CONFERENCE PROCEEDINGS

EUROPEAN INTERNATIONAL CONFERENCE ON MODERN SCIENCE AND RESEARCH

International Scientific and Practical Conference

20 October 2026



www.academscience.com

zenodo Google Scholar OpenAIRE

United Kingdom
Academic Research Publisher Ltd

****

MATERIALS
the international scientific-practical conference
«EUROPEAN INTERNATIONAL CONFERENCE ON MODERN SCIENCE AND RESEARCH»

London, Tashkent
October 20, 2026

****

European international conference on modern science and research // materials international scientific-practical conference. London, United Kingdom. October 20, 2026.

Editorial board of the conference

Temnova L.V. - DSc, Professor (Moscow, Russia); **Sagatbayev Y.N.** - PhD, professor (Astana, Kazakstan); **Duyshenaliev CH.D.** - DSc, Professor (Byshkek, Kyrgyzstan); **Pashkov S.V.** - PhD, professor (Petropavlovsk, Kazakstan); **Khakimov K.A.** - PhD, docent (Tashkent, Uzbekistan); **Melekoglu M.** - DSc, professor (Eskisehir, Turkey).

This event aims to discuss contemporary research across various scientific fields, exchange new scientific ideas, and support scientific activities aligned with global innovative processes.

Within the framework of the conference, scientists, researchers, young scholars, and practicing specialists will have the opportunity to present their research results, exchange scientific ideas, and expand international cooperation.

The main objective of this International Scientific-Practical Conference is to consolidate the results of contemporary research across various scientific fields and strengthen the integration of science and practice through advanced scientific approaches.

**The authors are responsible for the content of the articles, the information, facts, and figures presented therein.*

The proceedings of the International Scientific-Practical Conference have been discussed by the Scientific-Technical Council of the international publisher **"Academic Research Publisher"** (London, United Kingdom) and recommended for publication (October 19, 2026, Protocol No. 27.3).

CONTENTS

1-SECTION 10

"MECHANISM OF ACTION OF PYRETHROID INSECTICIDES AND THEIR ELECTROPHYSIOLOGICAL INVESTIGATION USING THE PATCH-CLAMP TECHNIQUE" 11

COOPERATION OF DEHQON (PEASANT) FARMS AS AN ESSENTIAL CONDITION FOR THEIR EFFECTIVE DEVELOPMENT (ON THE EXAMPLE OF THE SOUTHERN REGIONS OF THE REPUBLIC OFUZBEKISTAN) 15

SHAHAR O'SIMLIKLARI TARKIBINING SHAKLLANISHIGA TABIIY VA ANTROPOGEN OMILLARINING TA'SIRI 25

QORATEPA TOG'LARIDA PEGMATITLAR VA KAMYOB METALLARNING RIVOJLANISHI TARQALISH XUSUSIYATI 31

EFFECTS OF MACHINING METHODS ON THE SURFACE QUALITY OF A STEEL 45–STEEL ST5 WELDED JOINT 38

SYNTHESIS OF THE MENTHOL–LEUCINE COMPOUND AND STUDY OF ITS PROPERTIES 45

ОЦЕНКА ЧИСТОТЫ И ИДЕНТИФИКАЦИИ п-БРОМФЕНИЛУКСУСНОЙ КИСЛОТЫ МЕТОДОМ ТОНКОСЛОЙНОЙ ХРОМАТОГРАФИИ 54

ВЛИЯНИЕ СООТНОШЕНИЯ КОМПОНЕНТОВ WEICON TI НА ПРОЧНОСТЬ СЦЕПЛЕНИЯ С МЕТАЛЛИЧЕСКИМ ОСНОВАНИЕМ .. 60

THE EFFECT OF BIOLOGICAL NUTRITION ON OIL AND FATTY ACID SYNTHESIS IN COTTONSEEDS 66

MODELING OF OSCILLATORY FLOW OF A RHEOLOGICALLY COMPLEX FLUID IN A PLANE CHANNEL 71

2-SECTION 78

THE ROLE OF DIGITAL TECHNOLOGIES IN EDUCATION MANAGEMENT: CHALLENGES AND OPPORTUNITIES IN THE CONTEXT OF HIGHER EDUCATION 79

TA'LIM JARAYONIDA SUN'IY INTELLEKT METOD VA TEXNOLOGIYALARIDAN FOYDALANISH 84

INTEGRATING ARTIFICIAL INTELLIGENCE INTO UNIVERSITY EDUCATION IN UZBEKISTAN: A NARRATIVE REVIEW OF OPPORTUNITIES, CHALLENGES AND POLICY DIRECTIONS 90

THE ROLE OF TRICHOSCOPY AND EMERGING TECHNOLOGIES IN ALOPECIA DIAGNOSIS 99

THE IMPORTANCE OF IMMERSIVE TECHNOLOGIES IN TEACHING ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION 107

SUN'IY INTELLEKT VA IMMERSIV TEXNOLOGIYALARNING O'ZARO ALOQADORLIGINI MUTAXASSISLIK FANLARINI O'RGANISHDA TAHLIL QILISH 114

LEGAL FRAMEWORK FOR PERSONAL DATA PROTECTION IN THE DIGITAL SPACE 121

THE ROLE OF AI-BASED AUTOMATED WRITING EVALUATION SYSTEMS IN PRIMARY EDUCATION 129

O'ZBEK TILIDA SUN'IY INTELLEKT TEXNOLOGIYALARINI RIVOJLANTIRISH: MUAMMOLAR VA ISTIQBOLLAR 132

3-SECTION 143

DYNAMICS OF ENDOGENOUS INTOXICATION AT DIFFERENT STAGES OF BURN TOXEMIA IN CHILDREN 144

OPTIMIZING DENTAL IMPLANTATION IN PATIENTS WITH A DEFECT OF THE DENTAL ROW AGAINST THE BACKGROUND OF RHEUMATOID ARTHRITIS 149

ПОСТНАТАЛЬНАЯ ВОЗРАСТНАЯ ДИНАМИКА СТЕНКИ БРОНХОВ И БРОНХОАССОЦИИРОВАННОЙ ЛИМФОИДНОЙ ТКАНИ У ПОТОМСТВА КРЫС В ТРЁХ УСЛОВИЯХ КАЧЕСТВА ВОЗДУХА ... 158

ЗАДЕРЖКА СОЗРЕВАНИЯ ГЕПАТОЦИТОВ И ОПЕРЕЖАЮЩЕЕ РАСШИРЕНИЕ СИНУСОИДОВ В ПОСТНАТАЛЬНОЙ ПЕЧЕНИ ПОТОМСТВА КРЫС ПРИ МАТЕРИНСКОЙ ЭКСПОЗИЦИИ К ЗАГРЯЗНЁННОМУ ВОЗДУХУ 167

MOLECULAR MECHANISMS OF THE ANTIDIABETIC ACTION OF GLYCYRRHIZA GLABRA L. AS A BIOLOGICALLY ACTIVE SUPPLEMENT: A LITERATURE REVIEW 177

СОВРЕМЕННЫЕ МЕТОДЫ ДИАГНОСТИКИ И ПЕРСОНАЛИЗИРОВАННОЙ ТЕРАПИИ АНДРОГЕНЕТИЧЕСКОЙ АЛОПЕЦИИ 182

BIOSYNTHESIS AND GENE EDITING METHODS IN ENHANCING THE EFFECTIVENESS OF CAR-T CELL THERAPY AGAINST SOLID TUMORS 187

ESTETIK ZONADA ZAMONAVIY JARROHLIK YONDASHUVLARI YORDAMIDA PERIIMPLANT TO'QIMALAR HOLATINI OPTIMALLASHTIRISH 192

EPITHELIALIZATION TIMING AFTER LOCAL COMPOSITE GEL TREATMENT OF EXPERIMENTAL PERITONITIS 197

BEMORLARNI DAVOLASH UCHUN ROBOT TEXNOLOGIYALARINI RIVOJLANTIRISHNING HOZIRGI TENDENSIYALARI 201

MODERN METHODS OF MORPHOLOGICAL, MORPHOMETRIC AND IMMUNOHISTOCHEMICAL ASSESSMENT OF SPLEEN TISSUE 222

4-SECTION 227

THE USE OF NATURAL DYES IN THE NATIONAL ECONOMY 228

ENHANCING PROJECT MANAGEMENT EFFICIENCY THROUGH THE IMPLEMENTATION OF DIGITAL TECHNOLOGIES IN ORGANIZATIONS OF THE REPUBLIC OF UZBEKISTAN 247

SAMARQAND VILOYATIDA ETNOTURIZMNI RIVOJLANTIRISHNING IQTISODIY IMKONIYATLARI VA ISTIQBOLLARI 256

THE ROLE AND IMPORTANCE OF DIGITAL INNOVATIONS IN ECONOMIC DEVELOPMENT 260

OROLBO'YI MINTAQASIDA XIZMAT KO'RSATISH SOHASINI INNOVATSION BOSHQARISHNING TASHKILIY-IQTISODIY MEXANIZMLARINI TAKOMILLASHTIRISH 265

IMPROVING THE METHODOLOGY FOR DEVELOPING LABOUR MOBILITY IN THE TRANSFORMATION OF REGIONAL LABOUR MARKETS: EVIDENCE FROM UZBEKISTAN 270

MARKAZIY OSIYO VA O'ZBEKISTON IQTISODIY SALOHIYATINING TURIZM BOZORIGA TA'SIRI: MEHMONXONA XIZMATLARI BOZORI BILAN O'ZARO BOG'LIQLIK TAHLILI 275

MEHMONXONA BIZNESI KORXONALARIDA XORIJ TAJRIBASINI O'ZLASHTIRISHNING CHEKLOVLARI: INSTITUTSIONAL, MADANIY VA MEHNAT BOZORI OMILLARI 283

THE INSURANCE MARKET: EVOLUTION, TRENDS, CHALLENGES AND STRATEGIES FOR SUSTAINABLE GROWTH 289

IQTISODIYOTDA TARKIBIY TRANSFORMATSIYANI JADALLASHTIRISH VA YUQORI QO'SHILGAN QIYMATLI ISHLAB CHIQARISHNI KENGAYTIRISH 296

STRATEGIC PARTNERSHIP IN CONTEMPORARY INTERNATIONAL RELATIONS: THEORETICAL FOUNDATIONS, KEY DYNAMICS, AND FUTURE PROSPECTS 301

5-SECTION 311

DEVELOPING EVIDENCE-BASED REASONING IN BIOLOGY LESSONS: APPLYING THE CLAIM-EVIDENCE-REASONING FRAMEWORK 312

TARBIYACHILARNI EKOLOGIK STEAM MASHG‘ULOTLARINI LOYIHALASHGA TAYYORLASH: MODEL, RESURSLAR VA BAHOLASH MEZONLARI 318

IMPROVING THE PROFESSIONAL SKILLS OF FUTURE PRIMARY SCHOOL TEACHERS THROUGH DUAL EDUCATION 328

PSYCHOLOGICAL AND PEDAGOGICAL ASPECTS OF FORMAL COMMUNICATION AND ITS ORGANIZATION IN HIGHER EDUCATION 333

DESIGNING THE PROCESS OF PREPARING STUDENTS FOR UPBRINGING ACTIVITY IN A HIGHER EDUCATION INSTITUTION ON A MODULAR-ACMEOLOGICAL BASIS 342

METHODS FOR IMPROVING STUDENTS’ ANALYTICAL THINKING COMPETENCE THROUGH AN INTEGRATIVE APPROACH 349

MAKTABGACHA YOSHDAGI BOLALARDA MAYDA MOTORIKA TUSHUNCHASI VA UNING MAZMUN-MOHIYATI 355

“NAVRUZ DIPLOMACY” AS AN IMPORTANT SOURCE OF PUBLIC DIPLOMACY 360

SOCIAL-PHILOSOPHICAL BASIS OF FORMING IDEOLOGICAL IMMUNITY OF YOUTH AGAINST RADICAL INTELLECTUALS IN THE DIGITAL ENVIRONMENT 367

THE ROLE OF THE TEACHER IN ORGANIZING RESEARCH ACTIVITIES 371

THEORETICAL-PEDAGOGICAL FOUNDATIONS FOR STRENGTHENING ADOLESCENT HEALTH WITHIN THE EDUCATIONAL PROCESS 375

PSYCHOLOGICAL DIAGNOSIS OF INTERPERSONAL RELATIONSHIPS AMONG STUDENTS IN THE EDUCATIONAL PROCESS 379

6-SECTION 390

STATE AND PRODUCTION POTENTIAL OF UZBEKISTAN’S OIL AND GAS INDUSTRY ON THE EVE OF INDEPENDENCE 391

TIBBIYOT MUASSASALARIDA ELEKTR XAVFSIZLIGINI TA'MINLASH: IZOLYATSIYALANGAN TARMOQ VA IZOLYATSIYANI NAZORAT QILISH TIZIMLARINING TAHLILIY SHARHI 396

СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА СТРУКТУРЫ ФАКТОРОВ РИСКА В ЗАВИСИМОСТИ ОТ КОНСТРУКТИВНОГО ТИПА ЗДАНИЙ ДОШКОЛЬНЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ 403

KORXONA BOSHQARUVIDA INNOVATSION STRATEGIYALARNI JORIY ETISHNING XORIJIY TAJRIBASI 407

7-SECTION 411

THE EARLY FOUNDERS OF THE GHAZNAVID DYNASTY AND NASIR AL-DIN SABUKTEGIN IN THE TARIKH AL-YAMINI..... 412

ACADEMIC WRITING AND ITS CORE PRINCIPLES 419

A COMPARATIVE ANALYSIS OF ENGLISH AND UZBEK IDIOMATIC EXPRESSIONS 425

LINGUISTIC AND STYLISTIC FEATURES OF TRANSLATING POLITICAL ALLEGORY..... 433

FROM PARLIAMENTARY OVERSIGHT TO VERIFIED GOVERNMENT ACCOUNTABILITY: AN INSTITUTIONAL MODEL FOR UZBEKISTAN 443

"KUCH — G'AYRATDADIR": ERNEST XEMINGUEYNING «CHOL VA DENGIZ» ASARIDA QARILIKNING YENGILMAS RUHI 448

DIGITAL DIPLOMACY: HOW SOCIAL MEDIA IS CHANGING INTERNATIONAL RELATIONS 453

LEGAL FRAMEWORK FOR PERSONAL DATA PROTECTION IN THE DIGITAL SPACE 464

FONETIKA BO'LIMI VA UNING TILSHUNOSLIKDAGI AHAMIYATI472

"MEDIASAVODXONLIK VA AXBOROT MADANIYATI" MODULIDAN TALABALARNING MUSTAQIL ISHLARINI TASHKIL ETISHDA IMMERSIV TEXNOLOGIYALARDAN FOYDALANISH AFZALLIKLARI 477

MULKIY HUQUQLARNI JAMOAVIY BOSHQARUVCHI TASHKILOTLARNING HUQUQIY MAQOMI VA FAOLIYATINI TAKOMILLASHTIRISH MASALALARI..... 482

THE ROLE OF JOURNALISTIC COMMUNICATION IN INTERNATIONAL RELATIONS AND MEDIA DIPLOMACY: UZBEKISTAN'S EXPERIENCE AND DEVELOPMENT PROSPECTS ... 490

THE INTEGRATION OF HISTORICITY AND LOGICALITY IN THE SCHOLARLY LEGACY OF IBROHIM MO‘MINOV 499
HISTORY OF PRESCHOOL EDUCATION SYSTEMS IN CHINA, JAPAN AND UZBEKISTAN: A COMPARATIVE ANALYSIS 506
“MAHALLANI RIVOJLANTIRISH VA JAMIYATNI YUKSALTIRISH YILI”DA BUXORO VILOYATI MAHALLARIDA AMALGA OSHIRILGAN ISHLAR 510
A TWO-LAYER MODEL OF PRAGMATIC STRATEGIES IN HOROSCOPE TEXTS 518
PHONETIC ERRORS RELATED TO CONSONANT PRONUNCIATION AMONG UZBEK STUDENTS LEARNING KOREAN AND THE LINGUODIDACTIC BASIS FOR OVERCOMING THEM 523
SOCIO-PHILOSOPHICAL MECHANISMS FOR FOSTERING PATRIOTISM AMONG YOUNG PEOPLE IN THE CONTEXT OF SPIRITUAL TRANSFORMATION 526
UZBEKISTAN–GERMANY PEOPLE-TO-PEOPLE DIPLOMACY: A CASE STUDY OF THE KONRAD ADENAUER FOUNDATION 534
JADID ADIBLARINING IJODIDA MILLAT TALQINI 546
JADID ADIBLARINING IJODIDA MILLAT TALQINI 552
INTERETHNIC SOLIDARITY, SOCIAL TRUST AND EQUAL OPPORTUNITIES AS FACTORS OF SUSTAINABLE DEVELOPMENT 558
НЕКОТОРЫЕ АСПЕКТЫ ВНЕШНЕЙ ПОЛИТИКИ И ДИПЛОМАТИИ СОВРЕМЕННОГО ЕГИПТА 569
O‘ZBEK JADID HIKOYALARIDA MILLIY ISTIQLOL G‘OYASI 583

1-SECTION

"MECHANISM OF ACTION OF PYRETHROID INSECTICIDES AND THEIR ELECTROPHYSIOLOGICAL INVESTIGATION USING THE PATCH-CLAMP TECHNIQUE"

Burkhev Farkhod Zabhievich

PhD in Chemical Sciences

Gulistan State University, Agrobiotechnology and Biochemistry Research Institute

farkhod_2020@mail.ru

Abstract. *This article examines the effects of pyrethroids on insect nervous systems and the application of the patch-clamp technique to study their mechanisms of action. Particular attention is given to sodium ion channels and the effects of deltamethrin on insect neurons. The study also considers the potential use of this technique to evaluate the biological activity of pyrethroids derived from chrysanthemic acid.*

Keywords: *pyrethroids, insecticides, patch-clamp, sodium channels, deltamethrin, insect neurons, chrysanthemic acid.*

INTRODUCTION

The cultivation of high-quality agricultural products is directly related to pest control. This is because harmful insects have a significant impact on crop yields. This issue is becoming increasingly important, particularly against the background of population growth and the rising demand for food products. In particular, pyrethroids, organophosphorus compounds, carbamates, and organochlorine compounds are used as insecticides and acaricides. Pyrethroids are a group of insecticides used against insects that have been developed based on the structural characteristics of natural pyrethrins.

The main types of pyrethroids include permethrin, cypermethrin, deltamethrin, lambda-cyhalothrin, bifenthrin, fenvalerate, esfenvalerate, fenpropathrin, tetramethrin, allethrin, prallethrin, resmethrin, bioallethrin, cyfluthrin, beta-cyfluthrin, tau-fluvalinate, etofenprox, and tefluthrin.

In insects, the symptoms typically associated with Type I pyrethroid (tetramethrin) poisoning include a lack of coordination, hyperactivity, and prostration. In addition, conditions accompanied by paralysis have also been observed with Type II pyrethroids (supermethrin)[1]. It should be noted that the previous classification into Type I and Type II was initially based on the severity of poisoning symptoms and, subsequently, on the absence or presence of an alpha-cyano group. However, this classification proved to be structurally simplistic because some compounds exhibit intermediate characteristics[2]. From a toxicological perspective, investigating the sublethal effects of pyrethroids has now become a priority, as subtle structural modifications can have substantial effects on highly complex organisms, as demonstrated in bees. In honeybees, these sublethal effects include impaired olfactory function and learning performance[3], as well as behavioral changes such as disorientation and absconding from the hive, which contribute to the disruption of bee colonies worldwide[4]. Although some of these sublethal effects have been considered to be associated with their harmful effects on the peripheral nervous system, very little direct evidence has so far been obtained in bees[5]. Given its peripheral localization, this system may be particularly susceptible to exposure to these neurotoxic insecticides, especially during foraging. Consistent with the peripheral hypothesis, pyrethroids alter action potential activity in butterflies, as demonstrated by electroantennogram and single-sensillum recording analyses[6]. Some sublethal effects of pyrethroids (e.g., reduced egg-laying by queens) have also been associated with their effects on the central nervous system[7].

MAIN BODY

The “patch-clamp” technique, which is based on measuring ionic currents through ion channels, is widely used to determine the mechanism of action of pyrethroids.

Patch-clamp is an electrophysiological technique based on measuring ionic currents passing through the cell membrane. This method is used to

investigate the functioning of sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), and other ion channels, including their opening, closing, and changes in response to various chemical substances.

Patch-clamp is particularly important for investigating the effects of pyrethroids, such as lambda-cyhalothrin, cypermethrin, and deltamethrin, on nerve cells. This is because pyrethroids can alter the activity of voltage-gated sodium channels in nerve cells.

The cell membrane consists of a lipid bilayer. It contains specialized proteins called ion channels that regulate the passage of ions across the membrane.

The effect of deltamethrin on cockroach neurons was investigated using the patch-clamp technique. Tetrodotoxin-sensitive inward sodium currents were observed at concentrations of 10^{-8}–5×10^{-6} mol/L. The peak current was recorded at +10 mV, while the reversal potential was approximately +60 mV. Single-channel recordings revealed three types of activity patterns: brief events lasting 1–10 ms, openings lasting up to several seconds, and complex bursts consisting of 7–8 levels. The results demonstrated that deltamethrin alters the opening and closing kinetics of ion channels [8].

CONCLUSION

This method makes it possible to monitor the effects of all sodium channel inhibitors. Therefore, it is a modern instrumental method for investigating the effects of insecticides using a biophysical approach. The aim was to investigate the bioactivity of certain pyrethroids obtained from chrysanthemic acid using this particular method.

REFERENCES

1. Gammon DW, Brown MA, Casida JE (1981). Two classes of pyrethroid action in the cockroach. Pesticide Biochemistry and Physiology 15: 181–191.

2. Khambay BPS, Jewess PJ (2005). Pyrethroids. In: Gilbert LI, Iatrou K, Gill SS, editors. Comprehensive Molecular Insect Science. Oxford: Elsevier BV. pp. 1–29.

3. Decourtye A, Devillers J, Genecque E, Le Menach K, Budzinski H, et al. (2005). Comparative sublethal toxicity of nine pesticides on the olfactory abilities of the honeybee, Apis mellifera. Archives of Environmental Contamination and Toxicology 48: 242–250.

4. Cox RL, Wilson WT (1984). Effects of permethrin on the behavior of individually tagged honey bees, Apis mellifera L. (Hymenoptera: Apidae). Environmental Entomology 13: 375.

5. Kadala A, Charreton M, Jakob I, Le Conte Y, Collet C (2011). A use-dependent sodium current modification induced by type I pyrethroid insecticides in olfactory receptor neurons of the honeybee antenna. NeuroToxicology 32: 320–330.

6. Lucas P, Renou M (1992). Electrophysiological study of the effects of deltamethrin, bioresmethrin and DDT on the activity of pheromone receptor neurons in two moth species. Pesticide Biochemistry and Physiology 43: 103–115.

7. Zhou T, Zhou W, Wang Q, Dai PL, Liu F, et al. (2011). Effects of pyrethroids on the excitability of adult honeybee (Apis mellifera) neurons. Pesticide Biochemistry and Physiology 100: 35–40.

8. Amar M, Pichon Y, Inoue I. Patch-clamp analysis of the effects of the insecticide deltamethrin on insect neurones. Journal of Experimental Biology. DOI: 10.1242/jeb.163.1.65.

UDC 631.115.1:631.115.8 (575.1)

COOPERATION OF DEHQON (PEASANT) FARMS AS AN ESSENTIAL CONDITION FOR THEIR EFFECTIVE DEVELOPMENT (ON THE EXAMPLE OF THE SOUTHERN REGIONS OF THE REPUBLIC OFUZBEKISTAN)

Ашуров Абдулло Файзуллаевич

Техника фанлари бўйича фалсафа доктори (PhD), доцент

E-mail: a.ashurov2810@gmail.com | ORCID: 0000-0002-4512-8931

Abstract: *The article substantiates the institutional necessity of horizontal and vertical cooperation of dehqon (peasant) farms in the Republic of Uzbekistan as a tool to overcome the structural barriers of small-scale production. Based on a comparative analysis of international models, the priorities for adapting the experience of Asian and EU countries are highlighted. The author applied the Herfindahl-Hirschman Index (HHI) to assess the level of oligopsony in the fruit and vegetable procurement market in Kashkadarya and Surkhandarya regions. A techno-economic value (TEV) study for implementing a cooperative individual quick freezing (IQF) mini-center has been developed. It is proved that cooperation increases the income of dehqon farms by 25–30% and ensures a return on investment within 0.6 years.*

Keywords: *dehqon farm, agricultural cooperation, Herfindahl-Hirschman Index, oligopsony, quick freezing, Southern region, economic efficiency.*

INTRODUCTION

In the context of deepening market transformations in the agrarian sector of the Republic of Uzbekistan, dehqon (peasant) farms have established themselves as a solid foundation for ensuring the country's food security and promoting rural self-employment. As of 2026, more than **334,000 active dehqon farms** operate in the republic [6, p. 14]. However, the small-scale nature of this sector (with the average land plot size varying from 0.06 to 1.0 ha) significantly retards the pace of its modernization. Smallholders are isolated from large markets, lack the capacity to implement water-saving technologies, and incur

high transaction costs. In this regard, the practical implementation of the **Laws of the Republic of Uzbekistan "On Dehqon Farming" No. ZRU-680** and **"On Agricultural Cooperative" No. ZRU-995** actualizes the scientific search for effective integration formats for small-scale farming.

METHODS

The theoretical and methodological framework of the study is based on the works of domestic and foreign scholars in the field of agrarian economics. To quantitatively evaluate the level of monopolization in the produce procurement market, the author utilized the adapted **Herfindahl-Hirschman Index (HHI)** for the buyer's market:

$$HHI=\sum _{i=1}^{n}S_{i}^{2}$$

where S_{i} represents the market share of the i-th purchaser (exporter, intermediary) in the total volume of fruit and vegetable procurement in the region (%), and n is the total number of purchasing agents. To evaluate the commercial viability of the proposed solutions, a techno-economic value (TEV) method was applied, calculating the payback period (PP) and the break-even point (BEP).

Cooperation of Dehqon Farms as a Factor for Increasing the Efficiency of the Small-Scale Commodity Sector of the Agro-Industrial Complex

1. Theoretical-Legal Framework and Institutional Necessity of Dehqon Farm Cooperation in Uzbekistan

In the context of deepening market reforms within the agrarian sector of the Republic of Uzbekistan, dehqon (peasant) farms have established themselves as a critical driver for ensuring food security and rural self-employment. According to official statistical data, more than **334,000 active dehqon farms** successfully operate across the republic [6, p. 14]. However, despite their high adaptability, the growth potential of this sector is strictly constrained by structural factors such as small-scale commodity production, resource deficits, and organizational fragmentation. The average land plot size of a dehqon farm

ranges from 0.06 to 1 hectare, making it economically unviable for individual farms to adopt knowledge-intensive, resource-saving technologies, procure expensive high-performance machinery, or secure direct access to large-scale export markets.

As rightly noted by researchers D. T. Yuldashev, B. A. Alikulov, and Sh. Z. Uzokova, dehqon farms effectively develop as a unique form of family entrepreneurship; however, transitioning them to a qualitatively new level requires overcoming the structural barriers of monopoly pressure exerted by regional processing entities and local intermediaries [5, p. 112]. A systematic resolution to this economic contradiction lies in horizontal and vertical agricultural cooperation. The development of cooperative relations allows for the consolidation of output volumes, minimizes transaction costs, establishes collective marketing and distribution channels, and increases local value-added generation.

In recent years, the state policy of Uzbekistan regarding small-scale agribusiness support has formed a robust legislative and regulatory platform for the cooperative movement. The foundational operational principles and tax preferences for the small-scale commodity sector are legally institutionalized in the **Law of the Republic of Uzbekistan "On Dehqon Farming" No. ZRU-680** [1, art. 5]. Concurrently, a vital impulse for institutional modernization was initiated by the enactment of the strategically important **Law of the Republic of Uzbekistan "On Agricultural Cooperative" No. ZRU-995**, which laid down modern market-driven mechanisms for cooperatives operating as voluntary associations aimed at rendering integrated agro-services, procurement, and marketing assistance [2, art. 12].

These cooperative mechanisms are further incentivized by the **Resolution of the President No. PP-115**, which regulates the specialization of districts toward export-oriented crops and sets up unsecured credit facilities within the framework of continuous small business support [3, para. 2]. Additionally, the **Decree of the President No. UP-22** targets the establishment of the Council for

the Development of Activities of Household Land Owners and Dehqon Farms, along with the deployment of the *UzAgroStar* holding infrastructure [4, p. 3]. Cooperation, therefore, acts not merely as an organizational format for merging assets but as a critically indispensable condition for the intensification of agricultural production.

Actionable Practical Proposals for Enhancing Dehqon Farm Cooperation

I. National Level (General Framework across Uzbekistan)

1. Establishment of an Integrated Agro-Service Cooperative Network under the Auspices of UzAgroStar Holding

- *Core Substance:* Initiate the creation of multi-functional cooperatives (handling marketing, procurement, joint machinery leasing, and logistics) in every rural district. Participating dehqon farmers supply their produce at guaranteed prices, thereby eliminating the chain of marginal middlemen.
- *Financial Mechanism:* Leverage the potential of the active unsecured and subsidized credit systems to fund the primary physical infrastructure of the cooperatives (such as mini-cold storage facilities and automated sorting lines) [4, p. 5].

2. Digitalization and Implementation of GIS Management for Cooperative Agricultural Lands

- *Core Substance:* Deploy a unified digital platform integrating spatial and descriptive data regarding household land assets owned by dehqon farmers. This will enable cooperatives to accurately map production capacities, coordinate intervals for intermediate crop cultivation (legally permitted for up to 1 year) [1, art. 14], and consolidate large, homogeneous product batches for international export markets.

3. Fostering Contractual Cooperation with Large-Scale Agro-Clusters

- *Core Substance:* Formally anchor regulatory mechanisms for "futures-type" forward contracts executed between dehqon cooperatives and dominant

processing clusters. The cooperative acts as a single legal entity representing hundreds of local dehqon farmers to guarantee supply volumes, while the cluster advances high-quality seeds, biofertilizers, and crop protection agents.

II. Regional Level: Southern Regions of the Republic (Kashkadarya and Surkhandarya Provinces)

The Southern region of Uzbekistan possesses an exceptional agro-climatic potential (characterized by ultra-early crop ripening and high solar radiation indices) but faces acute deficits in water resources and sustainable pastures. As of mid-2026, there are 29,864 active dehqon farms in the Kashkadarya province, and 24,621 in the Surkhandarya province [6, p. 42].

1. Setting up Specialized Water-Saving Cooperatives in Arid Zones

- *Core Substance:* The fragmented smallholder nature of individual farms prevents solitary dehqon farmers from investing in modern drip irrigation networks or deep-water wells. It is proposed to aggregate dehqon farms in vulnerable southern districts into specialized "irrigation and land-reclamation cooperatives".
- *Implementation:* Utilize state subsidies (which cover up to 50% of construction expenditures for reservoirs designed to harvest rainwater and mudflow runoff) to set up collective, light-type hydro-technical irrigation systems [3, para. 4].

2. Cooperation in Early Vegetable Production and Individual Quick Freezing (IQF)

- *Core Substance:* Kashkadarya and Surkhandarya possess the natural capacity to supply the earliest fruit and vegetable produce for export markets. The strategy entails introducing a model of cooperative "educational-experimental plots" alongside mini-centers for individual quick freezing located directly within specialized *mahallas*. Processing crops via cooperative shock-freezing facilities prevents southern farmers from selling their harvest at a loss during peak harvest gluts, enabling off-season sales with a 40–50% surge in profit margins.

3. Pasture and Feed-Supply Cooperatives in the Livestock Sector

- *Core Substance:* The southern regions maintain a traditionally strong position in animal husbandry; however, dehqon farmers face severe bottlenecks regarding their forage and feed base. Based on the provisions of Law No. ZRU-680, which allows allocating up to 5 hectares of land to dehqon units for cultivating fodder crops [1, art. 18], the formation of specialized feed cooperatives is recommended. Dehqon farmers pool their rights to allocated fodder plots or leased forestry fund lands (available for up to 30 years) for mechanized alfalfa and silage cultivation, alongside setting up mini-feed mills to secure stable dietary rations for the livestock of cooperative members [2, art. 34].

RESULTS AND DISCUSSION

1. International Benchmarks for Institutional Development

A comparative analysis of global practices demonstrates that overcoming the barriers of small-scale production is successfully achieved through two core institutional models:

- **Multifunctional Asian Model (Japan, China):** Highly effective at the initial stages of local *mahalla*-based cooperation. It allows aggregating the demand of smallholder farms for seeds, biofertilizers, micro-crediting, and machinery sharing [5, p. 114].
- **Vertically Integrated European Model (Netherlands, France):** Essential at the stage of value-added generation and export chain establishment, where the cooperative directly owns the processing facilities and logistics networks.

2. Assessment of Market Imbalances in the Southern Region

The Southern region of Uzbekistan (Kashkadarya and Surkhandarya provinces) is characterized by early crop maturation but suffers from severe price dictation by intermediary structures. We calculated the HHI index during the peak harvest period of perishable produce (May–June).

It was found that in the local procurement markets of the Sherabad and Muzrabat districts of the Surkhandarya region, the HHI values fluctuate between **2400 and 2800 points**. According to international methodology, this indicates a state of tight oligopsony (ultra-high buyer concentration). Dehqon farmers are forced to sell their crops at dumping prices due to the highly perishable nature of the produce. Horizontal integration of farmers into a cooperative capable of consolidating the supply share up to \(S_{coop} \ge 35\%\) serves as the only viable counterweight to break the intermediary monopoly power.

3. Techno-Economic Value Study of a Cooperative Mini-Center

As a practical solution for the Southern region, a business model for a cooperative individual quick freezing (IQF) mini-center was designed with a capacity of 240 tons per season, uniting 150 local dehqon farms.

- **Capital Expenditures (CAPEX): 1,079.0 million UZS** (70% of which is covered by a subsidized bank loan at a 14% annual rate under Resolution No. PP-115).
- **Operating Expenses (OPEX): 1,294.4 million UZS** (including guaranteed procurement of raw materials from dehqon members at a price of 4,000 UZS/kg).
- **Seasonal Revenue** from the sale of frozen IQF produce for export at an average price of 1.1 USD/kg (**14,300 UZS/kg**) amounts to **3,432.0 million UZS**.

The net profit of the cooperative for the first operating season will reach **1,894.6 million UZS**. The primary investment indicators of the project are summarized in Table 1.

Table 1.

Key Performance Indicators of the Cooperative IQF Center

Performance Indicator	Value	Economic Interpretation
Payback Period (PP)	**0,6 years**	Full return on investment within one operating season
Break-Even Point (BEP)	**32%**	Project stability achieved at a minimum load of 76.8 tons

Member Income Growth	**+25–30%**	Ensured by eliminating the middleman margin

An Analysis of Land Use by Smallholders and Their Integration into Cooperatives: A Case Study of the Sariosiyo District, Surkhandarya Region

During the preparation of this dissertation research, we comprehensively investigated the status of land-use efficiency regarding plots allocated for dehqon (peasant) farming, the spatial distribution of agricultural crops and land types, and the economic performance indicators of agricultural production within the Sariosiyo district of the Surkhandarya province.

Based on the empirical findings, it was concluded that there is a critical lack of institutional monitoring over the utilization of allocated land plots. Furthermore, dehqon farm tenants face severe structural constraints, particularly in securing high-quality seed materials, accessing machinery, and obtaining other essential inputs necessary for agricultural production and subsequent marketing.

Currently, the Joint Venture Limited Liability Company (JV LLC) *"Indigo Trade"* operates within the district, specializing in the cultivation and industrial processing of agricultural commodities. This joint venture possesses substantial production capacities for the large-scale procurement and processing of fruits and vegetables. At present, however, the enterprise is forced to source raw materials from across the entire Surkhandarya province—specifically from the Jarqo‘rg‘on, Termiz, and Qumqo‘rg‘on districts—which incurs exorbitant transportation and logistical delivery costs. Alternatively, the cultivation of the required volume of specific crops could be efficiently organized directly within the Sariosiyo district by leveraging local household plots and dehqon land assets.

The management of JV LLC *"Indigo Trade"* has expressed a strong intent to establish robust cooperative forward links with local household land owners and dehqon farm tenants. Under a proposed contractual framework, the enterprise offers to supply local producers with the necessary high-quality seed varieties, while providing comprehensive agrotechnical consulting services

encompassing sowing, crop maintenance, and harvesting techniques. To achieve this, it is recommended to execute integrated cooperation contracts that span the entire value chain, starting from the strategic distribution of agricultural crops and land use, up to financing and the overall production-procurement cycle. The institutionalization of such cooperative relationships is urgently required.

Given that agriculture is formally designated as a strategic direction for the country's economic development, and considering that dehqon and personal subsidiary plots generate approximately **60% of the gross agricultural output (GAO)**, regional authorities must prioritize agricultural cooperation within local development programs. Particular emphasis must be placed on the specialized training of professional personnel in the field of cooperation. Furthermore, it is highly advisable to establish dedicated working groups under local regional unions of consumer societies to thoroughly analyze, systematically adapt, and promote both domestic and advanced international practices in agricultural cooperation.

CONCLUSION

The study proves that the agricultural cooperation of dehqon farms acts as an indispensable factor for their effective development in Uzbekistan. The application of the HHI index confirmed the existence of intense oligopsonistic pressure on southern dehqon farmers, which requires intervention in the form of collective marketing structures. The proposed model of an IQF mini-center proves that cooperation is not only highly efficient commercially (payback in 0.6 years) but also performs a vital social function — maximizing the incomes of rural households and integrating them into global value chains.

LIST OF REFERENCES

1. Law of the Republic of Uzbekistan "On Dehqon Farming" dated April 1, 2021, No. ZRU-680 // National Database of Legislation of the Republic of Uzbekistan Lex.uz.
2. Law of the Republic of Uzbekistan "On Agricultural Cooperative" dated November 8, 2024, No. ZRU-995 // National Database of Legislation of the Republic of Uzbekistan Lex.uz.
3. Resolution of the President of the Republic of Uzbekistan dated March 5, 2024, No. PP-115 "On measures to support the production of goods in households of the population by industrial method and utilizing new reserves in household and dehqon farms".

4. Decree of the President of the Republic of Uzbekistan dated February 14, 2025, No. UP-22 "On additional measures for introducing a modern organizational system and financial support for the activities of household land owners and dehqon farms".

5. Yuldashev D. T., Alikulov B. A., Uzokova Sh. Z. Smallholders and dehqon farms — an important form of family entrepreneurship and conditions for their development in the country // Economy and Society. — 2022. — No. 5 (96). — PP. 110–115.

6. Data of the National Committee of the Republic of Uzbekistan on Statistics (as of July 1, 2026).

SHAHAR O‘SIMLIKLARI TARKIBINING SHAKLLANISHIGA TABIIY VA ANTROPOGEN OMILLARINING TA’SIRI

I.R.Tursunaliyeva

Namangan davlat universiteti

E-mail: intizortursunaliyeva@gmail.com

Abstract. *This article presents a comparative analysis of the effects of natural-climatic and anthropogenic factors on the formation of vegetation composition in urban areas. Based on studies conducted in cities with different environmental conditions, the effects of irrigation, urban greening, construction, transport infrastructure, and changes in land use on vegetation cover were assessed. In the case of Namangan, the natural conditions of the Fergana Valley, a developed irrigation network, the expansion of newly built areas, and changes in land-use patterns were identified as the main influencing factors. The comparative analysis showed that Namangan shares certain similarities with Andijan and Fergana in terms of natural and geographical conditions, with Bukhara in terms of irrigation, with Pavlodar in terms of construction and transport impacts, and with Almaty and Ankara in terms of urban greening. The results indicate the need to assess urban vegetation composition through an integrated consideration of natural conditions and anthropogenic pressures.*

Keywords: *urban vegetation, Namangan, natural-climatic factors, anthropogenic impact, irrigation, urban greening, construction, transport, land use.*

KIRISH.Shahar hududlaridagi o‘simliklar tarkibi tabiiy-iqlimiy sharoit, shaharning maydoni, yer maydonlaridan foydalanish turi, transport tarmoqlari, ko‘kalamzorlashtirish, sug‘orish va begona o‘simliklarning kirib kelishi ta’sirida shakllanadi. Ural-Volga hududidagi 14 ta shaharni qamrab olgan tadqiqotda o‘simlik turlari soni 288 tadan 973 tagacha, begona turlar ulushi esa 21–41 % oralig‘ida o‘zgargani aniqlangan. Shahar kattaligi mahalliy turlar sonidagi farqning 56 % ini, begona turlar sonidagi farqning 91 % ini va jami turlar sonidagi farqning 71 % ini izohlagan. Hududning dengiz sathidan balandligi esa mahalliy turlar sonidagi farqning 22 % ini izohlagan [6]. Bu natijalar shahar

o‘simliklari tarkibini faqat inson faoliyati yoki faqat iqlim bilan izohlash yetarli emasligini ko‘rsatadi.

Shahar markazi va chekka hududlar o‘rtasidagi farq Pavlodar shahri misolida o‘rganilgan. O‘simliklar tarkibi shahar markazidan qishloq atrofigacha yo‘nalgan to‘rtta 20 km uzunlikdagi yo‘nalish bo‘yicha baholangan. Begona o‘simliklar ulushi shahar markazida 45 %, qishloq atrofi hududida 23 % ni tashkil etgan. Turlar boyligi shahar markazidan uzoqlashgan sari ortgan, o‘simliklar tarkibidagi farqlar esa yer maydonidan foydalanish turi va 500 m radiusdagi qurilgan maydon ulushi bilan bog‘langan [8].

Ko‘kalamzorlashtirishning shahar o‘simliklariga ta’siri Olmaota shahri misolida yaqqol ko‘rinadi. 2015–2017-yillarda olib borilgan tadqiqotlarda 396 tur, 204 turkum va 73 oila qayd etilgan. Ko‘kalamzorlashtirishda foydalanilgan daraxt va butalarning 54 turi yoki 25,3 % i mahalliy, 159 turi yoki 74,6 % i boshqa hududlardan keltirilgan o‘simliklardan iborat bo‘lgan [4]. Mazkur natija shahar yashil hududlarining tarkibi tabiiy o‘simliklar bilan bir qatorda inson tomonidan tanlangan o‘simliklar hisobiga ham shakllanishini ko‘rsatadi.

Anqaraning Mamak tumanida jami 233 o‘simlik birligi aniqlangan bo‘lib, ulardan 118 tasi mahalliy, 115 tasi chetdan keltirilgan va madaniy o‘simliklardan iborat bo‘lgan. Ularning ulushi mos ravishda 50,64 % va 49,36 % ni tashkil etgan [2]. Bu natija inson faoliyati bilan kiritilgan o‘simliklar ayrim shahar hududlarida mahalliy o‘simliklar bilan miqdor jihatdan deyarli tenglashishi mumkinligini ko‘rsatadi.

O‘zbekiston shaharlarida olib borilgan tadqiqotlar orasida Andijon shahri Namangan uchun geografik jihatdan eng yaqin qiyosiy hududlardan biridir. N.M. Sidiqjanov tomonidan Andijonda olib borilgan tadqiqotlarda 47 oila, 218 turkum va 355 tur aniqlangan. Namlikka munosabatiga ko‘ra mezofitlar, yorug‘likka munosabatiga ko‘ra esa geliossiofitlar ustunligi qayd etilgan [5].

Buxoro shahrida 42 oila, 170 turkum va 255 tur aniqlangan. Ulardan 159 tasi mahalliy, 96 tasi begona o‘simliklarga mansub bo‘lib, begona turlar umumiy tarkibning 37,6 % ini tashkil etgan [7]. Shuningdek, 2015–2024-yillarda

shahardagi yashil maydonlarning qisqarishi qayd etilgan. Qurg‘oqchil sharoitda doimiy sug‘orish va parvarish o‘simliklarning saqlanishida muhim omil sifatida namoyon bo‘lgan.

2026-yilda Toshkent, Farg‘ona va Buxoro shaharlaridagi o‘simliklarning qarindoshlik tuzilishi qiyosiy o‘rganilgan. Toshkent va Farg‘onada shahar muhiti begona o‘simliklar uchun nisbatan kuchli saralovchi sharoit yaratgan bo‘lsa, Buxoroda muntazam sug‘orish va inson tomonidan parvarish tabiiy qurg‘oqchilik ta’sirini yumshatgani qayd etilgan [3]. Bu holat bir mamlakat hududidagi shaharlarda ham iqlim va inson faoliyati ta’siri turlicha namoyon bo‘lishini ko‘rsatadi.

Namangan hududining tabiiy sharoiti mazkur shaharlarni qiyoslash uchun alohida ahamiyatga ega. Hududda yillik yog‘in miqdori 300–350 mm, iyul oyining o‘rtacha harorati 26,3 °C, vegetatsiya davri esa 236 kunni tashkil etadi. Katta Namangan kanali, Yangiariq, Namangansoy, Girvonsoy, Irvadonsoy va Kosonsoy hududdagi asosiy suv tarmoqlaridir [9]. Mazkur ko‘rsatkichlar Namanganda tabiiy yog‘in bilan bir qatorda sun’iy sug‘orish ham o‘simliklarning o‘sish sharoitiga ta’sir etuvchi muhim omil ekanini ko‘rsatadi.

Namangan shahrida yer maydonlaridan foydalanish shakli ham jadal o‘zgarib bormoqda. “Yangi Namangan shaharchasi” uchun jami 1203 gektar hudud ajratilgan bo‘lib, uning 508,4 gektari qishloq xo‘jaligiga mo‘ljallangan, 436,2 gektari esa sug‘oriladigan yerlardan iborat [1]. Ushbu yerlarning boshqa maqsadlarda foydalaniladigan hududlarga o‘tkazilishi avvalgi qishloq xo‘jaligi maydonlari o‘rnida yangi qurilish, yo‘l va yashil hududlarning shakllanishiga olib kelmoqda.

2026-yil yanvar–may oylarida Namangan shahrida 1 092,3 mlrd so‘mlik qurilish ishlari bajarilgan va o‘sish sur’ati 120,5 % ni tashkil etgan. 2026-yil 1-aprel holatiga shaharda 465 ta qurilish korxonasi faoliyat yuritgan [11]. Yangi Namangan hududida 47,12 km ichki yo‘l mavjud bo‘lib, shundan 30,57 km asfalt qoplamali yo‘lni ta’mirlash, 16,55 km tuproq yo‘lni shag‘allashtirish

rejalashtirilgan [13]. Bundan tashqari, yangi yo‘llar, piyodalar yo‘laklari, suv tarmoqlari va yashil hududlar barpo etilishi belgilangan [12].

Mavjud ilmiy va rasmiy ma’lumotlar Namangan shahrida tabiiy-iqlim sharoiti, sug‘orish, yer maydonlaridan foydalanishdagi o‘zgarishlar, qurilish va transport tarmoqlarining kengayishi bir vaqtning o‘zida kechayotganini ko‘rsatadi. Shu sababli Namangan shahrining o‘simliklar tarkibini mazkur omillar bilan bog‘liq holda boshqa shaharlarda aniqlangan qonuniyatlar bilan qiyosiy o‘rganish dolzarb hisoblanadi.

NATIJALAR. Namangan shahrining tabiiy va xo‘jalik sharoitlari ayrim shaharlarda aniqlangan holatlarga yaqinligini, ayrim yo‘nalishlarda esa sezilarli farq qilishini ko‘rsatdi. Namangan uchun eng yaqin qiyosiy hududlar Andijon va Farg‘ona shaharlari bo‘lib, ularning barchasi Farg‘ona vodiysida joylashgan. Ushbu geografik yaqinlik yozgi harorat, vegetatsiya davri, sug‘orish va qishloq xo‘jaligi yerlaridan foydalanish kabi omillarning o‘zaro yaqin sharoitda namoyon bo‘lishiga asos yaratadi.

Namangan hududida yillik yog‘in miqdori 300–350 mm, iyul oyining o‘rtacha harorati 26,3 °C va vegetatsiya davri 236 kunni tashkil etishi [9] suv bilan ta’minlanishning o‘simliklar uchun muhim ekanini ko‘rsatadi. Andijonda namlikka talabchanligi o‘rtacha bo‘lgan o‘simliklar hamda yorug‘sevar guruhlarning ustunligi aniqlangan [5]. Namangan va Andijonning bir xil vodiy hududida joylashganligi sababli namlik va yorug‘lik sharoitining o‘simliklar tarkibiga ta’siri ikki hudud uchun umumiy yo‘nalishlardan biri sifatida qaralishi mumkin.

Namangan bilan Buxoro o‘rtasidagi asosiy umumiy jihat sug‘orish tizimining shahar yashil hududlari uchun muhimligidir. Buxoroda qurg‘oqchil sharoitda muntazam sug‘orish va parvarish o‘simliklarning saqlanishiga sharoit yaratgan [3, 5]. Namanganda esa Katta Namangan kanali va bir qator soy hamda ariqlarning mavjudligi suv ta’minotining hududiy ahamiyatini ko‘rsatadi [9]. Biroq Buxoro va Namangan iqlim jihatidan bir xil emas. Buxoroda

qurg‘oqchilik kuchliroq, Namangan esa Farg‘ona vodiysi sharoitida joylashgan. Shu sababli sug‘orishning ta’sir kuchi ikki shaharda bir xil bo‘lishi kutilmaydi.

Namanganning Pavlodar bilan qiyosida qurilish va yer maydonlaridan foydalanish omili umumiy jihat sifatida ajralib chiqdi. Pavlodarda o‘simliklar tarkibining shaharning markaziy va chekka hududlarida farqlanishi qurilgan maydon ulushi hamda yer foydalanish turi bilan bog‘langan [8]. Namanganda “Yangi Namangan shaharchasi” uchun ajratilgan 1203 gektar hududning katta qismi avval qishloq xo‘jaligida foydalanilgan yerlardan iborat bo‘lgan [1]. Bu hududlarning qurilish va boshqa shahar vazifalariga o‘tkazilishi o‘simliklarning yashash sharoiti o‘zgarayotganini ko‘rsatadi.

Pavlodar va Namangan o‘rtasidagi yana bir umumiy jihat transport tarmoqlari bilan bog‘liq. Pavlodarda avtomobil yo‘llariga yaqinlik o‘simliklarning tarqalishi bilan bog‘langan [8]. Yangi Namangan hududida 47,12 km ichki yo‘l mavjud bo‘lib, ularning katta qismida ta’mirlash va qayta qurish ishlari rejalashtirilgan [6]. Shu sababli Namanganda yo‘l bo‘yi hududlari o‘simliklar tarkibidagi o‘zgarishlarni kuzatish uchun muhim maydonlardan biri hisoblanadi. Olmaota bilan qiyoslash ko‘kalamzorlashtirishning ahamiyatini ko‘rsatdi. Olmaota da ko‘kalamzorlashtirishda foydalanilgan daraxt va butalarning katta qismini boshqa hududlardan keltirilgan o‘simliklar tashkil etgan [5]. Namanganda Yangi Namangan hududida yangi yashil maydonlar tashkil etilishi ko‘zda tutilgan [1]

Anqara bilan qiyoslanganda ham ko‘kalamzorlashtirish va inson tomonidan kiritilgan o‘simliklarning ahamiyati ko‘zga tashlanadi. Mamak hududida mahalliy va chetdan keltirilgan hamda madaniy o‘simliklarning soni bir-biriga juda yaqin bo‘lgan [12]. Namanganda yangi turar joylar va yashil hududlarning barpo etilishi kelgusida mahalliy hamda keltirilgan o‘simliklar nisbatining o‘zgarishiga olib kelishi mumkin. Namanganning boshqa shaharlardan asosiy farqlaridan biri yangi qurilishlar, sug‘oriladigan yerlarning vazifasi o‘zgarishi va transport infratuzilmasining bir vaqtning o‘zida kengayib borayotganidir. 2026-yil yanvar–may oylarida shaharda 1 092,3 mlrd so‘mlik

qurilish ishlari amalga oshirilgani va qurilish sur’ati 120,5 % ni tashkil etgani ushbu jarayonning jadalligini ko‘rsatadi [11].

Foydalanilgan adabiyotlar ro`yxati

O‘zbekiston respublikasi normativ-huquqiy hujjatlari

1.O‘zbekiston Respublikasi Prezidentining qarori. (2022). Namangan shahrida “Yangi Namangan shaharchasi” zamonaviy ishbilarmonlik markazi va turar joylar kompleksini barpo etish chora-tadbirlari to‘g‘risida (PQ–160-son qaror, 2022-yil 11-mart). 3-band, 1- va 2-ilovalar.

Ilmiy maqolalar va dissertatsiyalar

2.Çakmak, M. H., & Aytaç, Z. (2018). Urban vascular flora and ecological characteristics of Mamak District (Ankara/Turkey). Biological Diversity and Conservation, 11(2), 123–131.

3.Juraev, Z., Urinboev, I., Esanov, H., et al. (2026). The first comprehensive assessment at the Central Asian scale of the phylogenetic diversity of urban floras in the arid and temperate regions of Uzbekistan. Acta Biologica Sibirica, 12, 489–508.

4.Sadirova, G. A., Inelova, Z. A., Jamilova, S. M., et al. (2018). Analysis of Urban Flora of the City of Almaty (Kazakhstan). OnLine Journal of Biological Sciences, 18(3), 365–376.

5.Sidiqjanov, N. M. (2024). Andijon shahri urbanoflorasining zamonaviy holati va ekologiyasi [Biologiya fanlari bo‘yicha falsafa doktori (PhD) dissertatsiyasi avtoreferati]. Andijon.

6.Tretyakova, A. S., Veselkin, D. V., Senator, S. A., & Golovanov, Ya. M. (2018). Factors of Richness of Urban Floras in the Ural–Volga Region. Russian Journal of Ecology, 49(3), 201–208.

QORATEPA TOG‘LARIDA PEGMATITLAR VA KAMYOB METALLARNING RIVOJLANISHI TARQALISH XUSUSIYATI

Очилов Шохрух Холикбердиевич

Институт минеральных ресурсов.

ochilovshoxrux2408@gmail.com

Касимов Носирбек Мансурович

Институт минеральных ресурсов.

qosimovnosirbek2001@gmail.com

Раджаббоев Фаридун Хужанзарзода

Институт минеральных ресурсов.

Faridunrajabboyev90@gmail.com

Annotatsiya. *Ushbu maqolada Qoratepa tog‘larining g‘arbiy qismida joylashgan Lolabuloq pegmatitli maydonining geologik tuzilishi, kamyob metallarning tarqalish xususiyatlari va ularning istiqbollari atroflicha tahlil qilingan. Hududdagi Mang‘it, Arabband, Uyshun va Sharqiy uchastkalarida olib borilgan kompleks geologik-geofizik tadqiqotlar hamda chuqur burg‘ulash ishlari natijalari yoritib berilgan. Maydondagi pegmatit tomir-daykalarining fazoviy joylashuvi aniqlanib, ularda litiy, tantal, niobiy, qalay va berilliy kabi strategik muhim metallar zaxiralari mavjudligi isbotlangan. Shuningdek, zamonaviy geologiya-qidiruv ishlarini rivojlantirish va mamlakatimizning mineral-xomashyo bazasini kengaytirishdagi ilmiy-amaliy ahamiyati asoslab berilgan.*

Аннотация. *В статье детально анализируются геологическое строение, особенности размещения и перспективы редких металлов на пегматитовом поле Лолабулок (Lolabuloq), расположенном в западной части Каратепинских гор. Освещены результаты комплексных геолого-геофизических исследований и глубокого бурения, проведенных на участках Мангит, Араббанд, Уйшун и Восточный. Определено пространственное положение пегматитовых жил и даек, а также доказано наличие промышленных запасов таких стратегически важных металлов, как литий, тантал, ниобий, олово и бериллий. Кроме того, обосновано научно-практическое значение полученных данных для развития геологоразведочных работ и расширения минерально-сырьевой базы страны.*

Annotation. *This article thoroughly analyzes the geological structure, distribution features, and prospects of rare metals in the Lolabuloq pegmatite field, located in the western part of the Qoratepa Mountains. It highlights the results of comprehensive geological-geophysical surveys and deep drilling conducted across the Mang'it, Arabband, Uyshun, and Sharqiy sectors. The spatial orientation of pegmatite veins and dikes was established, confirming industrial-grade reserves of strategically vital metals such as lithium, tantalum, niobium, tin, and beryllium. Furthermore, the paper substantiates the scientific and practical significance of these findings for advancing exploration and expanding the country's mineral resource base.*

Kalit so'zlar: *Pegmatit, Kamyob metallar, Zarafshon-Alay tuzilish-formatsiya zonasi, Intruziya, Skvazhina, Gamma-karotaj, Metamorfik jinslar, Dayka, Mineral-xomashyo bazasi, Lepidolit.*

Ключевые слова: *Пегматит, Редкие металлы, Зеравшан-Алайская структурно-формационная зона, Интрузия, Скважина, Гамма-каротаж, Метаморфические породы, Дайка, Минерально-сырьевая база, Лепидолит.*

Keywords: *Pegmatite, Rare metals, Zarafshan-Alay structural-formation zone, Intrusion, Borehole, Gamma logging, Metamorphic rocks, Dyke, Mineral-raw material base, Lepidolite.*

Сегодня в мировом масштабе спрос на редкие и редкоземельные металлы (Ta, Nb, Be, Li) стремительно растет, а показатели их производства увеличиваются в 3–10 раз. Бурное развитие высоких технологий, электроники, автомобилестроения и зеленой энергетики превращает освоение сырья стратегического значения в требование времени. В связи с этим в нашей стране проводятся масштабные работы по расширению минерально-сырьевой базы и освоению новых перспективных месторождений. Данное направление является одним из приоритетных в государственной политике. В Указе Президента Республики Узбекистан № УП-60 (2022 г.) и постановлениях № ПП-3578 (2018 г.), № ПП-5083 (2021 г.) и № ПП-343 (2022 г.) определены конкретные задачи по коренному совершенствованию сферы геологии, расширению минерально-сырьевой базы и выявлению новых

месторождений, что служит важной правовой основой для дальнейшего повышения экономического потенциала нашей страны.

Классификация и запасы литофильно-редкометальных месторождений Узбекистана и мира

На сегодняшний день в мировой экономике и промышленности наблюдается очень высокий спрос и потребность в редких металлах. Большая часть спроса на редкие металлы может быть удовлетворена за счет освоения их традиционных месторождений. За последние 10–15 лет в различных странах мира были выявлены и осваиваются новые типы редкометальных месторождений. Их запасы в десятки и сотни раз превышают запасы месторождений традиционных типов.

Таблица 6

Распределение площадей пегматитовых поясов в государствах-участниках Содружества Независимых Государств по геологическим периодам (в %)

Типы пегматитов	Мезозой	Палеозой	Докембрий (до кембрия)
Редкометальные	46	38	16
Слюдоносные и керамические	44	6	50
Хрусталеносные	42	35	23
Все пегматиты	45	21	34

В результате первичных исследований, проведенных на территории нашей республики, было выявлено в общей сложности 92 перспективных объекта, в том числе 55 участков и 37 мелких рудопроявлений. Несмотря на это, такие важные стратегические металлы, как тантал, ниобий, бериллий и литий, до сих пор добываются не на полную мощность, что указывает на наличие огромного неиспользованного потенциала в данной

отрасли. Ярким примером таких возможностей в регионе можно назвать пегматитовое поле Лолабулок (Lolabuloq), которое относится к числу средних и крупных месторождений.

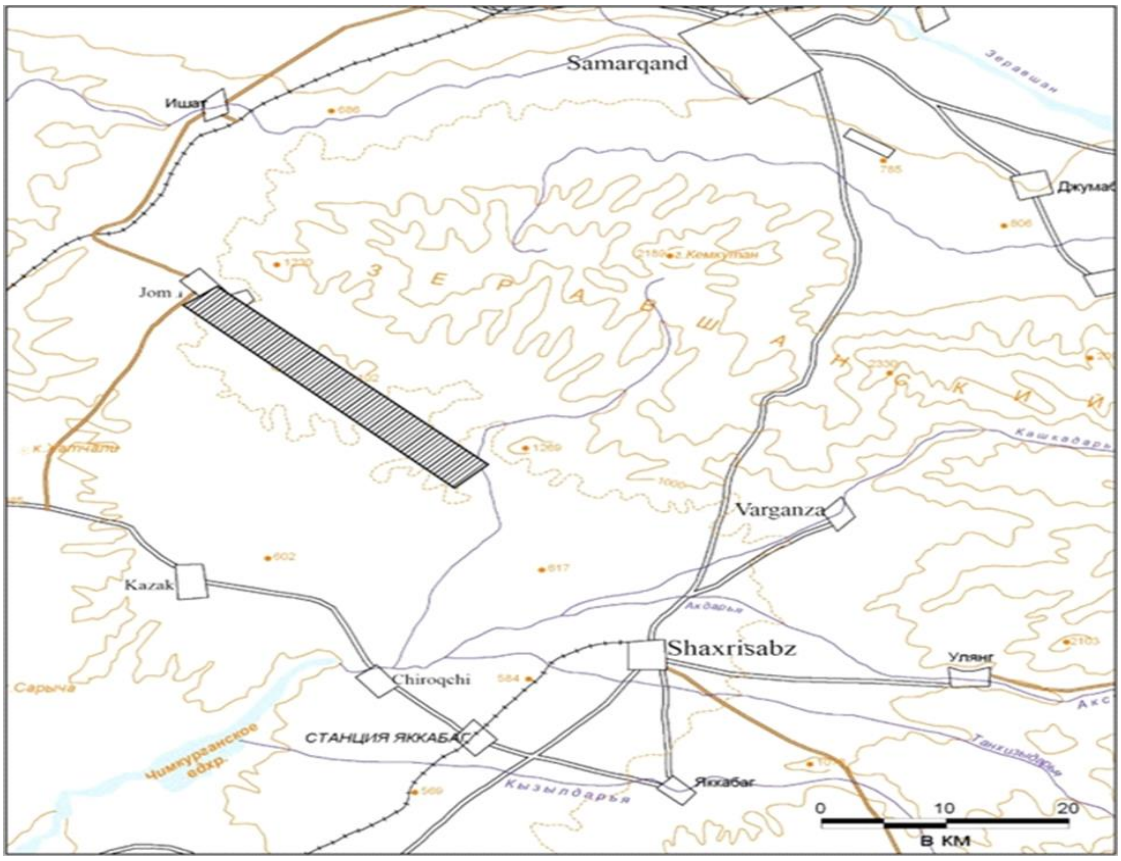


Рисунок 1. Общая обзорная карта расположения пегматитового поля Лолабулок (Lolabuloq).

Территория имеет сложное геологическое строение и сложена преимущественно метаморфическими породами палеозойского возраста и гранитными интрузиями.

Пегматитовые тела в основном заполняют линейные и межпластовые трещины, протягивающиеся с запада на восток, и сосредоточены в жилоподобных, линзовидных, плитчатых и дайкоподобных морфоструктурах.

Здесь редкие металлы развиты в пегматитах. Пегматиты — это крупнокристаллические магматические породы, образующиеся на завершающей стадии кристаллизации гранитной магмы. Они состоят

главным образом из кварца, полевого шпата и слюд. Пегматиты встречаются в природе в различных формах: жилоподобных, дайкоподобных, линзовидных и плитчатых. Они залегают преимущественно в зонах контакта грантных интрузий с осадочно-метаморфическими породами.

Пегматитовое поле Лолабулок (Lolabuloq), обладающее редкометальной минерализацией, характерно для восточных частей месторождения. Пегматитовое поле, богатенное полевым шпатом, расположено в местах контакта интрузива с осадочно-метаморфическими пластами и занимает территорию шириной 1,5 км и длиной 25 км.

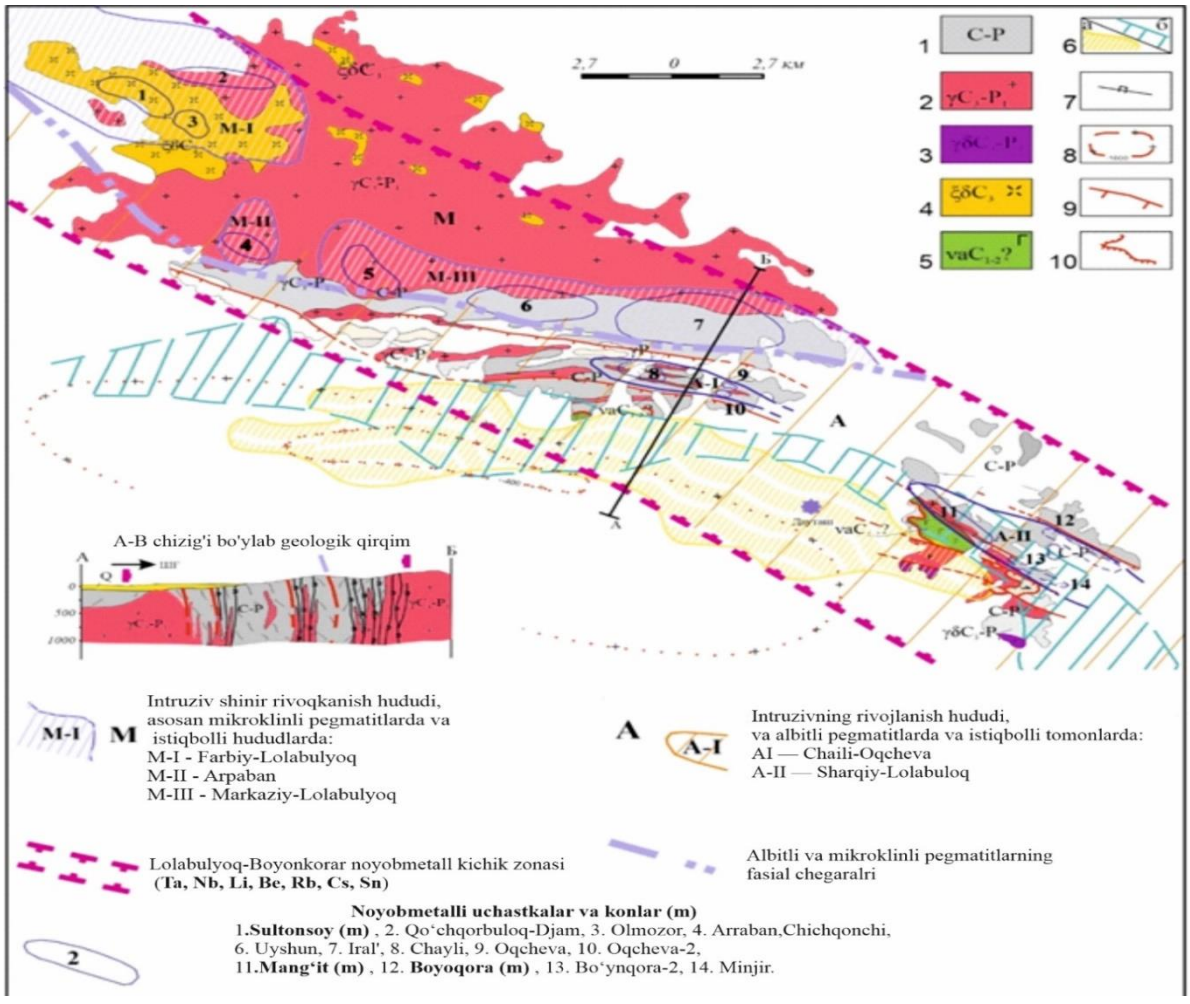


Рисунок 5. Геологическая карта пегматитового поля Лолабулок (Lolabuloq).

Исследования проводились на следующих 4 участках пегматитового поля Лолабулок (Lolabuloq): участок Мангит, участок Араббанд, участок Уйшун, Восточный участок.

Участок	Характеристика	Гамма-активность	Важная скважина
Мангит	Основной, наиболее изученный. Прорезан ортоклазовым гранитом	81–175 мкР/час	214, 216, 221, 254, 264, 272
Араббанд	Проведено поисковое бурение	131–135 мкР/час	Скв. № 260 (177 м)
Уйшун	Выявлено несколько аномалий	87–109 мкР/час	Скв. № 266, 267
Восточный	Часть Восточно-Лолабулокского рудного узла	84–122 мкР/час	Скв. № 263 (86–87 м)

ЗАКЛЮЧЕНИЕ

Пегматитное поле Лолабулок (Lolabuloq) расположено в западной части Каратепинских гор и относится к Зеравшан-Алайской структурно-формационной зоне. Поле генетически связано с гранитоидами Гиссарского комплекса и богато редкими металлами, такими как бериллий, тантал, ниобий, а также кварц-полевошпатовым сырьем.

В 2017–2021 годах на участках Мангит, Араббанд, Уйшун и Восточный было пробурено 89 скважин, выполнено бурение на общую глубину 11 494 м. Применялись методы гамма-каротажа, инклинометрии, электрокаротажа и магнитной разведки. В результате были выявлены пегматитовые жилы-дайки и определено их пространственное положение.

Проведенные комплексные геофизические и космические исследования подтвердили перспективы поля на редкометальные пегматиты и создали методологическую основу для дальнейших детальных геологоразведочных работ.

Согласно анализам, здесь доказано наличие промышленных запасов таких металлов, как литий (лепидолит), тантал и ниобий (колумбит-танталит), олово (касситерит) и бериллий (берилл).

СПИСОК ЛИТЕРАТУРЫ

1. Акбаров Х.А., Умарходжаев М.У., Исматуллаева Л.А. Геолого-структурные условия размещения оруденения на полиметаллических рудных полях Тянь-Шаня. Ташкент: Фан, 1981. С. 218.

2. Абдуллаев Х.М. Генетическая связь оруденения с гранитоидными интрузивами. Ташкент: Lesson Press, 2022. С. 82–86.

3. Ахмеджанов М.А., Абдуллаев Р.Н., Борисов О.М. Докембрий Срединного и Южного Тянь-Шаня. Ташкент: Фан, 1975. С. 25–31.

4. Бухарин А.К. Отчет «Региональная палеогеография Южного и Срединного Тянь-Шаня в рифее-антропогене (как основа для региональных минерагенических исследований)» за 1996–2000 гг. Ташкент: Фонд ГП «ИМР», 2000. Кн. 1. 323 с.

5. Джантуганов Н.И., Терлесский О.Г., Захидов А.Р. и др. Прогнозная оценка Каратепа-Чаклкальянского горно-рудного района с выявлением рудных полей и локальных геолого-структурных позиций ртутно-золоторудной джаспероидной формации за 1992–1996 гг. В 3 книгах. Ташкент: Фонд ГП «ИМР», 1996. Кн. 1. 231 с.

EFFECTS OF MACHINING METHODS ON THE SURFACE QUALITY OF A STEEL 45–STEEL ST5 WELDED JOINT

Vasilatkhon Yuldashali qizi Abdullayeva

[1] *Basic doctoral student (DSc), Department of Mechanical Engineering Technology, Fergana State Technical University (FSTU), Fergana, Republic of Uzbekistan*

vasilaabdullayeva91@gmail.com

Abstract. *This paper analyzes the surface roughness Ra after turning, surface plastic deformation (burnishing, SPD), and grinding in three zones of a welded joint made of Steel 45 and Steel St5: the Steel 45 base metal, the weld seam, and the Steel St5 base metal. Across the recorded measurements, Ra ranged from 4.074 to 5.449 μm after turning, from 0.350 to 3.569 μm after burnishing, and from 0.278 to 0.928 μm after grinding. The lowest recorded Ra values were obtained after grinding. The wide spread in the burnishing results indicates that the process parameters and each zone of the welded joint require separate optimization.*

Keywords: *Steel 45, Steel St5, welded joint, weld seam, Ra, surface roughness, turning, grinding, burnishing, surface plastic deformation, surface quality.*

INTRODUCTION

In a Steel 45–weld seam–Steel St5 joint, the base metals and weld differ in chemical composition and welding thermal history. These differences may affect the formation of the surface layer during machining. Surface roughness Ra is an important quality indicator that can influence friction and wear.

Turning removes material with a cutting tool; grinding uses abrasive grains to produce a finer surface; burnishing (surface plastic deformation, SPD) smooths surface asperities through roller-induced plastic deformation. A study on ball burnishing of AISI 1045 steel reported a reduction in Ra and an increase in hardness. That result is used here for comparison, not as evidence that AISI 1045 and Steel 45 are identical materials [2].

The research gap is the limited availability of comparative experimental data on Ra after turning, burnishing, and grinding across all three zones of a Steel 45–weld seam–Steel St5 joint. The contribution of this study is a zone-by-zone comparison of the available experimental records using the same roughness parameter. The aim is to determine the Ra ranges in each zone and assess differences among the three machining methods.

Rationale for selecting Steel 45 and Steel St5 and the effect of composition

Steel 45 and Steel St5 were selected because they are carbon structural steels with different carbon contents and different sensitivity to the thermal effects of welding. This material pair allows the machining response of both base metals and the weld zone to be compared along a single specimen. The exact Steel St5 grade and its chemical composition should be confirmed by the material certificate.

According to GOST 1050-2013, Steel 45 contains 0.42–0.50% C, 0.50–0.80% Mn, and 0.17–0.37% Si. GOST 380-2005 specifies 0.28–0.37% C and 0.50–0.80% Mn for St5ps; silicon is 0.05–0.15% for St5ps and 0.15–0.30% for St5sp. Limits for impurities such as sulfur and phosphorus also differ. The exact grade suffix and chemical certificate of the Steel St5 used should therefore be reported [4, 5].

Grade	C, %	Mn, %	Si, %
Steel 45	0.42–0.50	0.50–0.80	0.17–0.37
St5ps	0.28–0.37	0.50–0.80	0.05–0.15
St5sp	0.28–0.37	0.50–0.80	0.15–0.30

Table 1. Main chemical-composition limits specified in the standards (mass fraction, %)

A higher carbon content can increase strength and hardenability, but it may also increase the risk of hardening in the heat-affected zone during rapid cooling. Manganese and silicon affect strength and metallurgical processes.

Weldability depends not only on carbon content but also on carbon equivalent, thickness, welding consumable, hydrogen content, and cooling conditions [3–5].

Both materials are carbon steels with similar densities. Differences in composition, particularly carbon content, may affect phase transformations during heating and cooling and the resulting hardness distribution. For this reason, the machining response should be evaluated separately across the welded joint.

Metallurgical changes during welding

Metal adjacent to the weld may reach high temperatures without melting, forming the heat-affected zone. Rapid cooling on the Steel 45 side may increase hardness and reduce ductility; the weld metal and Steel St5 side may have different compositions and thermal histories. These differences may contribute to nonuniform hardness and surface deformation during machining [3–5].

Condition of the welded seam during burnishing

Burnishing (roller burnishing, SPD) is a process in which a roller moves under pressure along the surface and smooths micro- and surface asperities through plastic deformation. When the process parameters are selected appropriately, Ra may decrease and the surface layer may be strengthened. Roughness and hardness should be monitored separately across zones of welded joints [6].

The seam profile and the hardness–ductility differences among the three zones affect the contact load between the roller and the surface. Excessive pressure or an uneven seam may increase the risk of local indentation or surface damage. The process should therefore be optimized stepwise, the seam profile prepared in advance, and each zone checked by measurement.

The available experimental table contains Ra and HB records, but it does not report residual-stress, microstructure, or crack-inspection results. Accordingly, this paper discusses the effect of burnishing in terms of Ra only; it does not claim that residual stresses were reduced or that cracks were eliminated.

Industrial applications

The results may be relevant to welded and machined components produced in machine building, agricultural machinery, transport equipment, pump and compressor manufacturing, metal construction, and repair industries. Steel 45 is used for loaded components such as shafts and axles, while St5 is used in weldable frames and support elements. The process for a specific plant or component must be selected according to its drawing and approved production procedure.

Materials and methods

The test object was a welded joint made of Steel 45 and Steel St5. Ra values were assigned to three zones using the three columns in the experimental table: Steel 45 base metal, weld seam, and Steel St5 base metal. Ra was interpreted as the arithmetic mean deviation of the assessed profile; surface-texture terminology follows ISO 21920-2:2021 [1].

Turning was performed on a 16K20 screw-cutting lathe. Rough turning: d_1=38 mm, d_2=34 mm, t=2 mm, s=0.17 mm/rev, n=315 rpm; finish turning: d_1=34 mm, d_2=33 mm, t=0.5 mm, s=0.07 mm/rev, n=1000 rpm. Burnishing was performed on the 16K20 lathe at d=33 mm, s=0.07 mm/min (as recorded in the source), and n=400 rpm. Grinding was carried out on a 3M194 cylindrical grinder with a 750 mm wheel; wheel speed was 1000 rpm, specimen speed 120 rpm, and feed 1.2 m/min.

According to the experimental records, there are 8 Ra entries per zone for turning, 24 for burnishing, and 12 for grinding. These are reported as the number of entries in the source table, not necessarily as replicate measurements. The results were summarized as minimum–maximum ranges. Some burnishing labels (e.g., 1, 1.5, and 2) are not identified with a specific parameter. The profilometer model, evaluation/cutoff length, filter settings, measurement direction, and repeat-measurement protocol are also not specified; therefore, statistical significance was not assessed.

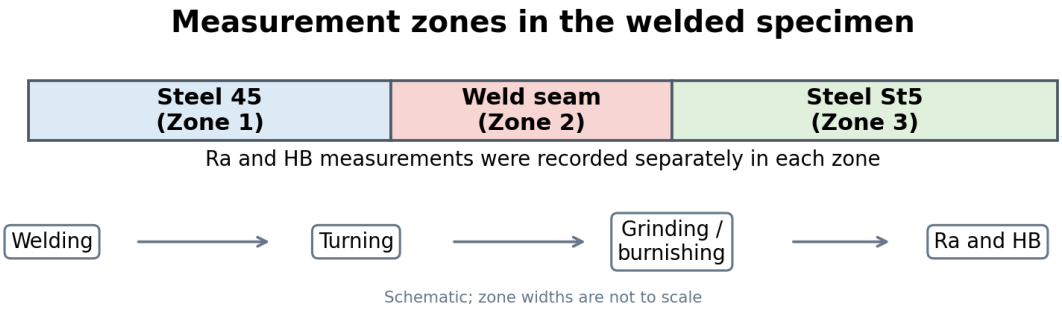


Figure 1. Measurement zones and experimental workflow

RESULTS AND DISCUSSION

The Ra ranges for the three zones are presented in Table 2. For each method, the table gives the lowest and highest recorded measurements; these values are not means or confidence intervals.

Zone	Turning Ra, µm (8 entries)	Burnishing Ra, µm (24 entries)	Grinding Ra, µm (12 entries)
Steel 45	4.184–5.449	0.413–3.569	0.325–0.664
Weld seam	4.074–5.425	0.350–2.771	0.278–0.749
Steel St5	4.241–5.323	0.360–3.364	0.365–0.928

Table 2. Ra ranges in the Steel 45, weld seam, and Steel St5 zones

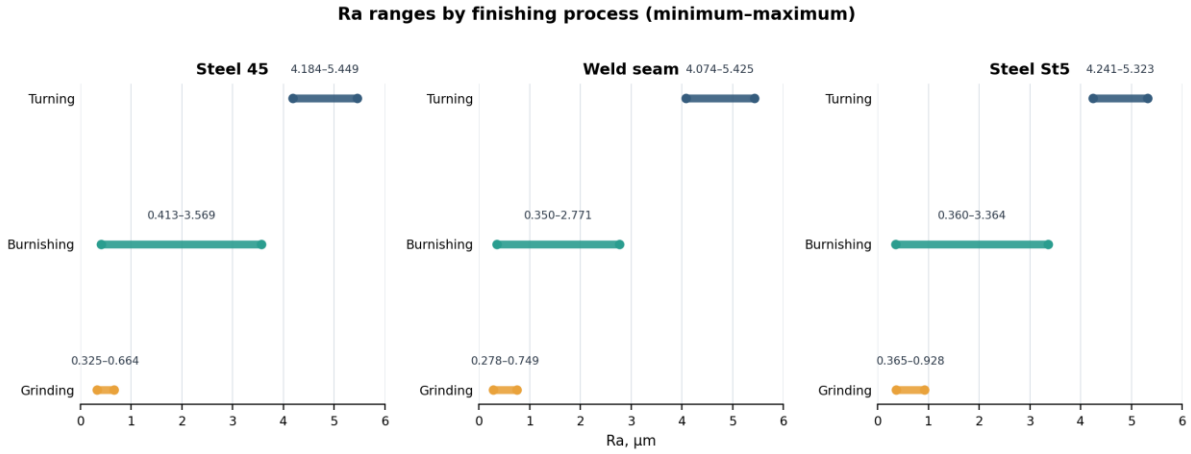


Figure 2. Minimum–maximum Ra ranges for the machining methods in the three zones

Grinding produced lower Ra ranges than turning in all three zones: the upper limit after grinding was 0.664–0.928 µm, compared with 5.323–5.449 µm after turning. For the specimens and recorded conditions in this dataset, grinding

produced the finer surface. Additional experiments are needed before generalizing this result to other materials or process settings.

Burnishing ranges varied by zone: 0.413–3.569 μm for Steel 45, 0.350–2.771 μm for the weld seam, and 0.360–3.364 μm for Steel St5. Although some entries were low, the overall spread indicates a need to optimize the process parameters. Because the table labels 1, 1.5, and 2 are not identified, the results cannot be linked to a particular pressure or deformation depth.

The turning ranges were similar across zones: 4.184–5.449 μm for Steel 45, 4.074–5.425 μm for the weld seam, and 4.241–5.323 μm for Steel St5. The lowest grinding entry, 0.278 μm, was recorded in the weld-seam zone. However, the ranges alone do not establish statistically significant differences among zones. Because the measurement protocol is incomplete, these comparisons are descriptive.

The table also contains HB hardness values, but some entries show wide variation and the correctness of certain values is uncertain. No quantitative conclusion on hardness is therefore drawn; these records should be checked against the original measurement log separately from the Ra results.

CONCLUSIONS

1. In the available experimental table, the turning Ra ranges for the Steel 45, weld-seam, and Steel St5 zones were 4.184–5.449, 4.074–5.425, and 4.241–5.323 μm, respectively. The burnishing ranges were 0.413–3.569, 0.350–2.771, and 0.360–3.364 μm. After grinding, the corresponding ranges were 0.325–0.664, 0.278–0.749, and 0.365–0.928 μm.

2. The lowest Ra ranges in all three zones were recorded after grinding. This conclusion applies only to the specimens and conditions reported in the available dataset. Some burnishing measurements were also low, but its overall range was wider.

3. The findings are descriptive. To strengthen the conclusions and select a process regime, the profilometer and measurement protocol should be

documented, the burnishing parameter labels clarified, repeated measurements made in each zone, and the means and variability assessed statistically.

REFERENCES

1. ISO 21920-2:2021. Geometrical product specifications (GPS) — Surface texture: Profile — Part 2: Terms, definitions and surface texture parameters. Geneva: ISO, 2021.

2. Influence of ball-burnishing on roughness, hardness and corrosion resistance of AISI 1045 steel. Surface and Coatings Technology, 339, 2018, 191–198. DOI: 10.1016/j.surfcoat.2018.02.013.

3. Arsić D. et al. Weldability Assessment of Various Steels by Hard-Facing. Materials, 15(9), 3082, 2022. DOI: 10.3390/ma15093082.

4. GOST 1050-2013. Metal products from nonalloyed structural quality and special steels. General specifications.

5. GOST 380-2005. Carbon steel of ordinary quality. Grades.

6. The Influence of the Burnishing Process on the Change in Surface Hardness, Selected Surface Roughness Parameters and the Material Ratio of the Welded Joint of Aluminum Tubes. Materials, 17(1), 43, 2024. DOI: 10.3390/ma17010043. (Comparative source: welded aluminum-alloy joint.)

SYNTHESIS OF THE MENTHOL–LEUCINE COMPOUND AND STUDY OF ITS PROPERTIES

Yettiboyeva Lola Abdumalikovna,

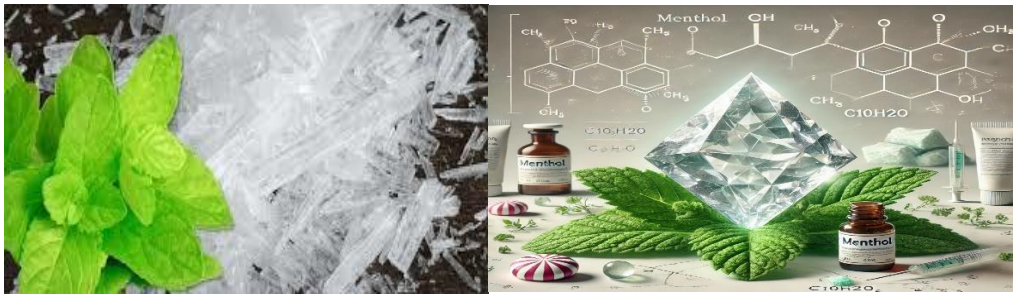
Turdibekova Muxlisa Zufar qizi

E-mail: turdibekovamuxlisa99@gmail.com

Abstract: *This article investigates the synthesis and physicochemical properties of a new compound obtained on the basis of menthol, a biologically active natural compound, and leucine, an important amino acid. The optimal reaction conditions (temperature, solvent, and time) were determined. The structure of the obtained compound was characterized using IR spectroscopy analysis. The results obtained are of significant scientific and practical importance for the development of new menthol-based bioactive substances.*

Keywords: *Menthol, leucine, menthol–leucine, physicochemical constants, IR spectroscopy, mass spectrometry.*

Menthol is an organic compound with a monoterpenoid alcohol structure that occurs naturally in mint plants and some members of the Lamiaceae family. With the chemical formula $C_{10}H_{20}O$, menthol is best known in the form of its (−)-menthol isomer and is widely recognized for its characteristic cooling sensation, aromatic smell, and pharmacological properties. It is a major additive in various industrial sectors, such as pharmaceuticals, food, cosmetics, and tobacco [1]. The Dutch botanist Gambius first isolated this compound from mint as a crystalline base in 1771. Its medicinal applications expanded in Europe in the 19th century. Today, India accounts for more than 70% of global menthol production. Advances in synthetic production have further expanded its position in the global market[2].



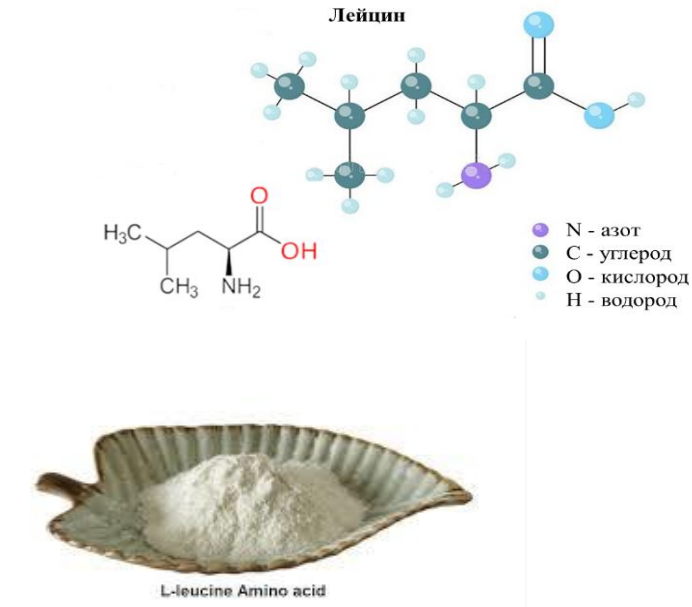
1- Figure. Crystalline form of menthol.

Menthol is a major essential oil constituent found in a very limited number of aromatic plants and is known to possess various biological properties, including antimicrobial, anticancer, and anti-inflammatory activities. These plants are also used as insect repellents or fumigants. Menthol is primarily obtained from *Mentha arvensis* (field mint), *Mentha piperita* (peppermint), and other *Mentha* species. Commercial production of menthol is generally carried out by steam distillation in countries such as India, China, and Japan. In addition to natural extraction, menthol is also synthesized chemically. Synthetic menthol is produced through the hydrogenation and isomerization of terpenes such as myrcene. The resulting mixture of isomers can be purified to isolate the desired (−)-menthol form. Most of the menthol supply is obtained naturally, and in 2007, global production of (−)-menthol amounted to approximately 19,000 tonnes (Clark, 2007), mainly obtained from *M. canadensis*. Only 6,300 tonnes were produced synthetically by companies such as Symrise (Germany), Takasago (Japan), and, to a lesser extent, Camphor & Allied (India) (Sell, 1999). Menthol [5-methyl-2-(1-methylethyl)cyclohexanol; 2-isopropyl-5-methylcyclohexanol or p-menthan-3-ol] is a naturally occurring compound with the molecular formula $C_{10}H_{20}O$ (molecular weight 156.27). It contains three asymmetric carbon atoms and therefore has four pairs of optical isomers, namely (+)- and (−)-isomenthol, (+)- and (−)-menthol, (+)- and (−)-neomenthol, and (+)- and (−)-neoisomenthol. The predominant naturally occurring form of menthol is (−)-menthol (L-menthol), which has the following configuration: 1R, 3R, 4S. This form is generally used because it exhibits stronger cooling properties than the other menthol isomers. Like other saturated alcohols, menthol undergoes a variety of reactions and can be oxidized to menthone. Menthol is a white or colorless, flaky, crystalline substance that exists in a solid state at room temperature. It has a density of 0.890 kg/dm³ (at 25 °C) and a melting point of 41–44 °C, depending on its purity. Menthol is practically insoluble in water (435.5 mg/L at 25 °C), but is freely soluble in alcohol, diethyl ether, or

chloroform (Sell, 1999; Hopp and Lawrence, 2006). Like many other terpene alcohols, such as citronellol, geraniol, linalool, nerol, and nerolidol, menthol does not absorb ultraviolet (UV) radiation effectively in the 290–320 nm range, but exhibits absorption below 290 nm, with maximum absorption at 220 nm. Mint tea and mint essential oil containing high concentrations of menthol and menthol are used in traditional medicine to treat various ailments, including infections, as well as serving as insect repellents. Various in vitro and in vivo studies have documented the biological properties of menthol, including its analgesic, antibacterial, antifungal, anesthetic, and penetration-enhancing effects, as well as its chemopreventive and immunomodulatory effects. Menthol is a white or colorless, flaky, crystalline substance that is solid at room temperature. Its density is 0.890 kg/dm³ (at 25 °C), and its melting point ranges from 41 to 44 °C, depending on its purity. Menthol is not completely soluble in water (435.5 mg/L at 25 °C), but is freely soluble in alcohol, diethyl ether, or chloroform (Sell, 1999; Hopp and Lawrence, 2006). Like many other terpene alcohols, such as citronellol, geraniol, linalool, nerol, and nerolidol, menthol does not absorb UV radiation effectively in the 290–320 nm range, but absorbs radiation at wavelengths below 290 nm, with maximum absorption at 220 nm. Mint tea and mint essential oil containing high concentrations of menthol and menthol are used in traditional medicine to treat various diseases, including infections, as well as serving as insect repellents. Various in vitro and in vivo studies have documented the biological properties of menthol, including its analgesic, antibacterial, antifungal, anesthetic, and penetration-enhancing effects, as well as its chemopreventive and immunomodulatory effects.

Amino acids are molecules used by all living organisms to form proteins. Twenty different amino acids are required for the proper functioning of the human body. The chemical formula of leucine is $C_6H_{11}NO_2$, and its molecular weight is 131.17 g/mol. It is classified as a nonpolar, aliphatic amino acid. Its chemical structure includes an α-amino group (in the protonated form $-NH_3^+$ under biological conditions), an α-carboxylic acid group (in the deprotonated

form $-COO^-$ under biological conditions), and a unique side chain. The side chain is an isobutyl group, which distinguishes leucine from other amino acids.



2- Figure. Crystalline form of leucine.

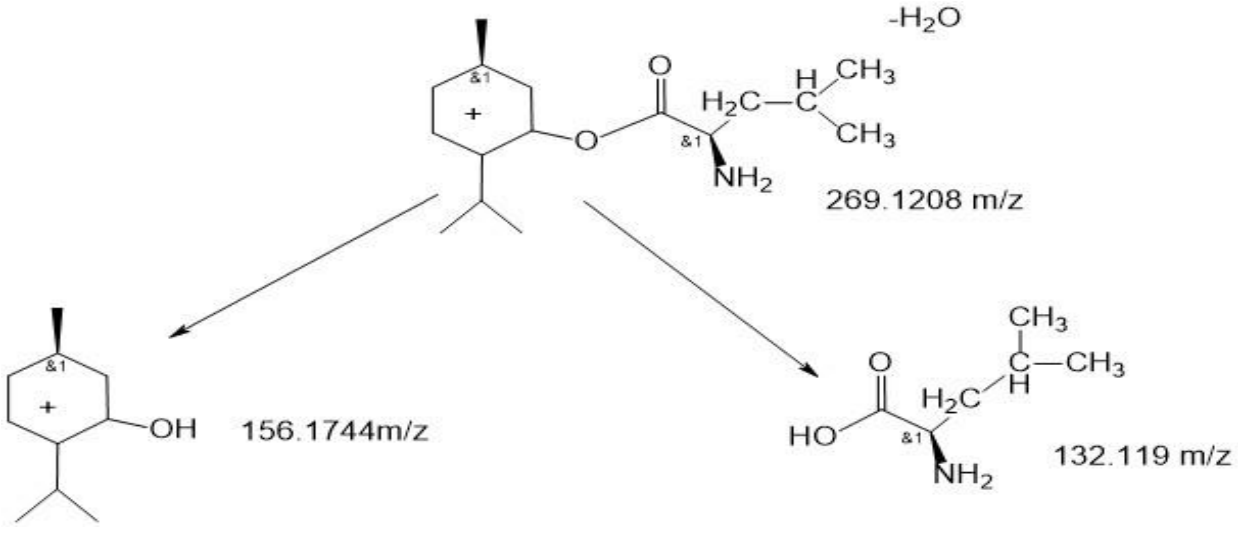
The presence of a branched side chain allows leucine to undergo a different metabolic pathway compared to other amino acids. It is metabolized primarily in muscle tissue rather than in the liver, which affects its role in energy production and muscle protein synthesis. Leucine is an essential amino acid used in protein biosynthesis and plays an important role in hemoglobin synthesis and the regulation of blood sugar and energy levels. It is essential in humans, meaning that the body cannot synthesize it; therefore, it must be obtained from food. Dietary sources of leucine include protein-containing foods such as meat, dairy products, soy products, beans, and other legumes. It is encoded by the codons UUA, UUG, CUU, CUC, CUA, and CUG. The name leucine is derived from the Greek word λευκός (*leukós*, "white"), referring to its appearance as a white powder, a characteristic it shares with many other amino acids. Leucine metabolism occurs in many tissues of the human body; however, most dietary leucine is metabolized in the liver, adipose tissue, and muscle tissue. Adipose and muscle tissues use leucine in the formation of sterols and other compounds. The combined utilization of leucine in these two tissues is seven times greater than that in the liver.

The solubility table of menthol and leucine is presented below:

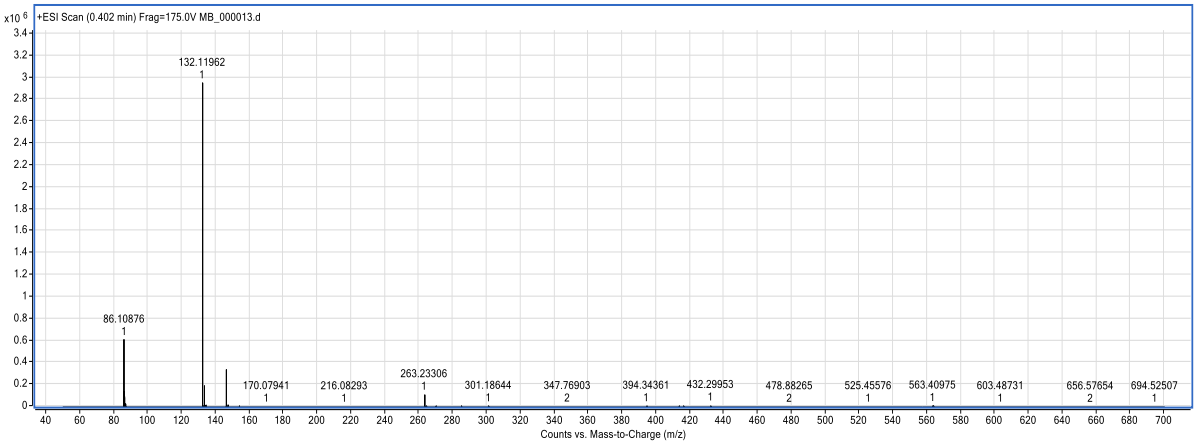
Solvent	Menthol ($C_{10}H_{20}O$)	Leucine ($C_6H_{13}NO_2$)
Water	Poorly soluble	Freely soluble
Methanol	Very freely soluble	Slightly soluble
Ethanol	Freely soluble	Slightly soluble
Benzene	Soluble	Very slightly soluble
Ethir	Freely soluble	Insoluble
Chlorofrom	Freely soluble	Insoluble
In acids and alkalis	Insoluble	Freely soluble

Research methodology

A quantity of 0.01 mol of menthol is dissolved in 50 mL of ethanol as a solvent. The solution is stirred for 30 minutes in a 100 mL two-neck round-bottom flask connected to a reflux condenser until it is completely dissolved. Then, 2 mL of concentrated HCl is added dropwise to an aqueous solution containing 0.01 mol of leucine, and the resulting solution is added to the menthol solution. After both substances have dissolved, the solutions are combined in a single vessel. The resulting mixture is heated at a temperature of 30–40 °C for 5–6 hours while continuously stirring. The progress of the reaction is monitored using TLC (thin-layer chromatography).



