking off of the affair, and its aftermath. In the story, James Duffy, a solitary bank cashier, gets to know Mrs Sinico at a Dublin concert. When Mrs Sinico tries to touch Duffy’s hand, he decides that they stop seeing each other. Mr Duffy lives alone and does not see any friends or family. Four years later, Duffy learns about Mrs Sinico’s death by suicide in the newspaper. Firstly, the analysis of the short story begins with a general interpretation. Secondly, its significant stylistic features are pointed out in terms of lexis, grammar, figures of speech, cohesion and context. Finally, this study shows how the formal stylistic features are used as the basis for inferring the short story’s meaning and effect.

## 2. A STYLISTIC ANALYSIS OF A PAINFUL CASE

(1) Mr James Duffy lived in Chapelizod because he wished to live as far as possible from the city of which he was a citizen and because he found all the other suburbs of Dublin mean, modern and pretentious. (2) He lived in an old sombre house and from his windows he could look into the disused distillery or upwards along the shallow river on which Dublin is built. (3) The lofty walls of his uncarpeted room were free from pictures. (4) He had himself bought every article of furniture in the room: a black iron bedstead, an iron washstand, four cane chairs, a clothes-rack, a coal-scuttle, a fender and irons and a square table on which lay a double desk. (5) A bookcase had been made in an alcove by means of shelves of white wood.



(6) The bed was clothed with white bedclothes and a black and scarlet rug covered the foot. (7) A little hand-mirror hung above the washstand and during the day a white-shaded lamp stood as the sole ornament of the mantelpiece. (8) The books on the white wooden shelves were arranged from below upwards according to bulk. (9) A complete Wordsworth stood at one end of the lowest shelf and a copy of the “Maynooth Catechism”, sewn into the cloth cover of a notebook, stood at one end of the top shelf. (10) Writing materials were always on the desk. (11) In the desk lay a manuscript translation of Hauptmann’s “Michael Kramer”, the stage directions of which were written in purple ink, and a little sheaf of papers held together by a brass pin. (12) In these sheets a sentence was inscribed from time to time and, in an ironical moment, the headline of an advertisement for “Bile Beans” had been pasted on to the first sheet. (13) On lifting the lid of the desk a faint fragrance escaped - the fragrance of new cedarwood pencils or of a bottle of gum or of an over-ripe apple which might have been left there and forgotten. (Joyce, 1993: 77)

### **2.1. General Interpretation**

There is a detailed description of the main character’s room. Thanks to the etched description, the readers can reconstruct, in their mind, the whole topography of the room which is colourless and has minimal furniture. The readers have a vivid feeling of the loneliness of the main character who is interested in reading. The story is told in 3<sup>rd</sup> person narration and is written in the past tense.

### **2.2. Lexical Analysis**

In terms of the syllable-length of words, the passage contains mostly two-syllable words. Therefore, the vocabulary is simple, and the tenor, which is related to how politely or formally one speaks, is formal. The passage contains of physical concrete nouns such as “bedstead”, “washstand”, “chairs”, “table”, “bookcase”, etc. In terms of semantic field, these physical concrete nouns relate to indoor surroundings. The description is made largely of noun phrases such as “an iron washstand”, “a coal-scuttle”, “white wooden shelves”, “a brass pin”, etc. Adjectives refer to colour such as “white bedclothes”, “a white-shaded lamp”, “white wooden shelves”, “a black and scarlet rug”, “a black iron bedstead”, etc. These descriptive words refer to negative feelings. The verbs are mostly stative referring to states such as “hung”, “stood”, “were”, “lay”, etc.

Mr Duffy’s house functions as a microcosm of his soul. His room is not colourful or cluttered but rather it is made of “white wood”, “white bedclothes”, “a white-shaded lamp”, “white wooden shelves”, and “lofty walls” with no pictures. This shows that he is cold and has no passion. Mr Duffy keeps his orderly home very neat, places his books precisely on shelves, organizes a sheaf of papers by a brass pin, and has plain and functional furniture. The colours yellow and brown in Mr Duffy’s “uncarpeted floor” and “an overripe apple” in his desk are considered a symbol of his decaying possibilities. Joyce uses these colours to symbolize paralysis and decay of the main character. The bookshelf, a writing desk, a translation of a German play and his book of thoughts “Bile Beans” show that Mr Duffy is an intellectual.

### **2.3. Grammatical Analysis**

The opening paragraph of the short story consists only of declarative sentences. There are 13 sentences consisting of 314 words. The number of sentence lengths in words is 37 - 29 - 11 - 41 - 14 - 15 - 20 - 13 - 30 - 8 - 30 - 31 - 35. Thus, the average sentence length is 24 words. Sentences (1), (2) and (11) are complex sentences and have a certain similarity of structure such as linking (coordination) and nesting (subordination) constructions.

These sentences give more detailed information about the main character and his room than other sentences. These sentences reveal that the main character is lonely. Sentence (4) consists of listing construction. The article of furniture in the room is narrated one after another. These all words are related to indoor surroundings. The passage includes prepositions of place and direction such as “in” and “on” in sentences (10), (11) and (13). In fact, there is the use of prepositional phrases in terms of the sentence’s syntactic complexity. The preposition “of” relates two noun-expressions together. In this sense, cognition and perception go hand in hand when the eye cannot make a record of an object in the raw, but schematizes it in cognitively coded grouping. Joyce uses simple past tense in order to confirm compatibility with the figural narrative situation he used. Joyce summarizes the story time to put emphasis on the ordinary manner in which Duffy’s life “rolled out evenly”. In terms of semantics, the first sentence (1) and the last sentence (13) of the passage above are about the main character’s loneliness. Sentences (2) - (12) are about his house, his writing materials and article of furniture in the room. Therefore, the meaning of the first and last sentences of the passage is exemplified through the description of his house, furniture and writing materials that reveal the main character’s state of soul.

#### ***2.4. Figures of Speech Analysis***

There is lexical repetition of “iron” in sentence (4); “black” (4) and (6); “white” (5) - (8); “desk” (4), (10), (11), and (13); “shelf” (5), (8) and (9); and “sheet” (11) and (12). These lexical repetitions direct one’s attention to the negative feeling such as loneliness. There is simile in sentences (7) because the “white shaded lamp” is considered as “the sole ornament of the mantelpiece”. Noun phrases such as “over-ripe apple” (13) and “faint fragrance” (13) bear semantic deviations. When a fruit is on a tree branch for a long time, it can be overripe. However, the apple in the lid of the desk can be considered as a metaphor which may mean decay as it is forgotten there. While the adjective “faint” is negative like bad, the noun “fragrance” is positive like sweet smell. Therefore, there is a paradox which leads to semantic deviation. The noun phrase “a faint fragrance” is personified through the verb “escape” (13) which is used for living beings. There is grammatical parallelism between sentences (8) and (9) through prepositions of direction such as “from below upwards”, “at one end of the lowest shelf”, and “at one end of the top shelf”.

#### ***2.5. Cohesive and Contextual Analysis***

The passage bases upon implicit connections of meaning which are strengthened by repeat of words from the same semantic field. Sentences (1) and (2) are about the main character’s house. Sentences (3) - (7) are about article of furniture in his room. Sentences (8) - (13) are about writing materials and the desk in his room. The description of these indoor surroundings reveals the main character’s loneliness. The story is narrated by 3<sup>rd</sup> person who pays attention to elaborated detail. A 3<sup>rd</sup> person perspective compels the readers to confide in the character’s concept and perception, leading to the idea that 3<sup>rd</sup> person narrator is omniscient. The narrator knows everything and takes the readers inside the character’s mind. The use of free indirect speech provides access into the character’s inner world. There is a detailed description about the room which reveals the main character’s state of soul. The domain, which is related to the field or the subject matter, is indoor surroundings, and the tenor is formal. There is spatial (the physical ‘angle’ of) viewpoint related to narrator’s description of the main character’s room. In terms of the characteristics of the passage, it is prosaic, objective, simple and straightforward.

The names of the main character and the suburb have implicit connections with the short story's theme. The main character's name is Mr Duffy which means "dark" or "black" in Gaelic. The suburb, Chapelizod, in which Mr Duffy dwells, takes its name from the French, Chapel d'Iseult. In this sense, Iseult is one of the renowned set of lovers, Tristan and Iseult, whose devoted affair is an iconic love story in literature. This name links the unrequited love and Mrs Sinico's death with Mr Duffy's modest existence when Mr Duffy deliberately chooses his home in this neighbourhood to keep his distance from Dublin's bustle and hustle, and to have a starting point for his daily routine. There are also inter-textual references in sentences (9) and (11). According to sentence (9), a complete Wordsworth stands at the lowest shelf, and a copy of the "Maynooth Catechism" stands at the top shelf. While Wordsworth is a poet of romantic period, the "Maynooth Catechism" is a modified version of a [Catechism](#) written in 1775 by Dr James Butler who was the Archbishop of Cashel. There is a conflict between romanticism and realism which leads to isolation. Hauptmann's "Michael Kramer" in sentence (11) is a four-act drama written in 1900 in which Kramer experiences an epiphany about the pain of his dead son, Arnold, who commits suicide. "The headline of an advertisement for Bile Beans" in sentence (12) refers to Charles Forde's "Bile Beans" which was considered as a remedy for the flu epidemic of 1899. The narrator employs journalistic precision when describing Mr Duffy. Joyce's style might be personal naturalism. The narrator takes the reader beyond the usual aspects of life through epiphany. Emotional paralysis of Mr Duffy compels him into a lifelong loneliness.

### 3. CONCLUSION

The short story's title, *A Painful Case*, foreshows the cause of the inner conflict of the main character and deals with the theme of isolation. The story starts with a detailed description of Mr Duffy's plain home in a neighbourhood he selected for being distant from Dublin because he hates his city and wants to live as far away from it as he can. The narrator describes the space in detail because the author, Joyce, characterizes Mr Duffy through his possessions. Mr Duffy's room is not colourful or cluttered but rather it is made of white and black colours. There are no pictures on his wall. This shows that he is cold, and he has no passion and no friends. He has no joyful memories to immortalize in a frame on his bedroom walls. Mr Duffy keeps his orderly home very neat, places his books precisely on shelves, organizes a sheaf of papers by a brass pin, and has plain and functional furniture. The colours yellow and brown in "uncarpeted floor" and "an overripe apple" symbolize decay and paralysis of the main character. His room reflects the state of his mind: austere and orderly, uncluttered by anything resembling passion. Though figuratively speaking, Mr Duffy is dead. The narrator adopts a pessimistic view of the central character. Mr Duffy feels remorse about Mrs Sinico's death and realizes that his pursuit of control and order has caused only to his loneliness. He experiences an epiphany of his loneliness at the end of the story. Mr Duffy has unwittingly been lonely in the past, is presently lonely, and will be forever lonely.

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## THE POLITICS OF FICTIONAL LITERATURE: A CROSS-DISCIPLINARY APPROACH

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### Abstract

Language could be said to condition, limit and predetermine our understanding of the universe. It does not record but rather constructs all reality. Characteristically it could be considered as the required mean when it comes to intellectual inquiry issues such as politics and literature. Politics can be defined as an interactive social activity through which individuals, according to the cluster of their perceptions and sensory data, set structure, purpose and ideals in their lives and shape this common world. On the other hand, the purpose of good literature is essentially the enhancement of life and the propagation of humane values not in a programmatic and propagandistic way. It speaks to what is constant in human nature by transcending the limitations of time and space.

Fictional writers, but not only, use words as tools for communicating meaning that results from the relation of signs to signs within a literary work. By doing this they automatically commit to the framing of the common world. Furthermore, the meanings within a literary work are never fixed and reliable but always shifting and ambiguous and it is characteristic of language to generate infinite webs of meaning. Theoretically, meaning is jointly constructed by reader and writer and in their pursuit for meaning they both must resort to domains outside literature in the form of a quasi-political commitment in order to ground their arguments and understanding of a literary work on some linguistic specificity.

What T.S.Eliot taught us about artistic expression is that the best way of expressing an emotion in art is to find some vehicle for it in gesture, action, or concrete symbolism, rather than approaching it directly or descriptively. With these principles in mind necessary for an understanding of the various approaches to fictional literature I will take account of the short story by Ernest Hemingway “Hills like White Elephants” written in 1927 and published in 1929. In my perspective I find that the understanding of this short story encompasses various disciplines such as semiotics, anthropological structuralism, Lacanian (and perhaps Freudian) psychoanalysis, history, politics of gender and even the art of visualization in drawing. The approach seems by far a cross-disciplinary one with reference to viewing one discipline (literature in our case) from the perspective of (an)other/s. A very much “ideas-led” rather than “text-led” track in the interpretation of this piece of short story, it tends to tackle big general issues concerned with fictional literature at large.

**Keywords:** politics, fictional literature, semiotics, perspective, gender, psychoanalysis, anthropology

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## CROSSING OVER THE DEMYSTIFICATION OF THE MIRAGE OF CULTURE IN L.P. HARTLEY'S THE GO-BETWEEN

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### **Abstract**

It is a known fact there is a generalisation of the concept of culture in the world of oral and written literature from the standpoint of the definition it is awarded. Such a blunder subtly causes disintegration in a world that is athirst of righteousness which is regrettably traded with a deadly formalism in the name of culture. I stand in the defence the truth that the cultures of the day have sprung from the world's past historic heritage. Taking into consideration the novel under study, the interval of the study situates between the 19<sup>th</sup> Victorian era's grand ethical themes and contemporary notions of culture. As Hartley has done in his novel, if nothing is done to instil into the consciences of the younger generation of men and women that culture which has at its very roots pure and unfeigned love as a foundation, a great devastating status quo will be maintained and will irremediably ruin the world.

**Keywords:** Demystification, Mirage, Culture, Mirage of culture, Demystification of the mirage.

### **Résumé**

C'est un fait connu qu'il y a une généralisation du concept de la culture dans le monde de la littérature orale et écrite du point de vue de la définition qui lui est décerné. Une telle erreur magistrale cause subtilement la désintégration dans un monde assoiffé de la justice qui malheureusement est échangé avec un formalisme mort au nom de la culture. Je me tiens en défense de la vérité selon laquelle les cultures du jour proviennent de l'héritage historique du monde du passé. En prenant en compte le roman soumis à étude, l'intervalle de l'étude se situe entre les grands thèmes éthiques et les notions contemporaines de la culture. Comme Hartley l'a fait dans son roman, si rien n'est fait pour inculquer cette culture qui a à ses racines même l'amour pur et sincère comme fondation dans les consciences de la jeune génération d'hommes et de femmes, un statut quo dévastateur sera maintenu et contribuera irrémédiablement à la ruine du monde.

**Mots-clés:** Démystification, Mirage, Culture, Mirage de culture, Démystification du mirage.

### **INTRODUCTION**

This paper takes stand on the grand narratives of philosophical literature such as right and wrong, the deadly nightshade is a picture of evil: [poisonous and beautiful; Marian] ... to explore the many facets of cultural bias that hamper happiness in a world in which humans are desperately panting and thirsting after righteousness. This is possible through a close analysis of the different roles some key characters play and how it has direct relevance or can have with real life. After all fiction is in a sense a reflection of reality itself.

This research work is divided into three main sections. The first is about the introduction to the study. The second section is a critical outlook on Hartley's posit of culture and the last indicates some perspectives on a redefinition of the concept of culture.

### 1- Introduction to the study

Literature has globally bequeathed a heritage of culture to both modern and traditional people. The staple of such a declaration renders overtones of codes and principles peculiar to specific human societies. It provides to a given group of humans' behaviouristic rule and norms, shapes their understanding of the world and their mentality as a whole, governs what they believe in individually as well as collectively, constitutes a groundwork for laws and customs in the community. Culture encompasses all those ideals and represents a massive iceberg of meaning to different groups of people with a tight union with their past life, experiences, and new resolves for prosperity and/or fulfilment. These can gradually freeze in the presence of blind determination, inconsistent adaptation to the realities of the present world coupled with spiritual irreligion.

In this paper, what I seek to do is showcase the love of culture in both the modern and traditional worlds and carve limitations from them to demystify what they falsely advertise as a by-product of satisfaction, meaning...fulfilment, long lasting advantageous asset, wellbeing in the world. This study centres on religious culture as this constitutes a great point of controversy capable of overturning the course of events in the whole world if nothing concrete is done to hamstring its expansion. The different kinds of meaning people give to different kinds of worship in various parts of the world rules their standing over against their counterparts and determines the quality of their relationships.

An emphasis is laid on the intractability of the deeply rooted Afro-American regrettable history of transatlantic trade which has left a huge scar on the consciences of many a man in both camps. However, there is a clear stipulation in this paper that meditation on past harm done roots or can root unconquerable desires of revenge that can by all accounts contribute to humans' annihilation themselves. Conversely, it can greatly help in brooding over the quality of past choices and their consequences as well in the person's life. Here, Leo's case is a great exemplification of this very reality. The fruits and leaves of which are the scenes of complaints of racism, intolerance, and the many difficulties that form the contours of the relationship between Africans and Americans.

In the novel under study, such like patterns of culture are visible in Leo Colston's writing of magic spells for instance in his diary to protect himself against the bullying of his school mates. Hartley indirectly resorts to this African way of solving certain problems to bridge a gap between Afro-American culture. After all, history proves that the transatlantic slave trade has given way to certain cultural melange between the two ethnies. The term Afro-American itself signifying an American whose ancestors were born in Africa clearly proves that very melange<sup>1</sup>.

There is also the culture of lying which is evident in Marian's lie to her mother in the first five chapters of the novel. She continues to hold tight to her lying starting from chapter 9 to 11.

The materialistic culture that has characterized the 18<sup>th</sup> and 19<sup>th</sup> century England in springing forth the famous stratification of classes that is pervasive in men's society nowadays and which constitutes a driving force in many a people's daily lives is a remarkable example that is part of the current discussion.

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<sup>1</sup> [This is culture considered in terms of lineage].



Hartley portrays this on purpose through Marian's been pressured by her mother to marry Lord Trimingham. She wanted the family to go up the scale of aristocracy.<sup>2</sup>

### 1-1 Problem statement:

The problem that the present research work poses has direct and irrefutable link with the very year in which most events Hartley describes are set in. The Victorian era was one in which social class was a great issue to reckon with. As such, Marian sees herself in the face of a perplexed situation of choice of life partner. She has to choose between Ted Burgess, a peasant and Lord Trimingham, an aristocrat in the great Brandham Hall. And given that marriage was an opportunity for husbands to take care of their brides in the time, coupled with the care people took in the choice to avoid having to earn a living for life just after marriage led Mrs Maudsley to pressure Marian into making a choice just because she has to and not because she really wanted that freely. This aspect of Hartley's great narrative, along with other instances [the lie culture by Marian herself]; described in the novel clearly set the pace for the demystification of what most people designate by the name of the culture of the day that they tightly cling to, but which is not necessarily the right alternative in going through and living life. To this effect, a suggestion of the revision of a person's immanent vision of life and how it correlates with the preservation of his/her soul in his/her daily experiences of life- as in Leo's case- is an imminent must.

### 1-2 Purpose of the study:

The purpose of the present endeavour lies in the need to reassert the urgency of a thorough reconsideration of the manifestations of evil, a direct result of human nature and original sin through some key scenes Hartley subjects to consideration and analysis in his work. The recurrence of the themes in most scholarly works takes ground in the very fact that they constitute the centre of any sort of problem any person on planet earth will mention as inherently oppressive to his/her personal life. There is no need to fear threats of judgement against this aspect of things because the author's narrative itself is flooded with central biblical concepts such as *rapture*;<sup>3</sup> *the Jacob's ladder*;<sup>4</sup> *a miserable sinner*;<sup>5</sup> *resurrection*;<sup>6</sup> *Transfiguring*;<sup>7</sup> *True impulse of contrition*;<sup>8</sup> *sin*;<sup>9</sup> *The hosts of Midian*...<sup>10</sup> Through the present undertaking, I am seeking to put stress on the conviction of sin in whatever shape or form it takes, which is represented here in manipulation and lies and the glorification of opulence characteristic of the 19<sup>th</sup> century England to the detriment of sound reason and contentment exemplified in the life of Jesus Himself while He was on planet earth according to biblical narratives, the Apostle Paul, the disciples, and great divines in the history of the world. This is the culture that need to be countered. It only serves the satisfaction of self and blinds a person to the realities of his need of salvation from sin and self.

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<sup>2</sup> [This is culture considered in terms of values and conceptions of life inherent to a particular group or society of humans. It often threatens the infringer with rebukes and punishments].

<sup>3</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.16

<sup>4</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.97

<sup>5</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.49

<sup>6</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.22

<sup>7</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.52

<sup>8</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.159

<sup>9</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.161

<sup>10</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.86

### 1-3 Limitation of the study:

The purpose of the study openly displays the vastness of the theme under discussion. Much time and material, human as well as financial means are needed to cover all the derivatives of the concept of culture. What is more, the culture of pure unfeigned love as the central theme in this work presupposes dedicated and long hours of study which it is practically difficult but possible to achieve. The fields to cover are too large. For the present time, I solely focus on trying to follow Hartley's mode of narration on the concept throughout the novel with an average touch of intertextuality in vital parts of the development. This is far from being the exploit of an inclusive consideration of all the contours of culture. However, it rather serves as a sensitizing weapon to direct the attention of the reading audience towards the demystification of the mirage of trivial representations and practices of culture in the whole world. It also invites to a change of culture in the habit of the use, representation and understanding of the word culture, pointing to the culture of love as the ultimate culture that can liberate the whole world from its bondage.

### 1-4 Literature Review:

The novel under study discloses complexities and intricacies that a single reading cannot provide a deep, profound and objective angle of vision to. However, a number of alerted and well brained scholars have tried to bring out the deep messages that Hartley has sought to convey with a special relation to the context in which the novel was published.

Ella Berthoud and Susan Elderkin identify for instance the focal ailment in the novel as *being a hopeless romantic*. There's even a funny sentence that they propound as they invite folks enamoured with romanticism to read the novel, which simply is that such folks should read it to inoculate against heartbreak ahead. Leo's sense of a *wasted life*... as they have put it in the review, indirectly reminds of the dangers of romanticism that many a postmodern writers and advocates have warned the world of literature against considering the moral decline it has brought the world into ever since its spread and the paroxysmal sway it took in the Renaissance period. One of their literary prescriptions for the modern romanticism, to quote them once again reads: '*Sacrificing yourself on the altar of love is all very well, but the wounds incurred can last a lifetime.*'<sup>11</sup>

Ann Brashares, author of the *Sisterhood of the Traveling Pants, Girls in Pants*... poses the same problem of understanding especially in relation with Leo's conversation with himself as though he were two people after a reconsideration of his past experience with Brandham Hall and its people and relatives. She suggests that instead of viewing Leo as a person whose identity is cracked, he certainly is evolving in a process of continuity.<sup>12</sup>

The book is judged as being fundamentally a drama of social hierarchy. The New York Review of Books Paperback says that it is a masterpiece- a richly layered, spellbinding story about past and present, naïveté and knowledge, and the mysteries of the human heart.<sup>13</sup> This comes as a press hold to the present discussion in the sense that what we have cultivated the habit of chanting as a culture of our own that we need to cherish and adore for our own advancement in many a domain has the potency of blinding our eyes to the dynamics of the culture of love and other centeredness.

<sup>11</sup> <https://www.independent.co.uk/arts-entertainment/books/features/go-between-lp-hartley-novel-cure-being-hopeless-romantic-a6691986.html>. Consulted 06/04/2021, 11:05a.m.

<sup>12</sup><https://www.npr.org/2011/06/22/136926704/love-betrayal-humiliation-a-coming-of-age-affair?>. Consulted 05/04/2021, 09:20a.m.

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Jay Parini's comment from the New York Times reads: Hartley examines [in the novel] the nuances of morality with a shimmering exactness, focusing on characters like Leo, the narrator ...caught between natural impulses and the social conventions that would thwart them.<sup>14</sup> Such a comment comes as a confirming verdict to serve as the groundwork and the testifying materials of the relevance of the theme of this very study.

Sarah Dunant from the Daily Telegraph identifies the themes of love, pain of adolescence and the lure of the forbidden<sup>15</sup>. These words are characteristic of Leo's experiences throughout the novel. The class snobbism prevalent in the 19<sup>th</sup> century England in which the novel is set is what Hartley has certainly made one of his most important *cheval de bataille* in his work. The strict character and the tight emphasis laid on honour and dignity according to the rules of the time have failed to enter into a deal with the language of the heart, that of love pure and unfeigned. Though, this is in no way applicable to Leo himself, he can directly by himself observe it in the triangle link of love that Lord Trimmingham, Marian, and Burgess form.

Roger Ebert gets the credit of providing Joseph Losey's brief narrative on the man's adaptation of the novel into a film. He says that the novel is about class distinction and its warping effect upon the life of one small boy.<sup>16</sup>

The author of the novel's epilogue grounds all these sayings by revealing the following about the Hartley's own writings:

He wrote that the novelist's world "must, in some degree, be an extension of his own life; its fundamental problems must be his problems, its preoccupations his preoccupations—or something allied to them." He also warned that while it is "unsafe to assume that a novelist's work is autobiographical in any direct sense," it is nonetheless "plausible to assume that his work is a transcription, an anagram of his own experience, reflecting its shape and tone and tempo."<sup>17</sup>

However, he diverges in opinion with some critics' appraisal of the novel. While some of them evaluate the novel as treating preponderantly of class distinction, COLM TÓIBÍN argues that it is the difficulty that Leo meets in his struggle with his fleshly impulses<sup>18</sup> His account is the following:

Hartley was right to cut this passage. It made too much too clear. It is, in any case, written between the lines of the book, which turns out not to be a drama about class or about England, or a lost world mourned by Hartley; instead it is a drama about Leo's deeply sensuous nature moving blindly, in a world of rich detail and beautiful sentences, toward a destruction that is impelled by his own intensity of feeling and, despite everything, his own innocence.<sup>19</sup>

The New Standard Gallery's summary of the novel mention that Hartley himself recognises that his work is pregnant with symbols, the deadly nightshade being the most obvious one. There is also the Belladonna, representing sexual symbolism.<sup>20</sup> It touches on the struggle Marian and Ted had to go through against the strictures of the social norm of the time. Deadly preceding nightshade clearly points to their very brief and only sexual experience as genuine lovers. The cricket match is a way of decrying the upper class's snobbism.

<sup>14</sup> Ibid

<sup>15</sup> Ibid

<sup>16</sup> <https://www.rogerebert.com/reviews/the-go-between-1971>. Consulted 06/04/2021, 06:30 a.m

<sup>17</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, Prologue, p.7

<sup>18</sup> This is as has been observed in Hartley's own style of writing a reference to the biblical narrative of the struggle between flesh and spirit.

<sup>19</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, Prologue, pp.8-9

<sup>20</sup> <https://thenewsstandardgallery.com/the-go-between-analysis/>. Consulted 05/04/2021, 08:10 a.m.

Mrs Maudsley is the very imagery of the deeply rooted need to follow in the steps of the requirements of social class of the time. Being the main instigator of Lord Trimingham and Marian's engagement, she couldn't bear another kind of union that is below the standards of the time. Hartley emphasises such a stance by putting forth how horrifically disabled she became after the shock of hearing that Marian hadn't come back with the carriage from Nannie Robson's.

The Litchart edition consecrated to the analysis of the theme of love, sex and Marriage in the novel indicates that the Go-Between explores the nature of romantic human relationships with the larger social world.<sup>21</sup> But it is important to note the devastating effects it has had eventually. Though it is crystal clear that social conventions can't control even romantic passionate love, it is from such a standpoint undeniable that righteous, pure and holy love's power far surpasses mere restraints which are the results of the animalism that is predominant in the souls of the men and women who fail to recognise God as He is and described in the Holy Scriptures. This is at least made more explicit by Ted's own view on spooning. Modern readers will rightly acknowledge the normalcy of the naturalness of sexual intercourse and romantic relationship regardless of marital status.

Susan Wolf and Christopher Grau's Understanding Love: Philosophy, Film and Fiction, published in Oxford Scholarship Online in January 2014 suggests that the novel tells the interrelated stories of a forbidden love between a beautiful aristocrat and a farmhand and of an adolescent introduction to the unruliness of sexual desire... in direct confrontation with the inflexibility of the English class system... and the arrogance of its upper class.<sup>22</sup>

Even to say "Bad luck" would have been in bad taste, as suggesting that I was not able to look after myself. It would have been like pointing out some physical defect. The law that one must consume one's own smoke was absolute, and no one subscribed to it more wholeheartedly than I. A late-comer to school, I had uncritically accepted all its standards. I was a conformist: it never occurred to me that because I suffered, there was something wrong with the system, or with the human heart.<sup>23</sup>

This Hartley's way of presenting the problem of cultural alienation in his novel. Leo finds himself in an aristocratic world. He is innocent, falls in love, but had to conform to everything he saw and was required to do. His social class status aggravated his plight as he was even on a sinking sand trying to conceal his identity. But while he was struggling to please everybody, everybody cared little who he was and what he could become...Hartley certainly knew that the different tensions he pictured throughout his work are like channels of water that spring from only one source. It is from the heart that vices spring forth from to paraphrase the Bible. If there's a problem, it has to do with alienation from God and insubordination to His will and purpose in people's lives.

### 1-5 Conceptual clarification and theoretical framework:

English dictionary *conceives* of culture as a particular society at a particular time and place; the tastes in art and manners that are favoured by a social group.

Antonio Lebrón's propounds the difficulty the American anthropologists, Kroeber and Kluckhohn faced while trying to provide a right definition of culture, which led them to provide 164 different definitions for the concept.

<sup>21</sup> <https://www.litcharts.com/lit/the-go-between/themes/love-sex-and-marriage>.

<sup>22</sup> <https://oxford.universitypressscholarship.com/>. Consulted 04/04/2021, 11:10.