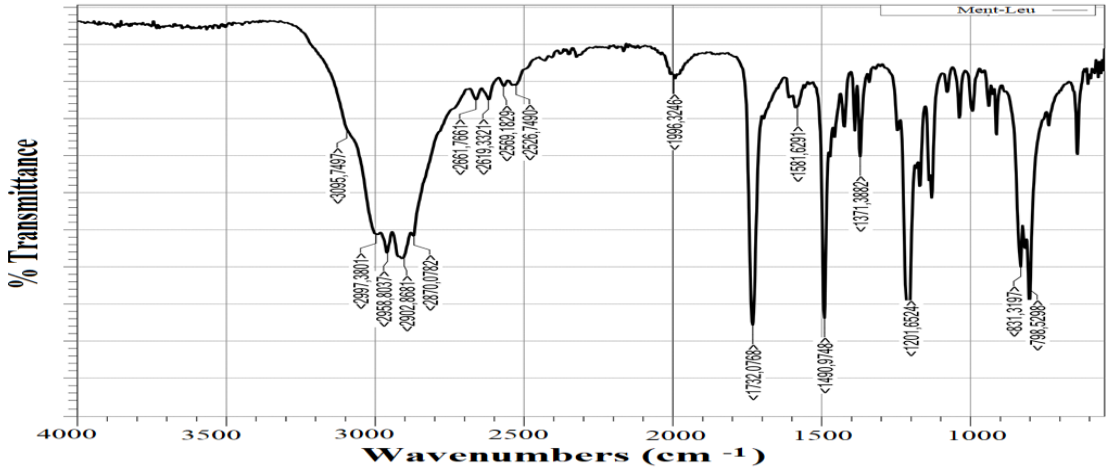
The menthyl leucinate ester ($C_{16}H_{31}NO_2$), obtained from leucine and menthol, is a condensed organic compound with a distinctive chemical structure. Menthyl leucinate is an ester with a molecular mass of approximately 269.4 g/mol and a high degree of lipophilicity (fat solubility). In appearance, it is a colorless or pale yellow liquid with a characteristic viscosity. The ester bond (–COO–) occupies a central position in its structure, providing the molecule with high surface activity. The substance is practically insoluble in water but is miscible in any proportion with all the main organic solvents, including ethanol, ether, and chloroform. It is thermodynamically stable but tends to undergo degradation in strongly alkaline environments. The biological effectiveness of menthyl leucinate lies in its ability to function as a molecular transport agent (permeation enhancer). Its molecule can readily pass through intercellular spaces without disrupting the skin's lipid barrier. This ester modulates the permeability of biological membranes and facilitates the passage of other therapeutic molecules along with it. Furthermore, this ester exhibits selective activity: it binds directly to skin receptors, producing a prolonged cooling effect and improving microcirculation. Its biological advantage is that it does not accumulate in the body (no cumulative effect) and is completely metabolized at the cellular level. Its antiseptic properties and ability to maintain the skin's hydrolipid balance make it one of the most active carriers for medicinal products.



Mass spectrometry of menthyl leucinate

In the mass spectrum of menthyl leucinate, the main peak appears at m/z = 269. This represents the mass of the fully formed ester molecule. The

fragments include m/z = 269, corresponding to the loss of water ($[M - H_2O]^+$); m/z = 156, corresponding to the menthol fragment; and m/z = 131, corresponding to the leucine fragment. The peak at m/z = 287 provides evidence of ester formation with leucine. The fragments indicate the synthesis pathway of the compound.



Spectrum of menthyl leucinate

In the IR spectrum, several distinct peaks are observed in the 2800–3000 cm^{-1} range due to the C–H stretching vibrations of the methyl (CH_3), methylene (CH_2), and methine (CH) groups. In the 1000–1300 cm^{-1} range, C–O stretching vibrations are present, which are characteristic of alcohols. Bending vibrations of the CH_3 and CH_2 groups can also be observed in the 1300–1500 cm^{-1} range.

The IR (infrared) spectroscopic analysis of the menthol–leucine compound reveals the characteristics of the chemical bonds and functional groups between the two components. The main functional group of menthol is the –OH (hydroxyl) group, which exhibits a distinct peak in the IR spectrum in the range of 3300–3500 cm^{-1}. The IR spectrum of leucine shows significant absorption peaks due to its –COOH (carboxyl) and $–NH_2$ (amino) groups.

In the IR spectrum of the ester, the absence of the –OH stretching vibration band in the region of 3245 cm^{-1} indicates the formation of an ester between the hydroxyl group of menthol and the amino acid. The observation of stretching vibrations of the –C=O (carbonyl) group in the functional group region at 1726

cm^{-1} further supports the formation of an ester bond, in accordance with the literature.

CONCLUSION

The physical constants of the newly obtained compound were determined, and its IR and mass spectra were analyzed. In the IR spectrum of the ester, the –OH stretching vibration band is not observed in the region of 3245 cm^{-1}, which, in turn, indicates the formation of an ester between the hydroxyl group of menthol and the amino acid. In our future work, research is being conducted to determine the structures of the newly obtained compounds using NMR and X-ray structural analysis methods, as well as to investigate their biological activity.

REFERENCES

1. Abdumalikovna, Y. L., & Turdibekova, M. (2025). MENTHOL ASOSIDA AYRIM AMINOKISLOTALAR BILAN SINTEZ QILINGAN YANGI BIRIKMALARNING TUZILISHI VA FIZIK-KIMYOVIY XOSSALARINI O ‘RGANISH. *TANQIDIY NAZAR, TAHLILIY TAFAKKUR VA INNOVATSION G ‘OYALAR*, *1*(1), 372-378.

2. Абдурахманова, У. К., Еттибаева, Л. А., & Хайдарова, Э. Э. (2011). Экстракционнофотометрическое определение таллия (III) 1-(2-пиридилазо)-4 гексилфенолом. In *Материалы международной науч.-технич. конф.«Наука, образование, производство в решении экологических проблем».–Россия: г. Уфа* (pp. 219-222).

3. Артиков, А., Машарипова, З. А., & Рахматов, Ф. О. У. (2020). Автоматизированные расчеты равновесия трехфазной системы в процессе обезвоживание жидкого материала. *Universum: технические науки*, (12-3 (81)), 24-30.

4. Эргашев, А. Ш. У., Еттибаева, Л. А., Турлибекова, М. З. К., Абдурахманова, У. К., & Матчанов, А. Д. (2025). СИНТЕЗ НОВЫХ ПРОИЗВОДНЫХ МЕНТОЛА С НЕКОТОРЫМИ АМИНОКИСЛОТАМИ И ИССЛЕДОВАНИЕ ИХ СТРУКТУРЫ. *Universum: химия и биология*, *1*(3 (129)), 35-40.

5. Ettibaeva, L. A., Abdurahmonova, U. K., Matchanov, A. D., Allanazarova, D. M., & Halmuratova, Z. T. (2021). Influence of Glycyrrhizic Acid, Menthol and Their Supramolecular Compounds on the Functional Activity of Rat Mitochondria in in-vitro Experiments. *Journal of the Korean Chemical Society*, *65*(5), 313-319.

6. Рахматов, О. О., Рахматов, Ф. О., Тухтамишев, С. С., & Худойбердиев, Р. (2019). Дыня древнейшая культурацентральной Азии. In *Научные основы развития АПК* (pp. 166-168).

7. Рахматов, Ф. О., & Рахматов, О. (2023). МЕТОДИКА ОПРЕДЕЛЕНИЯ ТЕПЛОВОГО БАЛАНСА И АЭРОДИНАМИЧЕСКИХ ПАРАМЕТРОВ СУШИЛЬНОЙ УСТАНОВКИ. *Journal of Agriculture & Horticulture*, *3*(6), 90-94.

8. Рахматов, О., & Рахматов, Ф. (2025). Теоретический и экспериментальный анализ работы комбинированной сушильной установки для сушки сельхозпродуктов с ик-излучением. *Ilm, tadqiqot va taraqqiyot/Наука, исследования и развитие*, *5*(13), 115-122.

Yettibaeva, L. A., Tashbaeva, S. K., Allanazarova, D. M., & Hudoynazarov, M. (2021). L-(-)-Spectroscopic analysis of Menthol compounds Formed with certain dicarboxylic Acids. *Annals of the Romanian Society for Cell Biology*, *25*(2)

ОЦЕНКА ЧИСТОТЫ И ИДЕНТИФИКАЦИИ п-БРОМФЕНИЛУКСУСНОЙ КИСЛОТЫ МЕТОДОМ ТОНКОСЛОЙНОЙ ХРОМАТОГРАФИИ

Маткаримова У.У., Кутлимуротова Н.Х.

Ташкентский государственный технический университет, Национальный университет Узбекистана, г. Ташкент, Республика Узбекистан

E-mail: umidamatkarimova2@gmail.com

Аннотация. *В данной работе представлены результаты синтеза п-бромфенилуксусной кислоты методом электрохимического окисления, а также оценки идентичности и хроматографической чистоты полученного продукта методом тонкослойной хроматографии (ТСХ). В качестве исходного вещества использовали п-бромэтилбензол. Хроматографический анализ проводили на пластинках, покрытых силикагелем 60, с использованием смеси гексана и этилацетата в соотношении 3:1 (об./об.) в качестве подвижной фазы. Хроматографические пятна выявляли под ультрафиолетовым излучением с длиной волны 254 нм. В результате анализа получены следующие значения Rf: 0,72 для исходного вещества, 0,34 для эталонного образца п-бромфенилуксусной кислоты и 0,35 для синтезированного продукта. Близость хроматографической подвижности синтезированного продукта к подвижности эталонного образца служит предварительным подтверждением образования целевого соединения. Полученные результаты демонстрируют практическую значимость тонкослойной хроматографии для качественного контроля продуктов электрохимического синтеза.*

Abstract. *This study presents the results of the synthesis of p-bromophenylacetic acid by electrochemical oxidation and the evaluation of the identity and chromatographic purity of the obtained product using thin-layer chromatography (TLC). p-Bromoethylbenzene was used as the starting material. Chromatographic analysis was performed on silica gel 60-coated plates using a mixture of hexane and ethyl acetate in a 3:1 (v/v) ratio as the mobile phase. The chromatographic spots were visualized under ultraviolet light at a wavelength of 254 nm. The analysis yielded the following (R_f) values: 0.72 for the starting material, 0.34 for the reference sample of p-bromophenylacetic acid, and 0.35 for the synthesized product. The similarity between the chromatographic mobility of the synthesized product and that of the reference sample provides preliminary evidence for the formation of the target compound.*

The results demonstrate the practical significance of thin-layer chromatography for the qualitative assessment of products obtained by electrochemical synthesis.

Ключевые слова: *п-бромфенилуксусная кислота, п-бромэтилбензол, электрохимическое окисление, тонкослойная хроматография, значение Rf, силикагель, идентификация продукта.*

Keywords: *p-Bromophenylacetic acid, p-bromoethylbenzene, electrochemical oxidation, thin-layer chromatography, Rf value, silica gel, product identification.*

ВВЕДЕНИЕ

В настоящее время разработка экологически безопасных, энергоэффективных и селективных методов органического синтеза является одним из актуальных направлений химической науки. Электрохимические методы, представляющие собой альтернативу традиционным методам органического синтеза, позволяют осуществлять окислительно-восстановительные процессы с использованием электрического тока или контролируемого электродного потенциала. Такой подход может способствовать снижению потребности в химических окислителях и восстановителях, обеспечивать контроль условий реакции и в некоторых случаях уменьшать образование побочных продуктов [1, 2].

Фенилуксусная кислота и её галогенсодержащие производные имеют важное значение в органическом синтезе, фармацевтической химии и химии биологически активных соединений. Введение атома брома в молекулу может изменять её физико-химические свойства и расширять возможности последующей химической функционализации. Поэтому получение п-бромфенилуксусной кислоты и достоверная оценка её качественных характеристик представляют собой важную научно-практическую задачу.

Окисление боковой цепи алкилбензольных производных позволяет получать соответствующие карбоновые кислоты. Однако эффективность таких реакций зависит от материала электрода, состава электролита, природы растворителя, электродного потенциала и продолжительности электролиза. Наряду с получением целевого продукта важным этапом

синтеза является выявление остатков исходного вещества и возможных побочных продуктов.

Тонкослойная хроматография широко применяется для разделения органических соединений, контроля протекания реакций и предварительной оценки хроматографической чистоты продуктов. К основным преимуществам данного метода относятся простота выполнения анализа, необходимость небольшого количества образца, оперативность и отсутствие потребности в сложном аналитическом оборудовании.

ОСНОВНАЯ ЧАСТЬ

Цель исследования — оценить идентичность и хроматографическую чистоту п-бромфенилуксусной кислоты, полученной методом электрохимического окисления, с помощью тонкослойной хроматографии и сопоставить результаты с хроматографическими характеристиками исходного вещества и эталонного образца.

Экспериментальная часть (анализ методом ТСХ). Для оценки чистоты и идентичности синтезированной п-бромфенилуксусной кислоты использовали метод тонкослойной хроматографии. Анализ проводили на пластинках, покрытых силикагелем (SiO_2). В качестве подвижной фазы применяли смесь этилацетата и гексана в объёмном соотношении 3:1. Образцы наносили на пластинку с помощью капилляра. После подъёма фронта растворителя примерно на 8 см пластинку извлекали из хроматографической камеры и высушивали. Хроматографические пятна выявляли под ультрафиолетовым излучением с длиной волны 254 нм.

В результате анализа методом ТСХ были определены следующие значения Rf.

Таблица 1

Значения Rf исследуемых веществ

№	Исследуемое вещество	Значение Rf
1	п-Бромэтилбензол	0,72
2	п-Бромфенилуксусная кислота (эталонный образец)	0,34

3	Синтезированный продукт	0,35

Обсуждение результатов. Значение Rf, определённое для синтезированного продукта, составило 0,35, что практически совпадает со значением Rf эталонного образца п-бромфенилуксусной кислоты (0,34). Абсолютная разница между этими значениями составляет 0,01. Такое сходство свидетельствует о близкой хроматографической подвижности исследуемого продукта и эталонного соединения и служит предварительным подтверждением образования целевого вещества.

При сравнении с исходным п-бромэтилбензолом наблюдается существенное различие значений Rf. Разница между значениями для исходного вещества и синтезированного продукта составляет 0,37. Это указывает на возможность их разделения в выбранной хроматографической системе. Наличие карбоксильной группы в молекуле п-бромфенилуксусной кислоты влияет на её взаимодействие с поверхностью силикагеля, что обусловливает изменение хроматографической подвижности по сравнению с исходным соединением.

Полученные результаты согласуются с изменением химического строения исходного вещества в процессе электрохимического окисления. Вместе с тем значение Rf само по себе не позволяет однозначно установить химическую структуру соединения. Для более надёжной идентификации целесообразно сопоставить результаты ТСХ с данными масс-спектрометрии, ИК-спектроскопии или спектроскопии ядерного магнитного резонанса.

Наличие одного основного хроматографического пятна, соответствующего синтезированному продукту, может свидетельствовать об относительной хроматографической однородности образца. Однако отсутствие дополнительных пятен не гарантирует абсолютной химической чистоты, поскольку некоторые примеси могут иметь близкие или совпадающие значения Rf. Поэтому результаты ТСХ следует

рассматривать как предварительную качественную оценку чистоты продукта. В целом выбранная хроматографическая система позволяет различать исходный п-бромэтилбензол и п-бромфенилуксусную кислоту. Полученные результаты подтверждают возможность применения метода ТСХ для контроля процесса электрохимического синтеза и предварительной идентификации целевого продукта.

ЗАКЛЮЧЕНИЕ

Методом тонкослойной хроматографии проведена оценка идентичности и хроматографической чистоты п-бромфенилуксусной кислоты, полученной методом электрохимического окисления. Анализ выполняли на пластинках с силикагелем 60, используя смесь гексана и этилацетата в объёмном соотношении 3:1 и ультрафиолетовое излучение с длиной волны 254 нм.

Установлено, что значения Rf для исходного п-бромэтилбензола, эталонного образца п-бромфенилуксусной кислоты и синтезированного продукта составляют соответственно 0,72; 0,34 и 0,35. Незначительное различие между значениями Rf синтезированного продукта и эталонного образца служит предварительным подтверждением образования целевого соединения. Существенное отличие от значения Rf исходного вещества указывает на возможность их разделения в выбранной хроматографической системе. Таким образом, тонкослойная хроматография является простым и эффективным методом предварительной идентификации п-бромфенилуксусной кислоты и качественного контроля процесса её синтеза. Для окончательного подтверждения химической структуры и количественной оценки чистоты продукта рекомендуется использовать дополнительные инструментальные методы анализа.

СПИСОК ИСПОЛЬЗОВАННОЙ ЛИТЕРАТУРЫ

1. Martins G. M. et al. Recent advances in electrochemical annulation reactions // *Green Chemistry*. — 2020. — Vol. 22. — P. 1234–1256.

2. Goljani H. et al. A new electrochemical strategy for synthesis of organic compounds // *Scientific Reports*. — 2020. — Vol. 10. — Article number: 5678.

ВЛИЯНИЕ СООТНОШЕНИЯ КОМПОНЕНТОВ WEICON TI НА ПРОЧНОСТЬ СЦЕПЛЕНИЯ С МЕТАЛЛИЧЕСКИМ ОСНОВАНИЕМ

Юнусханов Дониёрбек Дилмуродович

Базовый докторант

Наманганский государственный технический университет, Узбекистан

yunuskhanovdoniyorbek@gmail.com

Аннотация. *Исследовано влияние массового соотношения компонентов WEICON TI на прочность при нормальном отрыве. При увеличении содержания отвердителя с 10 до 40 частей на 100 частей основы показатель снизился с 9,39 до 3,63 МПа. Рассмотрены ограничения интерпретации результатов применительно к восстановлению подшипниковых посадочных мест.*

Ключевые слова: *WEICON TI, эпоксидный композит, адгезия, нормальный отрыв, отвердитель, подшипниковое посадочное место.*

Abstract. *The effect of WEICON TI component mass ratio on pull-off strength was investigated. Increasing hardener content from 10 to 40 parts per 100 parts of resin reduced strength from 9.39 to 3.63 MPa. Interpretation limits relevant to restoring bearing seats are discussed.*

Keywords: *WEICON TI, epoxy composite, adhesion, pull-off strength, hardener, bearing seat.*

ВВЕДЕНИЕ

При восстановлении изношенного подшипникового посадочного места композитный слой должен сохранять связь с металлическим основанием. Отслоение нарушает передачу нагрузки и геометрию сопряжения, поэтому оценка прочности сцепления необходима наряду с определением механических свойств самого материала. Изготовитель относит WEICON TI к эпоксидным системам с титановым наполнителем и указывает возможность его применения для ремонта подшипниковых посадочных мест.

Испытание на нормальный отрыв характеризует сопротивление разрушению системы «основание–покрытие–испытательный элемент». ISO 4624:2023 предусматривает различные схемы испытания и предназначен прежде всего для сравнительной оценки покрытий. Полученное напряжение нельзя автоматически считать прочностью только межфазной границы: необходимо учитывать место разрушения (Росстандарт, 2025). Цель работы − установить наблюдаемое изменение прочности при отрыве для семи массовых соотношений A:B и определить границы применения результатов при выборе восстановительного состава.

ОСНОВНАЯ ЧАСТЬ

Материалы и методы

Испытания выполнены в Наманганском филиале ГУ «UzTest». Лабораторная справка содержит результаты по ГОСТ 32299–2025 (ISO 4624:2023) для семи составов: максимальную силу, диаметр отрывного элемента и прочность. Стандарт предусматривает сравнительную оценку адгезии покрытий методом отрыва.

Компонент А − эпоксидная основа, В − отвердитель. Исследованы массовые соотношения 100:10−100:40 с шагом 5 частей В. Принятая методика предусматривает обработку металла Р120−Р240, очистку и обезжиривание, слой 1,0–1,5 мм и выдержку 48 ч при 20 ± 2 ºС. Схема образца приведена на рисунке 1. Необходимость очистки и обезжиривания согласуется с описанной в узбекском учебнике технологией восстановления деталей полимерами (Tursunov et al., 2019, с. 160). Приведённые в учебнике режимы других полимерных составов на WEICON TI не переносились.

Экспериментальные массовые соотношения отличаются от штатной рецептуры. Технический лист изготовителя устанавливает 100:33 по массе и 100:35 по объёму (WEICON, 2026). Поэтому состав 100:35 по массе не рассматривается как точный паспортный контроль.

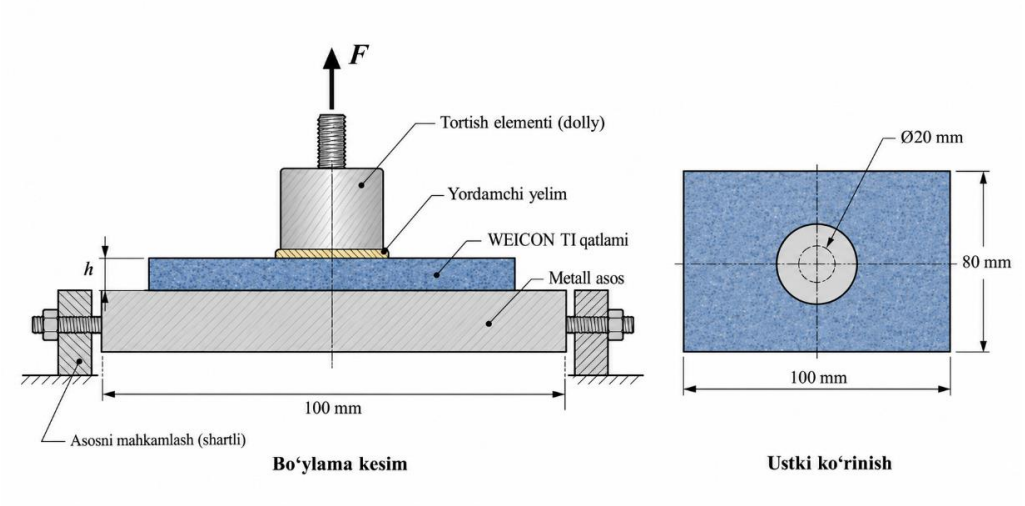


Рисунок 1. Схема образца для отрыва с видом сверху

$$S = \frac{\pi d^2}{4}, \qquad \sigma_{от} = \frac{F_{max}}{S} = \frac{4F_{max}}{\pi d^2}$$

d – диаметр контакта, мм; F_{max} – максимальная сила, Н; S – площадь, мм²; $\sigma_{от}$ – нормальное напряжение, МПа. Обозначение $\sigma_{от}$ использовано вместо τ, поскольку нагрузка направлена нормально к поверхности. При d = 20 мм площадь составляет 314,159 мм². Расчёт характеризует среднее номинальное напряжение, а не локальное распределение напряжений по контакту.

РЕЗУЛЬТАТЫ

Пересчёт сил по площади контакта подтвердил значения справки с округлением до 0,01 МПа (таблица 1). Её словесные оценки не использованы как нормативные классы: количественные границы этих оценок не указаны.

Таблица 1. Прочность WEICON TI при нормальном отрыве

A:B по массе	F_{max}, Н	$\sigma_{от}$, МПа
100:10	2950	9,39
100:15	2600	8,28
100:20	2240	7,13
100:25	1890	6,01
100:30	1530	4,87
100:35	1170	3,73
100:40	1140	3,63

Примечание. Источник числовых данных − предоставленная справка ГУ «UzTest»; диаметр отрывного элемента во всех испытаниях 20 мм.

Максимальное значение получено для состава 100:10 − 9,39 МПа. Для 100:20 прочность составила 7,13 МПа, что на 24,1 % ниже максимума. Состав 100:40 показал 3,63 МПа; снижение относительно 100:10 достигло 61,3 %. Проценты рассчитаны по опубликованным в справке округлённым значениям.

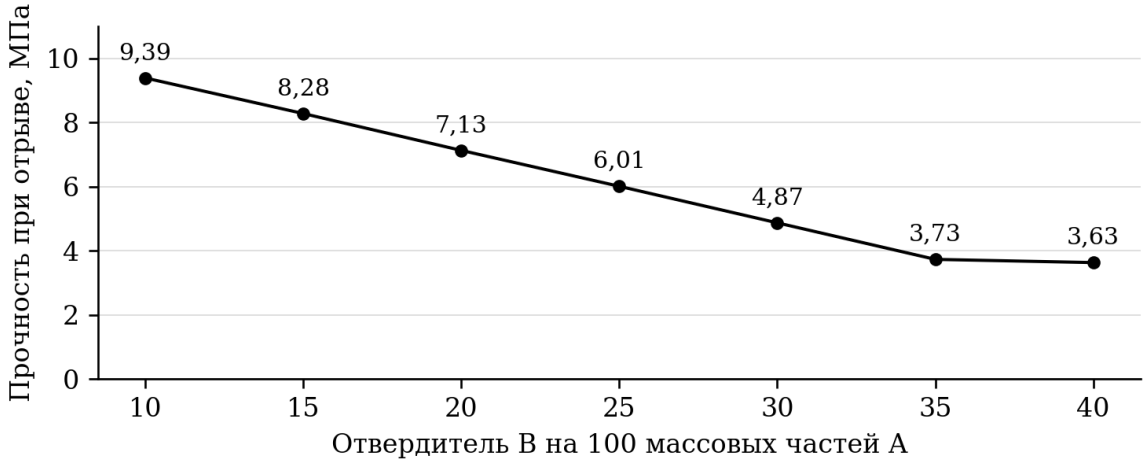


Рисунок 2. Изменение прочности при отрыве в исследованной серии составов

ОБСУЖДЕНИЕ

Увеличение количества В в данной серии сопровождалось снижением прочности при отрыве (рисунок 2). Причинами могут быть изменения отверждения, дефектности и остаточных напряжений. Однако

установить механизм по одной серии значений невозможно; необходимы самостоятельные исследования структуры и характера разрушения.

Результат зависит от места разрушения: границы «металл–композит», объёма композита либо вспомогательного клея dolly. В справке место разрушения не приведено, поэтому показатель характеризует систему при отрыве. В односторонней схеме необходимо исключить изгиб основания толщиной 1 мм, указанного в принятой методике.

Максимум у 100:10 не доказывает его наилучшую работоспособность в подшипниковом узле: отрыв не воспроизводит сдвиг, сжатие и циклические нагрузки. Петрова и соавт. (2019) на других эпоксидных клеях показали зависимость остаточной прочности от совместного воздействия нагрузки и климата, а также режима отверждения. Их численные результаты не переносились на WEICON TI; работа использована для обоснования необходимости эксплуатационной проверки. Для окончательного выбора необходимы испытания узла и контроль 100:33 по массе. Без индивидуальных повторных измерений статистическая значимость различий и доверительные интервалы не определялись.

ЗАКЛЮЧЕНИЕ

Для исследованной серии массовых соотношений WEICON TI увеличение содержания B с 10 до 40 частей на 100 частей A сопровождалось снижением номинальной прочности при отрыве с 9,39 до 3,63 МПа. Проверка через площадь контакта диаметром 20 мм подтвердила арифметическую согласованность данных справки. Максимум в изученном диапазоне соответствует 100:10, однако положение оптимума за пределами этого диапазона и эксплуатационная пригодность состава не установлены.

Применение результатов к восстановлению посадочных мест требует подтверждения характера разрушения, жёсткости основания и повторяемости. Окончательный выбор состава должен опираться на сравнение с рецептурой 100:33 по массе и испытания восстановленного узла.

СПИСОК ЛИТЕРАТУРЫ

1. Tursunov, T. N., Bazarov, D. R., Matyakubov, B. Sh., Berdiyev, M. S., Rajabov, N. Q., & Artikbekova, F. K. (2019). Gidroenergetik inshootlar. Toshkent irrigatsiya va qishloq xo‘jaligini mexanizatsiyalashtirish muhandislari instituti. https://staff.tiiame.uz/storage/users/371/books/vGEeeFyf2kMKsPAYCPlfBqmPNesKBjFFVPBppLCo.pdf

2. WEICON GmbH & Co. KG. (2026, June 17). WEICON TI [Technical data sheet]. https://media.weicon.de/fmds/307117/dld:inline

3. Наманганский филиал ГУ «UzTest». (б. д.). Справка о результатах испытаний адгезионной прочности эпоксидного композита WEICON TI

4. Петрова, А. П., Лукина, Н. Ф., & Исаев, А. Ю. (2019). Работоспособность клеевых соединений на эпоксидных пленочных клеях при одновременном воздействии нагрузок и климатических факторов. Труды ВИАМ, 9(81), 57–63. https://doi.org/10.18577/2307-6046-2019-0-9-57-63

5. Росстандарт. (2025). Материалы лакокрасочные. Определение адгезии методом отрыва (ГОСТ 32299–2025, ISO 4624:2023). https://protect.gost.ru/gost/details/2d2f05ce-f70c-4404-8355-95e5c9be0d88

THE EFFECT OF BIOLOGICAL NUTRITION ON OIL AND FATTY ACID SYNTHESIS IN COTTONSEEDS

Kosimov Makhamadjon Goppirjonovich

PhD student of the Institute of Genetics and Plants Experimental Biology, Uzbekistan Academy of Sciences

Abstract. *The application of a biological preparation significantly increased the total oil content of cottonseeds. Specifically, the oil content on an absolutely dry matter basis increased from 25.14% in the control to 25.93%, representing an increase of 0.79 percentage points. In addition, the moisture content of biologically treated seeds (7.07%) was lower than that of the control seeds (8.60%). This indicates a lower moisture content in cottonseeds obtained using EPS and the bacterial strain. The linoleic acid (C18:2) content in cottonseeds produced using the biological method with* Azotobacter chroococcum *strain XH2018 increased from 51.54% to 52.34% (+0.80 percentage points). In contrast, the oleic acid (C18:1) content decreased from 19.30% to 18.34%.*

Keywords: Azotobacter chroococcum *strain XH2018, oil, exopolysaccharides (EPS)*

INTRODUCTION

Numerous scientific studies have reported that nitrogen-fixing bacteria, such as *Azotobacter chroococcum*, have a positive effect on improving the oil content and fatty acid composition of cottonseeds [1]. This effect is primarily mediated by bioactive compounds synthesized by the bacteria and by the stimulation of plant growth and development. The effects of exopolysaccharides (EPS) and the EPS-producing *Azotobacter chroococcum* XH2018 strain were investigated not only in terms of soil moisture retention, pathogen control, and plant growth, but also with regard to oil content and fatty acid composition in cottonseeds [2].

The importance of microbial cells and their metabolites in plant growth and development has been extensively documented in the scientific literature. The EPS investigated in this study help create favorable conditions for plant growth by reducing the stress effects of soil salinity [3] and improving moisture

retention. The removal of Ca^{2+} ions from the soil by exopolysaccharides produced by *A. chroococcum* XH2018 occurs in two stages. In the first stage, insoluble calcium salts, primarily $CaCO_3$, $Ca_3(PO_4)_2$, and $CaSO_4$, are dissolved through the action of low-molecular-weight organic acids produced by the bacteria. In the second stage, the released Ca^{2+} ions are biosorbed by the EPS matrix through binding to its structure. The results showed that EPS removed 155,031.1 mg/L of Ca^{2+}. The removal of Na^+ reached 18,969.89 mg/L, thereby alleviating the effects of salinity stress.

EPS-producing bacteria play an important role in promoting plant growth under saline conditions and limiting sodium uptake. One of the principal mechanisms involves the biosorption of Na^+ ions by EPS, which function as natural biosorbents. These effects may contribute to increases in total plant biomass, crop yield, and beneficial chemical constituents in plant products. In cotton, such changes are reflected not only in fiber yield but also in seed oil content and the qualitative and quantitative composition of fatty acids.

Seed moisture content is an important quality parameter that indicates the amount of water in the seed and is essential for the accurate assessment of oil content. Therefore, in this study, oil content corrected for moisture and oil content expressed on an absolutely dry matter basis were evaluated separately. This approach enables a comparative analysis of the actual oil accumulation levels in the seeds of different cotton varieties.

RESULTS

Cotton plants of the ‘Sulton’ variety treated both at the root and foliar levels with a suspension containing cells of the EPS-producing *Azotobacter chroococcum* XH2018 strain produced seeds with an oil content of 24.1%, compared with 22.98% in cottonseeds grown using the conventional method under a complete NPK fertilizer regime.

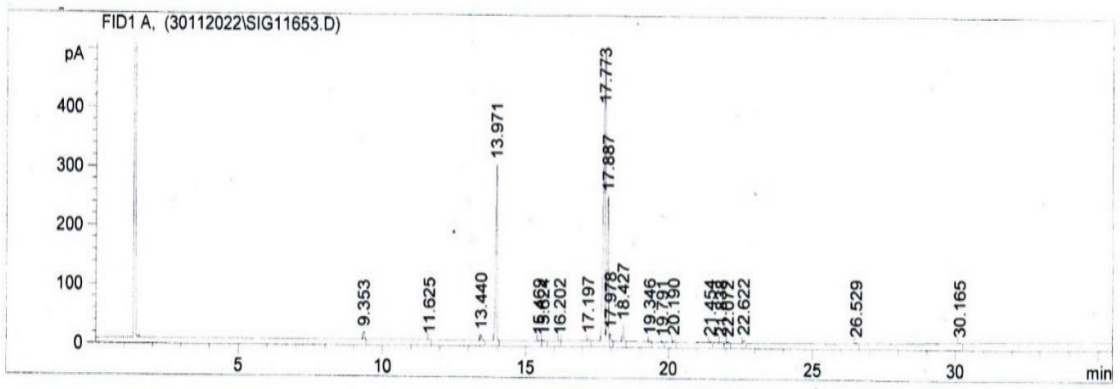
characteristics of cottonseed samples of the ‘Sulton’ variety grown using conventional methods and the *A. chroococcum* XH2018 strain

Parameter	Sample No. 1 (conventional method)	Sample No. 2 (biological treatment)
Moisture and volatile matter (%)	8.60	7.07
Oil content, accounting for moisture (%)	22.98	24.10
Oil content on an absolutely dry matter basis (%)	25.14	25.93

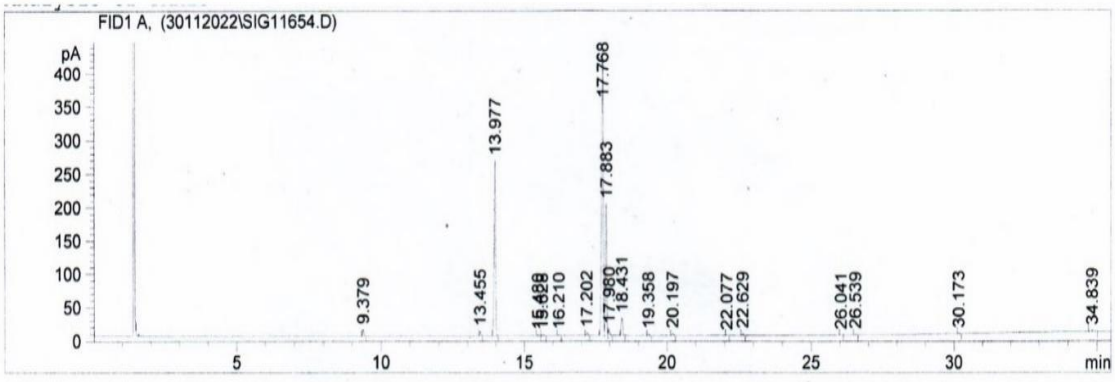
When calculated on an absolutely dry matter basis, the difference in oil content was 0.79 percentage points (25.93% and 25.14%, respectively). Notably, the moisture and volatile matter content of cottonseeds produced using the biological method (7.07%) was lower than that of seeds obtained using the conventional method (8.60%). This indicates a lower moisture content in the biologically treated seed samples.

Cottonseed oil contains a wide range of saturated and unsaturated fatty acids, whose proportions determine its quality characteristics. Essential fatty acids that cannot be synthesized by the human body, including arachidonic, linoleic, and alpha-linolenic acids, play an important role in the daily diet. These essential fatty acids are supplied to the human body through natural food sources. Cottonseed oil contains linoleic and linolenic acids. High-performance liquid chromatography (HPLC) was used to determine the contents of linoleic acid, linolenic acid, and other components in cottonseeds produced using the biological method. This analysis identified 12 fatty acids in the seed samples.

Me Oddiy chigit 1



Me Organic chigit 2



Fatty Acid Profiles of 'Sulton' Cottonseed Samples Determined by High-Performance Liquid Chromatography (HPLC)

The oil samples obtained from two differently treated variants were analyzed, with conventional cottonseeds (Sample 1, NPK) used as the control and biologically treated cottonseeds (Sample 2, Me Organic) used as the experimental variant. The retention times of the fatty acids were recorded in both chromatograms. Qualitative analysis revealed that the retention times of the major fatty acid peaks were nearly identical in both samples, with oleic acid eluting at approximately 13.97 min and linoleic acid at approximately 17.77 min. These findings indicate that biological treatment did not substantially alter the qualitative composition of cottonseed oil in terms of the fatty acid types present. The observed changes were primarily quantitative.

Quantitative analysis revealed an increase in the intensity (peak height and area) of the linoleic acid (omega-6) peak at approximately 17.77 min in the chromatogram of the biologically treated sample (Sample 2, Me Organic)

compared with the control. This finding suggests an increase in the relative proportion of linoleic acid following biological treatment. In contrast, the intensity of the oleic acid peak at approximately 13.97 min decreased in the biologically treated sample compared with the control. The calculations indicated that, following biological treatment, the total oil content increased to 28.42%, while the proportion of linoleic acid reached 52.34% (see Figure 4.1).

The HPLC results suggest that treatment with *Azotobacter chroococcum* strain XH2018 influenced fatty acid metabolism in cotton plants and may have enhanced linoleic acid accumulation. The observed changes are consistent with increased conversion of oleic acid to linoleic acid. Consequently, biological treatment may improve the nutritional quality of cottonseed oil by increasing the proportion of linoleic acid.

REFERENCES

1. Hafeez F. Y. et al. Plant growth-promoting bacteria as biofertilizer // Agronomy for Sustainable Development. 2006. Vol. 26, No. 2. P. 143-150.
2. Kosimov M. G., Bakhromova G. H., Pattaeva M. A., Rasulov B. A. Enhancing cottonseed oil quality using EPS-producing Azotobacter chroococcum XH2018 under salt stress // Environmental and Experimental Botany. 2025. Vol. 215. P. 143-150.
3. Kennedy H. et al. Organic carbon sources to SE Asian coastal sediments // Estuarine, Coastal and Shelf Science. 2004. Vol. 60, No. 1. P. 59-68.

MODELING OF OSCILLATORY FLOW OF A RHEOLOGICALLY COMPLEX FLUID IN A PLANE CHANNEL

Kuralbay Navruzov [1,a)], Laylo Aqmonova [1,b)], Nabijon Abdikarimov[1,c)]

Urgench State University, Khorezm, Uzbekistan

[a)] Kurol@urdu.uz

Corresponding author: [b)] aqmonova@gmail.com

[c)] nabijon.88@mail.ru

Abstract. *Oscillatory fluid flow in channels and pipelines is important in engineering applications involving polymer solutions, suspensions, and highly viscous petroleum products. Their flow behavior depends on rheological properties that may differ significantly from those of Newtonian fluids. This study investigates oscillatory flow of a rheologically complex fluid in a plane channel using a simplified mathematical model. A limiting case is compared with classical laws for Newtonian fluid flow to identify the main rheological effects.*

Keywords: *rheologically complex fluid, oscillatory flow, mathematical modeling, hydrodynamic effects, Maxwell model.*

INTRODUCTION

Oscillatory flow of rheologically complex fluids in channels is relevant to numerous engineering, industrial, and biomedical applications involving polymer solutions, suspensions, and viscous petroleum products. Unlike Newtonian fluids, these media may exhibit distinctive hydrodynamic behavior due to their specific rheological properties.

Oscillatory flow is important in cardiovascular research, targeted drug delivery, and microfluidic devices [1, 2]. Valieva and Purdin [3, 4] investigated pulsatile flow and heat transfer in pipes and plane channels using numerical finite-difference methods. Their results showed good agreement with analytical solutions and experimental data reported in [5].

Previous studies [6–14] examined unsteady viscoelastic flow in plane channels using the Maxwell model. These investigations established analytical relationships describing the influence of oscillation frequency and relaxation properties on wall shear stress. They also demonstrated that Newtonian-fluid approximations may not adequately represent the behavior of viscoelastic media under unsteady conditions.

Despite these advances, further analysis of rheologically complex fluids is needed. Therefore, this study investigates oscillatory flow in a plane channel using a simplified mathematical model, with particular emphasis on rheological effects and comparison with classical Newtonian-flow theory.

PROBLEM FORMULATION AND SOLUTION METHODOLOGY

Consider a plane channel formed by two parallel walls separated by a distance $2h$, with L denoting its length. Assuming $h/L \ll 1$, the channel is sufficiently long for the flow to be considered fully developed, allowing the transverse velocity component to be neglected.

Let the x- axis coincide with the channel's longitudinal direction and the y- axis represent the transverse coordinate perpendicular to the walls. Under these assumptions, the governing equations for oscillatory flow of a rheologically complex fluid can be reduced to a simplified one-dimensional mathematical model, which forms the basis for the subsequent analytical investigation.

$$\begin{cases} \dfrac{\partial u}{\partial t} = -\dfrac{1}{\rho}\dfrac{\partial p}{\partial x} + \dfrac{1}{\rho}\dfrac{\partial \tau}{\partial y}, \quad \dfrac{\partial p}{\partial y} = 0, \ \tau = \alpha_1\tau_1^0 + \alpha_2\tau_2^0, \\ \tau_1^0 = \eta_1^0\dfrac{\partial u}{\partial y}, \ \lambda\dfrac{\partial \tau_2^0}{\partial t} + \tau_2^0 = \eta_2^0\dfrac{\partial u}{\partial y}, \ \eta = \alpha_1\eta_1^0 + \alpha_2\eta_2^0 \end{cases} \tag{1}$$

Here u- denotes the longitudinal velocity; p- is the pressure and τ- represents the shear stress. The parameter α_1, α_2- characterizes the relative concentration of the Newtonian and Maxwell fluid components, while τ_1^0, τ_2^0 -

denotes the shear stress associated with these components. The coefficients η_1^0, η_2^0 - represent their respective dynamic viscosities, and η - denotes the effective dynamic viscosity of the mixture. The parameter λ - is the relaxation time, and t - represents the time variable.

Owing to the symmetry of the flow about the channel centerline, the boundary conditions are specified as follows:

$$y = h \; in \; u = 0, \quad y = 0 \; in \; \frac{\partial u}{\partial y} = 0. \tag{2}$$

By substituting the assumed periodic functions into the governing equations and applying the prescribed boundary conditions, analytical expressions for the velocity field and shear stress of the viscoelastic fluid in a plane channel are obtained.

Taking the boundary conditions into account, the general solution of the governing equation is expressed as follows:

$$u_1(y) = C_1(x)\cos(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)\frac{y}{h}) + C_2(x)\sin(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)\frac{y}{h}) + \frac{1}{\rho i\omega}(-\frac{\partial p_1}{\partial x}) \tag{3}$$

Based on this solution, the velocity distribution of the fluid is determined as:

$$u_1(y,t) = (-\frac{\partial p_1}{\partial x})\left[real\left[\frac{1}{\rho i\omega}\left(1 - \frac{\cos\left(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)\frac{y}{h} \right)}{\cos\left(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega) \right)} \right) e^{i\omega t} \right] \right] \tag{4}$$

Integrating the velocity profile across the channel height yields the volumetric flow rate:

$$Q_1 = 2h\left[\frac{1}{\rho i\omega}\left(-\frac{\partial p_1(x)}{\partial x} \right) real\left(1 - \frac{\sin\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)}{\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)\cos\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)} \right) e^{i\omega t} \right] \tag{5}$$

The cross-sectionally averaged velocity is then obtained from the resulting relationship:

$$< u_1 >= \frac{1}{\rho i\omega}\left(-\frac{\partial p_1(x)}{\partial x} \right) real\left(1 - \frac{\sin\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)}{\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)\cos\left(i^{3/2}\alpha_0\eta^*(i\omega) \right)} \right) e^{i\omega t} \tag{6}$$

The wall shear stress is determined by considering the velocity field and the rheological properties of the fluid, giving:

$$\tau_1 = -\frac{\eta}{\eta^{*2}(i\omega)}\frac{\partial u_1(y)}{\partial y}\Big|_{y=h} \tag{7}$$

Here:

$$\tau_1 = -\left(-\frac{\partial p(x)}{\partial x}\right) real\left(\frac{\mu}{\rho i\omega h}\left(\frac{i^{3/2}\alpha_0 \sin\left(i^{3/2}\alpha_0\eta^*(i\omega)\right)}{\eta^*(i\omega)\cos\left(i^{3/2}\alpha_0\eta^*(i\omega)\right)}\right)e^{i\omega t}\right) \tag{8}$$

$$< u_1 >= -\frac{h}{3\mu}\tau_1 \cdot \frac{3(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)\cos(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)) - \sin(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)))}{(i^{\frac{3}{2}}\alpha_0)^2 \sin(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega))} \tag{9}$$

Consequently, the relationship between the wall shear stress and the cross-sectionally averaged velocity is established through the transfer function:

$$W_{\tau_1,u_1}(i\omega) = \frac{h}{3\mu}\frac{\tau_1(i\omega)}{< u_1(i\omega) >} = -\frac{(i^{\frac{3}{2}}\alpha_0)^2 \sin(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega))}{3(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)\cos(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)) - \sin(i^{\frac{3}{2}}\alpha_0\eta^*(i\omega)))} \tag{10}$$

This function describes the relationship between the amplitudes of the wall shear stress and mean velocity, as well as the phase shift between them during oscillatory flow.

Assuming that the mean velocity varies harmonically with time, the corresponding wall shear stress is expressed as:

$$< u_1 >= a_{u_1}\cos\omega t \tag{11}$$

$$\tau_1 = a_{\tau_1}\cos(\omega t + \varphi_{\tau_1}) \tag{12}$$

The amplitude and phase shift are subsequently determined using the real and imaginary parts of the transfer function:

$$\tau_1 = \left(\frac{a_{\tau_1}}{a_{u_1}}\cos\varphi_{\tau_1}\right) < u_1 > + \left(\frac{a_{\tau_1}}{a_{u_1}}\sin\varphi_{\tau_1}\right)\frac{1}{\omega}\frac{\partial < u_1 >}{\partial t} \tag{13}$$

$$W_{\tau_1,u_1} = -\frac{1}{3}\left(\frac{-i\alpha_0^2 \sin\left(i^{3/2}\alpha_0\left(\frac{1+iDe\alpha_0^2}{1+iDe\alpha_0^2 X}\right)^{1/2}\right)}{i^{3/2}\alpha_0\left(\frac{1+iDe\alpha_0^2}{1+iDe\alpha_0^2 X}\right)^{1/2}\cos\left(i^{3/2}\alpha_0\left(\frac{1+iDe\alpha_0^2}{1+iDe\alpha_0^2 X}\right)^{1/2}\right) - \sin\left(i^{3/2}\alpha_0\left(\frac{1+iDe\alpha_0^2}{1+iDe\alpha_0^2 X}\right)^{1/2}\right)}\right) = \chi + \beta i \tag{14}$$

Through further transformations, the resulting relationships are expressed in dimensionless form using the Deborah number and the fluid acceleration parameter:

$$\frac{h}{3\mu}\frac{\tau_1}{<u_1>} = W_{\tau_1,u_1} = \chi + \beta\frac{1}{\omega}K_n \tag{15}$$

$$\frac{\tau_{ns}}{\tau_{0ks}} = \chi + \frac{3\beta}{\alpha_0^2}K_n \tag{16}$$

Equation (23) is then used to investigate the dependence of the ratio between unsteady and steady wall shear stresses on the oscillation frequency. Graphs constructed for different parameter values illustrate the influence of the fluid's elastic properties and acceleration on the flow characteristics.

The analysis also indicates that replacing the wall shear stress under unsteady conditions with its steady-flow counterpart is justified only when the longitudinal velocity profile is parabolic. In other cases, the effects of rheological properties and oscillation frequency must be considered separately.

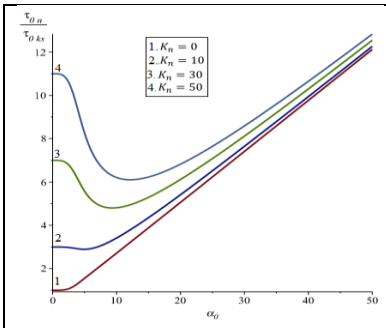


Figure 1.

Variation of the ratio of the wall shear stress in unsteady flow to that in steady flow as a function of the oscillation frequency parameter (for different values of the acceleration parameter at $De = 0$.

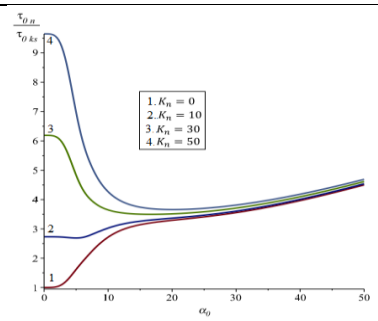


Figure 2.

Variation of the ratio of the channel wall shear stress in unsteady flow to that in steady flow as a function of the oscillation frequency parameter for different values of the acceleration parameter at $De = 0.01$ and $X = 0.1$).

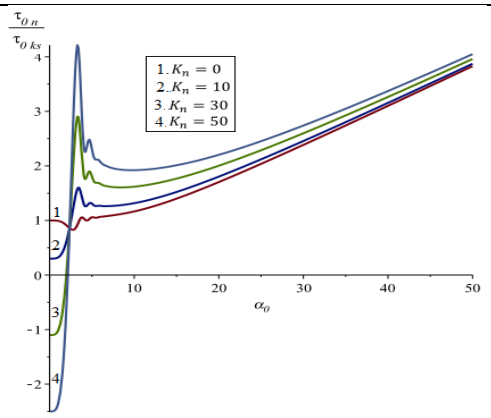


Figure 3.

Dependence of the unsteady-to-steady wall shear stress ratio on the oscillation frequency parameter for various values of the acceleration parameter, with $De = 0.1$ and $X = 0.1$).

CONCLUSION

This study examines the oscillatory flow of a rheologically complex fluid in a plane channel using a simplified mathematical model. The analytical results establish the relationship between the velocity field, wall shear stress, and the rheological properties of the fluid, with comparisons to classical Newtonian-flow theory.

The findings demonstrate that fluid elasticity, viscosity, and relaxation effects influence the velocity distribution, oscillation amplitude, and phase difference between mean velocity and wall shear stress. These factors should be considered when describing oscillatory flows of non-Newtonian fluids.

The proposed approach provides a theoretical basis for analyzing fluid motion in channels and pipelines and can support further research into the modeling and optimization of engineering processes involving viscoelastic fluids.

REFERENCES

1. Marx U., Wallis H., Hoffmann S., Linder G., Harland R., Sonntag F., Klotzbach U., Sakharov D., Tonevitskiy A., Lonster R. “Homan-on-a-Chip” developments: a translational cutting- edge alternative to systemic safety assessment and effecting evacuation in laboratory animals and man? //ATLA 2012. vol. 40. P. 235-257.
2. Sharipova Sh. Mathematical modeling of hydrodynamic resistance in oscillatory flow of a viscoelastic fluid. *Sources of Science (Ilm Sarchashmalari)*, 2022, No. 12, pp. 29–35.
3. Valueva E.P., Purdin M.S. Hydrodynamics and heat transfer of pulsating laminar flow in channels. *Thermal Engineering*, 2015, No. 9, pp. 24–33.
4. Valueva E.P., Purdin M.S. Pulsating laminar flow in a rectangular channel. *Thermophysics and Aeromechanics*, 2015, Vol. 22, No. 6, pp. 761–773.
5. Valueva E.P., Sviridov V.G. Introduction to Fluid Mechanics. Moscow: MEM Publishing House, 2001, 212 p
6. Begjanov A. Sh., Inoyatov M.O. Simplification of differential equations of elastic viscous fluid motion in pipes and ducts. // Central asian journal of theoretical and applied sciences. Volume: 02 Issue: 03 | March 2021. − P. 49-53.
7. Navruzov K., Rajabov S., Ashirov M. Mathematical modeling of hydrodynamic resistance an oscillatory flow of a viscoelastic fluid // E3S Web of conferences 401. 02026/ 2023 (CONMECHYDREO-2023).p.1-10.
8. Akilov, Zh. A., Dzhabbarov, M. S., & Md Ali, F. (2025). Unsteady and quasi-steady shear stress under oscillating flow of a viscoelastic fluid in a cylindrical pipe. *Chinese Journal of Physics*.
9. Navruzov K., Sharipova Sh. Oscillatory flow of rheological complex fluid in a flat channel // E3S Web of Conferences 508, 06008 (2024) p . 1-9 https://doi.org/10.1051/e3sconf/202450806008
10. Raghunatha, K. R. (2024). Viscoelastic effects on the oscillatory flow in a fluid-saturated porous layer. *Heat Transfer Journal*.

11. Shkurov Z.Navruzov K., Turaev M., Abdikarimov N. // Laminar unsteady flow of a viscoelastic liquid in a flat channel // E3S Web of Conferences 587, 01014 (2024) p . 1-10

12. Straughan, B. *Multiscale modelling of porous convection with a viscoelastic Maxwell fluid.* Multiscale Multidiscip. Model. Exp. Des. 9, 80 (2026). — Recent work on Maxwell viscoelastic fluid convection in porous media.

13. Alzahrani, J. *Analytical and numerical computations for bioconvective flow Maxwell nanofluid with variable thermal properties.* Sci. Rep. 15, 18585 (2025). — Covers analytical and finite-difference analysis of Maxwell nanofluid flows.

14. Jian, Y. *Oscillatory squeeze flow through an Oldroyd-B fluid-saturated porous layer.* Appl. Math. Mech. Engl. Ed. 45, 2037–2054 (2024). — Analytical study of porous oscillatory flow with Oldroyd-B viscoelastic model.

2-SECTION

THE ROLE OF DIGITAL TECHNOLOGIES IN EDUCATION MANAGEMENT: CHALLENGES AND OPPORTUNITIES IN THE CONTEXT OF HIGHER EDUCATION

Ismoilova Nilufar Muhammadbobir qizi
Master's Student in Education Management
Bucheon University in Tashkent, Uzbekistan
Email: Grafiniabarlas@gmail.com

Abstract. *This paper examines the transformative role of digital technologies in education management within higher education institutions. Drawing on contemporary literature and the specific context of Uzbekistan's educational reforms, the study analyzes key challenges—including infrastructure gaps, digital competence of managers and faculty, data privacy, and resistance to change—as well as emerging opportunities such as data-driven decision-making, personalized learning pathways, enhanced administrative efficiency, and improved stakeholder engagement. The research employs a qualitative literature review combined with a conceptual analysis of digital transformation frameworks in educational management. Findings highlight that successful integration of digital tools requires strategic leadership, continuous professional development, and a supportive institutional culture. The paper concludes with practical recommendations for education managers and policymakers aiming to leverage digital technologies for sustainable institutional development.*

Keywords: *digital technologies, education management, higher education, digital transformation, educational leadership, Uzbekistan*

1. INTRODUCTION

The rapid advancement of digital technologies has fundamentally altered the landscape of higher education worldwide. Education management, as a critical function responsible for planning, organizing, leading, and controlling educational processes and resources, is increasingly reliant on digital tools to enhance efficiency, transparency, and educational quality. In the context of Uzbekistan, the national education strategy emphasizes digitalization as a priority, aligning with global trends such as the Sustainable Development Goal 4 (Quality Education) and the digital transformation agendas of leading universities.

This paper aims to explore the dual nature of digital technologies in education management: the significant opportunities they present and the persistent challenges that institutions face during implementation. The specific focus is on higher education institutions, with particular relevance to the experiences and needs of emerging educational managers in Uzbekistan, including those studying at international branch campuses such as Bucheon University in Tashkent.

2. LITERATURE REVIEW

Scholars have extensively discussed the concept of digital transformation in education. According to Bates (2019), digital technologies enable more flexible, accessible, and learner-centered educational systems. In the domain of education management, Selwyn (2021) emphasizes that technology is not merely a tool but a catalyst that reshapes organizational structures, decision-making processes, and leadership practices.

Key digital tools relevant to education management include Learning Management Systems (LMS), Student Information Systems (SIS), data analytics platforms, artificial intelligence (AI) for predictive analytics, cloud-based collaboration tools, and digital assessment systems. Research by OECD (2023) indicates that institutions that strategically integrate these technologies demonstrate improved operational efficiency and better learning outcomes.

However, the literature also consistently identifies barriers. Infrastructure limitations, especially in developing contexts, digital skill gaps among academic and administrative staff, cybersecurity concerns, and organizational resistance remain significant obstacles (UNESCO, 2022; Altbach & de Wit, 2020).

3. METHODOLOGY

This study adopts a qualitative research approach based on a systematic literature review and conceptual analysis. Sources include peer-reviewed journal articles, international reports (UNESCO, OECD, World Bank), and policy documents related to digital education in Central Asia and globally. The analysis is framed around the Technology Acceptance Model (TAM) and the Digital Maturity Model for higher education institutions. The research questions guiding the study are: (1) What are the primary opportunities offered by digital technologies for education management? (2) What challenges hinder their effective implementation? (3) What strategies can education managers adopt to maximize benefits?

4. Opportunities of Digital Technologies in Education Management

4.1. Data-Driven Decision Making

Digital platforms generate vast amounts of data on student performance, resource utilization, and institutional operations. Education managers can use analytics to identify at-risk students, optimize resource allocation, and evaluate program effectiveness in real time.

4.2. Enhanced Administrative Efficiency

Automation of routine tasks—enrollment, scheduling, grade management, and reporting—reduces administrative burden and allows managers to focus on strategic leadership and educational quality improvement.

4.3. Personalized Learning and Student Support

AI-powered systems enable adaptive learning pathways and early intervention mechanisms, supporting more inclusive and student-centered education management practices.

4.4. Improved Communication and Stakeholder Engagement

Digital communication tools facilitate transparent interaction among students, faculty, parents, and external partners, strengthening institutional accountability and community trust.

5. Challenges and Barriers

Despite the potential benefits, several challenges persist. First, inadequate digital infrastructure and uneven internet access remain critical issues in many regions. Second, the digital competence of educational leaders and staff often lags behind technological advancements. Third, concerns regarding data privacy, cybersecurity, and ethical use of AI require robust institutional policies. Fourth, resistance to change and the lack of a digital culture within traditional academic structures can slow down transformation processes. Finally, the financial costs of acquiring, maintaining, and updating digital systems pose sustainability challenges for many institutions.

6. Recommendations for Education Managers

Based on the analysis, the following recommendations are proposed:

1. Develop a clear institutional digital strategy aligned with the university's mission and national education policy.

2. Invest in continuous professional development programs focused on digital leadership and technological skills for managers and faculty.

3. Establish robust data governance and cybersecurity frameworks.

4. Foster a culture of innovation and openness to change through participatory decision-making and pilot projects.

5. Collaborate with international partners and technology providers to access best practices and sustainable solutions.

7. CONCLUSION

Digital technologies offer substantial opportunities to modernize education management and improve the quality and accessibility of higher education. However, realizing these benefits requires more than technological adoption; it demands strategic leadership, capacity building, and a supportive organizational culture. For master's students and future education managers in

Uzbekistan, developing digital competence and a critical understanding of both the potential and limitations of technology is essential. Future research should focus on empirical studies of digital transformation processes in Central Asian higher education institutions to generate context-specific knowledge and evidence-based practices.

REFERENCES

Altbach, P. G., & de Wit, H. (2020). Post-pandemic outlook for higher education. International Higher Education, 102, 3–5.

Bates, A. W. (2019). Teaching in a digital age (2nd ed.). Tony Bates Associates Ltd.

OECD. (2023). Digital education outlook 2023. OECD Publishing.

Selwyn, N. (2021). Education and technology: Key issues and debates (3rd ed.). Bloomsbury Academic.

UNESCO. (2022). Reimagining our futures together: A new social contract for education. UNESCO.

World Bank. (2021). Digital transformation of education in Europe and Central Asia. World Bank Group.

TA'LIM JARAYONIDA SUN'IY INTELLEKT METOD VA TEXNOLOGIYALARIDAN FOYDALANISH

A.A. Abduvaliyev

Qarshi davlat texnika universiteti dotsenti

[a.abduvaliyev@kstu.uz]

S.E. Begmamatova

Qarshi davlat texnika universiteti, 1-bosqich magistrantlari

[s.begmamatova@kstu.uz]

M.E. Begmamatova

[m.begmamatova@kstu.uz]

M.U. Qo'ldoshova

[m.quldosheva@kstu.uz]

Annotatsiya: *Ushbu tezisda ta'lim jarayonida sun'iy intellekt metod va texnologiyalaridan foydalanish imkoniyatlari yoritilgan. Ularning ta'lim sifatini oshirish, o'quv jarayonini shaxsiylashtirish va o'qituvchi faoliyatini yengillashtirishdagi o'rni, shuningdek, yuzaga kelishi mumkin bo'lgan muammolar va samarali foydalanish shartlari ko'rib chiqiladi.*

Abstract: *This thesis examines the use of artificial intelligence methods and technologies in the educational process. It considers their role in improving education quality, personalizing learning and supporting teachers, as well as potential problems and the conditions for their effective use.*

Kalit so'zlar: *sun'iy intellekt, metod, texnologiya, ta'lim, raqamli ta'lim, innovatsion texnologiyalar.*

Key words: *artificial intelligence, method, technology, education, digital education, innovative technologies.*

KIRISH

Bugungi kunda raqamli texnologiyalarning jadal rivojlanishi ta'lim tizimiga ham sezilarli ta'sir ko'rsatmoqda. Xususan, sun'iy intellekt texnologiyalarining rivojlanishi ta'lim jarayonini tashkil etish, o'quv materiallarini tayyorlash, bilimlarni baholash va o'quvchilarning individual

ta’lim ehtiyojlarini aniqlash uchun yangi imkoniyatlarni yaratmoqda. An’anaviy ta’lim jarayonida barcha o‘quvchilarga bir xil yondashuv qo‘llanilishi mumkin. Biroq o‘quvchilarning bilim darajasi, qiziqishlari va o‘zlashtirish tezligi bir-biridan farq qiladi. Sun’iy intellektga asoslangan metod va texnologiyalar esa o‘quvchining individual xususiyatlarini hisobga olgan holda ta’lim mazmunini moslashtirish imkonini beradi.

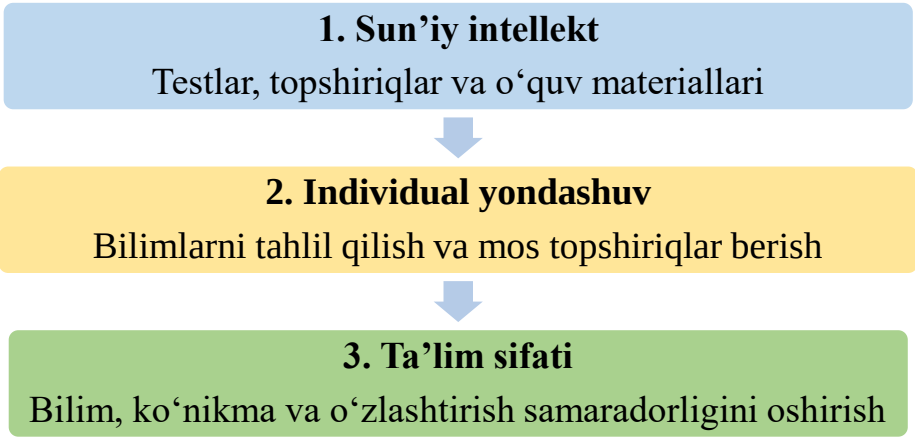
Sun’iy intellekt - insonning ayrim aqliy faoliyatlarini, jumladan, ma’lumotlarni tahlil qilish, muammolarni hal etish, matn yaratish va tavsiyalar berish kabi jarayonlarni texnologik vositalar yordamida amalga oshirishga xizmat qiluvchi yo‘nalishdir. Ta’limda sun’iy intellektdan foydalanish orqali o‘quv jarayonining ayrim bosqichlarini avtomatlashtirish va ta’lim samaradorligini oshirish mumkin.

ASOSIY QISM

Sun’iy intellekt metodlaridan foydalanishning muhim yo‘nalishlaridan biri shaxsiylashtirilgan ta’lim hisoblanadi. Bunda o‘quvchining bilim darajasi va o‘zlashtirish natijalariga qarab unga mos topshiriqlar, savollar va o‘quv materiallari tavsiya qilinishi mumkin. Bu esa o‘quvchining o‘z imkoniyatlariga mos sur’atda bilim olishiga yordam beradi. Shuningdek, sun’iy intellekt texnologiyalari avtomatlashtirilgan baholash jarayonida ham qo‘llanilishi mumkin. Test topshiriqlarini tekshirish, xatolarni aniqlash va o‘quvchining natijalarini tahlil qilish orqali o‘qituvchining vaqtini tejash mumkin. Natijada o‘qituvchi ko‘proq pedagogik va ijodiy faoliyatga e’tibor qaratish imkoniyatiga ega bo‘ladi.

Sun’iy intellektning yana bir muhim imkoniyati - ta’lim kontentini yaratishdir. O‘qituvchi sun’iy intellekt vositalaridan foydalanib, dars uchun savollar, testlar, mashqlar, tushuntirish materiallari va boshqa o‘quv resurslarini tayyorlashda yordam olishi mumkin. Biroq bunday materiallardan foydalanishda o‘qituvchi tomonidan ularning mazmuni, aniqligi va ta’lim maqsadlariga mosligi tekshirilishi zarur. Sun’iy intellekt metod va texnologiyalari o‘qituvchini almashtirish uchun emas, balki uning faoliyatini qo‘llab-quvvatlash uchun

xizmat qilishi muhim. O‘qituvchi ta’lim jarayonining asosiy tashkilotchisi sifatida qoladi. Sun’iy intellekt esa unga ma’lumotlarni tahlil qilish, individual yondashuvni tashkil etish va takroriy vazifalarni avtomatlashtirishda yordam beruvchi vosita sifatida qaralishi mumkin.



1-rasm. Sun’iy intellekt yordamida ta’lim sifatini oshirish modeli

Ushbu model sun’iy intellekt vositalari orqali o‘quv materiallarini tayyorlash, o‘quvchilarning bilimlarini tahlil qilish va individual topshiriqlar berish jarayonlarini ifodalaydi. Natijada ta’lim jarayonini o‘quvchilarning ehtiyojlariga moslashtirish va o‘zlashtirish samaradorligini oshirish imkoniyati yaratiladi. Bunda o‘qituvchi sun’iy intellekt yaratgan materiallarni tekshiradi va ta’lim jarayonini boshqaradi. Qarshi davlat texnika universiteti platformalari va raqamli resurslar yordamida o‘quv jarayonini tashkil etish shakli bo‘lib, u ta’lim mazmunini yetkazish, bilimlarni mustahkamlash va o‘zlashtirish natijalarini tahlil qilish imkoniyatlarini kengaytiradi. Ushbu jarayonda sun’iy intellektga asoslangan innovatsion texnologiyalardan foydalanish o‘qitish samaradorligini oshirish, o‘quvchilarning bilim darajasini aniqlash va ularga individual yondashuvni ta’minlash uchun sharoit yaratadi.



2-rasm. Sun'iy intellekt yordamida ta'lim sifatini oshirish modelining algoritmi.

1. O'quvchi ma'lumotlarini kiritish. Dastlab o'quvchining bilim darajasi, o'zlashtirish ko'rsatkichlari, ehtiyojlari va qiziqishlariga oid ma'lumotlar kiritiladi. Ushbu ma'lumotlar ta'lim jarayonini o'quvchining individual xususiyatlariga moslashtirishga yordam beradi.

2. Sun'iy intellekt. Kiritilgan ma'lumotlar sun'iy intellekt vositalari yordamida tahlil qilinadi. Natijada o'quvchining kuchli va zaif tomonlarini aniqlash, bilim darajasiga mos ta'lim strategiyasini tanlash imkoniyati yuzaga keladi.

3. Testlar, topshiriqlar va o'quv materiallari. Tahlil natijalariga asoslanib, o'quvchiga mos testlar, nazariy va amaliy topshiriqlar, elektron darsliklar hamda qo'shimcha o'quv materiallari tavsiya etiladi. Bu o'quv jarayonini mazmunan boyitadi va bilimlarni mustahkamlashga xizmat qiladi.

4. Individual yondashuv. Har bir o'quvchining bilim darajasi va o'zlashtirish tezligiga qarab topshiriqlar murakkabligi, o'rganish usullari va tavsiyalar moslashtiriladi. Natijada o'quvchining mustaqil ishlashi va mavzuni chuqurroq o'zlashtirishi uchun sharoit yaratiladi.

5. Natijani baholash. O'quvchining test natijalari, topshiriqlarni bajarish darajasi va mavzuni o'zlashtirishi tahlil qilinadi. Olingan natijalar belgilangan o'quv maqsadlari bilan taqqoslanadi. Agar kamchiliklar aniqlansa, algoritm

individual yondashuv bosqichiga qaytadi va o‘quvchiga qo‘shimcha tushuntirishlar hamda mos topshiriqlar beriladi.

6. Mukammal natija. O‘quvchi aniqlangan kamchiliklarini bartaraf etib, belgilangan ta’lim maqsadlariga erishganda, algoritmning kutilgan natijasi ta’minlanadi. Bunda bilimlarning mustahkamlanishi, amaliy ko‘nikmalarning rivojlanishi va o‘zlashtirish samaradorligining oshishi nazarda tutiladi.

Ta’lim sifatini oshirishda sun’iy intellekt metodlarining ahamiyati, avvalo, o‘quv jarayonini ma’lumotlarga asoslangan holda tashkil etish imkoniyati bilan belgilanadi. Jumladan, o‘quvchilarning test natijalari, topshiriqlarni bajarish darajasi va yo‘l qo‘ygan xatolarini tahlil qilish orqali ularning qaysi mavzularni yaxshi o‘zlashtirgani hamda qaysi yo‘nalishlarda qo‘shimcha yordamga ehtiyoj sezayotgani aniqlanishi mumkin. Bunday tahlillar o‘qituvchiga ta’lim metodlarini takomillashtirish, o‘quv materiallarini qayta ko‘rib chiqish va bilimlarni mustahkamlashga qaratilgan mashg‘ulotlarni rejalashtirishda yordam beradi. Innovatsion texnologiyalardan foydalanish o‘qituvchining kasbiy faoliyatini ham takomillashtiradi. Sun’iy intellekt vositalari yordamida dars ishlanmalari, test topshiriqlari, interaktiv mashqlar, taqdimotlar va turli darajadagi o‘quv materiallarini tayyorlash mumkin. Shuningdek, raqamli ta’lim platformalari orqali o‘quvchilarning natijalarini kuzatish, o‘zlashtirishdagi muammolarni aniqlash va qayta aloqa berish jarayonlarini samarali tashkil etish mumkin. Biroq sun’iy intellekt tomonidan tayyorlangan materiallarning ilmiy aniqligi, metodik jihatdan to‘g‘riligi va o‘quv dasturiga muvofiqligi o‘qituvchi tomonidan tekshirilishi lozim.

Shu bilan birga, ta’limda sun’iy intellektdan foydalanishda ayrim muammolarga ham e’tibor qaratish lozim. Jumladan, sun’iy intellekt tomonidan yaratilgan ma’lumotlarda xatolar bo‘lishi mumkin. Bundan tashqari, o‘quvchilarning mustaqil fikrlashi, ijodkorligi va akademik halolligini saqlash masalalari ham muhim ahamiyatga ega. Shu sababli sun’iy intellekt texnologiyalaridan foydalanishda inson nazorati va pedagogik yondashuv zarur.

XULOSA

Xulosa qilib aytganda, sun’iy intellekt metod va texnologiyalaridan ta’lim jarayonida foydalanish zamonaviy ta’limning rivojlanishiga xizmat qiluvchi muhim yo‘nalishlardan biridir. Ushbu texnologiyalar ta’limni shaxsiylashtirish, o‘quvchilarning bilimlarini tahlil qilish, baholash jarayonini takomillashtirish va o‘qituvchilarning faoliyatini yengillashtirish uchun keng imkoniyatlar yaratadi.

Biroq sun’iy intellektdan samarali foydalanish uchun o‘qituvchilarning raqamli kompetensiyalarini rivojlantirish, yaratilgan ma’lumotlarni tanqidiy tahlil qilish va texnologiyadan pedagogik maqsadlarga muvofiq foydalanish muhimdir. Sun’iy intellekt ta’lim jarayonida inson omilini to‘liq almashtiruvchi vosita emas, balki ta’lim sifatini oshirishga yordam beruvchi zamonaviy texnologik imkoniyat sifatida qaralishi lozim.

1. Ta’lim jarayonini shaxsiylashtirish. O‘quvchilarning bilim darajasi, qobiliyati va individual ehtiyojlarini hisobga oluvchi sun’iy intellekt vositalaridan foydalanish orqali har bir o‘quvchi uchun moslashtirilgan topshiriqlar va o‘quv materiallarini ishlab chiqish tavsiya etiladi.

2. Milliy ta’lim tizimiga mos sun’iy intellekt vositalarini joriy etish. O‘zbek tilidagi ta’lim resurslari, elektron darsliklar, interaktiv topshiriqlar va avtomatlashtirilgan baholash tizimlarini ishlab chiqish hamda amaliyotga tatbiq etishga alohida e’tibor qaratish zarur.

FOYDALANILGAN ADABIYOTLAR:

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.

OECD. (2021). *OECD digital education outlook 2021: Pushing the frontiers with artificial intelligence, blockchain and robots*. OECD Publishing.

UNESCO. (2021). *AI and education: Guidance for policy-makers*. UNESCO.

UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO.

INTEGRATING ARTIFICIAL INTELLIGENCE INTO UNIVERSITY EDUCATION IN UZBEKISTAN: A NARRATIVE REVIEW OF OPPORTUNITIES, CHALLENGES AND POLICY DIRECTIONS

Bakhriddinov Makhamadali Madaminovich

Teacher, Faculty of Philology, Turan International University, Namangan, Uzbekistan

E-mail: bahriddinov96@inbox.ru

ORCID: [0009-0000-2413-4845]

***Abstract**: Artificial intelligence (AI), and generative AI in particular, is rapidly entering university teaching, while Uzbekistan has adopted national strategies for digital transformation and AI development. This narrative review synthesises international research on AI in higher education and recent Uzbek studies to identify the main opportunities, challenges and policy directions for Uzbek universities. International evidence shows that intelligent tutoring and adaptive systems can improve learning outcomes and that AI can support assessment and feedback, but reviews also report weak links to pedagogy, limited attention to ethics, and risks of over-reliance on AI tools. Uzbek studies are still mostly conceptual; the available survey evidence indicates that most students already use AI tools, often without checking accuracy or originality. Four themes emerged: personalised learning, assessment and feedback, generative AI and academic integrity, and language and equity. The limited support for Uzbek and Karakalpak in AI systems and the gap between urban and regional universities are the most context-specific challenges. The review concludes that Uzbek universities need institutional AI policies, AI literacy training for teachers and students, support for national languages, and empirical studies conducted in local classrooms.*

***Keywords:** artificial intelligence; generative AI; higher education; Uzbekistan; AI literacy; academic integrity.*

1. INTRODUCTION

Artificial intelligence (AI) is no longer a futuristic concept in higher education. AI-based systems are used for adaptive tutoring, assessment, learning analytics and student support (Zawacki-Richter et al., 2019; Crompton & Burke,

2023). Since the public release of ChatGPT in late 2022, generative AI has made these tools available to every student with a smartphone, raising new questions about learning, assessment and academic integrity (Kasneci et al., 2023; UNESCO, 2023).

Uzbekistan has placed digital transformation high on its policy agenda. The "Digital Uzbekistan – 2030" Strategy, approved by Presidential Decree No. UP-6079 of 5 October 2020, sets goals for digital skills and assigns research programmes in areas such as AI to the higher education sector. Presidential Resolution No. PP-4996 of 17 February 2021 introduced measures for the accelerated introduction of AI technologies, and Resolution No. PP-358 of 14 October 2024 approved the Strategy for the Development of Artificial Intelligence until 2030, which includes raising public knowledge and skills in using AI.

Universities are expected to play a central role in this transformation. However, regional universities differ greatly in infrastructure, many teachers have limited experience with AI tools, and most AI systems were developed primarily for English. At the same time, research on AI in Uzbek higher education is recent and largely conceptual, and it has rarely been compared systematically with international evidence.

The aim of this article is to synthesise international and Uzbek research on AI in higher education and to identify implications for Uzbek universities. The review addresses three questions:

1) What opportunities does international research identify for AI in university education?

2) What do recent Uzbek studies report about the use of AI in Uzbek universities?

3) Which challenges and policy directions are most relevant to the Uzbek context?

2. METHOD

This article is a narrative literature review. Sources were identified through Google Scholar and the Directory of Open Access Journals (DOAJ) for international literature, and through Uzbek journal platforms (inlibrary.uz, institutional journal websites and Zenodo) for local studies. The search used combinations of the keywords “artificial intelligence”, “generative AI”, “ChatGPT”, “higher education”, “university” and “Uzbekistan”, together with their Uzbek and Russian equivalents (“sun’iy intellekt”, “oliy ta’lim”, “искусственный интеллект”).

Priority was given to (a) peer-reviewed systematic reviews and meta-analyses of AI in education, (b) empirical studies of generative AI in higher education and language learning, and (c) studies conducted in Uzbekistan. National policy documents were retrieved from the official legislative database (lex.uz). Each source was checked for availability and bibliographic accuracy. The selected literature was analysed thematically: findings were grouped into recurring themes, and international and Uzbek evidence was compared within each theme. Table 1 summarises the Uzbek studies included in the review.

Table 1.

Uzbek studies included in the review

Study	Type	Focus	Main points
Pirniyazov (2025)	Empirical (survey, n = 200, three universities)	Students’ use of AI tools (e.g., ChatGPT, Grammarly)	Over 60% use AI frequently, mainly for grammar checking, summarising and brainstorming; many use outputs without checking accuracy or originality

Study	Type	Focus	Main points
Sherimbetova & Abdikalikova (2025)	Conceptual review	AI in the teaching process	AI can help organise lessons, automate routine processes and individualise learning
Prenov & Atabaeva (2025)	Conceptual review	Problems of AI use in Uzbek higher education	Technological, socio-moral, pedagogical and legal challenges; personalised learning as a key opportunity

3. RESULTS

Four themes emerged from the analysis: personalized learning, assessment and feedback, generative AI and academic integrity, and language and equity.

3.1. Personalised and adaptive learning

Personalisation is the most frequently cited benefit of AI in higher education. In a review of 146 studies, Zawacki-Richter et al. (2019) identified four main application areas: profiling and prediction, assessment and evaluation, adaptive systems and personalisation, and intelligent tutoring systems. Evidence for intelligent tutoring is relatively strong: in a meta-analysis of 50 controlled evaluations, Kulik and Fletcher (2016) found that intelligent tutoring raised test scores by a median of 0.66 standard deviations over conventional instruction, which corresponds to moving a typical student from the 50th to the 75th percentile. Reviewing such meta-analyses, du Boulay (2016) concluded that these systems work best as classroom assistants that support, rather than replace, the teacher.

Uzbek authors also see individualised learning as the main opportunity (Sherimbetova & Abdikalikova, 2025; Prenov & Atabaeva, 2025). This is especially relevant for Uzbek universities, where large groups make it difficult for teachers to differentiate instruction manually. In English language courses, for example, adaptive tools could give additional grammar and vocabulary

practice to weaker students while offering more advanced reading and writing tasks to stronger ones. However, Uzbek studies have not yet tested such tools in local classrooms, so their effectiveness in this context remains to be demonstrated.

3.2. Assessment and feedback

AI can reduce teachers' workload in assessment and provide students with faster feedback. Crompton and Burke (2023), reviewing 138 studies published between 2016 and 2022, identified five main uses of AI in higher education: assessment and evaluation, prediction, AI assistants, intelligent tutoring systems and managing student learning. In language education, Mizumoto and Eguchi (2023) showed that a large language model could score 12,100 essays from the TOEFL11 corpus with a certain level of accuracy and reliability, and suggested that such tools can support, but not replace, human raters.

For Uzbek universities, AI-assisted feedback on student writing could be particularly useful in large English classes. At the same time, automated assessment raises questions of fairness, transparency and accuracy, especially for texts in Uzbek or texts containing culture-specific expressions. Therefore, AI-generated scores and feedback should be monitored and validated by teachers before they are used for grading.

3.3. Generative AI and academic integrity

Generative AI has changed the discussion from what AI systems can do for institutions to what students already do with AI. Kasneci et al. (2023) describe opportunities for personalised explanations, writing support and assistance to teachers, but also warn of bias, inaccurate output, copyright issues and over-reliance. In a systematic review, Zhai et al. (2024) found that over-reliance on AI dialogue systems can negatively affect students' critical thinking, decision-making and analytical reasoning. UNESCO (2023) therefore recommends a human-centred approach, validation of AI tools, protection of data privacy and capacity building for teachers.

The only empirical Uzbek study identified in this review confirms that these issues are already present in Uzbek universities. In a survey of 200 undergraduates at three universities, Pirniyazov (2025) found that over 60% used AI tools frequently, mainly for grammar checking, summarising information and brainstorming. Many students reported using AI output without checking its accuracy or considering originality and academic honesty. The author concludes that passive use of AI may weaken core academic skills and recommends teaching AI literacy.

3.4. Language and equity

The most context-specific challenge for Uzbekistan is language. Natural language processing research has focused on a small number of high-resource languages, while most of the world's languages have far fewer digital resources (Joshi et al., 2020). Uzbek, and even more so Karakalpak, have far fewer resources than English or Russian. As a result, AI tools may perform less accurately in these languages, which can disadvantage students who study or write mainly in Uzbek or Karakalpak.

A second dimension of equity is infrastructure. Universities in Tashkent generally have better internet access and digital equipment than many regional institutions. Prenov and Atabaeva (2025) list technological, socio-moral, pedagogical and legal problems among the main challenges of AI use in Uzbek higher education. Without targeted investment and teacher training, AI may widen rather than reduce the gap between urban and regional universities.

4. DISCUSSION

The review shows both the potential and the complexity of AI in Uzbek universities. International evidence supports the use of AI for personalised learning and feedback, but reviews also show that much AI-in-education research is weakly connected to pedagogical theory and gives limited attention to ethics (Zawacki-Richter et al., 2019; Bond et al., 2024). These concerns are directly relevant to Uzbekistan, where national strategies emphasise rapid adoption.

Comparing international and Uzbek research reveals a clear gap. International literature includes meta-analyses, controlled evaluations and large reviews, whereas Uzbek research is mostly conceptual and descriptive. The survey by Pirniyazov (2025) is an important exception, and it suggests that student use of generative AI is already widespread, while institutional guidance and AI literacy training are lagging behind.

A broader issue is the role of the teacher. Uzbek higher education places strong value on mentorship and the teacher's personal example. This tradition is consistent with international findings that AI is most effective as an assistant to the teacher (du Boulay, 2016) and with UNESCO's (2023) human-centred approach. AI should therefore be introduced to strengthen, not replace, the teacher's role.

This review has limitations. It is a narrative rather than a systematic review, so the selection of sources may not be exhaustive. Some Uzbek publications are not indexed in international databases and may have been missed. In addition, the rapid development of generative AI means that some findings may become outdated quickly.

5. RECOMMENDATIONS

Based on the review, the following recommendations are proposed:

1) **Institutional level.** Each university should adopt a clear policy on the use of AI in teaching, assessment and student work, including rules for disclosing AI use.

2) **Pedagogical level.** AI literacy should be taught to both teachers and students, covering effective prompting, verification of AI output, academic integrity and data privacy.

3) **Assessment level.** AI-generated scores and feedback should be used as support for, not a replacement of, teacher judgement, and assessment tasks should be redesigned to value process and original thinking.

4) **Language level.** National programmes should support the development of Uzbek- and Karakalpak-language datasets and AI tools for education.

5) **Infrastructure level.** Investment should prioritise regional universities to prevent AI from widening existing inequalities.

6) **Research level.** Uzbek researchers should conduct empirical studies, such as classroom experiments and surveys of teachers and students, to test the effectiveness of AI tools in local contexts.

6. CONCLUSION

This review suggests that AI offers Uzbek universities real opportunities for personalised learning, faster feedback and more efficient support for students, and that these opportunities are consistent with national strategies for digital and AI development. However, the evidence base in Uzbekistan is still limited, students are already using generative AI with little guidance, and AI tools remain less developed for Uzbek and Karakalpak than for major world languages.

If universities combine clear policies, AI literacy training, support for national languages and local empirical research, Uzbekistan can develop a model of AI in higher education that is both technologically advanced and grounded in its own linguistic, cultural and pedagogical traditions.

REFERENCES

Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., Pham, P., Chong, S. W., & Siemens, G. (2024). A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education, 21*, Article 4. https://doi.org/10.1186/s41239-023-00436-z

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education, 20*, Article 22. https://doi.org/10.1186/s41239-023-00392-8

du Boulay, B. (2016). Artificial intelligence as an effective classroom assistant. *IEEE Intelligent Systems, 31*(6), 76–81. https://doi.org/10.1109/MIS.2016.93

Joshi, P., Santy, S., Budhiraja, A., Bali, K., & Choudhury, M. (2020). The state and fate of linguistic diversity and inclusion in the NLP world. In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics* (pp. 6282–6293). Association for Computational Linguistics. https://doi.org/10.18653/v1/2020.acl-main.560

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103*, Article 102274. https://doi.org/10.1016/j.lindif.2023.102274

Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of intelligent tutoring systems: A meta-analytic review. *Review of Educational Research, 86*(1), 42–78. https://doi.org/10.3102/0034654315581420

Mizumoto, A., & Eguchi, M. (2023). Exploring the potential of using an AI language model for automated essay scoring. *Research Methods in Applied Linguistics, 2*(2), Article 100050. https://doi.org/10.1016/j.rmal.2023.100050

Pirniyazov, A. A. (2025). The use of artificial intelligence by students in the learning process in the context of Uzbekistan: Opportunity or risk? *International Journal of Inventive Engineering and Sciences, 12*(8), 15–20. https://doi.org/10.35940/ijies.H1119.12080825

Prenov, B. B., & Atabaeva, B. J. (2025). Jasalma intellektten paydalanıwda júzege keletuǵın ayırım mashqalalar [Some problems arising in the use of artificial intelligence]. *Science and Society*, (6-2), 45–47.

Presidential Decree of the Republic of Uzbekistan No. UP-6079. (2020, October 5). *On approval of the "Digital Uzbekistan – 2030" Strategy and measures for its effective implementation*. https://lex.uz/docs/5031048

Presidential Resolution of the Republic of Uzbekistan No. PP-358. (2024, October 14). *On approval of the Strategy for the Development of Artificial Intelligence Technologies until 2030*. https://lex.uz/docs/7159258

Presidential Resolution of the Republic of Uzbekistan No. PP-4996. (2021, February 17). *On measures to create conditions for the accelerated introduction of artificial intelligence technologies*. https://lex.uz

Sherimbetova, Z. O., & Abdikalikova, X. A. (2025). Sun'iy intellektdan dars jarayonida foydalanish [Using artificial intelligence in the teaching process]. *Modern Education and Development, 22*(5), 40–44. https://doi.org/10.71337/inlibrary.uz.mead.119291

UNESCO. (2023). *Guidance for generative AI in education and research* (F. Miao & W. Holmes, Authors). UNESCO. ISBN 978-92-3-100612-8

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education, 16*, Article 39. https://doi.org/10.1186/s41239-019-0171-0

Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments, 11*, Article 28. https://doi.org/10.1186/s40561-024-00316-7

THE ROLE OF TRICHOSCOPY AND EMERGING TECHNOLOGIES IN ALOPECIA DIAGNOSIS

Royfe Milana Shmulevna

Fourth-Year Student, Faculty of General Medicine, Kimyo International University in Tashkent, Uzbekistan

ORCID: https://orcid.org/0009-0006-7560-7669

(milana_royfe235@mail.ru)

Allaeva Miyassar Jalaliddinovna

Associate Professor, Department of Therapeutic Disciplines, Kimyo International University in Tashkent, Uzbekistan

ORCID: https://orcid.org/0000-0002-5765-5425

(allaevamuassar@gmail.com)

Abstract. *This critical narrative review examines the contribution of trichoscopy, advanced imaging and artificial intelligence to alopecia diagnosis. Targeted literature searches informed a comparison of clinical applications and evidential limitations. Trichoscopy supports pattern recognition and biopsy-site selection; emerging methods provide complementary structural information and automated measurements. Small, selected cohorts and limited independent validation restrict broader diagnostic claims. Additional technologies should address a defined clinical question, while histopathology remains necessary when tissue confirmation will guide management.*

Keywords: *alopecia; trichoscopy; noninvasive imaging; artificial intelligence; scalp biopsy.*

INTRODUCTION

Alopecia has diverse causes, and irreversible follicular loss makes timely recognition of cicatricial disease particularly important [1]. Trichoscopy evaluates surface patterns, advanced imaging examines subsurface structures, and artificial intelligence (AI) assists image analysis [2, 3]. This review asks what each approach adds beyond clinical assessment and whether the supporting evidence justifies a change in diagnostic practice.

METHODS

This review used targeted web searches of PubMed-indexed records and publisher sites. Search terms combined “alopecia” with “trichoscopy”, “reflectance confocal microscopy”, “optical coherence tomography”, “ultrasound” or “artificial intelligence”; reference lists supplemented retrieval. English-language human studies and reviews were selected for relevance to diagnosis or imaging assessment. Reporting guidance was included for AI appraisal. Single-case reports, commercial claims and treatment-only studies were not used as core evidence.

Eleven sources were selected: six reviews, four primary studies and one reporting guideline. Bibliographic records and available full texts were checked. Comparison considered sample size, reference standard, validation setting and added clinical value. Selection was purposive, without duplicate screening or formal risk-of-bias scoring; this is a narrative synthesis, not a systematic review or meta-analysis.

Clinical assessment and trichoscopy

Assessment integrates onset, distribution, shedding, medication exposure, family history, scalp symptoms and hair-care practices. Examination distinguishes diffuse or patterned thinning from patchy loss and identifies inflammatory changes. Laboratory investigations should follow clinical suspicion; blood counts, iron status and thyroid tests are not a universal panel. Scale with broken hairs may warrant mycological investigation [1].

Loss of follicular openings and perifollicular inflammation suggest cicatricial disease. If uncertainty persists, biopsy should target an active area with residual hairs rather than a fully scarred centre. Additional imaging should not postpone tissue assessment when its result will influence care [1, 2].

Trichoscopic evidence and interpretation

Trichoscopy reveals shaft calibre, follicular openings, dots and perifollicular changes. A systematic review of androgenetic alopecia (AGA)

included 34 studies, 2,860 affected patients and 1,840 controls. Hair-diameter variability, vellus hairs and the peripilar sign were reported in 94.07%, 66.45% and 43.27% of affected patients, respectively [4]. These frequencies are not universal diagnostic thresholds: definitions, scalp sites and comparator populations differed. A pattern of miniaturization is more informative than an isolated sign.

In alopecia areata, yellow dots, black dots, broken or tapering hairs and short vellus hairs contribute to pattern recognition. Black dots and tapering hairs may reflect activity, while regrowing hairs assist follow-up. No single finding establishes the diagnosis; distribution, history and competing explanations must be considered [5]. Diffuse shedding with inconclusive surface findings therefore requires reassessment rather than automatic assignment to one alopecia subtype [1, 5].

Generalisability also matters. A review of trichoscopy in skin of colour covered 60 papers, but disease stage and hair texture were often inadequately documented [6]. Skin phototype, texture and acquisition settings should be recorded when interpreting images. For follow-up, consistent scalp sites, magnification and illumination help distinguish biological change from differences in technique.

Practical diagnostic sequence

The sequence is clinical assessment, trichoscopy, then targeted testing or biopsy according to the unresolved question [1]. In this synthesis, advanced imaging is most defensible when a clinician specifies what additional finding would alter management. A descriptive image alone does not demonstrate that a test improves decisions or safely avoids biopsy [2].

Noninvasive imaging beyond trichoscopy

Reflectance confocal microscopy (RCM) depicts superficial cellular morphology, optical coherence tomography (OCT) measures cross-sectional architecture, and high-frequency ultrasound (HFUS) assesses deeper tissue and

follicles. Their outputs are complementary rather than interchangeable. A 2024 systematic review covered 42 scalp-imaging studies, but its scope extended beyond alopecia and its search covered publications before 2022 [2]. Disease-specific primary evidence is therefore more informative than the total publication count.

Three primary investigations illustrate the distinction between detecting abnormalities and establishing clinical diagnostic value (Table 1). RCM was compared with histopathology in scalp discoid lupus [7]; OCT compared scarring, nonscarring and healthy scalps [8]; HFUS compared clinically diagnosed AGA with healthy volunteers [9].

Table 1.

Selected primary imaging studies and their clinical limits

Method and sample	Observed contribution	What remains unproven
RCM [7]Cross-sectional; 12 patients with scalp discoid lupus	Agreement with histopathology exceeded 75% for 7 of 11 assessed features.	Differential diagnostic accuracy in unselected patients; ability to replace biopsy.

OCT [8]Pilot; 12 scarring, 14 nonscarring, 6 healthy participants	Scarring cases had fewer visible follicles and greater measured epidermal thickness.	Validated thresholds for individual diagnoses; clinical benefit beyond trichoscopy.
HFUS [9]Comparative; 30 AGA patients and 30 healthy controls	At 22 MHz, AGA showed smaller and fewer follicles, with reduced scalp/subcutaneous thickness.	Specificity against other alopecias; histological correlation; added value over trichoscopy.

Abbreviations are defined in the text. Findings concern different diseases and endpoints and do not support a ranking of diagnostic accuracy.

Agreement with tissue features in patients already known to have a disease does not establish sensitivity or specificity in a mixed referral population [7]. Likewise, differences between group averages cannot define a reliable diagnostic cutoff for an individual [8, 9]. The HFUS study used neither histological confirmation nor a direct trichoscopic comparison [9]. These designs support feasibility, but not routine substitution for established assessment.

The potential added value is spatial: RCM may clarify superficial inflammatory morphology, OCT structural change, and HFUS deeper architecture. Whether this changes biopsy decisions or improves outcomes requires prospective testing. Equipment, operator training and acquisition time also affect implementation [2].

Artificial intelligence and clinical translation

AI can support classification, follicular measurement and severity scoring. A 2026 systematic review identified 15 trichology studies, comprising 13 retrospective investigations and two prospective studies. It described promising automated Severity of Alopecia Tool (SALT) estimates, but limited external validation [3]. Agreement on a severity score is a different task from distinguishing diseases with similar appearances.

Suh and colleagues used 318 trichoscopic images from one Korean centre to distinguish early AGA from no hair loss: 298 images for model development and 20 for testing. The model correctly classified 18 of 20 test images, reporting 90% accuracy and an area under the receiver operating characteristic curve of 0.97 [10]. Although termed external validation by the authors, this review treats it as an internal hold-out test because images originated from the same institutional dataset [10, 11]. Patient-level separation was unclear.

The test set contained only ten images per class; one additional error would change overall accuracy by five percentage points [10]. This illustrates imprecision, not evidence of broad diagnostic reliability. Evaluation against healthy controls also leaves performance against other alopecias unresolved. Before adoption, studies should test clinician performance with and without AI, specify how uncertain outputs are handled, and measure effects on diagnostic decisions [3, 11].

Limitations and future research

This purposive English-language review may omit relevant evidence and does not provide a formal certainty rating. Across the selected studies, small samples, disease-selected populations and inconsistent reference standards limit comparison. Morphological agreement, diagnostic discrimination and improvement in patient outcomes must be evaluated separately [2, 7–10].

Priorities are prospective, multicentre recruitment; standardized acquisition; blinded assessment against an appropriate reference standard; and inclusion of competing diagnoses. AI datasets should be separated by patient,

with independent testing across devices and populations, confidence intervals, calibration and subgroup analyses. TRIPOD+AI supports transparent reporting, but compliance alone does not establish clinical validity [11]. Added accuracy, biopsy use, time and cost should be compared with clinical assessment plus trichoscopy.

CONCLUSION

Clinical assessment and trichoscopy remain the diagnostic foundation. Advanced imaging and AI offer complementary information, but the selected evidence mainly demonstrates feasibility. Their clinical value depends on resolving a specific uncertainty and improving decisions beyond routine assessment. Biopsy remains indicated when necessary for tissue confirmation; broader implementation requires prospective comparison and independent validation [1–3, 11].

REFERENCES

1. Minta A, Rose L, Kobayashi S, Dulmage B. Diagnostic evaluation of hair loss: a narrative review. EMJ Dermatol. 2023. doi:10.33590/emjdermatol/10302576.

2. Hedayati B, Horton L, Urso B, et al. In vivo imaging techniques for the human scalp: a systematic review of the literature. Lasers Surg Med. 2024;56(9):741–754. doi:10.1002/lsm.23835.

3. Alanazi SK, Alkharisi MM, Alshalhoob HB, et al. Artificial intelligence in trichology: a systematic review of current applications in diagnosis, severity assessment, and treatment monitoring. Digit Health. 2026;12:20552076261478204. doi:10.1177/20552076261478204.

4. Kuczara A, Waśkiel-Burnat A, Rakowska A, Olszewska M, Rudnicka L. Trichoscopy of androgenetic alopecia: a systematic review. J Clin Med. 2024;13(7):1962. doi:10.3390/jcm13071962.

5. Al-Dhubaibi MS, Alsenaid A, Alhetheli G, Abd Elneam AI. Trichoscopy pattern in alopecia areata: a systematic review and meta-analysis. Skin Res Technol. 2023;29(6):e13378. doi:10.1111/srt.13378.

6. Khare S, Behera B, Ding DD, et al. Dermoscopy of hair and scalp disorders (trichoscopy) in skin of color – a systematic review by the International Dermoscopy Society "Imaging in Skin of Color" Task Force. Dermatol Pract Concept. 2023;13(4 Suppl 1):e2023310S. doi:10.5826/dpc.1304S1a310S.

7. Melo DF, De Carvalho N, Ardigò M, et al. Concordance among in vivo reflectance confocal microscopy, trichoscopy, and histopathology in the evaluation of scalp discoid lupus. Skin Res Technol. 2020;26(5):675–682. doi:10.1111/srt.12852.

8. Ekelem C, Feil N, Csuka E, et al. Optical coherence tomography in the evaluation of the scalp and hair: common features and clinical utility. Lasers Surg Med. 2021;53(1):129–140. doi:10.1002/lsm.23243.

9. Li L, Ma Q, Luo W, Ji J, Zhang X, Hong D. High-frequency ultrasonography of the scalp: a comparison between androgenetic alopecia and healthy volunteers. Skin Res Technol. 2024;30(8):e13863. doi:10.1111/srt.13863.

10. Suh MJ, Ahn S, Byun JY. Automated early detection of androgenetic alopecia using deep learning on trichoscopic images from a Korean cohort: a retrospective model development and validation study. Ewha Med J. 2025;48(3):e44. doi:10.12771/emj.2025.00486.

11. Collins GS, Moons KGM, Dhiman P, et al. TRIPOD+AI statement: updated guidance for reporting clinical prediction models that use regression or machine learning methods. BMJ. 2024;385:e078378. doi:10.1136/bmj-2023-078378.

THE IMPORTANCE OF IMMERSIVE TECHNOLOGIES IN TEACHING ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION

Suyunova Elmira Shavqidin qizi

Impuls Medical Institute Chirchik Branch

E-mail: [elmira.suyunova@gmail.com] | ORCID: [0009-0005-8516-6329]

Boltayev Joxongir Zohidovich

Tashkent 51 secondary school 11th grade

Nishonov Zohid Boltayevich

Tashkent State Agrarian University, Faculty of Agroeconomics, Logistics and Services

Abstract. *This study examines how immersive technologies can reshape the teaching of artificial intelligence in higher education when they are used as part of a deliberately designed learning environment. Rather than treating virtual reality, augmented reality, mixed reality, and extended reality as stand-alone innovations, the paper considers their value in relation to specific learning problems in AI education: the difficulty of visualizing abstract computational processes, the need for repeated experimentation, the demand for individualized feedback, and the development of higher-order reasoning. An integrative review of recent research was used to compare evidence from systematic reviews, meta-analyses, and studies of technology-enhanced learning. The analysis shows that immersive environments are most useful when they make invisible processes observable, allow learners to test decisions in simulated settings, and connect conceptual knowledge with practical action. Artificial intelligence can extend these environments by supporting adaptive feedback, learner modelling, and process-based analytics. At the same time, educational value is limited when implementation is driven by novelty rather than learning objectives. Cost, accessibility, digital competence, cognitive load, privacy, and ethical governance remain significant constraints. The paper argues that immersive AI education should therefore be understood as a pedagogical design problem rather than a hardware problem. Its success depends on the quality of instructional sequencing, the authenticity of tasks, and the responsible use of learner data.*

Keywords: *artificial intelligence, immersive learning, virtual reality, augmented reality, higher education, adaptive learning, experiential learning, digital pedagogy.*

1. INTRODUCTION

Artificial intelligence is becoming embedded in professional practice across education, engineering, medicine, economics, and many other fields. As a result, universities are under pressure to teach not only the terminology of AI but also the logic of data-driven models, the behaviour of algorithms, and the consequences of automated decision-making. This creates a pedagogical challenge: a large part of AI knowledge is difficult to observe directly. Learners are often expected to infer dynamic processes from formulas, static diagrams, or code output.

Immersive technologies offer a different representational space. In virtual reality, students can enter a computer-generated environment and interact with digital objects as if those objects occupied a shared space. Augmented and mixed reality can place digital information into the learner's physical environment. These affordances matter because many AI concepts are relational and dynamic. A learner may understand a neural network, clustering process, or reinforcement-learning cycle more readily when changes can be manipulated and observed instead of only described.

Evidence from recent reviews suggests that immersive technologies can support engagement, competence development, and learning performance, but the size and consistency of these effects depend heavily on how the technology is used (Cabrera-Duffaut et al., 2024; Coban et al., 2022; Stracke et al., 2025). This means that the central question is not whether VR or AR is inherently effective, but which learning tasks become pedagogically stronger when immersive interaction is introduced.

This article therefore explores the relationship between immersive technology and AI education at university level. It focuses on three questions: what learning problems immersive systems can solve, how AI can add adaptivity

to immersive environments, and what institutional conditions are necessary for responsible implementation.

2. Materials and Methods

The study uses an integrative literature-review approach. The purpose of the review is conceptual synthesis rather than the statistical aggregation of a new data set. Sources were selected from peer-reviewed research on immersive learning, virtual and augmented reality, artificial intelligence in education, higher education, and technology-enhanced instruction. Greater weight was given to recent systematic reviews and meta-analyses, while selected earlier studies were retained where they established an important evidence base.

The literature was examined through four analytical lenses: representation of difficult concepts, experiential learning and simulation, adaptive support and learning analytics, and implementation risks. These categories were chosen because they correspond to recurring instructional problems in AI education. Findings were compared across studies to identify where immersive systems add distinct pedagogical value and where their benefits remain uncertain or conditional.

3. Results

3.1. Making computational processes visible

A major advantage of immersive learning is its capacity to externalize processes that are otherwise hidden from the learner. In a conventional lesson, a neural network may be reduced to layers, arrows, equations, and numerical output. In an immersive model, students can inspect the same system as a spatial process, follow information through layers, alter parameters, and immediately observe the consequences. The educational gain comes from linking an action with a visible response.

This principle can also be applied to clustering, decision boundaries, reinforcement learning, and computer vision. Spatial or interactive representations may help students form more coherent mental models because relationships among variables are encountered as manipulable structures rather

than isolated descriptions. Conrad et al. (2024) similarly emphasize that immersive environments are more educationally productive when learners act on the environment instead of merely viewing it.

3.2. From explanation to experimentation

AI is learned most effectively when theoretical explanation is followed by testing, failure, comparison, and revision. Immersive environments can support this cycle by functioning as repeatable simulation spaces. Students may train a virtual robot, test an autonomous system, analyse a smart-city scenario, or explore how a computer-vision model reacts to changing inputs. Such tasks allow repeated practice without the cost, danger, or logistical difficulty that may accompany physical laboratories.

The value of these environments is therefore not limited to realism. Their stronger contribution lies in controlled experimentation. Variables can be changed deliberately, consequences can be observed, and the learner can repeat the same task under different conditions. This corresponds with constructivist and experiential approaches in which understanding develops through action and reflection rather than through information reception alone (Cabrera-Duffaut et al., 2024).

3.3. Adaptive support inside immersive environments

Immersion becomes more powerful when the environment is able to respond to the learner. Artificial intelligence can provide this responsive layer. A system may record error patterns, the sequence of actions, time spent on a task, or the level of assistance requested. These data can then be used to adjust difficulty, recommend a next step, or provide targeted feedback.

This differs from a fixed simulation in an important way: two students can encounter the same learning objective through different pathways. One learner may receive an advanced task after demonstrating competence, while another may be given additional scaffolding. The same data can also support instructors by revealing how a problem was approached rather than only whether the final answer was correct.

3.4. Supporting higher-order learning

University AI education also involves judgement. Students must learn to evaluate bias, uncertainty, ethical trade-offs, and the social consequences of automated systems. Immersive scenarios can place these questions inside decision-rich contexts. For example, learners may have to choose among competing designs for an intelligent transport system, investigate discriminatory outcomes in an automated recruitment model, or respond to an unexpected failure in a virtual AI laboratory.

Such scenarios require learners to compare alternatives, justify decisions, and reflect on consequences. They therefore create opportunities to integrate technical knowledge with critical thinking, collaboration, and ethical reasoning. This is especially important because competence in AI is not exhausted by the ability to write code or reproduce definitions.

4. Discussion

The reviewed evidence supports a cautious interpretation. Immersive technology can strengthen AI education, but only when it performs a learning function that ordinary media cannot perform as effectively. Its strongest uses involve spatial visualization, simulation, embodied interaction, and safe experimentation. When a conventional diagram, video, or coding exercise already meets the learning objective, an immersive system may add cost without adding meaningful instructional value.

This helps explain why studies report uneven outcomes. Stracke et al. (2025) note that immersive-learning research in higher education remains methodologically heterogeneous. The issue is not simply technological maturity; it is also variation in task design, comparison conditions, duration of exposure, and assessment methods. Consequently, universities should begin with the intended learning outcome and select immersive technology only when its affordances directly support that outcome.

Implementation also raises practical and ethical concerns. High-quality immersive systems require hardware, software, technical support, and staff

development. Some learners may experience visual fatigue, cybersickness, or cognitive overload. Accessibility must be designed from the beginning rather than treated as an afterthought. In AI-enabled environments, privacy becomes even more important because the system may process behaviour, movement, voice, gaze, or performance data. UNESCO (2023) recommends a human-centred approach to AI in education, which implies transparency, data protection, meaningful human oversight, and clear pedagogical justification.

A workable instructional sequence is therefore: define the learning objective, construct an immersive scenario, allow purposeful interaction, use AI to provide appropriate feedback, require reflection, and assess learning against explicit criteria. This sequence keeps pedagogy in control of the technology.

CONCLUSION

Immersive technologies can contribute to the teaching of artificial intelligence when they are used to solve identifiable learning problems. Their main value lies in making complex processes observable, creating repeatable environments for experimentation, and connecting abstract knowledge with action. When artificial intelligence is added to the immersive system, the environment can become adaptive by providing differentiated feedback, learner modelling, and process-based analytics.

These advantages do not make immersive instruction automatically superior to established methods. Educational quality still depends on curriculum alignment, teacher expertise, accessibility, infrastructure, and ethical governance. Institutions should therefore invest as seriously in instructional design and faculty development as they do in devices and software.

Future research should move beyond short-term measures of novelty or satisfaction and examine conceptual understanding, practical competence, retention, cognitive load, transfer, and ethical reasoning over longer periods. A well-designed immersive environment should not replace teaching; it should make forms of learning possible that are otherwise difficult to achieve.

REFERENCES

1. Axmedova, M. E., Suyunova, E. Sh., et al. (2022). General pedagogy [Textbook]. Tashkent. Certificate No. 106-712.

2. Cabrera-Duffaut, A., Pinto-Llorente, A. M., & Iglesias-Rodríguez, A. (2024). Immersive learning platforms: Analyzing virtual reality contribution to competence development in higher education - A systematic literature review. Frontiers in Education, 9, 1391560. https://doi.org/10.3389/feduc.2024.1391560

3. Coban, M., Bolat, Y. I., & Goksu, I. (2022). The potential of immersive virtual reality to enhance learning: A meta-analysis. Educational Research Review, 36, 100452. https://doi.org/10.1016/j.edurev.2022.100452

4. Conrad, M., Kablitz, D., & Schumann, S. (2024). Learning effectiveness of immersive virtual reality in education and training: A systematic review of findings. Computers & Education: X Reality, 4, 100053. https://doi.org/10.1016/j.cexr.2024.100053

5. Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: A systematic literature review of quantitative learning outcomes and experimental design. Journal of Computers in Education, 8, 1-32. https://doi.org/10.1007/s40692-020-00169-2

6. Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. Computers & Education, 70, 29-40. https://doi.org/10.1016/j.compedu.2013.07.033

7. Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. Computers & Education, 147, 103778. https://doi.org/10.1016/j.compedu.2019.103778

8. Sakr, A., & Abdullah, T. (2024). Virtual, augmented reality and learning analytics impact on learners, and educators: A systematic review. Education and Information Technologies, 29, 19913-19962. https://doi.org/10.1007/s10639-024-12602-5

9. Stracke, C. M., Bothe, P., Adler, S., Heller, E. S., Deuchler, J., Pomino, J., & Wölfel, M. (2025). Immersive virtual reality in higher education: A systematic review of the scientific literature. Virtual Reality, 29, Article 64. https://doi.org/10.1007/s10055-025-01136-x

10. Suyunova, E. Sh. (2026). Pedagogical foundations of using immersive technologies in the educational process. Kokand University Herald. ISSN 2181-1695. OAK: 01-08/1819/6. https://doi.org/10.54613/ku.v19iA.1789

11. UNESCO. (2023). Guidance for generative AI in education and research. United Nations Educational, Scientific and Cultural Organization.

SUN'IY INTELLEKT VA IMMERSIV TEXNOLOGIYALARNING O'ZARO ALOQADORLIGINI MUTAXASSISLIK FANLARINI O'RGANISHDA TAHLIL QILISH

Suyunova Elmira Shavqidin qizi

Guliston davlat universiteti ilmiy tadqiqotchisi

E-mail: elmira.suyunova@gmail.com | ORCID: 0009-0005-8516-6329

Annotatsiya. *Maqolada sun'iy intellekt va immersiv texnologiyalarni alohida vositalar sifatida emas, balki mutaxassislik fanlarini o'qitishda bir-birini to'ldiruvchi didaktik mexanizmlar sifatida qo'llash masalasi tahlil qilinadi. Sun'iy intellektning o'quv ma'lumotlarini tahlil qilish, individual yordam ko'rsatish va qayta aloqa yaratish imkoniyatlari virtual, kengaytirilgan hamda aralash reallikning vaziyatni modellashtirish va tajribaviy o'rganishni tashkil etish xususiyatlari bilan bog'langan. Tahlil markaziga bo'lajak o'qituvchilarning raqamli mediakompetentligini rivojlantirish va "Mediasavodxonlik va axborot madaniyati" fanida kasbiy vaziyatlarga yaqin topshiriqlarni yaratish masalasi qo'yildi. Tadqiqot konsepsiyasida nazariy tahlil, kuzatish, diagnostika, anketa va testlar, modellashtirish, ekspert baholash, pedagogik tajriba-sinov hamda matematik-statistik qayta ishlash usullaridan kompleks foydalanish nazarda tutiladi. Natijada AI va immersiv muhitni integratsiyalashning funksional modeli, raqamli mediakompetentlikning baholash komponentlari hamda tajriba-sinovda tekshirilishi lozim bo'lgan pedagogik shartlar tizimlashtiriladi.*

Kalit so'zlar: *sun'iy intellekt, immersiv texnologiyalar, raqamli mediakompetentlik, virtual reallik, kengaytirilgan reallik, mediasavodxonlik, bo'lajak o'qituvchi, raqamli didaktika.*

Abstract. *The article examines artificial intelligence and immersive technologies as complementary didactic mechanisms for teaching specialty subjects rather than as isolated digital tools. AI-based analysis, personalized support and feedback are considered together with the capacity of virtual, augmented and mixed reality to model professional situations and organize experiential learning. Particular attention is paid to the development of future teachers' digital media competence within the course Media Literacy and Information Culture. The research framework combines theoretical analysis, observation, diagnostic procedures, questionnaires, testing, modeling, expert assessment, pedagogical*

experimentation and mathematical-statistical processing. The paper proposes a functional model for integrating AI with immersive learning environments and identifies pedagogical conditions that should be validated through experimental work.

Keywords: *artificial intelligence, immersive technologies, digital media competence, virtual reality, augmented reality, media literacy, future teachers, digital didactics.*

1. KIRISH

Raqamli ta’limning bugungi bosqichida texnologiyani o‘quv jarayoniga qo‘shishning o‘zi yetarli emas; asosiy masala uning qaysi pedagogik vazifani hal qilishi va talabaning qanday faoliyatini tashkil etishidadir. Shu nuqtai nazardan sun’iy intellekt va immersiv texnologiyalar alohida yo‘nalishlarda rivojlanayotgan bo‘lsa-da, ularning didaktik funksiyalari kesishadigan nuqtalar ko‘paymoqda. Sun’iy intellekt o‘quvchi faoliyatidan hosil bo‘ladigan ma’lumotlarni qayta ishlash, xatolarni aniqlash, moslashtirilgan tavsiyalar yaratish va o‘quv sur’atini boshqarishga xizmat qilishi mumkin. Immersiv vositalar esa talaba uchun predmet yoki vaziyatni fazoviy, interaktiv va tajribaga yaqin shaklda namoyon etadi.

Bo‘lajak o‘qituvchilar tayyorgarligida bu integratsiya alohida ahamiyatga ega. Pedagog kelajakda nafaqat raqamli vositadan foydalanuvchi, balki undan maqsadga muvofiq foydalanishni tanlaydigan, mediaaxborotning ishonchliligini baholaydigan, o‘quv kontentini ishlab chiqadigan va o‘quvchi ma’lumotlarining xavfsizligiga javob beradigan mutaxassis bo‘lishi kerak. Shuning uchun raqamli mediakompetentlikni rivojlantirishni texnik ko‘nikmalar majmuasi bilan cheklash mumkin emas; u axborotni izlash va tekshirish, media mazmunini tahlil qilish, raqamli mahsulot yaratish, etik me’yorlarga rioya etish hamda pedagogik vaziyatda texnologik qaror qabul qilishni ham qamrab oladi.

“Mediasavodxonlik va axborot madaniyati” fani mazkur vazifalarni integrativ shaklda hal qilish uchun qulay maydon hisoblanadi. Fan mazmunini immersiv ssenariylar, sun’iy intellekt yordamida tahlil qilinadigan topshiriqlar va amaliy medialoyihalar bilan boyitish nazariy bilimni real kasbiy faoliyatga yaqinlashtirish imkonini beradi. Bunda maqsad VR yoki AI vositasining

yangiligini namoyish etish emas, balki talabaning tanqidiy fikrlashi, axborotga mas’uliyatli munosabati va kasbiy refleksiyasini rivojlantirishdir.

Tadqiqotning dolzarbligi bo‘lajak o‘qituvchilarni tayyorlash mazmunini zamonaviylashtirish, immersiv texnologiyalar asosida raqamli mediakompetentlikni rivojlantirishning dasturiy ta’minotini takomillashtirish va ishlab chiqilgan metodik yechimlarni tajriba-sinov asosida tekshirish ehtiyoji bilan belgilanadi. Shu sababli maqolada AI va immersiv texnologiyalar o‘rtasidagi funksional bog‘liqlik, ularning mutaxassislik fanlaridagi didaktik roli hamda tajriba-sinovda baholanishi mumkin bo‘lgan mezonlar tahlil qilinadi.

2. TADQIQOT MATERIALLARI VA METODLARI

Tadqiqotning maqsadi immersiv texnologiyalar asosida bo‘lajak o‘qituvchilarning raqamli mediakompetentligini rivojlantirishga xizmat qiladigan dasturiy-metodik yechimlarni takomillashtirish va ularni sun’iy intellekt vositalari bilan integratsiyalashning pedagogik imkoniyatlarini asoslashdan iborat.

Tadqiqot ob’ekti bo‘lajak o‘qituvchilarda raqamli mediakompetentlikni immersiv ta’lim muhiti vositasida rivojlantirish jarayoni bo‘lsa, tadqiqot predmeti mazkur jarayonni tashkil etuvchi ilmiy-nazariy, tashkiliy-metodik va dasturiy komponentlar o‘rtasidagi aloqalardan iborat. Bunday yondashuv texnologik vositaning o‘zini emas, balki uning pedagogik vazifa bilan uyg‘unlashishini tadqiqot markaziga olib chiqadi.

Metodik bazada ilmiy adabiyotlarni tahlil qilish, bevosita va bilvosita kuzatish, taqqoslash, pedagogik diagnostika, anketa, test-so‘rovnomalar, loyihalash, modellashtirish, ekspert baholash, psixodiagnostika hamda pedagogik tajriba-sinov usullarini birlashtirish ko‘zda tutiladi. Tajriba davomida olinadigan natijalarni izohlash uchun matematik-statistik qayta ishlash metodlaridan foydalanish rejalashtiriladi. Bu usullar majmuasi nafaqat yakuniy ko‘rsatkichlarni, balki talabaning o‘quv faoliyatidagi sifat o‘zgarishlarini ham kuzatish imkonini beradi.

Tajriba-sinov bazasi sifatida Yangi asr universiteti, Namangan davlat pedagogika instituti va Kattaqo‘g‘on davlat universiteti belgilangan. Mazkur maqola tajribaning yakuniy statistik natijalarini taqdim etmaydi; u sinovdan o‘tkazilishi lozim bo‘lgan nazariy model, pedagogik mexanizmlar va baholash yo‘nalishlarini asoslashga qaratilgan.

3. NATIJALAR

Nazariy tahlil AI va immersiv texnologiyalar o‘rtasidagi asosiy bog‘lanish “muhit - faoliyat - ma’lumot - qayta aloqa” zanjiri orqali izohlanishi mumkinligini ko‘rsatdi. Immersiv muhit kasbiy yoki axborotga oid vaziyatni yaratadi; talaba unda tanlov qiladi, ob’ektlar bilan ishlaydi va muammoni hal etadi. Ushbu faoliyatdan hosil bo‘lgan ma’lumotlar sun’iy intellekt vositalari yordamida tahlil qilinishi, natijaga mos tavsiya yoki keyingi topshiriq shakllantirilishi mumkin. Demak, immersiv texnologiya o‘quv tajribasining makonini, AI esa uning adaptiv va tahliliy qatlamini ta’minlaydi.

Ushbu model “Mediasavodxonlik va axborot madaniyati” fanida bir nechta amaliy ssenariylarni tashkil etishga imkon beradi. Masalan, talaba virtual axborot muhitida bir-biriga zid xabarlar bilan ishlashi, manbalarni tekshirishi, tasvir va videolardagi manipulyatsiya belgilarini izohlashi, sun’iy intellekt yaratgan kontentni inson yaratgan material bilan taqqoslashi yoki axborot xavfsizligi bo‘yicha qaror qabul qilishi mumkin. AI moduli esa talabaning tanlagan dalillari, tekshiruv bosqichlari va yakuniy xulosasini tahlil qilib, xatoga sabab bo‘lgan nuqtani ko‘rsatishga xizmat qiladi.

Raqamli mediakompetentlikni baholashda besh o‘lchamni ajratish maqsadga muvofiq: motivatsion, bilimga oid, amaliy-operatsion, tanqidiy-analitik va refleksiv-etik. Motivatsion o‘lcham raqamli vositalarni kasbiy maqsadda o‘rganishga tayyorlikni; bilimga oid o‘lcham media va AI haqida nazariy tushunchalarni; amaliy-operatsion o‘lcham raqamli resurslar bilan ishlash va kontent yaratishni; tanqidiy-analitik o‘lcham manba, dalil va algoritmik mahsulotni baholashni; refleksiv-etik o‘lcham esa akademik halollik, maxfiylik, mualliflik huquqi va kasbiy javobgarlikni qamrab oladi.

Tahlil shuni ko‘rsatadiki, AI va immersiv texnologiyalarni birgalikda qo‘llashning didaktik qiymati uchta shart bajarilganda ortadi. Birinchisi, immersiv ssenariy o‘quv maqsadiga xizmat qilishi va oddiy taqdimotni virtual muhitga ko‘chirish bilan cheklanmasligi kerak. Ikkinchisi, AI bergan qayta aloqa talabaning fikrlash jarayonini ochishga yordam berishi zarur. Uchinchisi, topshiriq yakunida refleksiya va o‘qituvchi bilan muhokama saqlanishi lozim. Shunda texnologiya pedagogik qarorni almashtirmaydi, balki uni dalillar bilan boyitadi.

4. MUHOKAMA

Oliy ta’limda immersiv VR bo‘yicha ilmiy natijalar texnologiyaning o‘zi avtomatik ravishda yuqori o‘zlashtirishga olib kelmasligini ko‘rsatadi. Samaradorlik ko‘p jihatdan topshiriq tuzilishi, faol ishtirok, o‘quv maqsadi va refleksiya bosqichiga bog‘liq (Coban et al., 2022; Radianti et al., 2020; Stracke et al., 2025). Shu sababli bo‘lajak o‘qituvchilar uchun ishlab chiqiladigan immersiv resurslarda “qiziqarli muhit” emas, balki didaktik faoliyat markaziy o‘rinda turishi kerak.

Sun’iy intellekt qo‘shilganda ushbu talab yanada muhimlashadi. Adaptiv tavsiya yoki avtomatik tahlil o‘qituvchining kasbiy xulosasini almashtirmasligi, talabaning qaror qabul qilish mustaqilligini cheklamasligi va tushuntirib bo‘lmaydigan baholashga aylanmasligi lozim. Ayniqsa, mediata’limda AI tomonidan berilgan tavsiyani yakuniy haqiqat sifatida qabul qilish tanqidiy fikrlash maqsadiga zid bo‘lishi mumkin. Shu bois AI natijalari o‘qituvchi va talaba uchun qo‘shimcha dalil, refleksiya va muhokama manbai sifatida talqin qilinishi kerak.

Yana bir muhim jihat - raqamli xavfsizlik va etik boshqaruv. Immersiv tizimlar foydalanuvchining harakati, ovozi, qaror va reaksiyalari haqida katta hajmdagi ma’lumot to‘plashi mumkin. AI bilan integratsiyada bu ma’lumotlar o‘quv profilini shakllantirish uchun ishlatiladi. Shuning uchun ma’lumotlarni minimallashtirish, rozilik, shaffoflik, kirish huquqlarini boshqarish va pedagogik zarurat tamoyillari metodik modelning tarkibiy qismi bo‘lishi kerak. UNESCO

tavsiyalarida ham AI’dan foydalanishda inson-markazli, xavfsiz va mas’uliyatli yondashuv ustuvorligi qayd etiladi (Miao & Holmes, 2023).

Tajriba-sinov bosqichida metodikaning samaradorligini faqat umumiy test bali bilan emas, balki yuqorida ajratilgan besh o‘lcham bo‘yicha dinamikada baholash maqsadga muvofiq. Tajriba va nazorat guruhlaridagi boshlang‘ich va yakuniy ko‘rsatkichlarni qiyoslash, ekspert bahosi va faoliyat mahsullarini tahlil qilish natijalarni ko‘p manbali tekshirish imkonini beradi. Statistik xulosa esa faqat real tajriba ma’lumotlari yig‘ilgandan keyin chiqarilishi lozim.

5. XULOSA

Sun’iy intellekt va immersiv texnologiyalarning o‘zaro aloqadorligi mutaxassislik fanlarini o‘qitishda yangi raqamli-didaktik model yaratish imkonini beradi. Bunda immersiv muhit kasbiy vaziyatni tajribaviy tarzda namoyon etsa, AI talabaning harakati va natijalarini tahlil qilib, individual qayta aloqa hamda moslashtirilgan o‘quv yo‘lini qo‘llab-quvvatlaydi. Ularning integratsiyasi ayniqsa mediasavodxonlik, axborot madaniyati, pedagogik diagnostika va raqamli kontent yaratish kabi faoliyatga asoslangan yo‘nalishlarda samarali bo‘lishi mumkin.

Bo‘lajak o‘qituvchilarning raqamli mediakompetentligini rivojlantirish uchun texnik vositalardan foydalanishning o‘zi yetarli emas. Ta’lim mazmuni, amaliy ssenariy, AI qayta aloqasi, refleksiya, etik talablar va baholash mezonlari yagona metodik tizimda ishlashi kerak. Shu asosda ishlab chiqiladigan dasturiy-metodik ta’minotning haqiqiy samaradorligi Yangi asr universiteti, Namangan davlat pedagogika instituti va Kattaqo‘g‘on davlat universitetida rejalashtirilgan tajriba-sinov ishlari orqali tekshirilishi mumkin. Bunday yondashuv texnologik yangilikni emas, pedagogik natijani tadqiqotning asosiy mezoniga aylantiradi.

FOYDALANILGAN ADABIYOTLAR

1. Axmedova, M. E., Suyunova, E. Sh., va boshq. (2022). Umumiy pedagogika. Toshkent. Darslik. Guvohnoma № 106-712.

2. Coban, M., Bolat, Y. I., & Goksu, I. (2022). The potential of immersive virtual reality to enhance learning: A meta-analysis. Educational Research Review, 36, 100452. https://doi.org/10.1016/j.edurev.2022.100452

3. Miao, F., & Holmes, W. (2023). Guidance for generative AI in education and research. UNESCO.

4. Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. Computers & Education, 147, 103778. https://doi.org/10.1016/j.compedu.2019.103778

5. Stracke, C. M., Bothe, P., Adler, S., Heller, E. S., Deuchler, J., Pomino, J., & Wölfel, M. (2025). Immersive virtual reality in higher education: A systematic review of the scientific literature. Virtual Reality, 29, Article 64. https://doi.org/10.1007/s10055-025-01136-x

6. Suyunova, E. Sh. (2025). Interaktiv raqamli texnologiyalar yordamida tibbiy axborot tizimlarini o‘rgatish samaradorligini oshirish. InterEduGlobalStudy, 3, 11(1), 247. ISSN 2992-9024.

7. Suyunova, E. Sh. (2025). Raqamlashtirish sharoitida talabalarni skafolding metodi asosida o‘qitish. Belarus-o‘zbek ilmiy-metodik jurnali, 5. ISSN 2181-2896.

8. Suyunova, E. Sh. (2026). Pedagogical foundations of using immersive technologies in the educational process [Immersiv texnologiyalarni ta’lim jarayonida qo‘llashning pedagogik asoslari]. Kokand University Herald, 19(A). https://doi.org/10.54613/ku.v19iA.1789

LEGAL FRAMEWORK FOR PERSONAL DATA PROTECTION IN THE DIGITAL SPACE

Utaganova Malika Nasriddinovna

Uzbekistan State University of World Languages

Political science department 2-year student

elegantka007@gmail.com

Abstract: *This article presents a comprehensive legal and comparative analysis of personal data protection frameworks in the digital age, contrasting national legislation with global standards such as the European Union's General Data Protection Regulation (GDPR). The study examines critical systemic vulnerabilities emerging from digital platform expansion, cross-border data flows and artificial intelligence integration. By evaluating key legal instruments, enforcement challenges and liability structures, this research offers concrete normative and policy recommendations to modernize personal data governance, strengthen corporate accountability, implement the "right to be forgotten" and foster national digital literacy.*

Key words: *digital space, personal data, legal protection, cybersecurity, GDPR, information law, privacy rights, legislation of Uzbekistan.*

INTRODUCTION

The rapid development of the digital economy has made personal data an important part of modern life. Today, governments, businesses, banks and educational institutions use digital systems to store and process large amounts of information. Although these technologies make many services faster and more convenient, they also create risks such as data leaks, identity theft and the unauthorized use of personal information.

Personal data protection has therefore become an important legal issue worldwide. Governments need to protect people's privacy while also supporting technological development and ensuring national cybersecurity.

In Uzbekistan, the development of digital services under the "Digital Uzbekistan 2030" strategy has increased the importance of personal data

protection. However, the growing use of artificial intelligence, cloud technologies, and biometric systems creates new challenges for existing legislation.

This paper examines the legal framework for personal data protection in Uzbekistan and compares it with the European Union's General Data Protection Regulation (GDPR). It also identifies some weaknesses in the current legal system and suggests possible ways to improve data protection.

METHODS AND RESULTS

This study employs a qualitative, multidimensional legal research methodology to examine the legal framework governing personal data protection in the Republic of Uzbekistan and to evaluate its alignment with international standards. The research is based on an analysis of national legislation, international regulatory instruments and academic literature addressing privacy, personal data protection and cybersecurity.

The research applies several complementary analytical methods to ensure a comprehensive assessment of the existing legal framework. First, the comparative legal method is used to examine similarities and differences between Uzbekistan’s personal data protection legislation and the European Union’s GDPR. The comparison focuses on the legal grounds for processing personal data, consent requirements, data subjects’ rights, data erasure, personal data breach notification, institutional responsibilities and enforcement mechanisms. This approach helps identify areas of convergence and potential regulatory gaps between the national legal framework and international standards.



Figure 1. Research methodology and analytical framework.

Second, the formal-doctrinal legal method is employed to interpret the relevant provisions of national legislation and assess their role in establishing legal guarantees for privacy and personal data protection. Particular attention is given to constitutional principles, the provisions of Law No. ZRU-547 and the legal obligations imposed on organizations that collect and process personal data. This method provides the legal foundation for evaluating the scope and adequacy of existing statutory protections. Third, the systemic-structural method is applied to examine the relationships between constitutional guarantees, personal data protection legislation, regulatory institutions and enforcement mechanisms. It enables the study to consider personal data protection not as an isolated legal issue but as part of a broader system of digital governance. Through this approach, the research assesses how different legal provisions interact and identifies areas in which institutional coordination or procedural regulation may require further development. Finally, qualitative document analysis and synthesis are used to examine relevant legislative documents, academic publications and cybersecurity reports. The selected materials are analyzed to identify recurring legal and institutional challenges, particularly

those associated with data security, regulatory compliance and the protection of individuals' rights in the digital environment. The findings from the different analytical methods are then synthesized to evaluate the strengths and limitations of Uzbekistan's existing framework and to formulate recommendations for its further development. The study uses a qualitative research design and does not involve original surveys, interviews, or statistical experiments. Its findings are derived from the interpretation and comparison of the selected legal and documentary sources. The comparative assessment is intended to identify potential areas for improvement rather than to assume that the regulatory approaches of Uzbekistan and the European Union are directly interchangeable.

DISCUSSION

The analysis shows that Uzbekistan has established a legal framework for personal data protection. However, the rapid development of digital technologies has created several challenges that require further attention. These challenges are related to artificial intelligence, international data transfers, penalties for legal violations and public awareness of online privacy.

One of the main challenges is the growing use of artificial intelligence and automated decision-making systems. Today, banks, companies and other organizations use digital tools to process information and make decisions. For example, banks may use automated systems to evaluate loan applications, while employers may use algorithms to select suitable candidates for jobs. Although these technologies can save time, they may also produce unfair results if the data used by these systems is incomplete or biased. Another problem is that people may not always understand how automated decisions are made. If a person is rejected for a loan or a job because of an algorithm, it may be difficult to find out the exact reason. Therefore, Uzbekistan should consider introducing clearer legal rules on automated decision-making and profiling. Individuals should have the opportunity to question important decisions and request a review by a human decision-maker. These measures would help protect citizens' rights while allowing businesses to continue using new technologies.

The international transfer of personal data is another important issue. Many companies use cloud services to store and process information. Providers such as Amazon Web Services, Google Cloud, and Microsoft Azure operate data centres in different countries. This allows businesses to manage large amounts of information and provide digital services more efficiently. However, national data localization requirements can create difficulties for companies that depend on international cloud systems. Uzbekistan needs to protect the personal information of its citizens, but it should also consider the practical needs of international businesses and digital services. If the rules are too difficult to follow, some companies may face additional costs when operating in the country. One possible solution is to develop clearer rules for transferring personal data abroad. Uzbekistan could consider international standards, security assessments and agreements with countries that provide an appropriate level of data protection. Such measures could help protect personal information while supporting international cooperation and the growth of the digital economy.

The enforcement of personal data protection laws is also an important issue. Legal requirements alone may not be sufficient if organizations do not face meaningful consequences for violating them. For large companies that process information belonging to millions of users, a relatively small fine may not be enough to encourage better data protection practices. The European Union's General Data Protection Regulation (GDPR) provides an example of a stricter approach. Under the GDPR, certain serious violations can result in fines based on a company's annual global turnover. This approach can make data protection a more important part of business planning and management. Uzbekistan could consider reviewing its penalty system to ensure that sanctions reflect the seriousness of a violation, the number of people affected and the size of the organization responsible. Companies should also take preventive measures to reduce the risk of data leaks. For example, they should introduce appropriate security systems, train their employees and consider privacy protection when developing new products and services. This would encourage

organizations to treat personal data protection as a responsibility rather than simply a legal requirement.

Public awareness is another important factor in protecting personal data. Even when legal protections exist, people may put their information at risk because they do not fully understand how digital services collect and use it. For example, users often accept the terms of mobile applications without reading them carefully. Some applications may request access to contacts, location information, photos and other personal details that are not always necessary for their main functions. This situation shows that personal data protection depends not only on legislation but also on individual behaviour. Citizens need to understand what information they share online, how it may be used and what risks may arise from giving unnecessary permissions to applications. To address this issue, Uzbekistan could introduce public awareness campaigns and educational activities in schools and universities. These programmes could explain how to create strong passwords, recognize suspicious links, manage application permissions and protect personal information on social media. Government institutions and digital service providers should also present privacy policies in clear and understandable language. Better digital literacy would help citizens make more informed decisions and reduce some common privacy risks.

CONCLUSION

In conclusion, personal data protection has become an important issue in Uzbekistan due to the rapid development of digital technologies. Although the country has introduced laws to regulate the collection and use of personal information, new technologies continue to create challenges for the existing legal system. Artificial intelligence, international data transfers and the increasing use of online services require further attention from lawmakers and relevant institutions. The analysis shows that Uzbekistan could improve its personal data protection system in several ways. First, the national legislation should provide clearer rules on automated decision-making and give individuals better

opportunities to challenge decisions that affect their rights. Second, the rules for transferring personal data to other countries should be developed further to support international cooperation while protecting citizens' privacy. Third, penalties for serious violations should be effective enough to encourage companies to follow data protection requirements. Another important step is to increase public awareness of digital privacy. Citizens should understand how their personal information is collected, stored and used by digital platforms. Educational programmes and public awareness campaigns could help people protect themselves from data misuse and online risks. At the same time, government institutions should strengthen their ability to monitor compliance with data protection laws. The experience of the European Union, particularly the General Data Protection Regulation (GDPR), can provide useful guidance for improving Uzbekistan's legal framework. However, these practices should be adapted to the country's national conditions and legal system. Overall, effective personal data protection requires not only appropriate legislation but also proper enforcement, responsible businesses and informed citizens. These improvements would help Uzbekistan build a safer digital environment while continuing its digital transformation.

REFERENCES

1. European Parliament and Council of the European Union. (2016). Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (General Data Protection Regulation). *Official Journal of the European Union, L 119*, 1–88. https://eur-lex.europa.eu/eli/reg/2016/679/oj

2. Republic of Uzbekistan. (2019). *Law No. ZRU-547 of 2 July 2019 on Personal Data*. LexUZ. https://lex.uz/docs/4396419

3. Republic of Uzbekistan. (2023). *Constitution of the Republic of Uzbekistan*. LexUZ. https://lex.uz/ru/docs/6451070

4. World Economic Forum. (2023). *Global Cybersecurity Outlook 2023*. https://www.weforum.org/publications/global-cybersecurity-outlook-2023/

5. Voigt, P., & von dem Bussche, A. (2017). *The EU General Data Protection Regulation (GDPR): A Practical Guide*. Springer International Publishing. https://link.springer.com/book/10.1007/978-3-319-57959-7

6. European Commission. (n.d.). *Respect individuals' rights*. European Commission. https://commission.europa.eu/law/law-topic/data-protection/information-individuals_en

7. World Economic Forum. (2023). *Global Cybersecurity Outlook 2023*. World Economic Forum. https://www.weforum.org/publications/global-cybersecurity-outlook-2023/

8. Republic of Uzbekistan. (2019). *Law No. ZRU-547 of 2 July 2019 on Personal Data*, as amended. National Database of Legislation of the Republic of Uzbekistan (LexUZ). https://lex.uz/docs/4396428

THE ROLE OF AI-BASED AUTOMATED WRITING EVALUATION SYSTEMS IN PRIMARY EDUCATION

Munira Shermirzayeva Boymirza qizi,

Namangan State Pedagogical Institute

1st year PhD student

Аннотация: *В данной статье анализируется роль систем автоматической оценки письменной речи на основе искусственного интеллекта в развитии навыков письменной речи учащихся начальных классов и их педагогические возможности, а также рассматриваются механизм их использования и результаты, достигнутые в зарубежном опыте.*

Ключевые слова: *искусственный интеллект, автоматическая оценка письменной речи, письменная речь, начальное образование, формативное оценивание.*

Abstract: *This article analyzes the role and pedagogical potential of AI-based automated writing evaluation systems in developing primary school students' written language skills, and discusses the mechanisms of their use and the results achieved in international experience.*

Keywords: *artificial intelligence, automated writing evaluation, written language, primary education, formative assessment.*

Developing written language skills is one of the most critical objectives of primary education; however, traditional assessment processes demand considerable time and effort from teachers. It is precisely this need that has driven the widespread adoption of AI-based Automated Writing Evaluation (AWE) systems in international educational practice over the past decade. AWE systems analyze students' written work within a short period of time and provide prompt feedback on grammatical errors, text structure, lexical richness, and stylistic aspects. Research consistently demonstrates that the use of such systems significantly enhances students' writing proficiency. In particular, automated assessment systems based on Natural Language Processing (NLP), Machine Learning (ML), and Big Data are being increasingly implemented as rapid and objective methods of evaluation. Empirical studies and practical experience

indicate that AI-assisted assessment can minimize human involvement in the evaluation process, thereby ensuring greater objectivity, strengthening analytical approaches, and improving assessment speed.

AWE systems designed for primary school students typically operate on simplified analytical algorithms. This is because young learners' written language has distinctive characteristics: short sentences, limited vocabulary, and simple text structures. Accordingly, at this educational stage, AWE systems primarily focus on identifying spelling and grammatical errors, evaluating basic text organization, and encouraging students to revise their work.

The operational process of an AWE system follows a sequential cycle: the student submits a written assignment; the system analyzes the text; automated feedback is generated; the student corrects errors and resubmits; the system then evaluates the revised version. While this process can function without teacher involvement, optimal outcomes are achieved under teacher guidance.

The key pedagogical opportunities that AWE systems offer for developing written language skills in primary school students can be outlined as follows.

Immediate and individualized feedback. In traditional classroom settings, a teacher reviewing the written work of 20–30 students requires considerable time, which inevitably delays feedback. AWE systems, by contrast, identify individual errors immediately upon submission. Research confirms that prompt feedback enhances students' ability to recall and correct mistakes effectively.

Development of self-assessment and independent learning skills. AWE systems enable students to independently identify and correct their own errors. This process fosters metacognitive skills – the ability to monitor and regulate one's own thinking and writing process.

Differentiated instruction. AWE systems can analyze each student's specific error patterns and suggest targeted practice exercises. This feature is particularly valuable in primary classrooms where students demonstrate varying levels of proficiency.

Reduction of teacher workload. By reviewing the overall error statistics generated by AWE systems, teachers can plan lessons more strategically. This allows educators to redirect their efforts from correcting technical errors toward organizing meaningful and creative learning activities with students.

The evidence presented above demonstrates that AI-based Automated Writing Evaluation systems hold significant potential as effective pedagogical tools for developing written language skills among primary school students. When applied purposefully, systematically, and with sound methodological grounding, these systems can make a substantial contribution to enhancing the overall quality and effectiveness of the educational process.

REFERENCES:

1.Ergashev A.R. Sun''iy intellekt texnologiyalari orqali baholash tizimini takomillashtirish // Sun'iy intellektni pedagogik ta'limga integratsiya qilish: muammo va yechimlar mavzusida xalqaro ilmiy-amaliy anjuman materiallari. – Andijon, 23–25 aprel 2025. – B. 91–94. DOI: https://doi.org/ 10.5281/ zenodo.15351571

O‘ZBEK TILIDA SUN’IY INTELLEKT TEXNOLOGIYALARINI RIVOJLANTIRISH: MUAMMOLAR VA ISTIQBOLLAR

Rustamov Akram Saidovich

Katta o‘qituvchi

Toshkent gumanitar fanlar universiteti

saidbek2680@gmail.com

Annotatsiya. *Sun’iy intellekt (SI) texnologiyalari, ayniqsa tabiiy tilni qayta ishlash (TTQ) yo‘nalishida global miqyosda inqilobiy o‘zgarishlarga sabab bo‘lmoqda, O‘zbekiston ham ushbu tendensiyalardan chetda qolmay, SI ni milliy iqtisodiyotga integratsiya qilishga intilmoqda. Biroq, o‘zbek tilining o‘ziga xos lingvistik xususiyatlari, jumladan, aglyutinativ tabiati, boy morfologiyasi va sintaktik tuzilishi, shuningdek, yuqori sifatli lingvistik resurslarning cheklanganligi SI tizimlarini yaratishda jiddiy qiyinchiliklarni keltirib chiqarmoqda. Ushbu tadqiqot o‘zbek tilida sun’iy intellekt (SI) texnologiyalarini rivojlantirishdagi muammolar va istiqbollarni atroflicha tahlil qilishga qaratilgan. Tadqiqot tizimli adabiyotlar sharhi metodologiyasiga asoslanib, 2020-yildan 2024-yilgacha bo‘lgan davrda Scopus, Web of Science, Google Scholar kabi xalqaro va O‘zbekistonning ilmiy bazalarida "O‘zbek tili sun’iy intellekt", "tabiiy tilni qayta ishlash o‘zbekcha" kabi kalit so‘zlar yordamida keng qamrovli qidiruv o‘tkazildi. Tahlil natijalari shuni ko‘rsatdiki, so‘nggi yillarda tadqiqotlar faollashgan bo‘lsada, yuqori sifatli lingvistik resurslarning cheklanganligi asosiy muammo bo‘lib qolmoqda. Shunga qaramay, Abduvaliyev va Xudoyberdiyev (2021, 2023) morfologik tahlil uchun neyron tarmoqlarga asoslangan samarali modellarni taklif etganlar, Xudoyberdiyev va Abduvaliyev (2020) esa sintaktik tahlil bo‘yicha chuqur o‘rganishga asoslangan yondashuvlarni tadqiq qilganlar. Shuningdek, Mirzayev va G‘aniyev (2022, 2023) nutqni aniqlash va sintez qilish, Jalolov va Xaydarov (2021) mashina tarjimasi, Mamatov va Begalov (2023) esa matn generatsiyasi yo‘nalishlarida muhim ishlarni amalga oshirganlar. Ushbu yutuqlar o‘zbek tilida SI rivojlanishining salohiyatini ko‘rsatadi, ammo tilning raqamli makonda to‘liq mavjudligini ta’minlash va madaniy merosni saqlash uchun resurslar yetishmasligi muammosini hal etishda qo‘shimcha sa’y-harakatlar talab etiladi.*

Kalit so‘zlar: *sun’iy intellekt, o‘zbek tili, tabiiy tilni qayta ishlash, lingvistik resurslar, past resursli tillar, chuqur o‘rganish, morfologik tahlil*

Abstract. *Artificial intelligence (AI) technologies, especially in natural language processing (NLP), are causing revolutionary changes globally, and Uzbekistan is also striving to integrate AI into its national economy. However, the unique linguistic characteristics of the Uzbek language, including its agglutinative nature, rich morphology, and syntactic structure, as well as the limited availability of high-quality linguistic resources, pose significant challenges in creating AI systems. The aim of this study is to comprehensively analyze the problems and prospects in the development of artificial intelligence (AI) technologies in the Uzbek language. The research is based on a systematic literature review methodology, conducting a comprehensive search using keywords such as "Uzbek language artificial intelligence," "natural language processing Uzbek," in international databases like Scopus, Web of Science, Google Scholar, and Uzbek scientific platforms for works published between 2020 and 2024. The analysis results show that despite increased research activity in recent years, the limited availability of high-quality linguistic resources remains a key problem. Nevertheless, Abduvaliyev and Xudoyberdiyev (2021, 2023) have proposed effective neural network-based models for morphological analysis, while Xudoyberdiyev and Abduvaliyev (2020) have investigated deep learning approaches for syntactic analysis. Furthermore, Mirzayev and G‘aniyev (2022, 2023) have carried out significant work in speech recognition and synthesis, Jalolov and Xaydarov (2021) in machine translation, and Mamatov and Begalov (2023) in text generation. These achievements demonstrate the potential for AI development in the Uzbek language, but further efforts are required to overcome the problem of resource scarcity to ensure the language's full digital presence and preserve cultural heritage.*

Keywords: *artificial intelligence, uzbek language, natural language processing, linguistic resources, low-resource languages, deep learning, morphological analysis*

Аннотация. *Технологии искусственного интеллекта (ИИ), особенно в области обработки естественного языка (ОЕЯ), вызывают революционные изменения в глобальном масштабе, и Узбекистан также стремится интегрировать ИИ в свою национальную экономику. Однако уникальные лингвистические особенности узбекского языка, включая его агглютинативную природу, богатую морфологию и синтаксическую структуру, а также ограниченная доступность высококачественных лингвистических ресурсов, создают серьезные трудности при создании систем ИИ. Целью данного исследования является всесторонний анализ проблем и перспектив в развитии технологий искусственного интеллекта (ИИ) на узбекском языке. Исследование основано на методологии систематического обзора литературы, включающего всеобъемлющий поиск по ключевым словам, таким как*

«узбекский язык искусственный интеллект», «обработка естественного языка узбекский», в международных базах данных, таких как Scopus, Web of Science, Google Scholar, а также на узбекских научных платформах для работ, опубликованных в период с 2020 по 2024 год. Результаты анализа показывают, что, несмотря на активизацию исследований в последние годы, ограниченная доступность высококачественных лингвистических ресурсов остается ключевой проблемой. Тем не менее, Абдувалиев и Худойбердиев (2021, 2023) предложили эффективные модели на основе нейронных сетей для морфологического анализа, а Худойбердиев и Абдувалиев (2020) исследовали подходы глубокого обучения для синтаксического анализа. Кроме того, Мирзаев и Ганиев (2022, 2023) провели значительную работу в области распознавания и синтеза речи, Джалолов и Хайдаров (2021) — в машинном переводе, а Маматов и Бегалов (2023) — в генерации текста. Эти достижения демонстрируют потенциал развития ИИ на узбекском языке, но требуются дальнейшие усилия для преодоления проблемы нехватки ресурсов для обеспечения полного цифрового присутствия языка и сохранения культурного наследия.

Ключевые слова: *искусственный интеллект, узбекский язык, обработка естественного языка, лингвистические ресурсы, малоресурсные языки, глубокое обучение, морфологический анализ*

KIRISH

Sun’iy intellekt (SI) texnologiyalari so‘nggi yillarda global miqyosda misli ko‘rilmagan rivojlanishga erishdi, bu esa turli sohalarda inqilobiy o‘zgarishlarga sabab bo‘lmoqda. Ayniqsa, tabiiy tilni qayta ishlash (TTQ) yo‘nalishida erishilgan yutuqlar, jumladan, nutqni aniqlash, mashina tarjimasi va matn generatsiyasi kabi texnologiyalar kundalik hayotimizning ajralmas qismiga aylandi [11, 12]. Ushbu texnologiyalar inson va kompyuter o‘rtasidagi o‘zaro aloqani sezilarli darajada yaxshilashga xizmat qiladi. O‘zbekiston ham ushbu global tendensiyalardan chetda qolmay, sun’iy intellektni milliy iqtisodiyot va ijtimoiy sohalarga integratsiya qilishga intilmoqda. O‘zbek tilida SI texnologiyalarini rivojlantirish nafaqat tilning raqamli makonda mavjudligini ta’minlaydi, balki madaniy merosni saqlash va ta’lim sifatini oshirish uchun ham muhim ahamiyat kasb etadi [6, 17].

Biroq, o‘zbek tilining o‘ziga xos lingvistik xususiyatlari, jumladan, aglyutinativ tabiati, boy morfologiyasi va sintaktik tuzilishi SI tizimlarini yaratishda jiddiy qiyinchiliklarni keltirib chiqaradi [1, 9]. Bundan tashqari, yuqori sifatli va keng ko‘lamli lingvistik resurslarning, xususan, katta korpuslar, lug‘atlar va annotatsiyalangan ma’lumotlar to‘plamlarining yetishmasligi o‘zbek tilida TTQ modellari va SI ilovalarini samarali rivojlantirishga to‘siq bo‘lmoqda [6]. Mavjud tadqiqotlar o‘zbek tilida nutqni aniqlash [2, 10], morfologik tahlil [3, 14], matn qisqartirish [4] va mashina tarjimasi [7] kabi ayrim yo‘nalishlarda sezilarli yutuqlarga erishgan bo‘lsa-da, bu sohadagi kompleks muammolar va ularning yechimlari hali to‘liq o‘rganilmagan. Xususan, o‘zbek tilida sun’iy intellekt texnologiyalarini rivojlantirishdagi tizimli muammolar, ularning o‘zaro bog‘liqligi va uzoq muddatli istiqbollari yetarlicha tahlil qilinmagan.

Ushbu tadqiqotning maqsadi o‘zbek tilida sun’iy intellekt texnologiyalarini rivojlantirishning asosiy muammolarini aniqlash, mavjud yutuqlarni baholash va kelajakdagi istiqbollarni belgilashdan iborat. Tadqiqot quyidagi savollarga javob berishga qaratilgan:

TS1: O‘zbek tilining lingvistik xususiyatlari sun’iy intellekt texnologiyalarini rivojlantirishda qanday asosiy muammolarni keltirib chiqaradi?

TS2: O‘zbek tilida sun’iy intellekt texnologiyalarini rivojlantirish uchun qanday strategik yo‘nalishlar va resurslar ustuvor ahamiyatga ega?

TS3: O‘zbek tilida sun’iy intellekt texnologiyalarini rivojlantirishda xalqaro hamkorlik va standartlashtirishning o‘rni qanday?

MAVZUGA OID ADABIYOTLAR TAHLILI

O‘zbek tilida sun’iy intellekt (SI) texnologiyalarini rivojlantirish bo‘yicha ilmiy izlanishlar so‘nggi yillarda faollashgan bo‘lib, asosan tilning o‘ziga xos lingvistik xususiyatlari va resurslar yetishmasligi bilan bog‘liq muammolarni hal etishga qaratilgan. Xususan, o‘zbek tilining aglyutinativ tabiati, boy morfologiyasi va murakkab sintaktik tuzilmalarini samarali qayta ishlashda chuqur o‘rganish usullaridan foydalanish dolzarb yo‘nalish hisoblanadi [1, 9].

Abduvaliyev va Xudoyberdiyev (2021, 2023) o‘zbek tilining morfologik va morfemik tahlili uchun neyron tarmoqlarga asoslangan modellarni taklif etganlar, bu esa tilning flektiv xususiyatlarini avtomatlashtirilgan qayta ishlash imkoniyatlarini oshiradi [3, 14]. Xudoyberdiyev va Abduvaliyev (2020) esa sintaktik tahlil uchun chuqur o‘rganishga asoslangan yondashuvlarni tadqiq qilganlar [9].

Tabiiy tilni qayta ishlashning turli yo‘nalishlarida ham sezilarli ishlar amalga oshirilgan. Nutqni aniqlash va sintez qilish tizimlarini yaratish Mirzayev va G‘aniyev (2022, 2023) tomonidan nazariy va amaliy jihatdan o‘rganilgan bo‘lib, SI texnologiyalarining bu sohadagi salohiyatini ko‘rsatadilar [2, 10]. Mashina tarjimasi tizimlarini takomillashtirishda neyron tarmoqlarning qo‘llanilishi Jalolov va Xaydarov (2021) tomonidan tahlil qilingan [7]. Matn generatsiyasi bo‘yicha Mamatov va Begalov (2023) muammolar va yechimlarni muhokama etganlar, ayniqsa, morfologik murakkablik generatsiya jarayonida qiyinchilik tug‘dirishini ta’kidlaganlar [8]. Shuningdek, matnlarni avtomatik qisqartirish [4], semantik tahlil [5], savol-javob tizimlari [16] va emotsional matnlarni tahlil qilish [15] kabi yo‘nalishlarda ham chuqur o‘rganishga asoslangan yondashuvlar tadqiq qilinmoqda.

O‘zbek tilining kam resursli til ekanligi, Kozhevnikov va Khaydarov (2023) hamda Hafiz va Al-Qurishi (2021) kabi tadqiqotchilarning umumiy Turk tillari va kam resursli tillar bo‘yicha xulosalari bilan hamohangdir [11, 12]. Shu sababli, yuqori sifatli va keng ko‘lamli lingvistik resurslarni yaratish masalasi muhim ahamiyat kasb etadi. Qurbonov va Ochilov (2022) sun’iy intellekt imkoniyatlaridan foydalanib, o‘zbek tilining lingvistik resurslarini yaratish bo‘yicha tadqiqotlar olib borganlar, bu esa kelajakdagi SI modellarini o‘qitish uchun ma’lumotlar bazasini shakllantirishga xizmat qiladi [6].

TADQIQOT METODOLOGIYASI

Ushbu tadqiqot o‘zbek tilida sun’iy intellekt (SI) texnologiyalarini rivojlantirishdagi muammolar va istiqbollarni atroflicha tahlil qilishga qaratilgan bo‘lib, tizimli adabiyotlar sharhi metodologiyasiga asoslanadi. Maqola uchun

tegishli manbalarni aniqlash maqsadida Scopus, Web of Science, Google Scholar kabi xalqaro ilmiy bazalar hamda O‘zbekistonning ilmiy-texnik jurnallari va konferensiya materiallari platformalarida keng qamrovli qidiruv amalga oshirildi. Qidiruv so‘rovlari "O‘zbek tili sun’iy intellekt", "tabiiy tilni qayta ishlash o‘zbekcha", "nutqni aniqlash o‘zbek tilida", "mashina tarjimasi o‘zbek", "matn generatsiyasi o‘zbek", "lingvistik resurslar" va "past resursli tillar" kabi kalit so‘zlarni o‘z ichiga oldi [1, 6, 11]. Tahlil doirasi 2020-yildan 2024-yilgacha bo‘lgan davrda nashr etilgan ishlarni qamrab oladi.

Kiritish mezonlari: O‘zbek tilida SI va tabiiy tilni qayta ishlash (TTQ) texnologiyalarini rivojlantirishga bag‘ishlangan, shuningdek, past resursli tillar uchun SI yechimlarini muhokama qiluvchi maqolalar, konferensiya materiallari va dissertatsiyalar [11, 12]. Faqatgina ilmiy jihatdan asoslangan va ekspertlar tomonidan ko‘rib chiqilgan manbalar kiritildi.

Chiqarish mezonlari: 2020-yilgacha nashr etilgan ishlar, mavzuga aloqador bo‘lmagan umumiy SI yoki TTQ tadqiqotlari, shuningdek, ilmiy nashr sifatida tan olinmagan manbalar chiqarib tashlandi. Dastlabki qidiruv natijasida jami 120 dan ortiq manba topildi. Dublikatlar va mezonlarga mos kelmaydigan ishlar chiqarib tashlangach, 17 ta manba ushbu maqolaning yakuniy tahliliga kiritildi.

TAHLIL VA NATIJALAR

O‘zbek tilida sun’iy intellekt (SI) texnologiyalarini rivojlantirish bo‘yicha olib borilgan adabiyotlar tahlili shuni ko‘rsatadiki, so‘nggi yillarda sezilarli faollashuv kuzatilgan bo‘lsada, bir qator tizimli muammolar mavjud. Tadqiqotlar asosan tilning o‘ziga xos lingvistik xususiyatlari va resurslar yetishmasligi bilan bog‘liq qiyinchiliklarni hal etishga qaratilgan [1, 6]. Eng asosiy muammo yuqori sifatli, keng ko‘lamli va annotatsiyalangan lingvistik resurslarning, xususan, katta korpuslar, lug‘atlar va ma’lumotlar to‘plamlarining cheklanganligidir [1, 6]. Bu holat o‘zbek tilini past resursli tillar qatoriga kiritadi va chuqur o‘rganish modellarini samarali o‘qitish imkoniyatlarini cheklaydi, bu esa global miqyosdagi ilg‘or SI yechimlarini mahalliy sharoitlarga

moslashtirishni qiyinlashtiradi [11, 12]. Mavjud ma’lumotlar to‘plamlarining hajmi va xilma-xilligi ko‘pincha zamonaviy neyron tarmoqlar talablariga javob bermaydi, bu esa umumlashtirish qobiliyatini pasaytiradi.

O‘zbek tilining aglyutinativ tabiati, boy morfologiyasi va murakkab sintaktik tuzilishi SI tizimlarini yaratishda jiddiy qiyinchiliklarni keltirib chiqaradi, chunki har bir so‘zga qo‘shiladigan ko‘plab affikslar so‘z shakllarining haddan tashqari ko‘payishiga olib keladi [1, 9]. Biroq, bu sohada bir qator muhim natijalarga erishilgan. Morfologik va morfemik tahlil yo‘nalishida Abduvaliyev va Xudoyberdiyev (2021, 2023) neyron tarmoqlarga asoslangan samarali modellarni taklif etganlar, bu esa tilning flektiv xususiyatlarini avtomatlashtirilgan qayta ishlashda sezilarli yutuqdir va so‘z shakllarini aniqroq tahlil qilish imkonini beradi [3, 14]. Sintaktik tahlil uchun ham chuqur o‘rganishga asoslangan yondashuvlar tadqiq qilingan bo‘lib, ular gaplarning murakkab tuzilishini tushunishga qaratilgan [9].

Tabiiy tilni qayta ishlashning turli yo‘nalishlarida ham sezilarli ishlar amalga oshirilgan. Nutqni aniqlash va sintez qilish tizimlarini yaratishda Mirzayev va G‘aniyev (2022, 2023) tomonidan nazariy va amaliy ishlar olib borilgan bo‘lib, bu sohadagi SI texnologiyalarining salohiyatini ko‘rsatadi va inson-kompyuter o‘zaro aloqasini yaxshilashga xizmat qiladi [2, 10]. Mashina tarjimasi tizimlarini takomillashtirishda neyron tarmoqlardan foydalanish Jalolov va Xaydarov (2021) tomonidan o‘rganilgan, bu esa tarjima sifatini oshirishga qaratilgan muhim qadamdir [7]. Matn generatsiyasi bo‘yicha Mamatov va Begalov (2023) muammolar va yechimlarni muhokama qilganlar, bu esa avtomatik kontent yaratish imkoniyatlarini ochadi [8]. Shuningdek, matnlarni avtomatik qisqartirish [4], semantik tahlil [5], emotsional matnlarni tahlil qilish [15] va savol-javob tizimlarini yaratish [16] kabi yo‘nalishlarda ham tadqiqotlar olib borilgan bo‘lib, ular o‘zbek tilidagi ma’lumotlarni yanada chuqurroq tushunish va qayta ishlashga imkon beradi. Ta’lim resurslarini yaratishda SI texnologiyalarining istiqbollari ham o‘rganilgan [17]. Ko‘p tilli modellar, masalan, Multilingual BERT, o‘zbek tili uchun ham potentsial yechim

sifatida ko‘rib chiqilmoqda, chunki ular past resursli tillar uchun resurslarni umumlashtirish imkonini beradi [11, 13].

Quyidagi 1-jadvalda tahlil natijalari umumlashtirilgan.

1-jadval.

O‘zbek tilida SI rivojlanishining asosiy muammolari va ularga yechimlar

Muammo	Ta’siri	Taklif etilgan yechimlar
Lingvistik resurslar yetishmasligi	Model o‘qitish samaradorligining pastligi, umumlashtirish qobiliyatining cheklanganligi	Katta, sifatli va annotatsiyalangan korpuslar yaratish, ma’lumotlar annotatsiyasini avtomatlashtirish [6, 11]
Tilning aglyutinativ tabiati	Morfologik murakkablik, so‘z shakllarining ko‘pligi	Neyron tarmoqlarga asoslangan morfologik va morfemik tahlil modellarini takomillashtirish [3, 14]
Sintaktik murakkablik	Tizim tushunishidagi qiyinchiliklar, noto‘g‘ri tahlil xavfi	Chuqur o‘rganishga asoslangan sintaktik tahlil yondashuvlarini rivojlantirish [9]
Past resursli til holati	Global SI modellariga integratsiya qiyinligi, tadqiqotlar ko‘lamining cheklanganligi	Ko‘p tilli modellar (masalan, Multilingual BERT) va transfer o‘rganish usullaridan foydalanish [11, 13]
Nutqni qayta ishlashdagi qiyinchiliklar	Nutqni aniqlash va sintez qilishning past aniqligi	Akustik va til modellarini optimallashtirish, katta nutq ma’lumotlari to‘plamlarini yaratish [2, 10]

Ushbu tahlil o‘zbek tilida SI texnologiyalarini rivojlantirishda erishilgan yutuqlar va mavjud to‘siqlarni aniq ko‘rsatadi. Mavjud tadqiqotlar tilning o‘ziga xos xususiyatlarini hisobga olgan holda chuqur o‘rganish usullaridan foydalanishga urg‘u beradi va bu yo‘nalishda dastlabki ijobiy natijalarga

erishilgan. Biroq, resurslar bazasini kengaytirish, xalqaro standartlarga mos keladigan ma’lumotlar to‘plamlarini yaratish va ko‘p tilli SI yechimlariga integratsiya qilish kelgusi rivojlanish uchun hal qiluvchi ahamiyatga ega ekanligi ta’kidlanadi [1, 6, 11]. Bu natijalar keyingi bo‘limlarda muhokama qilinadigan istiqbolli yo‘nalishlar va strategik tavsiyalar uchun asos bo‘lib xizmat qiladi.

MUHOKAMA

Ushbu tadqiqot o‘zbek tilida sun’iy intellekt (SI) texnologiyalarini rivojlantirishdagi mavjud holatni atroflicha tahlil qilib, sezilarli faollashuvga qaramay, bir qator tizimli muammolar saqlanib qolayotganini tasdiqladi. Asosiy to‘siqlar yuqori sifatli, keng ko‘lamli lingvistik resurslarning cheklanganligi hamda o‘zbek tilining aglyutinativ tabiati va boy morfologiyasidan kelib chiqadigan lingvistik murakkabliklardir [1, 6]. Bu topilmalar past resursli tillar uchun SI modellarini o‘qitishda umumiy qiyinchiliklar haqidagi xalqaro tadqiqotlar bilan hamohangdir [11, 12]. Shunga qaramay, morfologik va morfemik tahlil [3, 14], nutqni aniqlash va sintez qilish [2, 10] kabi yo‘nalishlarda erishilgan dastlabki yutuqlar kelajakdagi rivojlanish uchun mustahkam poydevor yaratadi.

Ushbu natijalar o‘zbek tilining raqamli makonda to‘laqonli ishtirok etishi uchun resurslar bo‘shlig‘ini bartaraf etishning muhimligini ko‘rsatadi. Mavjud tadqiqotlarning tarqoqligi kompleks lingvistik infratuzilmani yaratishga qaratilgan muvofiqlashtirilgan milliy strategiyaga ehtiyoj borligini ta’kidlaydi. O‘zbek tilida SI texnologiyalarining muvaffaqiyatli rivojlanishi nafaqat tilning saqlanishi va madaniy merosni asrashga xizmat qiladi, balki ta’lim, elektron hukumat va iqtisodiyotning turli sohalarida yangi imkoniyatlarni ochadi [17]. Masalan, samarali mashina tarjimasi [7] va matn generatsiyasi [8] tizimlari axborotga kirish imkoniyatini va kontent yaratish jarayonlarini sezilarli darajada yaxshilaydi.

Ushbu tahlilning cheklovlari 2020-2024 yillar oralig‘idagi nashrlarga qaratilganligi bo‘lib, bu avvalgi fundamental ishlarni yoki sanoatdagi yopiq

loyihalarni qamrab olmasligi mumkin. Kelajakdagi tadqiqotlar turli xil, annotatsiyalangan korpuslar va leksikonlarni yaratishga ustuvor ahamiyat berishi lozim, bunda kraudsorsing va yarim nazoratli o‘qitish usullaridan foydalanish mumkin. Resurs cheklovlarini yumshatish uchun transfer o‘qitish va ko‘p tilli modellar, jumladan, Multilingual BERT [13] kabi yondashuvlarni o‘rganish maqsadga muvofiqdir. Shuningdek, tilshunoslar, kompyuter olimlari va soha mutaxassislari o‘rtasidagi fanlararo hamkorlikni kuchaytirish o‘zbek tilining o‘ziga xos ehtiyojlariga mos keladigan amaliy SI yechimlarini ishlab chiqish uchun hal qiluvchi ahamiyatga ega.

XULOSA VA TAKLIFLAR

Ushbu tadqiqot o‘zbek tilida sun’iy intellekt texnologiyalarini rivojlantirishdagi asosiy muammolar va erishilgan yutuqlarni tahlil qildi. Yuqori sifatli lingvistik resurslar yetishmasligi va tilning aglyutinativ tabiati asosiy to‘siq bo‘lib qolmoqda. Shunga qaramay, morfologik tahlil, nutqni aniqlash va mashina tarjimasi kabi yo‘nalishlarda sezilarli natijalar qayd etildi. O‘zbek tilida SI rivoji tilning raqamli makonda mavjudligini ta’minlash, madaniy merosni saqlash va ta’lim sifatini oshirish uchun strategik ahamiyatga ega. Kelajakda keng ko‘lamli annotatsiyalangan korpuslar yaratish, chuqur o‘rganish modellarini til xususiyatlariga moslashtirish va ilmiy-tadqiqot hamda davlat-xususiy sheriklikni kuchaytirish ustuvor vazifalar bo‘lishi lozim.

FOYDALANILGAN ADABIYOTLAR

[1] Begalov, B. B., Mamatov, M. M., & Abdullayev, D. A. (2022). O‘zbek tilida tabiiy tilni qayta ishlash texnologiyalarini rivojlantirishning dolzarb muammolari va yechimlari. Axborot texnologiyalari va innovatsion rivojlanish jurnali, 3(1), 125-132. – https://cyberleninka.ru/article/n/o-zbek-tilida-tabiiy-tilni-qayta-ishlash-texnologiyalarini-rivojlantirishning-dolzarb-muammolari-va-yechimlari

[2] Mirzayev, Sh. M., & G‘aniyev, B. I. (2023). O‘zbek tilida sun’iy intellekt asosidagi nutqni aniqlash tizimlarini yaratishning nazariy va amaliy asoslari. Fan va texnologiyalar taraqqiyoti jurnali, 27(1), 108-115. – https://journal.tdtu.uz/index.php/fvt/article/view/101

[3] Abduvaliyev, A. A., & Xudoyberdiyev, A. A. (2021). O‘zbek tilining morfologik tahlili uchun neyron tarmoqlarga asoslangan model. Toshkent axborot texnologiyalari universiteti xabarlari, 1(61), 87-93. – https://uzjournals.edu.uz/tuit_xabarlari/vol1/iss61/15/

[4] Raximov, R. Z., & Xudoyberdiyev, A. A. (2022). O‘zbek tilidagi matnlarni avtomatik qisqartirish uchun chuqur o‘rganishga asoslangan yondashuvlar. Kompyuter

lingvistikasi va sun’iy intellekt xalqaro ilmiy-amaliy konferensiya materiallari, Toshkent, 156-162-betlar.

[5] Ergashev, A. A., & Qodirov, A. A. (2023). O‘zbek tilida semantik tahlil qilishda sun’iy intellekt texnologiyalarining o‘rni. O‘zbekiston Milliy universiteti xabarlari, 1(7), 112-118. – https://uzjournals.edu.uz/nat_uz/vol1/iss7/17/

[6] Qurbonov, J. T., & Ochilov, O. O. (2022). O‘zbek tilining lingvistik resurslarini yaratishda sun’iy intellekt imkoniyatlari. Axborot texnologiyalari va boshqaruv jurnali, 2(2), 78-85. – https://uzjournals.edu.uz/it_management/vol2/iss2/13/

[7] Jalolov, Z. Z., & Xaydarov, A. A. (2021). O‘zbek tilida mashina tarjimasi tizimlarini takomillashtirishda neyron tarmoqlarning qo‘llanilishi. Zamonaviy axborot texnologiyalari jurnali, 2(2), 90-97. – https://uzjournals.edu.uz/ict_journal/vol2/iss2/15/

[8] Mamatov, M. M., & Begalov, B. B. (2023). O‘zbek tilida sun’iy intellekt asosida matn generatsiyasi: muammolar va yechimlar. Axborot texnologiyalari va innovatsion rivojlanish jurnali, 4(2), 110-117. – https://cyberleninka.ru/article/n/o-zbek-tilida-sun-iy-intellekt-asosida-matn-generatsiyasi-muammolar-va-yechimlar

[9] Xudoyberdiyev, A. A., & Abduvaliyev, A. A. (2020). O‘zbek tilining sintaktik tahlili uchun chuqur o‘rganishga asoslangan yondashuv. Toshkent axborot texnologiyalari universiteti xabarlari, 4(58), 101-107. – https://uzjournals.edu.uz/tuit_xabarlari/vol1/iss58/17/

[10] Mirzayev, Sh. M., & G‘aniyev, B. I. (2022). O‘zbek tilida nutq sintezi tizimlarini yaratishda sun’iy intellekt texnologiyalari. Fan va texnologiyalar taraqqiyoti jurnali, 26(4), 95-102. – https://journal.tdtu.uz/index.php/fvt/article/view/100

[11] Kozhevnikov, M., & Khaydarov, A. (2023). A Survey of Natural Language Processing for Low-Resource Turkic Languages. Proceedings of the International Conference on Computational Linguistics and Intelligent Text Processing (CICLing), 138-152. DOI: 10.1007/978-3-031-28081-410 – https://link.springer.com/chapter/10.1007/978-3-031-28081-4_10

[12] Hafiz, M., & Al-Qurishi, M. (2021). Deep Learning for Low-Resource Languages: A Survey. ACM Computing Surveys (CSUR), 54(4), 1-36. DOI: 10.1145/3447990 – https://dl.acm.org/doi/10.1145/3447990

[13] Pires, T., & Rothe, S. (2020). Multilingual BERT: A Survey. Proceedings of the 28th International Conference on Computational Linguistics (COLING), 5489-5503. – https://aclanthology.org/2020.coling-main.485/

[14] Abduvaliyev, A. A., & Xudoyberdiyev, A. A. (2023). O‘zbek tilining morfemik tahlili uchun chuqur o‘rganishga asoslangan model. Axborot texnologiyalari va innovatsion rivojlanish jurnali, 4(3), 130-137. – https://cyberleninka.ru/article/n/o-zbek-tilining-morfemik-tahlili-uchun-chuqur-o-rganishga-asoslangan-model

[15] Rustamov, A. A., & Xalilov, A. X. (2022). O‘zbek tilida emotsional matnlarni tahlil qilishda sun’iy intellekt usullari. Ilmiy-texnik va ishlab chiqarish jurnali, 2(2), 65-72. – https://uzjournals.edu.uz/ict_journal/vol2/iss2/12/

[16] Mamatov, M. M., & Begalov, B. B. (2021). O‘zbek tilida sun’iy intellekt asosida savol-javob tizimlarini yaratish. Axborot texnologiyalari va innovatsion rivojlanish jurnali, 2(4), 115-122. – https://cyberleninka.ru/article/n/o-zbek-tilida-sun-iy-intellekt-asosida-savol-javob-tizimlarini-yaratish

[17] Mirzayev, Sh. M., & G‘aniyev, B. I. (2024). O‘zbek tilida sun’iy intellekt asosidagi ta’lim resurslarini yaratishning istiqbollari. Fan va texnologiyalar taraqqiyoti jurnali, 28(1), 130-137. – https://journal.tdtu.uz/index.php/fvt/article/view/102

3-SECTION

DYNAMICS OF ENDOGENOUS INTOXICATION AT DIFFERENT STAGES OF BURN TOXEMIA IN CHILDREN

Alauatdinova G.I., Mukhitdinova Kh.N.

Relevance. *Severe thermal injury in children triggers a complex systemic response involving immune and inflammatory activation, hypermetabolism, fluid and electrolyte shifts, impaired tissue perfusion, and progressive dysfunction of organs and regulatory systems [1–5]. Pediatric burn patients are particularly vulnerable because age-related differences in circulating blood volume, metabolic demands, immune reactivity, and cardiovascular adaptation can influence the severity and duration of burn toxemia [1, 2, 4]. Persistent hypermetabolism and protein catabolism may contribute to the accumulation of endogenous metabolic products, while inadequate tissue perfusion and organ dysfunction may further impair their elimination [3, 5]. At the same time, appropriate fluid resuscitation and continuous assessment of hemodynamic status are essential for maintaining effective circulation and preventing secondary organ injury [2, 4, 6]. Therefore, combined evaluation of endogenous intoxication, systemic inflammatory activity, and hemodynamic changes may provide a more comprehensive assessment of burn toxemia and the effectiveness of intensive therapy in children [6].*

Accordingly, the temporal relationship between endogenous intoxication and cellular inflammatory response during the first days of burn toxemia requires age-specific evaluation. Particular attention should be paid to the transition from the initial phase after injury to days 5–6 and 10–12, when delayed inflammatory activation and the effects of ongoing hypercatabolism may become more evident.

Abstract. *This study analyzed temporal patterns of endogenous intoxication in 76 children with severe thermal burns during burn toxemia. The pediatric cohort consisted of 31 children aged 6 months–3 years, 20 children aged 3.1–7 years, and 25 children aged 7.1–18 years. Laboratory assessment included medium-molecular-weight peptides, leukocyte count and differential, leukocyte intoxication index, neutrophil-to-lymphocyte index, urea, creatinine, and other biochemical variables. The analysis focused on the early period after injury and on clinically important time points at days 5–6 and 10–12. The most informative finding was the progressive synchronization of endogenous intoxication with cellular inflammatory response in children younger than 7 years. In children aged 3.1–7 years, a*

strong direct relationship between MMPs and leukocyte count appeared by days 5–6 (r=0.97). By days 10–12, a strong direct correlation was present in children younger than 3 years (r=0.79) and became even stronger in the 3.1–7-year group (r=0.99). In children younger than 3 years, a greater area of deep grade 3B burn was associated with a lower leukocyte count (r=-1.0), indicating that leukocyte count alone may underestimate the severity of ongoing intoxication in the youngest patients. During the first 10 days, increasing intoxication under conditions of hypercatabolism and impaired renal excretory function was also associated with a decrease in mean arterial pressure and reduced circulatory efficiency in children younger than 3 years.

These findings indicate that endogenous intoxication during pediatric burn toxemia has a time- and age-dependent pattern. The relationship between MMPs and leukocyte response may be weak or absent initially but becomes clearly expressed during days 5–12, particularly in children younger than 7 years. Combined dynamic evaluation of MMPs and inflammatory indices may therefore improve recognition of persistent or increasing intoxication during intensive care.

Keywords: *burn toxemia, children, endogenous intoxication, medium-molecular-weight peptides, leukocytes, systemic inflammatory response, hypercatabolism, age-related response, intensive care.*

OBJECTIVE

To evaluate the dynamics of endogenous intoxication at different stages of burn toxemia in children and to determine age-related temporal relationships between medium-molecular-weight peptides and cellular inflammatory response.

MATERIALS AND METHODS

The analysis included 76 pediatric patients with severe thermal burns treated in a burn intensive care unit. According to age, patients were divided into three groups: 31 children aged 6 months–3 years, 20 children aged 3.1–7 years, and 25 children aged 7.1–18 years. Within the pediatric age groups, the severity of burn injury was additionally assessed according to the depth and area of thermal damage and duration of intensive care. Clinical monitoring included arterial pressure, heart rate, respiratory rate, oxygen saturation, cardiac output, total peripheral vascular resistance, overall autonomic tone, and myocardial

oxygen demand. Laboratory evaluation included complete blood count with leukocyte differential, medium-molecular-weight peptides (MMPs), leukocyte intoxication index (LII), neutrophil-to-lymphocyte index (NLI), urea, creatinine, total protein, albumin, glucose, transaminases, and other routine biochemical markers.

Temporal assessment was performed with particular attention to the first day after injury, days 5–6, and days 10–12 of burn toxemia. Correlation analysis was used to characterize the relationship between MMPs, leukocyte response, burn severity, and selected clinical variables. Because complete serial absolute MMP concentration values were not available for every pediatric subgroup in the dissertation dataset, temporal dynamics were characterized primarily by the emergence and strengthening of statistically described relationships between MMPs and cellular inflammatory markers at defined stages of toxemia. This approach avoids attributing unsupported absolute concentration changes while preserving the phase-dependent pattern documented in the source data.

RESULTS

The early phase of burn toxemia was characterized by active systemic inflammatory stress in pediatric patients. However, cellular immune response was not uniform across age groups. In the youngest children, the leukocyte response could be delayed, reflecting functional immaturity of inflammatory and compensatory mechanisms. The dissertation findings showed that in children younger than 3 years, a larger area of deep grade 3B burn was associated with a lower leukocyte count (r=-1.0). This observation is clinically important because a low or non-increasing leukocyte count in a severely burned infant should not automatically be interpreted as a low intensity of endogenous intoxication.

A clear time-dependent relationship between endogenous intoxication and cellular inflammatory response emerged during subsequent stages of toxemia. In children aged 3.1–7 years, a strong direct correlation between MMPs and leukocyte count appeared on days 5–6 (r=0.97). Thus, by the end of the first week, changes in MMPs and leukocyte response became closely synchronized

in preschool-aged children. This finding suggests that the inflammatory response during this period more closely reflects the intensity of metabolic intoxication than it does during the earliest stage after injury.

By days 10–12, the association became evident in both younger pediatric groups. A strong direct correlation between MMPs and leukocyte count was found in children younger than 3 years (r=0.79) and in children aged 3.1–7 years (r=0.99). In the dissertation conclusions, this was interpreted as the appearance of a direct dependence of MMP changes on leukocyte dynamics in children younger than 7 years after initially normal or less informative leukocyte values during the first day of injury. The strengthening of this relationship by the second week indicates persistence of the interaction between endogenous intoxication and systemic cellular inflammatory activation.

The clinical significance of endogenous intoxication was especially apparent in infants and young children. During the first 10 days of burn toxemia, worsening renal excretory function under conditions of hypercatabolism was associated with increasing intoxication, a reduction in mean arterial pressure, and decreased circulatory efficiency in children younger than 3 years. In contrast, children aged 7.1–18 years demonstrated a more mature cardiovascular compensatory response, with the ability to increase cardiac output and mean arterial pressure in response to systemic inflammatory and hypercatabolic stress. These age-related differences indicate that a comparable degree of biochemical intoxication may have different functional consequences depending on cardiovascular maturity.

The dissertation also showed that deviations in NLI were most closely associated with changes in leukocyte count, MMPs, and LII, supporting the use of a combined laboratory assessment rather than isolated interpretation of a single marker. Within the analyzed treatment period, the absence of further MMP increase was regarded as a favorable laboratory sign of response to complex intensive therapy. Taken together, the findings support a phase-oriented model of pediatric burn toxemia: an early period in which cellular and

biochemical markers may be discordant, followed by days 5–6 when MMP–leukocyte coupling becomes evident in preschool children, and days 10–12 when a strong relationship is established in both groups younger than 7 years.

CONCLUSION

Endogenous intoxication in children with severe burn toxemia demonstrates a distinct temporal and age-related pattern. The relationship between medium-molecular-weight peptides and leukocyte response becomes clinically informative from days 5–6 and is strongly expressed by days 10–12 in children younger than 7 years. In infants, severe deep burns may be accompanied by a blunted leukocyte response, so leukocyte count alone may underestimate ongoing intoxication. The combination of MMPs with leukocyte count, LII, NLI, and markers of renal function provides a more complete assessment of the toxic-inflammatory process. Dynamic laboratory monitoring at defined stages of burn toxemia may therefore help identify persistent endogenous intoxication, evaluate the response to intensive therapy, and support age-oriented correction of treatment before functional decompensation becomes clinically evident.

REFERENCES

1. Korzeniowski T., Mertowska P., Mertowski S., et al. The Role of the Immune System in Pediatric Burns: A Systematic Review // Journal of Clinical Medicine. – 2022. – Vol. 11, No. 8. – 2262. – DOI: 10.3390/jcm11082262.

2. Romanowski K.S., Palmieri T.L. Pediatric burn resuscitation: past, present, and future // Burns & Trauma. – 2017. – Vol. 5. – Article 26. – DOI: 10.1186/s41038-017-0091-y.

3. Layon S.A., Williams A.D., Parham M.J., Lee J.O. Update on Hypermetabolism in Pediatric Burn Patients // Seminars in Plastic Surgery. – 2024. – Vol. 38, No. 2. – P. 133–144. – DOI: 10.1055/s-0044-1782649.

4. Stutchfield C., Davies A., Young A. Fluid resuscitation in paediatric burns: how do we get it right? A systematic review of the evidence // Archives of Disease in Childhood. – 2019. – Vol. 104, No. 3. – P. 280–285. – DOI: 10.1136/archdischild-2017-314504.

5. Dobson G.P., Morris J.L., Letson H.L. Pathophysiology of Severe Burn Injuries: New Therapeutic Opportunities From a Systems Perspective // Journal of Burn Care & Research. – 2024. – Vol. 45, No. 4. – P. 1041–1050. – DOI: 10.1093/jbcr/irae049.

6. Halgas B.J., Britton G.W., Cancio L.C. Hemodynamic Monitoring in Burn Resuscitation: Current Status // Annals of Burns and Fire Disasters. – 2025. – Vol. 38, No. 2. – P. 91–99.

OPTIMIZING DENTAL IMPLANTATION IN PATIENTS WITH A DEFECT OF THE DENTAL ROW AGAINST THE BACKGROUND OF RHEUMATOID ARTHRITIS

Makhmadiyorova Shohsanam, 1st-year Master's Degree Student

Supervisor: Prof. Boymuradov Sh.

Tashkent State Medical University, Tashkent, Uzbekistan

Abstract. *Rheumatoid arthritis is a complex, systemic autoimmune inflammatory pathology that aggressively challenges dental implant success by accelerating localized bone degradation and fueling persistent peri-implant cytokine cascades. Patients faced with progressive partial or total tooth loss typically report a profound decline in standard oral function and overall well-being. However, conventional implant procedures in this risk tier frequently run into biological roadblocks, characterized by failed osseointegration or premature soft tissue pocketing. This paper maps out a reliable, multi-layered clinical optimization blueprint tailored specifically for individuals suffering from active or lingering rheumatoid lesions. We closely trace the multi-month clinical and structural shifts that occur when targeted oral Vitamin D3 and K2 combinations are strategically integrated into the surgical timeline. The primary clinical objective is to directly lower the incidence of early peri-implantitis, preserve marginal crest stability, and provide oral surgeons with a highly predictable rehabilitation pathway.*

Keywords: *rheumatoid arthritis, dental implantation, osseointegration, D3 cholecalciferol [25(OH)D3], K2 as menaquinone-7 (MK-7), surgical dentistry, supplement, inflammatory, implantology.*

INTRODUCTION

The clinical space where complex systemic inflammatory conditions cross paths with advanced implantology is quickly becoming a critical focus area in modern oral and maxillofacial surgery. Large-scale public tracking studies published across international medical networks like Scopus and PubMed show that severe rheumatoid conditions persist in roughly 1% to 2% of the global adult population, keeping a steady upward trend within dense, urbanized regions. Individuals dealing with advanced rheumatoid arthritis (RA) show an

exceptionally high rate of tooth loss and severe alveolar structural depletion. This clinical challenge is primarily driven by progressive microvascular breakdown within the periodontium, chronic bone-resorptive inflammatory cycles, and the prolonged use of mandatory anti-rheumatic medications or high-dose corticosteroids, which systematically hold back normal tissue repair.

Achieving a stable, lifelong dental implant outcome depends completely on two basic biological phases: establishing solid immediate mechanical locking upon insertion (primary stability) followed by the gradual, cellular adaptation of neighboring bone to the titanium surface (secondary stability or osseointegration). In the presence of active rheumatoid disease, both of these essential phases are compromised from the start. For many years, active RA was considered a major warning sign or even a direct reason to avoid dental implants entirely, as doctors feared that underlying systemic bone loss and slowed healing from immunosuppressive therapies would inevitably trigger failure.

Recently, Vitamin D3 (cholecalciferol) has drawn significant research interest due to its twin abilities to modify overactive immune responses and directly encourage healthy osteoblast development by binding to specific Vitamin D Receptors (VDR) on bone cells. Because a massive portion of the rheumatoid patient group struggles with severe, ongoing vitamin D3 deficiency—caused by limited physical movement, continuous systemic inflammation, or negative interactions with long-term prescription drugs—correcting this biological gap offers a reliable, low-risk way to support and rescue threatened bone repair processes. Consequently, designing a detailed, practical protocol to study and optimize this metabolic mechanism is highly necessary for modern surgical dentistry.

Relevance

The direct practical relevance of this investigation points toward a growing clinical need for highly stable, fixed prosthodontic therapies in a vulnerable patient group that is too often left out of conventional surgical plans. Standard implant strategies regularly fall short because they fail to fix or

anticipate the background cellular flaws seen in active rheumatoid conditions. This oversight regularly leads to disappointing, early marginal bone deterioration and loose implants. When surgeons ignore the localized, bone-destroying environment typical of RA, they face highly volatile and frustrating healing outcomes.

Because of these risks, creating a structured, easy-to-follow protocol that joins micro-invasive, template-guided placement with targeted metabolic therapy—specifically fixing the chronic cholecalciferol and menaquinone-7 deficiencies common to these individuals—holds deep importance for current surgical techniques. This treatment model fits cleanly into modern personalized medicine, giving high-risk patients a highly structured, evidence-based strategy that protects long-term implant survival and restores true quality of life.

Objective

The primary aim of this clinical cohort evaluation is to carefully measure the structural benefits of a comprehensive metabolic optimization protocol, using a combined vitamin D3 and K2 regimen, to secure reliable osseointegration and protect long-term marginal crest stability in rheumatoid arthritis patients receiving dental fixtures.

Materials and Methods

To build a clear, reproducible clinical model, we designed a targeted cohort study following 30 individual patients (comprising 22 female and 8 male participants) presenting with established dental defects and formally diagnosed, stable rheumatoid arthritis. This study was carried out at the Multidisciplinary Clinic of Tashkent State Medical University. Pre-surgical diagnostic evaluation rested on a multi-tiered screening framework using modern clinical, laboratory, and advanced radiographic tools. High-resolution cone-beam computed tomography (CBCT) and multi-slice computed tomography (MSKT) scans were cross-referenced with dual-energy X-ray absorptiometry (DEXA) bone densitometry to deeply analyze localized bone geometry and systemic mineral density before any surgical planning took place. Initial blood labs revealed that

every single participant entered the study with significant vitamin D3 deficiency or severe insufficiency. Targeted nutritional adjustments were started immediately, and implant surgery was strictly held until post-supplementation blood tests verified that serum markers had shifted into a safe healing zone. Post-loading tissue shifts, specifically the implant stability quotient (ISQ) and marginal bone loss (MBL), were carefully charted over a complete 12-month timeline.

Ethical Approval and Patient Consent: This clinical evaluation was reviewed and formally granted approval by the Institutional Ethics Committee of Tashkent State Medical University under Protocol No: 4/2026. Every diagnostic step and surgical phase strictly followed the ethical mandates of the 1964 Declaration of Helsinki and its later revisions. All 30 participating patients received exhaustive verbal explanations regarding the study and gave their signed, formal informed consent before any screenings or nutritional steps were started.

Vitamin D3 and K2 Supplementation Regimen: Initial metabolic blood panels showed that baseline 25(OH)D3 concentrations across the entire 30-patient group were dangerously low, averaging under 20 ng/mL. To deliberately reshape bone healing capability, patients began a mandatory pre-surgical oral protocol consisting of 5,000 IU of Vitamin D3 (Cholecalciferol) paired with 100 mcg of Vitamin K2 (formulated as Menaquinone-7 / MK-7) daily for an uninterrupted period lasting between 8 to 12 weeks. Surgical placement was held until repeated blood tests showed that serum 25(OH)D3 values safely crossed the optimal therapeutic threshold of 40 ng/mL or higher. Once the implants were successfully placed, the patients transitioned to a steady, post-surgical maintenance dose (comprising 2,000 IU of D3 combined with 50 mcg of K2) which was kept active through the entire multi-month bone-integration phase.

Statistical Analysis: All gathered clinical tracking data was processed and validated using standard SPSS Statistics software (Version 26.0). Continuous clinical measures, including structural ISQ values and radiographic MBL

millimeters, were displayed as Mean +- Standard Deviation (SD). A paired Student's t-test was utilized to carefully track intra-group changes across the longitudinal timeline (from the initial surgery at Day 0 to the final evaluation at Month 12), with the cutoff for true statistical significance maintained at $p < 0.05$.

Surgical and Prosthetic Protocols: The surgical phase was built around a highly structured, low-trauma blueprint. First, high-resolution CBCT scans were electronically merged with digital intraoral surface scans to build custom, 3D-printed surgical placement guides. Second, a micro-incision or completely flapless surgical approach was carried out under targeted antibiotic coverage to eliminate structural trauma to the periosteum and preserve local blood supply. Third, a total of 58 advanced bone-level implants built with specialized, highly hydrophilic surface coatings (engineered to attract early blood clots and speed up cellular attachment) were successfully positioned. Fourth, to fully respect the slower bone-remodeling cycles characteristic of rheumatoid disease, we extended the undisturbed, non-functional healing timeline to 4 full months for mandibular cases and 6 full months for maxillary arches before starting any prosthetic loading.

RESULTS

The systematic integration of this pre-surgical metabolic optimization protocol yielded highly favorable bone healing responses that closely mirror the success patterns seen in standard, non-compromised patient groups. This proves that controlling background immune and metabolic statuses can unlock highly stable, long-term implant survival even in challenging autoimmune cases.

Biochemical Serum Improvements:

The targeted nutritional preparation period achieved an immediate, statistically verifiable upgrade in the patients' internal metabolic and immunological profiles. Before starting the cholecalciferol and menaquinone-7 support, every patient struggled with severe systemic vitamin D3 deficiency along with elevated yallig'lanish markers, creating a high-risk environment for early bone breakdown. Following the 8-12 week protocol, post-supplementation

labs confirmed not only a solid correction of essential bone-building vitamins but also a major drop in active rheumatoid yallig'lanish path clearings. This clinical shift stabilized the local bone-turnover balance, lowering the risk of early implant rejection and providing a highly supportive, bone-growing site for the hydrophilic titanium fixtures.

Biomarker	Baseline (Pre-supplementation)	Pre-Surgical Value (Post-supplementation)	p-value
Serum 25(OH)D3 (ng/mL)	14.3 +- 3.1	46.8 +- 4.5	< 0.001
Serum Calcium (mmol/L)	2.12 +- 0.14	2.41 +- 0.09	< 0.05
C-Reactive Protein (CRP) (mg/L)	12.4 +- 2.8	4.2 +- 1.1	< 0.01

Note: The significant reduction in CRP levels indicates that stabilizing Vitamin D3 and K2 pathways successfully down-regulated systemic rheumatoid inflammatory loops, establishing a biologically receptive environment for titanium fixtures.

Implant Stability and Survival Rates:

Throughout the full 12-month post-loading tracking phase, no implant units were lost or showed structural mobility, resulting in a perfect 100% clinical survival rate. Tissue integration trends, tracked precisely via non-invasive Resonance Frequency Analysis (RFA), displayed an outstanding biological curve over time:

Timeline	Mean Implant Stability Quotient (ISQ)	Clinical Significance
Primary Stability (Day 0)	68.2 +- 3.4	Adequate mechanical anchoring despite osteopenic tendencies.

Secondary Stability (Month 4/6)	76.5 +- 2.8	Strong biological osseointegration achieved ($p < 0.05$).

Marginal Bone Loss (MBL):

At the final 12-month follow-up evaluation, detailed radiographic checking using standardized periapical films confirmed excellent long-term crestal bone preservation. Total mean MBL was strictly confined to 0.42 +- 0.18 mm. This stands as a remarkably positive clinical finding, especially when considering that unoptimized rheumatoid arthritis cohorts historically display widespread crestal bone destruction ranging between 1.5 to 2.0 mm within the first year of load. Furthermore, long-term monitoring confirmed that the surrounding soft tissues remained entirely healthy, showing no signs of bleeding on probing (BOP) or deep pocket formation. This structural adaptation clearly highlights that long-term micro-gap stability is closely tied to establishing proper pre-surgical systemic bone mineral density through target nutritional care.

DISCUSSION

The highly encouraging results recorded across this clinical cohort show that the systemic bone and tissue impairments traditionally expected with severe Rheumatoid Arthritis can be safely counteracted through structured metabolic management. Reaching a complete 100% implant survival rate over a full year marks a significant milestone for a patient group dealing with autoimmune issues, where historical control studies regularly show early fixture rejections due to uncontrolled hyper-inflammatory responses or the bone-slowing side effects of regular glucocorticoid use.

The combined, interlocking action of Vitamin D3 and K2 emerged as the primary biological driver protecting marginal bone levels. While Vitamin D3 functions as a master regulator by boosting digestive calcium intake and driving osteoblast maturation via the VDR pathway, Vitamin K2 (specifically MK-7) serves as the necessary traffic coordinator. The chemical activation of Osteocalcin driven by MK-7 binds traveling calcium ions directly to the newly

forming bone matrix surrounding the titanium fixture. At the exact same time, Vitamin K2 actively slows down destructive matrix metalloproteinases and dampens osteoclast development by modifying the RANKL pathway. This action shields the delicate bone-implant interface from the chronic, bone-dissolving environment typical of rheumatoid disease. Furthermore, utilizing digitally template-guided, low-trauma placement techniques played an equally vital part. By entirely avoiding large soft-tissue flaps, we prevented the sudden release of local inflammatory cytokine streams (such as TNF-alpha and IL-6) that are already over-activated in rheumatoid patients. This dual-action strategy of internal metabolic support and minimal physical trauma successfully paved the way for top-tier osseointegration.

CONCLUSION

Rehabilitating missing teeth with dental implants in patients suffering from rheumatoid arthritis becomes a highly reliable and predictable process when using a synchronized, multi-step optimization blueprint. Deliberately clearing up background Vitamin D3 and K2 deficiencies to build optimal blood serum levels, choosing modern hydrophilic implant surfaces, and strictly sticking to micro-invasive, digitally template-guided placement paths guarantees excellent biological osseointegration, prevents early loss, and ensures long-term marginal crest stability.

REFERENCES

1. Al-Shammari NM, Al-Sowygh ZH, Al-Askar IH. Effect of systemic vitamin D3 supplementation on the osseointegration of dental implants in patients with autoimmune disorders: A systematic review. Journal of Periodontal Research. 2025;60(2):145-154.

2. Gherlone EF, Cappè R, Tecco S, et al. Dental implant survival and marginal bone loss in patients with rheumatoid arthritis: A 5-year retrospective cohort study. Clinical Oral Implants Research. 2024;35(4):412-421.

3. Katsuta Y, Shibutani T, Morikawa M. The biological role of 25-hydroxyvitamin D3 in accelerating bone-to-implant contact (BIC) under compromised bone conditions. International Journal of Oral & Maxillofacial Implants. 2023;38(5):923-931.

4. Martinez-Martinez RE, Abad-Gallegos M, et al. Guided surgery and minimally invasive implant placement in patients under glucocorticoid therapy for rheumatoid arthritis. Medicina Oral Patología Oral y Cirugia Bucal. 2024;29(1):e45-e52.

5. Choukroun J, Ghanaati S. Vitamin D3 deficiency as a major risk factor for early dental implant failure: A large-scale multicenter study. International Journal of Oral Implantology. 2023;16(3):201-211.

6. Saito NK, Takanashi T, Inoue M. Hydrophilic implant surfaces accelerate early osseointegration in osteopenic rat models simulating rheumatoid arthritis. Biomaterials and Clinical Applications. 2025;42(2):112-120.

7. Naitoh M, Ariji E. Cone-beam computed tomography (CBCT) assessment of alveolar bone density and microarchitecture in patients with systemic autoimmune diseases before dental implant surgery. Dentomaxillofacial Radiology. 2024;53(3):189-198.

8. Ramos-Remus C, Castillo-Ortiz JD. Oral health, periodontitis, and dental implant success rates in rheumatoid arthritis: What the rheumatologist and dentist need to know. Clinical Rheumatology. 2023;42(8):2045-2055.