<sup>23</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.19

The problem of the right definition is summarized in the following words: '*Despite a century of efforts to define culture adequately, there was in the early 1990s no agreement among anthropologists regarding its nature*'. One of the definitions he proposes in the paper reads:

Culture is the unique characteristic of a social group; the values and norms shared by its members set it apart from other social groups and is influenced by conscious beliefs.<sup>24</sup>

Orlando Patterson in the Department of Sociology, Harvard University, Cambridge, Massachusetts 02138, clearly sets the tone for the arbitrariness of the concept and its overlapping by-products. It is best phrased in the chronic fallacy of the blind people and the elephant.

Alexei N. Tarasova gives himself the challenge of analysing the theoretical and methodological foundations for the introduction to culture philosophy and cultural theory the "sociocultural transformation" concept.<sup>25</sup> He exposes in the development the notion of dynamics of culture and sociocultural transformation which highly relates to the concern being addressed in the present endeavour. One might well perceive through his work that the word culture, as it is used by many writer and speakers, presupposes a certain triviality that obviates from its very essence. A follow up of his line of thought suggests a goal oriented consideration of the progressive aspects of the process culture to unblock the embracing of spiritual realities of society life. However, Christian love as previously set forth constitutes the battlefield of this discussion given the spiritual context that Hartley himself makes allegiance to in his work. I seek to represent it as the ultimate culture for every reader so that in reading the book and this piece of work one might perceive the motivations behind my appellation.

According to scholars, the first highly influential definition came from Edward Taylor (1871-1), who opens his seminal anthropology text with the stipulation that culture is:

that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of a society.<sup>26</sup>

In *Culture and Anarchy* (1869) he had defined as 'the best that has been thought and said in the world' (Arnold [1869] 1971: 6). This is from the part of Arnold a clear-cut representation of culture from an intellectual perspective. As such, all other kinds of culture become sub-cultures that enter into the realm of a kind of rivalry with the former. The spiritual dimension of culture is also pinpointed as the centre of culture itself. That nexus is the focal point to which every discussion relates in this paper.

As Arnold puts it: 'Religion says, the kingdom of God is within you; and culture, in like manner, places human perfection in an internal condition, in the growth and predominance of our humanity proper, as distinguished from our animality' (47). Arnold conceives of poetry as the major means of culture and we only fully enter the realm of it if we choose, at least temporarily, to disregard the here and now of personal ambition, political manoeuvring, and economic gain.<sup>12</sup>

Mathew Arnold's view well suits this paper's argumentativeness even if for reasons of concision and flawlessness in the development, emphasis has to be laid on the very kind of poetry that is to be discussed.

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<sup>24</sup> Lebrón, Antonio, *What is culture*, Merit Research Journal of Education and Review Vol. 1(6), July 2013, pp.126-132.

<sup>25</sup> Tarasova, N. A, *Theoretical-methodological Bases of the "Sociocultural Transformation" Concept Explication*, INTERNATIONAL JOURNAL OF ENVIRONMENTAL & SCIENCE EDUCATION 2016, VOL.11, NO.18, 11993-12003 Abstract.

<sup>26</sup><https://www.google.com/search?q=Scholarly+articles+on+the+concept+of+culture&client=ms-opera-mini-android&channel=new>. Consulted 07/04/2021, 03:27 a.m.

It is already evidenced that the whole discussion of culture in this paper centres on the cultivation of pure and unfeigned love. Two of the most relevant theoretical assets Tarasova talks about in the evolving continuum of European culture are:

Renaissance - a sociocultural transformation from the medieval to the new European culture-system.

Postmodern - sociocultural transformation, reflecting the transition from the modern culture-system to the post-modern.<sup>27</sup>

These assets provide the methodological background applicable to the theme of this study. Therefore, the modern culture system as included in the Renaissance period ideals and the postmodernists are subject to stringent rigorous analysis to sort out the different notional illegitimacies linked to the culture of love. This is made possible through a thorough consideration of the plot of the novel under study. The workings of self-love are so subtle that there's a possibility that the most repulsive heart to God be admired by society because it seeks praise, adoration and acceptance of men and so strive to do what is pleasing to them just for the sake of his making the exploit of a clean outward moral sheet.

### **1-6 Methodology of research**

In the present study, intertextuality and social criticism have been used to appraise the concept of culture as revealed by L. P. Hartely in *The Go-Between*. Intertextual approach helps to correlate works and studies which, from a close or far view share any similitude with the concept under analysis. Social criticism helps to appraise critically and underpin the arguments raised in the frame of this research

## **2- Exploration of the mysteries of the mirage of culture in the novel and critical outlook**

### **2-1 Exploration of the mysteries of the mirage of culture in the novel**

A book about a boy becoming initiated into the mysteries of adult life (sex and its frequent thematic partner, betrayal), it is itself the kind of novel that introduces youngish readers into the mysteries and subtleties of fiction. Reading the novel is part of the process of learning how to read novels. But there was something appropriate, also, about the long delay in my getting round to it. I was reading *The Go-Between* at the same age as the "60-odd" narrator when he looks back at the momentous summer of 1900. As a result, my experience of the book became infected with the reading that had come between the age when I might or should have read it and the advanced age when I eventually did.

The narrator, Leo, starts looking through his old diaries in the early 1950s. They take him back to the kind of blazing summer we associate with the heatwave of 1914. From his friend Marcus, Leo learns that the local toff, Viscount Trimingham, "was wounded in the war and his face hasn't got right". A few pages later Leo gets his first glimpse of Trimingham:

On the side of his face turned to me was a sickle-shaped scar that ran from his eye to the corner of his mouth; it pulled the eye down, exposing a tract of glistening red under-lid, and the mouth up, so that you could see the gums above his teeth.

Such sights, such faces, were an all-too-common aspect of life in the aftermath of the first world war. When Harold Abrahams goes up to Cambridge in 1919, in *Chariots of Fire*, he is greeted at the station by railway staff wearing various masks and using surgical appliances to help hide and make good their injuries. The larger point is that the country itself has been maimed.

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<sup>27</sup> This is suggested from... without taking into account the recent British exit out of the European Union.



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A phrase, just two words, snagged me the way that barbed wire can snag a sweater. Now, “the war” in which Trimingham has been wounded is the Boer war, which is still unfolding while the action of the novel plays out. But *that* war becomes deliberately interwoven with the one still to come, both of which, from the perspective of 1950 – five years after the end of the second world war – let alone 2022, have become part of the deep (and ever-present) past. That Hartley intended something like this is made explicit in the epilogue when the 60-odd Leo visits Marian, the lovely, free-spirited young woman from that blazing summer, now an elderly and lonely grandmother. Both of Marian’s brothers, including Leo’s friend Marcus, died in the first world war. And her son was killed in the second.

Even before then, as the narrative coaxes and nudges the reader forward, the first world war becomes, as it were, *part of a past that has yet to occur*. Various elements of a shared literary heritage contribute to this blurring of the strict sequential ordering of social or military history. Ted Burgess, the farmer with whom Marian has a love affair, seems an emanation from the sunburned world of Thomas Hardy, with the pastoral skies of Norfolk replacing Wessex, thereby taking us deeper into an already mythic past. The class-defying affair itself – upper-class young woman, soon to be the viscount’s wife, passionately involved with one of his tenant farmers – inevitably recalls that of DH Lawrence’s *Lady Chatterley*, whose husband, Clifford, has been left crippled by the first world war. (A related example of the kind of temporal elisions that determine the atmosphere of *The Go-Between*: privately printed in 1928, Lawrence’s novel did not become widely available until 1960, seven years after Hartley’s.) All of this seems deliberate and consciously done by Hartley. Here I want to mention something else, a tiny point about a book whose plot turns on tiny things – the glimpse of a letter, a small alteration in the timing of an assignation – that Hartley can’t have intended. It’s akin to Roland Barthes’s famous notion of the punctum: something that is there in the text (or photograph in Barthes’s case) but which is also something I have brought to it. Shortly after we have learned of Trimingham’s disfigured face, residents and guests from the great house of Brandham Hall go swimming. There might be an echo – or, since it’s 1900, a pre-echo – of Rupert Brooke’s line about embracing war “like “swimmers into cleanness leaping”: a silly idea, albeit one Hartley (born eight years after Brooke, in 1895) would, at some point, have had splashing around his head. But it’s another phrase, just two words, that snagged me the way that strands of barbed wire can snag a sweater as one attempts to clamber awkwardly through them. The girls of the bathing party, Leo remembers, were in shallow water where it was only waist-deep; their feet showed softly white on the shining gold gravel, as they waded about with long, uneven steps, plunging into unsuspected holes, splashing each other, shrieking and giggling and laughing.

Leaving aside Brooke’s imagery, does anyone else feel the latency or gravitational tug of the first world war in this innocent passage? If so, it derives, surely, from Philip Larkin’s *MCMXIV*, which opens with the poet contemplating a photo of “Those long uneven lines” of young men queueing up to enlist in 1914 “as if it were all / An August Bank Holiday lark”. The poem is a memorial to what has happened, remembered entirely in terms of what is to come, culminating in “The thousands of marriages, / Lasting a little while longer”.

The villagers, who regard Ted as a ladies’ man, perhaps think of him as larking about, but the affair with Marian has tragic, deadly and lasting consequences. Leo’s innocence itself becomes culpable. For half a century the story he now remembers has had to be forgotten; although on the face of it he has lived a normal life, internally he is left as damaged as Trimingham.

MCMXIV, with its famous last line, “Never such innocence again”, was completed in 1960 and published in *The Whitsun Weddings* (1964), so Hartley can’t have got this little phrase from Larkin. Did Larkin perhaps come across it in Hartley and, like the novel’s narrator, innocently retain it while forgetting he had done so? Even if he didn’t – if it’s just the kind of “frail” coincidence witnessed and recorded in the book’s title poem – the past becomes for a moment so pervasive as to encompass the whole novel, distinctly localised and *unforeign*. They do things the same there.

## 2-2 Critical outlook on Hartley’s posit of culture

Throughout the novel, there’s the stratification culture that has been accepted as normal in the then society. This does well to inform us with a view on the consequences it has generated that ethical teachings as found in different cultures of the world fail miserably as is obvious- but foggy unto the internal sight of men who are given to self-love- to humble souls to see their greatest need to provide solutions for evil in the world.

Evil in the form of racial segregation taking root from lack of love by the instrumentality of the breeding of a spirit of discontent, contempt and disrespect for the other person, because the faultfinder finds it excruciatingly hard to confront his/her own unwillingness to work out love in the real sense of the word by facing his/her weaknesses and uses the shortcomings of others as a cover to justify his/her own. While we are not concerned with racial segregation here, the imagery well suits the occurrences in the novel. Impatience has ruined both the life of Mrs Maudsley and Ted Burgess. This is where Hartley has to intervene. His discussion of the power of love which ends tragically remains a mystery. Maybe his impatience with Christianity’s incessant insistence on sin as he says has created inconsistency in the writing up process of his ideas.

There’s no doubt about it that Hartley is a great writer. He subjects for example the main social problem of his time in the following words, mixing even with something extra that demands attention in the context of the completion of this work:

Dimly I felt that the contrast represented something more than the conflict between Hall and village. It was that, but it was also a struggle between order and lawlessness, between obedience to tradition and defiance of it, between social stability and revolution, between one attitude to life and another. I knew which side I was on, yet the traitor within my gates was not so sure; he felt the issue differently, he backed the individual against the side, even my own side, and wouldn’t mind seeing Ted Burgess pull it off. But I couldn’t voice such thoughts to the hosts of Midian prowling round me under the shade of the pavilion veranda.<sup>28</sup> Agreed he talks of social class problem, but deems it necessary to add that- this cannot be a coincidence from Hartley himself- the contrast represented something more... and proceeds to explain in the following sentence.

Were the novel to be written a second time, Hartley’s characters would present a better scenery by heeding the following counsel from him:

***Knowledge may be power, but it is not resilience, or resourcefulness, or adaptability to life, still less is it instinctive sympathy with human nature***<sup>29</sup>

The novel influencing contemporary writers like Ian McEwan says much on how deep and symbolic it is in addressing major core issues of life. The term adolescence demands attainment of maturity. That is the *raison d’être* of:

***‘The past is a foreign country: they do things differently there.’***<sup>30</sup>

<sup>28</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.85

<sup>29</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.21

<sup>30</sup> Opening sentence of *The Go-Between* by L. P. Hartley.



Now that he is reflecting on his past experience, he can if he so chooses assess his own failures and develop a better perspective on life and how to live it purposefully.

Kevin Gardener perceives things differently. According to the author:

Leo- in the narrative- is far from wistful or nostalgic about his recovered past. Indeed, he is no crabbed and saturnine pensioner, peevisly railing against modernity [End Page xxi] while yearning sentimentally for a pastoral Edwardian simplicity.<sup>31</sup>

However, lust caused by the heat of moral passion cannot be denied in the plot of this novel. Is Hartley describing himself in the novel? Here is a great passage treating of Leo's own view and perception of sin:

"No," I thought, growing more rebellious, "life has its own laws, and it is for me to defend myself against whatever comes along, without going snivelling to God about sin, my own or other people's." How would it profit a man, if he got into a tight place, to call the people who put him there miserable sinners? Or himself a miserable sinner? I disliked the levelling aspect of this sinnerdom.<sup>32</sup>

This is quite a bad deal with sin doomed to failure and punishment of eternal damnation. Hartley's own homosexuality tells more on his own weaknesses though he fills his narrative with biblical concepts. This does help humans for their need of help from the bonds of sin for example. Though a great book, attention has to be paid to its content and the practicability it suggests in real life. There's thus the need of a working out of love in the lives of people. Hartley has clearly failed as a Christian example. Williams Raymond discusses the problem more clearly when he suggested the following idea:

The scale of the whole process-the struggle for democracy, the development of industry, the extension of communications, and the deep social and personal changes- is indeed too large to know or even imagine. In practice, it is reduced to a series of disconnected or local changes, but while this is reasonable, in the ordinary sense, it seems to me that this scaling-down only disguises some of the deepest problems and tensions, which then appear only as scattered symptoms of restlessness and uncertainty.<sup>33</sup>

The working out of love as is represented here has to do with picking vital resources from the word of God to be constantly renewing one's mind over and over again so as to keep one's heart from yielding to the fatal- if adhered to or consented to by the will of Man- temptations of the devil for and an independence of man vis à vis God and His person. Repentance appears here as necessary because it produces peace with God, that which the soul is most in need of to thrive and guard against the tricks of the enemy of the souls of men.

For this purpose, adopting Leo's philosophy might be a great deal helpful. The following words from him are the very touchstone of authenticity in the book:

**... But at any rate it was myself I saw, not a sea-green, corruptible parody.**<sup>34</sup>

Could we humans just adhere to the culture of truthfulness and sincerity with ourselves regarding our lost condition and our need for a saviour, things will begin to work out and superficiality will freeze of itself to leave place to the solid rock of truth yielding forth the fruits of love, peace and joy. And so there's need that the culture of truth that recognises the sinfulness of man and the and the remedy of the cross that have to be the unit measure of people's lives.

<sup>31</sup>[https://www.researchgate.net/publication/265813813852\\_Reevaluation\\_L\\_P\\_Hartley\\_The\\_GoBetween\\_Leftover\\_Life\\_To\\_Spoil](https://www.researchgate.net/publication/265813813852_Reevaluation_L_P_Hartley_The_GoBetween_Leftover_Life_To_Spoil). Consulted 17/04/2021, 10:18.

<sup>32</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.49

<sup>33</sup> William, Raymond, *The Long Revolution*, Penguin Books, p.12

<sup>34</sup> Hartely, L.P, *The Go-Between*, The New York Review of Book, p.148

### 3- Perspectives on a redefinition of the concept of culture:

Extensive reading on works of literature about culture brings with a striking conscientiousness the problematic nature of the word culture. Daniel Hartley recognises that historic elements have been much instrumental in bringing about the challenges in defining such seemingly trivial words. The following sentence expounds more clearly the idea:

Historical capitalism produces a total social formation whose material constitution is such that the topographical relation of its elements-‘culture’, ‘nature’, ‘politics’, ‘society’, and the ‘state’- is constantly shifting, and continually altering the internal compositions of that which the terms denote.<sup>35</sup>

The conceptual problems that are related to the word culture be them ideological or philosophical, or even materialistic in nature, have to bow to the culture of truth in love to stand unwaveringly throughout time and eternity. From an analytical point of view, the different cultures that have marked the history of the world constitute in Hartley’s words the deadly nightshade that is casting malevolent spells on the world. The new culture he suggests as a remedial force to malevolence is that of confrontation of sin. That is why he repented towards the end of the story from impatience with practical Christianity. It has already been proved the author’s own seasoning of his work with key biblical concepts. A close inspection of events in the novel reveals the dark side of class snobbism and the ever-rotten state of the human heart.

There’s first of all Mrs Maudsley’s lack of self-control that led to her insanity. Though everybody stood against such a kind of relationship, she should have wised up to the fact nothing escapes the touch of change. She has alone suffered and reaped the consequence of her frivol behaviour. Holding up tight to honour to keep tradition can generate eternally lamentable outcomes.

Secondly, the romantic euphoria of Marian and Ted’s relationship is one thing that has worsened things. It has possibly blinded them to a probable consideration of patience and long-suffering to salve the moral tension that their relationship has chosen of itself to trail behind. I cannot fail to mention Leo’s use of the word façade while talking Brandham Hall, and his backing the individual side referring to Ted in another part of the discussion as a sign of authenticity. What is more, given that fiction is in one way or another the reflection of reality, there’s the possibility that the history has relation to Hartley himself. Therefore, chances are he might be telling us indirectly and/ or knowingly or unknowingly that entertaining romantic relationships constitutes a sinking sand to both actors involved. Ted didn’t not need to shoot himself dead. Some might argue that the power of love made him do that. But if the power of love can issue a death sentence with no promise of a glorious future assured like the resurrection life assured for the elects of God, believers in Jesus Christ even after their departure from earth- Hartley nowhere puts it that Ted’s suicide is heroic-, then, this is not love, but an amalgamation of ego and blind deification of mere mortal human beings. The report thus made is the trailblazer of one important reality. There’s no talking of a divergence of cultures in the world. People choose to employ the term cultures for the differences in tastes, environmental settings, and level of advanced pursuit and mastery of science and letters. Ultimately though, men and women all over the world share the same culture. They are essentially made up of the same organic elements. This is maybe clear when one considers the American declaration of independence for instance: We hold these truths to be self-evident. That men are created equal and that they share the same unalienable rights. Another proof might well be discerned through the words of former American president’s words during the speech that drove in the first black American in the white house:

<sup>35</sup> Hartley, Daniel, *Anthropocene, Capitalocene, and the Problem of Culture*, p.11

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...Alongside our famous individualism, there's an ingredient in the American side. A belief that we are all connected as one people...-.... there's no liberal America, there's no conservative America, there's the United States of America. There's no black America or white America, or Latino America, or Asian America, there's the United States of America.<sup>36</sup> In the context of American cultural realities, these words convey the meaning that despite the differences that mark a certain nation, they are still fundamentally the same people. This applies to the whole world as well. David Buckingham informs us that: he[Hartley] distrusted the modern "collectivist age" and saw the welfare state as a symptom of moral deterioration and a devaluation of individual responsibility.<sup>37</sup>

The multicultural approach and uniformity of culture does well to suggest in as clear a visible way that there exist a literary contention between the two terms. The famous philosophy of the secular world which posits that diversity-or cultural relativism- best suits the needs of the world and its inhabitants' betrays the consideration that truth might be compromised and wreak havoc upon the whole destiny of the world. Cultural givens are spiritual face masks to hide unto many a man or a group of man -adhering to the same evil course- the true most cherished offenses against God. Many a sinners find them too sweet to do away with. Secularism brings with it superficiality by the way of the emptiness of soul that characterizes its professors. There's need to question the diversity of culture. The applicable reality of the expression blinds and kills slowly but certainly in the inner man. That's why I can assert unflinchingly that there's need of firm faith in an anxious age where truth is sought to be done away with by the subtle ways of antinomianism and legalism.

These ideas are far from being a prevarication. The event described by Hartley himself condemns the social class system, romantic love, and the consequences therein attached.

One thing that needs to be addressed here is the prevarication that follows the use of the word. I am alluding to Hartley's own reference to French in his English narrative to French words and expression. This might be his way of providing an intimation of his love of the French culture. Some people cherish the definition of culture as language plus lifestyle. But even if this is true, it does nothing in reversing the course of things due the sole evil culture inherent in the hearts of men. The fact is, it just manifests itself in different ways. This is how low people have gone in addressing the concept. There are some questions that results from those analyses if we consider the ever-disintegrating aspects of culture like that discernible in Hartley's brilliant narrative: is there any possibility to ascertain that the traditional understanding of culture rightly serves the objective of the development of the world, everything considered? Had people set themselves in a meditating frame of spirit, which could instil in their heart humility of heart when they consider the awfulness and the majesty of God, wouldn't they have given up on trivial representations and adoption of culture through profound reflection on the very role those- rather- subcultures- and consequently they are contained in culture itself- are playing in their lives?

<sup>36</sup> [http://www.barackobama.com/2004/07/27/keynote\\_address\\_at\\_the\\_2004\\_de\\_l.php](http://www.barackobama.com/2004/07/27/keynote_address_at_the_2004_de_l.php). Last accessed December 5, 2008.

<sup>37</sup> <https://davidbuckingham.net/growing-up-modern/an-awkward-age/the-go-between/>. Consulted 03/10/2022, 08:20 p.m.

## Conclusion

Throughout the present endeavour, I have dedicated my energy at trying to introduce the philosophy of the demystification of the mirage that culture and applications of culture have also proved from an outlook on the different events described in Hartley's novel to meet the realities- in terms of joy, sadness- of genuine, authentic culture. Thus, it becomes crystal clear that there is a certain conceptual instability that is attached to culture.

However, the study of culture appears doable. And although there's no impossibility in life, what has been suggested here in the different discussions wouldn't cover the expansive universe of the many contours of culture. Nonetheless, it has helped to debunk the mirage of aristocracy, romanticism, superficiality, untruth, blind determination for the cause of lies represented in the novel by Brandham Hall and truth, innocence, sincerity,... lust-by some critics- , innocence-especially Leo's- , represented by Ted Burgess and his social class appurtenance. Modern and postmodern tableaux of culture fail miserably to respond to the very need of the paramount importance of the culture of truth in people's lives. Only a right view of culture by the means of contrition of heart and dedicated worship of God certainly is the only solution to live the real life of culture.

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## FRAGILE HERITAGE

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### ABSTRACT

The Republic of Macedonia (recently North Macedonia) is considered to be a rich oasis of cultural heritage from the Byzantine period with over one hundred sacral edifices (churches and monasteries) from the chronological span 10<sup>th</sup> – 15<sup>th</sup> century. Some of them have been origins of significant program and iconographic novelties, while others manifested painterly features comparable to the fresco ensembles in the metropolis of Constantinople where only few monuments from the Byzantine era have been preserved in their original form. However, although master-peaces in the sphere of Byzantine artistic legacy, the churches in Macedonia have suffered a great deal of damage due to historical reasons (wars, military disasters, earthquakes, fire etc.) and moreover due to social reasons – institutional indolence and human negligence. In that regard, the paper will present a picture of how these valuable architectural and painterly products have been left unprotected and vulnerable with little to no care for their current wellbeing and their unpredictable future destiny.



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**CASTE IN URBAN MILIEU: AN ANTHROPOLOGICAL STUDY IN PUNE CITY,  
INDIA**

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**Abstract**

It is generally assumed that caste is the key parameter of identity only in villages. In contrast, in cities people from lower strata of the caste hierarchy face discrimination in new forms and strategies. In urban India, the casteism is covertly practiced, manifesting itself in matrimonial advertisements in newspapers or as hushed whispers about colleagues in office spaces, masked by a pretentious civility.

The upper-caste urban Indians insist that caste/ casteism is dead or dying, as forces of westernization, modernization, urbanization and globalization are taking away the age old social distinctions, and fostering meritocracy which rewards individual merit on a level playing ground. This paper intends to study the nature of casteism in urban spaces of Pune in Maharashtra state, India. It is a qualitative study; data were collected by interviewing respondents from Scheduled Castes (SCs) or Dalits.

The data shows that behind the fictional caste anonymity and meritocracy in urban spaces of Pune, lies the bitter reality of casteism, in the form of discrimination in labour market, educational disparities, residential segregation, direct and indirect instances of untouchability, resulting in caste manifesting its grip on all these spheres.

Pune city shows segregated residential pattern, with SCs largely relegated to a few clusters mostly in slums. These people lack access to basic amenities such as piped water and toilets, suggesting that caste determines access to basic amenities. Lack of basic amenities could be due to poverty but there is ample evidence to suggest that residential segregation itself is a cause of poverty, hampering chances of education and employment.

SC tenants face rejections in getting houses and apartments on rent because of their caste. Same is the case with the SC entrepreneurs as they also face discrimination in getting loan from banks and land or commercial spaces at prime locations in the city. And when it comes to marriage, the caste endogamy is strictly followed barring few exceptions of inter-caste marriages. The nature of casteism has changed in terms of forms and strategies and it is covertly practiced in cities.

**Keywords:** Urban India, casteism, matrimonial advertisements, residential segregation

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## AKIŞKAN OSİLTÖR İLE MİKROKANALLI ISI DEĞİŞTİRİCİSİNDE PERFORMANS ARTIŞININ ZAMANA BAĞLI REJİMDE İNCELENMESİ

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### ÖZET

Bu çalışmanın amacı, akışkan osilatörlü bir mikro kanallı ısı değiştiricisinde momentum ve ısı transferindeki iyileşmeyi araştırmaktır. Bu çalışma, farklı çarpma açıları, osilatör çıkış merkezleri arasındaki mesafe ve çeşitli Reynolds sayıları ile süpürmeli jet çarptırılmalı ısı transferi performansını içermektedir.

Teknolojinin gelişmesiyle birlikte havacılık, uzay, otomotiv vb. alanlarda kullanılan ısı değiştiricilerin performans kapasitesinin artırılması gerekli hale gelmiştir. Hava kaynaklı pin fin dizilimine sahip ısı değiştiricileri yaklaşık  $100 \text{ W/cm}^2$  ısı transferi kapasitesine sahiptir. Isı transfer kapasitesini arttırmak ve daha az yer kaplaması amacıyla mikro kanallı ısı değiştiricilerin kullanımı yaygınlaşmaya başlamıştır. Bu çalışmada, iki adet akışkan osilatörü kullanılarak mikro kanallı bir ısı değiştiricide ısı transferi incelenmiştir. Çarptırılmalı jet ile soğutmada ısı transferi performansını arttırmak için akışkan süpürülerek çarptırılmıştır. Bu sayede Nusselt sayısı artmış ve dış akış etki alanı genişleyerek ısı transfer performansı artmıştır. Çalışmada, Wu Y. Ve ark. gerçekleştirdiği çalışma temel alınmıştır. Doğrulama çalışmaları, temel alınan çalışma üzerinde gerçekleştirilmiş ve model doğrulanmıştır. Ek olarak, akışkan osilatör giriş yüzeyinin kanal ile açısı  $30^\circ$ ,  $45^\circ$  ve  $60^\circ$  olarak incelenmiştir. Elde edilen sonuçlar ile iki osilatör arasındaki mesafe de incelenmiştir. Çıkış delik merkezleri arasındaki mesafe  $7D$ ,  $7.5D$  ve  $8D$  olacak şekilde incelenmiştir. Çalışma akışkanı olarak su kullanılmıştır. Akışkanın giriş sıcaklığı  $300 \text{ K}$ 'dir. Sıcak duvar olarak  $9D \times 15D$  alana sahip çarpma yüzeyi modellenmiştir. Çarpma yüzeyine sabit bir ısı akısı  $q''=10^6 \text{ W/m}^2$  olarak tanımlanmıştır. Akışkanın Reynolds sayı aralığı  $3000$ ,  $4000$ ,  $5000$ ,  $7000$  ve  $10000$  olarak belirlendi. Diğer duvarlar ise adiyabatik ve hızın sıfır olduğu varsayılmıştır. Isı transfer performansının ve akışkan dinamiklerini incelemek için zamana bağlı RANS k- $\omega$  türbülans modeli kullanılmıştır.

**Anahtar Kelimeler:** Akışkan Osilatör, Çarptırılmalı Jet, Isı Transferi İyileştirme, Hesaplamalı Akışkanlar Dinamiği.

### IN MICROCHANNEL HEAT EXCHANGER PERFORMANCE ENHANCEMENT WITH FLUIDIC OSCILLATOR INVESTIGATION BY TRANSIENT REGIME

#### ABSTRACT

The motivation of this study was to investigate the momentum and thermal energy transfer improvement in a microchannel heat exchanger with fluidic oscillator. This study included sweeping jet impingement heat transfer performance with a different impact angle, distance between fluidic oscillators and various Reynolds Number.

With the development of technology, it was necessary to increase the performance capacity of the heat exchanger used in areas of aviation, space, automotive, etc. Air source heat exchangers have a heat transfer performance of about  $100 \text{ W/cm}^2$  in pin fin arrays. Microchannel heat exchangers have become widespread in order to increase the heat transfer capacity and occupy less space. In this study, heat transfer is investigated in a microchannel heat exchanger using 2 fluid oscillators. In order to enhancement the heat transfer performance in impinging jet cooling, the fluid is swept. Thus, the Nusselt Number has increased and external flow area is expanded, and augmentation the heat transfer performance. The study was based on the work of Wu Y. et al. validation studies were carried out on the study from the base study and model is validated. In addition, the angle of the fluidic oscillator with the channel was examined as  $30^\circ$ ,  $45^\circ$ , and  $60^\circ$ . With the results obtained, the distance between the two oscillators was investigated.  $7D$ ,  $7.5D$ , and  $8D$  were investigated in the distance between exit hole centers. Water was used as the working fluid in the study. The inlet temperature of the fluid is  $300 \text{ K}$ . The surface with an area of  $9D \times 15D$  was modeled as a hot wall as the impingement surface. A constant heat flux to the impingement surface is defined as  $q' = 10^6 \text{ W/m}^2$ . The Reynolds range of the fluid was determined as  $3000$ ,  $4000$ ,  $5000$ ,  $7000$ , and  $10000$ . Other walls are considered adiabatic and non-slip. Time dependent RANS  $k-\omega$  turbulence model is embraced to study the heat transfer performance and the fluid dynamics.