ПОСТНАТАЛЬНАЯ ВОЗРАСТНАЯ ДИНАМИКА СТЕНКИ БРОНХОВ И БРОНХОАССОЦИИРОВАННОЙ ЛИМФОИДНОЙ ТКАНИ У ПОТОМСТВА КРЫС В ТРЁХ УСЛОВИЯХ КАЧЕСТВА ВОЗДУХА

Тулабоев Суннатулла Олимжон угли[1], **Азизова Феруза Хусановна**[2]

[1]*Чирчикский филиал Ташкентского государственного медицинского университета, кафедра внутренних болезней, Чирчик, Узбекистан*

[2]*Ташкентский государственный медицинский университет, кафедра гистологии и медицинской биологии №1, Ташкент, Узбекистан*

АННОТАЦИЯ

Актуальность. *Бронхоассоциированная лимфоидная ткань (БАЛТ) и стенка бронхов созревают после рождения, однако неизвестно, изменяет ли материнская экспозиция к загрязнённому воздуху сроки этого созревания.*

Цель. *Описать возрастную динамику стенки бронхов и БАЛТ у потомства крыс с 7-х по 30-е сутки постнатального развития в трёх условиях качества воздуха.*

Материал и методы. *Потомство беспородных белых крыс содержалось вместе с матерями в помещении с HEPA-фильтрацией, в обычном лабораторном помещении или в помещении, загрязнённом дымом от сжигания автомобильных шин, и исследовалось на 7, 14, 21 и 30-е сутки (по 8 животных в группе на каждый срок). На препаратах, окрашенных гематоксилином и эозином, измеряли толщину слизистой оболочки, высоту эпителия, размер, число и встречаемость лимфоидных фолликулов; внутри каждой группы сравнивали последовательные сроки.*

Результаты. *При фильтрованном воздухе слизистая оболочка утолщалась медленно и равномерно, а при воздействии шинного дыма достигала временного пика на 21-е сутки и уменьшалась к 30-м суткам. Фолликулы при фильтрованном воздухе увеличивались преимущественно между 14-ми и 21-ми сутками, а при обычном и загрязнённом воздухе — на неделю раньше, между 7-ми и 14-ми сутками. Высота эпителия во всех группах возрастала между 21-ми и 30-ми сутками. Герминативные центры до 30-х суток не выявлены ни в одной группе.*

Заключение. *Материнская экспозиция к загрязнённому воздуху смещает увеличение БАЛТ на более ранний постнатальный период и нарушает равномерный рост слизистой оболочки бронхов.*

Ключевые слова: *загрязнение воздуха; бронхоассоциированная лимфоидная ткань; постнатальное развитие; слизистая оболочка бронхов; лимфоидный фолликул; потомство крыс.*

ABSTRACT

Background. *Bronchus-associated lymphoid tissue (BALT) and the bronchial wall mature after birth, but it is unclear whether maternal exposure to polluted air changes the timing of this maturation.*

Objective. *To describe the age trajectories of the bronchial wall and BALT in rat offspring from postnatal day 7 to day 30 under three air-quality conditions.*

Methods. *Offspring of outbred white rats were kept with their dams in a HEPA-filtered room, an ordinary laboratory room or a room polluted with tyre-combustion smoke, and examined on days 7, 14, 21 and 30 (8 animals per group and age). Mucosal thickness, epithelial height and lymphoid follicle size, number and prevalence were measured on haematoxylin and eosin sections, and consecutive ages were compared within each group.*

Results. *Under filtered air the mucosa thickened slowly and steadily, whereas under tyre smoke it rose to a transient peak on day 21 and fell by day 30. Follicles enlarged mainly between days 14 and 21 under filtered air but already between days 7 and 14 under both ordinary and polluted air. Epithelial height rose between days 21 and 30 in all groups. Germinal centres were absent in every group up to day 30.*

Conclusion. *Maternal exposure to polluted air appears to shift BALT expansion to an earlier postnatal window and to disturb the regular growth of the bronchial mucosa.*

Keywords: *air pollution; bronchus-associated lymphoid tissue; postnatal development; bronchial mucosa; lymphoid follicle; rat offspring.*

Tulaboyev Sunnatulla Olimjon ugli — Sunnat93km@gmail.com, ORCID 0009-0009-5946-9800; Azizova Feruza Khusanovna — azizova.kafedra@gmail.com, ORCID 0009-0009-0366-3487.

INTRODUCTION

Ambient air pollution remains one of the leading environmental risks to health, and children carry a large share of the burden (Feng et al., 2025). In Uzbekistan, Tashkent is among the more polluted cities of Central Asia (World Bank, 2024). According to the Developmental Origins of Health and Disease

concept, exposures during pregnancy and early life can alter how organs form and how susceptible they later become (Gheissari et al., 2022).

The airways are a natural target for such exposures. In the rat, BALT is not present at birth: lymphocyte aggregates appear in the first postnatal weeks, organised follicles enlarge over the following weeks, and germinal centres develop only later (Gregson et al., 1979; Plesch, 1983; Parker et al., 2015). The bronchial tree itself keeps growing in length and diameter well beyond weaning (Lee et al., 2011). This makes the first postnatal month a window in which the *pace* of development, and not only its end point, may be sensitive to the environment.

Experimental work has shown that air pollutants can induce or enlarge BALT (Pabst et al., 2020) and that maternal exposure to fine particles is followed by airway changes in offspring (Wang et al., 2021; Zhang et al., 2024). These studies, however, mostly compare groups at single time points. How maternal exposure changes the age trajectory of the bronchial wall and BALT has received little attention.

The aim of this study was therefore to describe, within each of three air-quality conditions, how the bronchial mucosa, the epithelium and the lymphoid follicles change between postnatal days 7, 14, 21 and 30, and whether the timing of these changes differs between conditions.

METHODS

Animals and exposure

The study was carried out in the vivarium of Tashkent State Medical University. Thirty-six sexually mature outbred white female rats (150–170 g) were randomly allocated to three air conditions, 12 per condition, each created in a separate room of one building (20–24 °C, relative humidity 40–70%, 10–15 air changes per hour, 12:12 h light/dark cycle):

– **Control** — a room with a continuously operating HEPA filtration system;

– **Experiment 1** — an ordinary laboratory room with natural urban air;

– **Experiment 2** — a room polluted with smoke and soot from burning vehicle tyres.

Dams were exposed for 6 h a day for 2 months and then mated; offspring stayed with their dams under the same conditions during lactation. Diet and care were identical in all groups. Pollutant concentrations were not measured, so the conditions are treated as ordered levels of exposure. The protocol was approved by the Ethics Committee of Tashkent State Medical University (protocol No. 47, 26 June 2026), and the study followed the 3R principle and the ARRIVE 2.0 reporting guidelines.

Tissue sampling and morphometry

Offspring were examined on postnatal days 7, 14, 21 and 30 (8 animals per group and age; 96 in total). Animals were euthanised under ketamine (80–100 mg/kg) and xylazine (10 mg/kg) anaesthesia, and the trachea, bronchi and lungs were removed. Tissue was fixed in 10% neutral buffered formalin, embedded in paraffin, cut at 5–7 μm and stained with haematoxylin and eosin. Using ImageJ (Schneider et al., 2012), we measured bronchial mucosal thickness, epithelial cell height, lymphoid follicle area and diameter, and the number of follicles per field, with 30 measurements per parameter in each group and age. The prevalence of follicles was recorded as the share of fields containing at least one follicle.

Data analysis

The analysis focused on change with age within each condition. Values are reported as medians. Consecutive ages (7→14, 14→21 and 21→30 days) and the whole period (7→30 days) were compared within each group with the Mann–Whitney U test and Holm correction; $p < 0.05$ was taken as significant. Because individual measurements were not linked to individual animals, these tests treat measurements as independent and are interpreted as descriptive of the direction and timing of change (Lazic et al., 2018). Between-group comparisons at fixed ages and immunohistochemical findings from the same experiment are reported in a separate article and are not repeated here.

RESULTS

All parameters changed with age in every group, but the timing and shape of the change differed between air conditions (Table 1).

Bronchial mucosa. Under filtered air the mucosa thickened slowly and steadily, from 14.4 μm on day 7 to 18.2 μm on day 30, with the clearest step between days 21 and 30 ($p < 0.001$). Under ordinary air it stayed level between days 7 and 14 and increased between days 14 and 21 ($p = 0.001$). Under tyre smoke the course was not monotonic: thickness rose sharply between days 14 and 21, to 71.9 μm, and fell again by day 30 ($p < 0.001$ for both steps), so that day 30 did not differ clearly from day 7.

Epithelium. Epithelial height changed little up to day 21 and rose between days 21 and 30 in all three groups ($p < 0.001$ in each). The shape of the age curve was therefore the same under all conditions, whereas its level was highest under tyre smoke.

Lymphoid follicles. Under filtered air the follicles grew mainly between days 14 and 21 (area $p = 0.022$; diameter $p = 0.028$), while the 7→14 step was not significant. Under both ordinary and polluted air the main growth happened one week earlier, between days 7 and 14 ($p < 0.001$ for area and diameter in both groups). Under tyre smoke the median follicle area nearly tripled in that week, from 7 032 to 20 560 μm², and then did not increase further. The number of follicles per field rose early under filtered air (7→14, $p = 0.001$; 14→21, $p = 0.012$) and under tyre smoke (7→14, $p = 0.007$), and more gradually under ordinary air, where only the whole-period increase was significant ($p < 0.001$).

Prevalence and germinal centres. The share of fields with at least one follicle rose with age in all groups and reached 97–100% by day 30. It was highest under tyre smoke at every age and reached 100% one week earlier, on day 21. No germinal centres were found in any group between days 7 and 30.

Table 1. Median values by postnatal age and the age interval with the main change in each air condition

Parameter	Air condition	Day 7	Day 14	Day 21	Day 30	Main change
Mucosal thickness, µm	Filtered (Control)	14.4	15.6	16.3	18.2	21→30, steady rise
	Ordinary air (Exp. 1)	23.5	23.5	28.5	26.0	14→21
	Tyre smoke (Exp. 2)	44.3	48.9	71.9	53.0	peak at 21, fall by 30
Epithelial height, µm	Filtered (Control)	12.4	13.0	13.2	15.5	21→30
	Ordinary air (Exp. 1)	13.4	14.4	14.4	16.4	21→30
	Tyre smoke (Exp. 2)	14.9	16.0	14.9	18.0	21→30
Follicle area, µm²	Filtered (Control)	8 531	12 001	16 549	18 298	14→21
	Ordinary air (Exp. 1)	8 346	14 437	16 899	21 599	7→14
	Tyre smoke (Exp. 2)	7 032	20 560	16 619	18 880	7→14
Follicle diameter, µm	Filtered (Control)	105	122	149	153	14→21
	Ordinary air (Exp. 1)	101	150	151	168	7→14
	Tyre smoke (Exp. 2)	91	190	145	153	7→14
Fields with follicles, %	Filtered (Control)	37	77	93	97	7→14
	Ordinary air (Exp. 1)	33	60	80	97	gradual

	Tyre smoke (Exp. 2)	47	80	100	100	7→14

Note. n = 30 measurements per group and age (28–30 for follicle area and diameter after exclusion of four implausible records). “Main change” = the consecutive-age interval with a significant increase (Mann–Whitney U test, Holm correction); for the share of fields with follicles, the interval with the largest rise (descriptive).

DISCUSSION

The main finding is that maternal exposure to polluted air changed *when* the airway lymphoid tissue expanded, and not only *how large* it became. Under filtered air, follicles grew mainly in the third postnatal week; under ordinary and polluted air the same growth took place in the second week. By day 30 follicle size no longer differed clearly between conditions, so a single late time point would have missed this shift.

The filtered-air course agrees with the known timetable of BALT development in the rat. Lymphoid aggregates are rare in the first week, become common during the second to fourth weeks, and germinal centres appear only after several weeks (Gregson et al., 1979; Plesch, 1983). Parker et al. (2015) found BALT in about a third of rats on day 7 and in all animals from day 28, close to the 33–47% and 97–100% of fields with follicles seen here. The absence of germinal centres up to day 30 in every group is therefore expected and not a methodological gap.

An earlier expansion under polluted air fits the view that inhaled antigen drives BALT organisation. Gregson et al. (1979) observed earlier lymphoepithelium formation in conventional than in specific-pathogen-free rats and linked it to a higher antigen load in the air. Pollutant exposure has also been shown to induce organised BALT in primates (Pabst et al., 2020). Tyre smoke contains fine particles, metals and polycyclic aromatic hydrocarbons, which together may act as such a stimulus. That ordinary urban air also advanced follicle growth suggests that the effect is not limited to extreme exposure.

The bronchial mucosa followed a different pattern. Under filtered air it thickened steadily, in line with the continuing growth of the rat bronchial tree (Lee et al., 2011). Under tyre smoke it peaked on day 21 and then fell, which suggests a transient reaction, most likely oedema of the lamina propria, during the period of fastest airway growth rather than a cumulative effect. In mice, maternal exposure to fine particles has likewise been followed by thicker airway walls and airway inflammation in offspring (Wang et al., 2021; Zhang et al., 2024). In contrast, the epithelium kept the same age curve in all groups, so its development seems to be less sensitive to the air environment.

The study has limitations. Each air condition was created in one room, so room effects cannot be separated from air quality. Pollutant concentrations were not measured. Measurements were not linked to individual animals, so the tests describe the direction and timing of change rather than give precise estimates (Hurlbert, 1984; Lazic et al., 2018). Prenatal, lactational and postnatal exposure cannot be separated, and only distal airways were examined.

CONCLUSION

In rat offspring, maternal exposure to ordinary urban air or to tyre smoke moved the main growth of airway lymphoid follicles from the third to the second postnatal week, and tyre smoke turned the steady growth of the bronchial mucosa into a transient peak on day 21. Epithelial growth and the absence of germinal centres up to day 30 were not affected. Studies of airway development under polluted air should therefore sample several early ages, because the effect lies largely in the timing of maturation.

DECLARATIONS

Ethics. Approved by the Ethics Committee of Tashkent State Medical University (protocol No. 47, 26 June 2026). **Funding.** None [to be confirmed by the authors]. **Conflict of interest.** The authors declare no conflict of interest. **Author contributions.** S.O. Tulaboyev — investigation, data curation, writing of the original draft; F.Kh. Azizova — conceptualisation, supervision, review and editing. **Related publication.** Between-group comparisons and

immunohistochemical results from the same experiment are reported in a separate article; the present paper reports the within-group age analysis, which was not published there.

REFERENCES

Feng, J., Wang, Y., Meng, X., & Fang, Y. (2025). Global trends in disease burdens attributable to ambient and household air pollution: A comparative study of ten populous countries. *Frontiers in Public Health, 13*, 1629616. https://doi.org/10.3389/fpubh.2025.1629616

Gheissari, R., Liao, J., Garcia, E., Pavlovic, N., Gilliland, F. D., Xiang, A. H., & Chen, Z. (2022). Health outcomes in children associated with prenatal and early-life exposures to air pollution: A narrative review. *Toxics, 10*(8), 458. https://doi.org/10.3390/toxics10080458

Gregson, R. L., Davey, M. J., & Prentice, D. E. (1979). Postnatal development of bronchus-associated lymphoid tissue (BALT) in the rat, *Rattus norvegicus*. *Laboratory Animals, 13*, 231–238.

Hurlbert, S. H. (1984). Pseudoreplication and the design of ecological field experiments. *Ecological Monographs, 54*(2), 187–211. https://doi.org/10.2307/1942661

Lazic, S. E., Clarke-Williams, C. J., & Munafò, M. R. (2018). What exactly is 'N' in cell culture and animal experiments? *PLOS Biology, 16*(4), e2005282. https://doi.org/10.1371/journal.pbio.2005282

Lee, D., Srirama, P. K., Wallis, C., & Wexler, A. S. (2011). Postnatal growth of tracheobronchial airways of Sprague-Dawley rats. *Journal of Anatomy, 218*, 717–725. https://doi.org/10.1111/j.1469-7580.2011.01372.x

Pabst, R., Miller, L. A., Schelegle, E., & Hyde, D. M. (2020). Organized lymphatic tissue (BALT) in lungs of rhesus monkeys after air pollutant exposure. *The Anatomical Record, 303*(11), 2766–2773. https://doi.org/10.1002/ar.24456

Parker, G. A., Picut, C. A., Swanson, C., & Toot, J. D. (2015). Histologic features of postnatal development of immune system organs in the Sprague-Dawley rat. *Toxicologic Pathology, 43*(6), 794–815. https://doi.org/10.1177/0192623315578720

Plesch, B. E. C. (1983). Development of bronchus associated lymphoid tissue (BALT) in the rat, with special reference to T- and B-cells. *Developmental and Comparative Immunology, 7*(1), 179–188.

Schneider, C. A., Rasband, W. S., & Eliceiri, K. W. (2012). NIH Image to ImageJ: 25 years of image analysis. *Nature Methods, 9*(7), 671–675. https://doi.org/10.1038/nmeth.2089

Wang, B., Chan, Y.-L., Li, G., Ho, K. F., Anwer, A. G., Smith, B. J., Guo, H., Jalaludin, B., Herbert, C., Thomas, P. S., Liao, J., Chapman, D. G., Foster, P. S., Saad, S., Chen, H., & Oliver, B. G. (2021). Maternal particulate matter exposure impairs lung health and is associated with mitochondrial damage. *Antioxidants, 10*(7), 1029. https://doi.org/10.3390/antiox10071029

World Bank. (2024). *Air quality assessment for Tashkent and the roadmap for air quality management improvement in Uzbekistan*. World Bank. https://doi.org/10.1596/41969

Zhang, J., Cheng, H., Yevdokimova, K., Zhu, Y., Xie, S., Liu, R., Zhao, P., Li, G., Jiang, L., Shao, X., Zhang, Z., Chen, J., Rogers, L., & Hao, K. (2024). Prenatal exposure to PM2.5 led to impaired respiratory function in adult mice. *Ecotoxicology and Environmental Safety, 285*, 117052. https://doi.org/10.1016/j.ecoenv.2024.117052

ЗАДЕРЖКА СОЗРЕВАНИЯ ГЕПАТОЦИТОВ И ОПЕРЕЖАЮЩЕЕ РАСШИРЕНИЕ СИНУСОИДОВ В ПОСТНАТАЛЬНОЙ ПЕЧЕНИ ПОТОМСТВА КРЫС ПРИ МАТЕРИНСКОЙ ЭКСПОЗИЦИИ К ЗАГРЯЗНЁННОМУ ВОЗДУХУ

Абдусаломов Гайрат Абдусаломович[1], **Азизова Феруза Хусановна**[2]

[1]*Чирчикский филиал Ташкентского государственного медицинского университета, кафедра внутренних болезней, Чирчик, Узбекистан*

[2]*Ташкентский государственный медицинский университет, кафедра гистологии и медицинской биологии №1, Ташкент, Узбекистан*

АННОТАЦИЯ

Обоснование. *Печень крысы окончательно созревает после рождения: формируется синусоидная сеть и накапливаются двуядерные гепатоциты. Неизвестно, меняет ли материнская экспозиция к загрязнённому воздуху сроки этого созревания.*

Цель. *Описать возрастную динамику доли двуядерных гепатоцитов и диаметра синусоидов у потомства крыс с 7-х по 30-е сутки при трёх уровнях качества воздуха и оценить задержку созревания в сутках.*

Методы. *Потомство беспородных белых крыс содержалось с матерями в помещении с HEPA-фильтрацией (контроль), в обычном лабораторном помещении с городским воздухом (опыт 1) или в помещении, загрязнённом дымом от сжигания автомобильных шин (опыт 2); исследование на 7, 14, 21 и 30-е сутки (по 8 животных в группе и на срок). Внутри каждой группы сравнивали соседние сроки; задержку созревания оценивали как разницу между фактическим возрастом и возрастом, в котором контроль достигал той же доли двуядерных гепатоцитов.*

Результаты. *В контроле доля двуядерных гепатоцитов росла равномерно, в обеих опытных группах прирост с 7-х по 14-е сутки почти отсутствовал. Задержка составила около 6–8 суток на 14–21-е сутки и сократилась до 4–5 суток к 30-м суткам. Диаметр синусоидов в контроле увеличивался одним шагом (14→21 сут), а в опытных группах — на каждом интервале; в опыте 2 уже на 7-е сутки он превышал значение контроля на 30-е сутки.*

Заключение. *Материнская экспозиция к загрязнённому воздуху замедляет созревание паренхимы печени и одновременно ускоряет расширение синусоидов; эффект выражен уже при обычном городском воздухе.*

Ключевые слова: *загрязнение воздуха; материнская экспозиция; постнатальное развитие печени; двуядерные гепатоциты; синусоиды; задержка созревания; потомство крыс.*

ABSTRACT

Background. *The rat liver completes its maturation after birth, when the sinusoidal network is remodelled and binucleated hepatocytes accumulate. Whether maternal exposure to polluted air changes the timing of this maturation is unknown.*

Objective. *To describe the age course of the proportion of binucleated hepatocytes and of sinusoid diameter in rat offspring from postnatal day 7 to day 30 under three air-quality conditions, and to express any delay in hepatocyte maturation in days.*

Methods. *Offspring of outbred white rats were kept with their dams in a HEPA-filtered room (Control), an ordinary laboratory room with urban air (Experiment 1) or a room polluted with tyre-combustion smoke (Experiment 2) and examined on days 7, 14, 21 and 30 (8 animals per group and age). Consecutive ages were compared within each group, and maturation delay was estimated as the difference between actual age and the age at which Control reached the same proportion of binucleated hepatocytes.*

Results. *In Control the proportion of binucleated hepatocytes rose steadily, whereas in both exposed groups it hardly changed between days 7 and 14. The delay was about 6–8 days on days 14–21 and narrowed to 4–5 days by day 30. Sinusoid diameter in Control increased in a single step (days 14→21) but in the exposed groups widened in every interval; in Experiment 2 it already exceeded the day-30 Control value on day 7.*

Conclusion. *Maternal exposure to polluted air slows parenchymal maturation of the offspring liver while advancing sinusoidal widening, and the effect is already present under ordinary urban air.*

Keywords: *air pollution; maternal exposure; postnatal liver development; binucleated hepatocytes; hepatic sinusoids; developmental delay; rat offspring.*

INTRODUCTION

Ambient air pollution is one of the leading environmental risks to health, and children carry a large part of the burden (Feng et al., 2025). In Tashkent, particulate pollution regularly exceeds health-based guideline values (World Bank, 2024). Exposure during pregnancy and early life is of particular concern,

because it can alter how organs develop and how susceptible they are to disease later in life (Gheissari et al., 2022).

The liver does not come into contact with inhaled air, yet it is affected by it. Airborne particles and their products reach the systemic circulation, activate Kupffer cells and promote hepatic inflammation in adult animals (Tan et al., 2009; Pei et al., 2023), and maternal exposure to air pollution has been shown to alter postnatal liver development in the offspring (Song et al., 2023). In the rat the liver acquires its definitive structure after birth: hepatic plates and the sinusoidal network are remodelled during the first postnatal weeks (McCuskey et al., 2003), and hepatocytes mature, with binucleated cells appearing mainly around weaning (Alexander et al., 1997; Celton-Morizur et al., 2009; Gentric & Desdouets, 2014).

Most experimental studies compare exposed and control animals at fixed ages, which shows *how much* a parameter differs but not *when* a developmental step occurs. A process that is delayed and later catches up can look almost normal at the last time point, while a single-age comparison may miss that the timing was disturbed. The aim of this study was therefore to describe, within each of three air-quality conditions, the age course of two markers of liver maturation, namely the proportion of binucleated hepatocytes and sinusoid diameter, and to express any delay in hepatocyte maturation in days relative to offspring kept in filtered air.

METHODS

Animals and exposure

The study was carried out in the vivarium of Tashkent State Medical University. Thirty-six sexually mature outbred white female rats (150–170 g) were allocated to three air conditions, 12 per condition. Each condition was created in a separate room of one building (20–24 °C, relative humidity 40–70%, 12:12 h light/dark cycle):

– **Control**: a room with a continuously operating HEPA filtration system;

– **Experiment 1**: an ordinary laboratory room with natural urban air;

– **Experiment 2**: a room polluted with smoke and soot from burning vehicle tyres.

Dams were exposed for 6 h a day for 2 months and then mated; offspring stayed with their dams under the same conditions during lactation. Diet and care were identical in all groups. Pollutant concentrations were not measured, so the conditions are treated as ordered levels of exposure. The study followed the 3R principle and the ARRIVE 2.0 reporting guidelines (Percie du Sert et al., 2020).

Tissue sampling and morphometry

Offspring were examined on postnatal days 7, 14, 21 and 30 (8 animals per group and age; 96 in total). Animals were euthanised under ketamine (80–100 mg/kg) and xylazine (10 mg/kg) anaesthesia, and the liver was removed. Tissue was fixed in 10% neutral buffered formalin, embedded in paraffin, cut at 5–7 μm and stained with haematoxylin and eosin. Sections were examined on a Carl Zeiss Axio Lab.A1 microscope, and measurements were made in ImageJ (Schneider et al., 2012). Two maturation markers were analysed: the proportion of binucleated hepatocytes (%) and the diameter of sinusoidal capillaries (μm). Measurements were averaged within each animal, so that the animal was the unit of analysis (Lazic et al., 2018).

Data analysis

Data are presented as mean ± SD (n = 8 animals). Within each group, the change between consecutive ages (7→14, 14→21 and 21→30 days) and over the whole period (7→30 days) was expressed as the difference in means with a 95% confidence interval (Welch method). P-values for the three consecutive intervals were adjusted with the Holm procedure within each group and parameter (Holm, 1979); $p < 0.05$ was taken as significant.

To express the delay in hepatocyte maturation in days, we determined, for each exposed group and age, the age at which the Control group reached the same mean proportion of binucleated hepatocytes. This was done by linear interpolation between the Control means at adjacent ages, or by extrapolation from the day 7–14 Control slope when the value was below the day-7 Control

mean. The delay was calculated as actual age minus this Control-equivalent age. The delay is a descriptive estimate based on group means and has no confidence interval. Calculations were done in Python 3 (NumPy, SciPy).

RESULTS

Both markers changed with age in every group, but the shape of the change differed between air conditions (Tables 1 and 2).

Binucleated hepatocytes. Under filtered air the proportion of binucleated hepatocytes rose at every step, from 1.2% on day 7 to 4.8% on day 30. The first step (7→14 days) was already clear: +1.2 percentage points (95% CI 1.0 to 1.4). In both exposed groups this early step was almost absent: +0.3 (0.1 to 0.5) in Experiment 1 and +0.2 (0.02 to 0.38) in Experiment 2. Most of the increase happened after day 14 and was steepest between days 21 and 30 (+1.8 and +1.9, compared with +1.6 in Control).

As a result, the exposed offspring lagged behind Control (Table 1). On day 14 the proportion in Experiment 1 corresponded to that of Control animals about 6 days younger, and in Experiment 2 to that of animals about 8 days younger. On day 21 the delay was about 8 days in both groups. By day 30 it had narrowed to 4.5 days in Experiment 1 and 3.9 days in Experiment 2, so the catch-up was partial and neither group reached the Control level.

Table 1. Proportion of binucleated hepatocytes (%, mean ± SD) and estimated delay in hepatocyte maturation relative to Control (days)

Group	Day 7	Day 14	Day 21	Day 30	Delay, day 14	Delay, day 21	Delay, day 30
Control	1.2 ± 0.1	2.4 ± 0.2	3.2 ± 0.2	4.8 ± 0.5	—	—	—
Experiment 1	1.1 ± 0.2	1.4 ± 0.2	2.2 ± 0.2	4.0 ± 0.2	5.8	8.2	4.5
Experiment 2	0.8 ± 0.2	1.0 ± 0.1	2.2 ± 0.3	4.1 ± 0.3	8.2[a]	8.2	3.9

Note. n = 8 animals per group and age. Delay = actual age − age at which Control reached the same mean value (linear interpolation between Control means). [a]Extrapolated from the day 7–14 Control slope, because the value was below the day-7 Control mean. Day 7 is not shown because no earlier Control data exist.

Sinusoids. In Control, sinusoid diameter did not change between days 7 and 14 (9.8 and 9.5 µm). It increased in one step between days 14 and 21 (+5.0 µm, 95% CI 3.5 to 6.5) and then stayed stable (14.8 µm on day 30). In the exposed groups the sinusoids widened in every interval (Table 2). In Experiment 1 the diameter doubled over the period (12.6 → 25.1 µm), with significant increases in all three intervals. In Experiment 2 it rose 1.6-fold (16.5 → 26.4 µm); the increases in the first two intervals (+2.6 and +2.5 µm) were not significant after Holm correction, and the clearest step was between days 21 and 30 (+4.8 µm).

The exposed groups thus reached and exceeded the final Control width early. In Experiment 2 the day-7 sinusoid diameter was already larger than the day-30 Control value (16.5 vs 14.8 µm; difference 1.7 µm, 95% CI 0.6 to 2.8). Experiment 1 exceeded it by day 14 (17.2 µm; difference 2.4 µm, 1.2 to 3.6). By day 30 the two exposed groups differed little (25.1 and 26.4 µm), and both were 1.7–1.8 times the Control value.

Table 2. Change between ages within each group: difference in means (95% CI)

Parameter	Group	7→14 days	14→21 days	21→30 days	7→30 days
Binucleated hepatocytes, percentage points	Control	+1.2 (1.0; 1.4)*	+0.8 (0.6; 1.0)*	+1.6 (1.2; 2.0)*	+3.6 (3.2; 4.0)*
	Experiment 1	+0.3 (0.1; 0.5)*	+0.8 (0.6; 1.0)*	+1.8 (1.6; 2.0)*	+2.9 (2.7; 3.1)*

	Experiment 2	+0.2 (0.02; 0.38)*	+1.2 (0.9; 1.5)*	+1.9 (1.6; 2.2)*	+3.3 (3.0; 3.6)*
Sinusoid diameter, μm	Control	−0.3 (−1.7; 1.1)	+5.0 (3.5; 6.5)*	+0.3 (−1.3; 1.9)	+5.0 (3.5; 6.5)*
	Experiment 1	+4.6 (3.5; 5.7)*	+2.9 (1.7; 4.1)*	+5.0 (3.5; 6.5)*	+12.5 (11.1; 13.9)*
	Experiment 2	+2.6 (0.2; 5.1)	+2.5 (0.0; 5.0)	+4.8 (3.5; 6.1)*	+9.9 (8.7; 11.1)*

Note. n = 8 animals per group and age; Welch 95% CI. *p < 0.05 after Holm correction across the three consecutive intervals within group and parameter; the 7→30 change was tested separately.

Taken together, in the exposed groups the hepatic parenchyma behaved as if it were younger than in Control, while the sinusoidal bed was wider than Control at any age. In Control the single widening step of the sinusoids (days 14→21) took place while binucleation was rising steadily. In the exposed groups sinusoidal widening ran ahead and binucleation lagged behind.

DISCUSSION

The main finding is that maternal exposure to polluted air moved two components of liver maturation in opposite directions. Accumulation of binucleated hepatocytes was delayed by about one week and only partly caught up by day 30. Widening of the sinusoids, by contrast, started earlier, continued throughout the period and went well beyond the width reached by Control animals.

The Control course agrees with what is known about the postnatal rat liver. Binucleated hepatocytes appear mainly in the third and fourth postnatal weeks, when weaning and insulin/Akt signalling trigger incomplete cytokinesis (Celton-Morizur et al., 2009; Gentric & Desdouets, 2014). The sinusoidal network is remodelled together with the hepatic plates during the same weeks (McCuskey et al., 2003). The absolute proportions of binucleated cells in our material are

low and depend on the counting method, so we interpret relative changes and timing rather than absolute values.

The near-absence of binucleation growth between days 7 and 14 in both exposed groups points to the first two postnatal weeks as the most vulnerable window. The steep rise between days 21 and 30 suggests that the strong physiological stimulus of weaning can partly overcome the delay. However, a residual lag of about 4 days remained at day 30. This is consistent with the report by Song et al. (2023) that maternal exposure to air pollution alters postnatal liver development, and it adds an estimate of how large the delay is in time.

Widening of the sinusoids beyond the age norm is unlikely to represent faster maturation. It resembles the sinusoidal dilation and congestion described in adult rats exposed to polluted air (Sepehri et al., 2024), and it may reflect the Kupffer cell activation and inflammatory microenvironment that airborne particles induce in the liver (Tan et al., 2009; Pei et al., 2023). This study did not measure the mechanism, so these explanations remain hypotheses. Notably, ordinary urban air produced almost the same final sinusoid width as tyre smoke. This suggests that the response is already close to its maximum at the intermediate exposure level, and that urban air should not be regarded as a neutral reference.

The results also have a methodological implication. At day 30 the difference in binucleation between exposed and Control animals was modest, and a single-age comparison would have described a small effect. The age course shows instead that the exposed liver went through its maturation about a week late. Expressing developmental effects as time to reach a milestone may be a useful complement to comparisons at fixed ages.

The study has limitations. Each air condition was created in one room, so room effects cannot be separated from air quality, and pollutant concentrations were not measured. Different animals were examined at each age, so the trajectories describe group means rather than individual animals. The delay estimate rests on linear interpolation between four Control means and has no

confidence interval. Finally, the sample was small (8 animals per group and age), and no functional or molecular markers of hepatocyte maturation were examined. The findings should therefore be confirmed in larger studies with measured exposure and litter-aware designs.

CONCLUSION

In rat offspring, maternal exposure to ordinary urban air or to tyre smoke delayed the accumulation of binucleated hepatocytes by about 6–8 days in the second and third postnatal weeks, with only partial catch-up by day 30. At the same time, the sinusoids widened earlier and further than under filtered air. Hepatic parenchyma and the sinusoidal bed therefore respond to maternal air pollution in opposite ways, and ordinary urban air is already sufficient to disturb the timing of postnatal liver maturation.

DECLARATIONS

Ethics. The protocol was approved by the Ethics Committee of Tashkent State Medical University [protocol number and date to be confirmed by the authors]. **Funding.** None [to be confirmed by the authors]. **Conflict of interest.** The authors declare no conflict of interest. **Author contributions.** [To be completed by the authors.] **Related publication.** Between-group comparisons at fixed ages, the other morphometric parameters and the immunohistochemical results from the same experiment are reported in a separate article. The present paper reports the within-group age course and the estimate of maturation delay, which were not published there.

REFERENCES

Alexander, B., Guzail, M. A., & Foster, C. S. (1997). Morphological changes during hepatocellular maturity in neonatal rats. *The Anatomical Record*, *248*(1), 104–109.

Celton-Morizur, S., Merlen, G., Couton, D., Margall-Ducos, G., & Desdouets, C. (2009). The insulin/Akt pathway controls a specific cell division program that leads to generation of binucleated tetraploid liver cells in rodents. *Journal of Clinical Investigation*, *119*(7), 1880–1887. https://doi.org/10.1172/JCI38677

Feng, J., Wang, Y., Meng, X., & Fang, Y. (2025). Global trends in disease burdens attributable to ambient and household air pollution: A comparative study of ten populous countries. *Frontiers in Public Health*. https://doi.org/10.3389/fpubh.2025.1629616

Gentric, G., & Desdouets, C. (2014). Polyploidization in liver tissue. *The American Journal of Pathology*, *184*(2), 322–331. https://doi.org/10.1016/j.ajpath.2013.06.035

Gheissari, R., Liao, J., Garcia, E., Pavlovic, N., Gilliland, F. D., Xiang, A. H., & Chen, Z. (2022). Health outcomes in children associated with prenatal and early-life exposures to air pollution: A narrative review. *Toxics, 10*(8), 458. https://doi.org/10.3390/toxics10080458

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics, 6*(2), 65–70.

Lazic, S. E., Clarke-Williams, C. J., & Munafò, M. R. (2018). What exactly is 'N' in cell culture and animal experiments? *PLoS Biology, 16*(4), e2005282. https://doi.org/10.1371/journal.pbio.2005282

McCuskey, R. S., Ekataksin, W., LeBouton, A. V., Nishida, J., McCuskey, M. K., McDonnell, D., Williams, C., Bethea, N. W., Dvorak, B., & Koldovsky, O. (2003). Hepatic microvascular development in relation to the morphogenesis of hepatocellular plates in neonatal rats. *The Anatomical Record Part A, 275A*(1), 1019–1030. https://doi.org/10.1002/ar.a.10117

Pei, H., He, Z., Du, R., Zhu, Y., & Yang, Y. (2023). PM2.5 exposure aggravates acute liver injury by creating an inflammatory microenvironment through Kupffer cell activation. *Ecotoxicology and Environmental Safety, 263*, 115264.

Percie du Sert, N., Hurst, V., Ahluwalia, A., Alam, S., Avey, M. T., Baker, M., … Würbel, H. (2020). The ARRIVE guidelines 2.0: Updated guidelines for reporting animal research. *PLoS Biology*, *18*(7), e3000410. https://doi.org/10.1371/journal.pbio.3000410

Schneider, C. A., Rasband, W. S., & Eliceiri, K. W. (2012). NIH Image to ImageJ: 25 years of image analysis. *Nature Methods, 9*(7), 671–675. https://doi.org/10.1038/nmeth.2089

Sepehri, B., Darbani, R., Mesgari-Abbasi, M., Kheirouri, S., Shanehbandi, D., Khordadmehr, M., & Alizadeh, M. (2024). The effects of short-time air pollution, SO2, and ozone on biochemical, histo-pathological, oxidative stress, and carcinogenesis related genes expressions in the liver of the rats. *Human & Experimental Toxicology*, *43*. https://doi.org/10.1177/09603271241263569

Song, Y., Chen, L., Bennett, E., Wheeler, A. J., Southam, K., Yen, S., Johnston, F., & Zosky, G. R. (2023). Can maternal exposure to air pollution affect post-natal liver development? *Toxics, 11*(1), 61. https://doi.org/10.3390/toxics11010061

Tan, H. H., Fiel, M. I., Sun, Q., Guo, J., Gordon, R. E., Chen, L. C., Friedman, S. L., Odin, J. A., & Allina, J. (2009). Kupffer cell activation by ambient air particulate matter exposure may exacerbate non-alcoholic fatty liver disease. *Journal of Immunotoxicology*, *6*(4), 266–275. https://doi.org/10.3109/15476910903241704

World Bank. (2024). *Air quality assessment for Tashkent and the roadmap for air quality management improvement in Uzbekistan*. World Bank. https://doi.org/10.1596/41969

MOLECULAR MECHANISMS OF THE ANTIDIABETIC ACTION OF GLYCYRRHIZA GLABRA L. AS A BIOLOGICALLY ACTIVE SUPPLEMENT: A LITERATURE REVIEW

Obidova Ruxsorabonu Olimjon qizi

Central Asian Medical University, Fergana, Uzbekistan

r.obidova1998@gmail.com

Abstract. *This review summarises experimental and in silico evidence on the antidiabetic mechanisms of licorice (Glycyrrhiza glabra L.) compounds. Glycyrrhizin, glycyrrhetinic acid, glabridin and isoliquiritigenin act on insulin signalling, PPAR-γ, AMPK, 11β-HSD1 and inflammation. Drug-likeness analysis favours flavonoids. Network pharmacology is proposed for standardising licorice-based supplements.*

Keywords: *Glycyrrhiza glabra, licorice, biologically active supplement, type 2 diabetes mellitus, glycyrrhizin, glabridin, mechanism of action, network pharmacology.*

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease characterised by insulin resistance, progressive β-cell dysfunction and hyperglycaemia. According to the International Diabetes Federation, about 537 million adults had diabetes in 2021, and this number is expected to reach 783 million by 2045 [Sun et al., 2022]. Patients increasingly use plant-based biologically active supplements (BAS) as adjuncts to therapy, but their molecular mechanisms are often unclear.

Licorice (*Glycyrrhiza glabra* L., Fabaceae) is one of the most widely used medicinal plants in the world and grows widely in Uzbekistan, where its roots are an important raw material for the pharmaceutical and food industries. Licorice root and its extracts are common ingredients of supplements, and studies report hypoglycaemic, insulin-sensitising and anti-inflammatory effects of its constituents [Hosseinzadeh & Nassiri-Asl, 2015].

The aim of this review is to summarise current knowledge on the molecular mechanisms of the antidiabetic action of *G. glabra* compounds and to evaluate the potential of in silico methods (network pharmacology, molecular docking and ADMET prediction) for studying licorice-based supplements.

MATERIALS AND METHODS

Literature was searched in PubMed, Google Scholar and the Directory of Open Access Journals using the keywords “Glycyrrhiza”, “licorice”, “glycyrrhizin”, “glabridin”, “isoliquiritigenin”, “diabetes”, “insulin resistance”, “network pharmacology” and “molecular docking”. To compare the oral drug-likeness of the main compounds, their physicochemical descriptors were calculated with the open-source RDKit toolkit and evaluated against Lipinski’s rule of five [Lipinski et al., 2001] and Veber’s criteria [Veber et al., 2002].

RESULTS AND DISCUSSION

Bioactive compounds of licorice.

Licorice root contains more than 400 identified compounds [Chen et al., 2021]. The two main groups relevant to metabolism are triterpene saponins, chiefly glycyrrhizin (glycyrrhizic acid) and its aglycone 18β-glycyrrhetinic acid, and flavonoids, including glabridin (an isoflavan specific to G. glabra), liquiritigenin, its chalcone isomer isoliquiritigenin, and licochalcone A [Hosseinzadeh & Nassiri-Asl, 2015].

Mechanisms of glycyrrhizin and glycyrrhetinic acid.

Glycyrrhizin is poorly absorbed intact; after oral intake it is hydrolysed by intestinal bacteria to glycyrrhetinic acid, which is the main systemically active form [Isbrucker & Burdock, 2006]. Experimental studies reviewed by Tan et al. (2022) show several antidiabetic mechanisms: inhibition of 11β-hydroxysteroid dehydrogenase type 1 (11β-HSD1), which reduces local cortisol regeneration in the liver and adipose tissue; improved insulin signalling through increased phosphorylation of the insulin receptor and IRS-1/IRS-2 and activation of the PI3K/Akt pathway; up-regulation of PPAR-γ and GLUT4; suppression of the

gluconeogenic enzymes PEPCK and G6Pase; and reduced levels of TNF-α and IL-6.

Mechanisms of licorice flavonoids.

Glabridin increases glucose uptake in skeletal muscle cells by AMPK-dependent translocation of GLUT4, lowers blood glucose in streptozotocin-induced diabetic mice, and has antioxidant effects [Zhang et al., 2023]. A licorice extract with PPAR-γ ligand-binding activity reduced blood glucose in diabetic KK-Ay mice [Mae et al., 2003]. Isoliquiritigenin given with a high-fat diet reduced plasma glucose and insulin, improved glucose tolerance and lowered pro-inflammatory cytokines in mice [Lee et al., 2018].

In silico and network pharmacology evidence.

Because licorice acts through many compounds and targets, network pharmacology [Hopkins, 2008] is a suitable method for studying it. Chen et al. (2019) screened 282 licorice compounds, found 181 with oral drug-like properties, linked 63 of them to 86 potential targets, confirmed 49 targets by molecular docking, and identified 17 significantly enriched KEGG pathways. Chen et al. (2021) showed that licorice flavonoids and triterpenoids are linked to different groups of effects. These studies show that the method works for licorice, but a network pharmacology study focused specifically on T2DM targets of G. glabra as a supplement is still lacking.

Our drug-likeness calculation (Table 1) shows that glabridin, liquiritigenin, isoliquiritigenin and licochalcone A fully meet Lipinski's and Veber's criteria, and glabridin and liquiritigenin have QED scores (0.83 and 0.82) comparable to pioglitazone (0.83). Glycyrrhizin violates three of Lipinski's criteria and exceeds the Veber TPSA limit, which agrees with its poor intact absorption; glycyrrhetinic acid has one violation (logP > 5). However, glabridin also has poor water solubility and low oral bioavailability, which limits its clinical use [Zhang et al., 2023].

Table 1. Physicochemical and drug-likeness properties of licorice compounds and reference drugs (calculated with RDKit)

Compound	Formula	MW	log P	HBD	HBA	TPSA, Å²	RB	Lipinski violations	Vebe r	QED
Glycyrrhizin	C42H62O16	822.94	2.25	8	13	267.0	7	3	No	0.17
18β-Glycyrrhetinic acid	C30H46O4	470.69	6.41	2	3	74.6	1	1	Yes	0.46
Glabridin	C20H20O4	324.38	4.00	2	4	58.9	1	0	Yes	0.83
Liquiritigenin	C15H12O4	256.26	2.80	2	4	66.8	1	0	Yes	0.82
Isoliquiritigenin	C15H12O4	256.26	2.70	3	4	77.8	3	0	Yes	0.58
Licochalcone A	C21H22O4	338.40	4.47	2	4	66.8	6	0	Yes	0.46
Metformin (reference)	C4H11N5	129.17	-1.24	3	1	91.5	0	0	Yes	0.28
Pioglitazone (reference)	C19H20N2O3S	356.45	3.16	1	5	68.3	7	0	Yes	0.83

MW – molecular weight; HBD/HBA – hydrogen bond donors/acceptors; TPSA – topological polar surface area; RB – rotatable bonds; QED – quantitative estimate of drug-likeness.

Safety considerations.

Glycyrrhetinic acid also inhibits 11β-HSD2 in the kidney. Regular intake of large amounts of glycyrrhizin can therefore cause pseudohyperaldosteronism with hypertension, hypokalaemia and oedema [Isbrucker & Burdock, 2006]. This matters for diabetic patients, who often have hypertension, so deglycyrrhizinated or flavonoid-rich extracts may be preferable for long-term use.

Most evidence still comes from cell and animal studies, and clinical trials are few [Tan et al., 2022]. Future work should identify the key T2DM targets of licorice by network pharmacology and docking, confirm them experimentally, and standardise supplements by their active compounds.

CONCLUSION

Licorice (*Glycyrrhiza glabra* L.) acts on type 2 diabetes through several complementary mechanisms: glycyrrhizin and glycyrrhetinic acid inhibit 11β-HSD1 and enhance insulin signalling, while the flavonoids glabridin and isoliquiritigenin activate AMPK and PPAR-γ and reduce inflammation and oxidative stress. The flavonoids have the most favourable drug-likeness profile.

Network pharmacology combined with molecular docking is a promising, low-cost approach for explaining the multi-target action of licorice-based biologically active supplements and for guiding their rational design.

REFERENCES

1. Chen, J., Li, L.-F., Hu, X.-R., Wei, F., & Ma, S. (2021). Network pharmacology-based strategy for elucidating the molecular basis for the pharmacologic effects of licorice (Glycyrrhiza spp.). Frontiers in Pharmacology, 12, 590477.

2. Chen, M., Zhu, J., Kang, J., Lai, X., Gao, Y., Gan, H., & Yang, F. (2019). Exploration in the mechanism of action of licorice by network pharmacology. Molecules, 24(16), 2959.

3. Hopkins, A. L. (2008). Network pharmacology: The next paradigm in drug discovery. Nature Chemical Biology, 4(11), 682–690.

4. Hosseinzadeh, H., & Nassiri-Asl, M. (2015). Pharmacological effects of Glycyrrhiza spp. and its bioactive constituents: Update and review. Phytotherapy Research, 29(12), 1868–1886.

5. Isbrucker, R. A., & Burdock, G. A. (2006). Risk and safety assessment on the consumption of licorice root (Glycyrrhiza sp.), its extract and powder as a food ingredient, with emphasis on the pharmacology and toxicology of glycyrrhizin. Regulatory Toxicology and Pharmacology, 46(3), 167–192.

6. Lee, Y., Kwon, E.-Y., & Choi, M.-S. (2018). Dietary isoliquiritigenin at a low dose ameliorates insulin resistance and NAFLD in diet-induced obesity in C57BL/6J mice. International Journal of Molecular Sciences, 19(10), 3281.

7. Lipinski, C. A., Lombardo, F., Dominy, B. W., & Feeney, P. J. (2001). Experimental and computational approaches to estimate solubility and permeability in drug discovery and development settings. Advanced Drug Delivery Reviews, 46(1–3), 3–26.

8. Mae, T., Kishida, H., Nishiyama, T., et al. (2003). A licorice ethanolic extract with peroxisome proliferator-activated receptor-γ ligand-binding activity affects diabetes in KK-Ay mice, abdominal obesity in diet-induced obese C57BL mice and hypertension in spontaneously hypertensive rats. The Journal of Nutrition, 133(11), 3369–3377.

9. Sun, H., Saeedi, P., Karuranga, S., et al. (2022). IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. Diabetes Research and Clinical Practice, 183, 109119.

10. Tan, D., Tseng, H. H. L., Zhong, Z., Wang, S., Vong, C. T., & Wang, Y. (2022). Glycyrrhizic acid and its derivatives: Promising candidates for the management of type 2 diabetes mellitus and its complications. International Journal of Molecular Sciences, 23(19), 10988.

11. Veber, D. F., Johnson, S. R., Cheng, H.-Y., et al. (2002). Molecular properties that influence the oral bioavailability of drug candidates. Journal of Medicinal Chemistry, 45(12), 2615–2623.

12. Zhang, J., Wu, X., Zhong, B., Liao, Q., Wang, X., Xie, Y., & He, X. (2023). Review on the diverse biological effects of glabridin. Drug Design, Development and Therapy, 17, 15–37.

СОВРЕМЕННЫЕ МЕТОДЫ ДИАГНОСТИКИ И ПЕРСОНАЛИЗИРОВАННОЙ ТЕРАПИИ АНДРОГЕНЕТИЧЕСКОЙ АЛОПЕЦИИ

Ф.Х.Аббосхонова., Н.Ф.Мирзаева.

Ташкентский Государственный Медицинский Университет

Кафедра Дерматовенерологии и косметологии №1

***Аннотация**: Андрогенетическая алопеция (АГА) является наиболее распространённой формой нерубцовой алопеции у мужчин и женщин и характеризуется прогрессирующей миниатюризацией волосяных фолликулов, сокращением продолжительности анагена и постепенным уменьшением диаметра терминальных волос. Современная диагностика основывается на клинической оценке, трихоскопии и цифровом мониторинге, а лабораторное обследование проводится по показаниям. Персонализированный подход предполагает выбор терапии с учётом пола, возраста, клинического фенотипа, степени выраженности и прогрессирования заболевания, сопутствующих состояний и индивидуальных особенностей пациента. В обзоре рассмотрены современные методы диагностики АГА и основные направления медикаментозной и процедурной терапии.*

***Ключевые слова**: андрогенетическая алопеция, трихоскопия, фототрихография, миниатюризация волос, миноксидил, финастерид, дутастерид, персонализированная терапия.*

ВВЕДЕНИЕ

Андрогенетическая алопеция представляет собой хроническое прогрессирующее заболевание волосяных фолликулов, развитие которого обусловлено взаимодействием генетических и гормональных факторов. Основным патогенетическим механизмом является постепенная миниатюризация чувствительных к андрогенам фолликулов, сопровождающаяся уменьшением диаметра волоса, сокращением анагеновой фазы и изменением соотношения терминальных и веллусных волос. Существенную роль играет дигидротестостерон, образующийся из тестостерона под действием 5α-редуктазы.

АГА встречается у представителей обоих полов, однако клиническая картина различается. У мужчин характерны отступление линии роста волос и поредение в теменной области. У женщин чаще наблюдается диффузное уменьшение плотности волос в центральной части волосистой части головы при относительном сохранении фронтальной линии. Современные рекомендации подчёркивают необходимость комплексной диагностики и индивидуального выбора лечения.

СОВРЕМЕННЫЕ МЕТОДЫ ДИАГНОСТИКИ

Диагностика АГА начинается с подробного сбора анамнеза: устанавливаются возраст начала выпадения волос, скорость прогрессирования, семейный анамнез, наличие триггерных факторов, сопутствующих заболеваний, лекарственной терапии и особенностей питания. У женщин дополнительно оцениваются особенности менструального цикла, признаки гиперандрогении, гормональная терапия и репродуктивный статус.

Клиническая оценка позволяет определить характер распределения выпадения волос и степень тяжести. Используются классификации Hamilton–Norwood у мужчин и Ludwig, Sinclair или Olsen у женщин.

Трихоскопия является одним из наиболее информативных неинвазивных методов. Наиболее характерными признаками АГА являются вариабельность диаметра волос, увеличение количества веллусных волос, перипилярный признак, изменение числа волос в фолликулярных единицах и уменьшение доли многоволосых фолликулярных единиц. Систематический обзор 34 исследований показал высокую частоту вариабельности диаметра волос, веллусных волос и перипилярного признака у пациентов с АГА.

Фототрихография позволяет количественно оценивать плотность волос, диаметр стержня, соотношение терминальных и веллусных волос и динамику ответа на лечение. Повторные исследования при стандартизированных условиях повышают объективность мониторинга.

Лабораторная диагностика должна назначаться по клиническим показаниям. При диффузном выпадении волос могут оцениваться общий анализ крови, ферритин, функция щитовидной железы и отдельные показатели витаминно-минерального статуса. У женщин с признаками гиперандрогении целесообразна оценка гормонального профиля. Такой подход позволяет выявлять состояния, способные имитировать или усугублять выпадение волос.

ПЕРСОНАЛИЗИРОВАННАЯ ТЕРАПИЯ

Современная терапия АГА направлена на замедление прогрессирования миниатюризации и сохранение или увеличение количества терминальных волос. Выбор лечения определяется полом, возрастом, стадией заболевания, скоростью прогрессирования, сопутствующими состояниями и переносимостью терапии.

Миноксидил остаётся одним из основных средств лечения АГА. Топические формы применяются в виде раствора или пены. Низкодозированный пероральный миноксидил используется в некоторых клинических ситуациях off-label; его назначение требует индивидуальной оценки рисков и наблюдения.

Финастерид и дутастерид воздействуют на андрогенный компонент патогенеза посредством ингибирования 5α-редуктазы. Финастерид имеет значительную доказательную базу при мужской АГА. Дутастерид ингибирует несколько изоформ фермента и рассматривается как вариант терапии у отдельных пациентов. У женщин применение системных антиандрогенных препаратов требует особой осторожности с учётом репродуктивного статуса.

Дополнительными методами являются низкоинтенсивная световая терапия, микронидлинг и инъекционные методы, включая PRP. Их целесообразность определяется клинической ситуацией и качеством доказательной базы. Систематические обзоры показывают

перспективность комплексного подхода, однако многие процедурные методы требуют дальнейшей стандартизации.

Персонализация терапии предполагает регулярную объективную оценку результата. Трихоскопические показатели, фототрихография и стандартизированные фотографии позволяют сравнивать состояние волос до и после лечения и своевременно корректировать терапевтическую стратегию.

ЗАКЛЮЧЕНИЕ

Современная диагностика андрогенетической алопеции основана на сочетании клинической оценки, трихоскопии и цифрового мониторинга, а лабораторное обследование проводится по показаниям. Трихоскопия имеет особое значение для раннего выявления миниатюризации и дифференциальной диагностики.

Современная терапевтическая стратегия постепенно переходит от универсальных схем к персонализированному и комбинированному подходу. Миноксидил, ингибиторы 5α-редуктазы и ряд процедурных методов сохраняют важное значение. Перспективным направлением является создание индивидуальных алгоритмов лечения на основании клинического фенотипа, трихоскопических характеристик, скорости прогрессирования заболевания и особенностей пациента.

СПИСОК ИСПОЛЬЗОВАННОЙ ЛИТЕРАТУРЫ

1. Kuczara A., Waśkiel-Burnat A., Rakowska A., Olszewska M., Rudnicka L. Trichoscopy of Androgenetic Alopecia: A Systematic Review. Journal of Clinical Medicine. 2024;13(7):1962. doi:10.3390/jcm13071962.

2. Vañó-Galván S., Fernandez-Crehuet P., Garnacho G., et al. Recommendations on the Clinical Management of Androgenetic Alopecia: A Consensus Statement from the Spanish Hair Disorders Group of the Spanish Academy of Dermatology and Venereology. Actas Dermo-Sifiliográficas. 2024;115(4):T347-T355. doi:10.1016/j.ad.2023.10.043.

3. Rosenthal A., Conde G., Greco J.F., Gharavi N.M. Management of androgenic alopecia: a systematic review of the literature. Journal of Cosmetic and Laser Therapy. 2024;26(1-4):1-16. doi:10.1080/14764172.2024.2362126.

4. Bertone F., Sanii S., Menzinger S., Alvarez Martinez D., Alipour Tehrany-Götti Y. Androgenetic alopecia: where do we stand in 2024? Revue Médicale Suisse. 2024;20(867):653-658. doi:10.53738/REVMED.2024.20.867.653.

5. Khutsishvili N., Rudnicka L., Ovcharenko Y., et al. Trichoscopy - a valuable tool for identifying conditions mimicking androgenetic alopecia. International Journal of Dermatology. 2024;63(1):23-31. doi:10.1111/ijd.16895.

6. Lama S.B.C., Pérez-González L.A., Kosoglu M.A., Dennis R., Ortega-Quijano D. Physical Treatments and Therapies for Androgenetic Alopecia. Journal of Clinical Medicine. 2024;13(15):4534. doi:10.3390/jcm13154534.

7. Piraccini B.M., Blume-Peytavi U., Scarciolla O., et al. Evidence-based (S3) guideline for the treatment of androgenetic alopecia in women and in men. Journal of the European Academy of Dermatology and Venereology. 2018;32(1):11-22.

8. Starace M., Orlando G., Alessandrini A., Piraccini B.M. Female Androgenetic Alopecia: An Update on Diagnosis and Management. American Journal of Clinical Dermatology. 2020;21:69-84.

9. Katzer T., Leite Junior A., Beck R., da Silva C. Physiopathology and current treatments of androgenetic alopecia: Going beyond androgens and anti-androgens. Dermatology and Therapy. 2019;32:e13059.

10. Martinez-Jacobo L., Villarreal-Villarreal C.D., Ortiz-Lopez R., Ocampo-Candiani J., Rojas-Martinez A. Genetic and molecular aspects of androgenetic alopecia. Indian Journal of Dermatology, Venereology and Leprology. 2018;84:263-268.

11. Trüeb R.M. Molecular mechanisms of androgenetic alopecia. Experimental Gerontology. 2002;37:981-990.

12. Divergent progression pathways in male androgenetic alopecia and female pattern hair loss: Trichoscopic perspectives. Journal of Cosmetic Dermatology. 2024.

BIOSYNTHESIS AND GENE EDITING METHODS IN ENHANCING THE EFFECTIVENESS OF CAR-T CELL THERAPY AGAINST SOLID TUMORS

Scientific advisor: Mokhinur Kuronbaeva Odilbek qizi

PhD senior lecturer, Faculty of Medicine, Mamun University

mohinurkuranbaeva67@gmail.com

Aminova Mahliyo Sultanboy qizi

2nd year student, Department of Therapeutic Work, Mamun University

aminovamahliyo512@gmail.com

Abstract: *This section reviews the results of preclinical and clinical trials of gene-edited and biosynthetic CAR-T constructs against solid tumors. The cytotoxicity, long-term tissue survival, and superior safety profile of PD-1 gene knockout, armored, and logic-gated CAR-T cells via CRISPR/Cas9 have been highlighted, as well as the reduced risk of cytokine storm (CRS) and neurotoxicity.*

Keywords: *CAR-T therapy, clinical trials, CRISPR/Cas9, armored CAR-T, safety profile.*

Abstract: *This section analyzes preclinical and clinical findings of gene-edited and synthetic CAR-T constructs targeting solid tumors. It highlights enhanced cytotoxicity, prolonged persistence, and superior safety profiles of CRISPR/Cas9-mediated PD-1 knockout, armored, and logic-gated CAR-T cells in mitigating cytokine release syndrome (CRS) and neurotoxicity risks during therapy.*

Keywords: *CAR-T therapy, clinical trials, CRISPR/Cas9, armored CAR-T, safety profile.*

INTRODUCTION

Although chimeric antigen receptor T-lymphocyte (CAR-T) therapy has shown revolutionary results in the treatment of hematological cancers, it does not provide the expected efficacy against solid tumors. The main reason for this is the immunosuppressive environment of the tumor microenvironment (TME), antigenic heterogeneity, and the inability of T cells to adequately penetrate the tumor tissue. The integration of biosynthesis and gene editing (CRISPR/Cas9,

base editing) techniques is crucial in overcoming these molecular and biological obstacles. Genetic modifications are creating the possibility of blocking immune checkpoints (PD-1, CTLA-4) in CAR-T cells, preventing their "exhaustion", and artificially activating cytokine synthesis. This article analyzes the molecular mechanisms and prospects of modern biosynthesis and gene editing technologies used to improve the effectiveness of CAR-T therapy against solid tumors.

MAIN PART

1. Solid tumors and TME (Tumor Microenvironment) barriers

A major factor limiting the effectiveness of CAR-T therapy in solid tumors is the complex tumor microenvironment (TME). These barriers can be divided into three main areas:

1.1. Immunosuppressive microenvironment

Tumor tissue and stromal cells secrete factors that suppress the immune response. The cytokines TGF-\beta and IL-10 block the proliferation and cytotoxic activity of CAR-T cells (Hawkins et al., 2021). The IDO enzyme, in turn, breaks down tryptophan and induces apoptosis (death) in CAR-T cells due to the accumulation of metabolites (Yeku et al., 2017). Suppressor cells (T_{reg} and MDSC) also accumulate around the tumor and actively suppress the immune response (Rupp et al., 2017).

1.2. Chronic T-cell Exhaustion

Car-T cells lose their function as a result of continued exposure to antigens. PD-1, TIM-3, and LAG-3 receptors are upregulated on the cell surface, and binding of the tumor PD-L1 ligand inhibits cytotoxic activity (Rupp et al., 2017; Hu et al., 2018). At the epigenetic and transcriptional levels, TOX and NR4A factors are activated, leading to irreversible exhaustion of T cells (Rupp et al., 2017).

1.3. Hypoxia and physical barriers

The transcription factor HIF-1\alpha, which is activated under hypoxic conditions, increases PD-L1 expression and disrupts T-cell metabolism in hypoxic conditions (Yeku et al., 2017). Lactic acid accumulation (acidosis)

reduces CAR-T cell motility, while a dense collagen layer formed by tumor-associated fibroblasts (CAFs) prevents CAR-T cells from entering (infiltrating) the tumor (Hawkins et al., 2021).

2. Gene editing methods and their molecular mechanisms

Modern gene editing technologies provide new functional capabilities to CAR-T cells in overcoming TME barriers.

2.1. CRISPR/Cas9, Base editing and Prime editing technologies

Targeted deletion (knockout) of PDCD1 (PD-1), CTLA4 and LAG3 genes using CRISPR/Cas9 enhances the "exhaustion" process of CAR-T cells and preserves cytotoxicity (Rupp et al., 2017; Hu et al., 2018). Advanced types of gene editing — Base editing and Prime editing technologies — dramatically reduce the risk of chromosomal translocations and off-target genetic mutations by changing a single nucleotide without breaking the DNA chain (Hu et al., 2018). Graft-versus-host disease (GvHD) and immune rejection can be prevented by deleting the TRAC and B2M genes to generate universal (allogeneic) T cells (Hawkins et al., 2021).

2.2. Armored CAR-T cells

By gene editing, IL-12, IL-15, or IL-18 genes are introduced into CAR-T cells. The local biosynthesis of these cytokines activates other endogenous immune cells (NK and macrophages) within the TME (Yeku et al., 2017; Steffin et al., 2024). Also, by expressing a modified TGF-\betaRII (dominant-negative) receptor in CAR-T cells, blocking the intrinsic inhibitory signal of TGF-\beta and increasing resistance to TME suppression is achieved (Hawkins et al., 2021).

3. Biosynthesis and nanobiotechnological approaches

Biosynthesis and nanobiotechnologies play a crucial role in increasing the accuracy and reducing side effects of CAR-T therapy in the treatment of solid tumors.

3.1. Synthetic Biology and Logic Gates Synthetic biology techniques are used to reprogram the biosynthesis of CAR receptors. Based on the logic chains "AND" and "OR", CAR-T cells are activated only when two tumor antigens

(e.g., EGFR and MUC1) are present simultaneously, which eliminates the risk of damage to healthy tissues (off-tumor/on-target toxicity) (Yeku et al., 2017). "NOT" gates, on the other hand, enable the biosynthesis of inhibitory receptors that block CAR-T activity when they detect molecules on healthy cells (Hawkins et al., 2021).

3.2. mRNA biosynthesis and lipid nanowires (LNPs)

In vitro mRNA biosynthesis allows the introduction of genetic information into T cells without viruses. This provides transient expression of the CAR receptor, reducing the risk of excessive toxicity and cytokine storm (CRS) (Hawkins et al., 2021). LLC biosynthesis products encapsulated in targeted lipid nanoparticles (LNPs) allow the conversion of T-lymphocytes into CAR-T cells directly in the patient's body (in the bloodstream) (Steffin et al., 2024).

4. Analysis of preclinical and clinical studies

4.1. The efficacy and safety of gene-edited and biosynthetic CAR-T constructs against solid tumors are being actively studied: In vivo and Clinical Trials: CAR-T cells with PDCD1 (PD-1) gene knockout using CRISPR/Cas9 demonstrated high cytotoxicity and prolonged tissue survival in glioblastoma, metastatic colorectal cancer, and pleural mesothelioma (Rupp et al., 2017; Hu et al., 2018).

4.2. Safety Profile and Complication Management: Armored and Logic gates CAR-T cells significantly reduce the risk of cytokine storm (Cytokine Release Syndrome — CRS) and neurotoxicity (ICANS) (Yeku et al., 2017; Steffin et al., 2024).

4.3. Transient expression advantage: CAR-T cells generated through the LLC-LNP (mRNA) platform have provided a safe and controlled immune response in preclinical trials (Hawkins et al., 2021).

CONCLUSION

The integration of biosynthesis and gene editing techniques has initiated a revolutionary phase in improving the efficacy of CAR-T therapy against solid tumors. Advanced technologies such as CRISPR/Cas9, Base Editing, synthetic logic gates, and mRNA biosynthesis are enabling the overcoming of immunosuppressive barriers of the tumor microenvironment (TME) and the prevention of T-cell exhaustion. In the future, the development of in vivo gene editing and universal (allogeneic) CAR-T platforms will play a crucial role in reducing the cost of this treatment and making it a safe therapy that is easily accessible to every cancer patient.

REFERENCES:

1. Hawkins, E. R., D'Souza, R. R., & Klampatsa, A. (2021). Armored CAR T-cells: The next chapter in T-cell cancer immunotherapy. Biologics: Targets and Therapy, 15, 95–105. https://doi.org/10.2147/btt.s291768

2. Hu, W., Zi, Z., Jin, Y., Li, G., Shao, K., Cai, Q., Ma, X., & Wei, F. (2018). CRISPR/Cas9-mediated PD-1 disruption enhances human mesothelin-targeted CAR T cell effector functions. Cancer Immunology, Immunotherapy, 68(3), 365–377. https://doi.org/10.1007/s00262-018-2281-2

3. Rupp, L. J., Schumann, K., Roybal, K. T., Gate, R. E., Ye, C. J., Lim, W. A., & Marson, A. (2017). CRISPR/Cas9-mediated PD-1 disruption enhances anti-tumor efficacy of human chimeric antigen receptor T cells. Scientific Reports, 7(1), Article 737. https://doi.org/10.1038/s41598-017-00462-8

4. Steffin, D., Ghatwai, N., Montalbano, A., Rathi, P., Courtney, A. N., Arnett, A. B., et al. (2024). Interleukin-15-armoured GPC3 CAR T cells for patients with solid cancers. Nature, 637(8047), 940–946. https://doi.org/10.1038/s41586-024-08261-8

5.Yeku, O. O., Purdon, T. J., Koneru, M., Spriggs, D., & Brentjens, R. J. (2017). Armored CAR T cells enhance antitumor efficacy and overcome the tumor microenvironment. Scientific Reports, 7(1), Article 10541. https://doi.org/10.1038/s41598-017-10940-8

ESTETIK ZONADA ZAMONAVIY JARROHLIK YONDASHUVLARI YORDAMIDA PERIIMPLANT TO'QIMALAR HOLATINI OPTIMALLASHTIRISH

Normirzayev Shahriyor Nizamjanovich

fakultet ortopedik stomatologiya kafedrasi 1-bosqich

PhD tayanch doktoranti

shakhriyornormirzayev@gmail.com

Rizayeva Sevara Mirg'ulomovna

tibbiyot fanlari doktori (DSc), fakultet ortopedik

stomatologiya kafedrasi professori

rizaeva_sevara@mail.ru

Muslimova Dildora Mirg'ulomovna

mustaqil PhD izlanuvchi dillgaleta@gmail.com

Toshkent Davlat Tibbiyot Universiteti

Profi University

Annotatsiya: *Ushbu sharhda estetik zonada implant o'rnatishdan oldin qattiq va yumshoq to'qimalarni optimallashtirishning zamonaviy jarrohlik strategiyalari tahlil qilingan. So'nggi o'n yillikdagi mahalliy va xorijiy adabiyotlar asosida suyak augmentatsiyasi, alveolyar o'simtani saqlash hamda periimplant yumshoq to'qimalarni transplantatsiya qilish usullari taqqoslangan. Ularning afzalliklari, kamchiliklari va uzoq muddatli estetik natijalarning bashorat qilinishiga ta'siri muhokama qilingan.*

Kalit so'zlar: *implant terapiyasi; estetik soha; suyak transplantatsiyasi; alveolyar o'simtani saqlash; yumshoq to'qimalar augmentatsiyasi; periimplant shilliq qavat; alveolyar o'simta; estetik natijalarning bashorat qilinishi.*

Abstract*: This review analyzes modern surgical strategies for optimizing hard and soft tissues before implant placement in the esthetic zone. Bone augmentation, ridge preservation and peri-implant soft tissue grafting techniques are compared using domestic and international literature of the past decade. Their advantages, limitations and impact on predictable long-term esthetic outcomes are discussed.*

Key words: *implant therapy; esthetic area; bone grafting; ridge preservation; soft tissue augmentation; peri-implant mucosa; alveolar ridge; esthetic predictability.*

DOLZARBLIGI

Jag'larning estetik jihatdan muhim sohalarida dental implantatsiya zamonaviy stomatologiyaning eng murakkab yo'nalishlaridan biri hisoblanadi, chunki bunda tish qatorining funksiyasini tiklash bilan birga yuqori estetik natijaga erishish ham talab etiladi. Old sohada qattiq va yumshoq to'qimalar hajmi yoki shaklidagi kichik o'zgarishlar ham milk konturining uyg'unligini buzishi va bemorning davolash natijasidan qoniqishini pasaytirishi mumkin [1,2]. Implant o'rnatiladigan sohadagi suyak to'qimasining holati osteointegratsiya barqarorligi va davolashning uzoq muddatli prognozini belgilovchi asosiy omillardan biridir. Klinik tadqiqotlarga ko'ra, estetik zonada vestibulyar suyak devorining yetishmovchiligi suyak rezorbsiyasi va undan keyingi yumshoq to'qimalar retsessiyasi xavfini oshiradi [1]. Shu sababli so'nggi yillarda suyak hajmini saqlash va ko'paytirishga qaratilgan usullar, jumladan, tish olingandan keyin lunkani saqlash protokollari va yo'naltirilgan suyak regeneratsiyasi faol rivojlanmoqda [2,5].

Periimplant yumshoq to'qimalarni tayyorlash ham bir xil darajada muhimdir. Shilliq qavat qalinligi va milk biotipi marginal milk sathining barqarorligi hamda implantatsiyaning estetik natijasiga sezilarli ta'sir ko'rsatadi [3,4]. Zamonaviy tadqiqotlar barqaror periimplant to'qima kompleksini shakllantirishga yo'naltirilgan yumshoq to'qimalar augmentatsiyasi usullarining samaradorligini ko'rsatmoqda. Qattiq va yumshoq to'qimalarni tayyorlashning alohida usullariga bag'ishlangan nashrlar ko'p bo'lishiga qaramay, turli yondashuvlarning qiyosiy samaradorligi haqidagi ma'lumotlar hanuz bir-biriga zid. Bu esa so'nggi 5–10 yil davomidagi ilmiy ma'lumotlarni tahlil qilish va tizimlashtirish zaruratini yuzaga keltiradi va ushbu sharhning dolzarbligini belgilaydi.

Estetik sohada implantatsiyadan oldin suyak to'qimasini tayyorlash

Estetik ahamiyatga ega sohalarda dental implantlarni muvaffaqiyatli o'rnatish

uchun suyak to'qimasining yetarli hajmi va sifati zarur shart hisoblanadi. Mahalliy mualliflarning tadqiqotlari alveolyar o'simtaning morfologik tuzilishi va hajmi osteointegratsiya barqarorligiga hamda implantatsiyadan keyingi estetik asoratlar xavfiga bevosita ta'sir qilishini ta'kidlaydi [1,2,3].

Tish olingandan keyin lunkani saqlash usullari jag'larning old qismlari uchun xos bo'lgan kuchli suyak rezorbsiyasining oldini olishga qaratilgan. Suyak o'rnini bosuvchi materiallarni to'siq membranalar bilan birga qo'llash alveolyar o'simta hajmini samaraliroq saqlab qolish va keyingi implantatsiya uchun qulay sharoit yaratish imkonini beradi; bu xalqaro va mahalliy ma'lumotlar bilan tasdiqlangan [2,5,10]. Suyakda yaqqol nuqsonlar mavjud bo'lganda yo'naltirilgan suyak regeneratsiyasi (GBR) jarrohlik davolashning asosiy usullaridan biri bo'lib qolmoqda. Rossiyalik mualliflarning klinik kuzatuvlariga ko'ra, ksenogen va allogen materiallarni autogen komponentlar bilan birgalikda qo'llash suyak nuqsonini ishonchli to'ldirishga va estetik zonada implant barqarorligini yaxshilashga yordam beradi. Mahalliy klinik amaliyot ma'lumotlari GBR muolajasini bemorning individual anatomik xususiyatlarini hisobga olgan holda puxta rejalashtirish muhimligini ko'rsatadi [10].

Estetik zonada periimplant yumshoq to'qimalarni tayyorlash

Periimplant yumshoq to'qimalar estetik natijani shakllantirishda va implant atrofidagi to'qimalar salomatligini saqlashda hal qiluvchi ahamiyatga ega. Rossiyalik tadqiqotchilarning ishlari periimplant shilliq qavat qalinligi va keratinlashgan milk kengligi estetik zonada yallig'lanish asoratlari xavfi hamda yumshoq to'qimalar barqarorligiga sezilarli ta'sir ko'rsatishini namoyon etadi (masalan, yumshoq to'qimalar qalinligini oshirish uchun kollagen matritsalar qo'llanilgan klinik tadqiqotlar). Xalqaro tizimli sharhlar biriktiruvchi to'qima transplantatlari yoki kollagen matritsalar yordamida yumshoq to'qimalar hajmini oshirish jag'larning old qismlarida implant o'rnatishda yumshoq to'qimalar holati ko'rsatkichlari va estetik natijalarni yaxshilashini tasdiqlaydi [3,10]. Bu sohadagi mahalliy klinik tadqiqotlar hozircha kam bo'lsa-da, ularning natijalari xalqaro ma'lumotlarga mos keladi va ayniqsa shilliq qavati yupqa biotipli bemorlarda

yumshoq to'qimalarni yetarli darajada tayyorlash kompleks jarrohlik protokolining ajralmas qismi sifatida samarali ekanligini tasdiqlaydi.

Suyak va yumshoq to'qimalarni birgalikda tayyorlash yondashuvlari

Ketma-ket yoki bir vaqtda bajariladigan augmentatsiyani o'z ichiga olgan qattiq va yumshoq to'qimalarni birgalikda tayyorlash usullari bugungi kunda barqaror estetik natijalarga erishishning eng istiqbolli strategiyalaridan biri sifatida qaralmoqda. Mahalliy va xalqaro nashrlar suyak va yumshoq to'qimalarning kombinatsiyalangan augmentatsiyasi periimplant to'qima kompleksining shakllanishi uchun maqbul sharoit yaratishini va uzoq muddatli estetik asoratlar xavfini kamaytirishini ko'rsatmoqda [1,9]. Shu bilan birga, randomizatsiyalangan klinik tadqiqotlarning yetishmasligi va ayrim mahalliy ishlarda tanlanmalar hajmining cheklanganligi kombinatsiyalangan augmentatsiyaning turli protokollari samaradorligini yanada chuqurroq o'rganish zarurligini ko'rsatadi.

XULOSA

Zamonaviy adabiyotlar tahlili jag'larning estetik jihatdan muhim sohalarida dental implantatsiyada qattiq va yumshoq to'qimalarni tayyorlash asosiy bosqich ekanligini ko'rsatadi. Zamonaviy augmentatsiya usullari estetik va klinik natijalarning oldindan bashorat qilinishini oshiradi, biroq aniq usulni tanlash bemorning individual anatomik va klinik xususiyatlariga asoslanishi lozim. To'qimalarni tayyorlashning maqbul protokollarini ishlab chiqish uchun uzoq muddatli kuzatuvga ega qo'shimcha tadqiqotlar o'tkazish zarur.

FOYDALANILGAN ADABIYOTLAR:

Amkhadova, M. A., & Frolov, A. M. (2018). Dinamicheskaya otsenka metabolizma v myagkikh tkanyakh pri dental’noy implantatsii u patsientov s tonkim biotipom desny [Dynamic evaluation of metabolism in soft tissues during dental implantation in patients with thin gingival biotype]. *Meditsinskiy alfavit*, *3*(24), 6–11.

Araújo, M. G., & Lindhe, J. (2009). Ridge preservation with the use of Bio-Oss collagen: A 6-month study in the dog. *Clinical Oral Implants Research*, *20*(5), 433–440. https://doi.org/10.1111/j.1600-0501.2008.01636.x

Avila-Ortiz, G., Elangovan, S., Kramer, K. W., Blanchette, D., & Dawson, D. V. (2014). Effect of alveolar ridge preservation after tooth extraction: A systematic review and meta-analysis. *Journal of Dental Research*, *93*(10), 950–958. https://doi.org/10.1177/0022034514541127

Buser, D., Chappuis, V., Belser, U. C., & Chen, S. (2017). Implant placement post extraction in esthetic single tooth sites: When immediate, when early, when late? *Periodontology 2000*, *73*(1), 84–102. https://doi.org/10.1111/prd.12170

Chappuis, V., Araújo, M. G., & Buser, D. (2017). Clinical relevance of dimensional bone and soft tissue alterations post-extraction in esthetic sites. *Periodontology 2000*, *73*(1), 73–83. https://doi.org/10.1111/prd.12167

Rizaeva, S. M., Muslimova, D. M., & Akhmedov, M. R. (2019). Izmeneniya parametrov reologii krovi u patsientov s vospalitel'nymi zabolevaniyami parodonta [Changes in blood rheology parameters in patients with inflammatory periodontal diseases]. *International Journal of Scientific Research*, (5), 54–57.

Rizaeva, S. M., & Pantsulaya, I. V. (2019). Kliniko-morfologicheskaya otsenka sostoyaniya tkaney parodonta pri kompleksnom lechenii [Clinical and morphological assessment of periodontal tissues in complex treatment]. *Problemy biologii i meditsiny*, (4), 147–150.

Rizaeva, S. M., & Pantsulaya, I. V. (2020). Osobennosti mikrotsirkulyatsii i regeneratsii myagkikh tkaney polosti rta pri vospalitel'nykh zabolevaniyakh [Features of microcirculation and regeneration of oral soft tissues in inflammatory diseases]. *Vestnik stomatologii*, (2), 41–45.

Sanz-Sánchez, I., Ortiz-Vigón, A., Sanz-Martín, I., Figuero, E., & Sanz, M. (2015). Effectiveness of lateral bone augmentation on the alveolar crest dimension: A systematic review and meta-analysis. *Journal of Dental Research*, *94*(9 Suppl.), 128S–142S. https://doi.org/10.1177/0022034515594780

Thoma, D. S., Naenni, N., Figuero, E., Hämmerle, C. H. F., Schwarz, F., Jung, R. E., & Sanz-Sánchez, I. (2018). Effects of soft tissue augmentation procedures on peri-implant health or disease: A systematic review and meta-analysis. *Clinical Oral Implants Research*, *29*(Suppl. 15), 32–49. https://doi.org/10.1111/clr.13114

Yan, Q., Xiao, L. Q., Su, M. Y., Mei, Y., & Shi, B. (2016). Soft and hard tissue changes following immediate placement or immediate restoration of single-tooth implants in the esthetic zone: A systematic review and meta-analysis. *International Journal of Oral and Maxillofacial Implants*, *31*(6), 1327–1340. https://doi.org/10.11607/jomi.4668

Zucchelli, G., & Mounssif, I. (2015). Periodontal plastic surgery. *Periodontology 2000*, *68*(1), 333–368. https://doi.org/10.1111/prd.12059

EPITHELIALIZATION TIMING AFTER LOCAL COMPOSITE GEL TREATMENT OF EXPERIMENTAL PERITONITIS

U. N. Turakulov[1,2], F. M. Ergashev[1], J. N. Mardonov[1,3], R. A. Sadikov[1,3]

[1]State Institution "Republican Specialized Scientific and Practical Medical Center of Surgery named after Academician V. Vakhidov", Tashkent, Uzbekistan

[2]Center for the Development of Professional Qualifications of Medical Workers, Tashkent, Uzbekistan

[3]Tashkent State Medical University, Tashkent, Uzbekistan

E-mail: md.jamshidbek@gmail.com

Abstract. *In a 72-rat peritonitis experiment, local composite gel treatment was associated with epithelialization at 8–10 days versus 14–16 days under conventional treatment ($p < .001$). This focused analysis describes an earlier repair interval accompanied by less necrosis and restoration of serosal architecture, without establishing functional barrier recovery.*

Keywords: *fibrinopurulent peritonitis; epithelialization; local composite gel; tissue repair; serosal recovery*

INTRODUCTION

Surface repair timing describes the course of recovery after peritoneal injury. In a three-dimensional culture model, mesothelial cells formed different structural patterns within or on a collagen matrix, supporting their role in reepithelialization and extracellular matrix remodeling (Bittinger et al., 1999).

Local materials can also be studied in relation to this repair period. Osawa et al. (2017) demonstrated regeneration of mesothelial coverage beneath a bioresorbable hyaluronate–carboxymethylcellulose membrane in a surgical peritoneal injury model. That experiment provides a rationale for examining repair timing, although its material and injury conditions differ from those of fibrinopurulent peritonitis.

The objective was to compare reported epithelialization intervals after conventional treatment and local composite gel application in experimental peritonitis, with morphological findings providing the structural context.

MATERIALS AND METHODS

A focused descriptive analysis was conducted using aggregate outcomes from one experiment involving 72 outbred white rats weighing 180–220 g with fibrinopurulent peritonitis. The study compared conventional treatment with local application of a composite gel after abdominal sanitation. The gel contained levofloxacin, kukumazin, and sodium carboxymethylcellulose. This analysis addressed the repair timing endpoint within that experiment and did not represent a separate animal series.

The parent protocol included assessments on days 3, 7, 14, and 21. Tissue examination covered the peritoneum and internal organs, including necrotic changes, granulation tissue, inflammatory infiltration, and serosal architecture. The experimental work followed international laboratory animal welfare guidance described by the Council of Europe (1986) and the National Research Council (2011).

Lower and upper boundaries of the reported epithelialization interval were compared descriptively, with necrosis and serosal restoration providing structural context. The original significance level was retained. Intervals were not interpreted as means or confidence intervals; no additional statistical test or time-to-event model was applied.

RESULTS

Epithelialization was reported at 8–10 days in the local gel group and at 14–16 days in the conventional treatment group ($p < .001$). The lower boundary was six days earlier, shifting from day 14 to day 8. The upper boundary was also six days earlier, shifting from day 16 to day 10. Thus, both boundaries indicated an earlier reported epithelialization interval with local treatment.

Both reported group intervals spanned two days and did not overlap. These descriptive boundaries do not estimate the mean difference in individual healing time.

Morphological descriptions of the gel group indicated less pronounced necrotic damage and restoration of serosal architecture. These structural findings accompanied the earlier timing endpoint and described a reparative tissue response. Epithelialization timing and serosal restoration remained distinct observations; no animal-level association between them was calculated.

DISCUSSION

The main finding is the earlier reported epithelialization interval associated with local composite gel treatment. Its interpretation differs from that of a histological image obtained on one assessment day: the interval describes when a repair endpoint was reported, while tissue morphology describes the structural state at examination. Considering both provides a temporal and anatomical account of recovery.

Less necrosis accompanied active repair, but the observations establish neither the temporal relationship between these changes nor the separate effects of the gel constituents.

The mesothelial regeneration described by Osawa et al. (2017) supports the relevance of examining surface coverage during local material application. Direct numerical comparison with the present intervals is inappropriate because the models and interventions differ. Bittinger et al. (1999) likewise showed that mesothelial cells can participate in matrix remodeling, illustrating why surface coverage and the organization of deeper tissue should be assessed as related but distinct features.

Several limits define the interpretation. Aggregate intervals do not provide individual healing times, variation within groups, or censoring information. The timing endpoint also does not identify the regenerated cell population or measure barrier permeability. Consequently, the findings support an earlier reported

structural repair window in this animal experiment, without establishing complete functional restoration or efficacy in patients.

CONCLUSION

Local composite gel treatment was associated with epithelialization at 8–10 days versus 14–16 days under conventional treatment, with both interval boundaries six days earlier. Less necrosis and restored serosal architecture accompanied this earlier reported repair window. The findings describe structural recovery in experimental fibrinopurulent peritonitis without establishing functional barrier recovery.

REFERENCES

Bittinger, F., Schepp, C., Brochhausen, C., Lehr, H. A., Otto, M., Köhler, H., Skarke, C., Walgenbach, S., & Kirkpatrick, C. J. (1999). Remodeling of peritoneal-like structures by mesothelial cells: Its role in peritoneal healing. Journal of Surgical Research, 82(1), 28–33. https://doi.org/10.1006/jsre.1998.5449

Council of Europe. (1986). European convention for the protection of vertebrate animals used for experimental and other scientific purposes (ETS No. 123). https://rm.coe.int/168007a67b

National Research Council. (2011). Guide for the care and use of laboratory animals (8th ed.). The National Academies Press. https://doi.org/10.17226/12910

Osawa, H., Nishimura, J., Hiraki, M., Takahashi, H., Haraguchi, N., Hata, T., Ikenaga, M., Murata, K., Yamamoto, H., Mizushima, T., Doki, Y., & Mori, M. (2017). Regeneration of peritoneal mesothelial cells after placement of hyaluronate carboxymethyl-cellulose (Seprafilm®). Surgery Today, 47(1), 130–136. https://doi.org/10.1007/s00595-016-1350-4

BEMORLARNI DAVOLASH UCHUN ROBOT TEXNOLOGIYALARINI RIVOJLANTIRISHNING HOZIRGI TENDENSIYALARI

DSc. Xodjiyev Sh.M[1]., PhD Xolboyeva Nodira[2]

Buhoro Davlat Texnika universiteti

xalbaevanodirabegim@gmail.com

Annotatsiya. *Maqolada bemorlarni davolashda robot texnologiyalarining rivojlanishi mexatronik loyihalash, matematik modellashtirish va qayta aloqa asosida boshqarish nuqtayi nazaridan tahlil qilinadi. Jarrohlik robotlari, reabilitatsiya qurilmalari, magnit boshqaruvli mikrorobotlar hamda molekulyar triggerlarga javob beruvchi DNK nanokonstruksiyalarining vazifalari va dalillar darajasi qiyoslanadi. Tanlangan birlamchi tadqiqotlar va rasmiy hujjatlar asosida sensor ma'lumotlarining ishonchliligi, robot bilan to'qima o'rtasidagi mexanik ta'sir, boshqaruv algoritmlarining barqarorligi va materiallarning biologik taqdiri muhokama qilinadi. Manipulyator dinamikasi, impedansli boshqaruv va magnit ta'sirning asosiy tenglamalari keltiriladi. Ikki telemeditsina markazining muvofiqlashtirilgan ishlashi uchun soddalashtirilgan nazariy model taklif etilib, uning cheklovlari ko'rsatiladi. Klinik sinovlardagi natijalar robotning texnik aniqligi davolash samaradorligini avtomatik ravishda kafolatlamasligini ko'rsatadi. Mikrorobotlar bo'yicha so'nggi tajribalar tasvirlash, navigatsiya va dori yetkazib berishni bir tizimga birlashtirishga yo'nalgan. Maqola yangi klinik yoki eksperimental natijalarni taqdim etmaydigan ilmiy sharhdir. Asosiy xulosa shuki, tibbiy robotni joriy etish uning mexanik imkoniyatlari, boshqaruv sifati va aniq klinik vazifa uchun tasdiqlangan foydasini birgalikda baholashni talab qiladi.*

Kalit so'zlar: *tibbiy robototexnika, mexatronika, matematik modellashtirish, qayta aloqa, magnit boshqaruv, mikrorobot, DNK nanorobot, telemeditsina, impedansli boshqaruv, reabilitatsiya, biologik parchalanish, klinik baholash.*

Abstract. *This article analyzes the development of robotic technologies in patient treatment from the perspectives of mechatronic design, mathematical modeling, and feedback-based control. It compares the functions and levels of evidence for surgical robots, rehabilitation devices, magnetically controlled microrobots, and DNA nanostructures that respond to molecular triggers. Based on selected primary studies and official documents, the discussion covers the reliability of sensor data, mechanical interactions between robots and biological tissue, the stability of control algorithms, and the biological fate of materials. Key equations governing manipulator dynamics, impedance control, and magnetic actuation are*

presented. A simplified theoretical model for the coordinated operation of two telemedicine centers is proposed, and its limitations are outlined. Results from clinical trials indicate that the technical precision of a robot does not automatically guarantee treatment efficacy. Recent experiments with microrobots have focused on integrating imaging, navigation, and drug delivery into a single system. This article is a scientific review and does not present new clinical or experimental findings. The main conclusion is that the implementation of a medical robot requires a comprehensive assessment of its mechanical capabilities, control quality, and proven benefits for a specific clinical task.

Keywords: *medical robotics, mechatronics, mathematical modeling, feedback, magnetic control, microrobot, DNA nanorobot, telemedicine, impedance control, rehabilitation, biodegradation, clinical evaluation.*

KIRISH

Bemor tanasida ishlaydigan robotdan kutiladigan asosiy xususiyat aniq va nazorat qilinadigan harakatdir. Jarrohlik asbobi to‘qimaga ortiqcha kuch bilan tegsa yoki dori tashuvchi mikrorobot belgilangan hududdan chetga chiqsa, texnik xato biologik oqibatga olib kelishi mumkin. Shu sababli tibbiy robototexnika mexanik qurilmani ishlab chiqish bilan birga, uning holatini o‘lchash, boshqaruvni tekshirish va klinik vazifaga mosligini baholashni ham qamrab oladi [1].

Robotlashtirishning imkoniyatlari qurilma turiga qarab farqlanadi. Jarrohlik manipulyatori shifokor harakatini asbobga uzatadi; reabilitatsiya roboti bemorning mashqlarini qo‘llab-quvvatlaydi; tashqi maydon bilan boshqariladigan mikrorobot esa kichik hajmdagi yukni biologik muhitda ko‘chirishga mo‘ljallanadi. Bularning o‘lchami, energiya ta’minoti va nazorat usuli bir xil emas. Ularni bitta umumiy “avtonom davolovchi robot” tushunchasiga birlashtirish har bir yo‘nalishning haqiqiy imkoniyatlarini baholashni qiyinlashtiradi.

Mazkur maqolada asosiy e’tibor robotlashtirish va mexatronikaning muhandislik jihatlariga qaratiladi. Tahlilning markaziy masalasi robot qanday vazifani bajara olishi bilan birga, bu vazifani qaysi sharoitda ishonchli bajarishi va natijaning qanday tekshirilishidir. Shu yondashuv klinik amaliyotda

qo‘llanadigan tizimlar bilan laboratoriya yoki hayvon modelida sinalgan qurilmalarni dalillar darajasiga ko‘ra ajratishga imkon beradi.



1-rasm. Tibbiy robotning ko‘rgazmali obrazi. Maqola uchun taqdim etilgan illustratsiya.

Tadqiqot maqsadi va usuli

Tadqiqotning maqsadi bemorlarni davolashga yo‘naltirilgan robot texnologiyalarining rivojlanishini mexatronik tuzilma, boshqaruv algoritmi va klinik qo‘llashga tayyorlik mezonlari asosida tahlil qilishdir. Jarrohlik va reabilitatsiyaga oid randomizatsiyalangan sinovlar, mikro va nanorobotlar bo‘yicha birlamchi tajriba maqolalari, robot dinamikasi haqidagi mualliflik darsligi va xavfsizlikka oid rasmiy hujjatlar tanlandi.

Manbalar PubMed, jurnal nashriyotlari va tadqiqot muassasalarining ochiq sahifalari orqali tekshirildi. Sharh 2012–2026-yillardagi tanlangan biotibbiy ishlanmalarni, shuningdek, boshqaruv nazariyasining mavzuga tegishli oldingi ishlarini qamrab oladi. Tahlil 2026-yil 14-oktabrgacha mavjud bo‘lgan materiallarga tayangan. Tanlashda qurilmaning vazifasi, tajriba muhiti, asosiy natijasi va natijani klinik amaliyotga umumlashtirish chegarasi hisobga olindi. Ushbu ish tizimli sharh yoki metatahlil sifatida bajarilmagan; turli tadqiqotlarning ko‘rsatkichlari umumiy statistik bahoga birlashtirilmagan.

Matematik ifodalar boshqaruvning fizik mazmunini tushuntirish uchun ishlatiladi. Ikki markaz uchun keltirilgan model nazariy misol bo‘lib, uning parametrlari bemorlar yoki tibbiyot muassasalaridan olingan ma’lumotlar bilan identifikatsiya qilinmagan. Shuning uchun modelning barqarorlik xossalari klinik samaradorlikning o‘lchangan natijasi sifatida talqin qilinmaydi.

Natijalar va muhokama

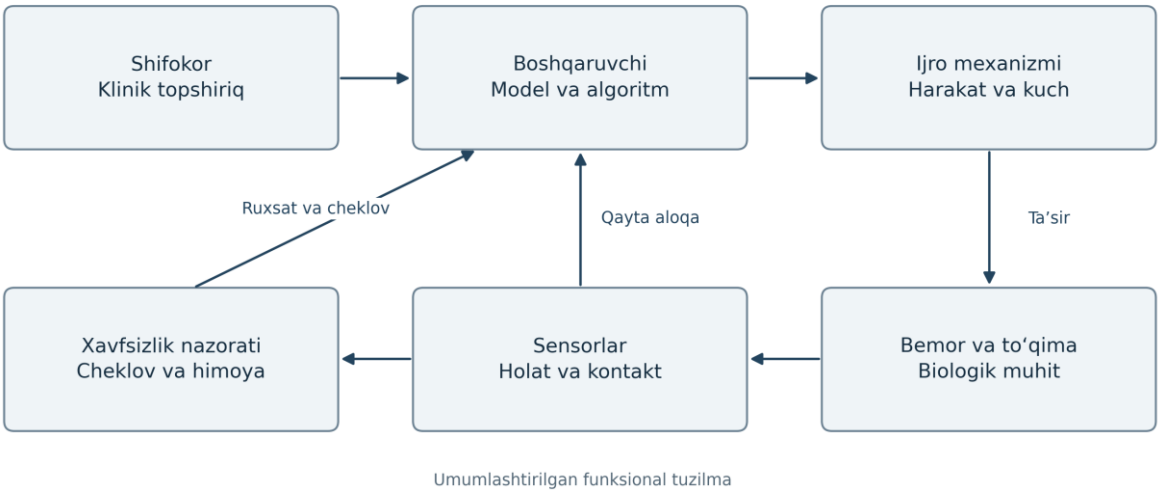
Tibbiy robotning mexatronik tuzilishi

Mexatronika mexanika, elektronika, o‘lchash vositalari va hisoblash algoritmlarini birgalikda loyihalashga asoslanadi. Tibbiy qurilmada bu birikmaga biologik muhitning xususiyatlari qo‘shiladi. Masalan, asbobning mexanik qattiqligi harakat aniqligiga ta’sir qiladi, biroq yumshoq to‘qima bilan xavfsiz ishlash uchun kontakt kuchi ham nazorat qilinishi kerak. Demak, konstruksiya va boshqaruv algoritmini alohida takomillashtirish yetarli bo‘lmasligi mumkin.

Tibbiy robotning funksional tuzilmasida ijro mexanizmi, sensorlar, boshqaruvchi hisoblash tizimi va operator interfeysi o‘zaro bog‘lanadi. Ijro mexanizmi harakat yoki kuch hosil qiladi. Sensorlar esa holat, tezlik, kontakt kuchi yoki tasvir haqidagi ma’lumotlarni beradi. Boshqaruvchi tizim topshiriq bilan kuzatilgan holat orasidagi farqni baholab, ijro mexanizmiga tuzatish buyrug‘ini yuboradi. Bemor bilan kontakt mavjud bo‘lsa, xavfsizlik cheklovlari ushbu boshqaruv jarayonining tarkibiy qismi bo‘ladi [2].

Sensor tanlashda nominal aniqlik bilan birga ma’lumotning qanchalik tez kelishi, shovqin darajasi va ishlash sharoiti hisobga olinadi. Jarrohlik tasvirida asbobning bir qismi yopilib qolishi mumkin; kuch sensori esa kalibrlashdagi siljish tufayli kontaktni noto‘g‘ri baholashi ehtimoli bor. Bunday holatda algoritmning ishonchliligi xato o‘lchovni aniqlash va tegishli cheklangan rejimga o‘tish imkoniyatiga ham bog‘liq. Ma’lumot sifati yetarli bo‘lmaganda harakatni davom ettirishga ruxsat beruvchi shartlar oldindan asoslanishi kerak [16].

2-rasmda davolashga yo‘naltirilgan mexatronik tizimning umumlashtirilgan tuzilishi ko‘rsatilgan. Bemor haqidagi kuzatuv qayta aloqa orqali boshqaruvchiga qaytadi. Shifokor klinik topshiriqni belgilaydi va jarayonni kuzatadi; xavfsizlik nazorati esa ruxsat etilgan harakat, kuch va ishlash sharoitlarini tekshiradi. Sxema aniq mahsulot konstruksiyasini yoki klinik sinov natijasini ifodalamaydi.



2-rasm. Tibbiy mexatronik tizimning funksional tuzilishi. Mualliflik sxemasi; [2, 16, 17] dagi umumiy tamoyillar asosida.

Jarrohlik robotlari va klinik natijalarni baholash

Robot yordamidagi jarrohlikda ko‘plab tizimlar jarrohning konsoldagi harakatini bemor yonidagi asboblarga uzatadi. FDA tavsifiga ko‘ra, bunday qurilmalar kompyuter va dasturiy vositalar orqali asboblarni boshqarishga imkon beradi. Amaliy foyda muayyan operatsiya, bemor anatomiyasi va operator tayyorgarligi doirasida baholanadi. Harakatni kichraytirib uzatish yoki qulay vizual nazorat mavjudligi barcha operatsiyalarda ustun klinik natijani anglatmaydi [1].

2017-yilda e’lon qilingan ROLARR sinovida to‘g‘ri ichak saratoni bo‘lgan 471 bemor robot yordamidagi yoki an’anaviy laparoskopik operatsiyaga randomizatsiya qilingan. Ochiq operatsiyaga o‘tish ko‘rsatkichi tahlil qilingan bemorlarda mos ravishda 8,1% va 12,2% bo‘lgan. Farq statistik ahamiyatga erishmagan ($p = 0,16$). Natija ushbu sinovning asosiy yakuniy ko‘rsatkichi bo‘yicha robot usulining ustunligi tasdiqlanmaganini bildiradi [3].

2025-yilda chop etilgan REAL sinovida boshqa natija qayd etilgan. O‘rta va past joylashgan to‘g‘ri ichak saratoni bo‘yicha birlamchi tahlilga 1171 bemor kiritilgan; uch yillik mahalliy va mintaqaviy qaytalanish robot guruhida 1,6%, laparoskopiya guruhida 4,0% bo‘lgan. Uch yillik kasalliksiz yashovchanlik

87,2% va 83,4% ni tashkil etgan, umumiy yashovchanlik bo‘yicha esa statistik ahamiyatli farq aniqlanmagan. Ushbu dalillar aniq operatsiya va tadqiqot sharoitiga tegishli [4].