**Keywords:** Fluidic Oscillator, Impinging Jet, Heat Transfer Augmentation, Computational Fluid Dynamics

## 1. INTRODUCTION

In the current technological landscape, numerous engineering designs are constrained by heat transfer requirements that limit their performance and size. The demand for high-thermal performance systems has necessitated the exploration of methods to enhance heat transfer. Improvement of heat transfer is crucial in applications such as electronic equipment cooling and turbine blade cooling, as it allows for the necessary heat rates required for the proper functioning and longevity of these systems. This has spurred the search for various approaches to increase heat transfer rates in engineering applications and subsequently reduce the temperature of equipment and systems.

Impingement jet cooling is a highly effective method for cooling equipment and systems the operate in high-temperature environments. [1] It has ability to thin the boundary layer and increase turbulence in the fluid, thereby enhancing the heat transfer capacity.[2] The point at which the jet flow and the impinging surface meet is referred to as the stagnation point. (At this point, the local velocity is zero but the stagnation pressure is at its highest.) [3]As the flow exits the stagnation zone, it transforms into wall jets towards the periphery and decelerates in the flow direction, with the boundary later thickness gradually increasing. [4]

The fluidic oscillator is a specialized device that converts a steady jet flow, without any moving parts, into a sweeping jet based on internal instability mechanisms. [5] With this sweeping movement, the wall effect is reduced and the Nu distribution is improved. The sweeping motion is self-induced and self-sustaining.[6] Fluidic oscillators are a type of fluid device that, using pressurized fluid, generates an oscillated jet at a wide range of frequencies for the purpose of active flow control. These devices emerged primarily in the 1960s and utilize only stationary parts for fluidic logic, magnification, sensing, and control. The potential of fluid oscillators has been increasing over time as they have found more and more applications in various fields.

Fluidic oscillators, which are systems that involve the oscillation of fluids, have a wide range of applications, including energy generation, water treatment, and flow control.

Although fluidic oscillators have been utilized in a variety of fields, the internal fluid dynamics characteristics such as pressure drop and oscillation frequency have not been thoroughly studied. [7]–[11] Hossain et al. [7] carried out studies to observe the effect of surface roughness on the fluid in the fluidic oscillator. It has been observed that the increase in roughness in the throat also increases the sweeping frequency at low mass flow rates. It is determined that increased roughness in the chamber and feedback channel negatively affected the performance of the fluidic oscillator. Seo et al. [8] carried out CFD analyses on various parameters to assess the effect of geometric properties, including alterations in the feedback channel length and mixing chamber length in a fluidic oscillator with two feedback channels. It appears that there is an inverse relationship between chamber length and frequency, meaning that as chamber length increases, frequency decreases. This relationship is non-linear, meaning that the change in frequency is not directly proportional to the change in chamber length. In other words, the change in frequency may not be the same for all changes in chamber length.

Tomac and Gregory conducted a study in which they used particle image velocimetry to visualize and quantify the internal flow patterns inside a fluidic oscillator. These techniques were used to analyze the movement and behavior of fluids, and the results were determined that four main eddies were formed. Two of them were called domes, while the other two were called side eddies.

Fluidic oscillators have been utilized for flow separation control. [12]–[15] Wosidlo et al. [16] examined the use of a fluidic oscillator array to control flow separation on the airfoil and observed that the oscillation occurs at high frequency in directly proportional to the volumetric flow rate. It was determined that the spacing between the oscillator array is dependent on the ratio of jet stream and free flow velocity. With the fluidic oscillator, studies were carried out to increase the angle of transition of the wing to the stall and to increase the lift force significantly. To this end, Phillips et al. [17] studied the effects of sweeping flow on the trailing edge blade and the airfoil, specifically how it causes rapid changes in lift, drag, and pitch angles.

Studies have been carried out in the literature to provide jet thrust vectoring [18] and disrupt combustion instability. [19] There have been numerous studies that have investigated the heat transfer performance through the use of oscillating flow. [20]–[26] Camci and Herr [20] were the first to utilize a fluidic oscillator to transform the jet stream into a sweeping impinging jet in order to enhance the heat transfer performance of impinging jets. When air was used as the fluid, an increase of 20% to 70% in heat transfer performance compared to stationary jet values was observed as the impinging jet impacted a wider area due to its sweeping motion. Kim et al. [22] conducted numerical and experimental investigations into the behavior of the fluid and its heat transfer effect when two feedback oscillators were connected to the channel wall with a constant temperature. One significant finding from these studies is that the dimensionless sweep frequency (St Number) is dependent of the type of working fluid and the mass flow rate. Furthermore, it was observed that the frequency increases with an increase in the Re number, but the heat transfer in the channel does not significantly change due to the increase in the convection velocity of the vortices with increasing mass flow rate.

In this study, heat transfer in a microchannel heat exchanger was investigated using two commonly used fluidic oscillators. In an effort to increase the heat transfer performance of impinging jet cooling, an increase in heat transfer was sought by scavenging the fluid. Wu et al. [27] conducted validation studies based on their work and validated the model.

To expand the range of impact of the impinging jet, the angle of the fluidic oscillator with respect to the channel on the impact surface was examined at  $\alpha_c$  ( $30^\circ$ ,  $45^\circ$ , and  $60^\circ$ ). In addition, the distance between the centers of the two oscillators was examined, with  $L_g$  ( $7D$ ,  $7.5D$ , and  $8D$ ) being considered for the distance between the outlet hole centers. Water was chosen as the working fluid due to its superior heat removal performance compared to air.

## 2. METHODOLOGY

### 2.1 Geometry and Boundary Condition

In this study, two fluidic oscillators with angled two feedback were placed over the heat exchanger channel at an angle of  $\alpha_i$ . The gap between the two oscillators was set to  $L_g$ . Each fluidic oscillator consists of a power nozzle, mixing chamber, two feedback channels, outlet throat, and exit hole with a trailing edge of  $4D$ . The fluidic oscillator has a thickness of  $0.5D$  and a height of  $D$ . The nozzle entrance extends forward and parallel to the impact surface, allowing the jets to interact with the main stream, and has a minimum width of  $0.7D$ . The outlet of the channel is  $24D$  away from the center of the strait to ensure fully developed flow and minimize the impact of the outlet boundary condition on the fluid dynamics of the oscillating jets. The inlet of the power nozzle is  $2D$  wide and has a minimum width of  $0.7D$  at a distance of  $2.65D$  from its inlet. The mixing region inlet in the feedback channel is  $D$  wide.

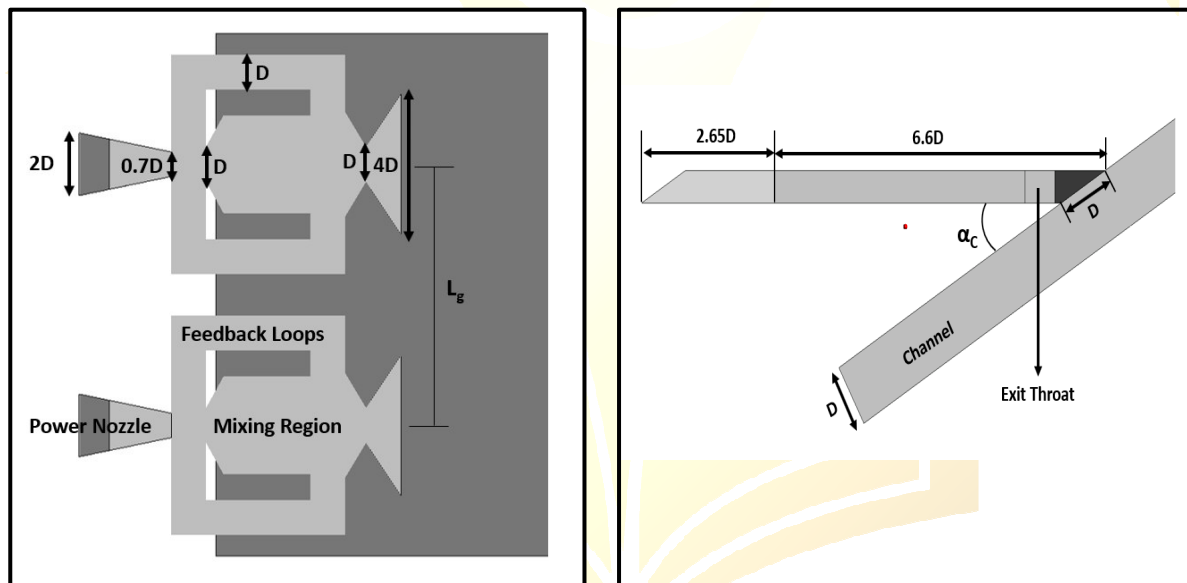


Figure 5 The Oscillator Computational Model

The fluid at the inlet is assumed to be uniform and has a temperature of 300 K. The outlet pressure, located  $24D$  away, was set to 0 Pa to avoid affecting the flow area. In the study, the Re number for model validation ranged from 3000 to 5000, while parametric studies were performed using 4000, 7000, and 10000. A constant heat flux boundary condition of  $q' = 10^6$  W/m<sup>2</sup> is applied to the wall that the oscillating flow impacts in the channel, while the other walls in the model are assumed to be adiabatic and non-slip. The impingement surface, which has an area of  $9D \times 15D$  was modeled as a hot wall.

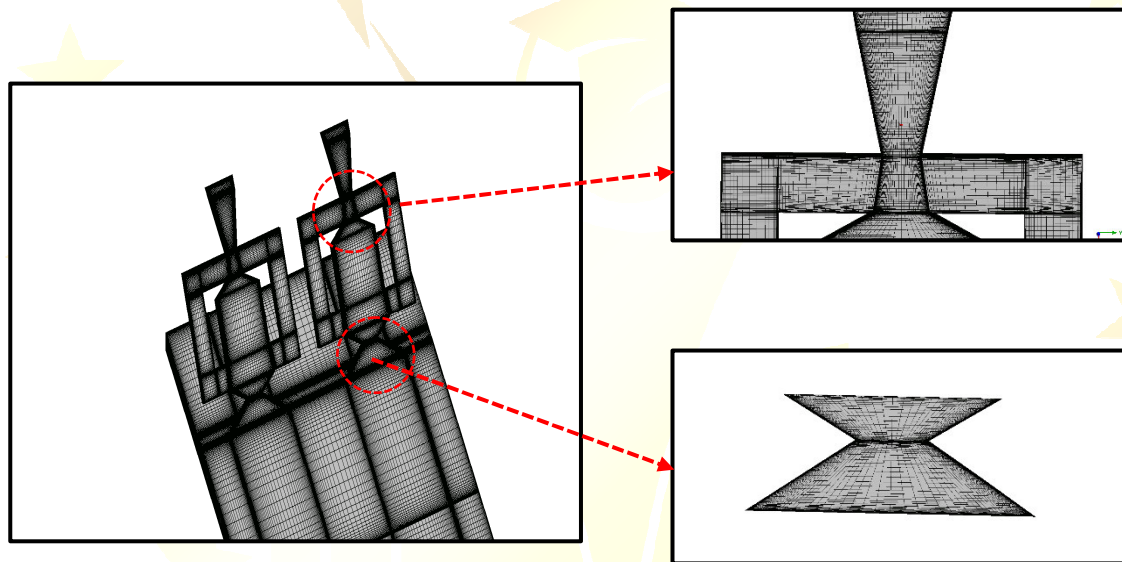
### 2.2 Mesh Validation and Governing Equation

ANSYS Fluent 21.2 was utilized for computation, with the SIMPLE model and Gauss-Green method employed for pressure-velocity coupling and pressure discretization, respectively.



The second-order upwind method was used for discretizing the parameters, with the time step determined based on the average velocity at the nozzle throat, where the average flow velocity was high. The time step was set to 10 dimensionless times. The simulation continued until the oscillation reached a steady state, using a convergence criterion of  $10^{-5}$  for the energy equation and a criterion of  $10^{-7}$  for the other equations. The k- $\omega$  SST model was selected for its robustness and accuracy in predicting flow behavior, particularly in the vicinity of walls and in high turbulent flow.

The computing domain employed a structured grid. Structured grids are frequently utilized in numerical simulations and analyses due to their ease of generation, visualization, and efficient solution of the governing equations. They are often used in conjunction with finite volume method to solve problems in a variety of application. The mesh model used in the analysis is shown in **Figure 6**. To capture  $y^+ \sim 1$  on the walls, bias factor was applied during the meshing process, with a more frequent mesh preferred in the power nozzle and throat.



**Figure 6 Mesh Structure Figure**

It is important to validate a mesh before using it in any critical application, as errors or inconsistencies can cause problems such as instability, incorrect results, or even crashing. Three different types of mesh were used in the analysis, referred to as coarse, medium, and fine, with 3350874, 6849175, and 8329482 nodes respectively. A mesh independence study was conducted in which frequency data for three different mesh sizes were analyzed for a given Re number (5000). The frequency data for the three different mesh sizes were found to be 122, 126, and 127 respectively. There is a small difference (less than 2%) between the frequency value obtained in a reference study and the error rate in the results obtained using coarse and fine mesh sizes. This indicates that the results are independent of the mesh size, meaning that the choice of mesh size does not significantly impact the results. Therefore, a medium mesh with a lower number of nodes was chosen.

To understand the behavior of this system, it is necessary to consider a set of governing equations that describe its dynamics.

Continuity equation

$$\frac{\partial(\rho)}{\partial t} + \frac{\partial(\rho u_i)}{\partial x_i} = 0 \quad (1)$$

This equation states that the rate of change of mass in a fluid element is equal to the net rate of mass flow into or out of the element through its surface. One of the key governing equations for this system is the momentum equation, which describes the forces acting on an object and how they affect its motion.

Momentum equation

$$\frac{\partial(u_i)}{\partial t} + \frac{\partial(u_i u_j)}{\partial x_j} = \frac{-1}{\rho} \frac{\partial P}{\partial x_i} + \frac{\partial}{\partial x_j} \left( \nu \frac{\partial u_i}{\partial x_j} - \overline{u_i u_j} \right) \quad (2)$$

where  $\overline{u_i u_j}$  represent to turbulent fluctuating.

Energy equation

$$\frac{\partial(\rho c_p T)}{\partial t} + \frac{\partial(\rho c_p u_j T)}{\partial x_j} = \frac{\partial(\lambda \frac{\partial T}{\partial x_j} - \rho c_p \overline{u_j' T'})}{\partial x_j} \quad (3)$$

The k equation

$$\frac{\partial(\rho k)}{\partial t} + \frac{\partial(\rho k u_j)}{\partial x_j} = \frac{\partial(\Gamma_k \frac{\partial k}{\partial x_j})}{\partial x_j} + G_k - Y_k + S_k + G_b \quad (4)$$

The  $\omega$  equation

$$\frac{\partial(\rho \omega)}{\partial t} + \frac{\partial(\rho \omega u_j)}{\partial x_j} = \frac{\partial(\Gamma_w \frac{\partial \omega}{\partial x_j})}{\partial x_j} + G_\omega - Y_\omega + S_\omega + G_{ob} \quad (5)$$

The variable  $G_k$  and  $G_\omega$  represent the generation of turbulent kinetic energy due to the average velocity gradients, while  $\Gamma_k$  and  $\Gamma_w$  symbolize the effective diffusivity of  $k$  and  $\omega$ , respectively.  $Y_k$  and  $Y_\omega$  represent the dissipation due to turbulence, and  $S_k$  and  $S_\omega$  are user defined source terms. The terms  $G_b$  and  $G_w$  also account for buoyancy effects on turbulence. [28]

### 3.RESULTS

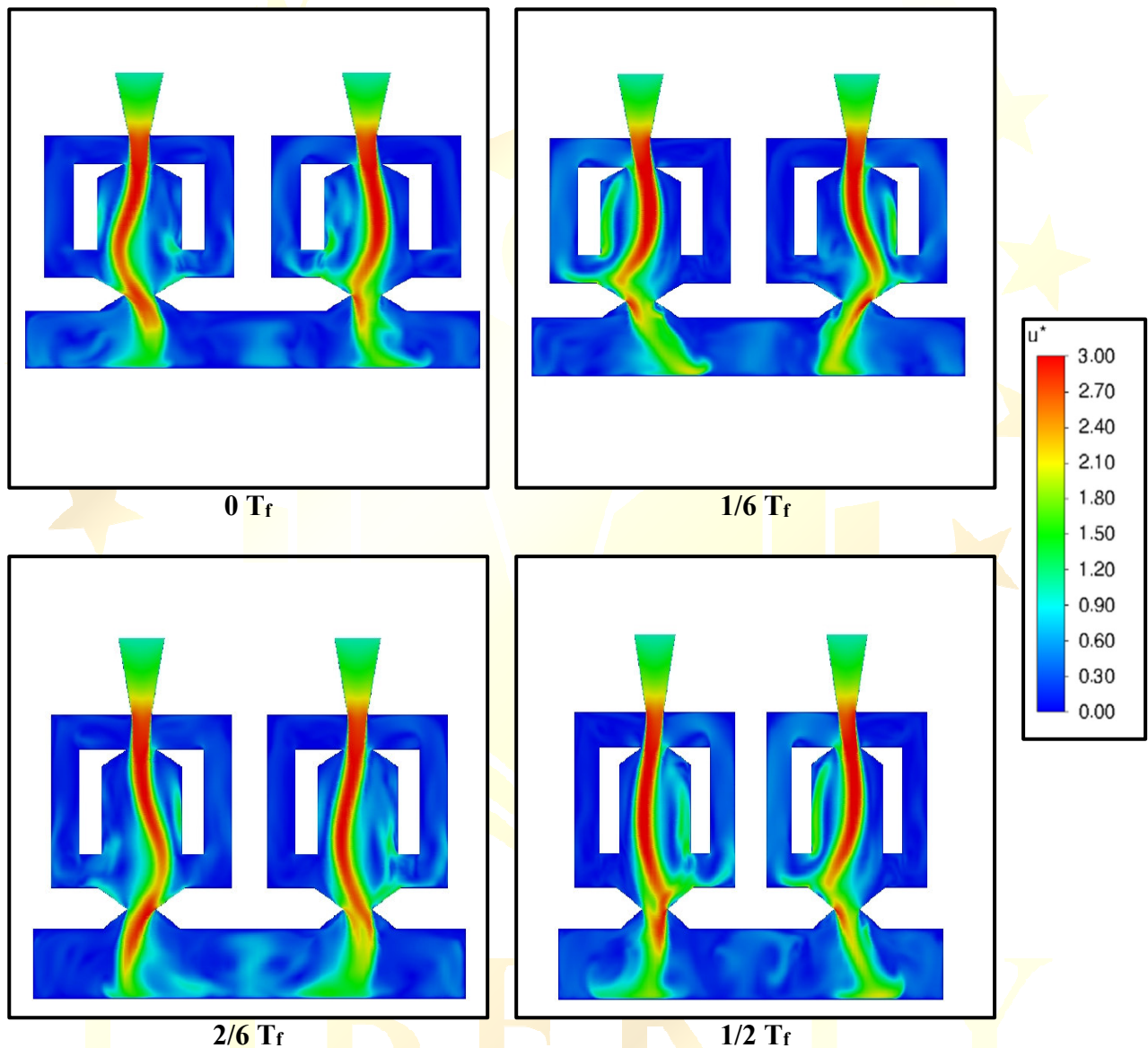
#### 3.1 Internal Fluid Dynamic Result

This study examined the occurrence of a quasi-constant oscillating flow pattern in each fluidic oscillator. The initial flow pattern in the oscillators was random, but as the flow passed through the oscillators, asynchronous output phases were observed. It is essential to accurately capture the acceleration of the flow and the temporal evolution of the pressure and flow fields within the array as the flow passes through the oscillators.

**Figure 7** shows a oscillating flow pattern for the fluidic oscillator. The velocity contours have been partitioned into six time increments for one oscillation cycle. The internal flow dynamics of the numerical model has been compared with the reference study, and the results observed in this study are consistent with the reference study.

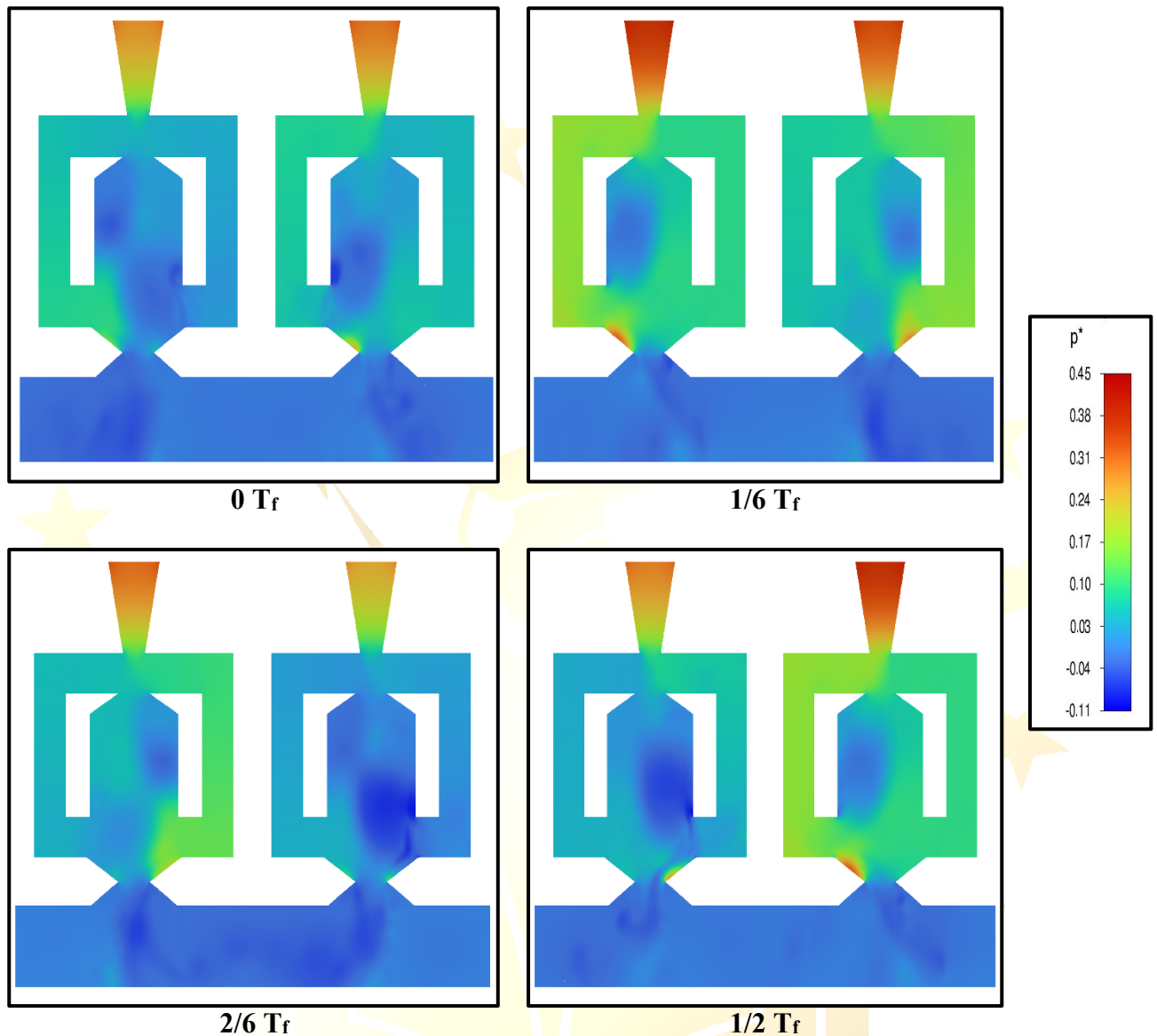


The **Figure 7** demonstrates that, for half of the oscillation period at a Re Number of 4000, the interaction between the incoming flows and the main jet in the inlet region causes a deflection of the jet due to the pressure difference in the two feedback channels. At  $0 T_f$ , the fluid is adhered to the right wall of the nozzle of the first oscillator while it is attached to the left wall of the nozzle of the second oscillator. A portion of the fluid is also directed towards the feedback channel and returns to the inlet of the oscillator. The bubble that forms in the mixing region pushes the incoming fluid until it adheres to the opposite wall. In the next time step, the bubble disappears as it enters the feedback channel and exits through the outlet. This process is then repeated on the opposite wall, resulting in self-sustaining sweeping.



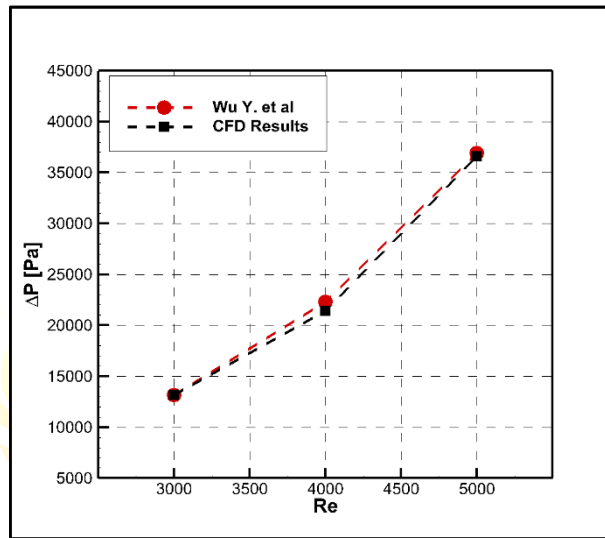
**Figure 7 The Dimensionless Velocity Contour for Half of the Sweep Period with Re=4000 and Impact Angle of 30 Degree**

The dimensionless pressure distribution in **Figure 8** demonstrates a similar process. When the jet stream adheres to the right side of the nozzle wall, high pressure is created in the left feedback channel, while negative pressure is observed on the right side of the mixing chamber due to the formation of a bubble.



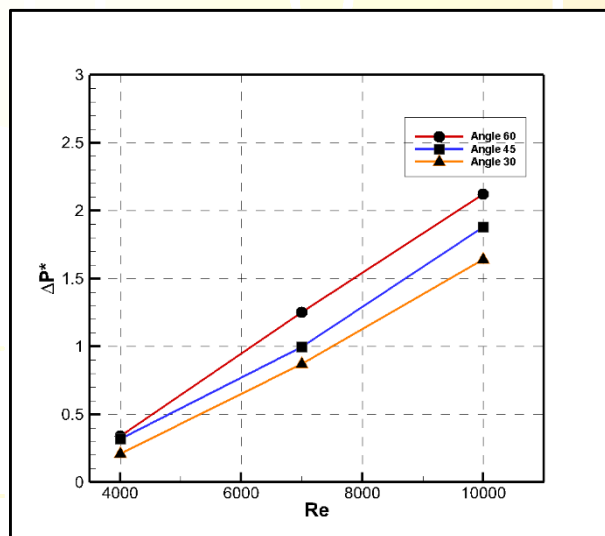
**Figure 8 The Dimensionless Pressure Contour for Half of the Sweep Period With  $Re=4000$  and Impact Angle of 30 Degree**

In a heat exchanger, increase in the pressure difference of the coolant can increase the heat transfer. This is because the higher-pressure difference creates a stronger driving force for heat transfer and also increases the inlet flow rate, resulting in faster heat transfer. The results indicate that the pressure difference increased as expected, consistent with the reference study, when the system was evaluated at three different Re Numbers. This can be seen in **Figure 9**. The values in the reference study are presented in units, and thus comparison in this graph is also made in units.



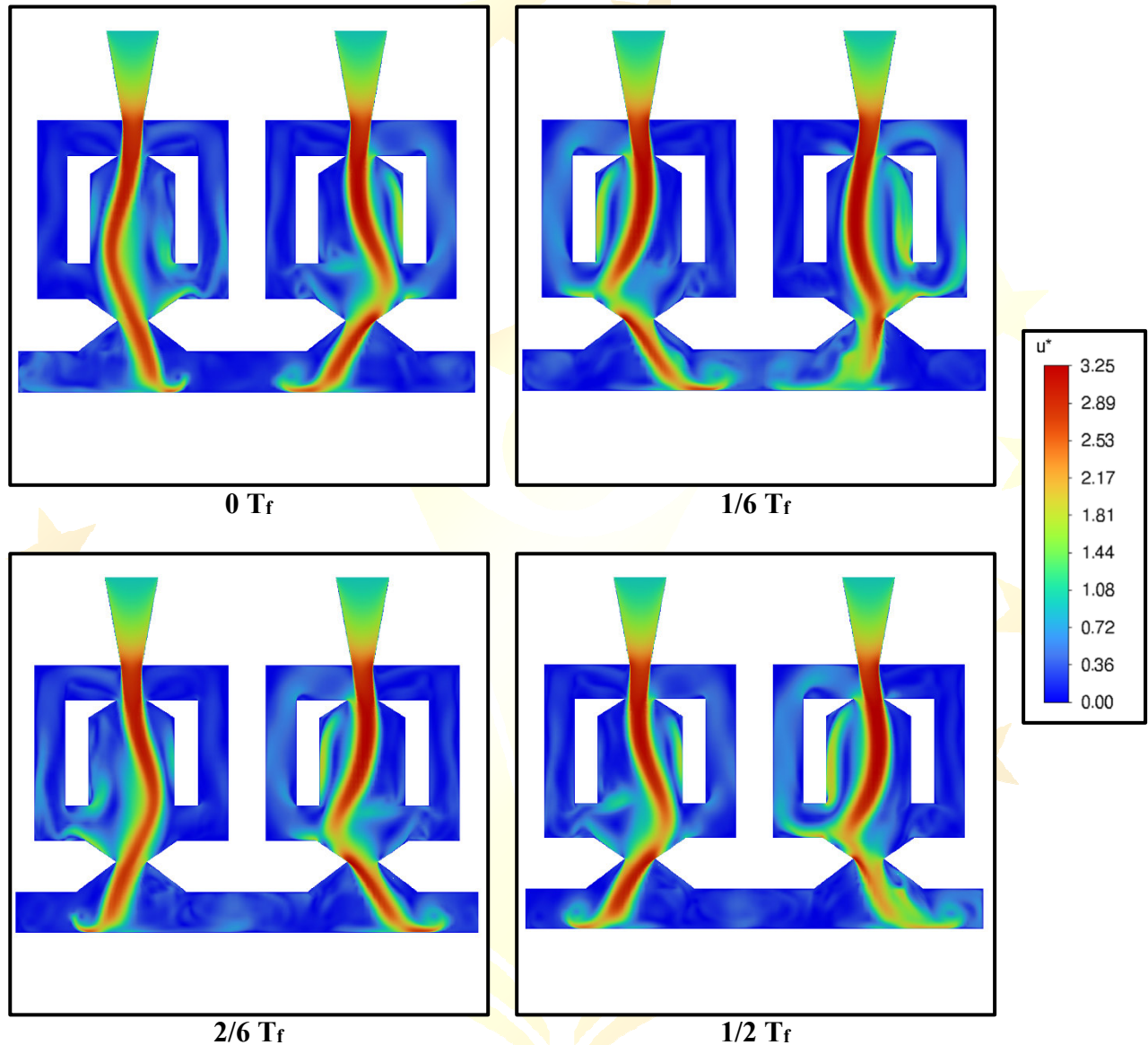
**Figure 9 The Pressure Difference of the Flow at various Re Numbers from 3000 to 5000**

In general, the angle of impingement of the coolant on the surface affects the pressure drop measurements. This is because a large impingement angle causes the fluid to spread over a larger area, leading to a variation in the surface roughness and, consequently, a change in the direction of traction. However, the relationship between impingement angle and pressure drop may not be linear, and the exact effect of impingement angle on pressure drop will depend on the specific measurement. This effect was investigated by increasing the impingement angle from 30 to 45 and 60 degrees. The results of the analysis showed that the pressure difference between the inlet and channel outlet increased as the angle of impact increased, but this trend remained unchanged when the Re number was varied. The relationship between the angle of impingement and pressure drop is shown in **Figure 10**. The pressure drop appears to increase linearly with the Re number, but this relationship may vary depending on the operating pressure range of the heat exchanger.



**Figure 10 The Dimensionless Pressure Drop of the Flow at Different Impinging angle with respect to Various Re Numbers**

The increase in pressure drop led to an increase in mass flow rate and velocity at the center of the jet stream, as depicted in **Figure 11**. As turbulence is known to increase with increasing velocity, it can be inferred that heat transfer at the impingement surface will also increase.



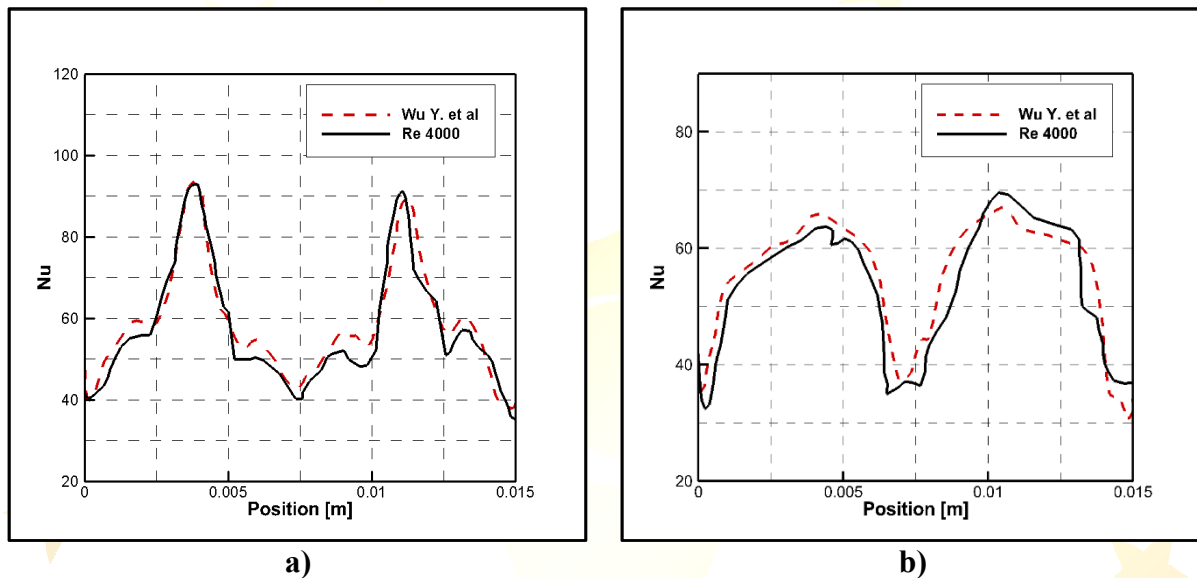
**Figure 11 The Dimensionless Velocity Contour for Half of the Sweep Period with  $Re=4000$  and Impact Angle of  $60^\circ$**

### 3.2 Heat Transfer Result

It has been established that oscillating flow can create turbulence, which leads to significant fluctuations in the flow and a reduction in boundary layer thickness. The results of the CFD analysis were consistent with the reference study in the model validation analyses, displaying a similar characteristic.

The impingement surface, which has an area of  $L \times W$  ( $9D \times 15D$ ), was investigated in terms of the time-averaged Nu number distribution on the impingement surface for  $X/L=0.25$  and  $X/L=0.5$  in the reference study. As seen in **Figure 12a**, the highest Nu value was found at the stagnation points, while there was a steep decrease in the Nu value at the center of the impingement surface.

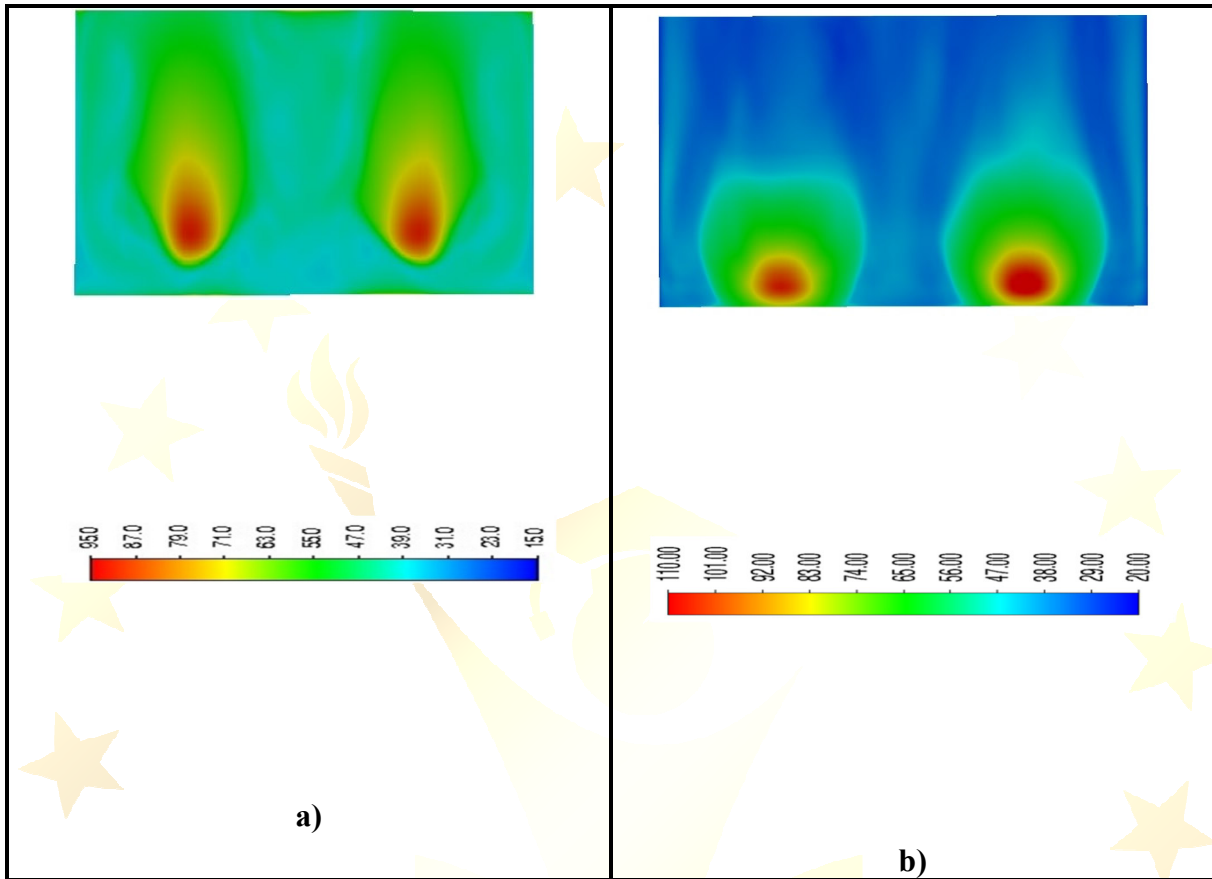
The time-averaged Nu distribution for channel lines with an X/L value of 0.5 at a Re number of 4000 and an impingement angle of 30 degrees was found to be lower than that for X/L=0.25. This is because the X/L=0.5 line was not directly impacted by the jet. While similar trends were observed in the reference study as seen as **Figure 12b**, the distribution was more homogeneous when compared to X/L=0.25. There are deviations in some values in the chart. The reason for this may be numerical errors in the calculation domain.



**Figure 12 The Time-averaged Distribution of the Nu Number for the a) X/L=0.25 and b)X/L=0.5 Channel Lines at Re=4000 and Impact Angle of 30 Degrees**

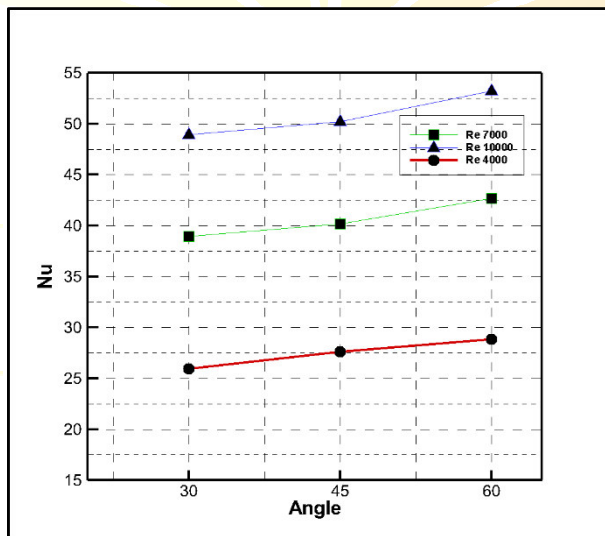
As shown in **Figure 13a**, the Nu distribution on the impingement surface is characterized by a prominent point of impact. However, as the angle of impact increases, the point of impact becomes more pronounced, and the stopping point occurs further away from X/L=0.25 where the angle of impact is 60 degrees. It was observed that the Nu distribution on the surface had significant variation, with maximum and minimum values differing significantly. As a result, the values could not be presented on a single scale. Upon closer examination of the color scale, it was determined that the model with an impact angle of 60 degrees had better heat transfer performance. The time-average Nu number graph for these three impact angles (30°, 45°, 60°) is shown in Figure 10, and it can be seen that the increase in turbulence had a positive effect on heat transfer as expected.





**Figure 13 The Time-averaged Nu Number Distribution on Impact Surface for a) Angle 30 and b) Angle 60**

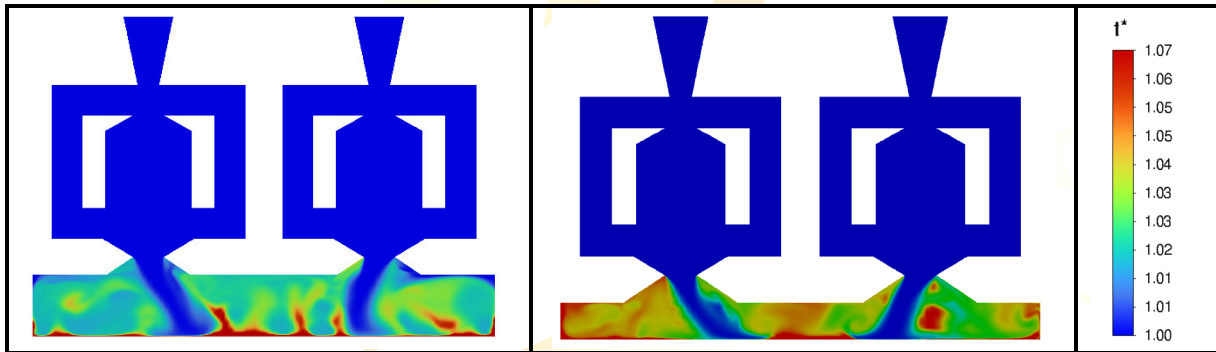
The effect of heat transfer with changes in the impact angle was also examined with changes in the Re number. It is seen in **Figure 14** that the observed phenomenon did not change with the increase of the Re number. However, it should be noted that this may not hold true for all heat exchangers. As the Re number increase, there is a possibility of flow choking in the channel.



**Figure 14 The Time-averaged and Area-averaged Nu Number Value**

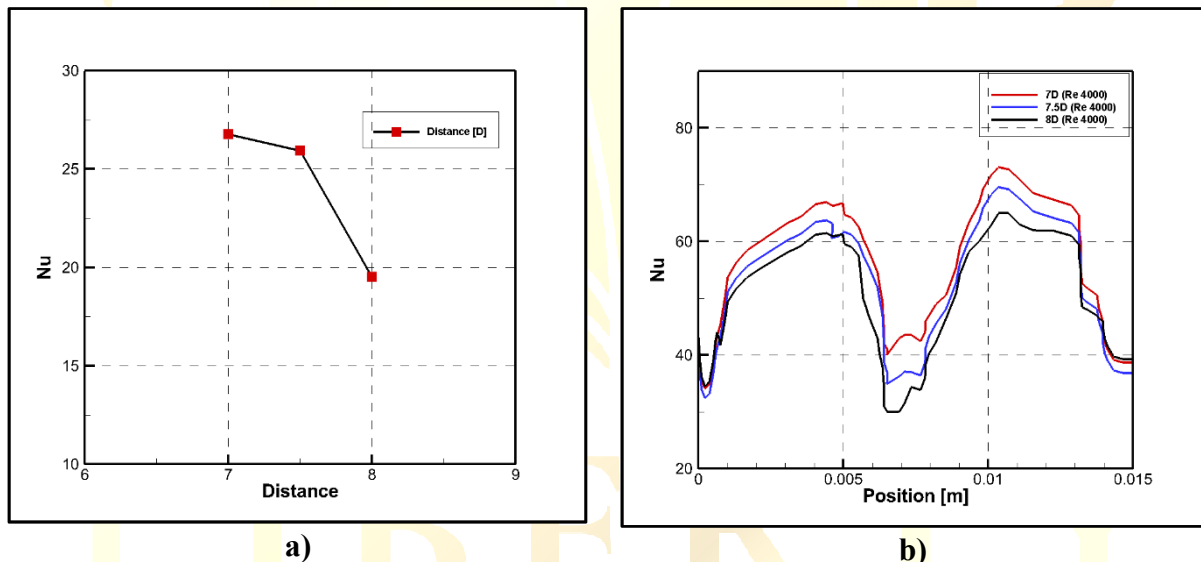


In order to better see the increase in turbulence with the change of the impact angle, the dimensionless temperature contour was examined in **Figure 15** on a common scale. When the contour is examined, it is seen that as the angle increases, the effect of sweeping in the jet flow and the fluctuating in the flow that occurs with the sweeping increase.



**Figure 15 Non-dimensional Temperature Distribution for a) Angle 30 and b) Angle 60**

Finally, when the effect of the distance between the oscillator arrays on the heat transfer was examined, it was observed that time-averaged Nu value increase when the distance between the arrays decreased. When the time-averaged Nu number is examined over  $X/L=0.5$ , it is seen in Figure 12b that the Nu number that decreases between the wall effect and the stagnation points occurs in a smaller region as the distance between the arrays decreases. In addition, it is seen that the maximum Nu number formed at the stagnation point increases as the distance between the arrays decreases. However, it is important to consider that reducing the distance between arrays may require the inclusion of additional fluidic oscillators, which could increase cost and pose placement challenges.



**Figure 16 The Time-averaged Nu Distribution: a) Area-averaged Values for Distance and b) at  $X/L=0.5$**

#### 4. Conclusion

A fluidic oscillator is a device that uses fluid flow to generate oscillations, and it has a wide range of applications in various fields, including air conditioning, aircraft control, and flow control systems.

It is a type of fluidic amplifier that amplifies small input signals to produce a larger output, and it can be used in situations where it is desirable to control the flow of a fluid without the use of mechanical components. Fluidic oscillators can operate over a wide range of frequencies and temperatures and are relatively simple and inexpensive to construct. They are also robust and can have a low maintenance requirement. There are several different types of fluidic oscillators, each with its own unique characteristics and suitability for different applications.

In this study, the heat transfer performance and fluid dynamics of a microchannel heat exchanger using two fluidic oscillators were investigated in order to enhance the heat transfer performance in impinging jet cooling. The Nu Number was increased and the external flow area was expanded by sweeping the fluid. The angle of the fluidic oscillator with the channel ( $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ ) was varied and the distance ( $7D$ ,  $7.5D$ ,  $8D$ ) between the two oscillators was also examined. Water was used as the working fluid, with an inlet temperature of  $300\text{ K}$  and a constant heat flux of  $q' = 10^6\text{ W/m}^2$  applied to the impingement surface, which had an area of  $9D \times 15D$ . The Re range of the fluid was varied from  $3000$  to  $10000$ , and other walls were considered adiabatic and non-slip. To summarize the CFD analysis results of a classical fluidic oscillator geometry:

- Oscillating the jet flow in the jet impingement cooling process increases the heat transfer performance.
- Increasing the impact angle both increases the pressure drop and increases the time-averaged Nu value as it increases the turbulence.
- It was observed that the heat transfer was positively affected when the distance between the arrays was reduced.

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### NOMENCLATURE

#### Symbols

D	Characteristic length (m)
$L_g$	Gap length between two oscillator centers
Nu	Nusselt number
Re	Reynolds number
P	Pressure (Pa)
$P_o$	Pressure of Operating (Pa)
$P^*$	Non-dimensional Pressure ( $P/P_o$ )
$T_f$	Oscillating period (s)
T	Temperature (K)
$T_i$	Temperature of inlet (K)
$T^*$	Non-dimensional temperature ( $T/T_i$ )
$q'$	Heat flux ( $W/m^2$ )
$\rho$	Density ( $kg/m^3$ )
u	Velocity (m/s)
$u_i$	Velocity of Inlet (m/s)
$u^*$	Non- dimensional velocity ( $u/u_i$ )
$\alpha_i$	Impact Angle

#### Abbreviations

CFD	Computational Fluid Dynamic
RANS	Reynolds-averaged Navier Stokes
SIMPLE	Semi-implicit Method for Pressure Linked Equations
SST	Shear Stress Transport

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## COMPUTATION OF IN-CYLINDER TRANSIENT THERMODYNAMICS AND VALVE LIFT EFFECTS ON FOUR STROKE RECIPROCATING PISTON INTERNAL COMBUSTION ENGINE

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### ABSTRACT

Several of advanced technological approach have been investigated, developed and tested in recent times in order to improve the efficiency and power output of Internal Combustion (IC) engine. However, in this study, the in-cylinder transient thermodynamics and valve lift effects on four stroke single cylinder IC engine cycle were modelled and simulated with ANSYS FLUENT version 15.0. Mass flow rate was varied at engine speeds ranging from 1000-12000 RPM for valve lifts in the range of 5-13mm. The simulated in-cylinder absolute mean velocity during combustion stroke attained peak values in the range of 1.30 and 1.50 m/s while turbulence kinetic energy attended peak values in the range of 0.26 to 0.30  $m^2/s^2$ . The peak turbulent velocity (0.44 m/s) and turbulent intensity (2.25) were caused by fluctuations resulting from random, unsteady and irregular nature of expanding air-fuel mixture in the cylinder. At engine loads of 25%, 50%, 75% and 100%, maximum cylinder pressure of 21 bar, 42 bar, 70 bar and 140 bar were obtained respectively. The in-cylinder air-fuel charges during combustion/expansion stroke was observed to be characterised by swirling turbulence and tumbling motion as it expanded towards the cylinder walls. A positive flow rate implies that charge is entering inside the cylinder while a negative flow rate implies that charge or air is leaving the engine cylinder. At low engine speed, higher valve lift led to greater charge loss while significant variation characterized by negative mass flow rate was observed after the bottom dead center.

**Keywords:** IC engine, Valve lift, In-cylinder pressure, Four stroke, Engine load, Air-fuel.

### 1. INTRODUCTION

In stoichiometric spark-ignition engines, where the intake gas velocity is controlled by throttle intake airflow, the efficiency of engine pumping losses is significantly reduced, especially at low loads. This often results in high fuel consumption in non-hybrid system operation [1]. However, adjusting the fresh gas inflow rate by adjusting the inlet valve closing angle (IVC) can significantly reduce pumping losses [2]. Although valve lift is designed for all cylinders in the intake and exhaust sections, valve timing is designed and operated for each intake and exhaust valve in a single cylinder of an IC engine [3]

Beginning with the 1.6-liter four-cylinder engine family, Volkswagen developed improved intake and exhaust variable valve timing (VVT) to effectively reduce compression while increasing exhaust temperature at minimum load [4].



Valve lift profiles can be grouped into three categories: opening, holding, and closing. These categories are mechanically automated to allow the valve to open, remain open, close, recover hydraulic fluids, and smoothly seat without the need for electronic feedback control and using just one magnetic coil per actuator. [5]

Clenchi et al. [6] performed a low-lift idle experiment on a port-injected engine with different intake valve lifts. The results of the study show that by controlling the maximum intake valve lift, intake quality and intake flow rate can be controlled while improving the air-fuel mixing process and in-cylinder vortex dynamics. The study also revealed clear improvements in fuel consumption and cycle variability. Therefore, intake valve lift can be used to overcome the drop in flow rate at the valve clearance, which can adversely affect combustion efficiency and stability.

Ikpe and Owunna [7] developed a model for a single-cylinder internal combustion engine that represents the four phases of a two-stroke cycle: intake, compression, expansion, and exhaust. They treated the engine as a closed system in their model. The temperature of the combusted gas within the cylinder of an internal combustion engine was found to be directly proportional to the pressure of the gas within the cylinder, when the air-fuel mixture was near ideal conditions (14.7:1) and both compression and expansion were taking place. The temperature of the combusted gas was observed to be in the range of 293.92-3000.60 K and the cylinder gas pressure was in the range of 60.76-80.20 bar. The maximum temperature of the engine was calculated to be 2367.56 K at equilibrium, and the maximum shear stress was determined to be  $176 \times 10^2$  MPa, using a heat transfer coefficient of  $581.236 \text{ W/m}^2\text{K}$ .

Sawant and Bari [8] conducted a study in which they altered the intake valve timings (IVT) and valve lift at different engine speeds to assess the impact on engine performance, specifically torque and power. They found that the changes resulted in an average increase in performance of 6.02% across the entire range of engine speeds from 3000 to 9000 rpm. In addition, the changes to the varied valve lifts (VVL) and variable valve timings (VVT) also led to decrease in brake specific fuel consumption (BSFC) by an average of 0.35% at all engine speeds.

Ikpe et al. [9]. used MATLAB 2018b to model and simulate the performance of a four-stroke internal combustion engine (IC engine) called the Renault engine (specifically, a Mercedes-Benz 250SE W108). The displacement volume and the minimum volume occupied by the in-cylinder charge were  $4.65 \times 10^{-4} \text{ mm}^3$  (or  $4.65 \times 10^{-7} \text{ cm}^3$ ) and  $0.5 \times 10^{-4} \text{ mm}^3$  (or  $5 \times 10^{-8} \text{ cm}^3$ ), respectively.

The maximum velocity was recorded at 72 degrees of crank angle, with a value of 19.65 m/s, while the minimum velocity occurred at 288 degrees of crank angle with a value of -19.65 m/s. The maximum cylinder pressure was 28 bar at 20 degrees of crank angle, and then gradually decreased to 0.2 bar at subsequent crank angles of 100, 200, and 300 degrees. The results showed that the maximum peak pressure was between 5347 and 5320 KPa for simulated and experimental data, and the maximum in-cylinder spark pressure before combustion was 1849 and 1730 KPa for simulated and experimental data, respectively. The highest crank angles recorded for maximum pressure were 30 and 22 degrees for simulated and experimental data, respectively.

Using CFD simulation, Kumar and Jayashankar [10] investigated the effect of valve lift on fluid flow in cylinder of internal combustion engine with inlet port diameter of 46 mm, valve diameter of 43 mm and also the length and diameter of the cylinder of 562 mm and 93.65 mm. The results revealed that valve lift affects the flow velocity regime in the cylinder. Thus, flow separation becomes more critical with increasing valve lift, increasing losses near valve opening.



Akele et al. [11] performed a flapper flow analysis on an ICE to determine flow and swirl at different valve lifts. The model geometry was developed using ANSYS Design Modeler for one cylinder, one intake and one exhaust port, and two valves. The swirling airflow is turbulent as it flows against the cylinder wall where it is subjected to a stroke motion, which in turn ensures uniform combustion in the cylinder while the intake mass flow increases with valve lift.

Ikpe et al. [12] conducted a port flow analysis using ANSYS R-16 software with a valve lift of 8 mm. The velocity magnitude and mass flow rate were monitored using simulated profiles and cut planes, and the angular velocity of the cycle was determined using SOLIDWORKS 2017. The average angular velocity of the crankshaft was found to be 1315 rpm with a percentage deviation of less than 20%. The area-weighted average velocity of charge was measured at 11 m/s with a corresponding mass flow rate of -0.055479 kg/s. The maximum flow rate at 8 mm was calculated to be 0.005417 kg/s. The intensity of swirl increased along the stroke length in the engine cylinder, and an increase in the swirl number resulted in a more uniform radial temperature distribution as well as a reduction in the in-cylinder flame temperature.

The process of analysing the impact of valve lift on the performance of a single cylinder internal combustion engine using fluid dynamics is complex and time-consuming, often requiring data from experimental procedures [13]. However, by using computer-aided modelling and simulation to link theoretical principles to the thermodynamics of the internal combustion engine, the process can be made more efficient and the simulation time can be reduced to achieve optimal results. This study aims to use modelling, simulation, and computation to examine the effects of valve lift on in-cylinder thermodynamics (such as turbulent velocity, in-cylinder temperature, flame development and propagation, turbulent kinetic energy, absolute mean velocity, turbulent intensity, and volumetric efficiency) during the four-stroke cycle of a reciprocating piston internal combustion engine.

## 2. MATERIALS AND METHOD

The engine being studied was a Nissan Primera inline engine, which is believed to operate using a four-stroke cycle. The cylinder ports, valve seats, and head were modeled in Solidworks 2018 before being imported into the IC engine workbench on ANSYS R-15. The cylinder head was only modeled in half because it is symmetrical, which helps to reduce the computation time needed for the analysis.