ROLARR va REAL natijalarini yonma-yon o‘qish robot texnologiyasini yagona samaradorlik ko‘rsatkichi bilan baholash mumkin emasligini ko‘rsatadi. Sinovlar turli birlamchi natijalarni o‘lchagan. Bemor tanlash mezonlari, kuzatuv muddati va jarrohlar tajribasi ham xulosaning qo‘llanish doirasiga ta’sir qiladi. Muhandislikdagi aniqlik klinik foydani tekshirish uchun asos yaratadi, ammo uning o‘rnini bosmaydi [3, 4].

Avtonomlik bo‘yicha tadqiqotlar ham alohida baholanishi kerak. Kim va hammualliflar taklif qilgan SRT-H tizimi vazifani rejalashtiruvchi yuqori darajali algoritmni harakat trayektoriyasini hosil qiluvchi quyi darajali algoritm bilan birlashtiradi. Ishda xoletsistektomiyaning muayyan bosqichlari sakkizta ex vivo o‘t pufagi namunasida sinalgan. Bu tirik insonda mustaqil operatsiya o‘tkazilganini anglatmaydi; natija belgilangan tajriba muhiti va vazifalar bilan chegaralangan [5].

Reabilitatsiya robotlarida bemor bilan o‘zaro ta’sir

Reabilitatsiya robotining maqsadi bemorning harakat mashqini o‘lchanadigan va takrorlanadigan tarzda qo‘llab-quvvatlashdir. Qurilma mashq paytidagi yo‘l, tezlik va ko‘rsatilgan yordamni qayd etishi mumkin. Biroq davolash natijasi faqat bajarilgan takrorlar soniga bog‘liq emas: bemorning faol ishtiroki, vazifaning kundalik hayotga aloqasi va terapiya dasturi ham baholanishi kerak [6].

RATULS randomizatsiyalangan sinovi insultdan keyingi yuqori qo‘l funksiyasini tiklashda robot yordamidagi mashg‘ulotni kuchaytirilgan an’anaviy terapiya va odatiy yordam bilan qiyoslagan. Uning asosiy funksional natijalari ushbu robot dasturini sinovda qatnashgan bemorlar uchun muntazam qo‘llashni qo‘llab-quvvatlamagan. Bu xulosa barcha reabilitatsiya robotlariga taalluqli emas, lekin yangi qurilmani funksional tiklanish mezonlari bilan tekshirish zarurligini ko‘rsatadi [6].

Mexatronik nuqtayi nazardan robot ko‘rsatadigan yordam bemorning o‘z kuchi va harakat qobiliyatiga moslashtirilishi lozim. Juda katta yordam bemorni passiv harakatlantirishi, yetarli bo‘lmagan yordam esa mashqni bajarishni qiyinlashtirishi mumkin. Shuning uchun yordam miqdorini tanlash klinik protokolga bog‘lanishi, kontakt kuchi va mexanik chegaralar esa boshqaruvda alohida nazorat qilinishi kerak.

Harakatni matematik modellashtirish va boshqarish

Robot manipulyatorining dinamik modeli harakat topshirig‘ini bajarish uchun zarur bo‘lgan kuch yoki momentni hisoblashga yordam beradi. Qattiq bo‘g‘inli manipulyator uchun umumlashtirilgan tenglama quyidagicha yoziladi [2]:

$$M(q)\ddot{q} + C(q,\dot{q})\dot{q} + g(q) = \tau + J(q)^T F_{ext} \qquad (1)$$

Bu yerda q bo‘g‘in koordinatalari vektori, M(q) inersiya matritsasi, C(q, ġ)ġ tezlikka bog‘liq dinamik hadlar, g(q) og‘irlik kuchi ta’siri, τ yuritma momentlari, J(q) esa Yakobian matritsasidir. F_{ext} tashqi kontakt kuchi va momentlarini ifodalaydi; uning ishorasi tashqi ta’sir robotga qo‘yilgan yuk sifatida belgilanganiga bog‘liq. Ushbu model kontakt ta’sirini hisobga olishga imkon beradi, lekin biologik to‘qimaning barcha xossalarini o‘z-o‘zidan tavsiflamaydi [2].

Tibbiy vazifa uchun modelga asbob egiluvchanligi, ishqalanish, mexanik bo‘shliq va to‘qima deformatsiyasi kabi omillar kerakli aniqlik darajasida kiritiladi. Parametrlar o‘lchash orqali baholanib, modelning bashorati mustaqil kuzatuvlar bilan solishtiriladi. Modelni faqat uni tuzishda ishlatilgan ma’lumotda tekshirish qo‘shimcha sharoitlardagi xatoni aniqlashga yetmaydi. Hisoblash murakkabligi ham muhim: boshqaruvchi algoritm qarorni ruxsat etilgan vaqt ichida ishlab chiqishi kerak.

Pozitsiyani boshqarishda topshiriq va joriy holat orasidagi xato asosida yuritma buyrug‘i shakllantiriladi. Proportsional, integral va differensial qismlarga ega PID rostlagich ko‘plab muhandislik vazifalari uchun boshlang‘ich yechim bo‘lishi mumkin. Bemor bilan kontaktda esa rostlagich

koeffitsiyentlarini faqat tezlik yoki pozitsiya xatosini kamaytirishga qarab tanlash yetarli emas. Cheklangan yuritma imkoniyati, sensor kechikishi va kontakt kuchining o‘zgarishi ham hisobga olinadi.

Yumshoq to‘qima bilan ishlashda impedansli boshqaruv robotning kontaktga javobini belgilangan mexanik xususiyatga yaqinlashtirish uchun qo‘llanadi. Soddalashtirilgan topshiriq quyidagicha ifodalanadi [19]:

$$M_d\ddot{e} + D_d\dot{e} + K_d e = F_c \qquad (2)$$

Bu yerda e asbobning belgilangan trayektoriyaga nisbatan siljishi, M_d istalgan inersiya, D_d so‘nish va K_d qattiqlik parametrlaridir. F_c asbobga ta’sir etuvchi tashqi kontakt kuchi deb olinadi. Parametrlarni tanlash robotning qanchalik qarshilik ko‘rsatishi yoki kontaktga moslashishini belgilaydi. Bu ifoda barcha jarrohlik amallariga tayyor algoritm emas; real tizimda kuchni o‘lchash, mexanik cheklovlar va qurilma dinamikasi bilan muvofiqlashtiriladi [19].

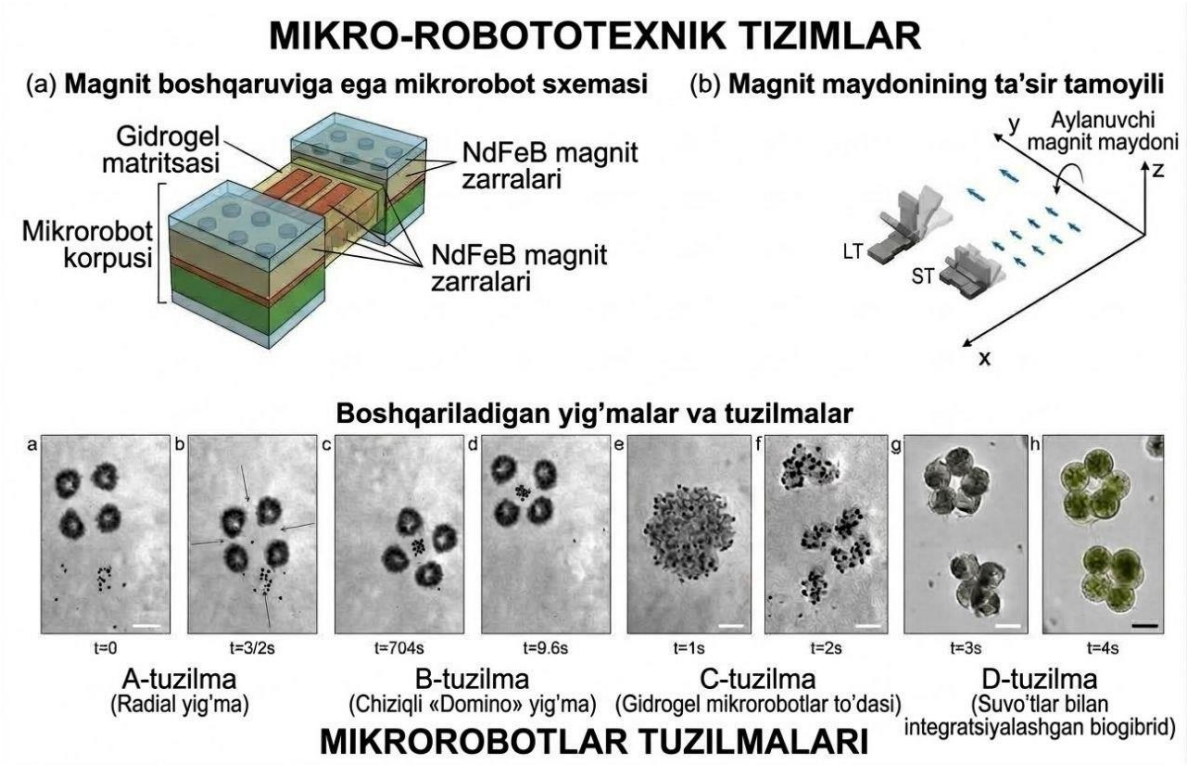
Modelga asoslangan bashoratli boshqaruv kelgusi qisqa vaqt oralig‘idagi holatlarni hisoblab, harakat buyruqlarini cheklovlar doirasida tanlashga imkon beradi. Masalan, rejalashtirishda ruxsat etilgan kuch, harakat tezligi va anatomik hudud chegarasi hisobga olinishi mumkin. Mazkur maqolada bu muhandislik yondashuvi sifatida tavsiya etiladi; muayyan tibbiy robot uchun samaradorlik da’vosi faqat alohida validatsiya bilan asoslanishi kerak.

Sun’iy intellekt tasvirdan asbob holatini ajratish va vazifani rejalashtirishda yordam berishi mumkin. SRT-H misoli o‘rganishga asoslangan rejalashtirishning imkoniyatini ko‘rsatadi. Klinik qo‘llashga o‘tishda algoritmning o‘rgatilgan sharoitdan tashqaridagi holatlarga javobi, noaniqlikni bildirishi va operatorga boshqaruvni qaytarish tartibi tekshirilishi lozim. O‘rganilgan algoritm xavfsizlik chegaralarini belgilaydigan nazorat bilan muvofiqlashtiriladi [5, 18].

Magnit boshqaruvli mikrorobotlar

Kichik robotlar haqida yozishda o‘lcham va ishlash mexanizmini aniq ko‘rsatish zarur. Mikrometr miqyosidagi suzuvchi tuzilma, millimetrga yaqin kateter uchi va DNK asosidagi nanokonstruksiya bir xil qurilma emas. Barcha

tibbiy nanorobotlar 1–100 nm oralig‘ida bo‘ladi, degan umumiy ta’rif bu xilma-xillikni qamrab olmaydi. Kichik o‘lcham ham o‘z-o‘zidan hujayrani tanish, mustaqil navigatsiya yoki xavfsiz davolash qobiliyatini bermaydi.



3-rasm. Mikrorobot tuzilmalari va guruhli harakatga oid taqdim etilgan ko‘rgazmali material. Undagi vaqt belgilari ushbu maqolada miqdoriy tahlil qilinmaydi.

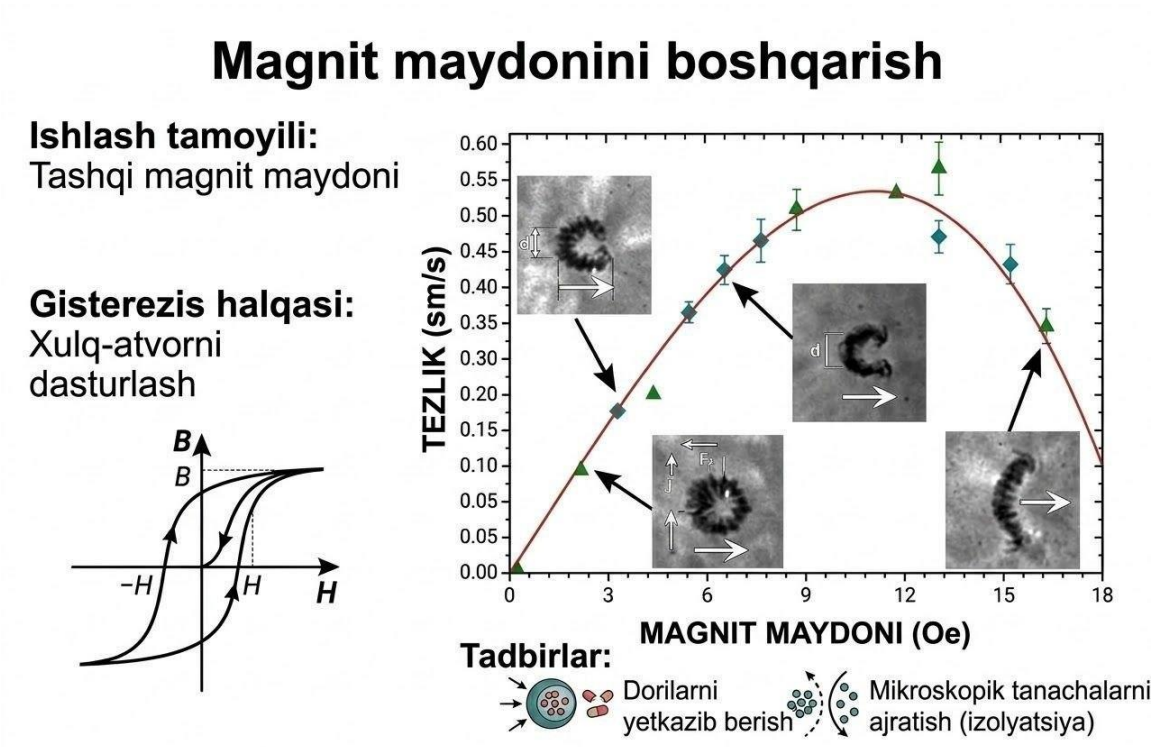
Zhang va hammualliflar 2024-yilda diametri 0,95 mm bo‘lgan optik tolali davomli robotni tavsiflagan. Ushbu o‘lcham 950 mikrometrga teng. Qurilmada tasvirlash, magnit yo‘naltirish va namuna olish, dori yuborish yoki lazer bilan ishlash uchun funksional kanal birlashtirilgan. Imkoniyatlar ex vivo tajribalarda tekshirilgan. Bu natija kichraytirish bilan birga sezish va ijro vazifalarini birlashtirishning muhandislik namunasidir [7].

Magnit boshqaruv robot ichida katta elektr motor yoki batareya joylashtirish zaruratini ayrim konstruksiyalarda kamaytiradi. Tashqi qurilma maydonni hosil qiladi, robot tarkibidagi magnit material esa unga javob beradi. Soddalashtirilgan, magnit dipol momenti o‘zgarmas deb olingan modelda kuch va aylantiruvchi moment quyidagicha ifodalanadi:

$$F_{mag} = \nabla(m \cdot B), \quad \tau_{mag} = m \times B \qquad (3)$$

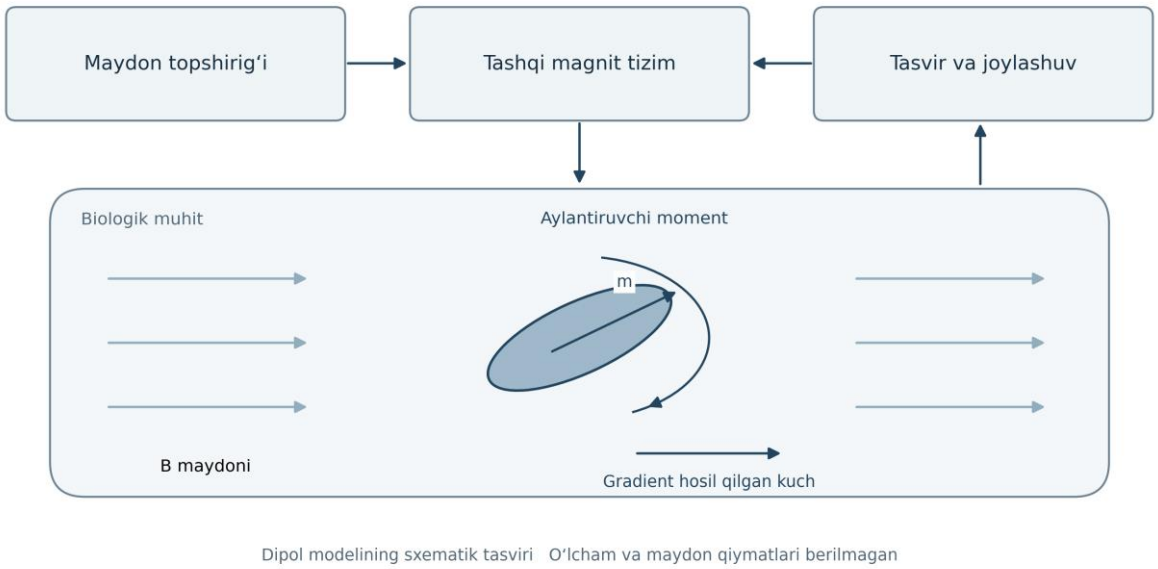
Bu yerda m magnit dipol momenti, B magnit induksiya vektori, ∇ fazoviy gradientdir. Bir jinsli maydon yo‘nalishni o‘zgartiruvchi moment hosil qilishi mumkin; shu dipol modelidagi bevosita translatsion kuch uchun esa gradient zarur. Spiral shaklli mikrosuzuvchida aylanish suyuqlik bilan o‘zaro ta’sir orqali oldinga siljishga aylanishi mumkin. Shu sababli robot tezligini faqat maydon kuchi orqali tavsiflash yetarli emas [20].

Magnit boshqaruvda robot shakli, muhit qovushqoqligi, maydonning aylanish chastotasi va yuk miqdori birgalikda hisobga olinadi. Gisterezis magnitlanishning maydon ta’siri tarixiga bog‘liqligini bildiradi; u universal “xulqni dasturlash” usuli emas. Fe_3O_4 asosidagi qoplama va kuchli doimiy magnit zarrachalari o‘z xossalariga ko‘ra farqlanadi. Material xususiyatlarini boshqaruv algoritmiga ko‘chirish uchun alohida o‘lchash va kalibrlash talab etiladi [20].



4-rasm. Magnit boshqaruv va gisterezisga oid taqdim etilgan material. Grafik o‘qlaridagi belgilashlar izchil emas; raqamlar tasdiqlangan tajriba ma’lumoti sifatida ishlatilmaydi.

5-rasm tashqi maydon, robotning magnit javobi va tasvir orqali qayta aloqa o‘rtasidagi bog‘lanishni ko‘rsatadi. Robotning harakatini mikroskopda boshqarish bilan uni organizm ichida kuzatish bir xil texnik masala emas. Chuqurroq joylashgan hududlarda mos tasvirlash usuli va uning vaqt hamda fazoviy aniqligi navigatsiya bilan birga baholanadi.



5-rasm. Magnit dipol, tashqi maydon va tasvir orqali qayta aloqa. Mualliflik sxemasi; [8, 10, 20] asosida. Tajriba grafigi emas.

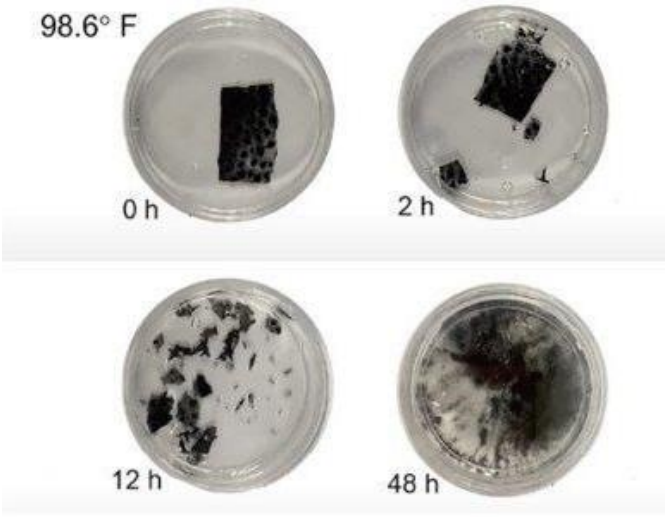
Yan va hammualliflar Spirulina mikroalgalariga magnetit qoplama berib, magnit bilan harakatlantiriladigan biogibrid mikrosuzuvchilarni yaratgan. Ishda biologik tuzilma, magnit navigatsiya va tasvirlash imkoniyatlari birlashtirilgan. Biogibrid asos foydali funksiyalarni berishi mumkin, biroq biologik kelib chiqishning o‘zi har qanday doza yoki yuborish yo‘lida xavfsizlikni tasdiqlamaydi [8].

2025-yilda Landers va hammualliflar magnit material, rentgen ostida ko‘rinishni ta’minlovchi modda va terapevtik yukni birlashtirgan mikrorobot platformasini taqdim etgan. Navigatsiya inson tomirlarining modellari va yirik hayvonlarda tekshirilgan. Tadqiqot nomidagi “klinikaga tayyor” iborasi odamlarda davolash samaradorligi isbotlanganini yoki qurilma barcha yurisdiksiyalarda tasdiqlanganini anglatmaydi [10].

2026-yilda Lin va hammualliflar Coscinodiscus granii asosidagi magnit biogibrid platformada tasvirga tayangan navigatsiya, guruhli harakat va dori ajralishini uyg‘unlashtirgan. Doksorubitsin tashuvchi qurilma siydik pufagi o‘smasining sichqon modelida sinalgan. Ishning mazkur sharh uchun muhim jihati navigatsiya va terapevtik vazifaning qayta aloqa orqali bog‘lanishidir; hayvon modelidagi natijani insondagi davolash foydasiga to‘g‘ridan-to‘g‘ri ko‘chirish mumkin emas [11].

Yumshoq materiallar va biologik parchalanish

Yumshoq robot to‘qima yoki obyekt bilan kontaktga moslashishi mumkin. Gidrogel asosidagi konstruksiyada mexanik deformatsiya tashqi magnit ta’sir yoki muhit o‘zgarishi bilan bog‘lanadi. Yang va hammualliflar magnit jelatin gidrogelidan tayyorlangan, hasharot tirnog‘iga o‘xshash ushlash elementlari bo‘lgan kichik robotni tavsiflagan. Unda yukni ushlash, tashish va materialning parchalanish imkoniyati tajribada ko‘rsatilgan [9].



6-rasm. Parchalanish jarayoniga oid ko‘rgazmali tasvir. Maqola uchun taqdim etilgan materialning tegishli qismi.

Parchalanishni baholashda korpus shaklining yo‘qolishi bilan uning barcha tarkibiy qismlarining biologik jihatdan xavfsiz chiqarilishini ajratish lozim. Suvda eriydigan jelatin matritsasi parchalangandan keyin magnit zarrachalar qolishi mumkin. Ularning to‘qimada tarqalishi va chiqarilishi boshqa

tekshiruvlarni talab qiladi. Petri idishidagi jarayon vaqtini organizm ichidagi jarayon muddati bilan tenglashtirish ham to‘g‘ri emas [9].

Material tanlash harakatni boshqarish bilan bevosita bog‘liq. Korpus yumshashi yoki massasi kamayishi robotning tezligi va magnit maydonga javobini o‘zgartirishi mumkin. Shu sababli bir martalik yuk tashishga mo‘ljallangan qurilmada vazifani yakunlash, parchalanish va qoldiq moddalar taqdirini baholash birgalikda rejalashtirilishi maqsadga muvofiq. Bu yerda taklif etilayotgan yondashuv muhandislik xulosasi bo‘lib, har bir material uchun alohida tajriba bilan tekshiriladi.

Mikrorobotlarning “yaqin 3–5 yilda odamlarda qo‘llanishi” kabi umumiy muddatini belgilash uchun yetarli asos yo‘q. Bunga qurilmaning konstruksiyasi, vazifasi, oldingi sinovlari va regulyativ baholash yo‘li ta’sir qiladi. Shu bois istiqbol aniq platforma bo‘yicha mavjud dalillar bilan ifodalanishi kerak.

Ikki telemeditsina markazining muvofiqlashtirilgan ishlashi

Telemeditsina konsultatsiya, masofaviy kuzatuv yoki robot yordamida tekshiruv kabi turli xizmatlarni qamrab olishi mumkin. Fizik qurilmaga masofadan buyruq uzatilganda aloqa kechikishi boshqaruv barqarorligiga ta’sir qiladi. Anderson va Spong ishida ikki tomonlama teleoperator boshqaruvida kechikish sababli yuzaga keladigan beqarorlik va uni passivlikka asoslangan yondashuv bilan bartaraf etish shartlari tahlil qilingan. Bu masala videotasvirning kech kelishi bilan cheklanmaydi: kuch haqidagi qayta aloqa ham kechikishi mumkin [14].

Jihozlanishi va kadrlar tajribasi har xil bo‘lgan ikki markaz hamkorligida mahalliy boshqaruv va masofaviy topshiriqning vazifalari oldindan belgilanadi. Masalan, kuch chegarasini tekshiruvchi mahalliy kontur tez ishlashi, boshqa markaz esa vazifani rejalashtirish yoki maslahat berishi mumkin. Maqolada ushbu taqsimot tavsiya sifatida qaraladi; real xizmat uchun uni aloqa sifati, ish jarayoni va favqulodda holat protokoli bilan tekshirish talab etiladi [14].

Muvofiqlashtirishning boshlang‘ich nazariy ifodasi sifatida quyidagi ikki holatli modelni olish mumkin:

$$\dot{x_1}(t) = -a_1 x_1(t) + c_{12}[x_2(t - T_{12}) - x_1(t)] + w_1(t),$$
$$\dot{x_2}(t) = -a_2 x_2(t) + c_{21}[x_1(t - T_{21}) - x_2(t)] + w_2(t). \quad (4)$$

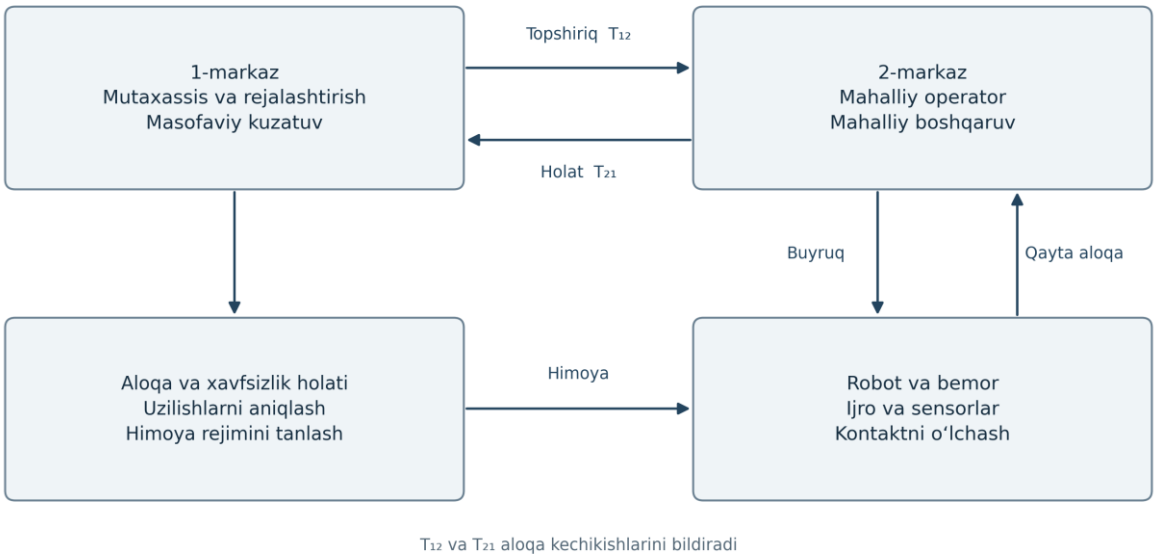
Bu yerda x_1 va x_2 ikki markazdagi normallashtirilgan kuzatish xatolari, a_1 va a_2 mahalliy xatoni so‘ndiruvchi koeffitsiyentlar, c_{12} va c_{21} o‘zaro muvofiqlashtirish koeffitsiyentlari, T_{12} va T_{21} esa aloqa kechikishlaridir. w_1 va w_2 tashqi buzilishlarni ifodalaydi. x qiymatlari xato bo‘lgani uchun musbat yoki manfiy bo‘lishi mumkin; ular markazning bemorlar soni, moliyaviy resursi yoki davolash sifati deb talqin qilinmaydi.

Kechikish va tashqi buzilish yo‘q deb olinib, a_1 va a_2 musbat, c_{12} va c_{21} manfiy bo‘lmasa, tizim matritsasining izi va determinanti quyidagi shartlarni qanoatlantiradi:

$$tr\ A = -(a_1 + a_2 + c_{12} + c_{21}) < 0,$$
$$det\ A = a_1 a_2 + a_1 c_{21} + a_2 c_{12} > 0. \quad (5)$$

Ushbu ikki o‘lchamli chiziqli modelda xato holati nolga intiluvchi barqaror muvozanatga ega. Bu xulosa tanlangan farazlardan kelib chiqadi. Modelda chekli sikl yoki dinamik xaos hosil bo‘lishi ko‘rsatilmagan. Kechikishlar, nochiziqli ta’sirlar va qo‘shimcha holatlar kiritilsa, barqarorlik qayta tekshirilishi kerak. Puankare kesimi yoki Lyapunov ko‘rsatkichi kabi tahlillar faqat aniq model va tegishli hisoblash natijalari mavjud bo‘lganda mazmunli bo‘ladi.

Shu sababli “trivial attraktor”, “dinamik xaos” va “qora tuynuk effekti” atamalarini tibbiy markazlarning haqiqiy ishlash rejimi sifatida e’lon qilish uchun bu maqolada asos yo‘q. Destruktiv holatni baholashda xizmat uzilishi, xavfsizlik chegarasining buzilishi yoki topshiriqning bajarilmay qolishi kabi o‘lchanadigan ko‘rsatkichlardan foydalanish aniqroq natija beradi. 7-rasm markazlararo muvofiqlashtirishni mahalliy fizik nazorat bilan bog‘laydigan tavsiya etilayotgan tuzilmani ifodalaydi.



7-rasm. Ikki markazda masofaviy muvofiqlashtirish va mahalliy fizik nazorat. Mualliflik sxemasi; [14, 17] asosida.

DNK konstruksiyalari va molekulyar diagnostika

DNK asosidagi nanokonstruksiyalarda boshqaruv biomolekulyar tanish va tuzilmaning o‘zgarishi orqali amalga oshirilishi mumkin. Douglas, Bachelet va Church ishida hujayra yuzasidagi molekulyar signallarga javob berib yukni taqdim etadigan DNK origami konstruksiyasi tavsiflangan. Bunday mantiqiy shart elektr boshqaruvchi yoki miniatyura motorning ishlashiga tenglashtirilmaydi [12].

Li va hammualliflar o‘sma bilan bog‘liq molekulyar triggerga javob beruvchi, trombin tashuvchi DNK robotini ishlab chiqqan. Konstruksiya ochilganda trombinning mahalliy ta’sir ko‘rsatishi hayvon modellarida tekshirilgan. Bu yo‘nalish manzilli yuk yetkazib berishga oid dalil beradi; u qon hujayralarini almashtiruvchi universal nanorobot yoki inson uchun tasdiqlangan davolash usuli sifatida qaralmaydi. “Respirotsit” kabi konseptlarni ham shu tajribalarning olingan natijasi bilan aralashtirmaslik kerak [13].

Polimeraza zanjir reaksiyasi (PCR; o‘zbekcha PZR) DNKning maqsadli qismini ko‘paytirishga asoslangan usuldir. RNK tahlilida teskari transkripsiya bosqichi talab qilinadi. PCR magnit mikrorobotni harakatlantiruvchi fizik tamoyil emas, ammo namuna tayyorlash va mikrohajmdagi suyuqliklarni

boshqarishni avtomatlashtirishda robototexnika bilan bog‘lanadi. Zhu va hammualliflar mikrosuyuqlik roboti yordamida bir hujayra uchun RT-qPCR tahlilining tomchi massivi asosidagi usulini ko‘rsatgan [15].

DNK orqali mantiqiy javob hosil qilish, PCR diagnostikasi va elektr energiyasini saqlovchi batareya yaratish alohida masalalardir. Mazkur sharhdagi manbalar DNK-kompyuting tibbiy robot batareyalarini yaxshilaydi, degan bevosita xulosani asoslamaydi. Bunday bog‘lanish uchun energiya zichligi, ish muddati va material barqarorligini o‘lchagan tegishli tadqiqot zarur.

Tadqiqotlar dalillarining qiyosiy tahlili

1-jadvalda klinik va tajriba ishlari bir xil mezonlar bo‘yicha qiyoslangan. Jadvaldagi natijalar mazkur maqolada o‘tkazilgan tajribalar emas; ular ko‘rsatilgan manbalardan umumlashtirilgan. Qiyoslashning vazifasi texnologiya haqidagi da’voni u olingan muhit bilan bog‘lashdir.

1-jadval. Tanlangan tadqiqotlarning muhiti va dalillar chegarasi

Tadqiqot	Sinov muhiti	Asosiy kuzatuv	Qo‘llanish chegarasi
ROLARR [3]	Insonlar Randomizatsiya	Ochiq operatsiyaga o‘tish bo‘yicha statistik ustunlik tasdiqlanmagan.	To‘g‘ri ichak saratoni; aniq birlamchi ko‘rsatkich.
REAL [4]	Insonlar Randomizatsiya	Robot guruhida uch yillik qaytalanish kamroq bo‘lgan.	O‘rta va past joylashgan to‘g‘ri ichak saratoni.
RATULS [6]	Insonlar Randomizatsiya	Asosiy qo‘l funksiyasi natijasi muntazam qo‘llashni qo‘llab-quvvatlamagan.	Sinovdagi robot dasturi va bemorlar guruhi.
SRT-H [5]	Ex vivo Sakkizta namuna	Muayyan jarrohlik bosqichlari avtonom bajarilgan.	Tirik insondagi klinik sinov natijasi emas.
0,95 mm robot [7]	Ex vivo model	Tasvirlash, magnit yo‘naltirish va funksional kanal birlashtirilgan.	Organizmdan tashqaridagi tekshiruv sharoiti.

Tadqiqot	Sinov muhiti	Asosiy kuzatuv	Qo‘llanish chegarasi
Magnit platforma [10]	Tomir modellari va yirik hayvonlar	Navigatsiya, rentgen kuzatuvi va terapevtik yuk birlashtirilgan.	Insonlarda klinik foydani alohida tekshirish kerak.
Algebot [11]	Sichqon o‘sma modeli	Tasvirga tayangan boshqaruv va dori yetkazib berish uyg‘unlashtirilgan.	Klinikagacha bo‘lgan tajriba.

Qiyoslashdan uchta muhandislik ehtiyoji kelib chiqadi. Birinchisi, harakat, kuch yoki dori chiqarilishi kabi ijro natijasini ishonchli kuzatishdir. Ikkinchisi, kuzatuvni fizik model va boshqaruv buyrug‘i bilan vaqt bo‘yicha moslashtirishdir. Uchinchisi, qurilma foydasini aniq bemor guruhi va davolash vazifasida tekshirishdir. Bular maqolada tahlil qilingan ishlardan chiqarilgan umumlashtirish bo‘lib, barcha robotlar uchun tayyor klinik protokol sifatida taklif etilmaydi.

Xavfsizlik va tibbiy ta’lim

ISO 14971:2019 tibbiy qurilmalar xavfini boshqarish jarayonini belgilaydi. Robotga tatbiq etishda xavf manbai uning vazifasi va ishlash muhitiga qarab aniqlanadi. Kontakt kuchining oshishi, joylashuvni noto‘g‘ri baholash yoki aloqa uzilishi singari hodisalar oqibat va ehtimol nuqtayi nazaridan baholanib, kamaytirish choralarining samarasi tekshiriladi. Xavf tahlili qurilmaning foydalanish davridagi yangi ma’lumotlar bilan yangilanishi lozim [16].

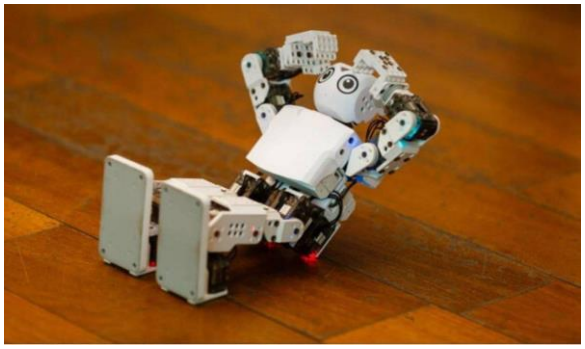
IEC 80601-2-77:2019 va uning 2023-yilgi tuzatishi robot yordamidagi jarrohlik jihozlarining asosiy xavfsizligi va muhim ishlash ko‘rsatkichlariga bag‘ishlangan. Ushbu hujjatning mavjudligi muayyan robot tasdiqlanganini anglatmaydi. Sinovlar, foydalanish maqsadi va regulyativ baholash alohida ko‘rib chiqiladi. Bu xalqaro manbalar O‘zbekistondagi barcha ruxsat tartiblarining to‘liq bayoni sifatida berilmaydi [17].

Sun’iy intellektdan foydalanishda bemor ma’lumotlarini himoya qilish, xatolarni kuzatish va inson nazoratini saqlash ham muhimdir. WHOning sog‘liqni saqlashdagi sun’iy intellekt bo‘yicha yo‘riqnomasi etik boshqaruv va javobgarlik masalalarini yoritadi. Tibbiy robot uchun bu masalalar algoritm qarorining klinik oqibatini tushuntirish, operatorning aralashish imkoniyati va ma’lumotdan foydalanish shartlari bilan bog‘lanadi [18].

Avtomatlashtirish funksiyalarini aniq ajratish tizimni loyihalash va o‘qitishda foydalidir. Nazorat holatni o‘lchaydi va qayd etadi; signalizatsiya chetlanish haqida xabar beradi; himoya xavfli holatga o‘tishni cheklaydi; rostlash berilgan ko‘rsatkichni saqlashga xizmat qiladi; boshqarish esa vazifa va rejimga mos harakatni tanlaydi. Masalan, kontakt kuchini o‘lchash nazoratga, uning chegaradan oshganini ko‘rsatish signalizatsiyaga, xavfsiz holatga o‘tish esa himoyaga tegishlidir. Himoya buyrug‘ining o‘zi ham bajarilayotgan muolaja sharoitida baholanishi kerak.

Shifokor va muhandislarni tayyorlashda simulyatsiya robotning ish chegaralarini tushunishga yordam beradi. VR yoki AR mashg‘uloti, fizik trenajyor va hisoblash modeli turli ko‘nikmalarni mashq qilish uchun birlashtirilishi mumkin. Ushbu maqolada bunday yondashuv ta’lim bo‘yicha tavsiya sifatida beriladi. Tayyorlikni faqat simulyatordagi tezlik bilan baholash yetarli emas: kontaktni boshqarish, xatoni tanish va favqulodda vaziyatdagi harakat ham tekshirilishi kerak.





8-rasm. Robototexnikaga oid o‘quv modellar: chapda domino konstruktori, o‘ngda gumanoid robot platformasi. Maqola uchun taqdim etilgan ko‘rgazmali materiallar.

Mahalliy sharoitda robotlashtirishni rivojlantirish uchun dastlab aniq klinik vazifani tanlash maqsadga muvofiq. Keyin shu vazifa uchun kerakli qurilma, kadrlar tayyorgarligi, servis va baholash mezonlari belgilanadi. Murakkab robotni xarid qilish xizmatning samarali ishlashini o‘z-o‘zidan ta’minlamaydi; klinik jarayonga moslashtirish va natijalarni kuzatish ham loyiha doirasida rejalashtiriladi.

XULOSA

Bemorlarni davolashga yo‘naltirilgan robot texnologiyalarining rivojlanishi mexanik konstruksiya, sensorlar va boshqaruv algoritmlarini bir tizimda muvofiqlashtirishga bog‘liq. Mexatronik model harakatning fizik asosini tushuntiradi, qayta aloqa esa real holatdagi chetlanishlarni tuzatishga xizmat qiladi. Tibbiy vazifada ushbu imkoniyatlar kontakt va ishlash cheklovlari bilan birga baholanishi kerak.

Klinik sinovlar robotning foydasi operatsiya yoki terapiya turiga qarab farqlanishini ko‘rsatadi. Mikrorobotlar bo‘yicha tanlangan ishlarda esa tasvirlash, magnit navigatsiya va terapevtik yukni yetkazib berish birlashtirilmoqda. Laboratoriya, ex vivo va hayvon modelidagi natijalar

istiqbolli yo‘nalishni belgilaydi, ammo insondagi klinik foydaning o‘rnini bosmaydi.

Ikki telemeditsina markazi uchun keltirilgan nazariy misol muvofiqlashtirish shartlarini ochiq belgilashning ahamiyatini ko‘rsatadi. Kechikishsiz chiziqli modelda barqarorlik asoslandi; undan xaos yoki destruktiv attraktor haqida xulosa chiqarilmadi. Keyingi tadqiqotlarda haqiqiy aloqa kechikishi, qurilma holati va xizmat uzilishlari bo‘yicha ma’lumot yig‘ib, model parametrlarini tekshirish mumkin. Amaliy rivojlanish uchun ustuvor vazifa aniq klinik ehtiyojga mos robotni ishlab chiqish, uning ishlashini ishonchli kuzatish va foydasini tegishli sinov bilan tasdiqlashdir.

FOYDALANILGAN ADABIYOTLAR

1. U.S. Food and Drug Administration. Computer-Assisted Surgical Systems. Rasmiy axborot sahifasi. Murojaat sanasi 14.10.2026. https://www.fda.gov/medical-devices/surgery-devices/computer-assisted-surgical-systems

2. Lynch K. M., Park F. C. Modern Robotics: Mechanics, Planning, and Control. Cambridge University Press, 2017. 8-bob Robot dinamikasi. https://modernrobotics.northwestern.edu/chapters/chapter8/

3. Jayne D., Pigazzi A., Marshall H., et al. Effect of Robotic-Assisted vs Conventional Laparoscopic Surgery on Risk of Conversion to Open Laparotomy Among Patients Undergoing Resection for Rectal Cancer: The ROLARR Randomized Clinical Trial. JAMA. 2017;318(16):1569–1580.
https://doi.org/10.1001/jama.2017.7219

4. Feng Q., et al. Robotic vs Laparoscopic Surgery for Middle and Low Rectal Cancer: The REAL Randomized Clinical Trial. JAMA. 2025;334(2):136–148. https://doi.org/10.1001/jama.2025.8123

5. Kim J. W., Chen J.-T., Hansen P., et al. SRT-H: A hierarchical framework for autonomous surgery via language-conditioned imitation learning. Science Robotics. 2025;10(104):eadt5254.
https://doi.org/10.1126/scirobotics.adt5254

6. Rodgers H., Bosomworth H., Krebs H. I., et al. Robot assisted training for the upper limb after stroke (RATULS): a multicentre randomised controlled trial. The Lancet. 2019;394(10192):51–62.
https://doi.org/10.1016/S0140-6736(19)31055-4

7. Zhang T., Li G., Ren H., et al. Sub-millimeter fiberscopic robot with integrated maneuvering, imaging, and biomedical operation abilities. Nature Communications. 2024;15:10874.
https://doi.org/10.1038/s41467-024-55199-6

8. Yan X., Zhou Q., Vincent M., et al. Multifunctional biohybrid magnetite microrobots for imaging-guided therapy. Science Robotics. 2017;2(12):eaaq1155. https://doi.org/10.1126/scirobotics.aaq1155

9. Yang L., Miao J., Li G., et al. Soft Tunable Gelatin Robot with Insect-like Claw for Grasping, Transportation, and Delivery. ACS Applied Polymer Materials. 2022;4(8):5431–5440.
https://doi.org/10.1021/acsapm.2c00522

10. Landers F. C., Hertle L., Pustovalov V., et al. Clinically ready magnetic microrobots for targeted therapies. Science. 2025;390(6774):710–715. https://doi.org/10.1126/science.adx1708

11. Lin L., Li H., Zhou Q., et al. Machine-intelligent multimodal algebot for intracavitary chemotherapy. Nature Nanotechnology. 2026;21:996–1007. https://doi.org/10.1038/s41565-026-02195-0

12. Douglas S. M., Bachelet I., Church G. M. A Logic-Gated Nanorobot for Targeted Transport of Molecular Payloads. Science. 2012;335(6070):831–834. https://doi.org/10.1126/science.1214081

13. Li S., Jiang Q., Liu S., et al. A DNA nanorobot functions as a cancer therapeutic in response to a molecular trigger in vivo. Nature Biotechnology. 2018;36(3):258–264. https://doi.org/10.1038/nbt.4071

14. Anderson R. J., Spong M. W. Bilateral control of teleoperators with time delay. IEEE Transactions on Automatic Control. 1989;34(5):494–501. https://doi.org/10.1109/9.24201

15. Zhu Y., Zhang Y.-X., Liu W.-W., Ma Y., Fang Q., Yao B. Printing 2-Dimentional Droplet Array for Single-Cell Reverse Transcription Quantitative PCR Assay with a Microfluidic Robot. Scientific Reports. 2015;5:9551. https://doi.org/10.1038/srep09551

16. International Organization for Standardization. ISO 14971:2019. Medical devices — Application of risk management to medical devices. https://www.iso.org/standard/72704.html

17. International Electrotechnical Commission. IEC 80601-2-77:2019+AMD1:2023 CSV. Medical electrical equipment — Part 2-77: Particular requirements for the basic safety and essential performance of robotically assisted surgical equipment. https://webstore.iec.ch/en/publication/89957

18. World Health Organization. Ethics and governance of artificial intelligence for health. Geneva: WHO, 2021. ISBN 9789240029200. https://www.who.int/publications/i/item/9789240029200

19. Hogan N. Impedance Control: An Approach to Manipulation: Part I—Theory. Journal of Dynamic Systems, Measurement, and Control. 1985;107(1):1–7. https://doi.org/10.1115/1.3140702

20. Abbott J. J., Peyer K. E., Cosentino Lagomarsino M., et al. How Should Microrobots Swim? The International Journal of Robotics Research. 2009;28(11–12):1434–1447. https://doi.org/10.1177/0278364909341658

MODERN METHODS OF MORPHOLOGICAL, MORPHOMETRIC AND IMMUNOHISTOCHEMICAL ASSESSMENT OF SPLEEN TISSUE

N. Kh. Rajabova

Base Doctoral Student, Department of Anatomy and Clinical Anatomy

Bukhara State Medical Institute named after Abu Ali ibn Sino, Bukhara, Uzbekistan

Email: nrajabova074@gmail.com

Abstract. *The spleen is a major secondary lymphoid organ involved in blood filtration and immune surveillance. This review summarizes histological, morphometric, immunohistochemical, and digital pathology approaches used to assess splenic tissue, with attention to tissue compartments, quantitative endpoints, cellular markers, and methodological limitations.*

Keywords*: spleen; morphology; morphometry; immunohistochemistry; white pulp; red pulp; digital pathology; stereology*

INTRODUCTION

The spleen is the largest secondary lymphoid organ and performs essential functions in blood filtration, immune surveillance, and the removal of aged or damaged blood cells. Its microarchitecture includes red pulp, white pulp, periarteriolar lymphoid sheaths, lymphoid follicles, and the marginal zone. These compartments have distinct cellular compositions and functions, and their appearance may vary with species, age, physiological state, and exposure to damaging factors (Elmore, 2006; Steiniger, 2015). Reliable assessment therefore requires methods that describe both tissue structure and measurable changes in individual compartments.

The aim of this review is to summarize contemporary morphological, morphometric, and immunohistochemical methods used for the assessment of spleen tissue and to outline their principal applications and limitations.

Materials and Methods

A narrative literature review was conducted using publications identified through PubMed/MEDLINE, eLibrary.ru (Russian Science Citation Index), CyberLeninka, and Google Scholar. The search covered literature published between 2015 and 2026 and used combinations of the terms “spleen,” “splenic morphometry,” “white pulp,” “marginal zone,” “immunohistochemistry,” “digital pathology,” and “stereology.” Relevant methodological papers and reviews were considered. Because the source materials reported different totals for the number of included publications, this article does not state a single definitive count. The review is descriptive and does not constitute a quantitative meta-analysis.

Results and Discussion

Conventional histological assessment

Routine hematoxylin and eosin staining remains a core method for evaluating splenic architecture, cellular distribution, vascular structures, and pathological lesions. Additional stains can be selected according to the research question: van Gieson and Masson’s trichrome for connective tissue, Perls’ Prussian blue for iron-containing deposits, silver impregnation for selected reticular structures, and periodic acid–Schiff staining for carbohydrate-rich components. Interpretation should consider the distribution of findings across red pulp, white pulp, follicles, periarteriolar lymphoid sheaths, and the marginal zone (Elmore, 2006).

Morphometric and stereological approaches

Morphometry converts visual observations into reproducible quantitative measurements. Common endpoints include capsule thickness, the relative areas of red and white pulp, the red-to-white pulp ratio, lymphoid follicle diameter, germinal-centre area, marginal-zone width, periarteriolar lymphoid sheath dimensions, and cell density. Manual planimetry and point counting can be useful, but results may depend on sampling strategy and observer judgement. Systematic sampling, clearly defined anatomical boundaries, consistent

magnification, and blinded assessment improve reproducibility. Stereological methods can help estimate three-dimensional tissue characteristics from appropriately sampled sections.

Immunohistochemical markers

Immunohistochemistry can help identify cellular populations and clarify the organization of splenic compartments. CD3 is commonly used to identify T lymphocytes, whereas CD20 or CD79a can support the identification of B-cell areas. CD68 and CD163 are used to assess macrophage populations; CD21 may highlight follicular dendritic-cell networks; Ki-67 is a marker of cellular proliferation; and CD31 or CD34 may assist in evaluating vascular endothelium. Marker selection and interpretation should be matched to the species, tissue preparation, antibody validation, and study hypothesis. No single marker should be interpreted in isolation when defining a complex compartment.

Digital pathology and image analysis

Digital image analysis can improve consistency in quantifying tissue compartments and immunostaining. Open-source platforms such as ImageJ/Fiji and QuPath support measurement, annotation, cell detection, and analysis of staining intensity (Bankhead et al., 2017; Schindelin et al., 2012). Color deconvolution can help separate chromogenic stain components and quantify histochemical staining (Ruifrok & Johnston, 2001). Deep-learning approaches have also been explored for enhanced histopathological assessment, including methods designed to support evaluation of rat spleen tissue (Mehrvar et al., 2025). However, digital results depend on slide quality, scanner settings, annotation quality, algorithm validation, and the representativeness of the training data.

Interpretation and methodological limitations

Species-related differences are important when comparing experimental animals with human spleen tissue; findings from mice or rats should not be transferred directly to humans without considering anatomical and

immunological differences (Steiniger, 2015). Published morphometric values are best treated as context-specific reference points rather than universal thresholds. Studies should define inclusion criteria, sampling sites, section thickness, staining protocols, image-analysis settings, and statistical methods in advance. Appropriate control groups and blinded measurements are essential for distinguishing treatment-associated changes from normal biological variation.

Additional molecular endpoints may be relevant when the research question concerns particular mechanisms of injury. For example, proposed panels for ferroptosis-related changes may include GPX4, ACSL4, and SLC7A11 alongside iron staining and biochemical measures; investigations of pyroptosis may assess NLRP3, caspase-1, gasdermin D, IL-1β, or IL-18. These markers are not substitutes for histological assessment and require a study design that supports the specific mechanistic interpretation.

CONCLUSION

Morphological examination, quantitative morphometry, immunohistochemistry, and digital image analysis provide complementary information about spleen tissue. A reliable assessment strategy should combine appropriate staining with clearly defined morphometric endpoints and validated cellular markers. Standardized sampling, suitable control groups, transparent reporting, and careful consideration of species differences are necessary to improve reproducibility and interpretation. Molecular markers may add mechanistic information when selected and validated for the specific research question.

REFERENCES

Bankhead, P., Loughrey, M. B., Fernández, J. A., Dombrowski, Y., McArt, D. G., Dunne, P. D., McQuaid, S., Gray, R. T., Murray, L. J., Coleman, H. G., James, J. A., Salto-Tellez, M., & Hamilton, P. W. (2017). QuPath: Open source software for digital pathology image analysis. Scientific Reports, 7, Article 16878. https://doi.org/10.1038/s41598-017-17204-5

Elmore, S. A. (2006). Enhanced histopathology of the spleen. Toxicologic Pathology, 34(5), 648–655. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1828535/

Mehrvar, S., Maisonave, K., Buck, W., Guffroy, M., Bawa, B., & Himmel, L. (2025). Immunohistochemistry-free enhanced histopathology of the rat spleen using deep learning. Toxicologic Pathology. https://doi.org/10.1177/01926233241303907

Ruifrok, A. C., & Johnston, D. A. (2001). Quantification of histochemical staining by color deconvolution. Analytical and Quantitative Cytology and Histology, 23(4), 291–299.

Schindelin, J., Arganda-Carreras, I., Frise, E., Kaynig, V., Longair, M., Pietzsch, T., Preibisch, S., Rueden, C., Saalfeld, S., Schmid, B., Tinevez, J.-Y., White, D. J., Hartenstein, V., Eliceiri, K., Tomancak, P., & Cardona, A. (2012). Fiji: An open-source platform for biological-image analysis. Nature Methods, 9, 676–682. https://doi.org/10.1038/nmeth.2019

Steiniger, B. S. (2015). Human spleen microanatomy: Why mice do not suffice. Immunology, 145(3), 334–346. https://doi.org/10.1111/imm.12469

Willard-Mack, C. L., Elmore, S. A., Hall, W. C., Harri, S. M., Hess, P. R., & Long, G. G. (2019). Nonproliferative and proliferative lesions of the rat and mouse hematolymphoid system. Toxicologic Pathology, 47(6), 665–783. https://doi.org/10.1177/0192623319867053

4-SECTION

THE USE OF NATURAL DYES IN THE NATIONAL ECONOMY

Khusnitdin Akramov (NamDU), Anvar Sayfitdinov (NamDPI)

Abstract: *The article describes the process of obtaining dyes from various plants for textile fibers. For example, the article gives examples of obtaining dyes from vegetation of blue and red. The article discusses anthocyanins, the color of which depends on the medium - acidic, alkaline or neutral. It has been proven that the combination of anthocyanins with acid has a red or pink color, violet neutral in a neutral environment and blue in an alkaline environment. Natural dyes are found not only in flowers, but also in other parts of the plant and stained in different ways. Autumn leaves are colored red, black-red and carrot colors, which cause anthocyanins on the cell surface. Anthocyanins, like in spring at low temperatures or, as their own "solar" coating in autumn, give filtering properties to leaves and stems.*

This article presents the experimental results of dyes. Pomegranate fruits, plants with green leaves, foliage, young shoots and other parts of the plant were selected. The effect of various extracts on the dyeing of wool yarn is shown in tables 1-10.

Key words: *anthocyanins, dyes, plants, textile yarns, leaves, fruits and parts of the plants, carrotenoids, chlorophyl, Delphinidine, wool dyeing with extracts*

The most common compounds in the plant world used as dyes are called anthocyanin. Unlike chlorophyll, they are not associated with the plastid part of the cell, they dissolve more in the cell sap, and some are divided into small crystals. Anthocyanes can be isolated from any blue or red vegetation. For example, grinding red beet kitchen slices or boiling red cabbage leaves in a little water, under the influence of anthocyanins the water turns purple or red. But when a solution is poured into a drop of vinegar, citric, sorgo or any other acid the solution turns red. [1]

Anthocyanins come in different colors depending on the environment in which they are (acidic, alkaline or neutral). The combination of anthocyanins with acid is red or pink, violet neutral in a neutral environment and blue in an alkaline environment. In the Meduniza flower collection at the same time there are half-bloomed flowers - pink, the ones with purpurals and the blossoms - blue. This is

due to the acid reaction of the cell sap in the buds; when the flower opens, the cell becomes a neutral and alkaline environment.[2]

When viewed from the Lungworms, pollinating insects flock to pink and purple flowers, which are fully open. The more hydroxide groups in the anthocyanin molecule, the darker the color (due to dilphinidine), when the alkali is methylated, the malvidin pigment is formed, then the leaves turn red. The color of the ends of the flower is also associated with salts of various metals in antitsan. The Mg and Ca salts cause a blue color, and the potassium salts cause a violet. Various color options are also caused by yellow pigments. (Khalconies, flavanols, aurones, etc.).[3]

Natural dyes are found not only in flowers, but also in other parts of the plant and play different roles. For example, potatoes, peel, eyes, tumors and soft flesh, phenolic compounds stain under the influence of bioflovinoids: there are also white, yellow, pink, red, blue, dark, purple and black. The native land of black bean potatoes is Chile and it mainly grows here. The white color is formed by the alkylantosian or catechins, the yellow - the flavons and the flavonoids, the red and the purple - the anthocyanins. The anthocyanins group is large and nowadays consists of 10 types. Pionidine, pelargonidine and malvidin, blue cyanide and dolphinidine, and colorless pigment petunidine are found in them. As a result of the tests, the root of the potato confirms that our body is rich in nutrients. For example, in the yellow flesh the complex contains large amounts of oils, caratinoids, riboflavin and flavonoids.[4]

Due to weather changes, we can see that the dramatic changes in potato tubers are due to anthocyanins, which also contribute to light intensity, soil reaction, mineral fertilizers and nucleochemicals. If potatoes are grown in peat areas, potatoes become more greenish, and when exposed to phosphorus, they become white and pink in the effect of potassium sulfate. Potatoes are often found to be irritated even if the nucleochemicals contain copper, iron, sulfur, phosphorus and other elements.

The autumn leaves are colored carrots, red-black and red, because they contain anthocyanins in the cell surface. These colors are caused by the active reproduction of colors, changes in the temperature of the air, intense light and weak vegetation, especially sugars. The following methods are proposed for this process: anthocyanin formation using a simple broaducker, plain sandstone, white poplar, normus or plane tree. [5]

In the spring a round circle is cut from one of the branches with a medium length and 2-2.5 cm wide. This enhances the accumulation of carbohydrates on the upper surface of the isolated horn, and the leaves at the top will turn red earlier than at the bottom of the round, or compared with leaves on adjacent branches. Anthocyanins, like in spring at low temperatures or as their own “sunny” coating in autumn, give filtering properties to leaves and stems. Trees with a red trunk, shrubs, autumn rye, ferns and some other types of young grasses and leaves in spring turn the energy of light into heat, preventing them from freezing.

Studies have shown that the color of seeds, leaves, and stems in plants has easy fermenting carbohydrates, sucrose, fructose and glucose, which cause them to be frost-resistant. Cultivating plants with these characteristics can produce long-term frost-resistant, sugar-resistant grasses.[6]

Carrotenoids (carotene and xanthophylls) are usually found on the leaves of large, hanging birch, and sometimes on the leaves. In this case, when the leaves become pale, the chlorophyll in them becomes golden-yellow. Therefore, the emergence of dark red leaves in the autumn leaves indicates that the plant is slow to fall into photosynthesis without any physiological effects, and that the plant may go to sleep during the winter.

Research has revealed that chlorophyl and anthocyanin (or xanthophyl) are present at the beginning of life on the green leaves of plants.

Anthocyanes and xanthophiles are of lesser color, and they become visible after the chlorophyll particles are decomposed into the environment. In November-December, when chlorophyll production is slow due to lack of sunlight and the

spectrum is incomplete, the roses and leaves of the house are purple in color. If the sunlight was right, they should be green right away.

Indoor Aloyni has green leaves in the winter and early spring when the sun's rays are still weak. If it is exposed to bright sunlight in June or July, they are reddish and if they are brought into a darker house the leaves will turn green. The yellow color of the flowers can be turned from light gray to light yellow with alkaline flavonoids (carotene, xanthophyll and antichlorine).[7]

The air between Nivyanka obiknovennaya, white water lily completely reflects the illumination and the plant becomes white and discolored. In the same way alpine edelweiss, poplar dry, field jungle are white.

In the dead plant tissues, the air is also white because the light returns. The birch white color is beautiful at any time of year due to the fact that the snow-white hairy crystals in the cells are due to betulin (birch camphor).

The juice of the plant cells contains brightly colored flavonoids, which are pH-dependent, which determine the color of fruits and flowers. Anthocyanins attract pollinators, remove pests from the leaf color, filter the fungal radiation and protect the plants. There are many anthocyanins in the black currant. 250 mg of anthocyanin contains 100 grams of fresh fruit, most of them in fruit pods.

Due to the positively charged molecule, it is well soluble in water, especially in acidic environments, and the presence of glycoside in plant tissues also increases water solubility. In nature, there are 30 monomeric anthocyanins, which are mainly 6 aglycone derivatives: pelargonidine, cyanide, peonidine, dolphinidine, petunidine and malvidin. Till today about 500 anthosian pigments have been found. Cyanidin is acid in acid, blue in dolphinidine, pelargonidine orange, petunidine brown in red, or peonidine purpur-red in color.[8]

Anthocyanins have partly shown anti-cancer properties. Anthocyanins have been shown to have partial anti-cancer properties. Mulberry fruit (Morus atropurpurea) slows down aging and weakens Alzheimer's disease. Anthocyanins reduce arterial pressure and increase blood vessel elasticity in the arterial system, reducing blood clot formation.

Experiments have shown that anthocyanins prevent the accumulation of fat in tissues Anthocyanes determine the diversity of flowers, and the main component of anthocyanins are antocyanides. Pelargonidine - Glucosyl is present in red pelargine, vilka, georgin. Cyanide is present in pot, rose, tulip, berry berries. In complex form it can be found in tulips, currants, raspberries, rhubarb.

Delphinidine - Delphinium Consolia, with a monomethyl ether, in the fruit of the cherry, in the flower of the petunia, the black mulberry, in the flower of the wild malvae in the dimethyl ether. These anthocyanidins and their methyl ether give different colors to acids. Anthocyanes are well soluble in acids, alcohol, water, ether and other solvents.

It is extracted by anthocyanins with alcohol; (cleansed from oil and grease). The aqueous solution is precipitated with lead acetate, and hydrogen is extracted by antisyan-cyanide (blue color).

According to Wiltsetter, flowers are often extracted with alcohol, with a mixture of acetic acid, then the solution is immersed in ether, the crystallized crystalline HCl, and the chlorides of anthocyanidins are prismatic or needle-separated.

They are insoluble in cold water and are slowly dissolved in alcohol. Antonyms are more common in cultural plants than wild species. In plants, the amount of anthocyanins is 7% of the horns and stems. (pelargonium and mountain males).[9]

Anthocyanes are glucosides, which when decomposed with acids are separated into sugar and anthocyanin. Close to catechins and flavonoids by structure. The presence of anthocyanidins in the pyryl salts gives the purple color, with alkaline salt, acid salts. There is also a colorless form of leucoform. When pH is less than 6, the anthocyanins are carmine red, pH = 6 is purple, pH= 8 is blue, pH=10 is green. When pH= 8-10, the color is unstable and stays the same for a few minutes, while the color is stable at pH=1,5-2.

Anthocyanins enter into condensation reactions by removing compounds that are difficult to dissolve and do not dye.[10]

The presence of anthocyanins and adjacent polyphenols gives the color and taste of plants. Leukoantocyanes, catechins give the fruit quality, some phenol bitterness. Anthocyanins, flavones together with chlorophyll and carotenoids form the natural color of fruits. The content of polyphenols in fruits is different. There are many flavors in most fruit-bearing fruits (apples, pears), citrus fruits. Experimental results of obtaining dyes and dyeing yarns. A scientific research on the production of natural dyes was led by the Azerbaijani scientist MA Kasymov. They have selected pomegranate fruit, green leafy greens, young shoots' bark and other plants. The dyeing feature was tested by the method learned in the textile research institute's textile lab at the Azerkhalcha carpet factory in Baku. Pomegranate fruit paint is known from ancient times. Pomegranate foam can be used in a wide range of colors such as wool, silk, cotton fabrics beige, green, whitish, sand and other colors.[11] The results of dyeing the wool yarn with aqueous extract from the pomegranate fruit peel when the fruit is ripe are presented in Table1

Table-1

The effects of various extracts on dyeing wool yarn with liquid extract of Punica granatum fruit polish are as follows:

№	Softening substance	The amount of chemical %	Color of dyed yarn
1.	Neutral Bath	-	the funeral color
2.	Potassium Sodium	5,0	-
3.	Acetic acid	5,0	the funeral color
4.	Alumocalyan growers	8,0	-
5.	Iron Cuisine	-	Dark black
6.	Copper Cube	4,0	Green
7.	Red blood salt	4,0	Black
8.	Yellow blood salt	4,0	oq –olarang
9.	Chromic	2,5	so'lg'in—sariq
10.	Cobalt acetate	4,0	Funeral
11.	Acetate of lead	1,44	Dark green-yellow

12.	Tin chloride	3,0	Black-red-yellow
13.	Tin chloride + acetic acid	3,0+4,0	Yellow

According to A. Grossheim's (1946) walnut fruit fly contains 15-25% gluten containing gall and ellagic acids. According to Brigl (1926), Fedorov and Rosen have painted on it. MA Kasymov studied the branches, leaves and young branches of fruit during ripening.[11]

Table 2 presents the results of wool dyeing with extracts from various parts of walnut. Different colors can be obtained using different vacuum cleaners. In the tested sections of walnuts the coloring is high: 1 kg crushed bark or leaf 15-20 kg of wool.

Table-2

Glycyrrhira glabra L in the presence of different flavorings. The results of the experiment on wool dyeing with aqueous extract of the growth vessels:

№	Sodium substances	quantity of chemicals in%	Colored yarn color
1.	Neutral Bath	—	dark red
2.	Potassium Sodium	5,0	-
3.	Acetic acid	5,0	-
4.	Alumocalyan growers	10,0	yellow
5.	Iron Cuisine	3,5	black- multi-colored
6.	Iron (ll) Chloride	3,5	multi-colored
7.	Copper Cube	4,0	green-yellow-dark red
8.	Chromic	2,5	Light yellow
9.	Vinegar cobalt	4,0	red-dark red
10.	Red blood salt	4,0	whitish-multi-colored
11.	Yellow blood salt	4,0	black –multi-colored
12.	Red blood salt + acetic acid	4,0-5,0	Light blue
13.	Sorrel acid	4,0	green-yellow
14.	Alkaline potassium with manganese	1, 4	red-dark red

Several colors are taken from different parts of the colony. These colors are milky, yellow and violet. (Table 3). Water extract of steam vessel is high color: 1 kg crushed root dye 15 kg of wool.

Table-3

The results of the experiment on dyeing wool with aqueous extract of different parts of the Juglins regia L Greek body under the influence of different stains:

№	Sodium substances	quantity of chemicals in%	The color of the yarn stained with the extract		Fruit bark
			Shell of young horns	Leaves	
1	Neutral bath	-	mustard color	mustard color	tobacco color
2	Sodium player	5,0	whitish- tobacco color	whitish- multi colored	dark- tobacco color
3	Acetic acid	5,0	mustard color	black- multi colored	multi colored - tobacco color
4	Alvumokiliv additive	10.0	-	Whitish	multi colored
5	Iron Cuisine	4:0	blood-multi colored	black- multi colored	tobacco color
6	Terair (II) Chloride	4,0	-	multi colored	Dark red- multi colored
7	Chromic	2,5	black-blue	whitish- multi colored	whitish-dark blue
8	Kobaliet acetate	4,0	whitish-tobacco color	Multi colored	whitish-multi colored

9	The red cone	4,0	whitish-dark blue	Multi colored	Oqish-olarang
10	Copper Cube	4,0	black- multi colored	-	-
11	Red blood salt + formic acid	4,0-5,0	-	-	Tobacco color
12	Red blood salt + CH3COOH	4,0-5,0	green-dark blue	Multi colored	-
13	Yellow blood salt	4,0	Black	black-multi colored	black-multi colored
14	Potassium permanganate	1,4	whitish-multi colored	black-multi colored	
15	potassium (II) chloride + oxalic acid	3,0+4,0		whitish-multi colored	whitish-multi colored
16	potassium (II) chloride + alumokalium additive + formic acid	3,0+4,0 +5,0	black-multi colored	black-multi colored	
17	Sorrel acid	4,0	green		black-multi colored

M. Kosimov studied 5 types of dyes for the carpet industry: Sotinus coggygria, Datisca cannabina, Nurricum perferatum, Peganum harmala, Rubica iberica. Cotinus coggygria. Scumpia, a jellyfish belonging to the Anacardiaceae family. There is a substance on the leaves. Scumpium is used to paint the wooden packages in red, light red and black.[12] The coloring feature of Scumpium oils and fruits is shown in Table 4 and 5.

Table-4

Results of experimentation on wool dyeing with aqueous extract of wood and Cotinus coggygria plant with different spices:

t/r	Softening substance	The uantity of chemical, %	Color of dyed yarn
1.	Neutral Bath	—	Yellow – multi colored
2.	Ammonia	0,4	Blonde-lemon-yellow
3.	Acetic acid	4,0	Yellow with lemon
4.	Alumocalyan growers	10,0	Yellow-orange, yellow-multi colored
5.	Iron Cuisine	5,0	red-multi colored, black –red
6.	Copper Cube	5,0	reddish-black
7.	Yellow blood salt	5,0	Light - greenish-yellow
8.	Chromic	2,0	Reddish-yellow
9.	Alkaline cobalt	6,0	Black-orange
10.	Alkaline potassium with manganese	1,3	Light yellow
11.	Red blood salt	5,0	Bluish-yellow
12.	Tin (ll) Chloride + Sorrel acid	3,0-4,0	Yellow-orange

Table-5

Turli xil xurishlagichlar ta'sirida Cotinus coggygria o'simligi yaproqlarining suvli ekstrskti bilan jun iplarni bo'yash tajriba natijaliri:

t/r	Softening substance	The quantity of chemical %	Color of dyed yarn
1.	Neutral Bath	-	Color blue
2.	Potassium Sodium	0,2	Take it
3.	Acetic acid	2,5	-
4.	Alumocalyan growers	8,0	Orange-yellow

5.	Iron Cuisine	2,0	Black
6.	Iron (ll) Chloride	2,0	-
7.	Miss Coupe	2,0	Green
8.	Chromic	1,2	Light-yellow
9.	Red blood salt	2,0	Multi colored
10.	Yellow blood salt	2,0	Whitish
11.	Acetic acid is cobalt	2,0	Blue, multi colored - yellow
12.	Alkaline potassium with manganese	0,7	Yellow as gold
13.	Red blood salt + formic acid	2,0+2,5	Black
14.	Sorrel acid	2,0	Blue
15.	Tin (ll) Chloride + Sorrel acid	1,5+2,0	-

As shown in the table, wool yarn is dyed yellow, light yellow, and brown depending on the nature of the souring. You can also get white, yellow, and green. 1 of extract of 100 g of shredded wood allows for 14-15 dye solution with 2-2.5 kg of wool.

Datisca cannabina Cheese datiska, family of Datiscaceae. It has a perennial plant, the root of the datasheet and the yellow pigment of the datiscet on the surface. It is isolated in the form of tetraoxiflavon (Mayer 1940). Datiska fruit ripens in October. Dyeing a woolen thread with aqueous extract of the surface of the earth gives a different look when applying different types of soils.[13] The color is dominated by yellow. (Table 6).

Table-6

Experimental results of Datisca cannabina wool dyeing with aqueous extract of top soil:

№	Softening substance	The quantity of chemical %	Color of dyed yarn

1.	Neutral Bath	-	Light yellowish yellow
2.	Potassium Sodium	0,4	A bell
3.	Acetic acid	3,0	Light yellowish white
4.	Alumocalyan growers	20,0	Yellow with lemon
5.	Iron Cuisine	20,0	Cigarette bell
6.	Iron powder + acetic acid	20,0-5,0	The whitish-tobacco color
7.	Copper Cube	20,0	Dark green
8.	Copper Cuper + Formic acid	20,0-5,0	Light-yellow gold
9.	Yellow blood salt	20,0	Bluish
10.	Chromic	4,0	-
11.	Alkaline cobalt	13,0	Green
12.	Alkaline potassium with manganese	4,0	Blonde

Nurericum pertoratum- tutsan. Its flower contains a hypericin dye, which is part of a group of flavonoids with quercetin. She wears a red yarn (Mayer, 1940). Zveroboy is used for dyeing when the flowers of the surface of the surface are completed and the fruits begin to bear fruit (Petrov, 1940). Flower alcohol extract is used for dyeing red, dung red (Grunskaya, Petrova, 1944). Flower sap gives the wool yellow and green, while the alkaline surface is red and light red (Fedorov, Rosen, 1950).[14]

In September, it was found that the extracted from the surface of the water during the harvesting period allows the dyeing of the wool to various colors. (Table 7).

Table 7

The results of the experiment on the dyeing of wool with aqueous extract of the surface of the Nurericum perforatum plant under the influence of various powders:

t/n	Softening substance	The quantity of chemical %	Color of dyed yarn
1.	Neutral Bath	-	Brown red
2.	Potassium Sodium	0,4	White orange and brown
3.	Acetic acid	4,0	White-yellow
4.	Alumocalyan growers	20,0	-
5.	Iron Cuisine	20,0	Green
6.	Cobalt with vinegar	2,0	Whitish-yellowish
7.	Alkaline potassium with manganese	13,0	Yellow-yellowish

Harmala - a colorful plant with a distinctive mark. The paint from its seed is called “Turkish paint” (Pavlov, 1947). The slightly alkaline boiling of the Isikiq Seed gives a reddish dye for wool and silk (Pavlov, 1947). According to Enden's (1944), aqueous extract of hives yields a dark brown color with green fluorescence. Paint has been found to be the best solvent water (alkaline alkaline) to extract matter.[16] The results of using aqueous extract of sesame seeds and wool yarn using different fertilizers are shown in Table 8 (Seed collected in September).

Table 8

The results of the experiment on dyeing wool with aqueous extract of the surface of the Peganium harmala under the influence of various powders:

№	Softening substance	The quantity of chemical %	Color of dyed yarn
1.	Neutral Bath	-	yellow, green, broun-yellow
2.	Potassium Sodium	0, 4	yellowish
3.	Acetic acid	4,0	cream colored

4.	Alumocalyan growers	20,0	reddish-brown-green
5.	Iron Cuisine	10,0	yellowish- yellow
6.	Copper Cube	20,0	Copper colored -green
7.	Chromic	2,0	yellowish- brown
8.	Alkaline cobalt	10,0	Light yellow
9.	Alkaline potassium with manganese	1,4	brown-yellow, yellowish

Rubia iberica - Georgia marena. Red paint is taken from the root. In the fall, the plant will produce pink, red, and brown. Rope color (Table-9). You can get 11 -12 g of a solution of 100 g of crushed root with 15-25 kg of wool.

Table-9

The results of the experiment on the dyeing of wool with water extract of the root of the cultivation of Rubia iberica with various additives:

№	Softening substance	The quantity of chemical %	Color of dyed yarn
1.	Neutral Bath	-	Reddish
2.	Potassium Sodium	0,4	black-reddish
3.	Acetic acid	4,0	yellowish-brown-red
4.	Alumocalyan growers	10,0	whitish-red
5.	Iron Cuisine	4,0	brown-red
6.	Copper Cube	4,0	Brown
7.	Chromic	2,0	reddish-brown
8.	Red blood salt	4,0	black-reddish
9.	Alumocalium Extract + An Acid Acid	5,0+10,0	brown –red
10.	Potassium manganese	2,0	Brown
11.	Ammonia + alkaline additive	0,4+10,0	yellowish-red
12.	Tin (II) Chloride + Sorrel Acid	4,0+3,0	reddish –yellow
13.	Tin (II) Chloride + formic acid	3,0+5,0	yellowish-red

14.	Ammonia + Tin (II) Chloride + formic Acid	0,4+3,5+5,0	Pomegranate-red color
15.	Formic acid + alumocalium additives	5,0+10,0	whitish-red
16.	Ammonia + Tin (ll) Chloride + formic Acid + Alumocalium additives	0,04+3,0+5,0+10,0	reddish-yellow

Scientists from Samarkand State University have done a great deal of research on the dyes production from plants. In 1940 G.V.Lazurevsky and A.S.Sodikov were interested in the dyeing properties of Ammothamnus solder. They found that this plant had been used by people in ancient times to dye handmade fabrics. The dyeing data shows that the dye collection, called soporeols, dye the wool yarn on yellow. If you apply artificial acid paints after the thermal treatment of dyes, you can extend the collection of dyes due to red and dark red. In 1951, the Bukhoro carpet weaving art was used to dye the wool and silk. The Tashkent leather factory has tested the best properties of these dyes. Interestingly that soporols are soluble in alcohol, acetone, butylacetate, which allows them to be used in varnish production.[17]

Since 1974, we have sought to isolate Ammothamnus lehman, Vexibia (sophora) alopecuroides, Vexibia (Sophora) pachycarpa, a collection of dyes from the roots and stem of Ammodendron conollyi. Taken fractions were subjected to quantitative and qualitative analysis. These dyes showed that they do not dissolve well in water and dissolve well in alkali. Under the influence of salts on dyes there are formed the soluble varnishes. Wool yarn dyes range from yellow, light yellow, red, green to dark red. The results of the dyeing are shown in Table 10.

Table 10

Experimental results of dyeing wool with various extracts from ammothamnus solderman root:

№	Softening substance	The quantity of chemical %	**Water suspension**	**Color of dyed yarn**		
				Acetone extract	Essential oil soluble extract	Essential insoluble extract
1	Neutral Bath	-	whitish-yellow	whitish-yellow	whitish-yellow	whitish-yellow
2	Sodium player	0,4	brown	yellowish- red	whitish-red	brown
3	Acetic acid	4,0	whitish-yellow	yellowish- red	yellowish-red	yellow
4	Iron Cuisine	4,0	Light yellow	green-red	yellowish-green	dark yellow
5	Copper Cube	4.0	green	yellowish- red	red	Green
6	Yellow blood salt	4,0	reddish-yellow	yellowish-red	green-red	Red
7	Red blood salt	4,0	reddish-green	whitish-red	green-red	whitish-red
8	Chromic	2,0	brown	brown	brown	yellow-red
9	Alumocalyan growers	10,0	Light brown yellow	reddish - yellow	Light brown yellow	whitish-yellow
10	formic acid -	4,0-8,0	green-reddish	reddish-yellow	yellowish-red	yellowish-red
11	Lead Acetate	4,0	red	whitish-red	grey-yellowish	yellow
12	Plumbic (II) Chloride-formic acid	3,0-4,0	light -red	whitish-yellow	yellowish-red	Light brown yellow
13	Ammonia- aluminum alloys	3,0-8,0	lemon yellow	-	yellow	Yellow

14	Ammonia-plumbic (II) Chloride- formic acid	3,0+3,0 +4,0-1,4	whitish – lemon color	yellow	Copper color	Light brown yellow

The usual white wool yarn is dyed on yellow or red depending on the cloths. Dyeing with acetone extract using a variety of different substances gives the appearance of yellow. It gives dark orange colors when dissolved in essential oils and gives yellowish or dark red color when do not dissolved in essential oil.[18]

The results showed that the use of chromium, iron, sulfate, aluminum potassium supplements and chromium acetate-based bleaching dyes give a wide range of colors. When applying dyes viscose, natural silk and acetate, the results were found to be better than those used in the textile industry, light colors were not worse, durability of distilled water and rapid wear. Comparing our results with industrial dyes shows that our dyes have averaged results.

REFERENCES

1 Bhattacharyya N. Natural Dyes for Textiles and Their Eco-friendly Applications. New Delhi: IAFL Publications; 2010.

2 John P, Angelini LG. Indigo-agricultural. In: Bechtold T, Mussak R, editors. Handbook of Natural Colorants. Chichester: Wiley; 2009. pp. 75–103.

3 Lucas A, Harris J. Ancient Egyptian Materials and Industries. Mineola, New York: Dover publications; 1999.

4 M.L. Gulrajani, D. Gupta (eds.), Natural Dyes and Their Application to Textiles (IIT New Delhi, New Delhi, 1992) pp. 19–45

5 Melo M.J. History of natural dyes in the ancient mediterranean world. In: Bechtold T, Mussak R, editors. Handbook of Natural Colorants. Chichester: Wiley; 2009. pp. 1–18.

6 Mohd Yu., Mohd Sh. & Faqeer M. Natural Colorants: Historical, Processing and Sustainable Prospects Natural Products and Bioprospecting volume 7, pages123–145(2017)

7 Mussak RAM, Bechtold T. Natural colorants in textile dyeing. In: Bechtold T, Mussak R, editors. Handbook of Natural Colorants. Chichester: Wiley; 2009. pp. 315–338.

8 Rungruangkitkrai N., Tubtimthai N., Cholachatpinyo A., R.Mongkholrattanasit, UV protection properties of wool fabric dyed with eucalyptus leaf extract by the padding techniques, in RMUTP international conference: textiles and fashion (Bangkok, 2012)

9 Samanta AK, Konar A. Dyeing of textiles with natural dyes. In: Kumbasar EPA, editor. Natural Dyes. Rijeka Croatia: InTech Open Access Publisher; 2011. pp. 29–52.

10 Schweppe H. Practical Hints on Dyeing with Natural Dyes: Production of Comparative Dyeings for the Identification of Dyes on Historic Textile Materials. Washington, DC: Conservation Analytical Laboratory, Smithsonian Institution; 1986.

11 Vankar P.S. Natural Dyes for Industrial Applications. New Delhi: National Institute of Industrial Research; 2007

12 ЮВ.Ф.Травен “Органическая химия”. В 2-х т. Москва. 2004. Т. 1. 705 стр.

13 . SH. V. Abdullayev, X. M. Shoxidoyatov, M. J. Raxmatova, N. Umarova. “Tabiiy birikmalar kimyosidan praktikum”. (uslubiy qo`llanma) 2010y. 131 bet.

14 .SH. V. Abdullayev, X.M.Akramov, J.R.Muhitdinova, A.Matkarimov. O'zbekistonda mavjud o'simliklardan olingan bo'yoqlar asosida to'qimachilik tolalarni bo'yash texnologiyasi. T.2019

15 .Х.М.Акрамов, Ж.Р.Мухитдинова. Ознакомление студентов с историей народного промысла как фактор их профессиональной подготовки. Приволжский научный вестник. №5. Г.Ижевск. 2016. Стр.140-145

16 .К. В. Вацуро, Г. Л Мищенко. "Именные реакции в органической химии". Москва. 1976 г. 536 стр.

17 . Б. Д. Березин, Д. Б Березин. Курс современной органической химии. Москва. 2003. 768 с.

18 .www. florio- fashion. com

ENHANCING PROJECT MANAGEMENT EFFICIENCY THROUGH THE IMPLEMENTATION OF DIGITAL TECHNOLOGIES IN ORGANIZATIONS OF THE REPUBLIC OF UZBEKISTAN

Author: Gulnoza Ismailova Baxodirovna

Specialty code: 08.00.13 – Management

Graduate School of Business and Entrepreneurship under the Cabinet of Ministers of the Republic of Uzbekistan

ORCID: 0009-0008-6421-8128

E-mail: aurorabrand@mail.ru

Abstract. *Digital transformation is reshaping the planning, coordination, monitoring, and decision-making processes used in project management. For organizations in the Republic of Uzbekistan, this issue is particularly relevant in the context of the Digital Uzbekistan – 2030 Strategy and the national strategy for artificial intelligence development. This study aims to identify how digital technologies can support project management efficiency and to propose a structured implementation framework. The research uses a narrative review of selected policy documents, international project management guidance, and recent peer-reviewed studies, combined with comparative analysis and conceptual synthesis. The results indicate that digital platforms, integrated data, analytics, and artificial intelligence can shorten information delays, strengthen monitoring, and support managerial decision-making when they are introduced together with appropriate governance, data quality, and staff competencies. An integrated project management cycle and a four-level digital maturity model are proposed for practical application.*

Keywords: *project management, digital transformation, digital technologies, project efficiency, artificial intelligence, data analytics, digital maturity, Uzbekistan.*

1. INTRODUCTION

The development of digital technologies has become one of the major drivers of change in contemporary organizational management. Project activities are particularly sensitive to the quality of information, the speed of communication, the coordination of resources, and a manager's ability to respond to deviations in a timely manner. Traditional project management

practices therefore increasingly coexist with cloud platforms, digital collaboration tools, automated reporting, data analytics, and artificial intelligence.

For the Republic of Uzbekistan, digital transformation has a clear institutional context. The Digital Uzbekistan – 2030 Strategy established a national framework for the development of the digital economy and the wider introduction of information and communication technologies (President of the Republic of Uzbekistan, 2020). This direction was reinforced by the Strategy for the Development of Artificial Intelligence Technologies until 2030, approved in 2024 (President of the Republic of Uzbekistan, 2024). These policy initiatives create favorable conditions for organizations to modernize project management processes, but technological availability alone does not guarantee better project outcomes.

Recent research emphasizes that digital transformation is a sociotechnical process rather than a simple software upgrade. Chen et al. (2025), in a systematic review of 66 peer-reviewed studies, identify the integration of digital tools, governance, leadership, and organizational interfaces as central themes in the transformation of project management. Similarly, Gonçalves et al. (2023) show that the relationship between project management and digital transformation depends on a combination of strategy, technologies, competencies, and project-based governance.

The problem addressed in this article is therefore not whether organizations should use digital technologies, but how such technologies can be integrated into project management in a way that improves information quality, coordination, control, and managerial decision-making. The aim of the study is to develop a conceptual framework for enhancing project management efficiency through the implementation of digital technologies in organizations of the Republic of Uzbekistan. The study focuses on four questions: which project management processes are most directly affected by digitalization; what benefits and constraints are identified in the literature; how digital

implementation can be structured as a management cycle; and how organizations can progress through different levels of digital maturity.

2. METHODS

The study uses a narrative literature review and conceptual analysis. It does not claim to be a systematic review and does not include primary empirical data. The analytical base consists of selected sources published between 2020 and 2026 that directly address project management, digital transformation, project data analytics, artificial intelligence, and the national digital policy of Uzbekistan.

The reviewed materials include two national policy documents, two international project management references, and four recent professional or peer-reviewed sources. The analysis was conducted in three stages. First, the sources were examined to identify recurring themes related to planning, monitoring, data integration, analytics, decision-making, governance, and competencies. Second, traditional and digitally enabled project management practices were compared. Third, the identified themes were synthesized into an integrated project management cycle and a staged digital maturity model. The purpose of the method is conceptual structuring rather than statistical generalization.

3. RESULTS

The synthesis indicates that digital technologies can support project management efficiency through four main mechanisms: faster information processing, improved integration of project data, automation of routine management tasks, and stronger analytical support for decisions. These mechanisms are consistent with ISO 21502 guidance on structured project management and with contemporary project management practice, while expanding the speed and connectivity of information flows (International Organization for Standardization, 2020; Project Management Institute, 2021).

Digital project environments generate data on schedules, resource utilization, costs, changes, quality, and communication. Shen et al. (2024) show that data analytics is becoming an important field for project delivery because it can help organizations move from descriptive reporting toward deeper analysis of project performance. At the same time, the Project Management Institute (2026) emphasizes that artificial intelligence should be applied within structured governance arrangements and with continued human oversight.

Table 1.

Comparison of Traditional and Digitally Enabled Project Management

Process	Traditional approach	Digitally enabled approach
Planning	Periodic updates to plans and documents	Shared digital baseline with synchronized updates
Schedule control	Reports and control milestones	Continuous or near-real-time monitoring
Resource management	Manual allocation and local files	Integrated workload and availability analytics
Reporting	Manual preparation of reports	Automated dashboards and updated indicators
Deviation analysis	Mainly after a visible problem appears	Earlier identification of trends and deviations
Decision-making	Experience and available reports	Data, analytics, and professional judgment

Note. Developed by the author based on Chen et al. (2025), Gonçalves et al. (2023), Shen et al. (2024), and Project Management Institute (2026).

The comparison suggests that the most important effect of digitalization is not the replacement of established project management principles but the reduction of the time gap between a change in project conditions and a managerial response. On this basis, the following integrated cycle is proposed: project objectives → digital planning → data integration → performance

monitoring → analytical assessment → managerial decision → corrective action → result evaluation. The cycle is iterative: the result of a corrective action becomes new project information and is incorporated into the next monitoring and decision cycle.

The literature also shows that organizations differ substantially in their readiness to use digital technologies. A phased maturity model is therefore more realistic than immediate transition to advanced AI-based project management. The proposed model consists of four levels.

Table 2. Proposed Digital Maturity Levels in Project Management

Level	Main content	Expected management effect
1. Basic	Electronic planning, task management, centralized document storage	Greater transparency and reduced information loss
2. Integrated	Connection of schedules, costs, resources, and status data	More consistent information and faster preparation of decisions
3. Analytical	Dashboards, performance indicators, trend and deviation analysis	Earlier identification of problems and stronger control
4. Intelligent	Predictive analytics and AI with human oversight	Scenario analysis, forecasting, and adaptive decision support

Note. Author's conceptual synthesis.

The results also identify conditions that can limit the expected benefits of digitalization. These include poor data quality, fragmented information systems, platform incompatibility, insufficient digital competencies, resistance to change, cybersecurity concerns, and excessive reliance on automated recommendations. Consequently, digital maturity should be understood as a combination of technologies, processes, governance arrangements, and professional competencies rather than as a list of software products.

4. DISCUSSION

The proposed framework has particular relevance for organizations in Uzbekistan because national policy is actively expanding digital infrastructure and the use of artificial intelligence. However, the effectiveness of this transformation will depend on organizational implementation. The Digital Uzbekistan – 2030 Strategy and the national AI strategy create an institutional environment for digitalization, but individual organizations still need clear responsibility for data quality, consistent project information, and management

processes that use digital data in decision-making (President of the Republic of Uzbekistan, 2020, 2024).

The findings support a gradual implementation logic. At the basic level, the priority is not artificial intelligence but disciplined electronic planning, task tracking, and document management. At the integrated level, organizations should connect schedule, cost, resource, and status data. Only after these foundations are stable does it become reasonable to develop analytical dashboards, predictive models, and AI-assisted recommendations. This sequence reduces the risk that advanced tools simply process inconsistent or incomplete information.

Another important issue is human responsibility. Digital tools can process large volumes of information, identify patterns, and generate recommendations, but they do not fully capture organizational culture, informal stakeholder relationships, political considerations, or the long-term consequences of managerial choices. The human-in-the-loop principle emphasized by Project Management Institute (2026) is therefore essential. AI should strengthen managerial judgment rather than remove accountability from the project manager.

The practical contribution of the article is the combination of an integrated management cycle with a four-level maturity model. The framework can be used as a diagnostic reference when an organization considers digitalizing project management. Instead of asking only which platform to purchase, managers can assess whether project data are reliable, whether information systems are connected, whether analytical results are actually used, and whether staff have the competencies required to interpret them.

The study has limitations. It is conceptual and review-based, and the proposed framework has not yet been empirically tested in a specific Uzbek organization or industry. Future research can validate the model through case studies, interviews, or project performance data and examine whether higher digital maturity is associated with measurable outcomes such as schedule

adherence, cost performance, decision speed, resource utilization, and stakeholder satisfaction.

5. CONCLUSION

Digital transformation creates substantial opportunities to strengthen project management, but its effect depends on more than the adoption of software. The literature reviewed in this study indicates that the main value of digital technologies lies in improving the speed, integration, and analytical use of project information. For organizations in Uzbekistan, the most sustainable path is a phased transition from basic electronic management to integrated data, analytical control, and, where appropriate, AI-supported decision-making.

The article proposes an integrated management cycle - planning, data integration, monitoring, analysis, decision, adjustment, and result evaluation - together with a four-level digital maturity model. The framework emphasizes data quality, organizational integration, professional competencies, and human responsibility. These conditions are necessary if digitalization is to contribute to more timely, transparent, and evidence-informed project management.

REFERENCES

Chen, M., Martins, T. S., Zhang, L., & Dong, H. (2025). Digital transformation in project management: A systematic review and research agenda. *Systems*, *13*(8), 625. https://doi.org/10.3390/systems13080625

Gonçalves, M. L. A., Penha, R., Silva, L. F., Martens, C. D. P., & Silva, V. F. (2023). The relationship between project management and digital transformation: Systematic literature review. *RAM. Revista de Administração Mackenzie, 24*(4), eRAMR230075. https://doi.org/10.1590/1678-6971/eRAMR230075.en

International Organization for Standardization. (2020). *ISO 21502:2020 Project, programme and portfolio management — Guidance on project management*. ISO.

President of the Republic of Uzbekistan. (2020, October 5). *On approval of the Digital Uzbekistan – 2030 Strategy and measures for its effective implementation* (Decree No. UP-6079). LexUZ. https://lex.uz/docs/5031048

President of the Republic of Uzbekistan. (2024, October 14). *On approval of the Strategy for the Development of Artificial Intelligence Technologies until 2030* (Resolution No. PP-358). LexUZ. https://lex.uz/docs/7158606

Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK guide)* (7th ed.). Project Management Institute.

Project Management Institute. (2026). *The standard for artificial intelligence in portfolio, program and project management*. Project Management Institute.

Shen, Y., Brookes, N., Flores, L. L., & Brettschneider, J. (2024). Data analytics for project delivery: Unlocking the potential of an emerging field. *International Journal of Managing Projects in Business, 17*(2), 302–337. https://doi.org/10.1108/IJMPB-08-2023-0180

SAMARQAND VILOYATIDA ETNOTURIZMNI RIVOJLANTIRISHNING IQTISODIY IMKONIYATLARI VA ISTIQBOLLARI

I.M.Shodikulovna

Samarqand iqtisodiyot va servis instituti magistranti

majidovaintizor01@gmail.com

O'zbekiston

Annotatsiya. *Maqolada Samarqand viloyatida etnoturizmni rivojlantirishning iqtisodiy imkoniyatlari rasmiy statistika asosida tahlil qilingan. 2024-2025-yillarda turistik firmalar, xizmat ko'rsatilgan shaxslar va joylashtirish obyektlari ko'rsatkichlari sezilarli oshgani aniqlandi. Hunarmandchilik va oilaviy mehmon uylarining daromad hamda bandlikka ta'siri ko'rib chiqilib, rivojlanish istiqbollari belgilandi. Etnoturistik marshrutlarni shakllantirish zarur ekani asoslab berildi.*

Annotation. *The article analyzes the economic opportunities for developing ethnotourism in Samarkand region using official statistics. Tourism indicators, including firms, served persons and accommodation facilities, grew significantly in 2024-2025. The impact of crafts and family guesthouses on income and employment is examined, and development prospects are identified. The need to develop ethnotourism routes was substantiated.*

Kalit so'zlar: *etnoturizm, Samarqand viloyati, iqtisodiy samaradorlik, hunarmandchilik, bandlik.*

Keywords: *ethnotourism, Samarkand region, economic efficiency, crafts, employment.*

KIRISH

Samarqand jahonda Buyuk Ipak yo'lining markaziy shaharlaridan biri sifatida tanilgan va turistlarni, avvalo, tarixiy yodgorliklari bilan jalb etadi. Biroq zamonaviy turist ko'rish bilan cheklanmay, mahalliy hayotni o'zi tajriba qilishni ham istaydi. Shu sababli etnoturizm, ya'ni hunarmandchilik, milliy oshxona va urf-odatlarga asoslangan turizm, iqtisodiy o'sishning yangi manbai sifatida e'tibor qozonmoqda.

Turizm O‘zbekiston iqtisodiyotida muhim o‘rin tutmoqda: 2025-yilda mamlakatga 11,7 million chet el fuqarosi sayohat maqsadida kelgan, turistik xizmatlar eksporti 4,8 milliard dollarga yetgan (Yuz.uz, 2026). Mamlakatning Buyuk Ipak yo‘lida joylashgani va boy tarixiy-madaniy merosi turizmni rivojlantirish uchun yuqori salohiyat yaratishi ta’kidlanadi (Abdullaev va boshq., 2023). O‘zbekistonda etnoturizmni rivojlantirishga qaratilgan davlat siyosati, mahalliy aholini jalb etish va infratuzilmani yaxshilash masalalari M. Askarov tomonidan tahlil qilingan (Askarov, 2025). Shunga qaramay, etnoturizmning Samarqand viloyati iqtisodiyotiga qo‘shadigan hissasi hali yetarlicha baholanmagan.

Tadqiqotning maqsadi Samarqand viloyatida etnoturizmni rivojlantirishning iqtisodiy imkoniyatlarini aniqlash va istiqbollarini belgilashdan iborat.

ASOSIY QISM

Metodlar. Tadqiqotda Samarqand viloyati statistika boshqarmasining 2024 va 2025-yillar uchun turizm ma’lumotlari, davlat hujjatlari, ilmiy maqolalar va matbuot materiallari tahlil qilindi. Qiyosiy, tizimli va mazmuniy tahlil usullaridan foydalanildi.

Natijalar. 2025-yilda viloyatdagi turistik firmalar soni 144 tadan 173 taga (20,1 % ga) oshdi. Turistik xizmat ko‘rsatilgan shaxslar soni 61 679 dan 192 833 ga yetib, taxminan 3,1 baravar ko‘paydi. Joylashtirish obyektlarida qabul qilingan mehmonlar soni 428 451 dan 679 163 ga (58,5 % ga) o‘sdi (1-jadval; Samarqand viloyati statistika boshqarmasi, 2025, 2026).

1-jadval. Samarqand viloyatida turizm ko‘rsatkichlari

Ko‘rsatkich	2024-yil	2025-yil	O‘zgarish
Turistik firma va tashkilotlar soni	144	173	+20,1 %
Turistik xizmat ko‘rsatilgan shaxslar soni	61 679	192 833	3,1 baravar

Mehmonxona va shunga o‘xshash obyektlarda joylashtirilgan shaxslar soni	428 451	679 163	+58,5 %

Manba: Samarqand viloyati statistika boshqarmasi ma’lumotlari asosida muallif tuzgan.

Bu mahalliy mahsulot va xizmatlarga talab ortishini bildiradi.

Etnoturistik resurslarning yaqqol namunasi Konigil qishlog‘i: u yerdagi «Meros» ustaxonasida Samarqand qog‘ozi qadimiy usulda tayyorlanadi, kuniga 100-120 dona ishlab chiqariladi, qishloq ayollari ish bilan ta’minlangan, turistlar esa suvenir sotib oladi (Kun.uz, 2018).

Muhokama. Etnoturizm iqtisodiy jihatdan uch yo‘nalishda samara beradi: mahalliy aholi daromadi va bandligini oshiradi, oilaviy mehmon uylari kabi kichik biznesni rivojlantiradi, turistning qolish muddatini uzaytirib, xarajatini ko‘paytiradi. Mahalliy aholining ishtiroki va infratuzilmaning yaxshilanishi bu jarayonning muhim sharti sifatida ko‘rsatiladi (Askarov, 2025).