**Table 1.** The internal combustion engine parameters and specification

<i>Parameters</i>	<i>Specification</i>	
<i>Number of Cylinders</i>	1	
<i>Stroke</i>	72 mm	
<i>Length of Connecting Rod</i>	122.4 mm	
<i>Compression Ratio</i>	11.9:1	
<i>Air/Fuel Ratio</i>	14.7:1	
<i>Specific heat ratio</i>	1.4	
<i>Swept volume</i>	499.5cm <sup>3</sup>	
<i>Squish height at TDC</i>	1.1mm	
<i>Number of valves</i>	4	
<i>Intake</i>	<i>Stock Port Length</i>	420 mm
	<i>Length of Variable Section</i>	350 mm
	<i>Valve Diameter</i>	40 mm
	<i>Number of Valves</i>	2
	<i>Valve Diameter</i>	33 mm
<i>Exhaust</i>	<i>Stock Port Length</i>	550 mm
	<i>Number of Valves</i>	2

the governing equations of mass and momentum are given by Equation 1

$$\frac{\partial \bar{U}_i}{\partial x_i} = 0 \quad (1)$$

$$\frac{\partial \bar{U}_i}{\partial t} + \frac{\partial}{\partial x_j} (\bar{U}_i \bar{U}_j) = \frac{\partial \bar{p}}{\partial x_i} + \frac{\partial}{\partial x_i} \left( \nu \left( \frac{\partial \bar{U}_i}{\partial x_j} + \frac{\partial \bar{U}_j}{\partial x_i} \right) \right) - \frac{\partial \tau_{ij}}{\partial x_i} \quad (2)$$

where  $\bar{U}$  and  $\bar{p}$  are expressed velocity and pressure fields respectively while  $\tau_{ij}$  remains the stress tensor. Thus the rate of mass flow which enters the IC engine cylinder is resolved by Equation 3a hence the rate of mass flow rate transiting the cylinder is shown in Equation 3b.

$$m(x) = \rho u F \quad (3a)$$

$$m(x + dx) = \rho u F + \frac{\partial}{\partial x} (\rho u F) dx \quad (3b)$$

It can be observed that the momentum conservation equation for the swirl velocity is expressed by Equation 4. Thus The strength of the swirl recorded can be evaluated by the swirl number ( $S_n$ ) as shown in Equation 5 while the ratio of axial flux (tangential momentum to the axial flux) of axial momentum times the effective nozzle radius as expressed as swirl intensity ( $S_i$ ) which is shown in Equation 6.

$$\frac{\partial}{\partial t} (\rho w) + \frac{1}{r} \frac{\partial}{\partial x} (r \rho u w) + \frac{1}{r} \frac{\partial}{\partial r} (r \rho v w) = \frac{1}{r} \frac{\partial}{\partial x} \left[ r \mu \frac{\partial w}{\partial x} \right] + \frac{1}{r^2} \frac{\partial}{\partial r} \left[ r^3 \mu \frac{\partial}{\partial r} \left( \frac{w}{r} \right) \right] - \rho \frac{v w}{r} \quad (4)$$

$$S_n = \frac{\int r w \vec{v} \cdot d\vec{A}}{\bar{R} \int u \vec{v} \cdot d\vec{A}} \quad (5)$$

$$S_i = \frac{\text{Axial flux of tangential momentum}}{\text{Axial flux of axial momentum} * \text{radius}} = \frac{2\pi \int_0^R \rho W U r^2 dr}{R * 2\pi \int_0^R \rho W U r^2 dr} \quad (6)$$

The momentum equation states that the total of the pressure and shear forces within the cylinder of an internal combustion engine is equal to the sum of the rate of change of momentum within the cylinder and the net momentum that leaves the cylinder. Thus, the pressure and shear forces can be represented by Equations 7 and 8.

$$pF - \left( p + \frac{\partial p}{\partial x} dx \right) \left( F + \frac{\partial F}{\partial x} dx \right) + p \frac{dF}{dx} dx = - \frac{\partial}{\partial x} (pF) dx + p \frac{dF}{dx} dx \quad (7)$$

$$\tau_w \pi D dx = -f \frac{\rho u^2}{2} \pi D dx \quad (8)$$

Thus D can be expressed as the equivalent diameter which the wall shear stress  $\tau_w$  is related to the friction factor as shown in Equation 9. Hence it can be observed that the rate of change of momentum in the cylinder is shown in Equation 10.

$$f = \frac{\tau_w}{\frac{1}{2} \rho u^2} \quad (9)$$

$$\frac{\partial}{\partial t} (pFu dx) \quad (10)$$

Thus the net efflux of momentum (net) in the cylinder is shown by Equation 11 and the momentum Equation forms the basis for the equations given by Equation 12.

$$\left(p + \frac{\partial p}{\partial x} dx\right) \left(u + \frac{\partial u}{\partial x} dx\right)^2 \left(F + \frac{dF}{dx} dx\right) - pu^2 F = \frac{\partial}{\partial x} (pu^2 F) dx \quad (11)$$

$$-\frac{\partial}{\partial x} (pF) dx + p \frac{dF}{dx} dx - f \rho u^2 \frac{1}{2} \pi D dx = \frac{\partial}{\partial t} (pFu dx) + \frac{\partial}{\partial x} (pFu^2) dx \quad (12)$$

Moreso, the specific stagnation enthalpy, specific internal energy, and energy equation for a fixed volume with the heat transfer rate is expressed by Equation 13-16.

$$C_v T + \frac{u^2}{2} + \frac{p}{\rho} \quad (13)$$

$$C_v T + \frac{u^2}{2} \quad (14)$$

$$Q - W_s = \frac{\partial (E)_{cv}}{\partial t} + (\text{Net efflux of stagnation enthalpy}) \quad (15)$$

$$Q = q \rho F dx \quad (16)$$

Thus q represent the heat transfer energy per unit mass per unit time and  $W_s$  is the external rate of shear work. And the time rate of change (intemal energy in the cylinder) is given by Equation 17 and the net efflux of stagnation enthalpy( in the cylinder) is shown in Equation 18.

$$\frac{\partial (E)_{cv}}{\partial t} = \frac{\partial}{\partial t} \left\{ (\rho F dx) \left( C_v T + \frac{u^2}{2} \right) \right\} \quad (17)$$

$$\frac{\partial}{\partial x} \left\{ (\rho u F) \left( C_v T + \frac{u^2}{2} + \frac{p}{\rho} \right) \right\} dx \quad (18)$$

Resolving the substitution of Equaions 16-18 with Equation 15, the energy equation becomes thus ;

$$q \rho F dx = \frac{\partial}{\partial t} \left\{ (\rho F dx) \left( C_v T + \frac{u^2}{2} \right) \right\} + \frac{\partial}{\partial x} \left\{ (\rho u F) \left( C_v T + \frac{u^2}{2} + \frac{p}{\rho} \right) \right\} dx \quad (19)$$

Thus the conservative form of the governing equations are shown as follows;

$$\text{Momentum equation} = \frac{\partial (\rho F)}{\partial t} + \frac{\partial (\rho u F)}{\partial x} = 0 \quad (20)$$

$$\text{Continuity equation} = \frac{\partial (\rho u F)}{\partial t} + \frac{\partial (\rho u^2 + p) F}{\partial x} - p \frac{dF}{dx} + \frac{1}{2} \rho u^2 f \pi D = 0 \quad (21)$$

$$\text{Energy equation} = \frac{\partial (\rho e_0 F)}{\partial t} + \frac{\partial (\rho u h_0 F)}{\partial x} - q \rho F = 0 \quad (22)$$

$$\text{where } e_0 = C_v t + \frac{1}{2} u^2 \text{ and } h_0 = e_0 + \frac{p}{\rho} \quad (23)$$

Similarly, the volumetric efficiency expressed in Equation 24 can be expressed as the ratio of mass of air (inducted) into the cylinder and to the mass of air which the cylinder volume can accommodate [14].

$$\eta_v = \frac{m_g}{m_{tn}} = \frac{m_g}{v_{th} \cdot \rho_{th}} = \frac{v_g}{v_{th}} \quad (24)$$

Thus,  $\eta_v$  is the volumetric efficiency,  $m_g$  is the actual mass of air inducted,  $m_m$  is the theoretical mass of air that the cylinder can accommodate,  $\rho_{th}$  is the density of ambient air,  $v_g$  is the volume of air inducted while  $v_{th}$  is the swept volume. The Effective cam duration (ECD) is the degrees of cam rotation as shown by Equation 25.

$$ECD = \left( \frac{(N \cdot RV \cdot L_{eff})}{(ECD \cdot 0.25 \cdot C \cdot 2)} \right) - 0.5D \quad (25)$$

Thus  $C$  is the speed of sound at intake temperature, and  $N$  is the engine speed,  $RV$  is the Number of reflections,  $D$  is the average runner diameter and  $L_{eff}$  is the effective length of runner as expressed by Equation 26 [15], 16].

$$L_{eff} = \left( \frac{(ECD \cdot 0.25 \cdot C \cdot 2)}{(N \cdot RV)} \right) - 0.5D \quad (26)$$

The in-cylinder adiabatic flame temperature during combustion for a lean mixture is specified by Equation 27, and the in-cylinder adiabatic flame temperature for a rich mixture is specified by Equation 28.;

$$T_R \cong T_o + \frac{m_f \cdot LHV + (m_a + m_f) \bar{C}_{p,R} (T_R - T_o)}{(m_a + m_f) \bar{C}_{p,P}} \quad (27a)$$

$$T_R \frac{m_f \cdot LHV}{(m_a + m_f) \bar{C}_{p,P}} = T_R + \frac{m_f / m_a \cdot LHV}{(1 + m_f / m_a) \bar{C}_{p,P}} \quad (27b)$$

$$T_R + \frac{f \cdot LHV}{(1+f) \bar{C}_{p,P}} = T_R + \frac{\phi \cdot f_s \cdot LHV}{(1+\phi \cdot f_s) \bar{C}_{p,P}} \quad (27c)$$

$$T_P = T_R + \frac{f_s \cdot LHV}{(1+f) \bar{C}_{p,P}} = T_R + \frac{f_s \cdot LHV}{(1+\phi \cdot f_s) \bar{C}_{p,P}} \quad (28)$$

$m_f$  and  $m_a$  is expressed as the mass of air and fuel,  $\bar{C}_{p,P}$  is an average value of specific heat calculated at the average temperature of reactants and standard temperature,  $f_s$  is the stoichiometric fuel/air ratio by mass, and  $T_P$  is the adiabatic flame temperature.

### 2.1. ANSYS ICE Fluid Port Simulation

The IC engine model domain was visualized as a mesh, which included the ICE fluid port. This mesh contained a total of 689651 nodes and 1444243 elements. The boundary physics for the ICE, the boundary conditions used for the simulation, the relaxation and pressure-velocity coupling, and the discretization scheme were all adopted for the model are presented in Table 1. To analyze and solve the ICE port flow simulation, we used a computational fluid dynamics (CFD) method in ANSYS FLUENT version 15.0. This method uses the finite volume method of numerical analysis to solve the equations that govern the movement and energy of the air in the internal combustion engine cylinder, including the continuity, Navier-Stokes, and energy equations. [17]

The software completed various tasks such as checking the geometry, preparing the geometry, generating a mesh, setting up the solver, and creating the default swirl plane using information from the geometry. It also defined custom field functions for the swirl planes. In computational fluid dynamics, boundary conditions are the conditions that must be met at the edges of a simulation domain in order to solve a boundary value problem. These boundary conditions can include inlet conditions, outlet conditions, wall conditions, constant pressure conditions, axisymmetric conditions, symmetric conditions, and periodic or cyclic conditions. Table 2 shows the thermodynamic parameters used in the ANSYS ICE fluid port flow simulation for an internal combustion engine.

**Table 2.** Boundary conditions for ANSYS ICE fluid port simulation

<i>Type</i>	<i>Zones</i>	<i>Values</i>	
<i>pressure-outlet</i>	<i>ice-outlet</i>	<i>Gauge Pressure (pascal) -5000</i>	
		<i>Backflow Total Temperature (k) 300</i>	
<i>pressure-inlet</i>	<i>ice-inlet- inplenum1</i>	<i>Gauge Total Pressure (pascal) 0</i>	
		<i>Supersonic/Initial Gauge Pressure (pascal) 0</i>	
		<i>Total Temperature (k) 300</i>	
<i>wall</i>	<i>wall-ice-fluid-port</i>	<i>Temperature (k) 300</i>	
<i>wall</i>	<i>ice-cyl</i>	<i>Temperature (k) 300</i>	
<i>wall</i>	<i>ice-slipwall- inplenum1</i>	<i>Temperature (k) 300</i>	
<i>wall</i>	<i>ice-slipwall- outplenum</i>	<i>Temperature (k) 300</i>	
<i>wall</i>	<i>ice-valve- proximity-faces</i>	<i>Temperature (k) 300</i>	
<i>Relaxation Details</i>		<i>Pressure-Velocity Coupling</i>	
<i>Variable</i>	<i>Relaxation Factor</i>	<i>Parameter</i>	<i>Value</i>
<i>Density</i>	<i>1.000</i>	<i>Type</i>	<i>Coupled</i>
<i>Body Forces</i>	<i>1.000</i>	<i>Pseudo Transient</i>	<i>no</i>
<i>Turbulent Kinetic Energy</i>	<i>0.800</i>	<i>Flow Courant Number</i>	<i>200.000</i>
<i>Specific Dissipation Rate</i>	<i>0.800</i>	<i>Explicit momentum under-relaxation</i>	<i>0.750</i>
<i>Turbulent Viscosity</i>	<i>1.000</i>	<i>Explicit pressure under-relaxation</i>	<i>0.750</i>
<i>Energy</i>	<i>1.000</i>		
<i>Discretization Scheme</i>			
<i>Variable</i>		<i>Scheme</i>	
<i>Pressure</i>		<i>Standard</i>	
<i>Density</i>		<i>Second Order Upwind</i>	
<i>Momentum</i>		<i>Second Order Upwind</i>	
<i>Turbulent Kinetic Energy</i>		<i>First Order Upwind</i>	
<i>Specific Dissipation Rate</i>		<i>First Order Upwind</i>	
<i>Energy</i>		<i>Second Order Upwind</i>	

### **2.2. Mesh Report for the IC Engine Model**

The process of dividing the domain in CFD into smaller elements, where the discretized governing equations are solved, is crucial but requires a significant amount of input from the user. It is important for this step to be done accurately and for the resulting mesh to be of high quality, as this will affect the accuracy and physical correctness of the solution. In areas with strong gradients, the mesh should be finer, while in areas with weaker gradients, the elements can be coarser to conserve computational effort. When conducting design optimization, it is desirable to minimize the amount of user input in order to streamline the process chain and save time and resources. This process involves repeating cycles of geometry generation, meshing, calculation, and post-processing, with an optimizer generating new parameter sets for each new cycle.

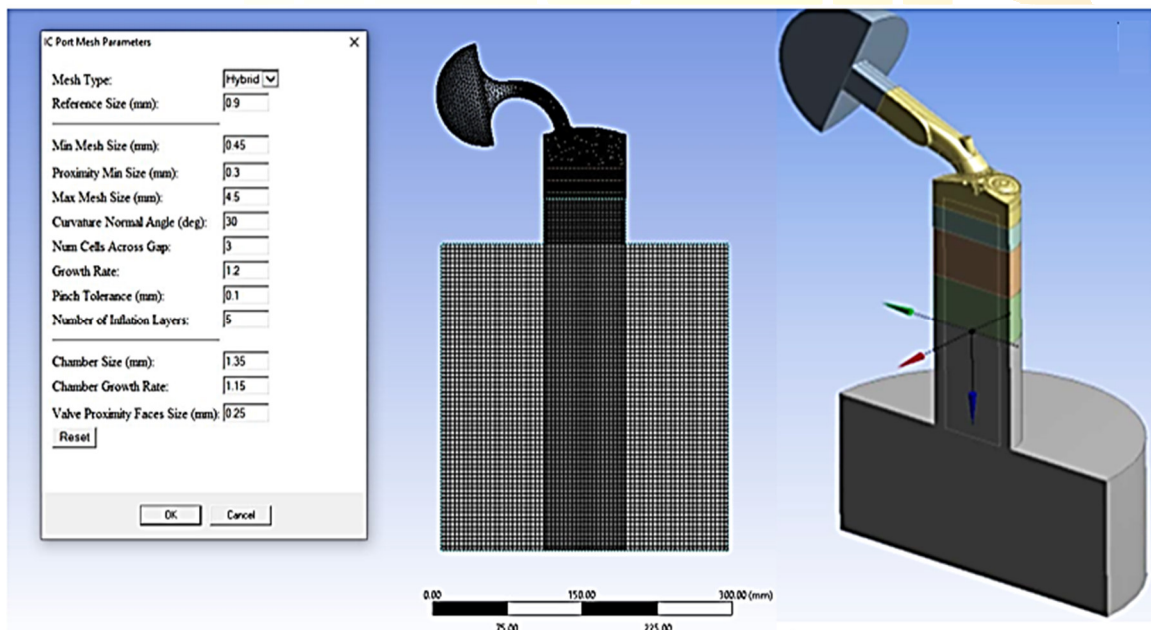


In order for the optimization process to run smoothly and efficiently, it is necessary for all of these steps to be fully automated and not require any manual input.

Hybrid mesh in the ANSYS ICE software is composed of tetrahedrons in the far field and prisms in the near wall boundary layer. The ANSYS IC mesher is designed to create smooth mesh flow and reduce the amount of manual input required. The mesh parameters were carefully chosen, particularly for the zones near the walls, to ensure that the edges of the valve and valve seat were accurately resolved with a fine enough mesh size to accurately represent the flow characteristics of that area. The surface was first meshed with triangular elements, and then the rest of the domain was filled with tetrahedral cells. The mesh details used in the IC engine simulation process are shown in Table 3 and the CAD model and mesh visualization can be seen in Figure 1.

**Table 3.** Mesh details for the simulation process

<i>Parameter</i>	<i>Value</i>
<i>Mesh Type</i>	<i>Hybrid</i>
<i>Reference Size (mm)</i>	<i>0.9</i>
<i>Min Mesh Size (mm)</i>	<i>0.3</i>
<i>Max Mesh Size (mm)</i>	<i>4.5</i>
<i>Curvature Normal Angle (deg)</i>	<i>30</i>
<i>Number of cells across gap</i>	<i>3</i>
<i>Growth Rate</i>	<i>1.2</i>
<i>Pinch Tolerance (mm)</i>	<i>0.1</i>
<i>Number of Inflation Layers</i>	<i>5</i>
<i>Chamber Size (mm)</i>	<i>1.35</i>
<i>Chamber Growth Rate</i>	<i>1.15</i>
<i>Valve Proximity Faces Size (mm)</i>	<i>0.25</i>

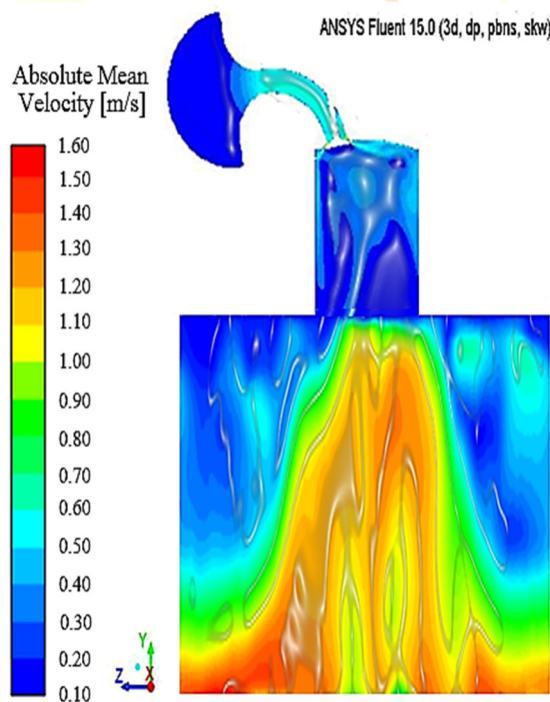


**Figure 1.** IC engine model and mesh visualization

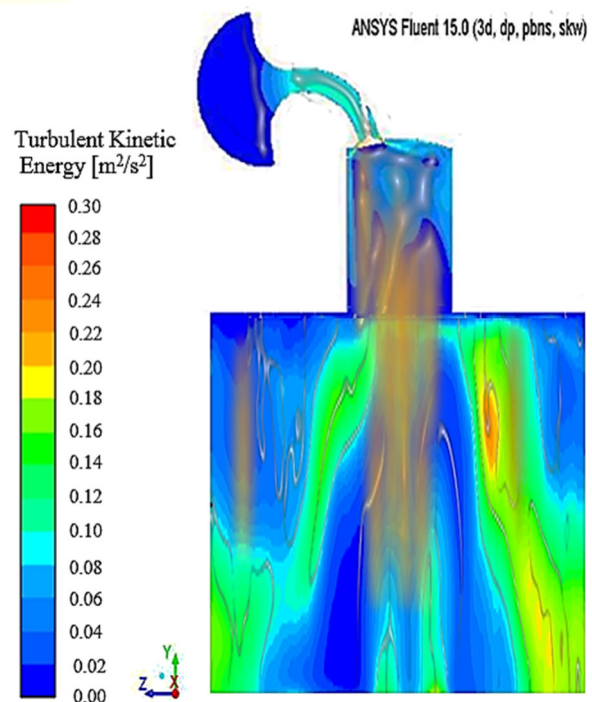


### 3. RESULTS AND DISCUSSIONS

Figure 2a shows the absolute mean velocity versus the mean fluid particle flow or movement of the air-fuel mixture in the cylinder during combustion. Together with the relative and peripheral velocities of the fluid particles inside the cylinder, the absolute mean velocity characteristic of turbulent swirling motion is obtained. The simulated mean absolute velocity varies between 0.10 and 0.60 m/s as the air-fuel mixture enters the cylinder, as shown in blue in the ICE slice plane. As the combustion of the air-fuel mixture takes place in the cylinder, the simulated absolute average speed reaches a range of maximum values between 1.30 and 1.50 m/s as indicated by orange and red in the plane of ICE cut. Figure 2b illustrates the simulation of turbulent kinetic energy (TKE) in the ICE sectional plane during combustion and expansion of the air-fuel mixture in the ICE cylinder. In this case, TKE is the average kinetic energy per unit mass associated with vortices in turbulent flow and is characterized by flame velocity fluctuations in the cylinder. It has a minimum range of values between 0.0 and 0.04 m<sup>2</sup>/s<sup>2</sup> as indicated by blue color and maximum values between 0.26 and 0.30 m<sup>2</sup>/s<sup>2</sup> as indicated by orange and red in the Simulated ICE cutting plane in Figure 2b shown.



**Figure 2a.** Cut plane showing in-cylinder absolute mean velocity



**Figure 2b.** Cut plane showing in-cylinder turbulent kinetic energy

For turbulent flow caused by the expansion of a mixture in a cylinder, the velocity and pressure at a given point are not constant with time, but appear as irregular high-frequency wave speed fluctuations. These fluctuations are the result of random, unstable and irregular fluid movement (air and fuel mixture) in the cylinder. Therefore, the velocity at a given time during combustion is called the instantaneous velocity because it changes continuously over time. Minimum turbulent velocities between 0.0 and 0.04 m/s are plotted in blue, and maximum values between 0.41 and 0.44 m/s are plotted in orange and red in the simulated ICE slice plane in Figure 2c. Quantifying in-cylinder charge motion is critical to understanding the effect of control actuators on flame entry velocity as characterized by volume flow and turbulence intensity.

Bulk fluid flow describes fluid motion patterns such as swirling, tumbling, compression, etc. and the average velocity of the air-fuel mixture in the cylinder.

The level of turbulence in the cylinder is determined by the fluctuation of the root-mean-square velocity, called the turbulence intensity [18], [19], which is an order of magnitude higher than the laminar flame velocity and is critical in the process of turbulent flame entrainment.

As shown in Figure 2d, the maximum value of the turbulence intensity is 2.25. A predictive turbulence intensity model is essential to develop combustion phase model-based control strategies for internal combustion engines. Due to the high temperature and high pressure in the cylinder, experimental measurements of the turbulence intensity are very difficult. To measure in-cylinder turbulence intensity using a hot-wire anemometer, the engine must be running without ignition while being monitored [20], [21]. However, laser-based methods provide spatial and temporal in-cylinder measurements of internal combustion engines, but these methods usually require extensive engine modifications [22].

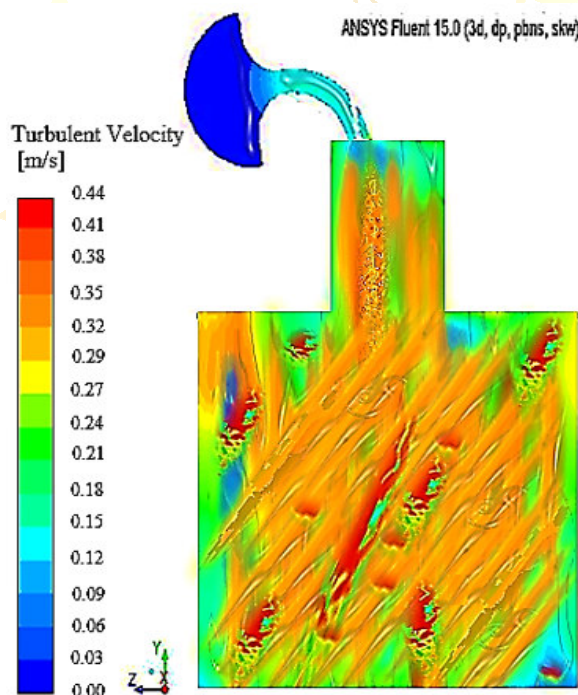


Figure 2c. Cut plane showing in-cylinder turbulent velocity

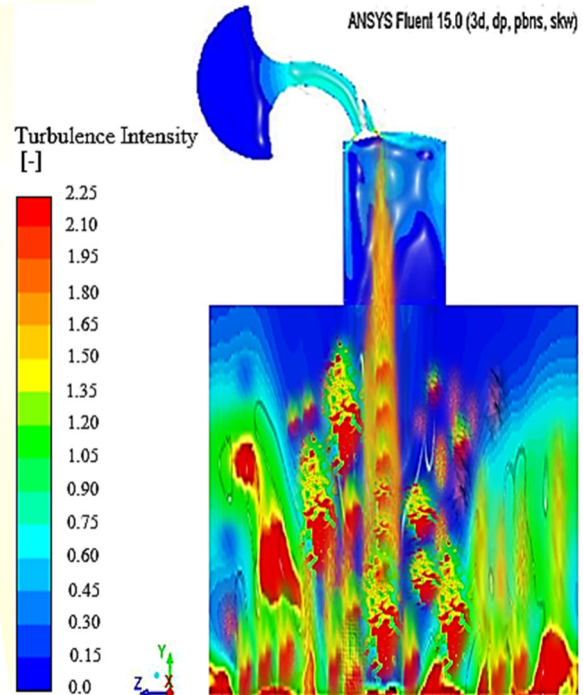
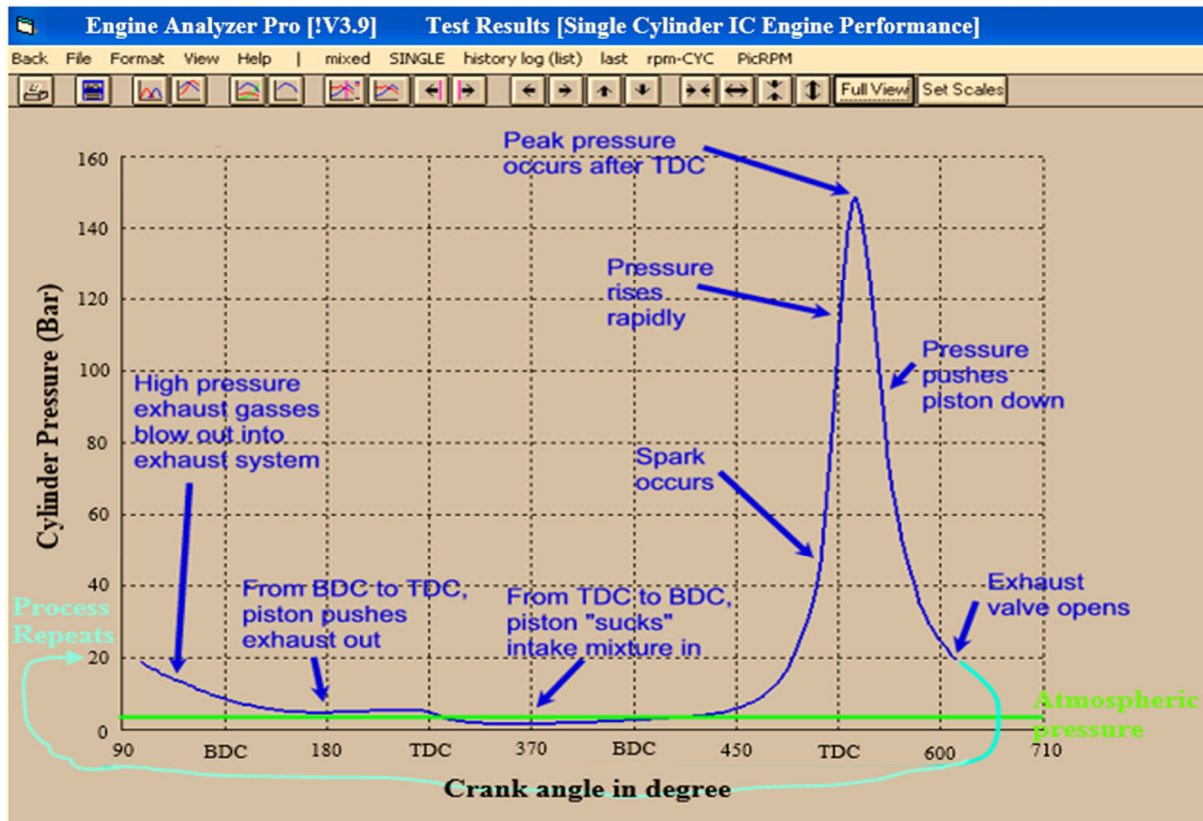


Figure 2d. Cut plane showing in-cylinder turbulence intensity

### 3.1. In-cylinder Pressure

Cylinder pressure measurement is the basis of cylinder pressure indication (CPI): Cylinder pressure indication is a metrological method for determining and analyzing the in-cylinder pressure curve of an internal combustion engine. Therefore, CPI provides more accurate information about thermodynamic processes in the combustion process and engine output power. Cylinder pressure measurements are typically determined using high temperature piezoelectric pressure sensors mounted through mounting holes drilled in the cylinder head. Measuring spark plugs with integrated high temperature and high pressure sensors are also used. This method does not require mounting holes as they can be easily screwed. Cylinder pressure is generally the pressure that exists in the cylinder during the four (4) strokes (intake, compression, expansion and exhaust) of a reciprocating engine.

In order to fully understand the pressure variation trend in the cylinder of a four-stroke internal combustion engine, the engine dynamometer was simulated and analyzed in Engine Analyzer Pro V3. machine) performance. As shown in Figure 3, the intake valve opens during the intake stroke and the piston moves down into the cylinder (the exhaust valve remains closed during the intake stroke). The increased cylinder volume creates a sub-atmospheric cylinder pressure that draws air into the cylinder and the intake valve closes [23]. The air/fuel mixture is compressed to a pressure of 6 to 13 bar or more, generating heat while vaporizing the fuel.



**Figure 3.** Flow dynamics showing variation of cylinder pressure with crank angle

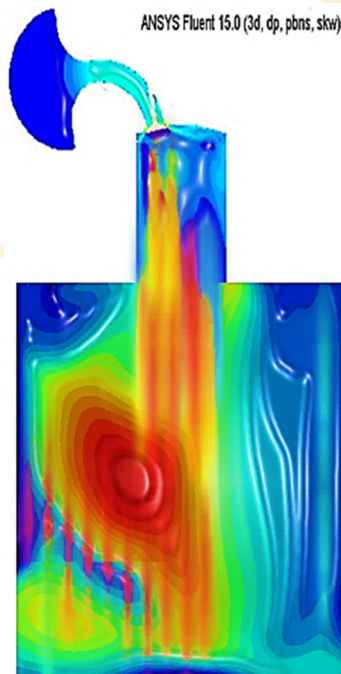
The mixture is ignited by the spark plug during the combustion/expansion stroke, creating extremely high cylinder pressure that rises rapidly. Maximum cylinder pressure near top dead center (TDC) can range from 25-30 bar for lightly loaded engines, 70-100 bar for full power production engines, 103 bar and higher for high range racing engines. The engine gains power as the piston moves down, increasing cylinder volume while reducing cylinder pressure. As the piston moves to the bottom of the cylinder, called bottom dead center (BDC), the cylinder pressure can drop to a range of 6 to 30 bar.