Davlat tomonidan qo‘llab-quvvatlash ham kuchaymoqda. 2025-yil 19-noyabrdagi PQ-348-son qaror asosida Turizm qo‘mitasi tashkil etildi, uning asosiy vazifalari qatorida etnoturizmni rivojlantirish ham belgilangan (Turizm qo‘mitasi, s.y.). Mehmon uylarida kunlik qabul qilinadigan turistlar soni 10 dan 20 kishiga oshirilgan, viloyat turizmiga qo‘shimcha 100 million dollar yo‘naltirish ko‘zda tutilgan (UzA, 2026). Biroq rasmiy statistikada etnoturizm alohida ko‘rsatkich sifatida ajratilmagan, xizmatlar esa yagona marshrutga birlashtirilmagan.

Istiqbollar. “Samarqand – Konigil” kabi tematik marshrutlar yaratish, qishloq joylarda mehmon uylari va ustaxonalar tarmog‘ini kengaytirish, mahalliy mahsulotlarni raqamli platformalar orqali targ‘ib qilish va etnoturizm uchun alohida statistik hisob yuritish maqsadga muvofiq (Yuz.uz, 2026).

XULOSA

Tadqiqot shuni ko‘rsatdiki, Samarqand viloyatida turistik faoliyat 2025-yilda sezilarli o‘sdi: turistik firmalar soni 20,1 % ga, joylashtirish obyektlarida qabul qilingan mehmonlar soni 58,5 % ga ko‘paydi, turistik xizmat ko‘rsatilgan

shaxslar soni esa taxminan 3,1 baravar oshdi. Bu etnoturizm uchun keng iqtisodiy imkoniyat yaratadi. Konigil tajribasi hunarmandchilikka asoslangan etnoturizm mahalliy aholi daromadi va bandligini oshirishini ko‘rsatadi. Davlat tomonidan Turizm qo‘mitasining tashkil etilishi va moliyaviy qo‘llab-quvvatlash bu yo‘nalish uchun qulay sharoit yaratmoqda. Biroq etnoturizm rasmiy statistikada alohida ajratilmagani va xizmatlar yagona marshrutga birlashtirilmagani uning to‘liq iqtisodiy samarasini cheklaydi. Shu sababli tematik etnoturistik marshrutlar yaratish, qishloqlarda mehmon uylari va ustaxonalarni kengaytirish, mahalliy mahsulotlarni raqamli platformalar orqali targ‘ib qilish hamda etnoturizm uchun alohida statistik hisob yuritish tavsiya etiladi.

FOYDALANILGAN ADABIYOTLAR

Abdullaev, A., Jumageldiev, N., Abdullaeva, A., & Erimbetov, E. (2023). O‘zbekistonda turizmni rivojlantirishda etnografiya, urf-odatlar va an’analarning tutgan o‘rni. *Ilim hám jámiyet*, (2). https://journal.ndpi.uz/ss/article/view/2023-2-1-024

Askarov, M. (2025). Some reflections on the state policy aimed at developing ethnotourism in the conditions of Uzbekistan. *Oriental Journal of Social Sciences, 5*(1S), 31-39. https://doi.org/10.37547/supsci-ojss-05-01S-05

Kun.uz. (2018, 19-aprel). Reportaj: Samarqandning umrboqiy qog‘ozi qanday tayyorlanadi. https://kun.uz/news/2018/04/19/reportaz-samarkandning-umrbokij-kogozi-kandaj-tajerlanadi

Samarqand viloyati statistika boshqarmasi. (2025). *Samarqand viloyatida turizm (2024-yil uchun).* https://samstat.uz/uploads/Press-relizlar/2024/Ijtimoiy/Turizm%202024.pdf

Samarqand viloyati statistika boshqarmasi. (2026). *Samarqand viloyatida turizm (2025-yil uchun).* https://samstat.uz/uploads/Press-relizlar/2025/Ijtimoiy/%D0%A2%D1%83%D1%80%D0%B8%D0%B7%D0%BC%202025.pdf

Turizm qo‘mitasi. (s.y.). *O‘zbekiston Respublikasi Turizm qo‘mitasi*. https://gov.uz/oz/uzbektourism/pages/o-zbekiston-respublikasi-prezidentning-ekologiya-atrof-muhitni-muhofaza-qilish-va-iqlim-o-zgarishi-vazirligi-huzuridagi-turizm-qo-mitasi-faoliyati

UzA. (2026). Samarqand turizmi uchun yangi imkoniyatlar ochilmoqda. https://uza.uz/ar/posts/samarqand-turizmi-uchun-yangi-imkoniyatlar-ochilmoqda_896727

Yuz.uz. (2026). Biz erishayotgan natijalar ustuvor yo‘nalish va vazifalarni yanada takomillashtirish zaruratini keltirib chiqarmoqda. https://yuz.uz/uz/news/biz-erishayotgan-natijalar-ustuvor-yonalish-va-vazifalarni-yanada-takomillashtirish-zaruratini-keltirib-chiqarmoqda

THE ROLE AND IMPORTANCE OF DIGITAL INNOVATIONS IN ECONOMIC DEVELOPMENT

Mirkamolova Dilyora Sirojiddin qizi

Graduate School of Business and Entrepreneurship under the Cabinet of Ministers of the Republic of Uzbekistan

mirkamolova.dilyora@mail.ru

Annotation. *This article examines the role of digital innovations in economic development, focusing on production efficiency, business performance, and competitiveness. It analyses digital technologies, artificial intelligence, e-commerce, and financial technologies, highlighting opportunities and challenges for digital transformation in Uzbekistan and proposing recommendations for sustainable economic growth.*

Keywords: *digital innovations, digital economy, economic development, innovative technologies, artificial intelligence, e-commerce, automation, entrepreneurship, labour productivity, competitiveness.*

INTRODUCTION

In the context of globalisation and rapid technological advancement, digital innovations have become important drivers of economic development. The expansion of information and communication technologies, internet access, and artificial intelligence is transforming production, trade, finance, and management. Unlike traditional economic models, the modern economy increasingly relies on data, knowledge, and digital infrastructure alongside labour and capital.

Digital innovations enable enterprises to automate operations, reduce costs, analyse market demand, and improve managerial decision-making. However, their effectiveness depends on adequate infrastructure, skilled professionals, information security, and institutional support.

The aim of this study is to examine the role of digital innovations in economic development, assess their impact on economic efficiency, and propose recommendations for advancing the digital economy in Uzbekistan. The

research employs analysis and synthesis, comparative analysis, a systems approach, and scientific generalisation.

Digital innovations involve the application of digital technologies, information systems, software solutions, and data-processing methods to improve economic activities and create new business opportunities. They also encompass changes in business models, organisational structures, and management practices.

A key feature of digital innovation is its ability to collect and analyse data for informed economic decision-making. Enterprises can identify market trends, forecast demand, allocate resources efficiently, and respond to changing business conditions.

The principal areas of digital innovation include artificial intelligence, e-commerce, financial technologies, cloud computing, the Internet of Things, and big data analytics. These technologies support automated decision-making, expand market access, facilitate electronic payments, and improve the monitoring of production processes.

Digital technologies can create significant economic opportunities, but their benefits depend on complementary investments in infrastructure, workforce skills, and institutional development [2]. Therefore, digital innovation should be viewed as a comprehensive process combining technological advancement with organisational improvement and human capital development.

Digital innovations enhance economic efficiency by increasing labour productivity, reducing operating costs, improving service quality, and expanding market opportunities. Their application is particularly relevant to manufacturing, agriculture, trade, finance, and logistics.

Automation enables enterprises to perform repetitive operations more accurately, monitor equipment, detect technical failures, and control raw material consumption. These improvements can reduce production losses and increase resource efficiency.

Digital technologies also help organisations optimise administrative and operational costs. Electronic document management reduces paperwork, while digital logistics systems improve delivery planning and inventory management. These solutions enable businesses to allocate resources more effectively.

Furthermore, e-commerce allows small and medium-sized enterprises to reach customers beyond local markets without establishing physical branches. Digital platforms facilitate customer communication, improve access to market information, and support the development of new products and services.

Data analytics strengthens managerial decision-making by enabling enterprises to evaluate sales performance, customer preferences, and financial information. The effectiveness of digital innovations can be measured through labour productivity, production costs, sales growth, customer numbers, order-processing time, and investment payback periods.

Nevertheless, digitalisation does not automatically guarantee improved performance. Poor planning, inadequate employee training, and ineffective integration with existing systems may increase costs. Enterprises should therefore evaluate their technological needs, train employees, and monitor implementation outcomes.

Digital transformation is an important component of economic modernisation in Uzbekistan. The development of electronic public services, digital financial systems, IT businesses, and online commerce creates opportunities to improve productivity and national competitiveness.

In public administration, electronic applications and online services simplify access to information and reduce administrative burdens. In the financial sector, mobile banking and electronic payments facilitate transactions and expand access to financial services, particularly for households and small businesses.

Digital technologies also offer opportunities in agriculture and industry. Smart irrigation systems can improve water management, while automated

production and digital monitoring can reduce resource waste and enhance product quality.

Despite these opportunities, several challenges remain. Differences in digital infrastructure across regions, shortages of qualified specialists, limited investment capacity, and cybersecurity risks may restrict technology adoption. In addition, unequal access to digital resources and skills can create digital inequality.

Addressing these issues requires investment in infrastructure, professional training, affordable digital services, and effective data protection. Cooperation between educational institutions, businesses, and government organisations is also essential for developing the skills and institutional capacity required for successful digital transformation.

To maximise the economic benefits of digital innovations, enterprises should develop clear digital transformation strategies that identify priorities, expected outcomes, implementation costs, and measurable performance indicators.

Support for small and medium-sized enterprises should be expanded through accessible digital solutions, professional consultations, and training programmes. Cooperation between universities and businesses can help prepare specialists in artificial intelligence, data analytics, programming, and cybersecurity.

Innovation should also be encouraged through support for start-ups, scientific research, and the practical application of new technologies. Regular evaluation of digital investments is necessary to determine their effects on productivity, operating costs, revenue, and service quality.

Finally, cybersecurity must be integrated into digital development strategies. Secure data management, regular system updates, and employee training can reduce risks and ensure the continuity of economic activities.

CONCLUSION

Digital innovations are important drivers of economic development because they improve production processes, optimise resource allocation, reduce operating costs, and create new business opportunities. Artificial intelligence, e-commerce, financial technologies, and data analytics are transforming economic activities and improving decision-making.

However, achieving sustainable benefits requires more than technological investment. Reliable infrastructure, qualified professionals, effective management, financial planning, and cybersecurity are essential for successful implementation.

In Uzbekistan, digital transformation offers opportunities to modernise public administration, improve financial services, increase agricultural and industrial productivity, and expand entrepreneurship. Coordinated efforts by government institutions, educational organisations, businesses, and technology developers can help realise this potential.

Overall, integrating digital innovations into economic activities should be considered a strategic priority. Combining technological development with human capital investment, organisational improvement, and inclusive digital policies can strengthen economic efficiency, promote sustainable growth, and enhance national competitiveness.

REFERENCES

1. OECD. The Digital Transformation of SMEs. Paris: OECD Publishing, 2021.
2. World Bank. World Development Report 2016: Digital Dividends. Washington, DC: World Bank, 2016.
3. World Bank. World Development Report 2021: Data for Better Lives. Washington, DC: World Bank, 2021.
4. Schwab, K. The Fourth Industrial Revolution. Geneva: World Economic Forum, 2016.
5. Rogers, D. L. The Digital Transformation Playbook: Rethink Your Business for the Digital Age. New York: Columbia University Press, 2016.
6. Republic of Uzbekistan. Regulatory documents concerning the Digital Uzbekistan – 2030 Strategy. National Database of Legislation. Available at: https://lex.uz/

OROLBO'YI MINTAQASIDA XIZMAT KO'RSATISH SOHASINI INNOVATSION BOSHQARISHNING TASHKILIY-IQTISODIY MEXANIZMLARINI TAKOMILLASHTIRISH

Umarova X.D.

Berdaq nomidagi Qoraqalpoq davlat universiteti tayanch doktoranti

xusnoraumarova3333@gmail.com

Annotatsiya. *Maqolada Orol dengizi qurishi oqibatlari ta'sir ko'rsatayotgan Orolbo'yi mintaqasida xizmat ko'rsatish sohasini innovatsion boshqarishning tashkiliy-iqtisodiy mexanizmlari tahlil qilinadi. Mintaqaning ekologik va iqtisodiy o'ziga xos xususiyatlari, xizmat tarmog'ining holati hamda aholi bandligidagi muammolar ko'rib chiqiladi. Tashkiliy, iqtisodiy, kadrlar va raqamli mexanizmlarni takomillashtirishga qaratilgan yo'nalishlar asoslanadi.*

Kalit so'zlar: *Orolbo'yi, xizmat ko'rsatish, innovatsion boshqaruv, tashkiliy-iqtisodiy mexanizm, mintaqaviy rivojlanish, bandlik, raqamli xizmatlar.*

1. KIRISH

Orol dengizi 1960-yillardan boshlab qurib borishi natijasida Orolbo'yi mintaqasi chuqur ekologik va ijtimoiy-iqtisodiy inqirozga yuz tutdi (Micklin, 2007). Suv tanqisligi, tuproqning sho'rlanishi, dengiz tubidagi tuzli changning tarqalishi va an'anaviy xo'jalik tarmoqlarining zaiflashishi aholi turmush darajasiga bevosita ta'sir qildi. Shu sharoitda xizmat ko'rsatish sohasi — savdo, transport, maishiy xizmat, turizm, sog'liqni saqlash, ta'lim, aloqa va ekologik monitoring — aholi bandligi va daromadining muhim manbaiga aylanishi kerak.

Biroq mintaqada xizmat tarmog'i ko'pincha infratuzilmaning pastligi, xizmat turlarining kamligi, aholi joylashuvining tarqoqligi va malakali kadrlar yetishmasligi bilan xarakterlanadi. Bu holat xizmatlar narxini oshiradi va sifatini pasaytiradi. Innovatsiya bu yerda faqat texnologik yangilik sifatida emas, balki xizmat mazmuni, jarayonlar va boshqaruv modelining yangilanishi sifatida talqin qilinadi (Schumpeter, 1934; Drucker, 1985).

O'zbekistonda Orolbo'yi hududlarini ijtimoiy-iqtisodiy rivojlantirish, aholi bandligini oshirish va mahalliy tadbirkorlikni qo'llab-quvvatlash bo'yicha davlat siyosati olib borilmoqda (O'zbekiston Respublikasi Prezidentining PF-4947-son Farmoni, 2017). Maqolaning maqsadi shu siyosat doirasida xizmat ko'rsatish sohasini innovatsion boshqarishning tashkiliy-iqtisodiy mexanizmlarini mintaqaviy xususiyatlarni hisobga olgan holda takomillashtirish yo'nalishlarini asoslashdan iborat.

2. MATERIAL VA METODLAR

Tadqiqot nazariy-tahliliy xarakterga ega. Quyidagi usullardan foydalanildi: (1) xizmat ko'rsatish, mintaqaviy rivojlanish va innovatsion boshqaruv bo'yicha ilmiy adabiyotlarni tizimli tahlil qilish; (2) Orolbo'yi hududlarini rivojlantirishga oid normativ-huquqiy hujjatlar va rasmiy strategiyalarni mazmunan o'rganish; (3) mintaqaviy xususiyatlarni (ekologik, demografik, infratuzilmaviy) xizmat turlari kesimida tizimlashtirish; (4) mexanizmlarni klaster yondashuvi asosida taqqoslash (Porter, 1990).

Xizmat sifatini baholash uchun SERVQUAL modelining asosiy o'lchamlari — ishonchlilik, tezkor javob berish, kafolat, empatiya va moddiy-texnik vositalar (Parasuraman va boshqalar, 1985) mintaqaviy sharoitga moslashtirildi. Bu yondashuv mexanizmlarni natijaviy ko'rsatkichlar bilan bog'lash imkonini beradi.

3. NATIJALAR

Tahlil shuni ko'rsatdiki, Orolbo'yi mintaqasida xizmat ko'rsatishni innovatsion boshqarishga to'sqinlik qiluvchi uchta asosiy omil mavjud. Birinchidan, suv resurslarining cheklanganligi va ekologik xavflar xizmat turlarini tanlashga va ularning joylashuviga ta'sir qiladi. Ikkinchidan, aholining tarqoq joylashuvi xizmat ko'rsatish xarajatlarini oshiradi, shu sababli markazlashgan xizmat modellari chekka hududlarda samarasiz bo'lib qoladi. Uchinchidan, yoshlar ulushining yuqoriligi bandlik muammosini kuchaytiradi,

lekin ularni xizmat sohasiga jalb qilish uchun malaka va moliyaviy imkoniyatlar yetarli emas.

Ushbu omillarga asoslanib, xizmat ko'rsatishni innovatsion boshqarishning to'rt guruh mexanizmi ajratildi: tashkiliy, iqtisodiy, kadrlar va ijtimoiy hamda raqamli va ekologik mexanizmlar (1-jadval).

1-jadval. Orolbo'yi mintaqasida xizmat ko'rsatishning innovatsion boshqaruv mexanizmlari

Mexanizm guruhi	Asosiy vositalar	Kutilayotgan natija
Tashkiliy	Tumanlararo xizmat klasterlari; ko'p tarmoqli mahalla xizmat markazlari; xizmat sohasida hududiy hamkorlik kengashlari	Xizmatlar qamrovini kengaytirish; chekka hududlarda xarajatlarni kamaytirish
Iqtisodiy	Xizmat ko'rsatuvchi kichik biznes uchun imtiyozli soliq rejimi; mikrokredit va grant mablag'lari; davlat-xususiy sheriklik loyihalari	Xizmat tarmog'ida yangi ish o'rinlari; mahalliy resurslardan foydalanish
Kadrlar va ijtimoiy	Mahalliy yoshlar va ayollar uchun qisqa muddatli kasbiy o'qitish; xizmat sohasida malaka markazlari; mehnat migratsiyasini kamaytirish dasturlari	Bandlikni oshirish; malakali kadrlar bilan ta'minlash
Raqamli va ekologik	Qishloq hududlarida internet va mobil xizmatlar; suv va ekologik monitoring xizmatlari; onlayn davlat xizmatlari	Xizmatga kirish imkonini kengaytirish; ekologik xavflarga tezkor javob

Tashkiliy mexanizmlar tumanlararo xizmat klasterlari orqali resurslarni birlashtirishga imkon beradi. Ko'p tarmoqli mahalla xizmat markazlari bir joyda bir nechta xizmat turini taqdim etib, chekka qishloqlardagi aholining transport va vaqt xarajatlarini kamaytiradi.

Iqtisodiy mexanizmlar xizmat ko'rsatuvchi kichik biznesni qo'llab-quvvatlashga qaratilgan. Imtiyozli soliq rejimi, mikrokredit va grantlar, davlat-xususiy sheriklik loyihalari mahalliy tadbirkorlikni rag'batlantiradi. Bu mexanizmlar xizmat tarmog'ida yangi ish o'rinlari yaratish bilan birga, mintaqaning iqtisodiy bog'liqligini kamaytirishga xizmat qiladi.

Kadrlar va ijtimoiy mexanizmlar mahalliy yoshlar va ayollarni xizmat sohasiga jalb qilishga qaratilgan. Qisqa muddatli kasbiy o'qitish va malaka markazlari bandlikni oshiradi hamda mehnat migratsiyasiga bog'liqlikni kamaytirishga yordam beradi. Raqamli va ekologik mexanizmlar esa qishloq hududlarida internet va onlayn davlat xizmatlarini kengaytirish, shuningdek, suv va ekologik monitoring xizmatlarini joriy etish orqali xizmatga kirish imkonini oshiradi.

4. MUHOKAMA

Tahlil shuni ko'rsatadiki, ko'rib chiqilgan mexanizmlar bir-biridan ajralgan holda emas, balki o'zaro bog'liq tizim sifatida ishlashi kerak. Masalan, kadrlar tayyorlash dasturlari moliyaviy qo'llab-quvvatlashsiz samarasiz bo'ladi, raqamli xizmatlar esa qishloqlarda internet infratuzilmasi bo'lmasa amalga oshmaydi. Shu sababli islohotlar mintaqaning barcha xususiyatlarini hisobga olgan holda kompleks rejalashtirilishi lozim.

Muhokama davomida uchta asosiy xavf aniqlandi. Birinchidan, xizmat sohasi ekologik omillarga, xususan, suv tanqisligiga kuchli bog'liq bo'lib, iqlim o'zgarishi bu bog'liqlikni kuchaytirishi mumkin. Ikkinchidan, imtiyozlarga haddan tashqari tayanish mahalliy tadbirkorlikni davlat yordamiga qaram qilib qo'yishi mumkin. Uchinchidan, xizmat markazlarini eng yirik aholi punktlarida joylashtirish chekka tumanlarni yanada chetda qoldirishi mumkin. Bu xavflar hududlar kesimida monitoring va ijtimoiy adolatga e'tibor qaratish orqali kamaytiriladi.

Innovatsion boshqaruvning muvaffaqiyati mahalliy hokimiyat organlari, tadbirkorlar va aholining ishtirokiga bevosita bog'liq. Shu bois avval tanlangan

pilot tumanlarda loyihalarni sinovdan o'tkazish, natijalarni baholash va keyin boshqa hududlarga kengaytirish tavsiya etiladi.

5. XULOSA VA TAVSIYALAR

Olib borilgan tahlil Orolbo'yi mintaqasida xizmat ko'rsatish sohasini innovatsion boshqarishning tashkiliy-iqtisodiy mexanizmlari mintaqaning ekologik va ijtimoiy xususiyatlariga moslashtirilishi zarurligini ko'rsatdi. Mexanizmlarni takomillashtirish uchun quyidagi yo'nalishlar tavsiya etiladi:

– tumanlararo xizmat klasterlari va ko'p tarmoqli mahalla xizmat markazlarini tashkil etish;

– xizmat ko'rsatuvchi kichik biznes uchun imtiyozli soliq, kredit va grant mexanizmlarini kengaytirish;

– mahalliy yoshlar va ayollar uchun malaka oshirish va bandlikka yo'naltirilgan dasturlarni joriy etish;

– qishloq hududlarida raqamli xizmatlar va ekologik monitoring tizimini rivojlantirish.

Kelgusida tadqiqotni mintaqaning statistik ma'lumotlari, mahalliy hokimiyat organlari va xizmat ko'rsatuvchi tadbirkorlar bilan so'rovnomalar asosida davom ettirish maqsadga muvofiq.

FOYDALANILGAN ADABIYOTLAR

1. Drucker P.F. Innovation and Entrepreneurship. — New York: Harper & Row, 1985.

2. Grönroos C. Service Management and Marketing: Customer Management in Service Competition. — 3rd ed. — Chichester: Wiley, 2007.

3. Micklin P. The Aral Sea Disaster // Annual Review of Earth and Planetary Sciences. — 2007. — Vol. 35. — P. 47–72.

4. Parasuraman A., Zeithaml V.A., Berry L.L. A Conceptual Model of Service Quality and Its Implications for Future Research // Journal of Marketing. — 1985. — Vol. 49, No. 4. — P. 41–50.

5. Porter M.E. The Competitive Advantage of Nations. — New York: Free Press, 1990.

6. Schumpeter J.A. The Theory of Economic Development. — Cambridge, MA: Harvard University Press, 1934.

7. O'zbekiston Respublikasi Prezidentining 2017-yil 7-fevraldagi PF-4947-son Farmoni «2017–2021-yillarda O'zbekiston Respublikasini rivojlantirishning beshta ustuvor yo'nalishi bo'yicha Harakatlar strategiyasi» to'g'risida.

IMPROVING THE METHODOLOGY FOR DEVELOPING LABOUR MOBILITY IN THE TRANSFORMATION OF REGIONAL LABOUR MARKETS: EVIDENCE FROM UZBEKISTAN

Shakarov Zafar Gafforovich

Tashkent Branch of the G.V. Plekhanov

Russian University of Economics,

Docent

Abstract. *The paper proposes a methodology that treats the transformation of regional labour markets as the policy goal and labour mobility as the mechanism that delivers it. Mobility is measured separately as potential, realised movement and programme outcome, while a new directional indicator, the regional mobility gap, compares required and realised net mobility across 14 regions of Uzbekistan. The results support a five-type regional typology and a differentiated, outcome-based mobility support scheme.*

Keywords: *labour mobility, regional labour market, mismatch, regional mobility gap, typology, Uzbekistan.*

INTRODUCTION

Labour market performance increasingly depends not on the number of jobs alone but on how efficiently workers are reallocated across regions, sectors, occupations and forms of employment. According to the ILO, global unemployment is expected to remain at about 4.9% in 2026, while the global jobs gap will reach 408 million people [1]. In Uzbekistan the resident population reached 38.2 million at the beginning of 2026 and grew by 1.8% in a year, which keeps strong pressure on regional labour markets [2]. Resolution PQ-49 of 5 February 2026 sets the targets of reducing unemployment to 4.5% and placing 1.0 million people in permanent jobs [3].

Between 2020 and 2025 unemployment in Uzbekistan fell from 10.5% to 4.8%, and the interregional range narrowed from 3.1 to 1.0 percentage points. Yet wages in Tashkent city remain 2.4 times higher than in Kashkadarya, 29.7% of all vacancies are concentrated in the capital, and the share of the informal

economy ranges from 10.2% to 37.2% across regions. Convergence in unemployment therefore does not by itself mean that labour resources are allocated efficiently. Existing tools, such as the Beveridge curve and mismatch indices, measure the size of the mismatch but not its direction or the part of required mobility that has not materialised [4; 5]. The aim of the study is to improve the methodology for assessing and developing labour mobility as the mechanism of regional labour market transformation.

DATA AND METHODOLOGY

The empirical base comprises official regional data of the National Statistics Committee for 14 regions over 2020-2025, vacancy records of the Ministry of Poverty Reduction and Employment as of 1 January 2025 (408.1 thousand vacancies), a survey of 454 external labour migrants conducted in August-October 2025 and a regional panel for 2014-2025. The methodology rests on a "goal-mechanism-result" framework. Transformation is defined by four measurable criteria, namely allocative fit, formalisation of employment, productivity and income, and regional convergence, and each criterion is linked to a specific form of mobility, an institutional condition and an outcome indicator.

Mobility itself is measured by three separate indices. The mobility potential index (I_{MS}) captures conditions for movement, the realised mobility index (I_{AOM}) captures actual transitions, and the mobility outcome index (I_{MN}) captures job placement, retention at 6 and 12 months, wage growth and formalisation. Unemployment, poverty and informality are kept outside the indices as context variables, which removes tautology between the index and the result. Weights are derived by equal, entropy and principal component methods and tested with 10,000 Dirichlet simulations, and class thresholds follow Jenks natural breaks [6].

The direction of required movement is given by the regional mobility balance index, a regional decomposition of the Jackman-Roper index [4]:

$$I_{HMB,r} = (U_r - U \cdot V_r/V) / L_r \times 100, \quad (1)$$

where U_r and V_r are regional unemployment and vacancies, U and V are national totals and L_r is the economically active population. A positive value indicates required net outflow and a negative value required net inflow. The author's key indicator, the regional mobility gap, compares this requirement with the net change in the labour force over 2020-2025 adjusted for natural growth (NA_r):

$$I_{HMT,r} = - I_{HMB,r} - NA_r. \quad (2)$$

A negative I_{HMT} means that surplus labour is retained in the region, a positive value means that the required inflow has not occurred or outflow exceeded the requirement. Measurement uncertainty is estimated by 5,000 Monte Carlo replications (90% interval). The incentive coefficient C_{RM}, based on Harris-Todaro expected wages [7], shows whether wage signals point in the required direction.

RESULTS AND DISCUSSION

First, regional mismatch in Uzbekistan is moderate but monocentric. The Jackman-Roper index equals 0.300, and about 5-6% of hires are lost because of mismatch [5]. Eight sending regions should supply a required net flow of about 250.4 thousand people, of which 89% is directed to Tashkent city and Tashkent region. Expected wages in sending regions are 7-21% below the national level, so the incentive to move exists and the main barriers lie in housing, transport and information costs.

Second, the ranking of regions by I_{MS} is almost insensitive to the choice of weights (Kendall τ = 0.98-1.00), whereas realised mobility is not related to potential ($\rho = -0.22$; $p = 0.44$). Potential therefore does not translate automatically into movement. In seven regions I_{HMT} is significantly negative, with the largest values in the Republic of Karakalpakstan (−6.08%), Khorezm (−4.09%) and Kashkadarya (−3.72%). The largest unrealised inflows are observed in Tashkent region (+6.76%), Bukhara (+5.23%) and Tashkent city (+3.25%). I_{HMT} does not duplicate existing indicators ($|\rho| \leq 0.27$ with I_{MS}, I_{HMB}, informality and expected wages).

Third, a transparent rule based on the sign of I_{HMB}, the class of I_{HMT} and the sign of C_{RM} divides regions into five types (Table 1).

Table 1

Typology of regional labour markets and policy priorities

Type	Regions	Policy priority
T-1 Effective attraction centre	Navoi	Targeted recruitment with employers
T-2 Constrained attraction centres	Tashkent city, Tashkent region	Reducing housing and commuting barriers
T-3 Unattractive vacancies	Bukhara, Syrdarya	Raising wage and job quality
T-4 Retained labour surplus	Karakalpakstan, Andijan, Jizzakh, Kashkadarya, Samarkand, Fergana, Khorezm	Relocation package and occupational voucher
T-5 Excess outflow	Namangan, Surkhandarya	Local employment, formal and circular migration, reintegration

Source: author's calculations.

The types are robust: the probability of a region keeping its type under measurement error is 0.93-1.00, and agreement with independent Ward clustering is ARI = 0.69-0.72. T-4 regions provide 77% of the required net flow and are therefore the main source regions for relocation support, while in T-5 regions such support would only intensify excess outflow.

Fourth, the policy effect of mobility is meaningful but moderate. A steady-state flow model shows that eliminating 25-60% of regional mismatch would reduce unemployment by 0.08-0.16 percentage points by 2030, or about 18.4 thousand people, while participants' wages would rise by 25.7% on average. A uniform subsidy for all regions barely pays for itself (benefit-cost ratio 1.01), whereas a targeted scheme with 30% employer co-financing reaches 1.74 [1.30; 2.32] with a payback period of 14.6 months.

CONCLUSION

The study makes three contributions. First, separating mobility potential, realised movement and outcomes prevents tautology in integral assessment and shows that potential is not yet movement. Second, the regional mobility gap is a new directional indicator that identifies where and in which direction the mobility mechanism breaks down. Third, the typological model links each region to a specific barrier and policy instrument.

On this basis, it is proposed to calculate I_{HMB} and I_{HMT} annually within the labour resources balance prepared under Cabinet of Ministers Resolution No. 1011 [8]. Relocation from T-4 to T-1 and T-2 regions should be supported by a package differentiated by I_{HMT} and I_{MS}, with payments split into 40/30/30 tranches tied to registered employment and to job retention at 6 and 12 months. Vacancy-candidate matching on a digital labour platform and regional training quotas would make these results verifiable. The mechanism should be introduced in 2026-2030 in the sequence "pilot - comparative evaluation - scaling up".

REFERENCES

1. ILO. Employment and Social Trends 2026. – Geneva: International Labour Office, 2026.

2. National Statistics Committee of the Republic of Uzbekistan. Demographic situation in the Republic of Uzbekistan, January-December 2025. – Tashkent, 2026. – URL: https://stat.uz.

3. Resolution of the President of the Republic of Uzbekistan No. PQ-49 of 5 February 2026 "On measures to increase incomes, create sustainable jobs and reduce poverty through the development of regions on the basis of new approaches in 2026". – URL: https://lex.uz/docs/8038302.

4. Jackman R., Roper S. Structural Unemployment // Oxford Bulletin of Economics and Statistics. – 1987. – Vol. 49. – No. 1. – P. 9-36.

5. Şahin A., Song J., Topa G., Violante G.L. Mismatch Unemployment // American Economic Review. – 2014. – Vol. 104. – No. 11. – P. 3529-3564.

6. OECD, JRC. Handbook on Constructing Composite Indicators: Methodology and User Guide. – Paris: OECD Publishing, 2008. – 162 p.

7. Harris J.R., Todaro M.P. Migration, Unemployment and Development: A Two-Sector Analysis // American Economic Review. – 1970. – Vol. 60. – No. 1. – P. 126-142.

8. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 1011 of 22 December 2017. – URL: https://lex.uz.

MARKAZIY OSIYO VA O'ZBEKISTON IQTISODIY SALOHIYATINING TURIZM BOZORIGA TA'SIRI: MEHMONXONA XIZMATLARI BOZORI BILAN O'ZARO BOG'LIQLIK TAHLILI

Rustamov Otabek Akbarovich

Head of Marketing and Admissions Department,

Silk Road International University of Tourism and Cultural Heritage

e-mail: otabekrustamov934@gmail.com

Phone:90-287-22-87

https://orcid.org/0009-0005-0075-0834

Annotatsiya*: Ushbu maqolada Markaziy Osiyo va O‘zbekistonning makroiqtisodiy salohiyati hamda infratuzilmaviy omillarining turizm bozori dinamikasi va mehmonxona xizmatlari sohasiga ta’siri tahlil qilinadi. Tadqiqotda investitsiya muhitining yaxshilanishi, transport-logistika dahlizlarining rivojlanishi va ijtimoiy islohotlarning turistik oqim hamda mehmonxona sektori investitsiya faolligiga ijobiy ta’siri asoslab berilgan. Shu bilan birga, suv tanqisligi, iqlim xavflari, logistika cheklovlari va mehmonxona bozoridagi segmentar nomutanosiblik kabi barqaror rivojlanishga to‘sqinlik qiluvchi omillar ko‘rib chiqilgan. Mintaqaviy turizm salohiyatini kompleks baholash uchun Turizm Salohiyati Indeksi (TSI) kontseptual modeli taklif etilgan bo‘lib, u mikro darajadagi (DEA va SERVQUAL-Uz) samaradorlik tahlilini makroiqtisodiy kontekst bilan bog‘lashga xizmat qiladi. Maqola yakunida mehmonxona xizmatlari bozorini barqaror rivojlantirish bo‘yicha ilmiy-amaliy tavsiyalar berilgan.*

Kalit so‘zlar: *turizm bozori, mehmonxona xizmatlari, Markaziy Osiyo, O‘zbekiston, makroiqtisodiy salohiyat, Turizm Salohiyati Indeksi (TSI), DEA tahlili, iqlim xavflari, investitsiyalar.*

Аннотация*. В данной статье анализируется влияние макроэкономического потенциала и инфраструктурных факторов Центральной Азии и Узбекистана на динамику туристического рынка и сферу гостиничных услуг. В исследовании обосновано положительное влияние улучшения инвестиционного климата, развития транспортно-логистических коридоров и социальных реформ на увеличение туристического потока и инвестиционную активность в гостиничном секторе. В то же время рассмотрены факторы, препятствующие устойчивому развитию, такие*

как дефицит водных ресурсов, климатические риски, логистические ограничения и сегментный дисбаланс на гостиничном рынке. Для комплексной оценки регионального туристического потенциала предложена концептуальная модель Индекса туристического потенциала (TSI), связывающая микроэкономический анализ эффективности (DEA и SERVQUAL-Uz) с макроэкономическим контекстом. В заключении приведены научно-практические рекомендации по устойчивому развитию рынка гостиничных услуг.

Ключевые слова: *туристический рынок, гостиничные услуги, Центральная Азия, Узбекистан, макроэкономический потенциал, Индекс туристического потенциала (TSI), анализ DEA, климатические риски, инвестиции.*

Abstract*. This article analyzes the impact of the macroeconomic potential and infrastructure factors of Central Asia and Uzbekistan on the dynamics of the tourism market and the hospitality sector. The study demonstrates the positive effect of an improved investment climate, the development of transport and logistics corridors, and social reforms on tourist inflow and investment activity in the hotel industry. At the same time, constraints to sustainable development—such as water scarcity, climate risks, logistics bottlenecks, and structural market imbalances—are thoroughly examined. To comprehensively assess regional tourism potential, a conceptual model called the Tourism Potential Index (TSI) is proposed, which connects micro-level efficiency analysis (DEA and SERVQUAL-Uz) with the broader macroeconomic context. Finally, scientific and practical recommendations are provided for the sustainable development of the hotel services market.*

Keywords: *tourism market, hotel services, Central Asia, Uzbekistan, macroeconomic potential, Tourism Potential Index (TSI), DEA analysis, climate risks, investments.*

KIRISH

So'nggi yillarda turizm Markaziy Osiyo, jumladan O'zbekiston iqtisodiyotining tobora ortib borayotgan strategik tarmog'iga aylanib bormoqda. Mintaqaning demografik, resurs va investitsiya salohiyati, shuningdek transport-logistika infratuzilmasidagi o'zgarishlar bevosita va bilvosita tarzda turistik oqimlar hajmi, tuzilmasi hamda mehmonxona xizmatlari bozorining rivojlanish sur'atlariga ta'sir ko'rsatadi. Ayni paytda mintaqa bir qator jiddiy tavakkalchiliklarga — suv tanqisligi, iqlim o'zgarishi va transport-logistika cheklovlariga — ham duch kelmoqda, bu esa turizm-mehmonxona majmuasining barqaror rivojlanishiga qo'shimcha talablar qo'yadi. Quyida ushbu

ikki blok — yutuqlar va kamchiliklar — izchil tahlil qilinib, ularning turizm va mehmonxona bozoriga ta'sir mexanizmlari ko'rsatib beriladi.

Markaziy Osiyo mamlakatlari bugungi kunda umumiy aholisi taxminan 80 million kishini tashkil etuvchi, jadal rivojlanayotgan mintaqa hisoblanadi; 2030-yilga borib aholi soni 90 millionga, mintaqaviy YaIM esa 450 milliard dollardan 700 milliard dollardan oshiq darajaga yetishi kutilmoqda. O'zbekiston iqtisodiyoti 2026-yilda 150 milliard dollar chegarasidan oshib, dunyoning eng yirik 50 ta iqtisodiyoti qatoriga kirdi. Mintaqaning umumiy tashqi savdo aylanmasi 245,4 milliard dollarni tashkil etsa, mintaqa ichidagi o'zaro savdo ulushi 2017-yildagi 6,6 foizdan 8,8 foizga (10,6 mlrd doll.) o'sdi, bu mintaqaviy iqtisodiy integratsiyaning kuchayib borayotganidan dalolat beradi. Xorijiy to'g'ridan-to'g'ri investitsiyalar (PII) hajmi 2010-yildan buyon 2,1 baravar o'sib, 2022-yilda 216,4 milliard dollarga yetdi.[1]

Ko'rsatkich	**Hozirgi holat**	**2030-yilga prognoz**
Mintaqa aholisi	~80 mln kishi	~90 mln kishi
Mintaqaviy YaIM	$450 mlrd	>$700 mlrd
Mintaqaviy eksport	$125 mlrd	$200 mlrd
O'zbekiston YaIMi	>$150 mlrd (2026)	Dunyo TOP-50 iqtisodiyoti
Mintaqadagi ichki savdo ulushi	8,8% ($10,6 mlrd)	2017-yilda 6,6%
Xorijiy investitsiyalar (PII)	$216,4 mlrd (2022)	2010-yildan 2,1 baravar o'sish

Bundan tashqari, mintaqa kritik xomashyo va noyob yer elementlari bo'yicha ulkan zaxiralarga ega: AQSh Geologik xizmati ma'lumotlariga ko'ra, 384 istiqbolli konning 87 tasi O'zbekiston hududida joylashgan, respublikada 22 turdagi kritik xomashyoning 11 tasi aniqlangan. Energetika sohasida esa quyosh energiyasi salohiyati 4000 GVt dan, shamol energiyasi salohiyati 350 GVt dan oshadi; O'zbekistonda qayta tiklanuvchi manbalar elektr energiyasi ishlab chiqarishning 25–30 foizini ta'minlamoqda, 2030-yilga borib esa bu ko'rsatkichni 40 foizga yetkazish rejalashtirilgan.

[1]Markaziy Osiyo va O'zbekistonning yangi iqtisodiy istiqbollari: rasmiy iqtisodiy hisobot va mintaqaviy salohiyat tahlili, 2026.

Mintaqaviy investitsiya jozibadorligining ortishi bevosita mehmonxona infratuzilmasi qurilishiga ko'chmoqda. Hukumat 3–5 yulduzli mehmonxonalar qurilishini rag'batlantirish maqsadida subsidiyalar tizimini joriy etdi — 3 yulduzli mehmonxona xonasi uchun 40 million so'm, 4–5 yulduzli xona uchun 65 million so'm miqdorida bir martalik subsidiya, shuningdek 2024-yil 1-oktyabrdan boshlab mehmonxona va turoperatorlarga to'langan QQSning 20 foizini byudjetdan qaytarish mexanizmi amal qilmoqda. Natijada mamlakatga JW Marriott Tashkent, Hilton Samarkand Regency, Hyatt Regency Tashkent, InterContinental Tashkent, Mövenpick Samarkand, Mercure Bukhara Old Town kabi yetakchi xalqaro brendlar kirib kelmoqda.[2]

2026-yil o'rtalariga kelib mamlakatdagi mehmonxona va turar joy vositalari soni 7 mingdan oshdi, respublikada taxminan 30 ta xalqaro mehmonxona brendi faoliyat yuritmoqda — bu ko'rsatkich so'nggi bir necha yil ichida investitsiya muhitining sezilarli yaxshilanganini aks ettiradi.[3]

Transkaspiy xalqaro transport marshruti (O'rta dahliz) mintaqaning tashqi bozorlarga, xususan Yevropa Ittifoqiga yaqinlashuvini ta'minlaydigan asosiy diversifikatsiya loyihasi hisoblanadi. YeI–Markaziy Osiyo savdo aylanmasi 2022-yilda 47,5 milliard yevroga yetdi, YeI esa dahlizni rivojlantirishga 10 milliard yevrogacha investitsiya yo'naltirishni rejalashtirmoqda, bu yetkazib berish muddatini 15 kundan kamga tushirishga xizmat qiladi. 2030-yilga borib dahliz orqali yiliga 120 ming konteyner tranzitini ta'minlash ko'zda tutilgan. Transport-logistika bog'lanishlarining yaxshilanishi nafaqat yuk tashish, balki xalqaro sayyohlar va biznes-turistlarning mintaqaga yetib kelish qulayligini ham oshiradi, bu esa mehmonxona bandligiga bilvosita ijobiy ta'sir ko'rsatadi.[4]

"Mahallabay" adresli qo'llab-quvvatlash dasturi doirasida 2022–2024-yillarda 977,6 ming oilaviy tadbirkorlik loyihasiga 1,7 milliard dollar miqdorida

[2]Gazeta.uz, 19.05.2026 — «Узбекистан за 4 месяца посетили 4 миллиона туристов».
[3]Nuz.uz, 19.06.2026 — TMИФ-2026 forumi materiallari.

kredit ajratilishi natijasida O'zbekistonda qashshoqlik darajasi 23 foizdan 11 foizga tushdi (2030-yilga maqsad — 5%), real ish haqi esa 2017–2024-yillarda 47 foizga o'sdi. Aholi turmush darajasi va daromadlarining o'sishi ichki turizm va bo'sh vaqtga sarflanadigan xarajatlar hajmini kengaytiradigan, shu orqali o'rta segmentdagi mehmonxona va turar joy vositalariga talabni oshiradigan muhim omil hisoblanadi.[5]

XVF ma'lumotlariga ko'ra, so'nggi 30 yilda mintaqa harorati global o'rtacha ko'rsatkichdan (0,7°C) ikki baravar yuqori — 1,5°C ga oshdi, Amudaryo suv sarfi so'nggi 20 yilda 30 foizga kamaydi. Afg'onistondagi Qo'shtepa kanali qurilishi 2030-yilgacha to'liq ishga tushirilgach, Amudaryo suv sarfini 25–30 foizga kamaytirishi, O'zbekiston qishloq xo'jaligi sohasida 250 ming ish o'rnini yo'qotilishiga olib kelishi mumkin. Bunday tendentsiyalar an'anaviy vohalarga asoslangan ekoturizm, agroturizm va suv resurslariga bog'liq rekreatsion hududlarning barqarorligiga bevosita tahdid soladi, shuningdek Butunjahon banki hisob-kitoblariga ko'ra mintaqa tabiiy ofatlardan yiliga o'rtacha 10 milliard dollar zarar ko'radi.6

O'rta dahliz salohiyatidan to'liq foydalanishga bir qator jiddiy to'siqlar xalaqit bermoqda: Kaspiy dengizi sathining yiliga 7 sm pasayishi (Qozog'iston qirg'og'ida dengiz 71 foizga sayozlashgan), 3–4 ming birlik temir yo'l vagonlari, xususan refrijeratorlar tanqisligi, hamda temir yo'l kengligining farqi (Xitoy, Yevropa, Eron va Turkiyada 1435 mm, MDH davlatlarida 1520 mm). Bunday cheklovlar nafaqat tashqi savdo, balki xalqaro turistlarning mintaqaga yetib kelish

vaqti va qiymatini ham oshiradi, bu esa uzoq masofali bozorlardan sayyohlar oqimini cheklashi mumkin.7

Rasmiy statistika ma'lumotlariga ko'ra, mamlakatda taxminan 23 ming mehmonxona xonasi mavjud bo'lsa-da, ularning atigi 3–3,5 mingtasigina zamonaviy sifat standartlariga javob beradi, bu xonalarning katta qismi (2,8

ming) Toshkentda, qolgani esa Buxoro, Samarqand va Xiva kabi tarixiy shaharlarda joylashgan. Tahlilchilar ta'kidlashicha, rivojlanish yuqori narxli segmentga qarab og'moqda — bu o'rta va quyi byudjetli sayyohlar uchun sifatli joylashuv tanqisligini keltirib chiqarish xavfini yaratadi va milliy klassifikatsiya talablarining xalqaro standartlardan qattiqroq bo'lishi kichik va o'rta mehmonxonalarning rasmiylashuvini murakkablashtiradi.8

Yuqorida ko'rsatilgan makroiqtisodiy va infratuzilmaviy omillarning yig'indi ta'siri natijasida O'zbekistonga tashrif buyurgan xorijiy fuqarolar soni barqaror o'sish tendensiyasini namoyon etmoqda: 2023-yildagi 6,6 milliondan 2024-yilda 8,2 millionga (+24,2%), 2025-yilda esa 11,7 millionga (+46,8%) yetdi. 2026-yilning yanvar-aprel oylarida mamlakatga 4 million turist tashrif buyurdi va ularga ko'rsatilgan xizmatlar hajmi 1,6 milliard dollarni tashkil etib, o'tgan yilning shu davriga nisbatan 40 foizga o'sdi.9

Davr	**Tashrif buyurgan xorijiy fuqarolar**	**O'sish sur'ati**
2023-yil	6,6 mln kishi	—
2024-yil	8,2 mln kishi	+24,2%
2025-yil	11,7 mln kishi	+46,8%
2026-yil, yanvar-aprel	4 mln kishi / xizmatlar $1,6 mlrd	+40% (xizmatlar hajmi)
2030-yilga maqsad	20 mln kishi / eksport $6 mlrd	Strategik ustuvorlik

Davlat 2030-yilga borib xorijiy turistlar sonini 20 millon kishiga, turizm xizmatlari eksportidan tushumni esa 6 milliard dollarga yetkazishni maqsad qilgan, shu bilan birga ekologik, gastronomik, ziyorat va tibbiy turizm kabi ixtisoslashgan yo'nalishlarni rivojlantirish, Expedia Group, Amadeus va Trip.com kabi xalqaro platformalar bilan hamkorlikni kengaytirish ustuvor vazifa sifatida belgilangan.10

[8]Cmwp.uz — «Настоящее и будущее гостиничной индустрии Узбекистана».

[10]Economist.kg, 18.05.2026 — «Узбекистан намерен увеличить поток туристов до 20 млн человек».

Turistlar oqimining o'sishi mehmonxona bozoridagi investitsiya faolligi bilan bevosita korrelyatsiyada: davlat rag'batlantiruvchi choralari (subsidiyalar, QQS qaytarilishi, imtiyozli soliq stavkalari) mehmonxona qurilishi bumini kuchaytirmoqda, biroq 4.3-bandda ko'rsatilgan segmentlar bo'yicha nomutanosiblik ushbu o'sishning barqarorligiga tahdid solmoqda — xususan, o'rta byudjetli va ichki sayyohlar uchun mo'ljallangan joylashuv salohiyati talabga nisbatan orqada qolmoqda.

Kompleks Samaradorlik Indeksi (KSI) metodologiyasiga tayanib, mintaqaviy turizm salohiyatini baholash uchun quyidagi kontseptual kompozit ko'rsatkich taklif etiladi:

$$\mathbf{TSI = w_1 \cdot M + w_2 \cdot I + w_3 \cdot R - w_4 \cdot Risk}$$

bunda: M — makroiqtisodiy blok (YaIM o'sishi, PII hajmi, savdo integratsiyasi); I — infratuzilma bloki (transport dahlizlari, mehmonxona xona fondi va uning sifat tarkibi); R — resurs-tabiiy salohiyat bloki (energetika, meros ob'ektlari, iqlim-geografik xilma-xillik); Risk — tavakkalchilik bloki (suv taqchilligi, iqlim xavflari, transport-logistika cheklovlari), $w_1 \ldots w_4$ — ekspert baholash yoki DEA-asosidagi og'irlik koeffitsientlari. Ushbu indeks mintaqaviy (Samarqand viloyati kesimidagi) mehmonxona samaradorligini baholovchi DEA va SERVQUAL-Uz asosidagi modellar uchun yuqori darajadagi (makro) kirish o'zgaruvchisi vazifasini bajarishi, shu orqali mikro darajadagi (korxona) samaradorlik tahlilini mintaqaviy iqtisodiy kontekst bilan bog'lashi mumkin.

XULOSA

Xulosa qilib, o'tkazilgan tahlil shuni ko'rsatadiki, Markaziy Osiyo va O'zbekistonning makroiqtisodiy o'sishi — investitsiya muhitining yaxshilanishi, transport-logistika dahlizlarining rivojlanishi va ijtimoiy islohotlar — turizm bozorining jadal o'sishiga va mehmonxona xizmatlari bozoridagi investitsion faollikka bevosita ijobiy ta'sir ko'rsatmoqda. Shu bilan birga, suv resurslari tanqisligi, iqlim xavflari va transport-logistika cheklovlari, shuningdek

mehmonxona bozoridagi segmentlar bo'yicha nomutanosiblik ushbu o'sishning uzoq muddatli barqarorligiga jiddiy xavf tug'diradi.

Samarqand viloyati mehmonxona korxonalari samaradorligini oshirish bo'yicha tadqiqotlar kontekstida quyidagi tavsiyalar taklif etiladi:

1) o'rta va quyi byudjetli segmentdagi mehmonxonalar qurilishini rag'batlantiruvchi maqsadli subsidiya mexanizmlarini joriy etish; 2) mintaqaviy suv-iqlim tavakkalchiliklarini hisobga oluvchi barqaror ("yashil") mehmonxona standartlarini kengaytirish; 3) mahalliy DEA/SERVQUAL-Uz asosidagi samaradorlik monitoringini yuqoridagi TSI ko'rsatkichi bilan uyg'unlashtirgan holda yagona mintaqaviy turizm-mehmonxona monitoring tizimini shakllantirish.

FOYDALANILGAN MANBALAR

1. Markaziy Osiyo va O'zbekistonning yangi iqtisodiy istiqbollari: rasmiy iqtisodiy hisobot va mintaqaviy salohiyat tahlili (taqdim etilgan hisobot, 2026).

2. Узбекистан за 4 месяца посетили 4 миллиона туристов // Gazeta.uz, 19.05.2026. URL: https://www.gazeta.uz/ru/2026/05/19/tourism/

3. Узбекистан намерен увеличить поток туристов до 20 млн человек // Economist.kg, 18.05.2026. URL: https://economist.kg/ekonomika/2026/05/18/uzbekistan-nameren-uvelichit-potok-turistov-do-20-mln-chelovek/

4. Настоящее и будущее гостиничной индустрии Узбекистана // CMWP.uz. URL: https://cmwp.uz/article/62

5. В 2025 году Узбекистан посетили 11,7 миллиона туристов // Stat.uz, 05.02.2026. URL: https://stat.uz/ru/press-tsentr/novosti-goskomstata/66310

6. Объявлено количество туристов, посетивших Узбекистан в 2024 году // Kun.uz, 03.02.2025. URL: https://kun.uz/ru/news/2025/02/03/

7. Гостиничные инвестиции в Узбекистане: развитие отрасли и меры господдержки // Topadvisor.biz, 08.10.2025. URL: https://topadvisor.biz/article/gostinichnye-investicii-v-uzbekistane-razvitie-otrasli-i-mery-gospodderzhki

8. На ТМИФ-2026 инвесторам представили новые возможности для вложений в туризм Узбекистана // Nuz.uz, 19.06.2026. URL: https://nuz.uz/2026/06/19/

MEHMONXONA BIZNESI KORXONALARIDA XORIJ TAJRIBASINI O‘ZLASHTIRISHNING CHEKLOVLARI: INSTITUTSIONAL, MADANIY VA MEHNAT BOZORI OMILLARI

S.A.Narzullayeva

Osiyo xalqaro universiteti, Buxoro, O‘zbekiston

e-mail: sarvinoznarzullayeva54@gmail.com

Annotatsiya. *Maqolada mehmonxona biznesi korxonalarida xorijiy inson resurslarini boshqarish amaliyotini o‘zlashtirishga to‘sqinlik qiluvchi cheklovlar tahlil qilingan. Institutsional, madaniy va mehnat bozori omillari guruhlangan, ularning transfer natijasiga ta’siri ko‘rsatilgan. Tajribani baholashning to‘rt mezonli filtri taklif etilib, moslashtirishning bosqichli yondashuvi asoslangan.*

Kalit so‘zlar: *inson resurslarini boshqarish, mehmonxona biznesi, xorij tajribasi, amaliyot transferi, institutsional muhit, madaniy masofa, mehnat bozori, kadrlar qo‘nimsizligi.*

Abstract. *The article analyses the constraints that hinder the adoption of foreign human resource management practices in hotel enterprises. Institutional, cultural and labour market factors are grouped and their influence on transfer outcomes is shown. A four-criteria filter and a phased adaptation approach are proposed.*

Keywords: *human resource management, hotel business, foreign experience, practice transfer, institutional environment, cultural distance, labour market, staff turnover.*

KIRISH

So‘nggi yillarda O‘zbekiston turizm bozorining jadal o‘sishi va xalqaro mehmonxona brendlarining mamlakatga kirib kelishi inson resurslarini boshqarish amaliyotiga yangi talablar qo‘ydi. Mahalliy mehmonxona korxonalari xorijiy tarmoqlarning kadr tanlash, o‘qitish, rag‘batlantirish va samaradorlikni baholash bo‘yicha yechimlarini tobora ko‘proq o‘rganmoqda. Biroq amaliyot shuni ko‘rsatadi: ilg‘or deb tan olingan modelning o‘zgarishsiz ko‘chirilishi ko‘pincha kutilgan natijani bermaydi.

Ilmiy adabiyotlarda xorij tajribasi asosan tavsifiy tarzda, ya’ni uning afzalliklarini sanab o‘tish orqali yoritiladi. Transferga to‘sqinlik qiluvchi omillar esa tizimli tahlil qilinmagan. Shu bilan birga, boshqaruv amaliyotlarining transmilliy ko‘chirilishi nazariyasida har qanday amaliyotning samarasi qabul qiluvchi muhitning institutsional, madaniy va tashkiliy kontekstiga bog‘liqligi asoslangan (Kostova, 1999).

Maqolaning maqsadi – mehmonxona biznesi korxonalarida xorijiy inson resurslarini boshqarish tajribasini o‘zlashtirishga ta’sir qiluvchi cheklovlarni aniqlash, ularni omillar guruhlari bo‘yicha tasniflash va tajribani baholashning mezonli yondashuvini taklif etish.

Tadqiqot ilmiy adabiyotlarni tizimli sharhlash, qiyosiy tahlil, institutsional yondashuv va mantiqiy umumlashtirish usullariga asoslanadi. Nazariy asos sifatida inson resurslarini boshqarish bo‘yicha fundamental ishlar (Armstrong & Taylor, 2020; Boella & Goss-Turner, 2019), mehmondo‘stlik sohasidagi kadr muammolari tadqiqotlari (Baum, 2015; Kusluvan va boshq., 2010; Nickson, 2013), institutsional nazariya (North, 1990) va madaniy o‘lchovlar konsepsiyasi (Hofstede va boshq., 2010) qabul qilingan.

ASOSIY QISM

1. Institutsional cheklovlar. Xorijiy mehmonxona tarmoqlarining inson resurslarini boshqarish tizimi rivojlangan institutsional infratuzilmaga tayanadi: soha kasbiy standartlari, mustaqil sertifikatlashtirish tashkilotlari, kasbiy uyushmalar, mehnat munosabatlarini moslashuvchan tartibga soluvchi huquqiy baza va ta’lim muassasalari bilan barqaror hamkorlik. O‘zbekistonda bu infratuzilmaning ayrim bo‘g‘inlari shakllanish jarayonida.

Birinchi cheklov – mehmonxona kasblari bo‘yicha kasbiy standartlar va malaka talablarining to‘liq tizimlashtirilmaganligi. Natijada xorijiy brendning kompetensiya modeli mahalliy malaka ramkasiga bog‘lanmaydi, ichki sertifikat esa mehnat bozorida rasmiy tan olinmaydi. Xodim uchun o‘qish natijasi kasbiy traektoriyaga aylanmaydi va bu o‘qitishga investitsiya qilish rag‘batini pasaytiradi.

Ikkinchi cheklov – ta’lim tizimi bilan ishlab chiqarish o‘rtasidagi aloqaning sustligi. Xorij modellarida amaliyot va ishga qabul qilish bir zanjirning bo‘g‘inlari hisoblanadi: talaba amaliyot davrida baholanadi va bitirgach shu korxonaga ishga oladi. Mahalliy sharoitda amaliyot ko‘pincha rasmiy xarakterga ega bo‘lib, kadr zaxirasini shakllantirish vositasiga aylanmaydi.

Uchinchi cheklov – norasmiy bandlikning sezilarli ulushi va mehnat shartnomalari amaliyotining nobirxilligi. Xorij tajribasidagi samaradorlikka bog‘langan rag‘batlantirish tizimi rasmiylashtirilgan mehnat munosabatlarini talab qiladi; norasmiy bandlik sharoitida u shunchaki ishlamaydi.

2. Madaniy cheklovlar. Boshqaruv amaliyoti madaniy jihatdan neytral emas. Hofstede o‘lchovlari bo‘yicha yuqori hokimiyat masofasi va kollektivizm ustun bo‘lgan muhitda gorizontal teskari aloqaga, xodimning rahbarni baholashiga yoki individual natijani ochiq taqqoslashga asoslangan vositalar qarshilikka uchraydi.

Amaliyotda bu bir necha shaklda namoyon bo‘ladi. Xodim rahbariyatga muammo haqida ochiq xabar berishdan tiyiladi, shu sababli “360 daraja” tipidagi baholash formal javoblar bilan to‘ldiriladi. Jamoada individual reyting e’lon qilinishi hamkorlik muhitiga salbiy ta’sir ko‘rsatishi mumkin. Kadr tanlashda qarindoshlik va tanish-bilishlik asosidagi tavsiya kompetensiyaviy mezonlardan ustun kelishi holatlari saqlanib qolmoqda.

Alohida e’tibor talab qiladigan jihat – xizmat ko‘rsatish mehnatining ijtimoiy nufuzi. Mehmondo‘stlik mahalliy madaniyatda yuqori qadriyat bo‘lsa-da, uni kasb sifatida tanlash ko‘pincha vaqtinchalik faoliyat deb qaraladi. Bu xorij modellarining o‘zagini tashkil etuvchi uzoq muddatli kasbiy o‘sish mantiqiga zid keladi: korxona xodimni yillar davomida o‘stirishga mo‘ljallangan tizim quradi, xodim esa uni o‘tkinchi ish joyi deb biladi.

3. Mehnat bozori cheklovlari. Uchinchi guruh omillar bozorning tarkibiy xususiyatlari bilan bog‘liq. Mehmonxona sohasidagi mehnat munosabatlari jahon miqyosida ham yuqori qo‘nimsizlik, mavsumiylik va past

ish haqi bilan tavsiflanadi (Baum, 2015). O‘zbekiston sharoitida bu muammolar bir qator mahalliy omillar bilan kuchayadi.

Birinchidan, turizm oqimining mavsumiy tebranishi yuqori: bahor va kuz oylaridagi yuklama qish davridan sezilarli farq qiladi. Doimiy shtatni to‘liq saqlash iqtisodiy jihatdan oqlanmaydi, mavsumiy xodimni esa xorij modellarida nazarda tutilgan ko‘p bosqichli o‘quv tizimidan o‘tkazishga vaqt ham, resurs ham yetmaydi.

Ikkinchidan, tashqi mehnat migratsiyasi malakali kadrlar uchun raqobat muhitini keskinlashtiradi: xizmat ko‘rsatish sohasida tajriba va til bilimiga ega xodim xorijda bir necha baravar yuqori daromad taklifini oladi. Korxona o‘qitishga sarflagan mablag‘i natijasini boshqa bozor oladi, bu esa o‘qitishga investitsiya qilishdan tiyilishga olib keladi.

Uchinchidan, bozor tarkibida kichik va oilaviy mehmonxonalar, mehmon uylari ustunlik qiladi. Xorijiy tajriba esa asosan 150–300 va undan ortiq xonali, alohida HR xizmatiga ega yirik korxonalar uchun yaratilgan. 20–30 xonali mehmonxonada HR vazifalarini ko‘pincha egasi yoki menejerning o‘zi bajaradi, shuning uchun ko‘p bosqichli tartib-taomillar shunchaki bajarilmay qoladi.

Keltirilgan cheklovlar va ularni yumshatish yo‘nalishlari 1-jadvalda umumlashtirilgan.

1-jadval

Cheklov guruhi	**Asosiy namoyon bo‘lish shakli**	**Moslashtirish yo‘nalishi**
Institutsional	Kasbiy standartlar va sertifikatlashtirish tizimining to‘liq shakllanmaganligi; ta’lim muassasalari va mehmonxonalar o‘rtasidagi aloqa uzilishi; norasmiy bandlik ulushi	Soha kasbiy standartlarini ishlab chiqish; dual ta’limni joriy etish; ichki sertifikatlash tizimini milliy malaka ramkasiga bog‘lash
Madaniy	Yuqori hokimiyat masofasi; teskari aloqa va tanqidni bildirishdan tiyilish; xizmat ko‘rsatish mehnatining nufuzi past baholanishi; qarindoshlik asosida kadr tanlash	Anonim teskari aloqa kanallari; mentorlik instituti; kasb nufuzini oshirish bo‘yicha targ‘ibot; tanlovning shaffof mezonlari

Cheklov guruhi	Asosiy namoyon bo‘lish shakli	Moslashtirish yo‘nalishi
Mehnat bozori	Mavsumiylik; tashqi mehnat migratsiyasi; til va raqamli ko‘nikmalar tanqisligi; kichik va oilaviy mehmonxonalarning ustunligi	Mavsumiy bandlikning moslashuvchan shakllari; hududiy kadrlar kooperatsiyasi; kichik mehmonxonalar uchun yengillashtirilgan HR-modullar

4. Tajribani baholashning mezonli filtri. Tahlil natijalari xorij amaliyotini tanlashda to‘rt mezonli baholash filtrini qo‘llashni taklif etish imkonini beradi: 1) institutsional moslik – amaliyot amaldagi huquqiy baza va malaka tizimi doirasida qo‘llanishi mumkinmi; 2) madaniy masofa – u qabul qiluvchi jamoaning muloqot va ierarxiya normalariga qanchalik zid; 3) resurs talabi – uni joriy etish uchun zarur vaqt, mablag‘ va mutaxassis korxonada bormi; 4) masshtabga sezgirlik – amaliyot kichik korxonada ham ishlaydimi yoki faqat yirik shtatda samara beradimi.

Shu mezonlar bo‘yicha har bir amaliyot uch toifadan biriga ajratiladi: bevosita joriy etish mumkin bo‘lganlar, moslashtirishdan so‘ng joriy etiladiganlar va hozirgi sharoitda qo‘llanishi oqlanmaydiganlar. Masalan, onboarding tartib-taomili va ichki mentorlik odatda birinchi toifaga, kompetensiyaga asoslangan baholash va samaradorlikka bog‘langan rag‘batlantirish ikkinchi toifaga, ko‘p bosqichli assessment-markaz va keng qamrovli “360 daraja” baholash esa aksariyat mahalliy korxonalar uchun uchinchi toifaga tushadi.

XULOSA

Birinchidan, xorijiy inson resurslarini boshqarish amaliyotining samarasi uning ilg‘orlik darajasi bilan emas, qabul qiluvchi muhitga mosligi bilan belgilanadi. Shu sababli tajribani o‘zlashtirish ko‘chirish emas, moslashtirish jarayoni sifatida loyihalanishi lozim.

Ikkinchidan, cheklovlarni institutsional, madaniy va mehnat bozori omillari guruhlariga ajratish ularning bartaraf etilish darajasini farqlash imkonini beradi: mehnat bozori omillari korxona darajasida boshqariladi, madaniy omillar

uzoq muddatli ta’sirni talab qiladi, institutsional omillar esa soha va davlat siyosati darajasida hal etiladi.

Uchinchidan, taklif etilgan to‘rt mezonli filtr korxonaga xorij amaliyotlaridan o‘z sharoitiga mos bo‘lganini tanlash va joriy etish ketma-ketligini belgilash uchun amaliy vosita bo‘lib xizmat qiladi.

To‘rtinchidan, moslashtirishning maqbul yo‘li – bosqichlilik: avval past resurs talab qiluvchi va madaniy jihatdan neytral amaliyotlar (onboarding, mentorlik, xizmat standartlari), so‘ngra baholash va rag‘batlantirish tizimlari, oxirida esa kompleks kompetensiya modellari joriy etiladi.

Keyingi tadqiqotlarda ushbu filtrni Buxoro viloyati mehmonxona korxonalari misolida empirik sinovdan o‘tkazish maqsadga muvofiq.

ADABIYOTLAR RO‘YXATI

1. Armstrong, M., & Taylor, S. (2020). Armstrong’s handbook of human resource management practice (15th ed.). Kogan Page.
2. Baum, T. (2015). Human resources in tourism: Still waiting for change? – A 2015 reprise. Tourism Management, 50, 204–212.
3. Boella, M. J., & Goss-Turner, S. (2019). Human resource management in the hospitality industry: A guide to best practice (10th ed.). Routledge.
4. Brewster, C., Mayrhofer, W., & Farndale, E. (Eds.). (2018). Handbook of research on comparative human resource management (2nd ed.). Edward Elgar.
5. Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). Cultures and organizations: Software of the mind (3rd ed.). McGraw-Hill.
6. Kostova, T. (1999). Transnational transfer of strategic organizational practices: A contextual perspective. Academy of Management Review, 24(2), 308–324.
7. Kusluvan, S., Kusluvan, Z., Ilhan, I., & Buyruk, L. (2010). The human dimension: A review of human resources management issues in the tourism and hospitality industry. Cornell Hospitality Quarterly, 51(2), 171–214.
8. Nickson, D. (2013). Human resource management for the hospitality and tourism industries (2nd ed.). Routledge.
9. North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge University Press.
10. UN Tourism. (2024). World tourism barometer. Madrid: UN Tourism.

THE INSURANCE MARKET: EVOLUTION, TRENDS, CHALLENGES AND STRATEGIES FOR SUSTAINABLE GROWTH

Bekberganova Mohira Ravshonbekovna

PhD Student, Department of Econometrics and Economic Modeling

National University of Uzbekistan

E-mail: mohira96@inbox.ru

Abstract. *The insurance market plays a fundamental role in ensuring financial stability, mobilizing long-term investment resources, and protecting households and businesses against various risks. This study examines the evolution of the insurance market in Uzbekistan, with particular emphasis on institutional reforms, market liberalization, digital transformation, and emerging development trends.*

Keywords: *insurance market, insurance development, digital insurance, InsurTech, life insurance, underwriting, insurance regulation, Solvency II, parametric insurance, Uzbekistan.*

Insurance markets represent one of the essential components of a modern financial system by facilitating risk transfer, supporting investment activities, and promoting macroeconomic stability. In emerging economies, the development of the insurance sector contributes not only to financial inclusion but also to sustainable economic growth through capital accumulation and improved risk management.

Over the past few years, Uzbekistan's insurance market has experienced profound structural changes driven by the country's comprehensive economic reform agenda. The expansion of market-oriented mechanisms, the liberalization of economic activities, and the establishment of a more competitive financial environment have significantly transformed the institutional and organizational framework of the insurance sector. As a result, insurance companies with different ownership structures—including state-owned, private, and foreign-invested firms—now operate in an increasingly competitive marketplace. This

transformation has contributed to improvements in both the volume and quality of insurance services offered across the country.

The government has introduced a broad range of initiatives aimed at strengthening the insurance industry by expanding insurance coverage, promoting public awareness, and encouraging greater participation in insurance activities. Despite these positive developments, several challenges continue to hinder the sustainable growth of the market. Insurance premium generation remains uneven across regions, insurance classes, and individual companies, while the demand for voluntary insurance products is still relatively limited. In addition, fluctuations in macroeconomic conditions and intensifying market competition pose significant risks to the stability of insurance companies' revenue streams.

The sustainable development of Uzbekistan's insurance market has also been supported by continuous improvements in the regulatory and institutional framework. The implementation of new insurance products, the modernization of legislation, and the gradual alignment of the industry with international standards have strengthened the operating environment for insurance companies. At the same time, ongoing policy measures aimed at improving transparency, reinforcing financial soundness, and enhancing market competitiveness have further contributed to the sector's development.

The development of Uzbekistan's insurance industry can be broadly classified into three major stages, each reflecting the country's changing economic environment and policy priorities.

Stage I: State-Dominated Insurance System

Before the transition to a market economy, the insurance sector was largely controlled by the state. Insurance services were provided by a limited number of government-owned organizations, offering only a narrow range of products. The market was dominated by compulsory insurance schemes, with little room for competition or innovation. As a result, insurance services were generally standardized and less responsive to the diverse needs of consumers.

Stage II: Market Liberalization and Institutional Reform

The introduction of comprehensive economic reforms marked a turning point in the development of the insurance market. To encourage private sector participation and strengthen competition, the government implemented a series of legislative and institutional reforms. These initiatives facilitated the entry of private insurance companies while improving the regulatory framework governing the industry.

At the same time, regulatory authorities adopted internationally accepted standards in areas such as risk management, capital adequacy, corporate governance, and consumer protection. These reforms enhanced market transparency, reinforced the financial resilience of insurance companies, and contributed to building greater confidence among policyholders and investors.

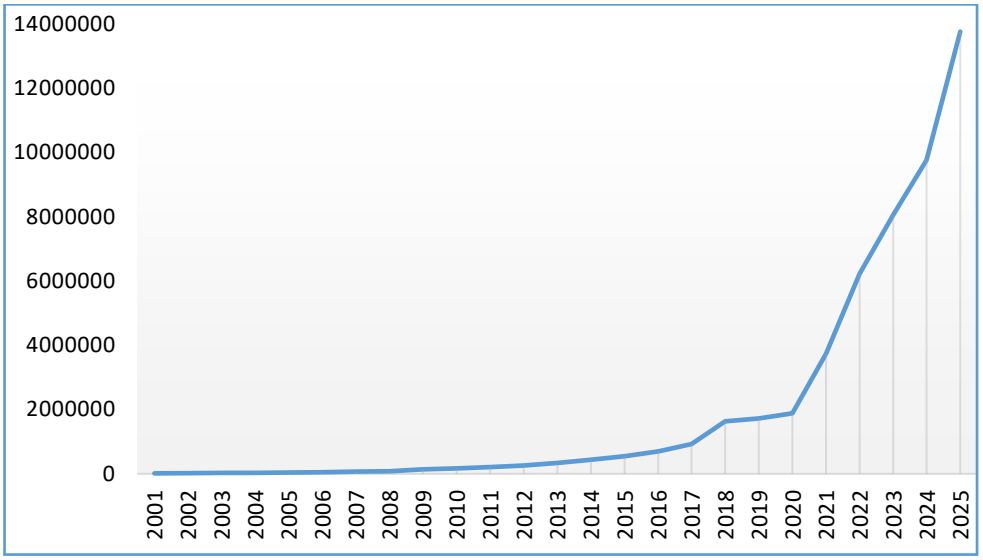
Stage III: Digital Transformation and Market Expansion

The insurance industry is currently experiencing a period of rapid digital transformation. Advances in information technology have encouraged insurers to introduce a wide range of digital services, including electronic policy issuance, online claims processing, digital customer verification, and automated underwriting systems. These innovations have streamlined business processes, reduced operating costs, and made insurance services more accessible and convenient for customers. As a result, insurers have been able to improve both operational efficiency and the overall customer experience.

In recent years, one of the most notable developments in Uzbekistan's insurance market has been the strong growth of the life insurance sector. Rising household incomes, improvements in financial literacy, and supportive government policies have encouraged more individuals to purchase life insurance products. At the same time, increasing awareness of financial security and long-term savings has strengthened demand for insurance solutions that provide both protection and investment benefits. These trends indicate a gradual shift toward a more diversified and mature insurance market, where life

insurance is becoming an increasingly important component of the overall industry.

Digital technologies have fundamentally reshaped the way insurance companies operate, transforming almost every stage of the insurance value chain. Innovations such as mobile applications, cloud computing, artificial intelligence (AI), and big data analytics have enabled insurers to automate underwriting processes, develop more personalized insurance products, identify fraudulent claims more effectively, and enhance the overall customer experience. These technological advancements have not only improved operational efficiency but have also made insurance services faster, more accessible, and increasingly customer-oriented.



Insurance Premium Dynamics in Uzbekistan, 2001–2025 (Million UZS)

The rapid emergence of InsurTech has further accelerated the digital transformation of the insurance industry. Collaboration among insurance companies, banks, and fintech firms has created integrated financial ecosystems that allow customers to access insurance products through digital platforms. This integration has expanded distribution channels, simplified policy purchases, and improved the delivery of insurance services in line with evolving consumer expectations.

Another important trend is the growing emphasis on investment portfolio diversification. As institutional investors, insurance companies are adopting more balanced investment strategies to achieve higher returns while maintaining adequate liquidity and meeting solvency requirements. A well-diversified investment portfolio also strengthens insurers' financial resilience, enabling them to better withstand economic fluctuations and periods of market uncertainty.

The future development of Uzbekistan's insurance market will increasingly depend on the adoption of advanced digital technologies. Artificial intelligence (AI), machine learning, blockchain, and predictive analytics are expected to play a key role in reshaping insurance business models. These technologies can streamline underwriting and claims processing, improve risk assessment and pricing, reduce administrative costs, and deliver more personalized services, thereby enhancing both operational efficiency and customer satisfaction.

Another promising area is the development of parametric insurance, particularly for agricultural production and climate-related risks. Unlike conventional insurance, parametric products provide automatic compensation when predefined indicators—such as rainfall, temperature, or earthquake intensity—reach specified thresholds. This approach simplifies the claims process, reduces settlement time, minimizes disputes, and increases transparency, making it an effective tool for managing natural disaster risks.

The insurance industry is also gradually shifting from a compensation-based approach toward a more proactive model focused on risk prevention. The use of Internet of Things (IoT) devices, telematics, and remote monitoring technologies allows insurers to identify potential risks before losses occur. Early risk detection not only helps policyholders prevent damage but also enables insurers to reduce claim frequency and improve overall portfolio performance.

Over the past two decades, Uzbekistan's insurance market has undergone significant structural transformation. Regulatory reforms, institutional

modernization, digital innovation, and the growing participation of private insurers have created a more competitive and dynamic market environment. These developments have strengthened the industry's contribution to the country's financial system and provided a solid foundation for its future growth.

Despite this progress, several challenges continue to limit the sector's long-term development. Insurance penetration remains relatively low, public confidence in insurance services needs further improvement, climate-related risks are becoming more pronounced, and the industry continues to face a shortage of highly qualified professionals. Addressing these issues will require coordinated policy measures and sustained investment in institutional and technological development.

Looking ahead, the successful implementation of risk-based regulation, digital insurance solutions, artificial intelligence, catastrophe risk modelling, and innovative products such as parametric insurance will be critical to enhancing the resilience and competitiveness of the insurance sector. At the same time, strengthening financial literacy, increasing public trust in insurance, and promoting closer cooperation among government agencies, insurers, financial institutions, and universities will be essential for ensuring sustainable market development.

With continued reforms and technological advancement, Uzbekistan's insurance industry is well positioned to make a greater contribution to financial stability, economic diversification, and the country's broader sustainable development objectives.

REFERENCE

1. Andre P. Liebenberg, James M. Carson,Randy E. Dumm “A dynamic analysis of the demand for life insurance”2012
2. Adam Sliwinski, Tomasz Michalski, Malgorzata Roszkiewic “Demand for life insurance – an empirical analysis in the case of Poland”2012
3. Željko Vojinović, Sunčica Milutinović, Dario Sertić, Bojan Leković “ Determinants of Sustainable Profitability of the Serbian Insurance Industry: Panel Data Investigation”, J: Sustainability 2022, 14, 5190.
4. Endang Ruchiyat “Analysis of companies’ characteristics, economic conditions, net premiums, and their impacts on profitability”, J: Journal of Business and Finance in Emerging Markets, 2020

5. Mehmet Balcilara, Rangan Guptab, Chien-Chiang Leed, Godwin Olasehinde-Williams “Insurance and economic policy uncertainty”, J: Research in International Business and Finance”, vol 54, 2020

6. Alina Kulustayeva, Aigul Jondelbayeva, Azhar Nurmagambetova, Aliya Dossayeva, Aliya Bikteubayeva “Financial data reporting analysis of the factors influencing onprofitability for insurance companies”, J: ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES, vol 7, 2020

7. Radek Hendrych, Tomas Cipra “Econometric model of the czech life insurance market”, J: Prague Economic papers, vol 24, 2015

IQTISODIYOTDA TARKIBIY TRANSFORMATSIYANI JADALLASHTIRISH VA YUQORI QO‘SHILGAN QIYMATLI ISHLAB CHIQARISHNI KENGAYTIRISH

Yoqubova (Sheraliyeva) Zilola Tura qizi

Mirzo Ulug‘bek nomidagi O‘zbekiston Milliy universiteti

Iqtisodiyot fakulteti mustaqil izlanuvchisi

ORCID: https://orcid.org/0009-0009-8061-8217

Annotatsiya: *Ushbu maqolada milliy iqtisodiyotda tarkibiy transformatsiyani jadallashtirish hamda yuqori qo‘shilgan qiymatli ishlab chiqarish hajmini kengaytirish masalalari tadqiq etilgan. 2010-2025-yillardagi O‘zbekiston tashqi savdo ko‘rsatkichlari hamda 2021-2025-yillardagi Maxsus iqtisodiy zonalar faoliyatining statistik ko‘rsatkichlari tahlili asosida sanoat va eksport tarkibidagi tizimli nomutanosibliklar aniqlangan. MIZ rezidentlarining xomashyo va komponentlar importiga yuqori darajada qaramligi hamda ularning aylanma mablag‘lari bojxona va soliq to‘lovlariga muzlab qolishi asosiy muammo sifatida ko‘rsatilgan.*

Kalit so‘zlar: *tarkibiy transformatsiya, yuqori qo‘shilgan qiymat, Maxsus iqtisodiy zonalar, Bond sanoat zonalari, bond ombori, mahalliylashtirish darajasi, eksport raqobatbardoshligi, sanoat kooperatsiyasi.*

Abstract: *This article examines the issues of accelerating structural transformation in the national economy and expanding high-value-added manufacturing. Based on an analysis of Uzbekistan's foreign trade indicators from 2010 to 2025 and performance data of Special Economic Zones from 2021 to 2025, systemic imbalances in the industrial and export structures were identified. The study highlights the high dependence of SEZ residents on raw material and component imports, alongside the freezing of working capital due to upfront customs duties and taxes.*

Keywords: *structural transformation, high value-added, Special Economic Zones, Bonded Industrial Zones, bonded warehouse, Domestic Content Requirement, export competitiveness, industrial cooperation.*

KIRISH

Milliy iqtisodiyotda tarkibiy transformatsiya jarayonlarini izchil jadallashtirish mamlakatning makroiqtisodiy barqarorligini ta’minlash hamda

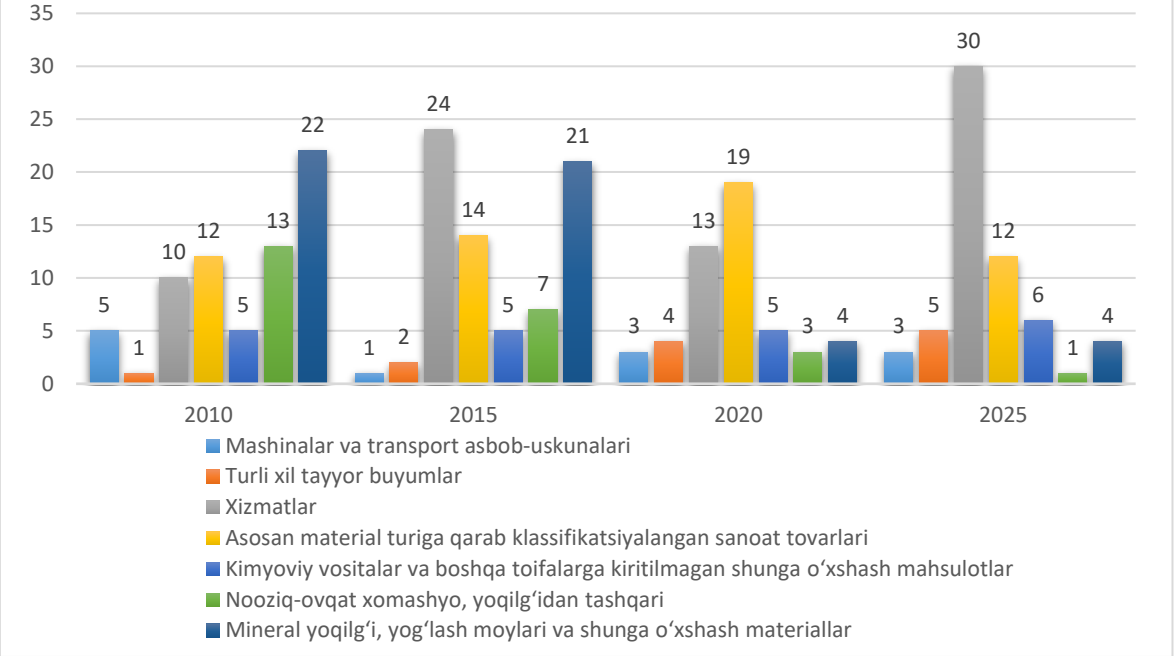
uzoq muddatli iqtisodiy o‘sish omili hisoblanadi. Bugungi globallashuv va keskin raqobat sharoitida iqtisodiyotning an’anaviy va past unumdor tarmoqlardan yuqori texnologik hamda doimiy qiymat yaratuvchi tarmoqlar tomonga yo‘naltirilishi makroiqtisodiy mutanosiblikni ta'minlashga xizmat qiladi. Ushbu transformatsiya jarayonlarining pirovard maqsadi va asosiy yo‘nalishidan biri xomashyo qayta ishlanishini chuqurlashtirish orqali yuqori qo‘shilgan qiymatli ishlab chiqarish zanjirlarini kengaytirishdir. Sanoat tarmoqlarida resurs tejamkor va zamonaviy texnologiyalarni joriy etish nafaqat ichki bozorni raqobatbardosh mahsulotlar bilan to‘ldirish, balki tashqi bozorlarda ham mustahkam o‘rin egallash imkoniyatini yaratadi.

TADQIQOT VA NATIJALAR

Sanoatdagi bunday sifat o‘zgarishlarining amaldagi holati va real samaradorligi, eng avvalo, tashqi savdo oborotining, xususan, eksport va import tuzilmasining o‘zgarishida namoyon bo‘ladi. Sanoat transformatsiyalashgani sayin import tarkibida modernizatsiya uchun zarur bo‘lgan texnologik uskunalar va resurslar ulushi ortishi, eksportda esa xomashyo bog‘liqligi qisqarib, qayta ishlangan tayyor mahsulotlar ustuvorlik qilishi lozim.

O‘zbekiston tashqi savdo ko‘rsatkichlarining so‘nggi yillardagi dinamikasi va eksport tarkibi tahlil qilinganda, sanoat ishlab chiqarish hajmlari barqaror o‘sayotganiga qaramay, eksportning sifat tarkibida muayyan tarkibiy nomutanosibliklar saqlanib qolayotgani ko‘zga tashlanadi.

Xususan, eksport tushumlarining salmoqli qismi hamon mineral resurslar, qimmatbaho metallar va birinchi bosqichda qayta ishlangan xomashyo tovarlariga to‘g‘ri keladi. Bu esa yaratilayotgan qo‘shilgan qiymatning asosiy qismi mamlakat tashqarisida shakllanayotganidan hamda eksportimizning tashqi konyunktura tebranishlariga ta'sirchanligi yuqoriligicha qolayotganidan dalolat beradi. (1-rasm)



1-rasm. O‘zbekiston Respublikasi tashqi savdo tovarlari tarkibining dinamikasi (2010–2025 yil)

Manba: https://stat.uz/uz/rasmiy-statistika/merchandise-trade-2 ma’lumotlari asosida muallif ishlanmasi

1-rasm ma’lumotlari tahlili shuni ko‘rsatadiki, 2010–2025-yillar oralig‘ida mamlakat tashqi savdo tarkibida muayyan strukturaviy siljishlar ro‘y bergan bo‘lsa-da, tashqi savdoning sifat ko‘rsatkichlarida kutilgan chuqur tarkibiy transformatsiya hali to‘liq namoyon bo‘lgani yo‘q. Xizmatlar ulushi 2010-yildagi 10 foizdan 2025-yilda 30 foizgacha o‘sib, eng yuqori dinamikani ko‘rsatdi. Asosan material turiga qarab klassifikatsiyalangan sanoat tovarlari ulushi esa 2010-yildagi 12 foizdan 2020-yilda 19 foizgacha oshib, 2025-yilda 12 foiz darajasida shakllandi. Shu bilan birga, mineral yoqilg‘i va moylar ulushi 22 foizdan 4 foizga, nooziq-ovqat xomashyosi esa 13 foizdan 1 foizga qisqargani kuzatildi.

Tadqiqotimizda aniqlangan asosiy muammo shundaki, iqtisodiy o‘sish drayveri hisoblangan va yuqori qo‘shilgan qiymat yaratuvchi tarmoqlar ulushi hamon past darajada qolgan. Xususan, mashinalar va transport asbob-uskunalari ulushi 2010-yildagi 5 foizdan 2025-yil yakuniga kelib 3 foizga tushgan, turli xil tayyor buyumlar ulushi esa bor-yo‘g‘i 1 foizdan 5 foizga yetgan.

Bu holat mamlakat sanoatida ishlab chiqarish hajmlari barqaror o‘sayotganiga qaramay, tashqi savdoda yuqori texnologik va chuqur qayta ishlangan tayyor mahsulotlar ulushining yetali emasligini hamda milliy iqtisodiyotda mahalliylashtirish va sanoat kooperatsiyasi zanjirlari hali to‘liq shakllanmaganligini anglatadi.

Aynan ushbu disbalansni bartaraf etish, import o‘rnini bosuvchi va eksportga yo‘naltirilgan sanoat zanjirlarini barpo etishda maxsus iqtisodiy zonalar (MIZ) asosiy amaliy instrument hisoblanadi. MIZlarning bosh vazifasi — investitsiyalarni jalb etish orqali import qilinayotgan tovarlarni mamlakat ichida ishlab chiqarishni yo‘lga qo‘yish, eksportni kengaytirish, resurslarni tejash va importga bog‘liqlikni kamaytirishdan iboratdir.

Tahlillar shuni ko‘rsatadiki, MIZ rezidentlarini xomashyo bilan uzluksiz ta’minlash, ularning aylanma mablag‘lariga tushayotgan moliyaviy yuklamani yengillashtirish hamda mahalliylashtirishni rag‘batlantirish uchun an’anaviy bojxona va soliq rejimlaridan ko‘ra moslashuvchan, xalqaro tajribada sinalgan maxsus bojxona-sanoat mexanizmlariga o‘tish ehtiyoji yuzaga kelmoqda. Xususan, oraliq mahsulotlarni bojxona to‘lovlarisiz saqlash va ularni qayta ishlash zanjiriga bosqichma-bosqich jalb etish imkonini beruvchi “Bond sanoat zonalari” va bond omborlari rejimlarini MIZlar hududiga tatbiq etish ushbu tizimli nomutanosibliklarni hal etishning eng samarali yechimi hisoblanadi.

Bizning fikrimizcha, yuqorida aniqlangan muammolar va o‘tkazilgan tahlillar natijasidan kelib chiqqan holda milliy iqtisodiyotda tarkibiy transformatsiyani jadallashtirish va yuqori qo‘shilgan qiymatli ishlab chiqarishni kengaytirish maqsadida Maxsus iqtisodiy zonalarda "Bond sanoat zonalari"ni tashkil etish hamda ularda faoliyat yurituvchi, mahalliylashtirish darajasini 30 foizdan oshirgan iqtisodiyot subyektlarini xomashyo va butlovchi qismlarni bond omboriga olib kirishda soliq va bojxona to‘lovlaridan to‘liq ozod qilish taklif etiladi.

XULOSA

Umuman olganda, taklif MIZlarni ekstensiv yig‘uv maydonlaridan chuqur qayta ishlovchi yuqori texnologik sanoat xablariga transformatsiya qiladi hamda milliy iqtisodiyotda YaIM o‘sish sur’atlariga qo‘shimcha ijobiy drayver bag‘ishlaydi.

FOYDALANILGAN ADABIYOTLAR RO‘YXATI:

1. O‘zbekiston Respublikasi Prezidenti huzuridagi Statistika agentligi. (2025). Rasmiy tashqi savdo statistikasi. Manba: https://stat.uz/uz/rasmiy-statistika/merchandise-trade-2
2. Center for Economic Research and Reforms (CERR). (2025). Enhancing Industrial Competitiveness and Special Economic Zones Efficiency in Uzbekistan. Tashkent: CERR Research Reports.
3. Gereffi G., Lee J. (2016). Economic and Social Upgrading in Global Value Chains and Industrial Policy. Industrial and Corporate Change, 25(1), 104–114.
4. Lewis W. A. (1954). Economic Development with Unlimited Supplies of Labour. The Manchester School, 22(2), 139–191.
5. Rodrik D. (2013). Structural Change, Fundamentals, and Growth: An Index and Some New Results. Institute for Advanced Study, Princeton.
6. Vahobov A. V., Toshxo‘jayev M. M. (2023). Milliy iqtisodiyotni modernizatsiya qilish va undagi tarkibiy o‘zgarishlarni jadallashtirish yo‘llari. Toshkent: Iqtisod-Moliya.
7. Wang J. (2013). The Economic Impact of Special Economic Zones: Learning from China’s Experience. Journal of Development Economics, 101(3), 133–148.
8. World Bank. (2024). Uzbekistan Economic Update: Structural Transformation and Industrial Policy Prospects. Washington, DC: World Bank Group.

STRATEGIC PARTNERSHIP IN CONTEMPORARY INTERNATIONAL RELATIONS: THEORETICAL FOUNDATIONS, KEY DYNAMICS, AND FUTURE PROSPECTS

Author: Master of International Studies Zarnigor Suyunova Shovkidin kizi

Institution: Uzbekistan State World Languages University

Field of Research: International Relations

Abstract. *Strategic partnership has become an important instrument of contemporary international relations, enabling states to coordinate their foreign policies, strengthen economic ties, address common security challenges, and promote long-term national interests. In an increasingly complex international environment characterized by geopolitical competition, economic interdependence, technological transformation, and regional conflicts, strategic partnerships provide states with flexible mechanisms for cooperation beyond traditional military alliances. This article examines the theoretical foundations, principal characteristics, and practical significance of strategic partnerships in contemporary international relations. It applies a qualitative research methodology based on a review of academic literature, comparative analysis, and the examination of international institutional documents. Particular attention is given to the relationship between strategic partnerships, national interests, international security, and multilateral cooperation. The article argues that the effectiveness of strategic partnerships depends on shared strategic interests, institutional continuity, mutual trust, and the ability of participating states to adapt to changing international conditions. It concludes that strategic partnerships will remain a significant instrument of international cooperation, although their long-term sustainability depends on the management of asymmetries, competing interests, and geopolitical uncertainty.*

Keywords: *strategic partnership, international relations, foreign policy, international security, national interests, geopolitical competition, economic cooperation, multilateralism.*

1. INTRODUCTION

The contemporary international system is undergoing profound transformations influenced by geopolitical rivalry, economic globalization, technological development, regional conflicts, and the changing distribution of

global power. These developments have encouraged states to reconsider traditional approaches to foreign policy and to develop more flexible forms of international cooperation. Among these instruments, strategic partnership has emerged as an important mechanism for advancing national interests while responding to shared international challenges.

Strategic partnerships differ from ordinary diplomatic relations because they generally involve sustained political dialogue, coordinated policies, and cooperation across several sectors. These sectors may include trade, investment, defence, energy, education, technology, environmental protection, and regional security. Nevertheless, the existence of a formal strategic partnership does not automatically guarantee the achievement of common objectives. Its practical significance depends on the depth of cooperation and the willingness of participating states to translate political declarations into concrete results.

The importance of this concept is also reflected in recent academic research. Wilkins (2026) argues that strategic partnerships have become an increasingly prominent form of international cooperation, while emphasizing the need to distinguish substantive partnerships from arrangements that possess the label but lack meaningful strategic content [1].

The principal research question of this article is: **How does the concept of strategic partnership influence state behaviour and international cooperation in contemporary international relations?**

The objective is to examine the theoretical foundations of strategic partnerships, identify their principal functions, analyse their opportunities and limitations, and assess their future prospects in a changing international environment.

The article argues that strategic partnerships are most effective when they combine clearly defined national interests with practical cooperation, institutional mechanisms, and sufficient flexibility to accommodate differences between participating states.

2. Literature Review and Theoretical Framework

Strategic partnership can be understood as a sustained and multifaceted relationship between states designed to coordinate selected policies and pursue common or complementary strategic objectives. Unlike a formal military alliance, a strategic partnership does not necessarily establish an automatic obligation to provide military assistance. Its scope may extend across political, economic, technological, diplomatic, and security-related fields.

Wilkins (2008) examined strategic partnerships as structured forms of collaboration through which states seek to benefit from economic opportunities and respond to security challenges more effectively. His subsequent research has contributed to debates about the conceptual boundaries between strategic partnerships and other forms of international alignment [1].

Several theoretical approaches help explain the development of strategic partnerships.

First, **realism** emphasizes the importance of national interests, power, and security. From a realist perspective, states develop partnerships to strengthen their strategic positions, balance potential threats, improve their bargaining power, and reduce vulnerabilities. Cooperation is therefore possible even when participating states have different political systems or ideological priorities, provided that their interests sufficiently overlap.

Second, **liberal institutionalism** highlights the importance of institutions, repeated interaction, and economic interdependence. Keohane and Nye (2012) demonstrate that international relations cannot be explained exclusively through military power because economic and institutional connections also shape state behaviour [2]. From this perspective, strategic partnerships facilitate communication, reduce uncertainty, and create opportunities for cooperation on shared problems.

Third, **constructivism** emphasizes the influence of political identities, shared values, norms, and mutual perceptions. Wendt (1992) argues that international structures are shaped not only by material capabilities but also by socially constructed understandings of interests and relationships . Strategic

partnerships can consequently develop through diplomatic engagement, educational exchange, and the gradual formation of mutual trust.

These approaches are complementary rather than mutually exclusive. Realism explains the strategic motivations behind cooperation, liberal institutionalism clarifies the role of economic and institutional mechanisms, and constructivism helps explain how political trust and shared understandings influence the durability of partnerships.

Taken together, these theoretical perspectives suggest that strategic partnerships should be analysed as dynamic relationships shaped by both material interests and political interaction.

3. Research Methodology

This study employs a qualitative research design. The methodology combines a review of scholarly literature, conceptual analysis, and comparative examination of institutional approaches to international cooperation.

The first method is **literature analysis**, which identifies major theoretical interpretations of strategic partnerships and their relationship with national interests, international security, and interdependence.

The second method is **comparative analysis**, which provides a framework for examining how strategic partnerships can operate across different political and economic contexts. Particular attention is given to the European Union's approach to international partnerships and the broader principles of cooperation established by the United Nations.

The third method is **document analysis**, based on international institutional documents and official policy materials. The United Nations Charter provides a normative foundation for peaceful relations, sovereign equality, and international cooperation [4]. The European External Action Service's materials on security and defence partnerships illustrate how contemporary institutions seek to coordinate responses to common security challenges [5].

The study is primarily analytical rather than statistical. It does not claim to measure the effectiveness of all strategic partnerships quantitatively. Instead, it develops a conceptual framework for understanding their principal characteristics, potential benefits, and limitations.

4. Strategic Partnerships in Contemporary International Relations

4.1. Strategic Partnership as an Instrument of Foreign Policy

Strategic partnerships allow states to pursue foreign policy objectives through sustained cooperation without necessarily entering into binding military alliances. They may be particularly useful when governments seek to strengthen relations while preserving independent decision-making and strategic flexibility.

A strategic partnership commonly involves regular high-level consultations, bilateral commissions, diplomatic coordination, sector-specific agreements, and joint programmes. These mechanisms help governments identify shared priorities and maintain dialogue when disagreements arise.

However, the terminology itself should not be confused with the actual depth of cooperation. A partnership may be described as comprehensive or strategic while producing limited practical outcomes. Consequently, its significance should be evaluated through measurable achievements, the continuity of institutional dialogue, and the extent to which agreed policies are implemented.

Strategic partnerships are therefore best understood as instruments of foreign policy whose effectiveness depends on the relationship between declared objectives and practical cooperation.

4.2. Economic Interdependence and Development

Economic cooperation represents one of the principal dimensions of strategic partnerships. States may coordinate trade policies, encourage investment, develop transport infrastructure, establish industrial projects, and strengthen cooperation in energy and digital technologies.

Economic interdependence can create mutual benefits by expanding markets, improving access to resources, and facilitating the transfer of

knowledge and technology. Long-term economic projects may also increase the incentives for governments to maintain stable diplomatic relations.

Nevertheless, interdependence does not necessarily produce political harmony. Unequal economic relationships can create vulnerabilities if one partner becomes excessively dependent on another for energy supplies, critical technologies, investment, or access to export markets.

For this reason, successful strategic partnerships require a balance between economic integration and national economic resilience. Diversification of trade, transparent agreements, and the development of domestic capabilities can help reduce the risks associated with asymmetric dependence.

The economic dimension of strategic partnerships is therefore both an opportunity for development and a potential source of political leverage.

4.3. Security Cooperation and Geopolitical Competition

International security has become a central consideration in many strategic partnerships. Contemporary security challenges extend beyond conventional military threats to include cyberattacks, terrorism, regional instability, disruptions to critical infrastructure, and threats to energy security.