The exhaust valve opens near BDC to bleed off any cylinder pressure above atmospheric pressure; this process is called "blowing". Depending on how fast the valves open and the pressure in the cylinder can create a pulse of sound, where the exhaust noise is coming from and why the engine makes a loud noise when it is under full load. The piston then returns the cylinder to TDC, forcing all remaining combustion air fuel (exhaust gas) out of the cylinder. How high or low the cylinder pressure is during the exhaust stroke determines how hard the engine has to work to expel burnt gases. Therefore, the cylinder pressure is the pressure that changes continuously in the cylinder during all four strokes.

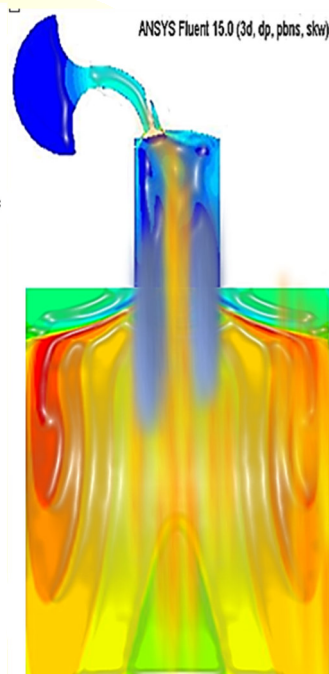
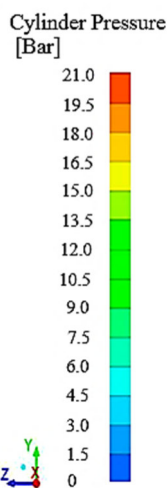


Figure 4a–d shows cross-sections of cylinder pressure variation for different engine loads. The engine speed and load data used in the simulations are obtained from a study by Maroa and Inambao [24], where the authors performed engine tests on a four-cylinder Iveco dual-fuel diesel engine.

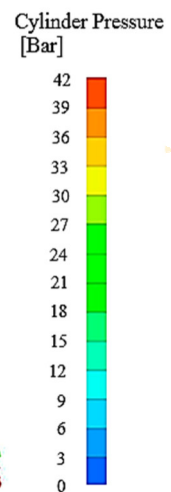
The engine is connected to a mechanical dynamometer with a position set at 500 rpm which corresponds to 25% engine load, 1000 rpm which corresponds to 50% engine load, 1500 rpm which corresponds to 75% engine load etc. efficiency and 2000 rpm is considered to correspond to 100% engine load. These data were used in ANSYS FLUENT version 15.0 to simulate the cylinder pressure as shown in the figure. 4a-d. Low engine load (25%) to full engine load (100%) results in a cylinder pressure of 21-140 bar respectively. Royal blue on the bar indicates minimum cylinder pressure per engine load, lemon indicates intermediate cylinder pressure per engine load, and red indicates maximum cylinder pressure per engine load.

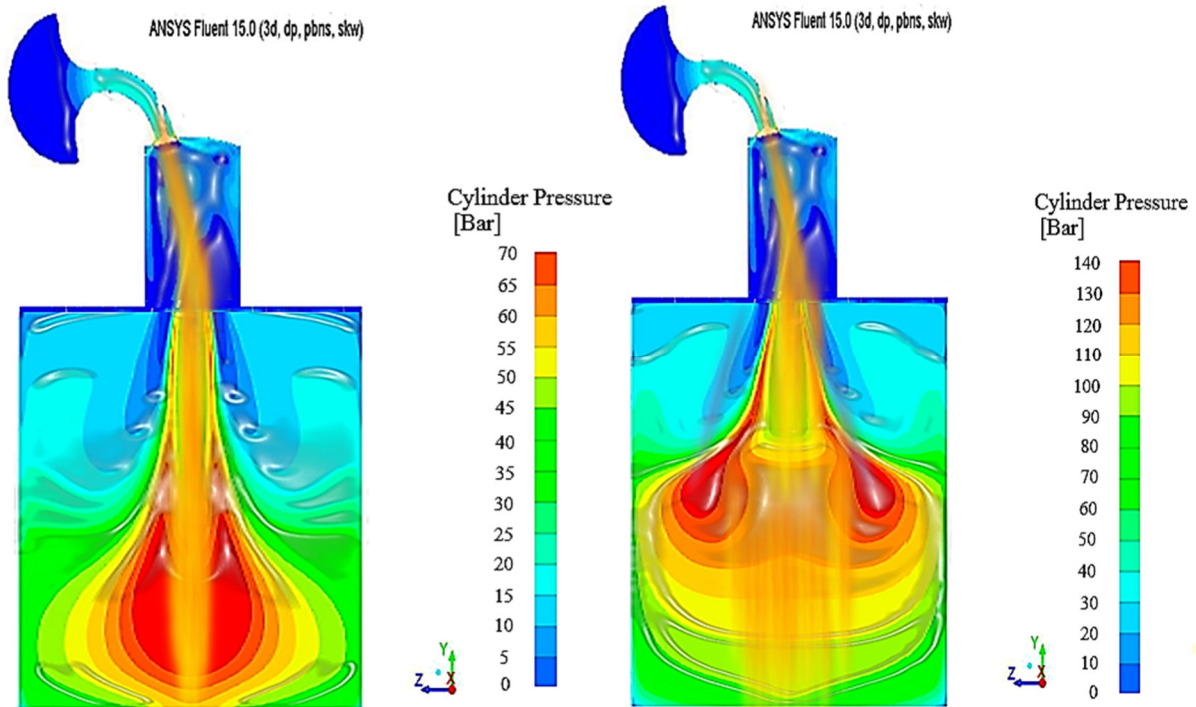


**Figure 4a.** Cut plane showing in-cylinder pressure @ 25% engine load



**Figure 4b.** Cut plane showing in-cylinder pressure @ 50% engine load





**Figure 4c.** Cut plane showing in-cylinder pressure @ 75% engine load

**Figure 4d.** Cut plane showing in-cylinder pressure @ 100% full engine load

Figure 5a shows the cyclic changes in cylinder temperature at an equivalent 25% idle or low engine load, while Figure 5b shows the cylinder temperature changes at an equivalent 100% full engine load. The in-cylinder temperature was observed to vary between 707-841°C when the engine was under low load and varied with significant increase between 2154-2254°C when the engine was fully loaded.

This is because at idle load, when the throttle is closed, the temperature and pressure in the cylinder are lower, which means that when the intake valve is closed, there is less air and fuel in the cylinder, so less power is produced. On the other hand, opening the throttle will cause the temperature and pressure in the intake cylinder to rise rapidly, and more air and fuel will be drawn in to achieve the best engine power. Hence, the temperature and pressure in the cylinder plays a crucial role in the operation of the engine.

Figure 6a shows changes in flame development, while Figure 6b shows changes in flame propagation in the cylinder. Flames in an internal combustion engine cycle are characterized by turbulent and unstable patterns of premixed air and fuel entering the combustion chamber. The presence of a turbulent condition in the flame pressure helps to spread the flame temperature and flame speed, thereby accelerating the rate of thermal reactions in the combustion chamber [25].

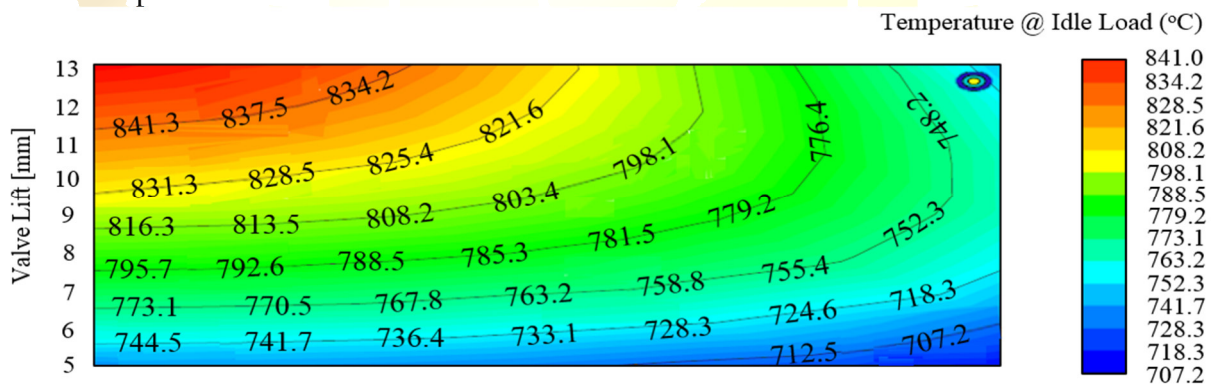
The transition between the flame development phase and the flame propagation phase is characterized by a gradual increase in temperature and turbulent velocity inside the cylinder. The flame propagation phase is characterized by high heat, extended engine run time and correspondingly increased engine load and speed.

In a similar study, it was observed that an increase in the temperature of the cylinder led to an increase in the number of inlet vortices (from 0.2-0.6 s), which improved the recirculation zone in the furnace and caused the formation of combustion substances in the internal recirculation zone [12] This allows for efficient mixing of fuel and air, thereby improving combustion efficiency by eliminating the high temperature zones responsible for nitrogen oxides (NO<sub>x</sub>) produced by internal combustion engines.

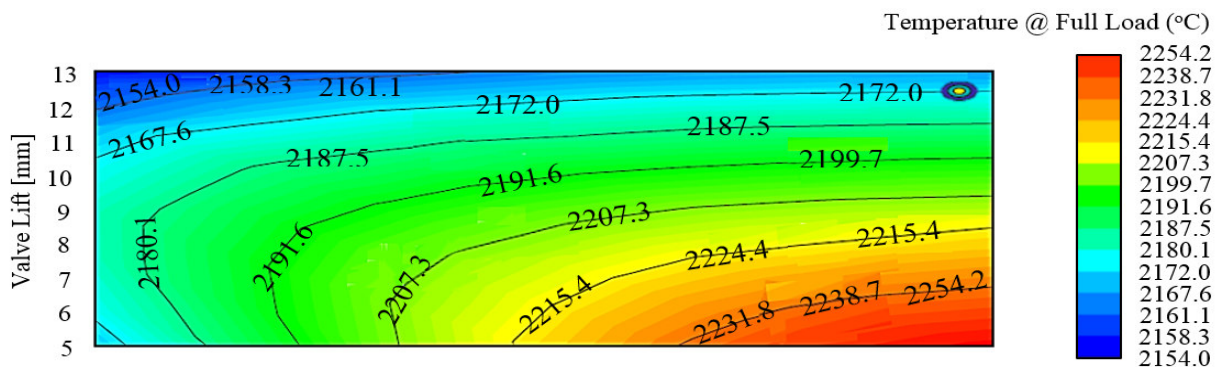
In addition to increasing the number of vortices, the radial distribution of the flow is improved and the heat transfer area of the flame is also increased, while the maximum flame temperature is reduced, thereby improving the radiation efficiency of the flow. Due to the increase in the number of vortices caused by the decrease in the axial velocity component and the increase in the tangential component, the flow expands radially, resulting in a uniform temperature distribution in the combustion chamber [26].

The volumetric efficiency of an internal combustion engine expresses the ratio or percentage ratio between the amount of air drawn into the cylinder and the amount of air expelled from the cylinder. In other words, it is the percentage of mass of air and fuel that is in the cylinder during the intake stroke, divided by the mass that would occupy the displaced volume if the density of the air in the cylinder were equal to the density of the surrounding air.

Figure 7 shows the changes in volumetric efficiency in the cylinder of an internal combustion engine. Considering valve lift variation between 5-13 mm, the variation shows minimum and maximum volumetric efficiencies of 0.315 and 0.822. The maximum volumetric efficiency achieved is the maximum amount of air-fuel mixture that is filled into the cylinder during the intake stroke cycle. This is because the engine requires the valve to open at a higher rate to move the charge in and out of the engine during the larger cycle. Volume efficiency up to 1.00 or 100%. With this value, the engine is able to absorb all the required charge level for efficient operation.



**Figure 5a.** Variation of valve lift with in-cylinder temperature @ idle engine load



**Figure 5b.** Variation of valve lift with in-cylinder temperature @ full engine load



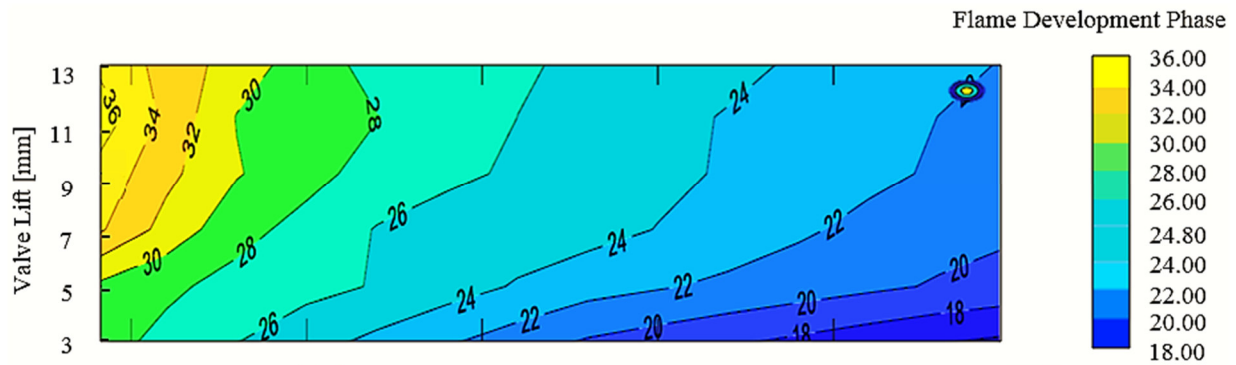


Figure 6a. Variation of valve lift with in-cylinder flame development

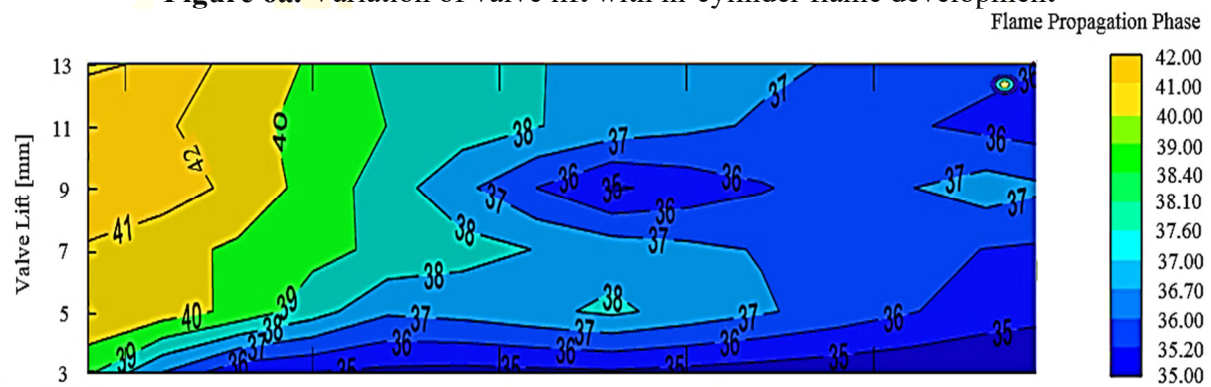


Figure 6b. Variation of valve lift with in-cylinder flame propagation

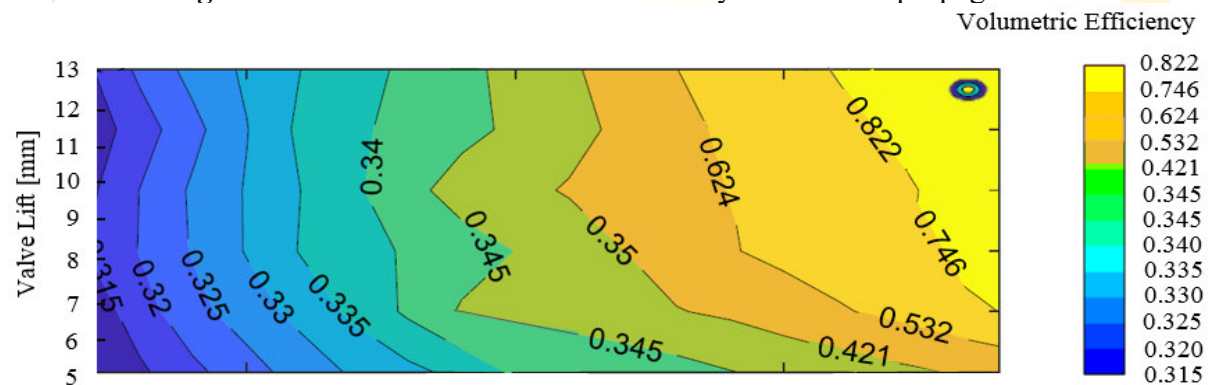
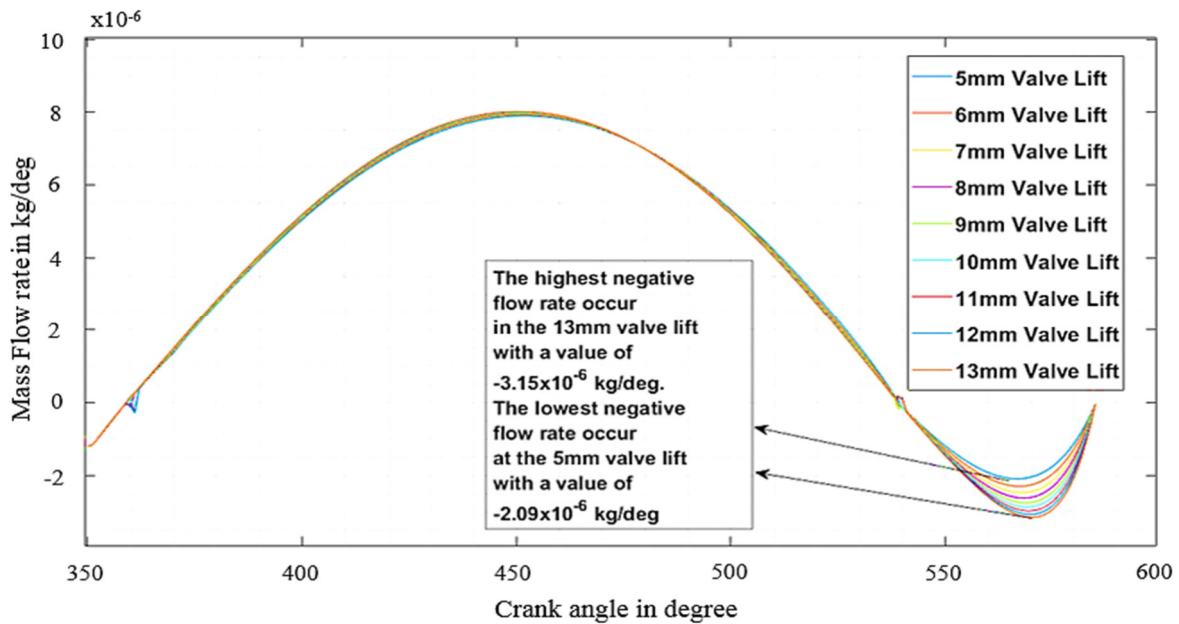


Figure 7. Variation of valve lift with in-cylinder volumetric efficiency

### 3.2. Variation of Mass Flow Rate with Crank Angle

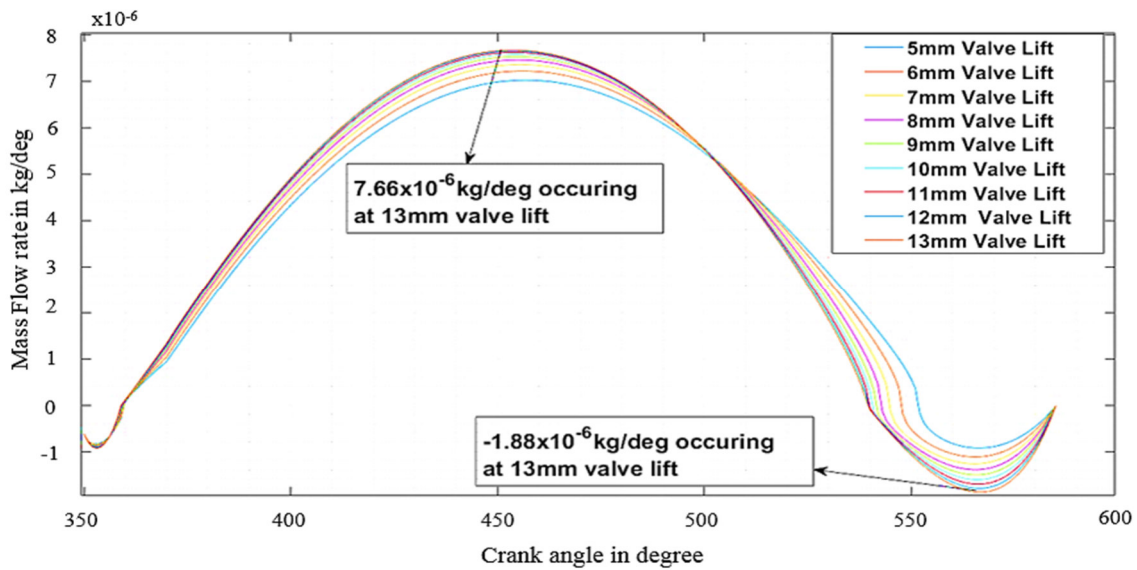
Figure 8 shows the mass flow rate in the engine as a function of crank angle through the intake stroke. The graph is obtained from the time the intake valve opens until the time the intake valve closes. The intake process takes place between  $350^\circ$  and  $585^\circ$  crank angle. This means the intake valve opens about 10 degrees before top dead center and closes 45 degrees after bottom dead center. Looking at the graph in Figure 8, it shows that there is a small positive flow change at 1000 rpm engine speed. A positive flow indicates that the charge (air-fuel mixture) is entering the cylinder, a negative flow indicates that the charge is leaving the engine cylinder.



**Figure 8.** Mass flow rate at 1000 rpm for different valve lift

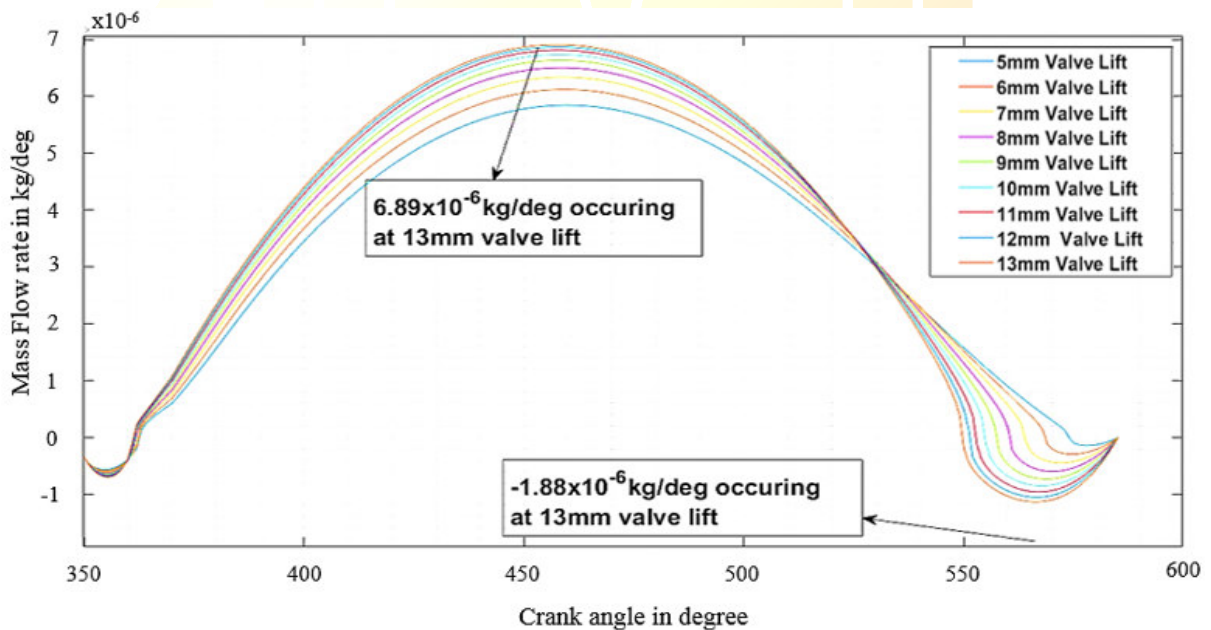
After bottom dead center, the higher the intake valve lift, the more charge is lost in the intake process. This is because at low engine speeds the air has enough time to escape through the intake valves.

The highest loss rate occurs at 13mm valve lift, the value of  $-3.15 \times 10^{-6} \text{ kg/deg}$  while, and the least is at 5mm valve lift, the value is  $-2.09 \times 10^{-6} \text{ kg/deg}$  as shown in Figure 8. Figure 9 shows the mass flow changes in the engine during intake at 3000 rpm. Unlike the 1000 rpm case, both positive flow (ie. flow into the engine) and negative flow (ie. flow out of the engine) are changing. At 3000 rpm, the 13mm shows the highest positive flow rate of  $7.66 \times 10^{-6} \text{ kg/deg}$  at approx. 450 degree crank angle while 5mm valve lift shows the lowest positive flow rate of rate of  $6.9 \times 10^{-6} \text{ kg/deg}$  at same crank angle. This means the 13mm carries more mass at 450 degrees than any other valve lifter. At approx. However, at 570 degrees after bottom dead center, 13 mm shows the largest flow loss compared to other valve lift values. This means that at 3000 rpm. A 13mm valve lifter draws air in and loses air at the same time.



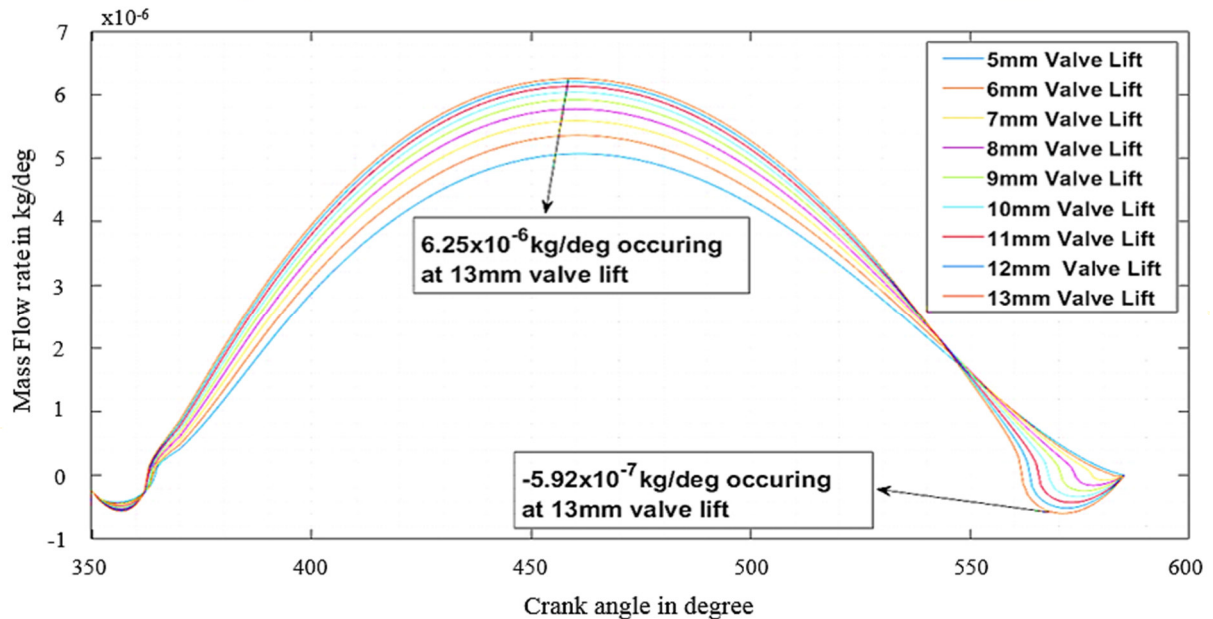
**Figure 9.** Mass flow rate at 3000 rpm for different valve lifts

Figure 10 shows the mass flow changes in the engine during intake at 6000 rpm. Similar to 3000 rpm, there is a change in both positive flow (ie into the engine) and negative flow (ie out of the engine). At 6000 rpm, with a 13mm crank angle of about 450 degrees, the maximum positive flow rate is  $6.89 \times 10^{-6}$  kg/deg while the minimum positive flow rate is  $5.9 \times 10^{-6}$  kg/deg with the same crank angle of 5mm valve lift. This means the 13mm carries more mass at 450 degrees than any other valve lifter. However at approximately 570 degrees after bottom dead center, 13mm shows the largest flow loss compared to other valve lift values. This means that at 6000rpm, while the valve lift of 13mm is drawing air in, it is also losing air. Comparing this flow rate to the flow rate at 3000 rpm also shows that there is a greater positive flow rate at 13 mm at 3000 rpm compared to 6000 rpm. This is because the engine is running so fast, there is less time to draw air into the engine.