Strategic partnerships may address these challenges through intelligence exchange, joint training, defence dialogue, cybersecurity cooperation, coordinated diplomatic initiatives, and crisis-management mechanisms. The European Union, for example, identifies partnerships with third countries and international organizations as an important component of its broader security and defence cooperation [5].

Strategic partnerships must nevertheless be distinguished from formal military alliances. While some partnerships involve substantial security coordination, others focus primarily on economic development or diplomatic dialogue. The depth of cooperation varies according to the participating states' interests and commitments.

At the same time, partnerships may intensify geopolitical competition when states use them to strengthen their influence or counterbalance rival

powers. This can contribute to deterrence and strategic stability in certain circumstances, but it may also deepen mistrust between competing groups of states.

Consequently, the contribution of strategic partnerships to international security depends on whether cooperation supports crisis prevention and predictable relations or primarily reinforces confrontation.

4.4. Multilateralism and Global Governance

Strategic partnerships increasingly operate alongside multilateral institutions rather than replacing them. The United Nations Charter identifies the maintenance of international peace and security, the development of friendly relations among nations, and international cooperation as central purposes of the United Nations [4].

Within this normative framework, strategic partnerships can facilitate cooperation on global challenges that individual states cannot effectively address alone. These include climate change, public health emergencies, sustainable development, migration, and technological governance.

Bilateral partnerships may provide an initial platform for coordinating policies, while regional and international institutions can expand cooperation and establish broader rules. This relationship is particularly important when problems cross national borders and require coordinated international responses.

However, strategic partnerships can also create difficulties for multilateral governance if they produce exclusive arrangements, undermine international institutions, or encourage selective compliance with common rules.

Their long-term value therefore depends partly on their compatibility with international law and their contribution to wider international cooperation.

5. Challenges and Future Prospects

Despite their growing importance, strategic partnerships face several structural challenges.

The first is **divergence of national interests**. Participating states may share certain economic or security priorities while disagreeing on regional

conflicts, international sanctions, or political developments. Such differences can restrict cooperation when sensitive issues arise.

The second challenge is **asymmetry of power**. Differences in economic capacity, military strength, technological development, and diplomatic influence may enable the stronger partner to shape the relationship disproportionately. This can weaken mutual trust and reduce the willingness of the less powerful state to implement joint commitments.

The third challenge is **institutional weakness**. Political declarations and summit meetings may generate expectations without establishing clear implementation mechanisms. In the absence of regular consultations, defined responsibilities, and practical monitoring, strategic partnerships risk becoming largely symbolic.

The fourth challenge concerns **geopolitical uncertainty**. Changes in government, international crises, economic restrictions, and shifts in the global balance of power can alter the priorities that originally motivated a partnership.

Looking ahead, several developments are likely to influence the evolution of strategic partnerships.

First, technological cooperation will become increasingly significant, particularly in artificial intelligence, cybersecurity, digital infrastructure, and advanced manufacturing. States will seek partnerships that improve technological capabilities while protecting critical national interests.

Second, economic security and supply-chain resilience will encourage governments to diversify international economic relations. Strategic partnerships may provide frameworks for developing alternative trade routes, strengthening energy security, and improving access to essential resources.

Third, environmental challenges and the transition to low-carbon economies will create additional opportunities for cooperation in renewable energy, climate adaptation, and sustainable infrastructure.

Finally, the effectiveness of future partnerships will depend increasingly on institutional quality. Clear objectives, transparent agreements, regular

evaluation, and mechanisms for managing disagreements can help ensure that political commitments produce tangible results.

These trends indicate that strategic partnerships are likely to remain an important feature of international relations. However, their durability will depend on their ability to reconcile national interests with the requirements of long-term cooperation.

6. CONCLUSION

Strategic partnership has emerged as a significant instrument of contemporary international relations, enabling states to coordinate policies, strengthen economic ties, address security challenges, and advance their national interests. Its importance reflects the growing complexity of the international system and the limitations of approaches based exclusively on traditional military alliances or diplomatic interaction.

The analysis demonstrates that strategic partnerships can be understood through several complementary theoretical perspectives. Realism explains their relationship with power and national security, liberal institutionalism highlights the role of institutions and economic interdependence, and constructivism emphasizes shared understandings, political identity, and mutual trust.

The findings also indicate that strategic partnerships are not automatically effective simply because governments formally establish them. Their practical value depends on the compatibility of national interests, the balance of power between participants, institutional continuity, and the implementation of agreed objectives.

Furthermore, strategic partnerships can contribute to international stability when they support peaceful dialogue, crisis prevention, economic development, and multilateral cooperation. Conversely, they may intensify geopolitical rivalry when they reinforce exclusive blocs, increase strategic dependence, or deepen existing security dilemmas.

In conclusion, the concept of strategic partnership should be understood as a flexible but substantive instrument of foreign policy. Its long-term

effectiveness requires a combination of strategic planning, mutual respect, practical cooperation, and adaptability to changing international circumstances. As global challenges become increasingly interconnected, strategic partnerships will continue to play an important role in shaping the future of international cooperation and global governance.

REFERENCES

1. Wilkins, T. S. (2026). A paradigmatic study of strategic partnerships in international relations: Concepts, debates and theorizations. *Contemporary Security Policy, 47*(2), 680–713. https://doi.org/10.1080/13523260.2026.2622863

2. Keohane, R. O., & Nye, J. S. (2012). *Power and Interdependence* (4th ed.). Longman. Publisher information: https://www.pearson.com/

3. Wendt, A. (1992). Anarchy is what states make of it: The social construction of power politics. *International Organization, 46*(2), 391–425. https://doi.org/10.1017/S0020818300027764

4. United Nations. (1945). *Charter of the United Nations, Chapter I: Purposes and Principles*. https://www.un.org/en/about-us/un-charter/chapter-1

5. European External Action Service. (2025). *Partnerships*. European Union. https://www.eeas.europa.eu/topic-page/partnerships_en

6. Wilkins, T. S. (2008). Russo-Chinese strategic partnership: A new form of security cooperation? *Contemporary Security Policy, 29*(2), 358–383. https://doi.org/10.1080/13523260802284247

5-SECTION

DEVELOPING EVIDENCE-BASED REASONING IN BIOLOGY LESSONS: APPLYING THE CLAIM-EVIDENCE-REASONING FRAMEWORK

Bahronov Sohibjon

Teacher

Presidential School in Tashkent, Uzbekistan

jon.expert.bio@gmail.com

Abstract. *This methodological paper proposes a claim–evidence–reasoning sequence for secondary biology lessons. An osmosis investigation illustrates how observations can support mechanistic explanations. The contribution comprises a lesson sequence, feedback prompts, and an analytic rubric. Classroom effectiveness remains to be tested through independent student responses.*

Keywords: *biology education, scientific reasoning, claim–evidence–reasoning, osmosis, formative assessment.*

INTRODUCTION

Explaining a biological process requires more than naming it. A learner may identify osmosis yet fail to show how measured changes in tissue mass support an explanation of water movement. Biology lessons therefore need tasks that connect observations with disciplinary knowledge. The National Research Council (2012) places constructing explanations and arguing from evidence among the practices through which students learn science.

The claim–evidence–reasoning (CER) framework makes three functions explicit: answering a scientific question, selecting relevant observations, and explaining why those observations support the answer. Research on scaffolded explanations provides a basis for this approach. McNeill et al. (2006) found that gradually withdrawing written support helped students produce stronger independent reasoning than retaining continuous support. However, that

investigation concerned chemistry; its findings do not establish effectiveness for every biology classroom.

This paper aims to translate CER principles into a practical secondary biology sequence using osmosis. Its contribution is an integrated instructional design linking an investigation question, evidence selection, mechanistic explanation, peer critique, and component-based assessment. It asks how these elements can be organised so that teachers can distinguish correct conclusions from well-supported explanations.

METHODS

A literature-informed instructional design approach was used. Four foundational publications were purposively selected for their relevance to scientific practices, explanation scaffolds, teacher instruction, and classroom argumentation. Publisher and institutional records were consulted to verify the sources. This focused selection is not a systematic review and does not claim comprehensive coverage of CER research. Principles were translated into a proposed osmosis activity and checked for alignment between the question, expected evidence, explanatory mechanism, and assessment criteria.

The intended learners are secondary students who have studied plant cells, partially permeable membranes, and diffusion. The design assumes access to a balance, potato tissue, labelled containers, water, and sucrose solutions. No students were recruited and no classroom intervention or learning measurements were conducted. Consequently, the results below are design outputs, not evidence of improved attainment. The numerical example is explicitly hypothetical and serves only to illustrate a completed CER response.

RESULTS

A lesson sequence linking observations and explanations

The proposed sequence begins with the question: “How does external sucrose concentration affect the percentage change in potato tissue mass, and how can osmosis explain the pattern?” Before seeing the CER prompts, students

write a short prediction and explanation. This initial response helps the teacher identify whether learners confuse the direction of water movement, merely repeat a definition, or connect a mechanism to an expected observation.

The teacher then models the difference between a claim, evidence, and reasoning using a separate example. Students are asked what each sentence contributes, rather than simply copying three headings. This makes the purpose of explanation explicit. McNeill and Krajcik (2008) showed that instructional practices and their combinations matter when teachers introduce scientific explanation; providing a worksheet alone should therefore not be treated as sufficient instruction.

For the investigation, groups compare potato pieces placed in water and several sucrose concentrations. They keep tissue source, piece dimensions, solution volume, immersion time, temperature, and blotting procedure as consistent as possible. Repeated pieces at each concentration allow variation to be examined. The teacher prepares cutting equipment and supervises its use. Students record initial and final masses, retain unexpected measurements, and calculate percentage change as 100 × (final mass − initial mass) / initial mass.

Students plot concentration against percentage mass change and compare the pattern across repeated pieces. They identify which observations answer the question and consider whether differences are large relative to the variation. A trend should be described only over the concentrations investigated. If measurements conflict, students check the procedure and qualify their conclusion instead of replacing the observations with the expected textbook pattern.

An illustrative CER response

The following values are hypothetical teaching examples, not experimental findings. Suppose comparable pieces increase from 5.00 g to 5.50 g in water and decrease from 5.00 g to 4.50 g in a concentrated sucrose solution. The changes are +10% and −10%, respectively. These two values illustrate the

response structure; they cannot establish a concentration-response relationship or experimental reliability.

Claim: Under the illustrated conditions, potato tissue gains water in water and loses water in the concentrated sucrose solution. Evidence: Mass rises by 10% in water but falls by 10% in the sucrose solution. Reasoning: Water moves across partially permeable cell membranes from higher to lower water potential. Where the external solution has a lower water potential than the cells, net water movement is outward, consistent with a fall in tissue mass. In water, the initial gradient favours entry into the cells. This interpretation assumes that water exchange is the principal cause of the measured changes.

Students then exchange explanations and ask: Does the claim answer the question? Are the observations specific and relevant? Does the reasoning explain water movement rather than restate the mass change? Each student revises the response and identifies one uncertainty, such as inconsistent blotting or differences between tissue pieces. This critique extends the task beyond completing a writing template.

Assessment and gradual removal of support

A proposed analytic rubric allocates 0–2 points to each CER component. For the claim, 0 indicates an absent or incorrect answer, 1 an incomplete answer, and 2 an accurate answer bounded by the observations. For evidence, 0 indicates no relevant data, 1 relevant but incomplete data, and 2 accurate quantitative comparisons with units or percentages. For reasoning, 0 indicates absent or incorrect explanation, 1 a relevant principle without a clear connection, and 2 an accurate mechanism explicitly connecting evidence to the claim.

The six-point total is a classroom feedback aid, not a validated measurement instrument. Component scores should guide feedback: a student with accurate evidence but weak reasoning needs help explaining the mechanism, not more measurements. Initially, prompts may include “The measurements show…” and “This supports the claim because…”. Later tasks remove these prompts and require an independent explanation of unfamiliar data.

Teachers can assess uncertainty separately so that the basic rubric remains transparent.

DISCUSSION

The design makes observable the difference between describing a result and explaining it. Its practical value lies in matching each assessed component to a teaching action: clarifying the question, selecting data, or applying biological knowledge. It also treats peer critique as evaluation of an explanation rather than agreement with a classmate. Osborne et al. (2004) reported improvements in scientific argumentation within a sustained teaching programme, supporting opportunities for structured discussion without implying that one CER lesson will reproduce those outcomes.

Several limitations require attention. A well-organised response may still contain an incorrect biological mechanism, and strong language skills may conceal weak evidence. Conversely, learners working in an additional language may understand the process but struggle to express it. Teachers can permit oral rehearsal and labelled diagrams while retaining the same scientific criteria. CER also needs repeated use across topics; successful completion of an osmosis task does not demonstrate transfer to ecology or genetics.

Evaluation should compare independent responses to parallel tasks before and after several lessons, record the scaffolds provided, and examine component scores alongside actual writing. A second teacher could score anonymised samples to check agreement. A comparison class and a delayed transfer task would strengthen subsequent evaluation. Until such evidence is collected, the sequence should be regarded as a testable instructional proposal rather than a proven intervention.

CONCLUSION

CER offers a practical structure for connecting biological observations with mechanistic explanations. The proposed osmosis sequence combines investigation, quantitative evidence, peer critique, and targeted feedback while

progressively reducing support. Its educational contribution is a coherent classroom design and transparent assessment criteria. Claims about learning gains require implementation and empirical evaluation.

REFERENCES

McNeill, K. L., & Krajcik, J. (2008). Scientific explanations: Characterizing and evaluating the effects of teachers' instructional practices on student learning. *Journal of Research in Science Teaching, 45*(1), 53–78. https://doi.org/10.1002/tea.20201

McNeill, K. L., Lizotte, D. J., Krajcik, J., & Marx, R. W. (2006). Supporting students' construction of scientific explanations by fading scaffolds in instructional materials. *The Journal of the Learning Sciences, 15*(2), 153–191. https://doi.org/10.1207/s15327809jls1502_1

National Research Council. (2012). *A framework for K–12 science education: Practices, crosscutting concepts, and core ideas.* The National Academies Press. https://doi.org/10.17226/13165

Osborne, J., Erduran, S., & Simon, S. (2004). Enhancing the quality of argumentation in school science. *Journal of Research in Science Teaching, 41*(10), 994–1020. https://doi.org/10.1002/tea.20035

TARBIYACHILARNI EKOLOGIK STEAM MASHG‘ULOTLARINI LOYIHALASHGA TAYYORLASH: MODEL, RESURSLAR VA BAHOLASH MEZONLARI

Ergashova Ro‘zigul To‘lqin qizi

Navoiy davlat universiteti

ergashovarozigul39@gmail.com

Annotatsiya. *Maqolada maktabgacha ta’lim tashkilotlari tarbiyachilarining ekologik mazmundagi STEAM mashg‘ulotlarini loyihalashga kasbiy-metodik tayyorgarligini takomillashtirish masalasi yoritilgan. Tarbiyachi tayyorgarligi ekologik mazmunni tanlash, STEAM tarkiblarini integratsiyalash, xavfsiz faoliyatni rejalashtirish va kuzatuv dalillarini mezonlar asosida tahlil qilish amallari orqali tavsiflangan. Diagnostika, loyihalash, amaliyot va refleksiv tahlil bosqichlaridan iborat metodik model, “Yashil STEAM Ustoz” raqamli platformasi resurslaridan foydalanish tartibi hamda baholash mezonlari taklif etilgan. Buxoro, Navoiy, Qashqadaryo viloyatlari va Toshkent shahridagi 11 ta MTTdan 93 nafar tarbiyachi ishtirokidagi so‘rovnoma natijalari tahlil qilingan.*

Kalit so‘zlar: *ekologik ta’lim, STEAM yondashuvi, tarbiyachi, kasbiy-metodik tayyorgarlik, metodik model, raqamli platforma, baholash mezonlari.*

Аннотация. *В статье рассматривается совершенствование профессионально-методической подготовки воспитателей дошкольных образовательных организаций к проектированию STEAM-занятий экологического содержания. Предложены методическая модель (диагностика, проектирование, практика, рефлексивный анализ), порядок использования ресурсов цифровой платформы «Yashil STEAM Ustoz» и*

критерии оценки. Проанализированы результаты анкетирования 93 воспитателей из 11 дошкольных организаций.

Ключевые слова: *экологическое образование, STEAM-подход, воспитатель, методическая подготовка, цифровая платформа.*

Abstract. *The article addresses the improvement of preschool teachers' professional and methodological readiness to design ecology-focused STEAM activities. A methodological model (diagnosis, design, practice, reflective analysis), a procedure for using resources of the "Yashil STEAM Ustoz" digital platform, and assessment criteria are proposed. Survey results from 93 teachers in 11 preschool organizations are analysed.*

Keywords: *environmental education, STEAM approach, preschool teacher, methodological readiness, digital platform.*

KIRISH

Maktabgacha ta'lim bolaning qiziquvchanligi, mustaqil fikrlashi va atrof-muhitga munosabati shakllanadigan muhim bosqichdir. Barqaror rivojlanish uchun ta'lim ekologik masalalarni bilim, qadriyat va kundalik harakatlar bilan bog‘lashni taqozo etadi [4]. Maktabgacha ta'limdan boshlang‘ich ta'limga o‘tishda o‘quv faoliyatining uzviyligi va pedagogik qo‘llab-quvvatlash hal qiluvchi omil sifatida qaraladi [17].

O‘zbekistonda maktabgacha ta'lim tizimini 2030-yilgacha rivojlantirish konsepsiyasi, Maktabgacha ta'lim va tarbiyaning davlat standarti hamda Yangi O‘zbekistonning taraqqiyot strategiyasida ta'lim mazmunini takomillashtirish va pedagog kadrlar salohiyatini oshirish vazifalari belgilangan [1; 2; 3]. Bu vazifalarni amaliyotga ko‘chirish uchun tarbiyachi ekologik mavzuni STEAM faoliyati bilan bog‘lay olishi, raqamli va bosma resurslarni maqsadga muvofiq tanlashi, mashg‘ulotni xavfsiz tashkil etishi va natijani kuzatiladigan mezonlar orqali tahlil qila olishi kerak.

STEAM yondashuvi tabiiy fanlar, texnologiya, muhandislik, san’at va matematikani bolaga tushunarli bitta muammo yoki loyiha atrofida birlashtiradi [5]. Ammo tarbiyachi uchun faoliyat namunasini bilishning o‘zi yetarli emas. U ekologik mazmunni tanlashi, yoshga mos savol va topshiriq tuzishi, material va xavfsizlikni oldindan rejalashi hamda bolalar kuzatuvlarini tahlil qilishi lozim.

Shu sababli tadqiqot markaziga bolalardagi natija emas, tarbiyachining ekologik STEAM mashg‘ulotini loyihalashga doir kasbiy-metodik tayyorgarligi qo‘yildi. Asosiy muammo – ekologik STEAM mashg‘ulotlari haqidagi umumiy tavsiyalarni tarbiyachi egallashi lozim bo‘lgan aniq kasbiy amallarga aylantirishdir.

ADABIYOTLAR TAHLILI

Xorijiy tadqiqotlarda STEAM mazmunini integratsiyalash va pedagog tayyorgarligi turli kesimlarda o‘rganilgan. G. Yakman integrativ ta’limning pog‘onali modelini taklif etgan [5]. J. Aldemir va H. Kermani maktabgacha ta’lim dasturiga integratsiyalashgan STEMni kiritish bolalar natijalarini yaxshilashini ko‘rsatgan [6]. K. Lindeman, M. Jabot va M. Berkley erta yoshdagi ta’lim muhitida STEM va STEAMning o‘rnini tahlil qilgan [7].

Pedagog omiliga bag‘ishlangan ishlarda F. Jamil, S. Linder va D. Stegelin kasbiy rivojlanish tadbiridan keyin tarbiyachilarning STEAMga qarashlari o‘zgarishini qayd etgan [8]. N. DeJarnette STEAMni erta ta’lim guruhida joriy etish tajribasini yoritgan [9]. O. Monkeviciene va hammualliflar innovatsion STEAM amaliyotining pedagoglar kasbiy rivojlanishiga ta’sirini isbotlagan [10]. D. Clements va J. Sarama integratsiyalashgan va fanlararo yondashuvlar farqini asoslab bergan [11].

MDH olimlaridan N.V. Ivanova bolalar bog‘chasida STEAM ta’limini tashkil etish imkoniyatlari va muammolarini ko‘rib chiqqan [12]. T.V. Volosovets, V.A. Markova va S.A. Averin maktabgacha va kichik maktab yoshidagi bolalar uchun modulli STEM dasturini ishlab chiqqan [13].

O‘zbekistonda I.N. Kim maktabgacha katta yoshdagi bolalar ekologik ta’limida STEAM texnologiyalaridan foydalanishni tadqiq etgan [14]. Y.R. Maxmutazimovaning o‘quv qo‘llanmasida STEAMni maktabgacha ta’limga tatbiq etish masalalari bayon qilingan [15]. Sh.R. Turdiyev STEAM ta’limini modellashtirish va raqamlashtirish nazariyasini ishlab chiqqan [16].

Tahlil shuni ko‘rsatadiki, mavjud ishlar STEAM faoliyati uchun mazmuniy asos beradi. Biroq ekologik mazmun, tarbiyachining metodik qarorlari, raqamli resurslar va baholash vositalarini yagona tizimga birlashtirish masalasi alohida ilmiy asoslashni talab etadi.

TADQIQOT METODOLOGIYASI

Tadqiqot 2023–2026-o‘quv yillarida uch bosqichda olib borildi: asoslovchi (2023–2024), tashkil etish va o‘tkazish (2024–2025) hamda yakunlovchi (2025–2026) bosqichlar. Unda ilmiy-metodik manbalarni tahlil qilish, so‘rovnoma, pedagogik kuzatish, metodik materiallar ekspertizasi va tavsifiy statistik tahlil metodlari qo‘llandi.

So‘rovnomada Buxoro, Navoiy, Qashqadaryo viloyatlari va Toshkent shahridagi 11 ta maktabgacha ta’lim tashkilotidan 93 nafar amaliyotchi tarbiyachi qatnashdi. Respondentlarning yoshi 23–53 yosh, pedagogik staji 2–25 yil oralig‘ida. Dual ta’lim asosida amaliyot o‘tayotgan talabalar fikri alohida manba sifatida o‘rganilib, sonli ko‘rsatkichlarga qo‘shilmadi.

Anonim so‘rovnoma uch jihatni aniqladi: STEAM haqida xabardorlik, bu yo‘nalishda maxsus tayyorgarlik olganlik va mashg‘ulotni mustaqil tashkil etishga ishonch. Har bir foiz tegishli savolga javob bergan respondentlar soniga nisbatan hisoblandi. Respondentlarga kod berilib, shaxsni aniqlovchi ma’lumotlar tahlil jadvaliga kiritilmadi.

NATIJALAR VA MUHOKAMA

So‘rovnoma natijalari. Boshlang‘ich so‘rovnoma tarbiyachilarning uchdan bir qismi STEAMni amaliyotda qo‘llashda metodik yordamga muhtojligini ko‘rsatdi (1-jadval).

1-jadval

Tarbiyachilarning STEAM bo‘yicha boshlang‘ich so‘rovnoma natijalari (n = 93)

Ko‘rsatkich	Respondentlar soni	Ulushi, %
STEAM yondashuvini bilmaydi	3	3,22
Bu yo‘nalishda maxsus ta’lim olmagan	28	30,11
Mashg‘ulotda mustaqil qo‘llashga qiynaladi	30	32,26
Mashg‘ulotni tashkil eta olishiga ishonadi	63	67,74

Olingan natijalar asosida kasbiy rivojlanish dasturi uchun maqsadli ko‘rsatkich belgilandi. 67,74 foizlik boshlang‘ich ulushga 10 foiz nisbiy o‘sish qo‘llanganda maqsadli ulush 74,52 foizni tashkil etadi, ya’ni 6,78 foiz punktga teng. 93 respondentga ko‘chirilganda bu 69 nafar tarbiyachiga (74,19 %) to‘g‘ri keladi. Ushbu qiymat o‘lchangan yakuniy natija emas, balki seminar-treninglarni rejalashtirish uchun mo‘ljaldir.

Metodik model. Tadqiqotda tarbiyachilarni kasbiy-metodik tayyorlash modeli maqsad, mazmun, jarayon va baholash qismlarining o‘zaro bog‘liqligi asosida takomillashtirildi. Model tizimlilik, izchillik, fanlararo integratsiya, nazariya va amaliyot birligi, ekologik mas’uliyat hamda faoliyat xavfsizligi tamoyillariga tayanadi. Uni amalga oshirish to‘rt bosqichli sikl ko‘rinishida tashkil etiladi:

1. **Diagnostika** – tarbiyachining ehtiyoji va tayyorgarlik darajasi aniqlanadi.

2. **Loyihalash** – ekologik muammo yoshga mos STEAM topshirig‘iga aylantiriladi, material va xavfsizlik rejalanadi.

3. **Amaliyot** – loyiha mikrodars yoki MTT guruhida sinovdan o‘tkaziladi, mentor fikri va kuzatuv dalillari to‘planadi.

4. **Refleksiv tahlil** – dalillar asosida reja takomillashtiriladi va keyingi siklga qaytariladi.

Model bir martalik ketma-ketlik emas: kuzatuv dalili keyingi rejalashtirishga qaytadi. Masalan, “suvni tejash” mavzusida tarbiyachi kuzatiladigan holatni belgilaydi, bolaga tushunarli savol tuzadi, tomchi oqimini o‘lchash faoliyatini rejalaydi va natijani rasm yoki sodda jadvalda qayd etish usulini tanlaydi. Bunda san’at elementi natijani tasvirlash, matematika elementi esa sanash va taqqoslash orqali bitta ekologik savolga xizmat qiladi.

Tajriba guruhidagi tarbiyachilar bilan 9 oy davomida haftalik seminar-treninglar o‘tkazildi. Dastur STEAM mohiyati, ekologik mavzuni integratsiyalash, yoshga mos topshiriq ishlab chiqish, raqamli platformadan foydalanish va mashg‘ulot refleksiyasini qamrab oldi. “Jonli va jonsiz tabiat bilan tajriba o‘tkazish” modulida faoliyat kuzatish, tadqiqot (tajriba) va hisobot tayyorlash bosqichlarida tashkil etildi.

“Yashil STEAM Ustoz” platformasi. Platformada guruh, oy va hafta bo‘yicha tizimlashtirilgan ekologik STEAM mavzulari matn, video va yuklab olinadigan dars ishlanmasi shaklida uch tilda berilgan [18]. Har bir yosh guruhi uchun 52 tadan tayyor ishlanma, har kuni yangilanadigan ekologik faktlar, ta’limiy videolar va reyting bo‘limi mavjud.

Resursni tanlashda maqsadga moslik, manba ishonchliligi, yosh xususiyatiga moslik va bevosita kuzatish yoki tajribaga ulanish ketma-ket tekshiriladi. Tarbiyachi materialni tayyor holicha ko‘chirmaydi, uni mavzu, yosh va xavfsizlik shartlariga moslab qayta loyihalaydi. Raqamli material bevosita

tajriba va muloqot o‘rnini egallamaydi, balki tayyorgarlik va refleksiya uchun yordamchi vosita bo‘lib xizmat qiladi.

Baholash mezonlari. Tarbiyachi kompetensiyasi uch darajada baholanadi (2-jadval). Baholash kamida uch manbaga tayanadi: metodik bilimlar testi, mashg‘ulot loyihasining ekspert ko‘rigi va mikrodars kuzatuvi.

2-jadval

Tarbiyachilarning ekologik STEAM kompetensiyasi darajalari

Daraja	Tavsif
Yuqori	Ekologik muammoni mustaqil tahlil qiladi, STEAM komponentlarini maqsadga muvofiq birlashtiradi, yoshga mos ochiq topshiriq yaratadi, xavfsizlik va baholashni rejalaydi, qarorini dalillar bilan izohlaydi
O‘rta	Tayanch metodik ko‘rsatmalar asosida mashg‘ulot rejasini tuzadi, integratsiya va baholash elementlaridan foydalanadi, ayrim bosqichlarda maslahat talab etadi
Boshlang‘ich	Mavzu va faoliyatni tanlashda, STEAM bog‘lanishlarini ko‘rsatishda yoki kuzatiladigan natijani belgilashda qo‘shimcha metodik yordamga muhtoj

Olingan natijalar xorijiy tadqiqotlar xulosalari bilan hamohang: pedagogning STEAM amaliyotidagi o‘sishi bir martalik ma’ruzadan emas, mashq, kuzatuv va refleksiyani birlashtirgan uzluksiz kasbiy rivojlanishdan kelib chiqadi [8; 10].

XULOSA

Tarbiyachilarning ekologik bilimlarini rivojlantirish ekologik tushunchalarni bayon etish bilan cheklanmay, ularni kundalik kasbiy faoliyatda

qo‘llashga tayyorlashni talab etadi. Tadqiqot natijalari asosida quyidagi xulosalarga kelindi:

1. Tarbiyachining ekologik STEAM faoliyatiga kasbiy-metodik tayyorgarligi ekologik mazmunni tahlil qilish, fanlararo aloqalarni belgilash, topshiriqni loyihalash, xavfsiz faoliyatni tashkil etish va natijani tahlil qilish amallari orqali operatsion tavsiflandi.

2. 93 nafar tarbiyachi ishtirokidagi so‘rovnoma ularning 32,26 foizi STEAMni mustaqil qo‘llashga qiynalishini va 30,11 foizi maxsus tayyorgarlik olmaganini ko‘rsatdi; bu tayyorgarlik mazmunida loyihalash va sinov mashqlariga ko‘proq o‘rin berish zarurligini asoslaydi.

3. Diagnostika, loyihalash, amaliyot va refleksiv tahlil bosqichlaridan iborat sikl tarbiyachiga tayyor ishlanmani takrorlash o‘rniga uni maqsad, yosh va sharoitga moslab qayta loyihalash malakasini shakllantiradi.

4. “Yashil STEAM Ustoz” platformasi resurslarini maqsadga moslik, ishonchlilik, yoshga moslik va amaliy faoliyatga ulanish mezonlari bo‘yicha tanlash raqamli resursni kasbiy qaror qabul qilish vositasiga aylantiradi.

Tavsiyalar. Malaka oshirish mashg‘ulotlarida tarbiyachilarga ekologik mazmundagi integratsiyalashgan STEAM topshiriqlarini mustaqil loyihalash va taqdim etish imkonini berish; metodik ishlanmalarga ekologik muammoni kuzatish, amaliy yechim ishlab chiqish va natijani refleksiv baholash topshiriqlarini kiritish; tarbiyachilar tayyorgarligini mezon va darajalar asosida muntazam baholab, individual metodik yordam ko‘rsatish maqsadga muvofiq. Keyingi tadqiqotlarda boshlang‘ich va yakuniy o‘lchovlarni bir xil mezonlar bilan qayd etib, metodikaning samaradorligini miqdoriy baholash rejalashtirilgan.

FOYDALANILGAN ADABIYOTLAR

1. O‘zbekiston Respublikasi Prezidentining “O‘zbekiston Respublikasi maktabgacha ta’lim tizimini 2030-yilgacha rivojlantirish konsepsiyasini tasdiqlash to‘g‘risida”gi 2019-yil 8-maydagi PQ-4312-son qarori. https://lex.uz/docs/4327235

2. O‘zbekiston Respublikasi Vazirlar Mahkamasining “Maktabgacha ta’lim va tarbiyaning davlat standartini tasdiqlash to‘g‘risida”gi 2020-yil 22-dekabrdagi 802-son qarori.

3. O‘zbekiston Respublikasi Prezidentining “2022–2026-yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasi to‘g‘risida”gi 2022-yil 28-yanvardagi PF-60-son Farmoni.

4. UNESCO. Education for Sustainable Development: A Roadmap. – Paris: UNESCO, 2020. – 66 p.

5. Yakman G. STEAM Education: An overview of creating a model of integrative education // Proceedings of the 2008 ASEE Annual Conference & Exposition. – 2008. – P. 19–35.

6. Aldemir J., Kermani H. Integrated STEM curriculum: improving educational outcomes for Head Start children // Early Child Development and Care. – 2017. – Vol. 187, No. 11. – P. 1694–1706.

7. Lindeman K.W., Jabot M., Berkley M.T. The role of STEM (or STEAM) in the early childhood setting // Learning across the early childhood curriculum. – Emerald Group Publishing, 2014. – Vol. 17. – P. 95–114.

8. Jamil F.M., Linder S.M., Stegelin D.A. Early childhood teacher beliefs about STEAM education after a professional development conference // Early Childhood Education Journal. – 2018. – Vol. 46. – P. 409–417.

9. DeJarnette N.K. Implementing STEAM in the early childhood classroom // European Journal of STEM Education. – 2018. – Vol. 3, No. 3. – Art. 18.

10. Monkeviciene O. et al. Impact of innovative STEAM education practices on teacher professional development and 3–6 year old children’s competence development // Journal of Social Studies Education Research. – 2020. – Vol. 11, No. 4. – P. 1–27.

11. Clements D.H., Sarama J. STEM or STEAM or STREAM? Integrated or Interdisciplinary? // Embedding STEAM in early childhood education and care. – Cham: Springer, 2021. – P. 261–275.

12. Иванова Н.В. Современные подходы к организации STEAM-образования в детском саду // Детский сад: теория и практика. – 2016. – № 5. – С. 16–25.

13. Волосовец Т.В., Маркова В.А., Аверин С.А. STEM-образование детей дошкольного и младшего школьного возраста: парциальная модульная программа. – 2-е изд. – М.: БИНОМ. Лаборатория знаний, 2019. – 112 с.

14. Kim I.N. Maktabgacha katta yoshdagi bolalar ekologik ta’limida STEAM-texnologiyalardan foydalanish: ped. fan. bo‘yicha fals. dok. (PhD) diss. avtoref. – Toshkent, 2023.

15. Maxmutazimova Y.R. Maktabgacha ta’limda STEAM texnologiyalari: o‘quv qo‘llanma. – Toshkent: Tamaddun, 2022.

16. Turdiyev Sh.R. STEAM fanlari ta’limini modellashtirish hamda raqamlashtirish orqali rivojlantirishning nazariyasi va metodikasi: ped. fan. dok. (DSc) diss. avtoref. – Qarshi, 2022.

17. OECD. Starting Strong V: Transitions from Early Childhood Education and Care to Primary Education. – Paris: OECD Publishing, 2017. – 296 p.

18. Yashil STEAM Ustoz. Ekologik tarbiya platformasi. URL: https://stem-ustoz.uz/

IMPROVING THE PROFESSIONAL SKILLS OF FUTURE PRIMARY SCHOOL TEACHERS THROUGH DUAL EDUCATION

Mahbuba Tohirova

Andijan Branch of Kokand University, Uzbekistan

E-mail: mahbubatohirova3@gmail.com

***Abstract**: This article examines how dual education can support the professional development of future primary school teachers. The study involved students in primary education and pedagogy programmes at three higher education institutions. It discusses the integration of theoretical preparation, school-based practice, mentoring, and reflection, and proposes methodological recommendations.*

***Keywords**: dual education, primary education, prospective teachers, professional skills, pedagogical competence, teaching practice, mentoring, reflection.*

1. INTRODUCTION

The quality of teacher preparation is an important factor in educational development. Professional competence is particularly significant in primary education because pupils begin to develop foundational reading, writing, numeracy, independent thinking, and positive attitudes toward learning during these years.

Future primary school teachers need more than theoretical knowledge of pedagogy and psychology. They must also be able to plan lessons, design learning tasks, manage classroom activities, communicate effectively with pupils, and reflect on their teaching. Theoretical knowledge alone may not fully prepare students to make sound decisions in authentic classroom situations. Therefore, higher education preparation should be closely connected with school-based practice.

Dual education is an approach that seeks to integrate theoretical study with practical experience. Higher education institutions provide academic and methodological preparation, schools offer an authentic pedagogical

environment, and mentor teachers support students' gradual professional development.

The aim of this study is to analyze the potential of dual education to improve the professional skills of students in primary education and pedagogy programmes across three higher education institutions and to propose methodological recommendations.

The objectives are to examine the theoretical and practical dimensions of dual education, identify the components of professional skills, and suggest ways to integrate teaching practice, mentoring, and reflective analysis.

2. METHODS

The study involved students enrolled in primary education and pedagogy programmes at three higher education institutions. The full names of the institutions, the number of participants, and the period of data collection should be specified before submission. The research approach draws on the analysis of literature concerning dual education, professional competence, and reflective pedagogical practice, together with a methodological synthesis of practical teacher-preparation activities.

The methods used to develop the article included literature review, comparative analysis, systematization, and pedagogical generalization. Professional skills were examined through five interrelated dimensions: motivational and value-based, cognitive, practical and activity-based, communicative, and reflective.

The motivational dimension concerns professional interest and responsibility; the cognitive dimension covers pedagogical, psychological, and methodological knowledge; the practical dimension includes lesson planning and classroom organization; the communicative dimension concerns interaction with pupils; and the reflective dimension involves analyzing and improving one's own practice. If questionnaires, observation schedules, or an experimental intervention were used in the research, their procedures should be described explicitly in the final version.

3. RESULTS

The analysis indicates the importance of aligning theoretical coursework with school-based practice. Students can apply knowledge gained in pedagogy and teaching methodology through classroom observation, lesson planning, teaching selected lesson segments, and analyzing pupils' learning activities.

A practice-oriented sequence is proposed: theoretical preparation → school-based observation → practical assignment → mentor feedback → reflective analysis → improved practice. This sequence can help students connect conceptual knowledge with pedagogical decision-making.

The first direction is mentoring. Experienced teachers can support students in setting lesson objectives, selecting teaching methods, managing the classroom, encouraging pupils, and reviewing learning outcomes. Feedback should be specific and developmental rather than limited to identifying mistakes.

The second direction involves practical assignments and microteaching. Students may design sound-letter activities for first grade, reading-comprehension questions for second grade, problem-based mathematics tasks for third grade, or differentiated activities for pupils with varying levels of readiness. Microteaching enables students to present a short lesson segment and refine it in response to feedback.

The third direction is reflective analysis supported by a teaching portfolio. After each practice session, students can record what went well, what difficulties arose, and what they plan to change in the next lesson. Portfolios may include lesson plans, learning materials, mentor feedback, and reflective notes.

Recommended assessment criteria include setting appropriate lesson objectives, selecting suitable methods, managing time, communicating with pupils, responding to individual needs, and reflecting on teaching performance. These criteria should be agreed upon by the higher education institution and partner school.

To report the empirical findings from the three institutions fully, the final article should specify the number of participants, research instruments, and

observed qualitative or quantitative outcomes. As these details have not yet been provided, no statistical percentages or numerical claims of effectiveness are included in this draft.

4. DISCUSSION

The main potential advantage of dual education is the gradual involvement of students in school settings and the connection of theoretical knowledge with authentic pedagogical tasks. However, the presence of a dual education arrangement does not automatically guarantee professional competence. Outcomes depend on the quality of practice, mentor preparation, cooperation between institutions, and students' active participation.

In primary teacher education, practice should address pupils' developmental characteristics, reading literacy, visual learning resources, differentiated tasks, and the creation of a positive classroom environment. A balance between student independence and mentor support is also important: excessive direction may limit autonomy, while insufficient guidance may reduce opportunities to learn from mistakes.

A limitation of the current draft is that the names of the participating institutions, participant numbers, and specific empirical indicators have not been included. Adding these details, describing the research instruments, and reporting the observed outcomes will strengthen the scientific transparency of the final conference submission.

5. CONCLUSION

Dual education offers an important opportunity to integrate theoretical knowledge with practical pedagogical activity in preparing future primary school teachers. Mentoring, microteaching, practice-oriented assignments, teaching portfolios, and reflective analysis are recommended as complementary tools for professional development.

Effective cooperation requires clearly defined responsibilities for higher education institutions, schools, and students, together with shared assessment

criteria. Future research should empirically evaluate the effectiveness of dual education by reporting participant numbers, initial and final indicators, and the methods used across the three institutions.

REFERENCES

Billett, S. (2011). Vocational education: Purposes, traditions and prospects. Springer.

Euler, D. (2013). Germany's dual vocational training system: A model for other countries? Bertelsmann Stiftung.

O'zbekiston Respublikasining "Ta'lim to'g'risida"gi Qonuni, O'RQ-637-son [Law of the Republic of Uzbekistan "On Education," No. O'RQ-637] (2020, September 23). https://lex.uz/docs/-5013007

Schön, D. A. (1983). The reflective practitioner: How professionals think in action. Basic Books.

PSYCHOLOGICAL AND PEDAGOGICAL ASPECTS OF FORMAL COMMUNICATION AND ITS ORGANIZATION IN HIGHER EDUCATION

Komila Turdiyeva Usmankulovna

Tashkent State Agrarian University

komilaturdieva13@gmail.com

Abstract. *Formal communication is an essential component of students' professional development and social integration in higher education. The effectiveness of professional interaction depends not only on linguistic knowledge but also on psychological readiness, communicative competence, emotional self-regulation, social perception, and adherence to professional ethics. This article examines the psychological and pedagogical aspects of formal communication and identifies the educational conditions that contribute to its effective organization.*

Keywords: *formal communication, communication culture, psychological factors, pedagogical approaches, communicative competence, higher education, professional communication, intercultural communication.*

INTRODUCTION

In the context of contemporary higher education, the development of students' professional competence requires more than the acquisition of theoretical knowledge and practical skills. Graduates are also expected to communicate effectively, express their opinions logically, participate in professional discussions, negotiate, collaborate with colleagues, and observe ethical standards in different institutional settings. Consequently, formal communication has become an important component of professional education.Formal communication refers to the exchange of information, ideas, and opinions within established social, academic, or professional contexts. It is generally characterized by a clear purpose, an organized structure, appropriate language, respect for communicative norms, and responsibility for the information conveyed. Its principal forms include academic presentations, official correspondence, professional meetings, interviews, negotiations, reports,

and institutional discussions.The organization of formal communication is a complex process influenced by linguistic, psychological, social, and pedagogical factors. Students may possess sufficient subject knowledge but experience difficulties when expressing their ideas publicly, responding to criticism, interpreting the intentions of interlocutors, or adapting their language to a particular professional situation.

The aim of this article is to examine the psychological and pedagogical aspects of formal communication and identify effective approaches to its organization in higher education.

1. Theoretical Foundations of Formal Communication

Communication is a multidimensional process involving the exchange of information, the coordination of social interaction, and the interpretation of other people's behavior and intentions. In educational and professional contexts, communication serves both informational and relational functions.Dell Hymes introduced the concept of communicative competence to emphasize that successful communication involves more than grammatical knowledge. Speakers must also understand how language is used appropriately in particular social situations (Hymes, 1972). This perspective is especially relevant to formal communication because the effectiveness of a message depends on its linguistic accuracy, social appropriateness, purpose, and context.Canale and Swain (1980) further developed the concept of communicative competence by distinguishing grammatical, sociolinguistic, and strategic components. Their framework provides a useful theoretical basis for understanding the skills required in formal communication. Students need to construct grammatically accurate messages, select expressions appropriate to the communicative situation, and use strategies to overcome misunderstandings or communication difficulties.Formal communication can therefore be understood as an organized communicative activity in which participants exchange information according to particular professional, institutional, and ethical expectations.

Its main characteristics include:

- **Purposefulness:** communication is directed toward a specific academic or professional objective.
- **Clarity and coherence:** information is presented logically and understandably.
- **Appropriateness:** language and behavior correspond to the situation and the participants' roles.
- **Professional ethics:** communication is based on respect, responsibility, and appropriate conduct.
- **Interaction and feedback:** participants clarify information, respond to questions, and evaluate mutual understanding.

These characteristics indicate that formal communication should be developed as an integrated competence rather than as an isolated linguistic skill.

2. Psychological Aspects of Formal Communication

The psychological dimension of formal communication concerns the internal processes and individual characteristics that influence how students initiate, maintain, and regulate interaction.One important factor is psychological readiness. Students who feel confident in their knowledge and abilities are generally better prepared to participate in discussions, deliver presentations, and express their opinions. In contrast, fear of making mistakes, negative evaluation, or public speaking may restrict their participation.Self-confidence should therefore be developed through supportive learning environments, gradual increases in task complexity, and opportunities for repeated practice. Students should be encouraged to regard mistakes as opportunities for learning rather than as reasons for embarrassment.

Another significant factor is emotional self-regulation. Formal communication sometimes involves disagreement, criticism, conflicting interests, or demanding professional situations. The ability to manage emotions helps individuals respond constructively rather than react impulsively. Students should learn to recognize their emotional responses, maintain composure, and

formulate reasoned arguments even when their opinions differ from those of others.

Social perception is also essential. Effective communicators must interpret verbal messages, recognize the perspectives of other participants, and respond appropriately to contextual cues. Misinterpretations may arise when individuals rely on assumptions rather than carefully examining what their interlocutors actually mean.Active listening is consequently a fundamental component of formal communication. It involves paying attention to the speaker, identifying the central message, asking relevant questions, and providing appropriate feedback. These skills promote mutual understanding and reduce the likelihood of unnecessary conflict.Empathy and reflective thinking further contribute to communication effectiveness. Empathy enables students to consider other people's perspectives, while reflection helps them evaluate their own communicative behavior and identify areas for improvement.

Bandura's (1977) social learning theory also provides a relevant perspective. It emphasizes the role of observation, modeling, and the perceived ability to perform a task in learning behavior. In educational settings, teachers can demonstrate appropriate communication practices, while students can develop their skills by observing examples and participating in structured interactions.

Thus, the psychological effectiveness of formal communication depends on the interaction of self-confidence, emotional regulation, active listening, empathy, social perception, and reflection.

3. Pedagogical Conditions for Organizing Formal Communication

The development of formal communication requires purposeful pedagogical organization. Students need opportunities to acquire relevant knowledge, observe appropriate models, practice communication in realistic situations, receive feedback, and evaluate their progress.

First, communication objectives should be integrated into the content of higher education courses. Students should understand not only what they are

expected to communicate but also how to select appropriate language, organize information, support arguments, and interact professionally.

Second, teaching methods should provide opportunities for active participation. Traditional explanation can establish the theoretical foundations of communication, but practical tasks are necessary for transferring knowledge into communicative performance.The following methods are particularly relevant.

Role-playing and simulation. Students assume professional roles and participate in simulated meetings, interviews, negotiations, and consultations. These activities enable them to practice appropriate language, decision-making, and interpersonal interaction in a controlled environment.

Case-based learning. Students analyze professional situations involving communication problems, identify possible solutions, and justify their decisions. This method develops critical thinking, argumentation, and the ability to choose appropriate communication strategies.

Group discussions and debates. These activities encourage students to express opinions, respond to opposing arguments, ask questions, and reach reasoned conclusions. They also promote respect for different viewpoints.

Presentations and public speaking. Students learn to structure information, maintain logical coherence, address an audience, and answer questions. Repeated practice can gradually strengthen confidence and reduce communication anxiety.

Reflective assessment. Students evaluate their communication performance, identify strengths and weaknesses, and develop strategies for improvement. Peer feedback and teacher feedback can support this process when they are specific, constructive, and clearly connected to learning objectives.

Research on business communication skills in higher education also highlights the value of interactive learning activities and professionally oriented tasks (Nagay et al., 2023). Such approaches can connect classroom learning with

the communication demands students are likely to encounter in their future careers.

The teacher's role is equally important. Teachers establish communication norms, demonstrate professional behavior, organize learning activities, and create conditions in which students can participate without fear of humiliation. A respectful and inclusive classroom environment can encourage students to ask questions, express disagreement constructively, and take responsibility for their contributions.

4. Formal Communication in Multilingual and Intercultural Environments

The growing importance of international academic cooperation has increased the need for students to communicate across linguistic and cultural boundaries. In multilingual educational environments, formal communication requires the integration of linguistic competence, pragmatic awareness, intercultural understanding, and professional ethics.Students may understand the vocabulary and grammar of a foreign language but still experience difficulties using it appropriately in formal situations. For example, the choice of greetings, forms of address, expressions of disagreement, and levels of directness may vary across languages and cultures.These differences can influence how a message is interpreted. An expression considered clear and direct in one context may be perceived as impolite in another. Similarly, the conventions of academic correspondence and professional meetings may differ across institutions and cultural settings.To address these challenges, educators should integrate intercultural communication tasks into the learning process. Students can compare authentic professional texts, analyze examples of formal correspondence, examine different forms of politeness, and participate in simulated international meetings.

Foreign-language instruction should also connect language learning with students' academic disciplines and professional needs. For instance, students may prepare research presentations, write formal emails, discuss professional

problems, or participate in project meetings in a foreign language.These activities enable learners to develop not only linguistic accuracy but also the ability to adapt communication to different audiences and purposes.In this respect, formal communication should be understood as a combination of language knowledge, contextual awareness, strategic competence, and intercultural sensitivity.

5. Criteria for Assessing Students' Formal Communication Skills

The systematic development of formal communication requires appropriate assessment criteria. Assessment should focus not only on grammatical accuracy but also on the overall effectiveness and appropriateness of students' communicative performance.

The following criteria may be used in higher education:

1. **Linguistic accuracy:** the appropriate use of vocabulary, grammar, and professional terminology.
2. **Logical organization:** the coherent presentation of ideas and arguments.
3. **Communicative appropriateness:** the ability to adapt language and behavior to the purpose, audience, and situation.
4. **Interaction skills:** active listening, asking questions, responding to feedback, and maintaining constructive dialogue.
5. **Psychological self-regulation:** the ability to manage anxiety and emotions during formal interaction.
6. **Professional ethics:** respect for interlocutors, responsible communication, and adherence to accepted standards of conduct.
7. **Reflective competence:** the ability to evaluate one's performance and identify areas for improvement.

These criteria can be applied through presentations, written assignments, simulated meetings, group projects, peer assessment, and reflective portfolios.

Assessment should be formative as well as summative. Formative assessment provides students with feedback during the learning process,

allowing them to improve specific skills before a final evaluation. Summative assessment can be used to determine the extent to which the intended learning outcomes have been achieved.

A transparent assessment system helps students understand expectations, monitor their progress, and take greater responsibility for their communicative development.

DISCUSSION

The analysis indicates that formal communication is a multidimensional competence that cannot be developed effectively through theoretical instruction alone. It requires the integration of linguistic knowledge, psychological readiness, social interaction, and practical experience.Psychological factors influence students' willingness to participate, their ability to manage challenging situations, and their capacity to understand other people. Pedagogical factors determine the opportunities available for practicing communication, receiving feedback, and developing professional behavior.An effective educational model should therefore combine theoretical instruction with practice-oriented tasks, supportive teacher guidance, peer interaction, and reflective assessment.Particular attention should be given to individual differences among students. Some learners may require additional support in public speaking, while others may need to improve their listening skills, argumentation, or intercultural awareness. Differentiated tasks and constructive feedback can help address these needs.Digital learning environments also offer opportunities for communication practice through online presentations, collaborative documents, virtual meetings, and professional correspondence. However, digital tools should be selected according to clearly defined educational objectives and should complement rather than replace meaningful interpersonal interaction.It is important to distinguish theoretical analysis from empirical evidence. The present article synthesizes conceptual perspectives and pedagogical implications; it does not report an original experiment or claim measured improvements among a specific group of students. Further empirical research could examine the effectiveness of

particular teaching methods by comparing students' communication performance before and after structured instructional interventions.

CONCLUSION

Formal communication plays a significant role in the professional and personal development of university students. Its effectiveness depends on linguistic competence, psychological readiness, emotional self-regulation, active listening, empathy, contextual awareness, and adherence to professional ethics.The psychological aspects of communication explain how individual characteristics and interpersonal processes influence communicative behavior. The pedagogical aspects determine how these abilities can be developed through purposeful instruction, interactive learning, realistic professional tasks, and systematic feedback.The use of role-playing, case-based learning, group discussions, presentations, and reflective assessment can provide students with opportunities to apply theoretical knowledge in practical situations. In multilingual and intercultural environments, these methods should be complemented by the development of pragmatic awareness and sensitivity to cultural differences.It can therefore be concluded that the effective organization of formal communication requires an integrated psychological and pedagogical approach. The systematic implementation of such an approach can support the development of students' communicative competence and prepare them for constructive interaction in academic, professional, and intercultural contexts.

REFERENCES

1. Bandura, A. (1977). *Social Learning Theory*. Prentice Hall.
2. Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics, 1*(1), 1–47. https://doi.org/10.1093/applin/I.1.1
3. Hymes, D. (1972). On communicative competence. In J. B. Pride & J. Holmes (Eds.), *Sociolinguistics: Selected Readings* (pp. 269–293). Penguin Books.
4. Nagay, I., Khalabuzar, O., Alieksieieva, H., & Antonenko, O. (2023). Peculiarities of the formation of students' business communication skills within distance learning. *Education Research International*. https://doi.org/10.1155/2023/9660270
5. Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.
6. Karimova, N. (2025). Pedagogical conditions for preparing students for professional communication. *International Journal of Pedagogics, 5*(6). https://doi.org/10.37547/ijp/Volume05Issue06-110

DESIGNING THE PROCESS OF PREPARING STUDENTS FOR UPBRINGING ACTIVITY IN A HIGHER EDUCATION INSTITUTION ON A MODULAR-ACMEOLOGICAL BASIS

Khusayinova Guzal Abdurasulovna

PhD in Pedagogical Sciences, Senior Lecturer of the Department of Intellectual Sciences and Information Technologies, Namangan State Pedagogical Institute, Namangan, Uzbekistan

xusayinovaguzal13@gmail.com,https://orcid.org/0009-0003-3845-0322

Ibrokhimov Maksadjon Akhmedovich

PhD in Pedagogical Sciences, Senior Lecturer of the Department of Intellectual Sciences and Information Technologies, Namangan State Pedagogical Institute, Namangan, Uzbekistan

maqsadjonibroximov@gmail.com

Abstract. *The article substantiates the design of the process of preparing higher education students for upbringing (educational) activity on the basis of an integrated modular-acmeological approach. The relevance of the study is determined by the contradiction between the growing social demand for teachers capable of purposeful, value-oriented upbringing work and the predominantly linear, knowledge-centred organisation of the corresponding courses in universities. Methodologically, the study combines the principles of modular learning (P.A. Yutsiavichene, J.D. Russell) with the acmeological theory of professional development (B.G. Ananyev, A.A. Bodalev, A.A. Derkach, N.V. Kuzmina). As a result, a five-stage design algorithm, a structure of five didactic modules with defined acmeological mechanisms, a four-component model of readiness for upbringing activity and an integral index for diagnosing its level are proposed. A worked calculation shows how the index is used to build an individual acmeological route for a student. The model can be applied in designing curricula of pedagogical specialities and in-service teacher training programmes.*

Keywords: *upbringing activity, readiness, modular learning, acmeological approach, pedagogical design, individual acmeological route, higher education, professional self-development.*

INTRODUCTION

The modernisation of education in the Republic of Uzbekistan treats upbringing as an integral part of the educational process. The Law "On Education" (No. ZRU-637, 2020) defines upbringing as a systematic process aimed at forming the personality on the basis of national and universal values, while the Concept of Continuous Spiritual Education approved by Presidential Resolution PQ-4307 (2019) sets the task of ensuring continuity of upbringing work at all levels, from preschool to higher education [1; 2]. The Concept for the Development of the Higher Education System until 2030 (Decree PF-5847) further emphasises the practice-oriented, competency-based training of specialists [3]. Consequently, higher education institutions must ensure that graduates — above all, future teachers — are ready to plan, organise and evaluate upbringing activity independently.

Analysis of current practice reveals several contradictions: between the integrative nature of upbringing activity and the fragmented presentation of its content across separate disciplines; between the requirement for individualised professional growth and the uniform, linear structure of training; and between the declared orientation towards professional excellence and the lack of tools that allow a student to see his or her own trajectory towards it. These contradictions define the research problem: how should the process of preparing students for upbringing activity be designed so that it is flexible, diagnosable and oriented towards the student's professional "acme"?

The **aim** of the study is to develop and theoretically substantiate a model for designing the process of preparing students for upbringing activity on a modular-acmeological basis.

MATERIALS AND METHODS

The study is based on theoretical analysis and synthesis of philosophical, psychological and pedagogical literature, systemic and structural-functional analysis, pedagogical modelling and the method of expert evaluation used to define the weights of readiness components. Two theoretical traditions served as the methodological foundation.

The **modular approach** treats a module as a relatively autonomous, purpose-complete unit of content and activity provided with its own objectives, methodological guidance and control tools [4; 5]. Reviews of modular instruction in higher education show that it allows students to progress at an individual pace and strengthens their responsibility for learning outcomes [6]. Among Uzbek scholars, modular and innovative learning technologies were developed by N.A. Muslimov and co-authors [7].

The **acmeological approach**, whose foundations were laid by B.G. Ananyev [8] and developed by A.A. Bodalev [9], A.A. Derkach [10] and N.V. Kuzmina [11], considers professional development as a movement towards the highest level of personal and professional maturity (“acme”). Its key categories — acmeological goal, acmeological invariants of professionalism, self-development and reflexive self-regulation — make it possible to shift the emphasis from the transfer of knowledge to the purposeful growth of the specialist’s personality.

The integration of these approaches rests on their complementarity: modularity provides the structural form (what and in what sequence is mastered), while acmeology provides the developmental vector (to what level and through which mechanisms the student grows).

RESULTS

1. Design algorithm. Designing the preparation process is carried out in five interrelated stages: (1) *diagnostic* — initial assessment of the student’s readiness for upbringing activity; (2) *acmeological goal-setting* — formulation of the personal “acme-goal” and expected learning outcomes; (3) *modular*

structuring — distribution of content across modules with defined entry and exit requirements; (4) *technological* — selection of forms, methods and technologies for each module; (5) *monitoring and correction* — repeated diagnostics and adjustment of the individual acmeological route. Unlike a linear course plan, the algorithm is cyclical: the results of stage 5 return to stage 2 and update the student's goals.

2. Modular structure. The content of preparation is organised into five modules (Table 1). Each module is completed by a control point; a student who does not reach the threshold value continues work within a correction block instead of moving on, which ensures mastery rather than mere coverage of the material.

Table 1.

Modular structure of preparing students for upbringing activity

Module	Main content	Acmeological mechanism	Share of study time
M0. Diagnostic-motivational	Entry diagnostics; value attitudes towards upbringing; formulation of the personal acme-goal	Self-cognition, goal-setting	5 %
M1. Theoretical-methodological	Essence, aims and principles of upbringing; national and universal values; normative documents	Formation of the professional worldview	20 %
M2. Technological	Forms, methods and technologies of upbringing work; the work of a tutor and class curator; extracurricular activity	Mastering acmeological invariants of professional activity	30 %
M3. Practice-oriented	Case simulations, upbringing projects, pedagogical practice in schools	Professional trial, accumulation of personal experience	30 %
M4. Reflexive-evaluative	Portfolio, self-assessment and peer assessment, correction of the acme-route	Reflexive self-regulation, self-development	15 %

3. Model of readiness and its diagnostics. Readiness for upbringing activity is considered an integrative personal quality comprising four components: *motivational-value* (k_1) — a stable positive attitude towards

upbringing work and acceptance of humanistic values; *cognitive* (k_2) — knowledge of the theory and methodology of upbringing; *operational-activity* (k_3) — skills in designing and conducting upbringing events; *reflexive* (k_4) — the ability to analyse and correct one's own activity. Each component is measured by a set of diagnostic tasks and normalised to the interval [0; 1]. The integral readiness index is calculated as a weighted sum:

$$R = w_1k_1 + w_2k_2 + w_3k_3 + w_4k_4, \quad \Sigma w_i = 1,$$

where the weights determined by expert evaluation are $w_1 = 0.25$, $w_2 = 0.25$, $w_3 = 0.30$ and $w_4 = 0.20$; the higher weight of the operational-activity component reflects the practical nature of upbringing work. Four levels of readiness are distinguished, corresponding to the acmeological stages of professional development (Table 2).

Table 2. Levels of students' readiness for upbringing activity

Level	Value of R	Characteristic
Adaptive	$R < 0.45$	Reproduces model upbringing events under guidance; motivation is situational
Basic	$0.45 \le R < 0.65$	Independently conducts standard events; limited reflection
Productive	$0.65 \le R < 0.85$	Designs upbringing activity taking into account pupils' characteristics; analyses results
Creative (acme)	$R \ge 0.85$	Creates original upbringing projects; stable need for self-development

4. Example of building an individual acmeological route. Suppose that after module M2 a student obtained the following normalised scores: $k_1 = 0.72$, $k_2 = 0.68$, $k_3 = 0.60$, $k_4 = 0.55$. Then $R = 0.25 \cdot 0.72 + 0.25 \cdot 0.68 + 0.30 \cdot 0.60 + 0.20 \cdot 0.55 = 0.180 + 0.170 + 0.180 + 0.110 = 0.64$. The student is at the upper boundary of the basic level. To move to the productive level, the index must increase by at least 0.01; the weakest components are reflexive (0.55) and operational-activity (0.60). The individual route therefore prioritises tasks of module M4 (keeping a reflexive diary, analysing a video recording of one's own event) and additional case simulations within module M3. If, after correction, k_3

and k_4 rise to 0.70 and 0.65, the index becomes $R = 0.180 + 0.170 + 0.210 + 0.130 = 0.69$, which corresponds to the productive level.

DISCUSSION

The proposed model differs from traditional linear organisation of courses in three respects. First, it makes the process diagnosable: the student and the teacher see not only the final grade but also the profile of four components, which shows exactly where growth is required. Second, modularity combined with control points provides flexibility — the content remains common for the group, while the pace and sequence of correction blocks become individual. Third, the acmeological orientation turns preparation into a process of self-development: the acme-goal formulated in module M0 and revised after each cycle stimulates the student's internal motivation, which is consistent with the conclusions of A.A. Derkach and N.V. Kuzmina on the role of self-regulation in achieving professionalism [10; 11].

At the same time, the model has limitations. The weights of the components were obtained by expert evaluation and should be refined on a larger sample; the threshold values of the levels also require empirical validation. These issues define the direction of further research — a pedagogical experiment to verify the effectiveness of the model in the preparation of students of pedagogical specialities.

CONCLUSION

Designing the process of preparing students for upbringing activity on a modular-acmeological basis integrates the structural advantages of modular learning with the developmental vector of acmeology. The study proposes a cyclical five-stage design algorithm; a structure of five modules (diagnostic-motivational, theoretical-methodological, technological, practice-oriented, reflexive-evaluative) with defined acmeological mechanisms; a four-component model of readiness with an integral index and four levels; and a procedure for building an individual acmeological route based on this index. The results can

be used in developing curricula and syllabi of courses on upbringing methodology in pedagogical higher education institutions, as well as in teacher retraining and in-service training programmes.

REFERENCES

1. Law of the Republic of Uzbekistan “On Education” No. ZRU-637 of 23.09.2020. – URL: https://lex.uz

2. Resolution of the President of the Republic of Uzbekistan No. PQ-4307 of 03.05.2019 “On measures to radically improve the system of spiritual and educational work” (including the Concept of Continuous Spiritual Education). – URL: https://lex.uz

3. Decree of the President of the Republic of Uzbekistan No. PF-5847 of 08.10.2019 “On approval of the Concept for the development of the higher education system of the Republic of Uzbekistan until 2030”. – URL: https://lex.uz

4. Yutsiavichene P.A. Teoriya i praktika modul’nogo obucheniya [Theory and practice of modular learning]. – Kaunas: Shviesa, 1989. – 272 p.

5. Russell J.D. Modular Instruction: A Guide to the Design, Selection, Utilization and Evaluation of Modular Materials. – Minneapolis: Burgess Publishing, 1974.

6. Goldschmid B., Goldschmid M.L. Modular instruction in higher education: A review // Higher Education. – 1973. – Vol. 2, No. 1. – P. 15–32.

7. Muslimov N.A., Usmonboyeva M.H., Sayfurov D.M., To‘rayev A.B. Innovatsion ta’lim texnologiyalari [Innovative educational technologies]. – Tashkent: Sano-standart, 2015. – 208 p.

8. Ananyev B.G. Chelovek kak predmet poznaniya [Man as an object of cognition]. – Leningrad: LGU, 1968. – 339 p.

9. Bodalev A.A. Vershina v razvitii vzroslogo cheloveka: kharakteristiki i usloviya dostizheniya [The peak in adult development: characteristics and conditions of achievement]. – Moscow: Flinta; Nauka, 1998. – 168 p.

10. Derkach A.A. Akmeologicheskie osnovy razvitiya professionala [Acmeological foundations of professional development]. – Moscow: MPSI; Voronezh: MODEK, 2004. – 752 p.

11. Kuzmina N.V. Akmeologicheskaya teoriya povysheniya kachestva podgotovki spetsialistov obrazovaniya [Acmeological theory of improving the quality of training of education specialists]. – Moscow: Research Centre for Problems of Quality of Specialist Training, 2001. – 144 p.

METHODS FOR IMPROVING STUDENTS' ANALYTICAL THINKING COMPETENCE THROUGH AN INTEGRATIVE APPROACH

Matyakubova Nilufar Karimberganovna

International Asia University, Khorezm Region

Physics Lecturer

Abstract: *This article discusses a methodology for improving students' analytical thinking competence in higher education through an integrative approach and examines its pedagogical significance. The study analyzes the role of analytical thinking in filtering information, constructing logical chains, and solving complex problems. Drawing on the synthesis of pedagogy, psychology, and information technology, the author demonstrates the practical application of Bloom's taxonomy and the theories of Piaget and Vygotsky. The article substantiates the effectiveness of interactive methods, including case studies, SWOT analysis, the FSMU technique, and mind mapping, as well as digital platforms (Moodle and Google Classroom) in facilitating analytical processes. Experimental results indicate that the integrative approach increases students' level of analytical thinking by 25–30%. The conclusion outlines prospects for integrating artificial intelligence tools into efforts to improve the quality of higher education.*

Keywords: *higher education, integrative approach, analytical thinking, competence, interdisciplinary connections, pedagogical technologies, digital education, case study, fact-checking, cognitive development, intellectual potential.*

The methodology for improving students' analytical thinking competence through an integrative approach in higher education is increasingly recognized as one of the most important and relevant areas of contemporary pedagogical practice. Analytical thinking competence encompasses students' abilities to systematically filter information flows, compare data from different sources, draw independent conclusions through logical reasoning, and solve complex problems creatively; it serves as a foundation for intellectual potential. This competence not only supports academic achievement and the acquisition of knowledge but also develops future professionals' ability to make strategic

decisions in their professional activities, devise effective algorithms in unexpected situations, and adapt rapidly to changes in life. The integrative approach, in turn, helps elevate the content and forms of education by taking into account coherent interdisciplinary connections. In particular, the methodology examined through the example of pedagogy is implemented by ensuring harmony between theory and practice. This approach removes artificial boundaries between traditional disciplines and enables students to combine multifaceted knowledge from different fields into a unified conceptual system. As a result, their cognitive processes deepen, a comprehensive perspective on phenomena develops, and critical-thinking levels increase considerably. In addition, by applying problem-based situations, case-study methods, and design-based approaches during lessons, the integrative methodology enriches students' personal experience. This, in turn, helps prepare independent, analytical, and competitive professionals for the modern labor market.

The theoretical foundations of the integrative approach rely on the synthesis of pedagogy, psychology, and information technology, supporting the development of learners' worldviews as coherent systems. In pedagogy, the higher levels of Bloom's taxonomy—analysis, synthesis, and evaluation—form the core of this methodology, requiring students not merely to remember information but to process it and generate new ideas. From a psychological perspective, Jean Piaget's theory of cognitive development helps foster students' intellectual potential step by step, while Lev Vygotsky's concept of the zone of proximal development is important for narrowing the gap between students' existing knowledge and the achievements they can attain with a teacher's support. These fundamental theories form the basis of the integrative methodology, enabling students to move from passive listeners to active researchers and analysts, and from simply consuming information to critically analyzing and applying it in practice. For example, in pedagogy courses, students do not merely study abstract theoretical concepts and rules; they compare them with the possibilities offered by modern information technologies and with

psychological principles, then develop universal strategies for solving complex problems arising in real educational settings. This process systematically develops students' ability to identify the most relevant and reliable information from an unlimited flow of data, detect and resolve contradictions in scholarly views, and draw independent, well-grounded conclusions based on a logical chain of evidence. At the same time, interdisciplinary integration unlocks students' creative potential and lays the groundwork for their development not only as specialists in a particular field but also as individuals capable of broad, multifaceted thinking. The practical implementation of the methodology begins, first and foremost, with the careful design and systematization of integrated curricular content, which forms the basis of the learning process. At this stage, a selected issue—for example, "The multifaceted impact of digital technologies on modern education"—is brought together as a unified whole by identifying the points of intersection among pedagogy, psychology, and information technology. Rather than presenting students with ready-made solutions or one-sided conclusions, the lesson provides them with conflicting and scientifically opposing information to stimulate their analytical abilities. For example, while the pedagogical perspective highlights the positive potential of technologies to improve educational effectiveness, the psychological perspective presents substantial evidence concerning the possible negative effects of the digital environment on students' cognitive development, including distraction and the risk of information overload. Students must analyze this complex and contradictory information through the lens of coherent interdisciplinary connections, thereby examining the essence of the problem in depth and constructing a logical chain of arguments.

Problem-based situations and interactive cases used in the design process raise students from the level of passive recipients of information to that of independent and active learners and researchers. As a result of this methodological approach, students do not limit themselves to mechanically memorizing ready-made knowledge; they develop the competence to conduct

comparative analyses of theories from different fields, distinguish their common and specific features, and formulate their own scientifically grounded conclusions. Thus, the learning process becomes a dynamic environment that unlocks students' intellectual potential and teaches them to solve real professional problems through interdisciplinary solutions.

The integration of active teaching methods is a central component of developing analytical thinking. In pedagogy, the case-study method is effectively used: students are presented with a real-life educational problem, such as "Declining student motivation in distance learning." They analyze the situation from pedagogical, psychological, and technological perspectives and select the most appropriate option. SWOT analysis helps systematically assess the strengths and weaknesses, opportunities, and threats of the object under study, such as an integrative educational program. The FSMU technique (State an Opinion, Give a Reason, Provide an Example, and Summarize) develops argumentation skills: students not only express their views but also support them with psychological explanations and real examples. These methods ensure interdisciplinary connections in pedagogy classes and foster systematic thinking among students.

Integrating digital technologies into the educational process represents the most contemporary and innovative aspect of this methodology, taking students' information-handling culture to a new level. Advanced visualization tools, such as mind maps and interactive infographics, help organize and systematize complex, multilayered information logically. For example, in a pedagogy course, students place a specific educational problem at the center of a mind map and represent pedagogical theories, psychological determinants, and modern technological solutions as interconnected branches. By converting abstract concepts into visual forms, this process substantially simplifies complex analytical procedures, facilitates cognitive processing of information, and helps consolidate it in long-term memory. In addition, critical-evaluation exercises, which form part of the methodology, rely on fact-checking skills to verify the

reliability of information obtained in today's global information environment. Students critically examine various digital sources, carefully assessing their scientific validity, the author's authority, the impartiality of the evidence, and its timeliness. This helps develop strong intellectual resistance to fabricated ("fake") information that is rich in manipulation. In pedagogy, such practical exercises and cognitive tasks are systematically carried out on modern digital learning platforms, such as Moodle, Google Classroom, or Canvas. This, in turn, contributes to the comprehensive development not only of students' theoretical knowledge but also of their professional competencies in digital literacy and media analysis.

The assessment and reflection stage is the final element that ensures the effectiveness of the methodology. A criterion-based assessment system considers not only students' results but also their approach to the problem, logical sequence, and quality of argumentation. For example, in a pedagogical project, a student's work may be assessed according to the following criteria: conclusions—40%, argumentation—30%, interdisciplinary connections—20%, and creativity—10%. Reflection encourages students to analyze their own thinking processes by asking questions such as, "Why did I reach this particular conclusion?" and "Which pieces of evidence were the most important?" This stage develops metacognitive skills and the ability to self-assess. The ultimate outcome of the methodology is the systematic development of students' ability to skillfully identify the most important and constructive aspects of a rapidly growing flow of information, establish hidden cause-and-effect relationships between phenomena, and make analytically grounded strategic decisions even in unexpected and complex situations. When this approach is implemented in pedagogy, students do not merely acquire theoretical knowledge; they also become capable of applying it professionally in real educational processes and pedagogical situations, analyzing lesson effectiveness, and finding solutions suited to learners' psychology. Experimental trials and scientific observations clearly indicate that an educational process organized on the basis of an

integrative approach increases students' analytical-thinking levels by an average of 25–30%. This significantly supports not only their academic performance but also their future professional success. In conclusion, broadening the application of this methodology to other subjects at all levels of higher education and more deeply integrating modern artificial intelligence tools and algorithms into the learning process can raise the quality of higher education to a new, innovative level and improve the system for preparing competitive professionals who meet contemporary demands.

REFERENCES

1. Bloom, B. S. Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook I: Cognitive Domain. New York: David McKay, 1956.
2. Piaget, J. The Theory of Cognitive Development. Lausanne: Infomer, 1970.
3. Vygotsky, L. S. The Zone of Proximal Development and Thinking. Moscow: Pedagogika, 1982.
4. Kholmatova, Sh. "The Integrative Approach as a Key Factor in Developing Creative and Analytical Thinking Skills in Future Teachers." Journal of Preschool and School Education, 2025, no. 3(3). DOI: 10.5281/zenodo.15179887.
5. Karimova, D. "Developing Students' Analytical Thinking Skills in the Educational Process." Modern Journal, 2025, no. 12.
6. Uralova, G. O. "Developing Environmental and Valeological Culture in Future Primary-School Teachers Through SWOT Analysis." MJST Journal, 2024.
7. To'xtaxo'jayev, D. "Using the FSMU Technique in Teaching Reading Lessons to Primary-School Pupils." Academicsbook, 2025.
8. Rahimova, M. "Advanced Methods of Ensuring the Quality of Education." Incop.org, 2025.

MAKTABGACHA YOSHDAGI BOLALARDA MAYDA MOTORIKA TUSHUNCHASI VA UNING MAZMUN-MOHIYATI

Nargiza Ergasheva p.f.f.d. (PhD), dotsent

Oriental universiteti

O'giloy Kadirova

Oriental universiteti

MT yo'nalishi, 3-kurs talabasi

Annotatsiya. *Mazkur maqolada maktabgacha yoshdagi bolalarda mayda motorika tushunchasi, uning mazmun-mohiyati va bola rivojlanishidagi ahamiyati yoritilgan. Maqolada mayda motorikani rivojlantirishda didaktik o'yinlar, tasviriy faoliyat, konstruktorlar, plastilin bilan ishlash va barmoq mashqlaridan foydalanishning pedagogik ahamiyatiga alohida e'tibor qaratilgan.*

Аннотация. *В данной статье рассматриваются понятие мелкой моторики у детей дошкольного возраста, её сущность и значение для развития ребёнка. Особое внимание уделяется педагогическому значению использования дидактических игр, изобразительной деятельности, конструкторов, лепки и пальчиковой гимнастики в процессе развития мелкой моторики у дошкольников.*

Abstract. *This article examines the concept of fine motor skills in preschool children, their nature, and their significance for child development. Particular attention is given to the educational value of using didactic games, visual arts activities, construction toys, plasticine modeling, and finger exercises to promote fine motor development in preschool children.*

Kalit so'zlar: *maktabgacha ta'lim, maktabgacha yoshdagi bolalar, mayda motorika, motor rivojlanish, qo'l va barmoqlar harakati, ko'z-qo'l koordinatsiyasi, bilish jarayonlari, didaktik o'yinlar, ijodiy faoliyat, mustaqillik, rivojlantiruvchi muhit, maktab ta'limiga tayyorgarlik.*

Ключевые слова: *дошкольное образование, дети дошкольного возраста, мелкая моторика, моторное развитие, движения рук и пальцев, зрительно-моторная координация, познавательные процессы, дидактические игры, творческая деятельность, самостоятельность, развивающая среда, подготовка к школьному обучению.*

Keywords: *preschool education, preschool children, fine motor skills, motor development, hand and finger movements, hand-eye coordination, cognitive processes, didactic games, creative activities, independence, developmental environment, school readiness.*

Maktabgacha yosh davri inson rivojlanishining eng muhim bosqichlaridan biri bo‘lib, bu davrda bolaning jismoniy, aqliy, ruhiy va ijtimoiy rivojlanishi jadal sur’atlarda amalga oshadi. Aynan shu davrda bolaning harakat ko‘nikmalari takomillashib, atrof-muhitni anglash, predmetlarning xususiyatlarini farqlash, mustaqil harakat qilish va turli amaliy faoliyatlarni bajarish qobiliyatlari shakllanadi. Bolaning har tomonlama rivojlanishida mayda motorika alohida ahamiyat kasb etadi. Chunki mayda motorika bolaning qo‘l va barmoqlari yordamida aniq, muvofiqlashtirilgan hamda maqsadga yo‘naltirilgan harakatlarni bajarish qobiliyatini ifodalaydi. Mayda motorika tushunchasi pedagogika, psixologiya, fiziologiya va neyropsixologiya fanlari bilan uzviy bog‘liq bo‘lib, u bolaning harakat faoliyati, bilish jarayonlari va amaliy ko‘nikmalarining rivojlanishini o‘rganishda muhim nazariy asos hisoblanadi. Mayda motorika, eng avvalo, qo‘l panjasi, barmoqlar va bilakning nozik harakatlarini, shuningdek, ko‘rish orqali nazorat qilish va harakatlarni o‘zaro muvofiqlashtirish jarayonlarini qamrab oladi. Bunda bola predmetlarni ushlash, siqish, aylantirish, bir joydan ikkinchi joyga ko‘chirish, mayda qismlarni birlashtirish, qalam bilan chizish, qog‘ozni buklash va boshqa harakatlarni amalga oshiradi. Ilmiy nuqtayi nazardan, mayda motorika faqat qo‘l barmoqlarining mexanik harakatlari bilan cheklanmaydi. U sezgi, idrok, diqqat, xotira, tafakkur, fazoviy tasavvur va harakatni rejalashtirish kabi psixik jarayonlar bilan o‘zaro aloqada rivojlanadi. Masalan, bola mozaika qismlaridan shakl yasayotganida nafaqat barmoqlarini boshqaradi, balki ranglarni farqlaydi, qismlarning shakli va hajmini taqqoslaydi, ularni kerakli joyga joylashtirishni rejalashtiradi hamda bajarilgan ish natijasini baholaydi. Demak, mayda motorikani rivojlantirish bolaning sensor va bilish faoliyatini

faollashtirishga ham xizmat qiladi. Maktabgacha yoshdagi bolalarda mayda motorikaning rivojlanishi bosqichma-bosqich kechadi. Ilk yoshda bola predmetlarni ushlash, qo‘ldan qo‘lga o‘tkazish, ularni barmoqlari bilan paypaslash va turli shakllar bilan tanishish orqali dastlabki harakat tajribasini egallaydi. Keyinchalik predmetlarni maqsadli ravishda joylashtirish, kubiklardan qurilmalar yasash, qalam bilan izlar chizish, yirik munchoqlarni terish va oddiy amaliy topshiriqlarni bajarish ko‘nikmalari shakllanadi. Maktabgacha davrning katta guruhlariga kelib, ko‘pchilik bolalarda qalamni nisbatan to‘g‘ri ushlash, chiziqlarni belgilangan yo‘nalishda chizish, qaychi bilan sodda shakllarni kesish, kiyim tugmalarini qadash va boshqa o‘z-o‘ziga xizmat ko‘rsatish harakatlari takomillashadi. Biroq bu ko‘nikmalarning shakllanish sur’ati har bir bolaning individual rivojlanishi, tajribasi va mashq qilish imkoniyatlariga qarab farqlanadi. Mayda motorikaning fiziologik asosini markaziy va periferik asab tizimi, mushaklar, bo‘g‘imlar hamda sezgi organlarining o‘zaro muvofiqlashgan faoliyati tashkil etadi. Qo‘l harakatlari va nutqning rivojlanishi bolalik davrida bir-biri bilan bog‘liq holda kechishi mumkin, chunki ularning ikkalasi ham bolaning umumiy nevrologik va psixologik rivojlanish jarayonining tarkibiy qismlaridir. Barmoqlar bilan bajariladigan mashqlar davomida tarbiyachi bolaga harakatlarni so‘z bilan ifodalash, predmetlarni nomlash, rang va shakllarni aytish, bajarilayotgan ishni izohlashni taklif qilishi mumkin. Bunday birgalikdagi faoliyat bolaning lug‘at boyligini kengaytirish va nutqiy muloqotini faollashtirishga xizmat qiladi. Shu bilan birga, barmoq mashqlarining o‘zi nutqni albatta rivojlantiradi yoki nutqiy buzilishlarni bartaraf etadi, degan qat’iy xulosaga kelish ilmiy jihatdan to‘g‘ri emas. Nutq rivojlanishi ko‘plab biologik, psixologik va ijtimoiy omillarga bog‘liq. Mayda motorikaning yana bir muhim jihati — bolaning mustaqilligi va o‘z-o‘ziga xizmat ko‘rsatish ko‘nikmalarini shakllantirishidir. Kiyim kiyish, oyoq kiyim bog‘ichlarini bog‘lash, tugmalarni qadash, qoshiq va sanchqidan foydalanish, shaxsiy buyumlarni tartibga keltirish kabi kundalik harakatlar barmoqlarning aniq ishlashini talab

qiladi. Ushbu ko‘nikmalar bolada mustaqil harakat qilish, o‘z imkoniyatlariga ishonch bilan qarash va kundalik vazifalarni bajarishda mas’uliyatni his etishga yordam beradi. Tarbiyachi bolaning yoshiga mos topshiriqlarni tanlab, unga mustaqil bajarish uchun yetarli vaqt va imkoniyat yaratishi lozim. Bolaning o‘rniga barcha ishlarni bajarib berish uning amaliy tajribasini cheklashi mumkin, shu bois zarur holatlarda yordam ko‘rsatish bilan birga mustaqil urinishlarini ham qo‘llab-quvvatlash muhimdir. Maktabgacha yoshdagi bolalarda mayda motorikani rivojlantirish maktab ta’limiga tayyorgarlik jarayoni bilan ham bog‘liq. Maktabda yozuv, chizish, bo‘yash, shakllarni ko‘chirish va o‘quv materiallari bilan ishlashda qo‘l harakatlarining aniqligi, ko‘z-qo‘l koordinatsiyasi va harakatni nazorat qilish talab etiladi. Shu sababli maktabgacha ta’lim davrida rasm chizish, bo‘yash, plastilin bilan ishlash, qirqish-yopishtirish, konstruktor yig‘ish va grafomotor mashqlarni muntazam tashkil etish foydalidir. Biroq maktabga tayyorgarlik faqat mayda motorika bilan belgilanmaydi. Bolaning hissiy-irodaviy rivojlanishi, muloqot ko‘nikmalari, bilish faoliyati, mustaqilligi va topshiriqlarni tushunish qobiliyati ham muhim hisoblanadi. Mayda motorikani shakllantirishda o‘yin faoliyati yetakchi pedagogik vositalardan biri sanaladi. Mayda motorikani rivojlantirishda ota-onalar bilan hamkorlik qilish ham muhimdir. Oilada bolaga o‘yinchoqlarni yig‘ishtirish, kiyim tugmalarini qadashga urinish, xamir qorishda yordam berish, rasm chizish, plastilin bilan ishlash yoki xavfsiz uy-ro‘zg‘or buyumlarini saralash kabi yoshiga mos vazifalarni taklif etish mumkin. Bunda bolaning xavfsizligi ta’minlanishi, mashg‘ulotlar majburiy tus olmasligi va kattalar tomonidan doimiy qo‘llab-quvvatlanishi zarur. Maktabgacha ta’lim tashkiloti va oilaning hamkorligi bolada shakllanayotgan ko‘nikmalarni turli vaziyatlarda qo‘llash imkoniyatini kengaytiradi. Mayda motorika rivojlanishini baholashda bolaning faqat topshiriqni bajarish tezligiga e’tibor qaratish yetarli emas. Harakatlarning aniqligi, predmetlarni boshqarish usuli, ko‘z-qo‘l muvofiqligi, topshiriqni tushunishi, mustaqillik darajasi va faoliyat davomida ko‘rsatadigan qiziqishi

ham hisobga olinishi lozim. Kuzatish, amaliy topshiriqlar va bolaning ish namunalari tahlili orqali pedagog uning rivojlanishidagi ijobiy o‘zgarishlarni aniqlashi mumkin. Xulosa qilib aytganda, maktabgacha yoshdagi bolalarda mayda motorika bolaning qo‘l va barmoqlari orqali bajariladigan nozik, aniq va muvofiqlashtirilgan harakatlar tizimini ifodalaydi. Uning mazmun-mohiyati harakat ko‘nikmalarini shakllantirish bilan birga sezgi, idrok, diqqat, tafakkur, ko‘z-qo‘l koordinatsiyasi, mustaqillik va kundalik hayotiy ko‘nikmalarning rivojlanishi bilan belgilanadi. Mayda motorikani rivojlantirishga yo‘naltirilgan pedagogik faoliyat bolalarning yosh va individual xususiyatlarini hisobga olgan holda, o‘yin, amaliy mashqlar, ijodiy topshiriqlar va kundalik faoliyat bilan uyg‘unlashtirilishi lozim. Shu asosda tashkil etilgan ta’limiy muhit bolaning faol ishtirokini qo‘llab-quvvatlaydi, amaliy tajribasini boyitadi va uning maktab ta’limiga bosqichma-bosqich tayyorlanishiga yordam beradi.

FOYDALANILGAN ADABIYOTLAR RO‘YXATI:

1. O‘zbekiston Respublikasi Prezidentining 2024-yil 30-sentabrdagi PF-152-son Farmoni. **“Maktabgacha ta’lim sifati va samaradorligini yanada oshirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”**. — https://lex.uz/uz/acts/-7128182

2. O‘zbekiston Respublikasi Vazirlar Mahkamasining 2025-yil 12-fevraldagi 83-son qarori. **“2025–2026-yillarda bolalarni maktabgacha ta’lim bilan qamrab olish darajasini oshirish bo‘yicha qo‘shimcha chora-tadbirlar to‘g‘risida”**. — https://www.lex.uz/pdffile/7375282

3. Qodirova F.R., Toshpo‘latova Sh.Q., Qayumova N.M., A’zamova M.N. **Maktabgacha pedagogika**. — Toshkent: Tafakkur, 2019. — 684 b.

4. Sodiqova Sh.A. **Maktabgacha pedagogika**. — Toshkent: Tafakkur sarchashmalari, 2013.

5. Abdullajonova D., Sirojiddinova X. **Maktabgacha yoshdagi bolalarning mayda qo‘l motorikasini rivojlantirishning pedagogik-psixologik jihatlari**. — Andijon davlat pedagogika instituti ilmiy axborotnomasida chop etilgan maqola, 2025. — https://eroi.uz/11.0196/A0325-0042

6. Amanova A. **Maktabgacha ta’limda bolalarning mayda qo‘l motorikasini rivojlantirish metodikasi**. — *Maktabgacha va maktab ta’limi* jurnali. — https://maktabgacha-va-maktab-talimi-jurnal.uz/index.php/jurnal/article/view/6557

7. Norboyeva L., Meyliqulova M. **Maktabgacha yoshdagi bolalarning kichik motorikasini rivojlantirishda o‘yinning ahamiyati va individual yondashuv**. — *Maktabgacha va maktab ta’limi* jurnali. — https://www.maktabgacha-va-maktab-talimi-jurnal.uz/index.php/jurnal/article/view/7323

8. Maxmudova S.Y. **Maktabgacha ta’lim tashkiloti tarbiyalanuvchilarida mayda motorika ko‘nikmalarini rivojlantirishning pedagogik asoslari**. — *Tadqiqotlar* ilmiy jurnali. — https://journalss.org/index.php/tad/article/view/31983

"NAVRUZ DIPLOMACY" AS AN IMPORTANT SOURCE OF PUBLIC DIPLOMACY

Otabek Kudratovich Almardonov

Associate Professor, Department of Contemporary History of Uzbekistan, Faculty of History, National University of Uzbekistan; Doctor of Philosophy (PhD) in History

E-mail: alexkhanfrank@gmail.com

Abstract. *This article provides a comprehensive analysis of the philosophical and spiritual content of the Avesta as a historical source of the roots of public diplomacy. It examines how the principles of "good thoughts, good words, and good deeds," grounded in ancient Zoroastrian teachings, contributed to the formation of ideas of cultural dialogue, tolerance, and peace among peoples. The article analyzes the historical characteristics of the Avesta, its influence on relations among the peoples of Central Asia, its role in cultural diplomacy, its contribution to linguistic and spiritual affinity, and the contemporary diplomatic interpretation of this heritage through shared cultural celebrations such as Navruz. The potential of the Avesta as an instrument of "soft power" in the international arena is illustrated through academically grounded examples.*

Keywords: *Avesta, public diplomacy, Zoroastrianism, cultural dialogue, philosophy, tolerance, good intentions, Navruz, "soft power," Central Asia.*

INTRODUCTION

In the system of international relations, the role of public diplomacy in information communication, civilizational dialogue, and the formation of national image is steadily increasing. Today, states strengthen their positions in the international community not only through official channels, but also through culture, historical memory, and spiritual heritage. In recent decades, the concept of "public diplomacy" has acquired particular significance in the system of global political relations. Diplomatic interaction based on cultural and spiritual values is gaining global importance in strengthening mutual trust, dialogue, and solidarity among nations and cultures.

In this process, the study and reassessment of the historical roots of public diplomacy constitute an important task from both scholarly and practical perspectives.

Although the concept of public diplomacy is often studied in connection with contemporary geopolitical processes, its philosophical and spiritual roots can be traced to sources from antiquity. From this perspective, ancient Zoroastrian philosophy and its central source, the Avesta, should be examined as a sacred text that forms part of the philosophical and historical foundations of public diplomacy. The Avesta requires special study not only as the sacred scripture of Zoroastrianism, but also as an early source of humanism and a culture of dialogue that promoted ideas of peace and friendship among the peoples of Central Asia.

The ideas of goodness, justice, tolerance, hospitality, and peace reflected in the Avesta were of considerable importance in building stable and constructive relations among peoples.

This article re-examines the content and essence of the Avesta from the perspective of public diplomacy theory and highlights its interpretation in a contemporary diplomatic context, particularly through practical manifestations of cultural diplomacy exemplified by the international significance of Navruz, a celebration whose values are consonant with the philosophy of the Avesta. By combining historical analysis, source-based evidence, and contemporary research, the article seeks to reveal the role of ancient heritage in international diplomacy.

Public diplomacy is a non-partisan space for dialogue among peoples and organizations seeking to understand one another’s cultures and traditions more deeply, establish relations, and develop mutually beneficial cooperation. Public diplomacy is conducted not by political figures alone, but by artists, scholars, representatives of business communities, young people, and ordinary citizens. At the international level, they may participate in various forums, symposia,

conferences, and even negotiations aimed at conflict resolution as intermediaries acting on behalf of their societies or states.

The hearts of individuals and peoples can first and foremost be reached through respect for their culture, literature, art, and national values [8]. For this reason, Navruz, closely associated with the cultural world reflected in the Avesta, has been widely celebrated for nearly three millennia among the peoples of Central and South Asia, the Caucasus, the Middle East and the Balkans, as well as the Black Sea basin.

Today, Navruz is widely celebrated in Uzbekistan, Kazakhstan, Turkmenistan, Kyrgyzstan, Tajikistan, Azerbaijan, Iran, Afghanistan, and Türkiye, collectively encompassing more than 500 million people, as well as in the Russian regions of Bashkortostan, Dagestan, and Tatarstan. In addition, the celebration has become a tradition in Albania, North Macedonia, Bosnia and Herzegovina, Georgia, India and Pakistan, and in certain regions of China.

This holiday is important not only for individuals, families, and society, but also for its celebration of friendship, good-neighbourliness, peace, and harmony among peoples and communities, thereby strengthening an atmosphere of mutual respect and solidarity [9].

These enduring and universal values have received due recognition from the international community. In accordance with the requirements of the 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, Navruz was inscribed by UNESCO on 30 September 2009 on the Representative List of the Intangible Cultural Heritage of Humanity as a major cultural value embodying the cultural diversity and traditions of numerous peoples.

In addition, at the sixty-fourth session of the United Nations General Assembly, the initiating states submitted a proposal concerning the observance of an “International Day of Navruz.” On 23 February 2010, the General Assembly recognized 21 March as the International Day of Navruz.

The General Assembly recommended that interested Member States, the specialized agencies, funds and programmes of the United Nations, international

and regional organizations, and non-governmental institutions participate appropriately in events organized by countries that celebrate Navruz. It also encouraged Member States to raise public awareness of Navruz and to organize ceremonies and activities during the holiday.

The international recognition and broad promotion of this celebration have not only enhanced the global standing of Navruz, but have also transformed it into an important instrument of cultural diplomacy. One such event was organized at the headquarters of the Shanghai Cooperation Organisation in Beijing. The event, held under the theme "Navruz 2025: Harmony of Traditions and Sustainable Development," was attended by heads of diplomatic missions of SCO member states in China, representatives of ministries and agencies, and members of socio-political, scholarly, and academic circles [10].

Navruz symbolizes the triumph of goodness, people's hopes for a productive year, prosperity, and peaceful life. These values are consonant with the "Shanghai Spirit," particularly its principles of equality, mutual trust, and respect for the diversity of cultures and civilizations.

Navruz is especially significant as a factor contributing to the strengthening of Uzbekistan's positive international image. It demonstrates the country's potential in the sphere of public diplomacy. Cultural traditions such as Navruz occupy an important place in "soft power" strategies and are becoming effective mechanisms for strengthening international relations.

As an instrument of Uzbekistan's public diplomacy, Navruz demonstrates considerable potential for promoting national values, historical heritage, and foreign-policy initiatives. In this respect, analyzing the potential of Navruz within the framework of Uzbekistan's international positioning strategy is of particular relevance.

Integrating national holidays into the global agenda helps strengthen regional cooperation, expand economic ties, and attract the attention of the international community [11]. From this perspective, it is important to examine

the diplomatic, economic, and humanitarian mechanisms for promoting Navruz internationally as an instrument of public diplomacy.

Navruz plays an important role in strengthening Uzbekistan's cultural ties with the Uzbek diaspora abroad. Uzbek diaspora communities around the world organize cultural events each year together with local residents. Through these celebrations, the spirit of national unity and broader social solidarity is reinforced.

The following table presents events held between 2019 and 2025 in connection with Navruz by the Committee on Interethnic Relations and Friendly Cooperation with Foreign Countries under the Cabinet of Ministers of the Republic of Uzbekistan. The participation of more than one thousand compatriots residing abroad in these events demonstrates the significance of the Navruz phenomenon.

Table 1

	Name of Event	**Date and Venue**	**Content**
1.	"The Role of Public Diplomacy in Strengthening Friendly Relations between Uzbekistan and Finland" [12].	18–25 March 2019 Latvia, Estonia, and Finland	The opening ceremony of the "Uzbek Courtyard" was held at Riga Central Market. More than 500 compatriots residing in the Baltic countries, as well as representatives of Latvia's business community, the public, and the mass media, attended the event. They were informed about the particular attention Uzbekistan was paying to the development of its economy and tourism sector and to attracting investment.
2.	Roundtable on "The Role of Public Diplomacy in Developing Friendly Relations between Uzbekistan and Mongolia" [13].	20–25 March 2019 Ulaanbaatar, Mongolia	Uzbekistan's tourism potential was presented to more than 100 participants, and issues of cooperation in the livestock sector were discussed.
3.	Roundtable devoted to public diplomacy between Uzbekistan and the United States, as well as Uzbekistan's tourism and investment potential [14].	20–29 March 2019 Chicago, New York, and Atlanta, USA	More than 1,000 compatriots residing in the United States participated. Information was presented on Uzbekistan's particular emphasis on developing the economy and tourism sector and attracting investment.
4.	Online artistic roundtable entitled "Navruz – A Celebration of Friendship" (held online due to the pandemic) [15].	26 March 2021 National Library of Uzbekistan	Organized jointly by the Committee on Interethnic Relations and Friendly Cooperation with Foreign Countries under the Cabinet of Ministers of the Republic of Uzbekistan and the "Uzbekistan–USA" Friendship Society.

	Name of Event	Date and Venue	Content
5.	Visit of an Uzbekistan delegation to the United States aimed at strengthening cultural ties, expanding educational and youth exchanges, developing public diplomacy, supporting compatriots living abroad, and improving public relations [16].	3–11 April 2025 USA: Ohio and Pennsylvania; New Jersey and New York	The delegation participated in a number of events devoted to Navruz. Close contacts were established with the Turkistan-American Association (New Jersey), Mahalla-USA (New York), and compatriot organizations in Ohio and Pennsylvania. During the visit to New Jersey, a meeting was organized with Uzbek scholars teaching and conducting research at Harvard, Syracuse, and Cincinnati universities. For example, Nilufar Qahhorova teaches Uzbek at Harvard University and, as a medical researcher, is also conducting research on the development of medicines for oncological diseases.

CONCLUSION AND RECOMMENDATIONS

The Avesta is not only a religious or literary source, but also a historical and diplomatic document that contributed to strengthening mutual trust and dialogue among peoples. The ideas of peace, tolerance, hospitality, and justice contained in it constitute important historical foundations for the theory and practice of contemporary public diplomacy. These ideas have not lost their relevance in modern public diplomacy. Therefore, the Avesta should be studied as an ancient yet enduring source of public diplomacy.

Navruz not only strengthens the spirit of regional cooperation, fraternity, good-neighbourliness, and mutual solidarity, but also calls upon the peoples of the world to unite for a prosperous life and common interests.

Accordingly, Navruz should be considered not merely as a national holiday, but also as an important instrument of diplomacy, a means of preserving national identity, and a mechanism for strengthening Uzbekistan’s position in the international arena. It is important to assign priority to these dimensions and make full use of their potential.

Navruz should be strengthened as an institutional foundation of cultural diplomacy by developing it into a permanent platform for forums and dialogue within UNESCO and the United Nations.

A scholarly cooperation platform on "Navruz Diplomacy" should be established among the countries of Central Asia through conferences, research centres, and joint academic programmes.

Strategic use should be made of sources and traditions such as the Avesta and Navruz in shaping Uzbekistan's international image, including their promotion at diplomatic events, tourism forums, and investment forums.