**Figure 10.** Mass flow rate at 6000 rpm for different valve lift

Figure 11 shows the changes in mass flow during engine intake at 9000 rpm. As with 6000 rpm, there is a change in both positive flow (ie into the engine) and negative flow (ie out of the engine). At 9000rpm, with a 13mm crank angle of about 450 degrees, the highest positive flow rate is  $6.89 \times 10^{-6} \text{ kg/deg}$ , while the 5mm valve lift means the lowest positive flow rate is  $5.9 \times 10^{-6} \text{ kg/deg}$ , at the same crank angle. This means the 13mm carries more mass at 450 degrees than any other valve lifter. But approx. At 570 degrees after bottom dead center, 13mm shows the largest flow loss compared to other valve lift values. This means that at 9000 rpm, a valve lift of 13 mm draws air in and also loses it.



**Figure 11.** Mass flow rate at 9000 rpm for different valve lift

Figure 12 shows the mass flow changes in the engine during the intake stroke at 12000 rpm. Similar to 9000 rpm, both positive flow (ie. into the engine) and negative flow (ie. out of the engine) are changing. At 12,000 rpm 13mm means the highest positive flow rate of  $5.74 \times 10^{-6} \text{ kg/deg}$  at which is about 450 degrees of crankshaft angle, while 5mm valve lift means the lowest positive the flow rate is  $4.5 \times 10^{-6} \text{ kg/deg}$  with the same crank angle. This means the 13mm carries more mass at 450 degrees than any other valve lifter. However, at approximately 570 degrees after bottom dead center, the 13mm showed the greatest flow loss compared to the other valve lift values. This implies that at 12,000 rpm, while the 13mm valve lift is drawing in air, it is also losing air.



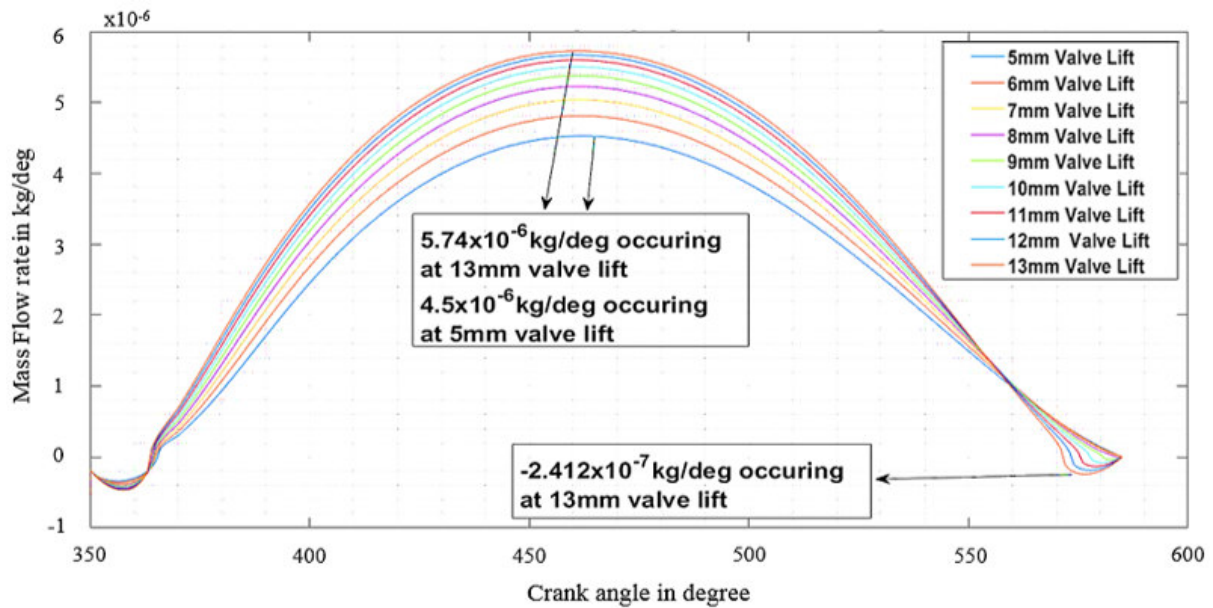


Figure 12. Mass flow rate at 12000 rpm for different valve lift

#### 4. CONCLUSION

In this study, the cylinder thermodynamics and valve lift effects of a four-stroke piston internal combustion engine cycle were successfully modeled, simulated and calculated using ANSYS R-15 software. It's worth noting that three of the four strokes of the engine's duty cycle, just during combustion/expansion, will do some work to the process. This means that the work done during the combustion/expansion stroke must compensate for the other three strokes and still have enough room to produce useful power. Studies have shown that at low engine speeds the positive mass flow has almost the same value for all valve lifts between 5mm and 13mm, with only minor variations. However, at low engine speeds there is a significant change in the negative mass flow that occurs after BDC. It was also noted that at low engine speeds, higher valve lift resulted in higher charge loss. This means that a four-stroke engine running at low revs below 2000 rpm should use more valve lift. The study also found that engine performance can be improved by using a lower valve lift of less than 6 mm at lower engine speeds. This is because at low engine speeds the charge has enough time to enter the engine cylinders and this affects pressure, temperature, density and volumetric efficiency. At higher engine speeds, it was also observed that the engine performed better with higher valve lift, i.e. valve lift is greater than 9 mm. The reason for this behavior is that at high engine speeds, the charge (air-fuel mixture) needs less time to be pumped into the engine cylinders, and only a higher valve lift ensures high-quality flow through the engine. Therefore, high-speed cars need to use more valve lift to improve performance.

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## PROJECTS TO CO-CREATE SCIENCE AND THEIR GROWTH TREND - EMPIRICAL VERIFICATION

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### Abstract

The focus of this paper are projects. We have defined their meaning, as well as differentiated between different types. Projects were classified into the following categories: national research programs and projects, young researchers, international research projects and international research programs. The difference between a project and a program was clarified. We then undertook a survey involving three Slovenian public universities: University of Maribor (cohesion region Eastern Slovenia), University of Ljubljana (cohesion region western Slovenia) and the University of Primorska (cohesion region western Slovenia), with the aim of providing an overview of the projects carried out between 2016 and 2021. It is clear that the University of Maribor (UM) is just below the Slovenian average in the implementation of ARRS as well as EU and other European projects and programs. In the following, we focus on the trend of projects carried out at the Faculty of Natural Sciences and Mathematics of the University of Maribor (FNM UM). Compared to other UM members, FNM UM has an above-average success rate in obtaining international research projects and national research programs and projects funded by the Slovenia Research Agency (ARRS).

**Keywords:** Project Programs, Average Number of Projects, ARRS, Self-Evaluation Reports

### Introduction

Projects represent a way of solving a problem, which includes everything from the initial recognition and analysis of the problem and the desire to solve it, as well as the definition and implementation of actions to solve it [1]. Thus, the project is a unique goal-oriented process of interconnected activities that are limited with time and finances [2]. It also has a predetermined start and end date, and its implementation is aimed at achieving precisely defined goals [3]. A project differs from regular work in that it has temporary sources of financing, risks and uncertainties are present during its implementation, and it has a one-time and final execution. Every project has several phases in its life cycle. Initially, the formation of the project takes place, in which the participants prepare a draft of the project proposal. This is followed by the application of the project, and after the project has been successfully obtained, the actual implementation of the project activities begins. Interim reports are usually submitted at the time of implementation, and at the end of the implementation, the project is concluded with a final report. After the completion of the project, the obtained results, knowledge, infrastructure and other products can be used in the future. The key for successful implementation of the project, is a good design of the project documentation, efficiently organization of tasks and group leading, resolving conflicts on the spot, communicating, as well as keeping up with deadlines, finances and costs [2]. In addition to projects, we can also use for solving problems. While projects consist of individual activities, programs consist of several projects and thus represent a higher level.

A program can be defined as a large-scale long-term action consisting of a set of projects with common strategic goals and resources. Projects within a program are usually closely linked to overarching goals, processes, strategies and methods. The difference between a project and a program is that, as a rule, a project has a narrower extent of activities compared to a program, furthermore a project lasts a shorter period of time than a program. While the success of the project is measured by the implementation of the planned activities, the usage of costs and time and also by the quality of the goals realization, the success of the program is measured according to the newly acquired skills and capacities and the achievement of interest. Thus, while achieving the goals of individual projects, the program must also ensure the realization of the intended effects and goals of the entire program [3].

### **Types of projects**

Projects are usually divided according to the source of funding and the area of implementation. Thus, in our article, we divided the projects into the following categories: national research programs and projects, young researchers, international research projects and international development projects. National research programs and projects include research programs, basic and applied projects, post-doctoral projects, targeted research projects and bilateral and multilateral collaborations, which are co-financed by the Public Research Agency of the Republic of Slovenia (ARRS). The category of young researchers included projects that were obtained under the ARRS Public Call for Young Researchers. We have included the following projects in the group of international research projects: Horizon 2020, Eureka, ERA-NET, COST, COSME, ARPAF, ESA, NATO and similar. The category of international development projects includes Erasmus+, CEEPUS, Interreg projects, transnational and cross-border cooperation programs, development projects financed by ministries from European structural funds (e.g., PKP, ŠIPK), interregional cooperation programs (Espon, Urbact), projects Creative Europe, Life, Europe for Citizens, projects of the European Social Fund, European Fund for Regional Development, EIP projects and other equivalent projects.

### **Facts about the implementation of cohesion policy and the impact on project financing**

Slovenia is divided into two cohesion regions - eastern and western (Figure 1). The EU implements cohesion policy with the aim of reducing inconsistent development between different regions and consequently promoting more balanced and sustainable territorial development. But if we look realistically, this is not the case, as 8 Centers of Excellence were established in 2009, which were financed in the amount of €84.1 million. All Centers of Excellence are based in the cohesion region of western Slovenia, and only three of the eight involved a public research organization from the cohesion region of eastern Slovenia. A year later, 7 Competence Centers were established, which were financed in the amount of over €45 million. Only one Competence Center is based in the cohesion region of eastern Slovenia, and no Public Research Organization from the cohesion region of eastern Slovenia participated in the three Centers based in the west of the country. The implementation of cohesion policy in the period between 2007 and 2013 generously financed investments in research infrastructure in the Republic of Slovenia. The eastern part of the country received 33% of the available funds, and the National Plan prioritized investment in the construction of the Faculty of Medicine of the University of Maribor, which, with its medical graduates, played a key role in mitigating the consequences of the Covid-19 epidemic. Without this investment, the east of the country would not receive even 15% of the available funds.

During the period of implementation of the cohesion policy between 2014 and 2020, the S4 Smart Specialization strategy was prepared and implemented, on the basis of which 9 priority areas were defined and, as a result, 9 strategic development-innovation partnerships were established in 2017. Only 2 out of 9 so-called councils are based in the Cohesion Region of Eastern Slovenia [4].

In the eyes of the EU, Slovenia is divided into a well-developed western part of the country and a less developed eastern part of the country. The area is in the ratio of 60% - 40% in favor of the eastern part of the country, the distribution of funds is also in this ratio. But it should be added that out of a total of 8 thousand km<sup>2</sup> of the area of the Western Slovenia cohesion region, 3 thousand km<sup>2</sup> are represented by the Slovenian Alps, which represents just under 40% of the area of the Western Slovenia cohesion region [4].



**Figure 1:** Distribution of resources in the outgoing perspective of the implementation of the European Cohesion Policy, [4].

It is necessary to be aware of the fact that, on an annual level, the state budget finances €350 million for the operation of knowledge investments in western Slovenia and only €70 million in eastern Slovenia. The number of researchers is key to the development of globally competitive science, and more than 74% of researchers are employed in the cohesion region of western Slovenia. Based on what has been written, we can understand that the eastern cohesion region of Slovenia is deprived of many projects, but despite this, the University of Maribor, which belongs to the eastern cohesion region of Slovenia, is above averagely successful in terms of the implementation of both national and international projects and programs.

### **Work methods, research implementation and results**

In the theoretical part, the paper is based on the use of various qualitative methods (the theory is taken from Slovenian and foreign literature and sources) and in the empirical part on the use of quantitative methods. The exploration of our problem throughout the article requires a compatible complementation of descriptive and analytical approaches to research. Statistical methods, with the help of which analyzed data collected data, represented the key foundation of the research. As part of the empirical research, we: (i) collected data by online searches and (ii) analyzed the data.

### **Overview of completed projects by members of the University of Maribor (UM) in the time window 2016-2021**

Based on the annual self-evaluation reports, we have prepared an overview of implemented projects, by individual UM members (faculties), in the time period of 2016 and 2021 (Table 1).



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In terms of the number of national research programs and projects, as well as the number of active young researchers, the Faculty of Mechanical Engineering strongly stands out, having implemented an average of 41 projects of this type in the considered time window and had an average of 22 young researchers per year. Faculty of Electrical Engineering and Computer Science had the largest number of international projects, which between 2016 and 2021 carried out an average of 11 international research and 25 international development projects.

**Table 1:** Average annual number of projects by UM members in the period 2016-2021. UM=University of Maribor; EPF=Faculty of Economics and Business; FERI= Faculty of Electrical Engineering and Computer Science; FE= Faculty of Energy Technology (dislocated unit in Velenje); FGPA=Faculty of Civil Engineering, Transportation Engineering and Architecture; FKKT= Faculty of Chemistry and Chemical Engineering; FKBV= Faculty of Agriculture and Life Sciences; FL=Faculty of Logistics (dislocated unit in Krško); FNM=Faculty of Natural Sciences and Mathematics; FOV= Faculty of Organizational Sciences (dislocated unit in Kranj); FVV= Faculty of Criminal Justice and Security (dislocated unit in Ljubljana); FS=Faculty of Mechanical Engineering; FZV=Faculty of Health Sciences; FF=Faculty of Art; MF=Faculty of Medicine; PEF=Faculty of Education; PF=Faculty of Law; FT=Faculty of Tourism (dislocated unit in Brežice); [5]–[37].

Project type	National research programs and projects	Young researchers	International research projects	International development projects
Member of the UM				
EPF	18	3	1	10
FE	3	0	0	6
FERI	22	18	11	25
FF	27	4	3	20
FGPA	7	1	5	14
FKBV	11	2	1	12
FKKT	30	9	5	6
FL	4	0	1	8
FNM	13	3	8	7
FOV	5	1	1	5
FS	41	22	9	14
FT	2	0	0	1
FVV	6	2	4	2
FZV	1	1	0	7
MF	20	5	4	6
PEF	7	0	0	15
PF	8	1	8	5

Graph 1 shows the average number of projects at the Faculty of Natural Sciences and Mathematics (FNM) and the average number of projects of all members of the University of Maribor (UM) between 2016 and 2021. Compared to the entire UM, FNM successfully obtains national research programs and projects. It is also necessary to point out the above-average implementation of international research projects, whereby FNM implemented, on average, one more project of this type per year in the considered time window. FNM, however, is slightly below average in the number of young researchers, as well as in international development projects.

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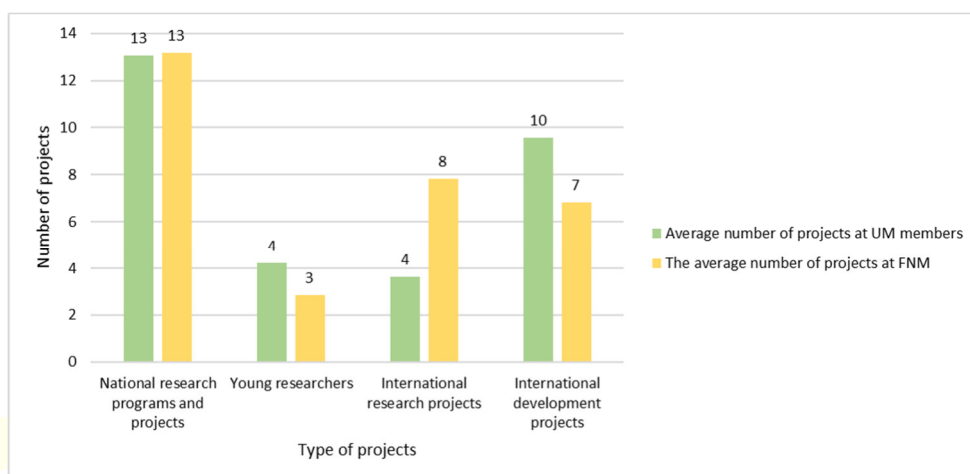


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**Graph 1:** Comparison of the annual average number of projects at FNM with the annual average number of projects at the entire UM, in the period 2016-2021.

**Overview of completed projects at the University of Ljubljana, the University of Maribor and the University of Primorska during the years 2016-2021**

Table 2 shows, according to the data available to us, the average number of projects at the entire University of Ljubljana (UL), University of Maribor (UM) and University of Primorska (UP) in the time frame 2016-2021. Most of the projects, both national and international, were carried out at the University of Ljubljana during the time period in question. The University of Maribor is thus, with an annual average number of 294 projects or programs financed by ARRS, and with 225 EU and other European projects or programs, in second place compared to other Slovenian universities.

**Table 2:** Average number of projects (according to the data available to us) at the University of Ljubljana, the University of Maribor and the University of Primorska between 2016 and 2021; UL=University of Ljubljana; UM=University of Maribor; UP=University of Primorska; ); [5]–[46].

Project type	ARRS projects and programs	EU and other European projects and programs
<b>University</b>		
<b>UL</b>	489	498
<b>UM</b>	294	225
<b>UP</b>	116	58

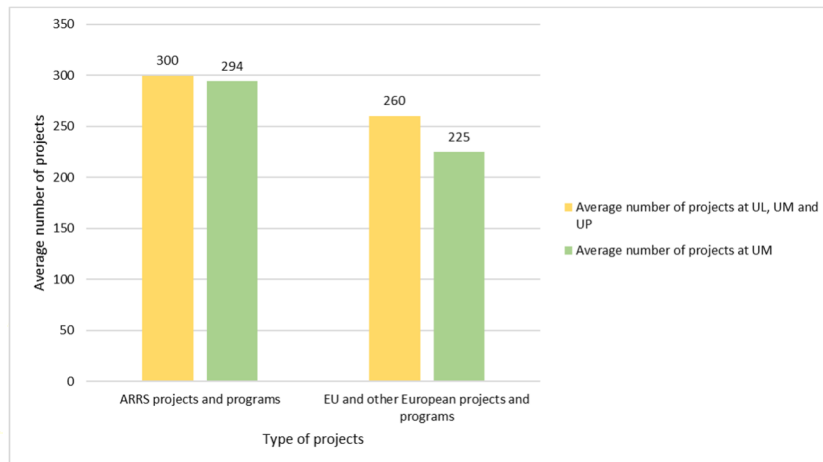
A comparison of the average number of projects at the entire UM with the average of all Slovenian public universities (UL, UM and UP) for the period 2016-2021 is shown in Graph 2. It can be seen that the University of Maribor is just below the Slovenian average both in the implementation of ARRS projects and programs as well as in the implementation of EU and other European projects and programs.

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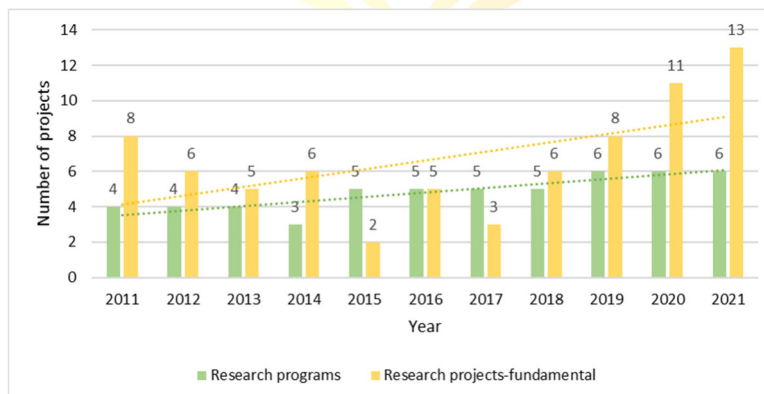
**Graph 2:** Average number of projects at the entire UM compared to the average number of all Slovenian public universities (UL, UM and UP) in the period 2016-2021.

**The trend of obtaining projects at the Faculty of Natural Sciences and Mathematics of the UM**

Table 3 presents the number of national research programs, basic research projects and young researchers from 2011 to 2021. Throughout the considered time period, we became more successful in obtaining the fundamental research projects, as well as in obtaining national research programs, which can be seen in Graph 3. The largest number of young researchers was in 2011. Despite the initial decline in their number, the trend of recruiting young researchers has been positive again in the last three years (Table 3).

**Table 3:** Number of national research programs, research foundation projects and young researchers in the period 2011-2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Research programs</b>	4	4	4	3	5	5	5	5	6	6	6
<b>Research projects-fundamental</b>	8	6	5	6	2	5	3	6	8	11	13
<b>Young researchers</b>	10	9	9	9	6	2	1	1	4	4	5



**Graph 3:** Trend in the number of national research programs and basic research programs.

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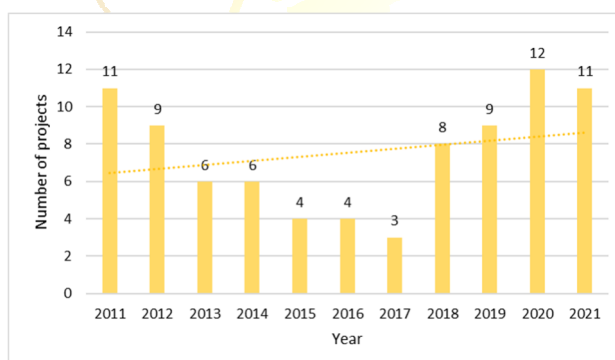
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The number of international research programs, by years from 2011 to 2021, is shown in Table 4. In this set of projects, it is necessary to highlight bilateral ARRS projects, which we have successfully applied for all years. Between 2012 and 2017, there was a noticeable drop in the number of these projects, but the trend significantly improved, and in 2020 and 2021 we again achieved numbers comparable to 2011. From 2018 onwards, we further expanded the range of successfully applied international research programs by acquiring the Interreg project. The positive trend of acquiring international projects can be seen from Graph 4.

**Table 4:** Number of international bilateral ARRS projects and Interreg projects between 2011 and 2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Bilat. ARRS projects</b>	11	9	6	6	4	4	3	7	8	11	10
<b>Interreg</b>	0	0	0	0	0	0	0	1	1	1	1

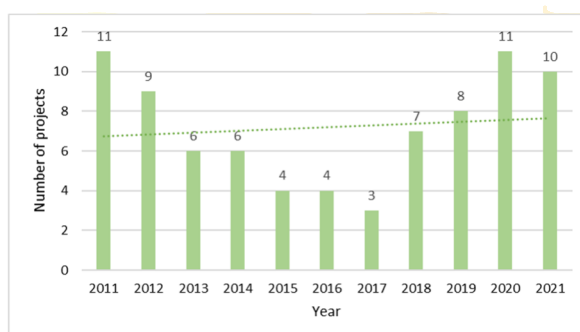


**Graph 4:** The trend of the success of the acquisition of international projects.

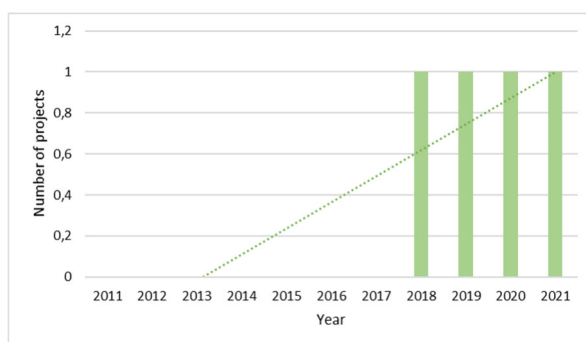
Table 5 shows the number of 70P or Horizon and Erasmus + projects between 2011 and 2021. After 2012, we initially recorded a decline in the number of 70P or Horizon projects, and already in 2019, the trend of acquiring them became positive again (Graph 5), while, in the considered time period, we became successful in acquiring Erasmus + projects after 2018 (Graph 6).

**Table 5:** 70P or Horizon and Erasmus + projects in the period 2011-2021.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>70P or HORIZON</b>	11	9	6	6	4	4	3	7	8	11	10
<b>Erasmus+</b>	0	0	0	0	0	0	0	1	1	1	1



**Graph 5:** Trend of the number of 70P or Horizon projects.



Graph 6: Trend of acquisition of Erasmus+ projects.

### Conclusions and possibilities for the future

In the period 2016-2021, the University of Maribor, of which the Faculty of Natural Sciences and Mathematics is a member, is in the Slovenian average in terms of the implementation of both national and international projects and programs. Compared to other UM members, FNM is above average successful in obtaining international research projects and national research programs and projects financed by ARRS. Thus, on an annual basis, in the period 2016-2021, FNM implemented an average of 13 national research programs or projects, trained 3 young researchers, and acquired 8 international research and 7 international development projects. Between 2011 and 2021, there is a clearly visible positive trend in the implementation of ARRS programs and projects as well as international projects at FNM. It is also necessary to point out Erasmus+ projects, which we successfully started acquiring in 2018.

Despite the success of project implementation at FNM, there is room for changes and improvements. In this regard, we could address the currently half-smaller number of young researchers compared to 2011. When comparing FNM with other UM members in the time period 2016-2021, we still note that FNM is just below the average of the entire UM in terms of the number of young researchers. FNM is also less successful in obtaining international development projects than other UM members, which could be improved with more effort in the future.

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## A SIMULATION STUDY OF COMBUSTION CHARACTERISTICS OF THE CUMMINS DIESEL ENGINE BY KIVA SOFTWARE

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### Abstract

In recent years, the research on engines by simulation method was very developed. In there, the software to calculate and simulate the working cycle of diesel engines is used, which helped improve the extraction process, and better diagnosis of technical status, thereby increasing the reliability during engine use. In this study, the paper presents the application of CFD software Kiva-3V to simulate the combustion characteristics of the Cummins NTA 855 diesel engine. The results show that pressure changes, heat release rate, and the distribution of combustion temperature in the combustion chamber are consistent with the theory of diesel engines, which is the basis for adjusting the working modes to improve engine efficiency.

**Keywords:** Cummins nta 855, combustion pressure, combustion temperature, heat release rate, kiva – 3V.

### Introduction

Improving the performance of an internal combustion engine to be better is a complicated job that needs to be studied theoretically or simulated before conducting experiments. Although simulation parameters may not be as accurate as experimental ones, this method still has outstanding advantages and is helpful for engine development [3]. Therefore, this is the method used a lot at engine research facilities, especially when conducting studies on changing work parameters, and structural parameters, using alternative fuels, and improving performance for internal combustion engines [4-5], [10-11].

Currently, there are a lot of Computational Fluid Dynamics - CFD software on the market such as Ansys fluent, Kiva, Avl-fire, and Star-cd. This software has calculated the combustion process inside the engine giving results consistent with experimental data. Among them, Kiva -3v simulation software has been widely used in the world [3].

The Kiva CFD software was developed over the years at Los Alamos National Laboratory (LANL) USA. Which is an open-source program using the Fortran language, simulating 2D and 3D flows of turbulent, chemically reactive substances, such as simulating the fuel injection and combustion of an internal combustion engine [1-2].

## 2. THE BASIS OF SIMULATION

Conservation of mass:

$$\frac{\partial \rho_m}{\partial t} + \frac{\partial (\rho_m u_i)}{\partial x_i} = \frac{\partial}{\partial x_i} \left( \rho D \frac{\partial (\rho_m / \rho)}{\partial x_i} \right) + \dot{\rho}_m^s + \dot{\rho}_m^c \quad (1)$$

Momentum equation:

$$\frac{\partial (\rho u_j)}{\partial t} + \frac{\partial (\rho u_i u_j - \tau_{ij})}{\partial x_i} = -\frac{1}{\alpha^2} \frac{\partial p}{\partial x_j} + \rho F_j^s + \rho g_j - A_0 \frac{2}{3} \frac{\partial (\rho k)}{\partial x_i} ; j = 1, 2, 3 \quad (2)$$

Conservation of energy:

$$\rho c_p \left( \frac{\partial T}{\partial t} + \frac{\partial T}{\partial x_i} \right) = \frac{\partial}{\partial x_i} \left( \rho D \sum_m h_m \frac{\partial (\rho_m / \rho)}{\partial x_i} \right) + k \frac{\partial^2 T}{\partial x_i^2} + A_0 \rho \varepsilon + \dot{Q}^s + \dot{Q}^c \quad (3)$$

The source functions to describe the interaction between the gas phase and the liquid phase and preserve the mass, momentum, and energy of the entire system. The source function is expressed through the equation [6]:

$$\dot{\rho}^s = - \int (4\pi r^2 f \rho_l R) d\bar{v} dr dy dT_d \quad (4)$$

The rate of momentum changes due to particle drag, inertia, and evaporation:

$$\rho_g \bar{F}^s = - \int f \rho_l \left( \frac{4}{3} \pi r^3 \bar{F}' + 4\pi r^2 R \bar{v} \right) d\bar{v} dr dy dT_d \quad (5)$$

Energy transfer between gas and fuel particles by evaporation, heat transfer to particles, and energy created by turbulent motion:

$$\begin{aligned} \dot{Q}^s &= - \int f \rho_l (A + B) d\bar{v} dr dy dT_d \\ A &= \left[ \frac{4}{3} \pi r^2 R (u_d + \frac{1}{2} (\bar{v} - \bar{u})^2) \right] \\ B &= \left[ \frac{4}{3} \pi r^3 (c_p \dot{T}_d + \bar{F}' (\bar{v} - \bar{u} - \bar{u}')) \right] \end{aligned} \quad (6)$$

The attenuation of turbulent potential energy due to fuel particle dispersion:

$$\dot{W}^s = - \int \left( \frac{4}{3} \pi r^3 f \rho_l \bar{F}' \bar{u}' \right) d\bar{v} dr dy dT_d \quad (7)$$

The RNG k-ε turbulent model (RNG k- ε) is used by Kiva because it describes the phenomena occurring in the engine combustion chamber in more detail than the k- ε standard turbulent model, especially the combustion chamber type unified [7-9], [12-13]:

$$\frac{\partial \rho k}{\partial t} + \nabla (\rho k u) = - \frac{2}{3} \rho k \nabla u + \tau : \nabla u + \nabla (\alpha_k \mu \nabla k) - \rho \varepsilon + \dot{W}^s \quad (8)$$

$$\begin{aligned} \frac{\partial \rho \varepsilon}{\partial t} + \nabla (\rho \varepsilon u) &= - \left[ \frac{2}{3} C_1 - C_3 \right] \rho \varepsilon \nabla u + \left[ \frac{2}{3} C_\mu C_\eta \frac{k}{\varepsilon} \nabla u \right] \rho \varepsilon \nabla u + \nabla (\alpha_\varepsilon \mu \nabla \varepsilon) \\ &+ \frac{\varepsilon}{k} \left[ (C_1 - C_\eta) \tau : \nabla u - C_2 \rho \varepsilon + C_s W^s \right] \end{aligned} \quad (9)$$

Additional coefficients:

$$C_3 = \frac{-1 + 2C_1 - 3m(n-1) + (-1)^8 \sqrt{6} C_\mu C_\eta \eta}{3} \quad (10)$$

$$C_\eta = \frac{\eta(1-\eta/\eta_0)}{1+\beta\eta^3}, \eta = S \frac{k}{\varepsilon}, S = (2S_{ij}S_{ij})^{1/2}, S_{ij} = \frac{1}{2} \left( \frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) \quad (11)$$

In the above equations:

$T$  – temperature, K;  $t$  – time, s;  $x_i$  – coordinates, m;  $p$  – pressure, N/m<sup>2</sup>;  $\rho$  – density of liquid, kg/m<sup>3</sup>;  $\rho_m$  – density of a substance m, kg/m<sup>3</sup>;  $u_i, u_j$  – velocity of the fluid element, m/s;  $\tau_{ij}$  – components of the stress tensor, N/m<sup>2</sup>;  $\mu$  – dynamic viscosity, kg/ms;  $c_p$  – isostatic specific heat, J/kgK;  $h_m$  – enthalpy, J/kgK;  $\rho_m^s$  – the density of substance m when spraying, kg/m<sup>3</sup>;  $\rho_m^c$  – density of substance m when burning, kg/m<sup>3</sup>;  $F_j^s$  – the rate of momentum due to the spray, kgm/s;  $\dot{Q}^s$  – mass component due to injection, kg/m<sup>3</sup>s;  $\dot{Q}^c$  – mass composition due to combustion, kg/m<sup>3</sup>s;  $\dot{W}^s$  – source terms interaction with the spray, kg/m<sup>3</sup>s;  $k$  – turbulent kinetic energy, kJ/kg;  $\varepsilon$  – dissipation rate of turbulent kinetic energy, kJ/kg;  $\eta$  – is the

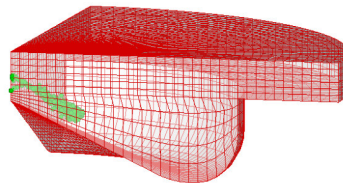


dependence ratio  $S$ ;  $S$  - mean strain magnitude; model constants:  $m_1=0.5$  và  $m_2=1.4$ ;  $C_s = 1.5$ ;  $C_\mu = 0.0845$ ;  $C_1 = 1.42$ ;  $C_2 = 1.68$ ;  $\alpha_k = \alpha_\varepsilon = 1.39$ ;  $\eta_0 = 4.38$  và  $\beta = 0.012$ ;  $A_0$  and  $1/\alpha^2$ - parameter improves computational performance for flows with small Mach numbers (the quantity  $A_0$  is zero in laminar calculations and unity when one of the turbulence models is used ( $A_0 = 1$ ));  $\bar{F}'$ - difference between acceleration and acceleration due to gravity;  $\bar{F}^s$ - particle velocity vector in liquid phase;  $\bar{u}$  - gas flow velocity vector;  $(\bar{v} - \bar{u})$  - relative velocity between particle and gas phase;  $\bar{u}'$  - turbulent amplitude of gas velocity;  $u_d$  - specific internal energy of the particle.

To build a highly reliable simulation model of the combustion process of the Cummins diesel engine, in addition to the basic parameters of the engine as shown in Table 1, the geometrical parameters of the combustion chamber, especially the dimension of the Omega profile of the Piston must be complete. So the grid of the combustion chamber used for simulation is present as shown in Figure 1.

**Table 1.** Engine and simulation parameters [14]

Parameters	Value
Engine/ Chamber type	Cummins NTA 855/Unified
Number of cylinders	6
Cylinder diameter, mm	140
Piston stroke, mm	152
Compression ratio	14.1:1
The engine speed of simulation, rpm	1200



**Fig. 1.** Grid model simulating the fuel injection process

### 3. RESEARCH RESULTS AND DISCUSSION

#### 3.1. Variation of combustion pressure in the cylinder

Figure 2 shows the variation of combustion pressure in the cylinder of the engine,  $a$  is the fuel injection time, corresponding to  $16^\circ$  CA BTDC (crank angle before top dead center);  $b$  is the starting time of the fire, corresponding to about  $4^\circ$  CA BTDC; the  $bc$  stage is the rapid combustion stage, also known as the pre-mixed combustion of the Cummins engine, this stage has the pressure in the cylinder rapidly increasing and reaching the maximum, at this time the fuel continues to injection and ignited in the next stage.

Due to the high temperature and pressure, the amount of fuel burned in this stage is also called the main combustion stage (controlled combustion). After reaching the maximum, the combustion pressure begins to decrease rapidly (the pressure curve goes down) because at this time the piston goes down to increase the volume and the combustion in this stage drop. With diesel engines, late fire is an undesirable thing to happen in all cases.



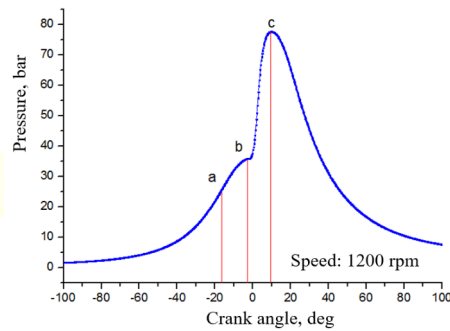


Fig. 2. Pressure evolution in the cylinder of Cummins NTA855 engine at 1200 rpm

### 3.2. Temperature variation and heat release rate

Figure 3 shows the variation of the heat release curve, the heat of fuel combustion divided into three different stages. In the first stage, the burning rate is high and lengthens by about  $5^{\circ}$  CA, this stage has a rapidly increasing pressure in the cylinder (first peak on the graph). The second stage has a decreasing heat release rate. The third stage is the rest of the graph.

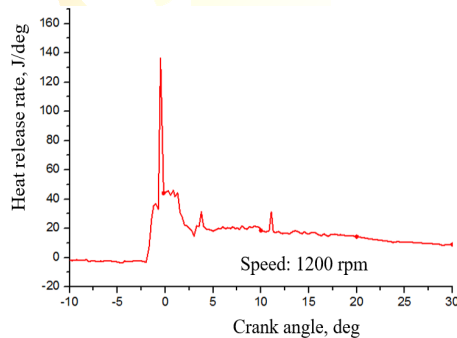


Fig.3. Heat release rate in the Cummins engine combustion chamber

Figure 4 shows the temperature variation in the engine combustion chamber according to the CA. From the graph, it can be seen that the time of increasing the fuel's combustion temperature is about  $4^{\circ}$  CA BTDC, and reach the maximum value at about  $20^{\circ}$  CA ATDC (crank angle after top dead center), this rule is consistent with the graph of pressure and heat release rate (Figure 5). Because right after the fire occurs, it is also the time when the heat release rate increases rapidly to reach the maximum value as shown in Figure 6.

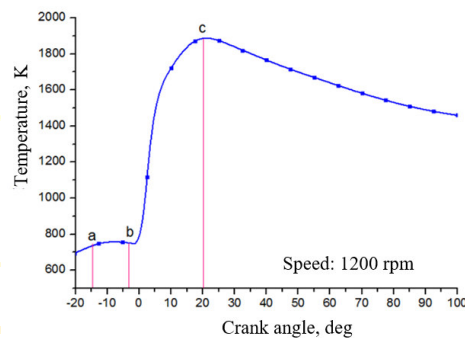
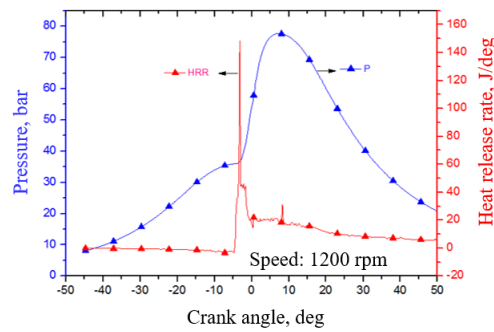
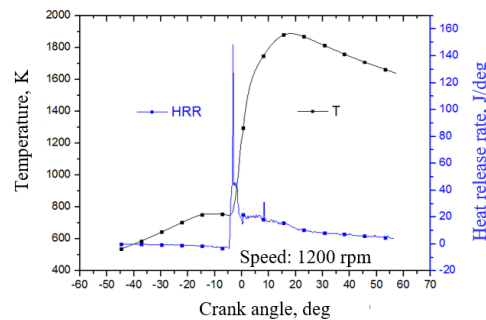


Fig. 4. Combustion temperature variation in the Cummins engine cylinder at 1200 rpm

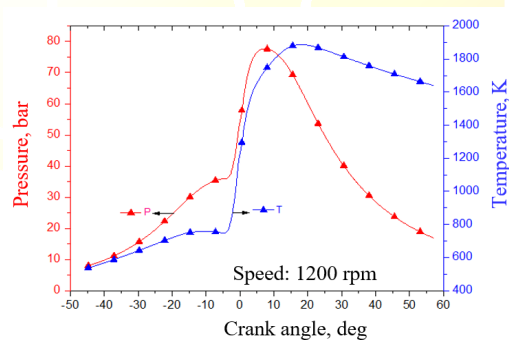


**Fig. 5.** Pressure characteristics and heat release rate in a working cycle of the Cummins engine

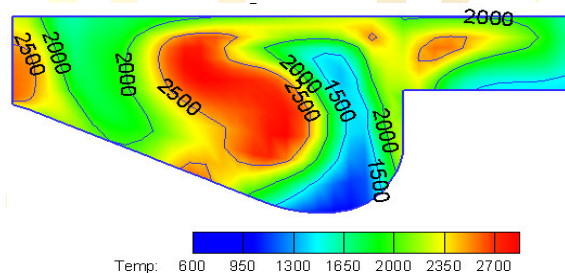


**Fig. 6.** Temperature characteristics and heat release rate in a working cycle of the Cummins engine

In Figure 7, the combustion pressure peaks in the range of 2-3<sup>0</sup> CA, then decrease rapidly. So the top of the temperature curve deflect to the right of TDC compare with the top of the combustion pressure curve. The temperature distribution during combustion is shown in Figures 8 and 9.



**Fig. 7.** Temperature characteristics and pressure in a working cycle of the Cummins engine



**Fig. 8.** Combustion temperature distribution at 10<sup>0</sup> CA ATDC

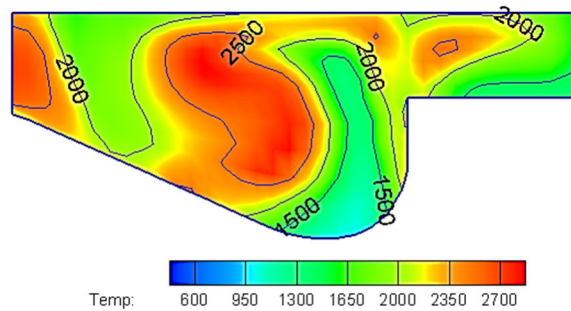


Fig. 9. Combustion temperature distribution at 20° CA ATDC

#### 4. CONCLUSION

Simulation of the working cycle of the engine shows the evolution of pressure, temperature, and heat release rate in the combustion chamber. Thereby, it is possible to adjust fuel injection parameters to optimize the combustion process to improve engine performance. Simulation results of the Cummins NTA 855 engine are consistent with the theoretical basis of diesel engines. From the above simulation model, it is possible to change the input parameters and boundary conditions to simulate and evaluate the work characteristics of Cummins diesel engines with similar structural and fuel injection parameters. Therefore, using the Kiva software to simulate the engine is very necessary, reducing costs and time, especially when conducting studies on the transformation of working, structure parameters, and alternative fuel for internal combustion engines.

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## ANTI-SEISMIC MEASURES OF CIVIL CONSTRUCTIONS

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### ABSTRACT

The article discusses and recommends known methods for reducing and protecting against the most catastrophic terrestrial phenomenon - an earthquake.

Humanity, its cultural and civilizational achievements suffer the most from a sudden catastrophic earthquake.

From time immemorial, our ancestors fought earthquakes, creating such engineering techniques, specifically to increase the stability of religious buildings, which are still known with interest, and some are even used in modern mass and industrial construction.

Humanity, its cultural and civilizational achievements suffer the most from a sudden catastrophic earthquake.

Since time immemorial, our ancestors have been fighting earthquakes, creating such engineering techniques, specifically to increase the stability of iconic buildings, which are still known with interest, and some are even used in modern mass and industrial construction.

It is known that cracks of various sizes appear in the building as a result of a reporting earthquake, and subsequently the number of cracks increases with repeated shocks, while the stiffness of the building decreases, and, as a result, the magnitude of the seismic load decreases. But if we know that by reducing the stiffness of a building, we can reduce the seismic impact on it, then we should think about how we can save the building in this way.

It was this circumstance that prompted scientists to search for a seismic protection system. Over the past three decades, several reporting practices have been developed: seismic isolation systems that are widely used outside of our country. These are systems of active and passive seismic isolation and seismic damping.

In seismic protection systems, seismic isolation foundations are widely used, which are used in many countries of the world.

The article discusses earthquake-resistant supports, which are resin-metal and rubber-plastic elements manufactured and used in new construction, especially in multi-storey buildings.

Multi-layer resin metal supports are easy to manufacture due to their simplicity, in building design, the choice of support parameters is easily carried out by determining the thickness and number of layers.

Such supports significantly increase vibration damping and almost double the building's response to seismic action and double the main oscillation period.



In connection with the state of existing buildings in our cities, the issue of strengthening and strengthening such buildings is of particular importance, special importance is attached to such buildings that will cause irreparable consequences, and some of them are not subject to demolition. These are: hospitals, kindergartens, schools, police, prisons, communications, water supply and other buildings that must function properly. Based on the material available in foreign and domestic literature, the purpose of the article is to clarify the methodology for calculating seismic impact systems and create the foundations for the implementation of these systems in the country.

An analysis of the results obtained shows a decrease in the seismic load acting on the building by about 2-2.5 times.

The goal set in this way is to use the world-proven method of preventing catastrophic earthquakes with the help of seismic isolation systems in Georgia.

**Keywords:** Active and passive seismic isolation and seismic damping, vibration damping,

### Main Part

The territory of Georgia is located in a zone of increased seismic activity. Due to the impact of the earthquake, many buildings were destroyed over the centuries and are still being destroyed.

The following is a chronological list of destructive earthquakes:

- 1088, Tmogvskoe earthquake. Magnitude \_ 6.5;
- 1283 Mtskheta earthquake (at that time the dome of Svetitskhovli collapsed).
- 1283, Samtsakh earthquake. Magnitude \_ 7.0;
- 1742. Alaverdi earthquake. Magnitude \_ 6.7;
- December 31, 1899, 00:50; Akhalkalaki earthquake. Value \_ 6.3.

Intensity \_ 8-9 points, 240 people died;

- February 20, 1920, Gori. The first strong shock was recorded at 02:55, and the second one at 14:45. Magnitude - 6.2, intensity 8-9 points. 9-point traction 3 km from Gori, p. This was noted on the bridgehead. St. And in Gori - 8 points. 114 people died. After that, Mazra Gori almost did not exist.

- May 7, 1940, 10:23 pm. Tabaksur. The epicenter of the earthquake was in the area of Lake Tabatskuri. Magnitude 6, intensity at the epicenter 8 points. Buildings were destroyed. 40 people died.

- Martvili earthquakes. January 26, 1957 (4:30 pm - 7:00 am), January 29 (3:17 pm and 3:21 pm - 8:00 am), which caused significant damage: buildings collapsed, no one was injured.

- July 16, 1963. 18:27 Abkhazia, Kodori Gorge, village of sticks.

The magnitude of the earthquake - 6.4 points, the force at the epicenter - 9 points. Since the Mechhris live in the area, there were no casualties from the earthquake. Damaged houses in the surrounding villages of Chkhalta. The earthquake was accompanied by landslides and rockfalls.

January 2, 1978 18:31 Dmanis. The magnitude of the earthquake is 5.3 points, and the intensity at the epicenter is 7-8 points. Minor damage and destruction, fortunately, did not lead to human casualties.

- May 13, 1986 20:44 Lake Paravni, magnitude of the earthquake - 5.6, strength at the epicenter (near Lake Paravni, on the Javakheti plateau) - 8. Houses were destroyed in nearby villages. The earthquake killed 2 people.

- 1991, April 29, 9:12 am. Racha earthquake, the epicenter of which was located east of the Tofar-Sabvi ridge. As a result of the earthquake, the rock that blocked the river collapsed.

Narrow gorge Khakhiatiskali and formed a lake 100 m wide and 300 m long. As a result of the earthquake, a 20-apartment village with 40 inhabitants fell under the collapsed mass.

It was the strongest earthquake that occurred on the territory of Georgia in the 20th century. Magnitude - 7, intensity at the epicenter - 9 points. The earthquake caused great destruction in the regions of Racha, Imereti, Shida Kartli. About 25,000 houses were destroyed and damaged. About 100,000 people were left homeless. 200 people died, the damage from the earthquake is estimated at 10 billion people at the rate of 1991. The fluctuation of intensity by 4-5 degrees was also felt in Tbilisi.

After the Racha earthquake, 18 aftershocks were recorded. The strongest of them was on June 15, 1991 at 0:05. The magnitude of which was 6.1, and the intensity at the epicenter was 8 points, which led to human casualties and destruction.

- October 23, 1992 23:19, Barisakh earthquake. A year and a half after the Racha earthquake, another strong earthquake occurred, the magnitude of which was 6.3 points, and the intensity at the epicenter - 7-8 points. The earthquake did not result in human casualties. The damage was minor.

- November 27, 1997, 5:34 pm. The magnitude of the earthquake near Khashmi was 5.3. The intensity at the epicenter is 7 points. Buildings in Khashmi and nearby villages were damaged. There were no victims. The earthquake was strongly felt in Tbilisi.

April 25, 2002, 5:34 pm. Tbilisi earthquake. Magnitude \_ 4.5. The intensity at the epicenter is 7 points. The epicenter was located from Chugureti in the direction of the Tbilisi Sea. 12 thousand buildings were damaged, especially in the old districts - Chugureti, Sololak, Nadzaladevi, Mtatsminda district. 5 people died. Direct damage was estimated at \$300,000, but the actual damage was much higher.

- February 6, 2006, 8:00 am. Racha. The magnitude of the earthquake - 5.2 points, the strength at the epicenter - 6-7 points. Many houses were damaged.

- September 7, 2009, 10:46 pm. Racha. The magnitude of the earthquake is 5.9, the strength at the epicenter is 7-8 points. There were no victims. Many buildings were damaged.

- January 19, 2011, 10:46 pm. Baghdad. The magnitude of the earthquake is 5.4, the intensity at the epicenter is 7 points. The earthquake was followed by destruction. There were no victims.

- December 25, 2012, in the Black Sea, 40 km west of Poti. At 22:44 an earthquake was recorded, it repeated at 22:55. The magnitude of the first earthquake was 5.6 points, the second - 4.9 points, but since the earthquake occurred in the sea, away from the coast, it did not lead to destruction and loss of life.

- July 12, 2016, 15 km west of Dmanis. At 10:14 there was an earthquake. Magnitude - 4.8, intensity at the epicenter - 7 points. The earthquake did not result in human casualties. The shake-up was also felt in Tbilisi.

Based on the foregoing, all issues related to seismic resistance in Georgia are very relevant and require the adoption of urgent effective measures.

In seismically active countries, the safety of people and the safety of buildings and structures during an earthquake is the most important scientific, technical and socio-economic problem. Historically, earthquake protection has always meant, first of all, predicting at its occurrence that in the event of a future earthquake and with knowledge of the place, people can be evacuated from a building to safe places and thus protect themselves from an earthquake.

The experience of past earthquakes has shown that the use of this method of protection in some cases gives a positive result. In most cases, strong earthquakes caused not only the destruction of thousands of buildings, but also the death of tens of thousands of people. In principle, that will give society a positive solution to the problem of earthquake prediction.

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It does not save us from earthquakes. An earthquake will still occur and cause the destruction of buildings and structures, life support, historical and cultural monuments.

Even with the most successful forecast, it is possible to indicate the location of the epicenter of the earthquake with an accuracy of only ten kilometers, the time - from several days to several months or years, and the strength - within 1-2 points. There will be many questions with ambiguous answers on the main measures of protection - evacuation.

If the prophetic epicenter turns out to be near a large population center, many questions will arise: when to evacuate people, stop industrial production, transport, social and medical services, stop the migration of people, who will compensate for the damage and compensation in case of a natural disaster. wrong prediction? Will economic losses be justified just because an earthquake could have happened? There will be calls to bring the wrong forecasters to justice. It is impossible to predict an earthquake in advance, but the future will show how well scientists can solve this problem.

At present, there simply isn't enough reliable data on any pre-earthquake event for us to make reliable predictions. It will take many years, many earthquakes, before this goal is fully achieved. Nevertheless, when the apartments retreated before this terrible event, we agree with the famous American Scientist J. Geary and H. Shah that "we can predict with certainty that most future earthquakes will not be prophetic."

Therefore, engineers and scientists have long been of the opinion that the best way to protect against earthquakes is reliable earthquake-resistant construction. This can be done, first of all, by improving the concept of seismic impact, calculation methods, introducing new technologies for planning and constructing buildings, and systematically improving the production of earthquake-resistant construction. The focus should be on building safety, material seismic resistance and durability.

To reduce the negative consequences of an earthquake, the most important scientific problem is not the exact time of predicting the expected earthquake, but the prediction of the behavior of buildings during an earthquake.

We believe the time has come to radically change our approach to these two aspects of earthquakes. We know "too much" about earthquakes, it's time to learn how to reliably defend against them. The 21st century should be the century of protection from the devastating effects of earthquakes. Only then will we be sure that the number of victims and the level of damage in future earthquakes will be minimal.

The opinion of Guram Gabrichidze, Corresponding Member of the National Academy of Sciences of Georgia, should be noted: "If humanity does not realize the need to reduce the level of risk inherent in the ideology of earthquake-resistant construction, the number of seismically unsafe buildings built around the world in the 20th century will increase even more in the 21st century.

It is known that cracks of various sizes appear in buildings as a result of a registered earthquake. With repeated shocks, the number of cracks and damage increases, which reduces seismic resistance. This also reduces the rigidity of the building and the magnitude of the seismic load.

It will be possible, i.e. If we know that by reducing the rigidity of the building it is possible to reduce the seismic effect on it, then we should think that in this way it will be possible to save the building.

It was this circumstance that prompted scientists to look for a system of protection against seismic effects. In recent years, several practical calculation methods have been created [1-20], these methods take into account the use of seismic isolation systems such as active and passive seismic isolation and other seismic resistance systems.

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The essence of seismic isolation is to shift the period of natural oscillations of the building (for rigid structures, usually  $t = 0.3-1$  s, in cases of higher periods  $t = 2-3$  s), which can significantly reduce the amount of acceleration acting on the building during an earthquake, and "isolate" the building from the top of the ground.

The main purpose of these systems is to divide the building into two parts (two separate masses).

The foundation is arranged, for example, on a rigid slab, on which columns or walls are placed (within the basement) and seismic isolators are arranged on them, and the roof on these seismic isolators is made of reinforced concrete slabs or coils, on which the building is then built.

The dynamic horizontal impact caused by an earthquake is either not transmitted to the above-ground structure and is completely absorbed by the insulators located in the underground part, or significantly reduces their impact.

In seismic isolation systems, a reduction in the mechanical energy received from the foundation structure is ensured. This is achieved by leaving an air gap between the foundation and the volumes of the main building, in which shock absorbers (rubber-metal supports) will be placed, which, with their flexibility, will (subsequently) absorb the destructive deformations of the building. Such foundations (shock absorbers) provide free ground movement, the amplitude of which is greater than the amplitude of a destructive earthquake, so seismic ground vibrations cannot cause the transfer of forces to the walls and the entire building.

It has been calculated by calculation that the intensity of an earthquake is reduced by 1.5-2 points when using a system of insulators.

Currently, seismic isolation systems [1] are widely used in both low-rise and high-rise construction (up to 101 floors) in almost all seismically active countries (except Georgia).

The calculation is also possible using the corrected software package LIRA 9.6 [21].

seismic isolation systems. As you know, about a hundred seismic isolation systems have been patented.

We will look at some of them:

Active seismic protection systems include additional energy sources and elements that regulate the operation of these sources, but their implementation requires significant costs for their arrangement and operation. Therefore, it is less usable;

Passive seismic protection systems include seismic damping and seismic isolation. No additional energy sources are used here;

Seismic damping systems include dampers and dynamic dampers, in which mechanical energy is converted into another form of energy, causing damping or distribution of vibration in the protective structure before damping.

Along with all known methods, adaptive systems have found wide application in seismic engineering, in which dynamic characteristics change irreversibly during an earthquake, since it "adapts" to seismic effects.

In the lower floor of the building between its supporting columns, connecting (link) panels are arranged, which are switched off during intense seismic impact, when the impact spectrum has periods equal to or close in magnitude to the period of free oscillation of the building. When the connected panels are destroyed under the action of a seismic shock, the frequency of free oscillations decreases, and the period of oscillations increases, and the seismic load decreases.



In low-frequency impacts, the period of free vibrations of a building with connected panels is much shorter than that of the ground, so the resonance phenomenon is weak and the connected panels are not destroyed. This method is especially effective when the forecast of the expected frequency of seismic shocks is known.

The negative side is that after an earthquake, when the disconnect connections are destroyed, it is necessary to restore them, which is always practically impossible.

In addition to the above, in some cases, at the final stage of the seismic process, the frequency of excessive impacts decreases. As a result, secondary resonance may occur and the capacity of the building structure may be lost. In this case, it is necessary to apply special construction measures associated with additional costs and an increase in the cost of construction.

The introduction of seismic isolation systems in construction should be carried out in accordance with building codes and regulations (PN 01.01-09).

The construction of high-rise buildings above ten floors on non-rocky ground must be carried out using reinforced concrete slabs or concrete slabs, or a combination of reinforced concrete slabs and concrete slabs.

As a rule, preference is given to concrete bases.

The positive role of pile foundations in construction, their resistance to seismic effects, and the positive effect of piles on the dynamic characteristics of a building are widely known. Therefore, the installation of concrete foundations is a correct, reasonable engineering decision.

The effectiveness of pile foundations on soft soils in seismic areas can be achieved by placing piles on soils of the I category of seismicity. When constructing stone foundations on category I soils, it is first necessary to determine their bearing capacity.

"Intermediate cushions" - a new word when using a rock foundation in seismic areas.

At the end of the last century in Chile, Russia and Moldova, stone foundations and "intermediate cushions" made of inert material were offered.

In our opinion, this method should have positive results if there is no strong connection between the roaster and pile. Above the chemicals buried in the soil of the third category of seismic resistance, a sand and gravel "cushion" is laid and compacted. On this "cushion" a conventional reinforced concrete lattice-type structure is arranged, which is calculated as a coil on an elastic foundation.

Intermediate shock-absorbed rock foundations drastically reduce the horizontal seismic load transmitted to the top of the building, which will be distributed, that is, embarrassed, along the "cushion".

Earthquake prediction. Since time immemorial, man has tried to predict earthquakes in order to save his life and his family.

During an earthquake, the safety of people and the preservation of buildings in seismically active countries is the most important scientific, technical and socio-economic problem.

### Conclusions

The paper proposes the use of seismic protection systems for buildings, in particular, seismic isolators, the room is placed between the foundation of the building and the supporting structures of the building. As a result of the research, it was established:

- The reproducibility of the earthquakes mentioned in the article clearly shows that Georgia is in a zone of high seismic activity.

Improving seismic resistance is the responsibility of specialists, scientists, designers and builders to conduct joint research.



State bodies have a special role in saving the population from the devastating consequences of an earthquake;

- Scientists and engineers have long been of the opinion that the best way to protect against an earthquake is a reliable earthquake-resistant structure and its timely preparation.

This can be implemented by creating new constructive systems of seismic effects, methods of calculation, planning and construction of buildings and structures, systematic, regular improvement of seismic engineering standards of construction;

- In the recent period, various variants of seismic isolation systems have been created and massively implemented in seismically active countries.

The use of seismic isolation systems leads to a 2.0-fold decrease in seismic loads acting on buildings, resulting in a reduction in the frequency of destruction of structural elements during an earthquake;

- Reducing the impact of seismic forces on the supporting structures leads to a decrease in inertial forces, which in turn reduces the movement of the supporting structures of the building.

This is very important when calculating and designing the seismic resistance of a building.

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25/01/2023

### **İLGİLİ MAKAMA**

*3. ULUSLARARASI LIBERTY DİSİPLİNLERARASI ÇALIŞMALAR KONGRESİ 13-15 Ocak 2023 tarihleri arasında Miami / ABD’de 25 farklı ülkenin (Türkiye-15, Diğer Ülkelerden-50) akademisyen/araştırmacılarının katılımıyla gerçekleşmiştir. Kongre 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen “Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır.” değişikliğine uygun düzenlenmiştir.*

*Bilgilerinize arz edilir,  
Saygılarımla*



**Dr. Mustafa Latif EMEK**

On behalf of Organizing Board

**Reference:** [www.libertyacademicbooks.com/libertyconference](http://www.libertyacademicbooks.com/libertyconference)