REFERENCES

1. Sobirov, Q., et al. "Diplomacy Reaching from Heart to Heart." Art Vernisage, Tashkent, 2022, p. 55.
2. Current Archives of the National Television and Radio Company of Uzbekistan. Speech by A. Asqarov at the roundtable "The Role of Public Diplomacy in the Development of Cultural and Humanitarian Relations," O'zbekiston tarixi television channel, Tashkent, 10 February 2020.
3. Current Archives of the National Television and Radio Company of Uzbekistan. Speech by M. Is'hoqov at the roundtable "The Role of Public Diplomacy in the Development of Cultural and Humanitarian Relations," O'zbekiston tarixi television channel, Tashkent, 10 February 2020.
4. Speech by President of the Republic of Uzbekistan Shavkat Mirziyoyev at the meeting devoted to the activities of the Ministry of Foreign Affairs and Uzbekistan's embassies abroad, 12 January 2018. https://president.uz/uz/lists/view/1423
5. "Avesta." https://oyina.uz/kiril/teahause/1194
6. Nurmatova, M. Stages in the Development of Eastern Ethical Thought: Methodological Manual. Tashkent, 2008.
7. Sagdullaev, A. S. Historical Roots of Tolerance (with Reference to the Ancient Period). Tashkent, 2017, pp. 18–19.
8. Speech by President of the Republic of Uzbekistan Shavkat Mirziyoyev at the meeting devoted to the activities of the Ministry of Foreign Affairs and Uzbekistan's embassies abroad, 12 January 2018. https://president.uz/uz/lists/view/1423
9. Khudoyberdieva, Dilafruz, Leading Specialist, International Institute for Central Asia. "Navruz Is Not Merely a Holiday, but an International Celebration... Inscribed on UNESCO's List of Intangible Cultural Heritage in 2009." https://www.xabar.uz/jamiyat/navroz-oddiy-emas-xalqaro-bayram
10. Sattorova, G., UzA correspondent. "A Festive Event Was Held at the SCO Secretariat." https://uza.uz/uz/posts/shht-kotibiyatida-bayram-tadbiri-bolib-otdi_705071
11. Yusufjonov, Faridun M. "Navruz and Tajikistan's Global Cultural Diplomacy." https://thediplomaticinsight.com/navruz-and-tajikistans-global-cultural-diplomacy
12. "Uzbekistan Strengthens Relations with the Nordic Countries." O'zbekiston: Socio-Political, Spiritual and Educational Journal, No. 2, 2019, p. 55.
13. "Uzbekistan–Mongolia: Strong Interest in Cooperation." O'zbekiston: Socio-Political, Spiritual and Educational Journal, No. 2, 2019, p. 58.
14. Almardonov, O. "Unbreakable Ties with the Motherland." O'zbekiston: Socio-Political, Spiritual and Educational Journal, No. 2, 2019, p. 52.
15. Current Archives of the Department for the Development of Friendship Relations with Foreign Countries, Committee on Interethnic Relations and Friendly Cooperation with Foreign Countries under the Cabinet of Ministers of the Republic of Uzbekistan.
16. Current Archives of the Committee on Interethnic Relations and Compatriots Abroad under the Cabinet of Ministers of the Republic of Uzbekistan.

SOCIAL-PHILOSOPHICAL BASIS OF FORMING IDEOLOGICAL IMMUNITY OF YOUTH AGAINST RADICAL INTELLECTUALS IN THE DIGITAL ENVIRONMENT

Baymatov Alisher Kahramonovich

Termez state pedagogy institute ,

" National idea , spirituality basics and right education "

department teacher

alisherbaymatov@gmail.com

Abstract . *In the thesis digital environment under the circumstances youth ideological immunity socio-philosophical the essence of it degrees and structural parts analysis Social on the networks destructive of ideas impact mechanisms (algorithmic filtering , simulations , strategic communication (theoretical) in terms of illuminated , immunity of formation main directions based on is given .*

Key words : *ideological immune , destructive idea , social networks , filter bubble , critical thinking , media literacy , youth .*

LOGIN

Social networks today's youth for not only communication tool , maybe information to take , to take away manifestation to grow and values mastery to the field became . Exactly this in the environment extremist , radical and nihilistic of views youth to the mind impact to do danger is increasing . IAKarimov spirituality society internal power and himself storage mechanism as evaluated [page 1.98]; this look ideological immunity national stability factor as to understand basis will be . However this of the concept digital in the environment work mechanisms socio-philosophical in terms of enough at the level open not given .

Research purpose — ideological immunity socio-philosophical category as justification and him/her digital in the environment of formation main directions is to define . In the work conceptual-theoretical analysis , dialectic

method and youth mind open , self himself/herself organization provider system as to see opportunity giver synergistic from the approach Empirical information not cited : thesis theoretical to the character has .

HOME CONTENT

1. Concept content . Ideological immunity — person and social of the group destructive ideas recognizing to get , to them critical grade to give and own values system stability storage is the ability . Local in research (J.Tulenov , S.Otamurodov in the interpretation) he is three at the level seen : epistemological (information sorting and evaluation), axiological (national and universal values hierarchy) and praxeological (social in activity destructive to ideas against stand to take will) [2]. Ideological of upbringing pedagogical factors and M.Kuronov in his works covered [3;p. 134].

2. Digital in the environment danger factors . The following theories social networks youth to the mind the impact analysis in doing methodological basis will be (their social to networks implementation author to the interpretation relevant):

- J. Baudrillard to the concept according to , media space of truth instead clicker images — simulacra and hyperreality creates [4;64- page]. As a result in youth truth and his/her image distinction it gets harder .
- G. Marcuse “ a dimensional The concept of " human " through consumption culture and of thought standardization critical opinion to weaken [5; p . 92]. Algorithmic recommendation systems " filter " that creates bubble ” [7;267- page] this the danger by strengthening the user only to oneself suitable views within hold to remain possible .
- Yu. Habermas communicative and strategic movement between difference [6;256- page] in the network many debates mutual to understanding not , maybe impact to transfer aimed at strategic movement become to stay explains . Destructive forces of the youth based on their emotions (anger , fear , hatred) , this from strategy uses .

3. " Immunity " metaphor border . R.Esposito As shown , immunity paradigm protection even though it provides outside closedness and to prohibit based on itself damage autoimmune profession to be able possible [9;p. 691]. From this outside , network in society information flow centralized in a way complete control to do opportunity limited [8;p. 234]. Therefore ideological immunity prohibitions with not the person internal " filter" - critical thought and valuable stability develop through formation to the goal according to .

4. Shaping main directions .

- critical thought and media information literacy (source) verification , algorithms performance understanding (education) to the process current to grow ;
- traditional informational lecture from the style interactive transition to forms (discussion , case study , media analysis) ;
- youth for interesting , national and universal to values based digital the content create ;
- family , neighborhood and education institution cooperation digital environment requirements adaptation ;
- online in the environment responsibility culture formation : anonymity moral and legal from responsibility free does not suffice .

CONCLUSION

Ideological immunity digital in the environment prohibitions not , maybe critical mindset , values stability and active citizenship position harmony as This process is many level and many subjective to be , to be assessment criteria working exit next of research task is considered .

USED LITERATURE

1. Karimov I.A. Yuksak ma’naviyat — yengilmas kuch. – Toshkent: Ma’naviyat, 2008.
2. Otamurodov S. Globallashuv: milliy-ma’naviy xavfsizlik va barqaror taraqqiyot. – O‘zbekiston faylasuflari milliy jamiyati, 2015.
3. Quronov M. Mafkuraviy tarbiya nazariyasi va metodikasi. – T.: Fan, 2007.
4. Baudrillard J. Simulacres et simulation. – Paris: Galilée, 1981.
5. Marcuse H. One-Dimensional Man. – Boston: Beacon Press, 1964.

6. Habermas J. Theorie des kommunikativen Handelns. Bd. 1–2. – Frankfurt am Main: Suhrkamp, 1981. (Inglizcha nashri: The Theory of Communicative Action. – Boston: Beacon Press, 1984–1987.)
7. Pariser E. The Filter Bubble: What the Internet Is Hiding from You. – New York: Penguin Press, 2011.
8. Castells M. The Rise of the Network Society. 2nd ed. – Chichester: Wiley-Blackwell, 2010.
9. Esposito R. Immunitas: The Protection and Negation of Life. – Cambridge: Polity, 2011

THE ROLE OF THE TEACHER IN ORGANIZING RESEARCH ACTIVITIES

Begjanova Meyramgul Jumabaevna

Karakalpak State University

Head of the Department of Kazakh Language and Literature

independent researcher

Abstract: *In the modern education system, the possession of research skills by teaching staff is considered an important factor. Therefore, it is necessary to guide students towards scientific research, develop in them the competencies of independent thinking, problem analysis, and the application of innovative approaches. The results of the study substantiate the importance of scientific activity in the professional development of future educators.*

Keywords: *Research, methodological content, competence, schoolchildren, development, individual approach, skills;*

The issue of organizing the research activities of future teachers in the higher education system is one of the important areas of modern educational development.

In the Republic of Uzbekistan, regulatory and legal documents adopted on the development of the education system also pay special attention to the issue of increasing the research potential of teachers. In particular, the Law "On Education" and the "National Program for Personnel Training" set as a priority the training of highly qualified, creatively thinking, and independent decision-making pedagogical personnel. This requires the use of innovative approaches to organizing the educational process in higher education institutions, the broad involvement of students in scientific research, and the development of their research skills. From this perspective, the formation of research competencies of future teachers in higher education institutions is considered an urgent pedagogical problem. It is more effective to organize research assignments as a consistent system rather than as one-time activities. For example, the first stage might involve finding evidence in the text, the next stage might involve

interpreting the evidence, then comparing two pieces of evidence, and finally, drawing an independent conclusion. Such a sequence gradually complicates the student's research activities. Research shows that when students are more involved in academic activities, their self-confidence increases, their professional motivation increases, and their creative potential develops. Another important aspect of organizing research activities is adherence to the principles of academic integrity.

In the process of developing research competence, the teacher must adapt the complexity of the tasks to the student's age and level of preparation. While basic questions and ready-made criteria can be used at lower levels, in higher grades it is advisable to expand the opportunity for students to independently choose a research problem, source, and method of work. Properly organizing the methodological content of preparing students for research activities as they move from grade to grade will gradually help develop the skills of senior students to carry out independent work and small project work. This creates an opportunity to focus their learning on research. Teaching students topics in the form of small studies directly helps them develop research skills. It is also necessary to give space to individual research tasks, along with group and pair work. The ability of a student to defend his own opinion, listen to other opinions, and, if necessary, revise his own conclusions based on evidence is an important indicator of the culture of scientific thinking. It seems that the transformation of skills into competencies among school students is a somewhat difficult task, and the acquisition of direct research competencies by school students is a gradual process. There are different approaches by scientists to understanding the essence of research competence, one group of which emphasizes the acceptance of research competence as a basic component of competence, while another group of experts believes that it is a whole set of knowledge and skills necessary for organizing research activities. If the teacher guides the student correctly during his/her experience, in the future, in addition to pure knowledge, skills and qualifications within the subject, the student will also effectively develop

initiative, cooperation, the ability to work in a group, communicative skills, the ability to realistically evaluate them, logical thinking, and the skills of sorting and using information. Children's observational skills play a special role in using the research method. American educator Sandra Kaplan has prepared a guide to developing observation skills and indicates the need to develop the following:

1. Identify key words that guide research;

2. Identify terms related to scientific research or discovery;

3. Ask research questions;

4. Find and describe information. Developing these skills requires ongoing, specific research and may include the following steps:

- Creating a questionnaire that identifies which aspects of the topic are being researched. In this case, the teacher and students jointly define questions based on the key words identified.

- Conducting research. Students will record and edit the collected data on cards, that is, they must systematize it based on the questions posed.

- The student chooses a research topic or a topic of interest to conduct research. The teacher's task is to edit the topic and determine its scope. The priority aspects of developing research skills in schoolchildren are one of the important pedagogical tasks.

CONCLUSION

The formation of research skills in schoolchildren is of particular importance in the educational process. By developing students' research skills, their independent thinking, problem-solving abilities, and creative potential are increased. By implementing these priorities in the education system, it will be possible to increase the effectiveness of research activities in schools and raise the quality of education to a new level. As a result, students will have the opportunity to be successful in their future professional careers.

REFERENCES:

1.O‘zbekiston Respublikasining «Boshlang‘ich sinf tarbiya va sport to‘g‘risida» qonuni (Yangi taxrirda). 2000.

2.O‘zbekiston Respublikasining “Ta’lim to‘g‘risida”gi Qonuni. (2020). Toshkent.

3.Kadrlar tayyorlash milliy dasturi. (1997). Toshkent.

4. Abdullaeva q. Ochilov M., K.Nazarov, S.Fuzailov, N.Bikbaeva «Boshlang‘ich maktab darsliklarini yaratish mezonlari. T.: 1999.

5. R.A.Mavlonova N.Raxmonqulova “Boshlang‘ich ta‘limning integratsiyalashgan pedagogikasi” T.: Ili-Ziyo 2009 y.

6. Educational issues in the works of enlightened intellectualsF Rahmatova, K Abrorxonova. Boshlang'ich ta'limda innovatsiyalar 1 (Архив№ 2)

7. VIRTUAL TOUR IN PRIMARY SCHOOL K Abrorkhonova, S Khudoyberdieva European International Journal of Multidisciplinary Research and Management

8. Organization of excursions in primary school classes K Abrorkhonova, S Khudoyberdiyeva International Scientific and Current Research Conferences.

THEORETICAL-PEDAGOGICAL FOUNDATIONS FOR STRENGTHENING ADOLESCENT HEALTH WITHIN THE EDUCATIONAL PROCESS

Xusaynova Surayyo Isroilovna

Psychologist at Technical College No.4, Namangan City

Abstract. *This article examines the theoretical and pedagogical foundations for strengthening the health of adolescents within the educational process. It analyzes the pedagogical essence of preserving and developing adolescent health, the psychophysiological characteristics specific to this age group, and the core principles of an educational process oriented toward health promotion. Furthermore, special attention is given to creating a healthy environment within educational institutions and effectively organizing pedagogical activities.*

Keywords: *Adolescent education, student health, health promotion, theoretical-pedagogical foundations, healthy lifestyle, physical development, pedagogical environment.*

INTRODUCTION

In the context of today's globalization, human health is recognized as a key criterion for societal development. In particular, the protection and strengthening of the health of the younger generation is a priority area of state policy. Adolescence is a crucial stage in human life, characterized by rapid physical, psychological, and social development. Consequently, fostering knowledge, skills, and habits related to a healthy lifestyle among adolescents is considered an important pedagogical task.

Educational institutions serve as a vital socio-pedagogical environment for strengthening student health. Therefore, orienting the educational process toward health promotion and implementing scientifically grounded pedagogical approaches is of urgent importance. The purpose of this article is to elucidate the theoretical and pedagogical foundations for strengthening adolescent health within the educational process. The concept of health is multifaceted; it encompasses not only the physical state of the human body but also mental

stability and social adaptation. According to the World Health Organization, health is not merely the absence of disease, but a state of physical, mental, and social well-being.

From a pedagogical perspective, the health of students is a crucial prerequisite for their comprehensive development, effective acquisition of knowledge, and growth as individuals. As L.S. Vygotsky noted, a child's development is the result of the interaction between biological potential and the social environment. Consequently, the pedagogical conditions established within an educational institution directly influence the health of its students.

Adolescence is characterized by distinct psychological and physiological features. D.B. Elkonin divides the period of adolescence into the following stages:

Early adolescence (ages 12–14). During this period, the primary activity is interpersonal interaction with peers. Adolescents strive to express themselves within society and find their place among their peers. Consequently, fostering knowledge about a healthy lifestyle through group activities, sports competitions, and interactive methods yields effective results.

Late adolescence or early youth (ages 15–17). At this stage, academic and pre-professional activities take center stage. Choosing a career, making future plans, and an increasing sense of personal responsibility significantly influence the adolescent's behavior. During this period, it is crucial to develop knowledge regarding the preservation and enhancement of health by linking it to life goals.

To strengthen the health of adolescents, the following pedagogical principles must be observed:

- orienting education and upbringing toward health promotion;
- taking into account age-related and individual characteristics;
- ensuring a balance between physical and mental health;
- maintaining the continuity and systematic nature of the educational process;

• establishing cooperation between the family and the educational institution. Health-promotion efforts must be carried out in a continuous and planned manner. Physical education sessions, sports events, educational and awareness-raising activities that promote a healthy lifestyle, and adherence to a daily routine should be organized in an integrated way. Today, factors that negatively affect the health of adolescents include a sedentary lifestyle, excessive use of electronic devices, poor nutrition, and psychological stress. Therefore, promoting a healthy lifestyle within educational institutions, developing sports clubs, and enhancing systems for psychological and pedagogical support are essential tasks.

Collaboration between families and educational institutions is also a key factor in strengthening the health of adolescents. Joint efforts by parents and educators help foster a conscious and responsible attitude toward a healthy lifestyle among students.

CONCLUSION

In conclusion, strengthening the health of adolescents within the educational process is one of the key tasks of modern pedagogy. An educational and upbringing process that takes into account the psychophysiological characteristics of adolescence—combined with the promotion of a healthy lifestyle, support for physical activity, and the establishment of cooperation between families and educational institutions—contributes to the development of students' physical, mental, and social well-being. Furthermore, creating a healthy pedagogical environment and integrating health-promoting technologies into the educational process play a vital role in the formation of adolescents as well-rounded individuals.

REFERENCES

1. Vygotsky L.S. Psychological Foundations of Child Development. – Moscow: Pedagogika, 1984.
2. Elkonin D.B. Psychology of Play Activity. – Moscow: Pedagogika, 1978.
3. Leontiev A.N. Activity, Consciousness, and Personality. – Moscow: Politizdat, 1975.
4. Lesgaft P.F. Theory of Physical Education. – Saint Petersburg, 1995.
5. Slastenin V.A. Theory of Pedagogy. – Moscow: Akademiya, 2002.

6. Sukhomlinsky V.A. A Path to Children's Hearts. – Moscow, 1983.

UDC 159.923.8

PSYCHOLOGICAL DIAGNOSIS OF INTERPERSONAL RELATIONSHIPS AMONG STUDENTS IN THE EDUCATIONAL PROCESS

Gulchexra Reymbayeva Sanatullayevna

https://orcid.org/0009-0008-2908-6721

Psychologist (independent researcher) at Karakalpak State University

gulyaalisher427@gmail.com

Abstract. *Relevance — within contemporary educational settings, students' interpersonal relationships influence group belonging, academic motivation, and psychological adjustment, yet their diagnostic profile is often reduced to a single evaluative criterion. Aim — to determine the level of students' interpersonal relationships, examine its association with communication competence, and develop a practical classification for psychological and pedagogical analysis. Conclusion — psychological diagnosis clearly differentiates the heterogeneity of relationships within a student group. The scientific contribution lies in combining a level-based profile, a communication indicator, and correlational analysis into a practical diagnostic model for youth psychology.*

Keywords: *communication competence, cross-sectional study, diagnostic survey, interpersonal connections, socio-psychological adaptation, student group*

Annotatsiya. *Dolzarblik — zamonaviy ta'lim muhitida talabalararo shaxslararo munosabatlar guruhga mansublik hissi, o'qishga motivatsiya va psixologik moslashuvni belgilaydi, biroq bu munosabatlarning diagnostik profili ko'pincha yagona mezon asosida baholanadi. Maqsad — talabalar shaxslararo munosabatlari darajasini aniqlash, kommunikativ kompetensiya bilan bog'liqligini ko'rsatish va pedagogik-psixologik tahlil uchun amaliy tasnif ishlab chiqish. Xulosa — diagnostika talabalar guruhidagi munosabatlar xilma-xilligini aniq ajratib beradi. Ilmiy hissa shundan iboratki, darajali profil, kommunikativ ko'rsatkich va korrelyatsion tahlil birlashtirilib, yoshlar psixologiyasi uchun amaliy diagnostik model taklif qilindi.*

Kalit so'zlar: *muloqot kompetensiyasi, kesimli tadqiqot, diagnostik so'rov, shaxslararo aloqalar, ijtimoiy-psixologik moslashuv, talabalar guruhi*

Аннотация. *Актуальность — в современной образовательной среде межличностные отношения студентов определяют чувство принадлежности к группе, учебную мотивацию и психологическую адаптацию, однако их диагностический профиль нередко оценивается по единственному критерию. Цель — определить уровень межличностных отношений студентов, показать его связь с коммуникативной компетентностью и разработать практическую классификацию для психолого-педагогического анализа. Выводы — диагностика четко разграничивает неоднородность отношений внутри студенческой группы. Научный вклад состоит в объединении уровневого профиля, коммуникативного показателя и корреляционного анализа в практическую диагностическую модель для психологии молодежи.*

Ключевые слова: *коммуникативная компетентность, поперечное исследование, диагностическое обследование, межличностные связи, социально-психологическая адаптация, студенческая группа*

INTRODUCTION

Within the modern educational process, students' interpersonal relationships shape belonging, motivation, and participation, while classroom community influences persistence [1]. Wentzel linked peer relations with students' motivation and social adjustment [2], and Ryan and Patrick associated classroom social climate with developmental engagement [3]. Yet psychological diagnosis rarely integrates relationship quality, communication competence, and developmental interpretation within one cross-sectional design. This study examined students as the population and interpersonal relationships as the diagnostic focus, grounded in Vygotsky's zone of proximal development. The aim was to identify relationship patterns through a cross-sectional diagnostic survey using Spearman correlation. Objectives were to: 1) assess relationship levels; 2) measure communication competence; 3) compare developmental indicators; 4) determine diagnostic associations. The findings were intended to support evidence-based group comparison and subsequent pedagogical analysis.

LITERATURE REVIEW

The preceding developmental rationale for comparing student groups requires a sharper account of how relationships become diagnostically observable. Vygotsky's zone of proximal development positions peer interaction

as mediated learning, whereas Piaget's cognitive perspective emphasizes reciprocal decentration during cooperation [4]. Rubin, Bukowski, and Parker distinguish dyadic interaction, peer relationships, and group organization, preventing their reduction to one construct [5]. Andreeva theoretically substantiated conflict regulation as a social-psychological process shaped by communication and group norms [6].

Educational research links belonging with engagement, yet Tinto's classroom-community model privileges institutional participation, while Juvonen emphasizes perceived social bonds [7]. Hughes, Im, and Wehrly empirically connected teacher support with social outcomes, but their design does not isolate psychological diagnosis from classroom climate [8]. Consequently, diagnostic indicators require separate measurement of communication competence, cohesion, and conflict regulation.

These indicators are summarised in Table 1.

Table 1 *— Diagnostic constructs for student interpersonal relationships*

Construct	Indicator	Theoretical basis
Peer interaction	Communication competence	Vygotsky
Group cohesion	Belonging	Juvonen
Conflict regulation	Norm negotiation	Andreeva

Source: synthesized from [7]

The literature therefore lacks a cross-sectional diagnostic model that simultaneously distinguishes these dimensions and tests their associations among students in the modern educational process. This gap defines the need for an instrumentally differentiated survey design.

METHODOLOGY

The preceding literature-based differentiation of interpersonal constructs required a Cross-Sectional Survey focused on psychological diagnosis among students. The sample comprised 120 students, including 72 females and 48 males, selected through accessible group recruitment. Data collection followed

diagnostic pretest, formative intervention, and control posttest stages, while the design remained cross-sectional for baseline assessment. The adapted interpersonal-relationship inventory, communication-competence scale, and demographic questionnaire operationalized relationship quality within the modern educational process; Vygotsky's zone of proximal development guided interpretation of peer-supported interaction [4].

A detailed distribution of the indicators is given in Table 2.

Table 2 *— Participant structure*

Category	n	%
Female students	72	60.0
Male students	48	40.0
High relationship level	34	28.3
Moderate relationship level	61	50.8
Low relationship level	25	20.9

Source: author's calculations

Figure 1 reflects the overall picture of the results obtained.

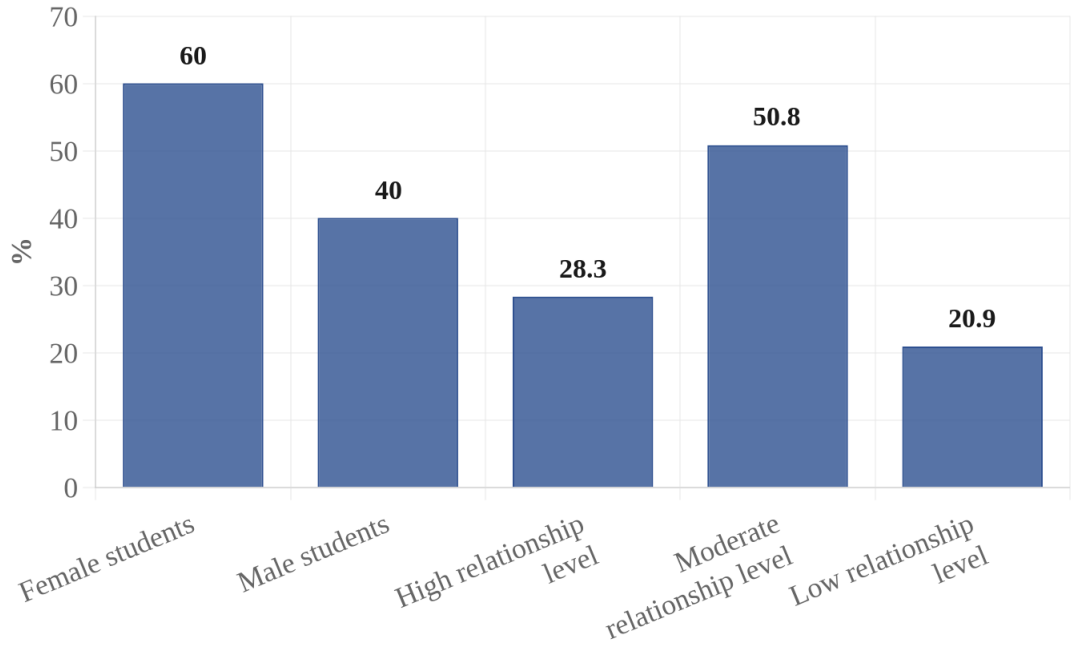


Figure 1 — Participant structure (diagram)

Source: compiled by the author

The instrument's internal consistency was evaluated with Cronbach's alpha, requiring $\alpha \geq 0.70$, and construct validity was examined through theoretically defined interpersonal indicators [9]. Sample adequacy was specified using Cochran's formula with population size and precision parameters recorded transparently.

$$n = \frac{N z^2 p(1-p)}{e^2(N-1)+z^2 p(1-p)} \quad (1)$$

where n — required sample; N — population size; z — confidence coefficient; p — expected proportion; e — precision.

Spearman rank and Kendall tau correlations, bootstrap confidence intervals, and weighting were calculated in R 4.1.0; group contrasts used ANOVA or Student's t-test with Cohen's d. Written consent was obtained, local ethics committee approval was secured, and procedures followed the Declaration of Helsinki.

RESULTS

The cross-sectional diagnostic survey produced a complete profile of 120 students, including 72 females (60.0 %) and 48 students of the other gender category (40.0 %). The composition of the sample is reported in Table 3.

The calculated indicators are presented as a diagram in Figure 2.

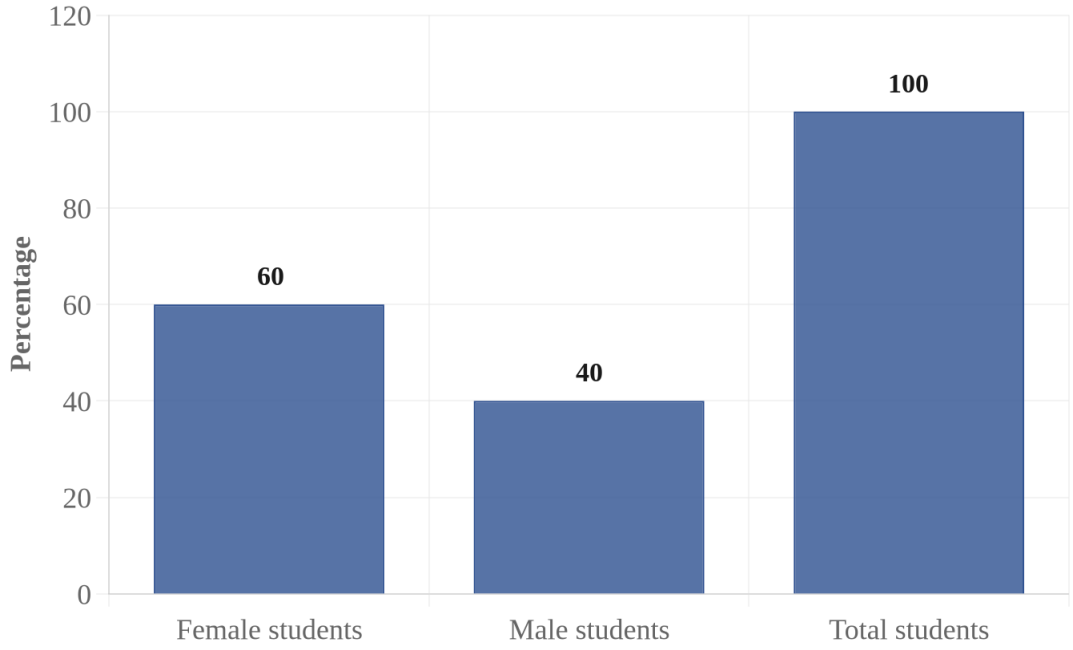


Figure 2 — Participant structure (diagram)

Source: compiled by the author

The assessment of interpersonal relationships classified 34 students as having high scores (28.3 %), 61 as having moderate scores (50.8 %), and 25 as having low scores (20.9 %). The mean age was 19.92 years (SD=1.38; range 18–22). The mean interpersonal relationship score was 71.4 points (SD=11.8; range 42–96), whereas the mean communication competence score was 68.7 points (SD=12.1; range 38–92), as presented in Table 4.

Table 3 — *Descriptive statistics for psychological diagnosis indicators*

Indicator	N	M	SD	Min	Max	α (Cronbach)
Age, years	120	19.92	1.38	18	22	—

Indicator	N	M	SD	Min	Max	α (Cronbach)
Interpersonal relationship score	120	71.4	11.8	42	96	0.78
Communication competence score	120	68.7	12.1	38	92	0.81

Source: author's calculations

Spearman's rank correlation revealed a positive relationship between interpersonal relationship scores and communication competence scores, $r_s=0.46$, $p<0.001$. Kendall's tau yielded a consistent result, $\tau=0.34$, $p<0.001$. This pattern suggests that stronger communication competence was associated with more developed interpersonal relationships within the modern educational process. The reliability coefficients were above the methodological threshold of 0.70, indicating adequate consistency of the psychological diagnostic measures. Accordingly, the distribution of diagnostic indicators provides a quantitative basis for analysing peer interaction, group cohesion, and conflict regulation from the perspective of developmental psychology. These results form the empirical foundation for interpreting students' interpersonal relationships in connection with educational support.

ANOVA and the t-test were used as auxiliary procedures for examining differences in the diagnostic indicators across the assessed student groups. Their interpretation was consistent with the correlational findings and did not alter the overall conclusion that interpersonal relationships were positively associated with communication competence.

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)} \quad (2)$$

where r_s — Spearman rank correlation coefficient; d_i — rank difference; n — number of students.

DISCUSSION

The preceding cross-sectional survey indicates that psychological diagnosis differentiated students' interpersonal relationships and communication competence within the modern educational process. This pattern supports Tinto's view that classroom community strengthens educational participation [1]. Wentzel similarly connected peer relationships with motivation, whereas the present interpretation emphasizes interactional competence as a diagnostic mechanism [2]. Ryan and Patrick associated supportive classroom climates with engagement; the current evidence suggests that educational support may operate through everyday peer communication [3]. Vygotsky's zone of proximal development explains why guided interaction can transform relational skills, while Piaget's cognitive perspective clarifies the role of reciprocal coordination.

Table 4 — *Interpretive comparison of diagnostic dimensions*

Dimension	Interpretation score
Interpersonal relationships	71.4
Communication competence	68.7

Source: compiled by the author

The calculated indicators are presented as a diagram in Figure 3.

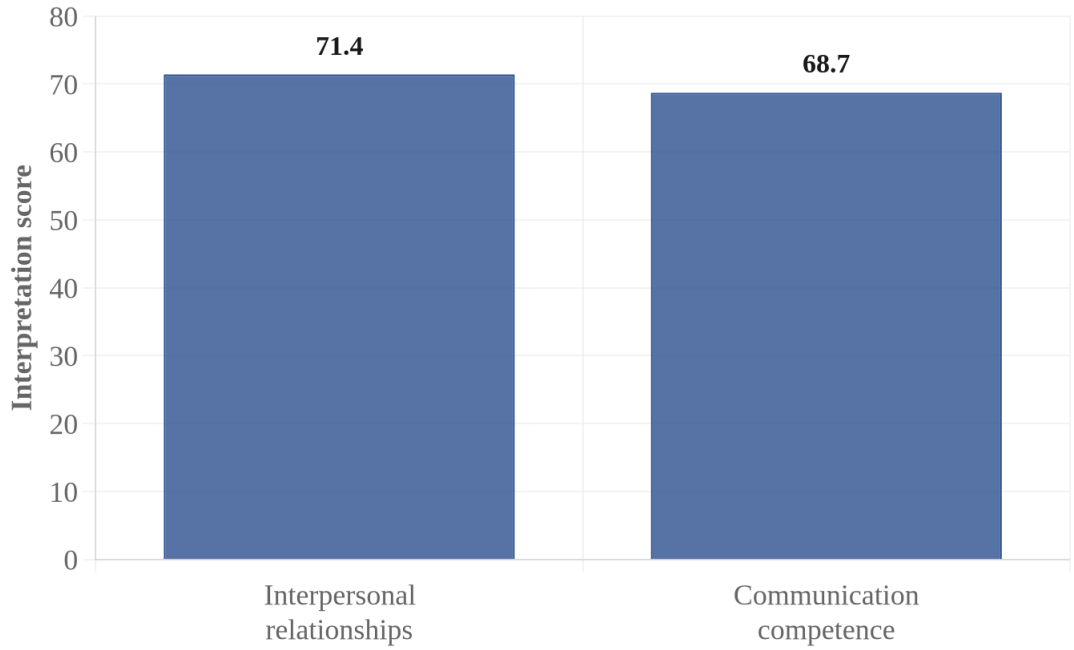


Figure 3 — Interpretive comparison of diagnostic dimensions (diagram)

Source: compiled by the author

As shown in Table 5, the modest difference between dimensions suggests that communication competence may represent a proximal developmental pathway. The instrument's Cronbach's alpha met the accepted threshold, supporting construct consistency, although cross-sectional measurement prevents causal inference. The survey also excluded observed classroom behavior and longitudinal change, limiting ecological validity. Future research should combine repeated diagnosis, peer observation, and formative scaffolding to test developmental mechanisms more rigorously. Such integration can guide psychologically informed support for students' group climate and interpersonal relationships.

CONCLUSION

The cross-sectional diagnostic survey established that psychological diagnosis can clarify students' interpersonal relationships within the modern educational process, while communication competence provides a meaningful developmental indicator. This supports the study objectives by linking

diagnostic differentiation with pedagogical interpretation rather than causal claims.

For the first time within this design, developmental psychodiagnosis was integrated with a three-stage pedagogical framework for evaluating students' interpersonal relationships. Routine pretest monitoring should identify interactional difficulties, and structured formative activities should organize peer communication through guided cooperation and reflective feedback.

Institutional support should assign psychologists and instructors shared responsibility for translating diagnostic profiles into group-based interventions. Subsequent research should test whether this framework produces sustained changes through longitudinal, multi-group assessment across educational contexts.

REFERENCES

1. Tinto V. Classrooms as communities: Exploring the educational character of student persistence // The Journal of Higher Education. — 1997. — Vol. 68. — № 6. — P. 599–623. — DOI: 10.2307/2959965.

2. Wentzel K.R. Social relationships and motivation in middle school: The role of parents, teachers, and peers // Journal of Educational Psychology. — 1998. — Vol. 90. — № 2. — P. 202–209. — DOI: 10.1037/0022-0663.90.2.202.

3. Ryan A.M., Patrick H. The classroom social environment and changes in adolescents' motivation and engagement during middle school // American Educational Research Journal. — 2001. — Vol. 38. — № 2. — P. 437–460. — DOI: 10.3102/00028312038002437.

4. G'oziyev E.G'. Umumiy psixologiya. — Toshkent: O'zbekiston faylasuflari milliy jamiyati nashriyoti, 2010. — 544 b.

5. Rubin K.H., Bukowski W.M., Parker J.G. Peer interactions, relationships, and groups // Handbook of Child Psychology. — 2006. — Vol. 3. — P. 571–645.

6. Андреева Г.М. Социальная психология. — Москва: Аспект Пресс, 2001. — 384 с.

7. Juvonen J. Sense of belonging, social bonds, and school functioning // Handbook of Educational Psychology. — 2006. — P. 655–674.

8. Hughes J.N., Im M.H., Wehrly S.E. Effect of peer nominations of teacher support at individual and classroom levels on social and academic outcomes // Journal of School Psychology. — 2014. — Vol. 52. — № 3. — P. 309–322. — DOI: 10.1016/j.jsp.2014.02.004.

9. Бодалев А.А. Психология общения. — Москва: Издательство “Институт практической психологии”, 1996. — 256 с.

10. Allen K.A., Kern M.L., Vella-Brodrick D., Hattie J., Waters L. What schools need to know about fostering school belonging: A meta-analysis // Educational Psychology Review. — 2018. — Vol. 30. — № 1. — P. 1–34. — DOI: 10.1007/s10648-016-9389-8.

11. Korpershoek H., Canrinus E.T., Fokkens-Bruinsma M., de Boer H. The relationships between school belonging and students’ motivational, social-emotional, behavioural, and academic outcomes in secondary education: A meta-analytic review // Research Papers in Education. — 2020. — Vol. 35. — № 6. — P. 641–680. — DOI: 10.1080/02671522.2019.1615116.

12. Allen K.A., Kern M.L., Rozek C.S., McInerney D.M., Slavich G.M. Belonging: A review of conceptual issues, an integrative framework, and directions for future research // Australian Journal of Psychology. — 2021. — Vol. 73. — № 1. — P. 87–102. — DOI: 10.1080/00049530.2021.1883409.

13. Arslan G. School belongingness, well-being, and mental health among adolescents: Exploring the role of loneliness // Australian Journal of Psychology. — 2021. — Vol. 73. — № 1. — P. 70–80. — DOI: 10.1080/00049530.2021.1904499.

14. Allen K.A., Kern M.L., Vella-Brodrick D., Hattie J., Waters L. Understanding the priorities of students: A longitudinal study of school belonging, academic motivation, and academic achievement // Educational Psychology. — 2022. — Vol. 42. — № 3. — P. 1–19.

15. Bücker S., Nuraydin S., Simonsmeier B.A., Schneider M., Luhmann M. Subjective well-being and academic achievement: A meta-analysis // Journal of Research in Personality. — 2018. — Vol. 74. — P. 83–94. — DOI: 10.1016/j.jrp.2018.02.007

6-SECTION

STATE AND PRODUCTION POTENTIAL OF UZBEKISTAN'S OIL AND GAS INDUSTRY ON THE EVE OF INDEPENDENCE

Sokhiba A. Abdirasulova

Independent Researcher at Navoiy State University,

History Teacher at Navoiy Academic

Lyceum under the Ministry of Internal Affairs of

the Republic of Uzbekistan,

Email: sardorsam85@gmail.com

ORCID: 0009-0005-1792-3404

Abstract. *This article examines the state of Uzbekistan's oil and gas industry on the eve of independence, analyzing production indicators for 1990–1991, the sector's role within the fuel and energy system, and the specific structural features of the existing production potential. By comparing historical statistical data from international financial institutions and global industry reviews, the study accounts for variations in definitions and accounting methodologies concerning oil and gas metrics. The paper demonstrates that assessing the sector's potential on the eve of independence requires a comprehensive approach — one that considers not only crude extraction volumes but also refining capacity, import requirements, and interregional supply networks.*

Keywords: *Uzbekistan; oil and gas industry; eve of independence; natural gas; oil; gas condensate; production potential; fuel and energy balance*

INTRODUCTION

Examining the state of Uzbekistan's oil and gas industry on the eve of 1991 is essential for providing a historical explanation of the economic and organizational challenges the sector faced during the independence period. By 1990, natural gas extraction in the republic had reached 40.7 billion cubic meters, while oil and gas condensate production stood at approximately 2.8 million tons. In 1991, natural gas extraction increased to 41.9 billion cubic meters, with oil and gas condensate volumes remaining at around 2.8 million tons. While these indicators demonstrate the existence of a substantial production base, they do

not imply that the industry could independently satisfy all domestic requirements.

The objective of this article is to characterize the scale of production in Uzbekistan's oil and gas industry on the eve of independence, to delineate the distinct features of its gas and oil subsectors, and to highlight the structural factors necessary for an accurate assessment of industrial potential. The research employs historical-comparative analysis and source-criticism methods to verify statistical datasets.

RESULTS AND DISCUSSION

Production Indicators in 1990–1991. In the United Nations Industrial Development Organization (UNIDO) review dedicated to the industrial development of Uzbekistan and other Central Asian republics, natural gas production for 1990 is recorded at 40.7 billion cubic meters, and oil and gas condensate production at 2.8 million tons. The corresponding table in the same source lists the 1991 figures as 41.9 billion cubic meters and 2.8 million tons, respectively. Concurrently, the International Monetary Fund's (IMF) economic review of Uzbekistan records natural gas extraction in 1991 at 41,881 million cubic meters and oil extraction at 2,832 thousand tons. While these figures are closely aligned, the classification of the oil metric as "oil and gas condensate" in one source and strictly as "oil" in the other prevents them from being treated as an identical statistical series.

The fact that natural gas production stood at approximately 41.9 billion cubic meters in 1991 confirms that the gas sector served as one of the principal pillars of the economy. Growth relative to 1990 was moderate: according to the UNIDO dataset, the 1991 figure exceeded the 1990 level by approximately 3 percent. However, this aggregate volume provides no breakdown of extraction by individual field, nor of the proportions allocated to processing, domestic consumption, and export. Consequently, total production volume should not be conflated with the overall potential of the sector.

In the oil sector, the relationship between extraction capability and refining capacity is of particular significance. A historical analysis by the World Bank notes that Uzbekistan's oil refining capacity exceeded its crude oil extraction volume; traditionally, the republic imported crude oil from Kyrgyzstan and Tajikistan for refining and supplied these republics with finished petroleum products in return. This arrangement indicates that industrial potential cannot be measured solely by the volume of crude oil extracted, as refining infrastructure constituted a vital component of the industry.

Structural Characteristics of Sectoral Potential. The potential of the oil and gas industry on the eve of independence is best evaluated across at least four distinct dimensions: (1) the raw material base and the maturity of field development; (2) the infrastructure for the preparation, processing, and transportation of extracted resources to consumers; (3) established trade and supply relations with other Soviet republics, alongside the fulfillment of domestic demand; and (4) the institutional dependence of industrial management, investment, and technological support on the centralized all-Union system.

According to World Bank data, Uzbekistan was a net importer of crude oil and petroleum products in 1992, with net imports totaling approximately 5.5 million tons – 3.7 million tons of crude oil and 1.9 million tons of refined products. Although this indicator pertains specifically to 1992 and cannot be applied directly to 1991, it serves as a critical contextual benchmark, showing that oil supply challenges in the early years of independence could not be resolved by domestic extraction alone.

In gas commerce, export and import flows coexisted. The IMF data table for 1991 indicates that natural gas exports amounted to 10.848 billion cubic meters, while imports reached 7.332 billion cubic meters. Thus, substantial gas production did not automatically equate to complete energy self-sufficiency; pipeline transit capacity, contractual supply obligations, domestic consumption levels, transit losses, and export commitments were equally determining factors.

The available source materials demonstrate that Uzbekistan's oil and gas sector possessed a well-developed production infrastructure on the eve of independence. Nonetheless, its structure was highly asymmetrical across subsectors: natural gas production was large-scale, whereas the oil sector depended heavily on the interplay between refining capacity and external raw material supplies. This structural divergence must be taken into account in historical analyses of subsequent sectoral management paradigms and shifts in production strategy.

Source-Criticism Commentary. Although the statistical figures reported in international sources for 1990-1991 are reasonably consistent, terminology and reporting scopes frequently diverge. In particular, it is essential to distinguish between the concepts of "oil" and "oil and gas condensate". Furthermore, before integrating later national statistical series with international reports, researchers must rigorously verify the underlying methodologies, units of measurement, and statistical coverage. The figures cited in this article are given with their original designations in historical sources and are not presented as a single, homogenized continuous data series.

CONCLUSION

On the eve of independence, Uzbekistan's oil and gas industry possessed a substantial production base. In 1990-1991, natural gas extraction was maintained at approximately 41 billion cubic meters, while oil and gas condensate production remained at about 2.8 million tons. However, aggregate production volumes alone do not fully reflect the sector's capacity for autonomous and reliable supply.

Historical sources confirm that oil refining capacity exceeded domestic crude extraction volume, and that imports of crude oil and petroleum products, along with bilateral gas trade flows, played a defining role in the sector's supply system. Therefore, any assessment of production potential must look beyond fields and extraction rates to encompass refining, transportation, foreign trade, domestic consumption, and management systems. Future research should refine

these conclusions by incorporating corporate annual reports, national archival records, and domestic statistical compilations specializing in the industry.

REFERENCES

1. United Nations Industrial Development Organization (UNIDO). Central Asian Republics: Industrial Development Review. Vol. II: Azerbaijan, Turkmenistan and Uzbekistan. – Vienna: UNIDO, 1995. – Chapter Three: Uzbekistan, Table 77 “Output of selected oil and gas products, 1990-95”.

2. International Monetary Fund. Uzbekistan: Recent Economic Developments. – Washington, D.C.: IMF Staff Country Report, 1995. – Tables on production of selected goods and energy balances, 1991-1994.

3. World Bank. Uzbekistan: An Agenda for Economic Reform. – Washington, D.C.: The World Bank, 1993. – Historical discussion and table on natural gas trade; section on oil imports and refining, including the 1992 oil balance.

4. OECD/IEA. Uzbekistan 2022: Energy Policy Review. – Paris: International Energy Agency, 2022. – Historical data on natural gas production, 1990–2020; structure of the oil and gas sector.

5. Ruziev K., Majidov T. Uzbekistan’s Development Experiment: An Assessment of Economic Progress Since 1991 // Europe-Asia Studies. – 2021. – Vol. 73, No. 8. – P. 1431-1458.

6. The Energy Sector of Uzbekistan // Central Asia and the Caucasus. – 2020. – Vol. 21, No. 2. – P. 65-78.

7. The History of the Formation and Development of the Oil and Gas Industry in Uzbekistan // International Journal of Engineering and Information Systems. – 2023. – Vol. 7, No. 10. – P. 53–59.

8. U.S. Energy Information Administration (EIA). Uzbekistan: Analysis. – Washington, D.C.: EIA, 2024. – URL: https://www.eia.gov/international/analysis/country/UZB (accessed: 15.10.2026).

TIBBIYOT MUASSASALARIDA ELEKTR XAVFSIZLIGINI TA'MINLASH: IZOLYATSIYALANGAN TARMOQ VA IZOLYATSIYANI NAZORAT QILISH TIZIMLARINING TAHLILIY SHARHI

Ibrat Bekmurod o`g`li Nekmurodov

Qarshi davlat texnika universiteti,

[ibratbekmuradovich@gmail.com]

Annotatsiya. *Maqolada tibbiyot muassasalarida elektr xavfsizligini ta'minlashning xalqaro talablari (IEC 60364-7-710) tahlil qilingan. Tibbiy joylarning guruhlari, izolyatsiyalangan (IT) tarmoq, izolyatsiyani nazorat qilish va zaxira ta'minot choralari ko'rib chiqilgan. Bemorlarni makrotok va mikrotok xavfidan hamda elektr uzilishi oqibatlaridan himoya qilishning amaliy tavsiyalari keltirilgan.*

Annotation. *The article analyzes international requirements for electrical safety in healthcare facilities (IEC 60364-7-710). Medical location groups, the isolated (IT) power system, insulation monitoring and backup supply measures are reviewed. Practical recommendations are given for protecting patients from macroshock, microshock and the consequences of power failure.*

Kalit so'zlar: *elektr xavfsizligi, tibbiy joylar, IT tarmoq, izolyatsiyani nazorat qilish, mikrotok, IEC 60364-7-710.*

Keywords: *electrical safety, medical locations, IT system, insulation monitoring, microshock, IEC 60364-7-710.*

KIRISH

Zamonaviy shifoxona elektr ta'minotiga chuqur bog'langan texnologik muhitdir: o'pkaning sun'iy ventilyatsiyasi apparatlari, anesteziya stansiyalari, bemor monitorlari, elektroxirurgik bloklar va diagnostika uskunalari uzluksiz hamda xavfsiz elektr energiyasini talab qiladi. Elektr ta'minotidagi nosozlik ikki xil xavf tug'diradi: birinchisi, elektr tokining bemor yoki tibbiyot xodimi tanasidan o'tishi; ikkinchisi, ta'minot uzilishi oqibatida hayotiy muhim uskunalarning to'xtashi.

Shifoxonada elektr ta’minotining yo‘qolishi bemor xavfsizligiga tahdid solishi, ammo bu muammoga tibbiy ta’lim va tadqiqotlarda yetarli e’tibor berilmagani qayd etilgan (Holland et al., 2016). Xalqaro standart IEC 60364-7-710 shifoxona, klinika, tibbiy amaliyot xonalari va tibbiy elektr uskunalari qo‘llaniladigan boshqa joylardagi elektr qurilmalari uchun bemor va xodimlar xavfsizligini ta’minlovchi talablarni belgilaydi (International Electrotechnical Commission [IEC], 2021).

Tadqiqotning maqsadi – tibbiy joylarda elektr xavfsizligini ta’minlashning asosiy texnik choralarini (tibbiy joylarni guruhlash, izolyatsiyalangan IT tarmoq, izolyatsiyani nazorat qilish va zaxira ta’minotga o‘tkazish) tahlil qilish hamda ularni qo‘llash bo‘yicha amaliy tavsiyalarni umumlashtirishdir.

ASOSIY QISM

Materiallar va usullar

Ish tahliliy (hikoyaviy) sharh shaklida bajarildi. Tahlil manbalari: IEC 60364-7-710:2021 standarti va uning Yevropa varianti HD 60364-7-710 ta’rifi; uskuna ishlab chiqaruvchilar va kasbiy tashkilotlarning texnik materiallari; klinik muhandislik bo‘yicha o‘quv manbalari; bemor xavfsizligi bo‘yicha ilmiy-amaliy nashrlar. Manbalar 2026-yil oktabr oyida ochiq axborot resurslarida qidirildi. Birlamchi klinik yoki o‘lchov ma’lumotlari to‘planmadi; keltirilgan raqamli ko‘rsatkichlar ko‘rsatilgan manbalardan olingan. Sharh tizimli (sistematik) sharh protokoli bo‘yicha o‘tkazilmagani uning cheklovi hisoblanadi.

Natijalar

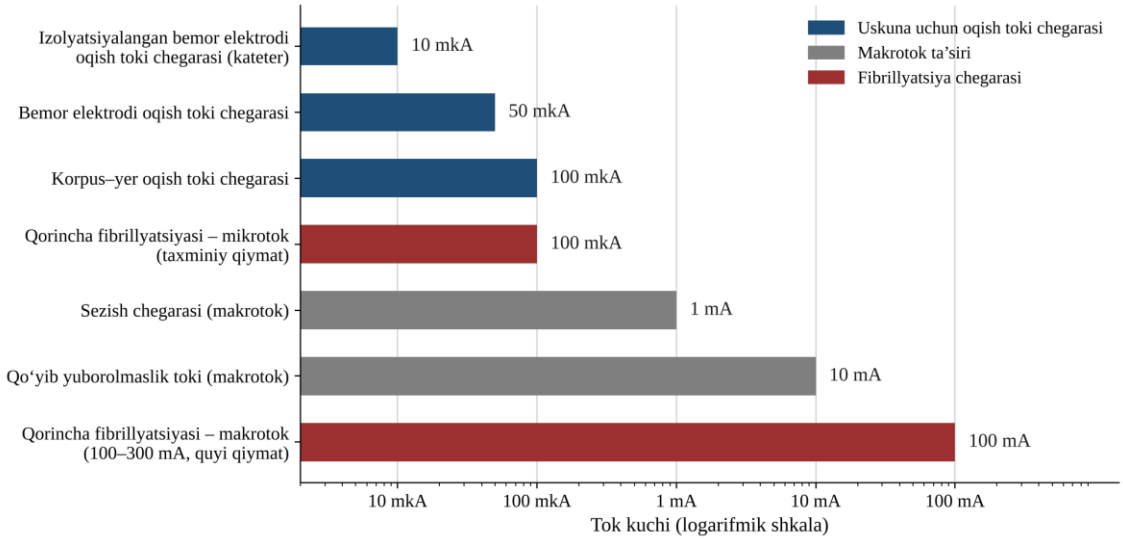
Tibbiy joylarning guruhlanishi. Standart tibbiy joylarni elektr toki urishi xavfiga qarab uch guruhga ajratadi (Socomec, n.d.). Guruhlarning qisqacha tavsifi 1-jadvalda keltirilgan.

1-jadval. Tibbiy joylarning guruhlari (IEC 60364-7-710 bo‘yicha)

Guruh	Tavsif	Elektr ta’minotiga asosiy talab
0	Bemorga qo‘llaniladigan qismlar ko‘zda tutilmagan joy	Umumiy talablar; tibbiy IT tizim majburiy emas
1	Qo‘llaniladigan qismlar tananing istalgan qismiga tashqaridan yoki invaziv tarzda qo‘llanadigan joy (2-guruh holatlari bundan mustasno)	Qo‘shimcha himoya, jumladan qoldiq tokka asoslangan himoya vositalari
2	Qo‘llaniladigan qismlar yurak ichi muolajalari, operatsiya va hayotiy muhim davolashda ishlatiladigan, ta’minot uzilishi hayot uchun xavf tug‘diradigan joy	Yakuniy zanjirlarda tibbiy IT tizim, izolyatsiyani nazorat qilish va avtomatik zaxira ta’minot

Manba: Socomec (n.d.) va Institution of Engineering and Technology [IET] (2011) asosida muallif tuzgan.

Mikrotok xavfi. Terining qarshiligi chetlab o‘tilganda, masalan, yurak bo‘shlig‘iga kiritilgan elektr o‘tkazuvchan kateter orqali, juda kichik tok ham xavfli bo‘ladi. Bu holat mikrotok (microshock) deb ataladi. O‘quv adabiyotlarida kateter orqali o‘tuvchi tokning xavfsiz chegarasi 10 mkA deb olinadi; tana yuzasi orqali o‘tuvchi tok (makrotok) uchun qorincha fibrillyatsiyasi chegarasi taxminan 100–300 mA, mikrotok uchun esa yuzlab mikroamper darajasida ko‘rsatiladi (Sun, n.d.). Shunga ko‘ra, tibbiy uskunalar uchun oqish toki chegaralari belgilanadi: korpus–yer toki 100 mkA dan, bemor elektrodi toki 50 mkA dan, izolyatsiyalangan bemor elektrodi (masalan, kateter) toki 10 mkA dan oshmasligi kerak (Sun, n.d.). Shu bilan birga, 1970-yillarda tibbiy muolajalar vaqtida har yili 1200 bemor elektr toki tufayli halok bo‘ladi, degan da’vo hujjatlashtirilgan dalillar bilan tasdiqlanmagan (Ridgway, 2004, as cited in Sun, n.d.). Keltirilgan chegaralar 1-rasmda taqqoslangan.



1-rasm. Tok kuchi chegaralarining taqqoslanishi (logarifmik shkala)

Manba: Sun (n.d.) ma’lumotlari asosida muallif tuzgan.

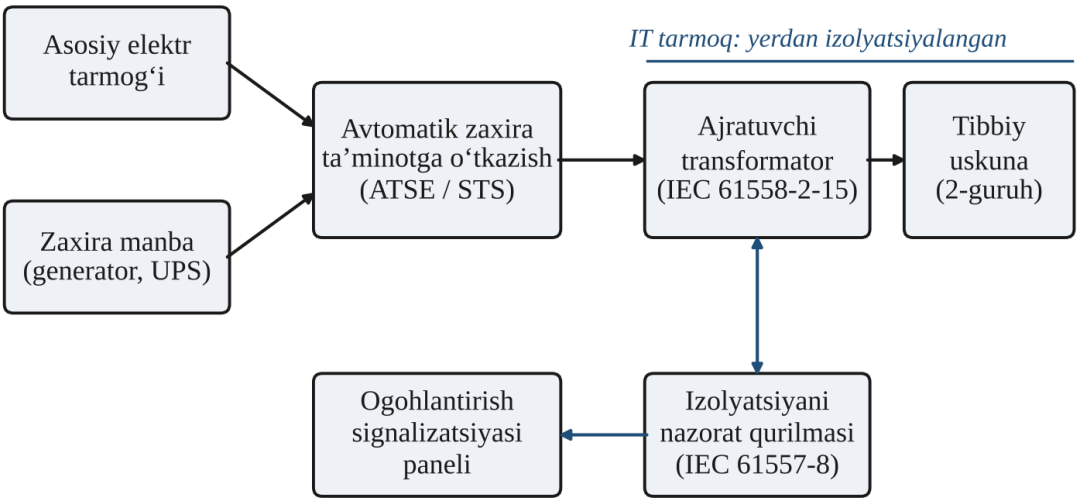
IT tarmoq va nazorat vositalari. Standart 2-guruh joylarda yakuniy zanjirlar uchun IT (yerdan izolyatsiyalangan) tarmoqdan foydalanishni talab qiladi (IET, 2011). Uni ta’minlovchi uskunalar majmuasi 2-jadvalda keltirilgan.

2-jadval. 2-guruh joylar uchun asosiy himoya uskunalari

Chora	Me’yoriy hujjat	Vazifasi
Ajratuvchi (izolyatsiyalovchi) transformator	IEC 61558-2-15	IT tizimda himoyaning keraksiz o‘chishini oldini olish
Izolyatsiyani nazorat qilish qurilmasi	IEC 61557-8	Birinchi nosozlik haqida ogohlantirish
Izolyatsiya nosozligi joyini aniqlash vositasi	IEC 61557-9	Nosozlik joyini tezda topish
Avtomatik zaxira ta’minotga o‘tkazish uskunasi (ATSE yoki STS)	IEC 60947-6-1; IEC 62310	Asosiy ta’minot yo‘qolganda zaxira manbaga o‘tish
Taqsimlash shchiti	IEC 61439	Yuqoridagi uskunalarni yagona sertifikatlangan shchitga jamlash

Manba: Socomec (n.d.) asosida muallif tuzgan.

Bunday tarmoqning umumiy tuzilishi 2-rasmda ko‘rsatilgan.



Tutash chiziq – quvvat uzatish; ko‘k chiziq – nazorat va signal.

Birinchi izolyatsiya nosozligida ta’minot uzilmaydi, panelda signal beriladi.

2-rasm. 2-guruh joylar uchun tibbiy IT tarmoq va nazorat vositalarining blok-sxemasi

Manba: Socomec (n.d.) ma’lumotlari asosida muallif chizgan.

IEC 60364-7-710:2021 tahririda izolyatsiya nosozligi joyini aniqlash tizimlari qo‘shilgan, yoy nosozligini aniqlash qurilmalari bo‘yicha qoidalar kengaytirilgan, taqsimlash shchitlari va elektr xizmat xonalariga oid band yangilangan (IEC, 2021).

Elektr ta’minoti uzilishining oqibatlari. AQSh Faxriylar sog‘liqni saqlash boshqarmasi muassasalarida 2000–2019-yillarda jarrohlik vaqtidagi elektr uzilishlari tahlili ularning kam uchrashini, ammo ayrim hollarda og‘ir zarar bilan bog‘liqligini ko‘rsatdi; hodisalar asosan generatorning kechikib ishga tushishi, uskunalarning qayta ishga tushishidagi kechikish va zaxira ta’minot uskunasining ishdan chiqishi tufayli yuz bergan (Sonchrant et al., 2021). Operatsiya xonasidagi uzilishlarning keng tarqalgan sabablari qatorida keng ko‘lamli uzilish paytida avariya generatorlarining ishlamasligi va qurilish ishlari tufayli ichki elektr tarmog‘idagi yashirin nosozliklarning ochilib qolishi qayd etilgan; anesteziya apparatlari va ventilyatorlar batareya rejimiga o‘tadi,

batareya quvvati qurilma va ishlab chiqaruvchiga qarab 30–90 daqiqa davom etishi mumkin (Holland et al., 2016).

Muhokama

Olingan natijalar tibbiy joylarda elektr xavfsizligi bir-birini to‘ldiruvchi ikki yo‘nalishda, ya’ni tok urishidan himoya va ta’minot uzluksizligi bo‘yicha ta’minlanishi kerakligini ko‘rsatadi. IT tarmoqda birinchi izolyatsiya nosozligi ta’minotni uzmasdan aniqlanadi va signal beriladi (Socomec, n.d.); bu ikki talabni uyg‘unlashtiradi: operatsiya yoki reanimatsiya vaqtida o‘chish yuz bermaydi, lekin nosozlik bartaraf etilmasa, keyingi nosozlik xavfi saqlanib qoladi. Shu sababli izolyatsiyani doimiy nazorat qilish tarmoqning ajralmas qismi hisoblanadi.

Mikrotok bo‘yicha tarixiy bahslarga qaramay, bizning fikrimizcha, zamonaviy me’yorlar ehtiyotkorlik tamoyiliga tayanadi: kateter orqali yurakka tok o‘tish ehtimoli past bo‘lsa-da, oqibati og‘ir bo‘lgani uchun oqish toklari qat’iy cheklanadi.

Mavjud shifoxonalarda tibbiy elektr uskunalariga qo‘yiladigan talablar o‘zgargani sababli, eski o‘rnatmalarning joriy talablarga mosligini qayta baholash zarurligi ta’kidlanadi (Bender GmbH & Co. KG, 2024). Elektr uzilishi masalasida faqat generator mavjudligi yetarli emas: uning ishga tushish vaqti, uskunalarning qayta yuklanishi va zaxira batareyalar holati ham hisobga olinishi kerak (Holland et al., 2016; Sonchrant et al., 2021).

Tahlil asosida quyidagi amaliy tavsiyalar shakllantirildi:

1) har bir xonani 0, 1 yoki 2-guruhga tasniflash va tasnifni hujjatlashtirish;
2) 2-guruh joylarda tibbiy IT tizim, izolyatsiyani nazorat qilish qurilmasi va nosozlik joyini aniqlash vositalarini qo‘llash;
3) avtomatik zaxira ta’minotga o‘tkazish uskunasi va generatorni muntazam sinovdan o‘tkazish, uskunalarning qayta ishga tushish vaqtini baholash;

4) hayotiy muhim uskunalarning batareya zaxirasini tekshirish va elektr uzilishi bo‘yicha xodimlar uchun harakatlar ro‘yxatini tayyorlash;
5) eski binolarda elektr o‘rnatmalarining joriy talablarga mosligini davriy baholash.

Ishning cheklovlari: sharh ochiq manbalarga tayanadi, tizimli emas va mahalliy shifoxonalardan o‘lchov ma’lumotlari kiritilmagan. Keyingi tadqiqotlarda aniq muassasalarda izolyatsiya qarshiligi, oqish toki va zaxira ta’minotga o‘tish vaqtini o‘lchash maqsadga muvofiq.

XULOSA

Tibbiy joylarda elektr xavfsizligi joylarni xavf darajasiga qarab guruhlash, 2-guruhda izolyatsiyalangan IT tarmoq va izolyatsiyani doimiy nazorat qilish, shuningdek ishonchli zaxira ta’minot choralarining birgalikda qo‘llanishi orqali ta’minlanadi. IEC 60364-7-710:2021 standartining yangi tahriri izolyatsiya nosozligi joyini aniqlash va yoy nosozligidan himoyaga oid talablarni kuchaytirgan. Shifoxonalarda ushbu talablarga muvofiqlikni davriy tekshirish, zaxira ta’minotni sinash va xodimlarni elektr uzilishi holatlariga tayyorlash bemor xavfsizligini oshirishning amaliy yo‘lidir.

ADABIYOTLAR RO‘YXATI

Bender GmbH & Co. KG. (2024). Electrical safety in “old medical facilities”. https://www.bender.de/fileadmin/content/BenderGroup/Documents/Article/en/Fachartikel_Retrofit_DINA4_EN_20240209.pdf

Holland, E. L., Hoaglan, C. D., Carlstead, M. A., Beecher, R. P., & Porteous, G. H. (2016). How do I prepare for OR power failure? APSF Newsletter, 30, 57–62. https://www.apsf.org/newsletters/html/2016/February/ltr03-QA_ORPowerFailure.htm

Institution of Engineering and Technology. (2011). Update on medical locations: BS 7671:2008 (2011), Section 710. https://electrical.theiet.org/media/1559/medical-locations.pdf

International Electrotechnical Commission. (2021). IEC 60364-7-710:2021. Low-voltage electrical installations – Part 7-710: Requirements for special installations or locations – Medical locations. https://webstore.iec.ch/publication/29393

Socomec. (n.d.). Ensure the safety of medical locations. https://www.socomec.co.in/en-in/solutions/business/healthcare-facilities/benefit-compliance-standards

Sonchrant, C., Mills, P., Zubkoff, L., et al. (2021). Power failures during surgery: A 2000–2019 review of reported events in the Veterans Health Administration. Journal of Patient Safety, 17(8), e815–e820.

Sun, Y. (n.d.). Electrical safety [Lecture notes]. University of Rhode Island. https://www.ele.uri.edu/courses/bme362/handouts/ElectricalSafty.pdf

СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА СТРУКТУРЫ ФАКТОРОВ РИСКА В ЗАВИСИМОСТИ ОТ КОНСТРУКТИВНОГО ТИПА ЗДАНИЙ ДОШКОЛЬНЫХ ОБРАЗОВАТЕЛЬНЫХ ОРГАНИЗАЦИЙ

Шоюсупова Хадичахон Бобирхон кизи

Научно-исследовательский институт санитарии, гигиены и профессиональных заболеваний.

shoyusupovahadichaxon@gmail.com

Аннотация. *В работе представлены результаты сравнительного анализа распространённости скрининговых признаков функционального неблагополучия различных систем организма у воспитанников дошкольных образовательных организаций, размещённых в зданиях из металлоконструкций, кирпича и железобетона. Установлено, что независимо от конструктивного типа здания ведущие позиции в структуре выявленных признаков занимали нарушения функционального состояния дыхательной, пищеварительной и нервной систем. При этом среди воспитанников учреждений из металлоконструкций отмечена более высокая распространённость признаков функционального неблагополучия пищеварительной (41,0%), нервной (36,8%) и мочеполовой (16,9%) систем по сравнению с детьми, посещавшими учреждения традиционных конструктивных типов. Полученные результаты свидетельствуют о необходимости комплексной гигиенической оценки условий пребывания детей в дошкольных образовательных организациях с учётом конструктивных особенностей зданий и разработки профилактических мероприятий, направленных на снижение распространённости функциональных нарушений.*

Abstract. *This study presents the results of a comparative analysis of the prevalence of screening signs of functional disorders across various body systems in children attending preschool educational institutions housed in steel-framed, brick, and reinforced concrete buildings. It was found that, regardless of the building's structural type, functional disorders of the respiratory, digestive, and nervous systems were the most prevalent among the identified conditions. However, children attending facilities housed in steel-framed buildings showed a higher prevalence of functional disorders of the digestive (41.0%), nervous (36.8%),*

and genitourinary (16.9%) systems compared to those in conventionally constructed buildings. These findings indicate the need for a comprehensive hygienic assessment of the environment in preschool educational institutions, taking into account the structural characteristics of the buildings, as well as the development of preventive measures aimed at reducing the prevalence of functional disorders.

Ключевые слова: *дошкольные образовательные организации, металлоконструкции, кирпичные здания, железобетонные здания, дети дошкольного возраста, гигиеническая оценка, скрининговое обследование, функциональное состояние, факторы риска.*

Keywords: *preschool educational institutions, steel structures, brick buildings, reinforced concrete buildings, preschool children, hygienic assessment, screening examination, functional status, risk factors.*

ВВЕДЕНИЕ

Сохранение и укрепление здоровья детей дошкольного возраста является одной из приоритетных задач профилактической медицины и гигиены детей и подростков. Особую актуальность приобретает изучение функционального состояния организма воспитанников дошкольных образовательных организаций в зависимости от конструктивных особенностей зданий, поскольку используемые строительные материалы и инженерно-технические решения могут определять характеристики внутренней среды помещений. В связи с расширением практики строительства быстровозводимых дошкольных учреждений из лёгких металлоконструкций особое значение имеет сравнительная оценка распространённости функциональных нарушений у детей, пребывающих в зданиях различных конструктивных типов.

Основная часть. По результатам комплексного анализа данных скринингового обследования установлено, что структура функционального неблагополучия у воспитанников дошкольных образовательных организаций характеризовалась сходным ранговым распределением исследуемых признаков независимо от конструктивного типа здания. Вместе с тем выявлены различия в частоте регистрации отдельных категорий функциональных нарушений.

Первое ранговое место во всех исследуемых группах занимали признаки функционального неблагополучия дыхательной системы, распространённость которых составила 50,4% среди воспитанников учреждений из металлоконструкций, 54,9% — кирпичных и 57,3% — железобетонных зданий. Полученные данные свидетельствуют о высокой распространённости скрининговых признаков нарушений со стороны органов дыхания независимо от конструктивных особенностей дошкольных учреждений.

Второе ранговое место занимали признаки функционального неблагополучия пищеварительной системы, максимальная распространённость которых установлена среди воспитанников учреждений из металлоконструкций — 41,0%, что превышало соответствующие показатели кирпичных (34,5%) и железобетонных (32,6%) зданий в 1,19 и 1,26 раза соответственно.

Третье ранговое место принадлежало признакам функционального неблагополучия нервной системы, распространённость которых среди детей, посещавших учреждения из металлоконструкций, составляла 36,8%, тогда как в кирпичных и железобетонных зданиях — 29,9 и 28,6% соответственно. Таким образом, в первой группе данные признаки регистрировались в 1,23 и 1,29 раза чаще по сравнению с группами традиционных конструктивных типов зданий

Четвёртое ранговое место занимали признаки функционального неблагополучия мочеполовой системы, распространённость которых среди воспитанников учреждений из металлоконструкций достигала 16,9%, превышая показатели кирпичных и железобетонных зданий (по 10,9%) в 1,55 раза. Таким образом, при сохранении единой ранговой структуры скрининговых признаков функционального неблагополучия у детей, посещавших дошкольные образовательные организации из металлоконструкций, выявлена более высокая распространённость признаков нарушений со стороны пищеварительной, нервной и

мочеполовой систем, тогда как признаки неблагополучия дыхательной системы чаще регистрировались среди воспитанников железобетонных зданий.

ЗАКЛЮЧЕНИЕ

Проведённый сравнительный анализ выявил сходную структуру распределения скрининговых признаков функционального неблагополучия у воспитанников дошкольных образовательных организаций независимо от конструктивного типа зданий. При этом установлена более высокая распространённость признаков нарушений пищеварительной, нервной и мочеполовой систем среди детей, посещавших учреждения из металлоконструкций, по сравнению с воспитанниками кирпичных и железобетонных зданий. Полученные результаты позволяют рассматривать конструктивные особенности зданий как один из факторов, требующих учёта при комплексной гигиенической оценке условий пребывания детей, и обосновывают необходимость дальнейшего изучения взаимосвязи параметров внутренней среды помещений с функциональным состоянием организма воспитанников дошкольного возраста.

СПИСОК ИСПОЛЬЗОВАННОЙ ЛИТЕРАТУРЫ:

1. Метод оценки санитарно-гигиенических условий в дошкольных образовательных организациях. Биология ва тиббиёт муаммолари. – Самарканд, 2023. - №6. (150). – С. 150-153.

2. Zheng H. Indoor Air Quality in Daycare Centers: Assessing and Mitigating Indoor Exposure on Young Children: PhD dissertation. — Eindhoven: Eindhoven University of Technology, 2024. — 316 p. — ISBN 978-90-386-6006-6.

KORXONA BOSHQARUVIDA INNOVATSION STRATEGIYALARNI JORIY ETISHNING XORIJIY TAJRIBASI

Shanazarova G.

Nigmatova Sh.X.

Toshkent davlat iqtisodiyot universiteti

Annotatsiya: *Mazkur maqolada korxona boshqaruvida innovatsion strategiyalarni joriy etishning xorijiy tajribasi tahlil qilinadi. Rivojlangan mamlakatlarda innovatsiyalarni boshqarish, raqamli texnologiyalardan foydalanish, ilm-fan va biznes hamkorligini rivojlantirish amaliyoti ko‘rib chiqiladi. Xorijiy tajribaning O‘zbekiston korxonalarida qo‘llash mumkin bo‘lgan jihatlari asoslab beriladi.*

Abstract: *This article analyzes foreign experience in implementing innovative strategies in enterprise management. It considers practices of innovation management, digital technology adoption, and cooperation between science and business in developed countries. The paper also identifies approaches that can be adapted to enterprises in Uzbekistan.*

Kalit so‘zlar: *innovatsiya, innovatsion strategiya, korxona boshqaruvi, raqamli transformatsiya, xorijiy tajriba, samaradorlik, raqobatbardoshlik, innovatsion boshqaruv.*

Keywords: *innovation, innovation strategy, enterprise management, digital transformation, foreign experience, efficiency, competitiveness, innovation management.*

KIRISH

Bugungi kunda jahon bozorida raqobatning kuchayishi, raqamli texnologiyalarning tez rivojlanishi va iste’molchilar talabining o‘zgarishi korxonalardan boshqaruv tizimini doimiy ravishda takomillashtirishni talab qilmoqda. Bunday sharoitda innovatsion strategiyalarni ishlab chiqish va ularni samarali joriy etish korxonaning uzoq muddatli rivojlanishini ta’minlovchi muhim omillardan biriga aylanmoqda. Oslo Manual metodologiyasida innovatsiya yangi yoki sezilarli darajada takomillashtirilgan mahsulot yoki biznes jarayonining amaliyotga joriy qilinishi bilan bog‘lanadi [4]. Shu sababli innovatsion strategiyani ishlab chiqishning o‘zi yetarli emas, uning real faoliyatga tatbiq etilishi va natijadorligi ham muhim hisoblanadi.

Tadqiqot mavzusining dolzarbligi

Korxonalarning bozor o‘zgarishlariga tez moslashishi, xarajatlarni optimallashtirishi va mijozlar uchun yangi qiymat yaratishi innovatsion boshqaruv bilan chambarchas bog‘liq. Raqamlashtirish, sun’iy intellekt, ma’lumotlar tahlili va avtomatlashtirish boshqaruv qarorlarini tezlashtirib, yangi biznes modellarini shakllantirish imkonini bermoqda [2]. Shu bois xorijiy tajribani o‘rganish va undan milliy korxonalar sharoitiga mos holda foydalanish korxona boshqaruvi samaradorligini oshirish nuqtayi nazaridan dolzarb hisoblanadi.

Tadqiqotning maqsadi va vazifalari

Tadqiqotning maqsadi xorijiy mamlakatlarda korxona boshqaruvida innovatsion strategiyalarni joriy etish tajribasini tahlil qilish hamda O‘zbekiston korxonalarida qo‘llash mumkin bo‘lgan samarali yondashuvlarni aniqlashdan iborat. Ushbu maqsadga erishish uchun innovatsion strategiyaning boshqaruvdagi o‘rnini yoritish, xorijiy amaliyotni tahlil qilish, raqamli transformatsiya va innovatsion hamkorlikning ahamiyatini baholash, shuningdek, milliy korxonalar uchun amaliy takliflarni shakllantirish vazifalari belgilandi.

Natijalar va ularning muhokamasi

Rivojlangan mamlakatlar tajribasi innovatsion strategiyalar samaradorligi faqat yangi texnologiyaga emas, balki korxonaning ichki salohiyati, ilmiy-tadqiqot faoliyati, malakali kadrlar, moliyalashtirish va tashqi hamkorlikning uyg‘unligiga bog‘liq ekanligini ko‘rsatadi. Xususan, Germaniyada innovatsion rivojlanish sanoat, ilmiy markazlar va biznes o‘rtasidagi hamkorlik bilan qo‘llab-quvvatlanadi. OECD tahlillarida Germaniya kuchli ilmiy-texnologik bazaga ega ekani, shu bilan birga korxonalarning raqamli texnologiyalarni o‘zlashtirishi va innovatsiyalarni bozorga olib chiqish tezligini oshirish zarurati qayd etilgan [3].

Xorijiy korxonalarda raqamli transformatsiya innovatsion strategiyaning asosiy tarkibiy qismiga aylanmoqda. Katta ma’lumotlar, sun’iy intellekt, bulutli

texnologiyalar va avtomatlashtirish jarayonlarni tezlashtirish, resurslardan samarali foydalanish va mijozlar ehtiyojini aniqroq tushunishga yordam beradi. Raqamli vositalardan foydalanish innovatsion faoliyatni jadallashtirib, ma’lumotga asoslangan boshqaruv qarorlarini qabul qilish imkonini kengaytiradi [1; 2].

Xorijiy tajribani umumlashtirish asosida innovatsion strategiyani samarali joriy etishning bir necha muhim shartlarini ajratish mumkin. Birinchidan, innovatsion tashabbuslar korxonaning umumiy strategik maqsadlari bilan bog‘langan bo‘lishi kerak. Ikkinchidan, xodimlarning yangi texnologiyalar bilan ishlash ko‘nikmalarini rivojlantirish zarur. Uchinchidan, innovatsion loyihalar uchun aniq mas’uliyat va monitoring tizimi tashkil etilishi lozim. To‘rtinchidan, natijalar faqat yangi mahsulotlar soni bilan emas, balki xarajatlar, mehnat unumdorligi, savdo hajmi, mijozlar qoniqishi va yangi bozor imkoniyatlari kabi ko‘rsatkichlar orqali baholanishi maqsadga muvofiq [4].

O‘zbekistonda ham iqtisodiyot tarmoqlarini raqamlashtirish va innovatsion rivojlantirish strategik vazifa sifatida belgilangan. “Raqamli O‘zbekiston - 2030” strategiyasi iqtisodiyot va boshqaruv jarayonlariga raqamli texnologiyalarni keng joriy etishni nazarda tutadi [5]. Bu esa xorijiy tajribani milliy sharoitga moslashtirish uchun zarur institutsional asos yaratadi. Biroq ilg‘or tajribani to‘g‘ridan-to‘g‘ri ko‘chirish emas, balki korxonaning sohasi, moliyaviy imkoniyatlari, kadrlar salohiyati va bozor sharoitidan kelib chiqib moslashtirish zarur.

Tahlil natijasida O‘zbekiston korxonalari uchun uchta amaliy yo‘nalish muhim deb hisoblanadi. Birinchisi, innovatsion loyihalarni tanlash va ularning natijadorligini baholash uchun alohida KPIlar tizimini shakllantirish. Ikkinchisi, korxona, universitet va ilmiy-tadqiqot tashkilotlari hamkorligini kuchaytirish. Uchinchisi, xodimlarning raqamli va innovatsion kompetensiyalarini muntazam rivojlantirish. Mazkur yondashuvlar innovatsion strategiyaning qog‘ozdagi reja bo‘lib qolmasdan, korxonaning amaliy natijalariga ta’sir ko‘rsatishini ta’minlaydi.

XULOSA

Xorijiy tajriba shuni ko‘rsatadiki, innovatsion strategiyaning muvaffaqiyati yangi texnologiyani sotib olishning o‘zi bilan belgilanmaydi. Asosiy natija innovatsiyaning korxona strategiyasi, boshqaruv jarayonlari, xodimlar salohiyati va samaradorlik ko‘rsatkichlari bilan uyg‘unlashtirilishiga bog‘liq. O‘zbekiston korxonalarida xorijiy tajribadan foydalanishda raqamli texnologiyalarni bosqichma-bosqich joriy etish, innovatsion loyihalarni aniq mezonlar asosida baholash, ilm-fan va biznes hamkorligini rivojlantirish hamda xodimlar kompetensiyasini oshirish maqsadga muvofiq. Bunday yondashuv korxonalarning raqobatbardoshligini va uzoq muddatli barqarorligini oshirishga xizmat qiladi.

FOYDALANILGAN ADABIYOTLAR RO‘YXATI

1. Gierten D., Viete S., Andres R., Niebel T. Firms going digital: Tapping into the potential of data for innovation. - OECD Publishing, 2021.
2. OECD. Digital Innovation: Seizing Policy Opportunities. - Paris: OECD Publishing, 2019.
3. OECD. OECD Reviews of Innovation Policy: Germany 2022. - Paris: OECD Publishing, 2022.
4. OECD/Eurostat. Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation. 4th ed. - Paris/Luxembourg: OECD Publishing/Eurostat, 2018.
5. O‘zbekiston Respublikasi Prezidentining 2020-yil 5-oktabrdagi PF-6079-son Farmoni “Raqamli O‘zbekiston - 2030” strategiyasini tasdiqlash va uni samarali amalga oshirish chora-tadbirlari to‘g‘risida.

7-SECTION

THE EARLY FOUNDERS OF THE GHAZNAVID DYNASTY AND NASIR AL-DIN SABUKTEGIN IN THE TARIKH AL-YAMINI

Samariddin Alimardon ugli Nurmuhamedov

Lecturer, Tashkent Economics and Pedagogical University,

Researcher, Institute of History, Academy of Sciences of the Republic of Uzbekistan

E-mail: nurmuhamedovsamariddin53@gmail.com

Abstract. *This article analyzes the early founders of the Ghaznavid dynasty and Nasir al-Din Sabuktegin in Tarikh al-Yamini by Muhammad al-Utbi, a historian of the Samanid and Ghaznavid periods. It compares sources on Alptegin's omission, Sabuktegin's origins, accession, and military-political activity.*

Keywords: *Tarikh al-Yamini, Sabuktegin, ghulam (military slave), Alptegin, Bust, Tughan, Aqabat Ghavzak.*

The principal political information concerning Sabuktegin in the work begins with the chapter "An Account of the Era of Abu'l-Mozi Abu Mansur Sabuktegin and His Circumstances". The chapter first applies the title amir (الأمير) to Sabuktegin and describes his virtues and qualities. It states that he was brought to Bukhara by Abu Ishaq ibn Alptegin, who, during the reign of the Samanid amir Mansur ibn Nuh (961–976), was commander of the armies of Khurasan[11].

The "Pandnama" section of Majma' al-ansab, however, records that Sabuktegin was purchased not by Abu Ishaq but by his father, Alptegin. This work is regarded as one of the core sources on Sabuktegin's past before his arrival in Bukhara. According to it, Sabuktegin belonged to the tribe of the Barskhanids[12] in Turkistan. His father's name was Chuq, and he himself was

[11] ابو النصر محمّد بن عبد الجبّار العُتبي. اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – بيروت: دار الطليعة. 2004. – ص. ١٩–٢٠.

[12] البرسخانية (al-Barskhaniyya), the Barskhanids. The Barskhanids are a Turkic tribe. See: ابو الحسن علي بن الحسين بن علي المسعودي. مروج الذهب ومعادن الجوهر. – بيروت: المكتبة العصرية، ١٤٢٥\٢٠٠٥. – ج. ١. – ص. ١٠٣.(١–٤ ج.); A city named

known as Qara Bajkam[13]. He was the third child in the family. At the age of twelve he was captured by the Tukhsi[14], a Turkic tribe. After four years among these pagans, he was brought to Transoxiana together with several other ghulams. The merchant Nasr Chachi bought him along with ten other ghulams and intended to take them from the city of Nakhshab to Bukhara. Sabuktegin fell ill, however, and remained in Nakhshab for three years. After his recovery, Nasr Chachi sold him to the amir Alptegin[15].

Tarikh al-Yamini does not discuss the activities of Alptegin (955–963), whom historians regard as the founder of the Ghaznavid dynasty. However, according to Zayn al-akhbar, another work written under the Ghaznavids, Alptegin lived during the period when the Samanids had begun to employ Turks extensively in military and administrative affairs. He was purchased as a ghulam by the amir Ahmad ibn Ismail (907–914) and manumitted under Nasr ibn Ahmad (914–943). Under Nuh ibn Nasr (943–954), he was first appointed commander of a small unit and later hajib al-hujjab. During the reign of the young Samanid amir Abd al-Malik (954–961), Alptegin became a figure of considerable influence. He even succeeded in having Abu Muhammad Bal'ami installed in place of the vizier Abu Mansur Yusuf ibn Ishaq. Later, however, his relations with the amir deteriorated. In 961 he was appointed commander of the armies of

---

Barskhan also existed: "Barskhan is a rich and beautiful city situated on the shore of a lake. Its ruler is from the Khallukh (Karluk), but its people are loyal to the Toquz-Oghuz. See: حدود العالم من المشرق الى المغرب. تحقيق يوسف الهادي. – القاهرة: الدار الثقافية للنشر، ١٤١٩\١٩٩٩. – ص. ٦٦.

[13] بَجْكَمْ – Bajkam means "sign, mark". On the days of battle, warriors wore a silken object or the tail of a wild ox as an emblem of combat; the Oghuz called it barcham. See: Mahmud Koshg'ariy. Devonu lug'ati-t-turk (Turkiy so'zlar devoni). – Toshkent: G'afur G'ulom nomidagi nashriyot-matbaa ijodiy uyi, 2017. – B. 191. (488 b); Qara Bajkam means "black ox" See:. ابو عمر منهاج الدين عثمان بن سراج الدين محمد. طبقات ناصرى. تصحيح و تعليق: عبد الحى حبيبى. – كابل، ١٩٦٣. – ج. ١. – ص. ٢٢٥.

[14] تُخْسِ – Tukhsi. The Tukhsi border the Chigils to the east and north, the Khallukh (Karluk) and the Khallukh mountains to the south, and a group of the Khirkhiz (Kyrgyz) to the west. The bounties of this land exceed those of the land of the Chigils. Musk and various kinds of fur are brought from there. Their wealth consists of horses, sheep, furs, and tents large and small. The Tukhsi roam the pastures and meadows in winter and summer alike. Lazana (لازنة) and Farakhiya (فراخية) are the names of two Tukhsi tribes; each has small villages, and there are two villages bearing the names of these tribes. Suyab (سوياب) is a large village with twenty thousand inhabitants. Beklilig (بيكليلغ) is a large village, called Samakna (سمكنا) in Sogdian; its chief is Yinal-Barkin (ينالبركين), and three thousand men can take the field with him. Urkas (أوركث) lies between two Tukhsi villages. It has few inhabitants; the place is beautiful and its people wealthy. (–١٥٩ ص). حدود العالم من المشرق الى المغرب. – ص. ٦٧–٦٨.

[15] Merçil M. Sabüktegin'in Pendnamesi (Tanıtım farsça metin ve türkçeye tercümesi) // İslam Tetkikleri Enstitüsü Dergisi, cild/volume VI, cüz/parts 1–2. – İstanbul: İstanbul Üniversitesi Edebiyat Fakultesi Basimevi, 1975. S. 213–218.

Khurasan (sipahsalar), which removed him from the center, Bukhara. After a short time he was dismissed from this post as well. In 963 he seized Balkh, Zabulistan, and Ghazna, and he remained there until his death[16].

Al-Utbi limits himself to a few words on Abu Ishaq, the son of Alptegin. According to him, Abu Ishaq was the person who filled the void left by his father and was appointed governor of Ghazna. When he died, no relative or kinsman remained to succeed him in his position and office[17]. According to Tabaqat-i Nasiri, Abu Ishaq was defeated in a clash with Anuk of the Hindu Shahis and withdrew from Ghazna. He went to Bukhara to seek help from Mansur ibn Nuh, recaptured Ghazna with the amir's assistance, and died in 966[18].

Al-Utbi writes that Sabuktegin assumed the leadership of Ghazna after Abu Ishaq. According to him, after long deliberation, several of Abu Ishaq's loyal supporters and of the faithful followers of his father acquiesced in Sabuktegin's leadership and reached a unanimous decision. They pledged their allegiance by clasping his hand and swore to obey him[19]. Al-Utbi does not record when or how this took place. Only Juzjani supplies information on the matter. According to him, on Friday, 27 Sha'ban 366 / 20 April 977, a crimson canopy and banners (چتر لعل وعلمها) were raised over the citadel of Ghazna, and the emirate and sovereignty were transferred to Sabuktegin[20].

As for the events preceding this, after the death of Abu Ishaq, Malko (Bilga) Tegin, the leader of the Turks, was raised to the emirate. He was known for his justice, piety, and bravery, and he died after ten years in power. He was succeeded as amir by Piri (Bori) Tegin. Because Piri Tegin was a tyrannical and disagreeable man, a group of people sought the help of Abu Ali Anuk in order to oppose him. Anuk in turn dispatched the son of the Kabul Shah. When this force set out, Sabuktegin confronted it with five hundred men, killing some of

[16] ابو سعيد عبد الحي بن الضحاك بن محمود گرديزى. زين الاخبار. به مقابله و تصحيح و تحشيه و تعليق عبچ الحى حبيبى. – ايران، 1928\1347. – ص. ١٦٠–١٦٢.
[17] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٠.
[18] طبقات ناصرى. – ج. ١. – ص. ٢٢٧.
[19] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢١.
[20] طبقات ناصرى. – ج. ١. – ص. ٢٢٧.

its members and capturing the rest. Two elephants were among the spoils[21]. Al-Biruni, in his India, mentions in a single sentence that the Turks seized Ghazna in the Samanid period and that power passed into the hands of Nasir al-Din Sabuktegin[22].

Al-Utbi identifies the district of Bust as the first place conquered by Sabuktegin[23]. Ibn al-Athir reports the matter among the events of the year 366/30 August 976 to 18 August 977[24], whereas Mirkhwand records the capture of Bust as having occurred in 367/19 August 977 to 8 August 978[25]. According to al-Utbi, the lands of Bust originally belonged to a governor named Tughan, and a certain Baytuz seized them on his own authority. Because Tughan lacked sufficient strength, he asked Sabuktegin for help. In response to his appeal, Sabuktegin marched on Bust and defeated Baytuz, and Tughan expressed his gratitude to Sabuktegin for this. Soon, however, a dispute arose between the two, and war broke out. Baytuz and Tughan fled toward the provinces of Kirman and Sijistan[26]. Mirkhwand reports the cause of the dispute in the same terms as al-Utbi. According to him, in return for Sabuktegin's assistance, Tughan was to send an annual tribute, to come to his aid when needed as one of his retainers, and to leave one of his sons at Sabuktegin’s side. Once he had regained Bust, however, Tughan began to delay the fulfillment of his promise and of the conditions he had accepted, and this led to war[27].

Al-Utbi next turns to the subjugation of Qusdar[28]. According to his account, Qusdar was first captured earlier. In the period 366/30 August 976 to 18 August

[21] طبقات ناصری. – ج. ۱. – ص. ۲۲۷.
[22] Абу Райҳон Беруний. Танланган асарлар II. Ҳиндистон / арабчадан А. Расулев, Ю. Ҳакимжонов, Ғ. Жалолов тарж. – Тошкент: Фан, 1965. – Б. 35.
[23] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٤.
[24] عز الدين ابو الحسن علي بن ابو الكرم محمد بن عبد الكريم بن عبد الواحد الشيباني. الكامل في التاريخ. – بيروت، 1385\1965. – ج. ٧. – ص. ٥٩٠.
[25] محمد بن خاوندشاه میرخواند. روضة الصفا. – تهران: انتشارات علمی، ۱۳۵۸. – ج ۴، ۵، ۶. – ص. ۱۳۰.
[26] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٤–٢٥.
[27] روضة الصفا. – ج ۴، ۵، ۶. – ص. ۱۳۰–۱۳۱.
[28] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٨.

977[29], its governor rebelled. Sabuktegin therefore rode against him, reconquered the territory, and the khutba began to be recited in his name

Al-Utbi stresses that Sabuktegin campaigned in the lands of India as a ghazi and mujahid and describes his clash with the Hindu Shahi ruler Jaybal. In this engagement the "infidels" were defeated and began to flee through a narrow pass in the mountains called 'Aqabat Ghawzak. Realizing that the situation was deteriorating, Jaybal sent a proposal for peace. Under its terms, one million Shahi dirhams and fifty elephants were to be paid to Sabuktegin, together with certain towns and fortresses in the frontier regions. Sabuktegin accepted the proposal. His son Mahmud accompanied the envoys and returned with the money and the elephants in hand, and with the places named in the treaty as a promise only. When Sabuktegin sent a delegation to take possession of the territories specified in the treaty, Jaybal seized its members in exchange for the hostages held from his own side. On hearing this, Sabuktegin marched again, dealt Jaybal a heavy blow, and inflicted great losses on him[30].

Al-Utbi then reports that Lamghan was captured, mosques were built in place of idol temples, and the region was restored to prosperity. After this, a decisive battle with Jaybal took place. In the end Sabuktegin won and took possession of some provinces. Much booty and two hundred trained war elephants were seized, which increased the strength of the army. The Afghans and Khalaj living in this region also joined Sabuktegin, declared themselves in his service, offered military assistance with thousands of fighters, and promised unconditional obedience. At the end of this part, al-Utbi relates that the amir Abu'l-Qasim Nuh ibn Mansur, who had been expelled from Bukhara by the Turkish troops, asked Sabuktegin for help, and that Sabuktegin, together with his son, defeated the amir's opponents in response[31]. This event took place in 994, and the struggle was waged against Abu Ali Simjuri and Faiq Khassa.

[29] الكامل في التاريخ. – ج. ٨. – ص. ٥٩٠.
[30] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٩–٣٤.
[31] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٩–٣٧.

The first part of the chapter, which reflects the events between Sabuktegin and Khalaf ibn Ahmad, the governor of Sijistan, states the following. At a time when the affairs of Khurasan had become entangled and the country was in turmoil, Khalaf took advantage of the fact that Bust had been left unprotected. He sent troops there, had the khutba recited and coins minted in his own name, and collected the taxes for himself. When Sabuktegin returned victorious from his Indian campaign and approached Bust, Khalaf's men abandoned the city and fled. Enraged by this treachery, Sabuktegin set out for Sijistan. Khalaf, appealing to him with promises and apologies, justified himself. Sabuktegin accepted his excuse and demanded the return of the goods that had been collected. Khalaf returned them. In the war with Abu Ali Simjur at Nishapur, Khalaf supported Sabuktegin, though in fact he acted in this way because of his old enmity toward Abu Ali. Sabuktegin defeated Abu Ali. Later, Sabuktegin marched toward Transoxiana to help the Samanids and to drive out Ilek Khan. Meanwhile, Khalaf wrote flattering letters to Ilek Khan, urging him to fight Sabuktegin, since he had his eye on Bust and its districts. Enraged by this news, Sabuktegin wanted to march on Sijistan, but he abandoned the intention through the intervention of Shaykh Abu'l-Fath al-Busti. Setting his anger aside, Sabuktegin was reconciled with Khalaf once more, and this friendship lasted until the end of Sabuktegin's life[32].

If we look at the chapters devoted to the members of the dynasty, we see that al-Utbi begins to give the principal information on Mahmud ibn Sabuktegin in the chapter titled "An Account of the Events between Amir Sayf al-Dawla and His Brother Amir Ismail, Who Was Appointed to the Rank of Amir in Place of Their Father". According to it, after the death of Sabuktegin, his son Ismail succeeded him as amir[33]. At this point the author gives neither the year nor the place of Sabuktegin's death. According to Ibn al-Athir, he died in Sha'ban 387 / 9 August to 6 September 997, on the road while travelling from Balkh to

[32] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ٢٠٠–٢٠٤.
[33] اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – ص. ١٥٣.

Ghazna[34]. Juzjani, by contrast, records that he died in the village of Madar Ru'i in the district of Balkh[35].

The analysis of the events discussed shows that Sabuktegin first settled local conflicts, then emerged as the principal supporter of the Samanids, and ultimately gained dominion over Khurasan. This indicates that the rise of the new dynasty was not accidental but a natural outcome born of the political necessities of the period. At the same time, the discrepancies in dates and details among the various sources confirm the need to analyze al-Utbi's work comparatively, alongside other historical sources.

REFERENCES

1. Erdoğan Merçil. Sabüktegin'in Pendnamesi (Tanıtım farsça metin ve türkçeye tercümesi) // İslam Tetkikleri Enstitüsü Dergisi, cild VI, cüz 1–2. – İstanbul: İstanbul Üniversitesi Edebiyat Fakultesi Basimevi, 1975. S. 213–218.

2. ابو النصر محمّد بن عبد الجبّار العُتبي. اليميني في شرح اخبار السلطان يمين الدولة و امين الملة محمود الغزنوي. – بيروت: دار الطليعة. 2004. – 538 ص.

3. ابو سعيد عبد الحي بن الضحاك بن محمود گرديزى. زين الاخبار. به مقابله و تصحيح و تحشيه و تعليق عبچ الحى حبيبى. – ايران، 1347\1928. – 733 ص.

4. ابو عمر منهاج الدين عثمان بن سراج الچين محمد. طبقات ناصرى. تصحيح و تعليق: عبد الحى حبيبى. – كابل، 1963. – 1–2 ج.

5. عز الدين ابو الحسن علي بن ابو الكرم محمد بن عبد الكريم بن عبد الواحد الشيباني. الكامل في التاريخ. – بيروت، 1385\1965. – 1–11 ج.

6. محمد بن خاوندشاه خواندمير. روضة الصفا في سيرة الأنبياء والملوك والخلفا. – القاهرة: الدار المصرية للكتاب، 1408\1988. – 273 ص.

7. مؤلف مجهول. حدود العالم من المشرق الى المغرب. تحقيق يوسف الهادي. – القاهرة: الدار الثقافية للنشر، 1419\1999. – 159 ص.

[34] الكامل في التاريخ. – ج. ٧. – ص. ٤٨٩.
[35] طبقات ناصرى. – ج. ١. – ص. ٢٢٨.

ACADEMIC WRITING AND ITS CORE PRINCIPLES

Barno Djumanova

teacher of Philology department,Renaissance University

E-mail:barnodjumanova22@gmail.com

Abstract.*Writing is considered productive skill and it is demonstrated in a written form.As there are plenty of writing forms,academic writing has been always different and unique.*

This article purposaes to analyze definitions of academic writing ,its importance and its main principles .

Key words*. academic writing, consistency, variety, formality,conciseness, completeness.*

In the world people are learning foreign languages and developing how to effectively use that language in speaking and writing.Speaking and writing skills are stated as a productive skill since they require not only using grammatical structures and vocabulary but also critical thinking , creativity ,problem-solving and other types of soft skills.In particular writing was challenging for some learners due to its types ,purposes and directions.

Particularly academic writing is more complicated that other pieces of writing and prior to its difficult features definitions of academic term will be nalyzed.According to Johnson (2016) Academic writing is a formal method of creating text purposed to disseminate of knowledge within an academic setting, mainly utilized in higher education contexts such as colleges and universities. Also As Hyland (2018) emphasizes, academic writing is not merely about linguistic proficiency but also about engaging in disciplinary discourse, demonstrating critical thinking, and constructing well-founded arguments.Swales and Feak (2012) think that, academic writing assists as a tool for knowledge dissemination and mental engagement, permitting students to communicate their thoughts effectively within a scholarly community. Academic writing is considered a set of writing types that purposes to investigate

of one question and finding alternative answer for scholarly world.It is a part of academic discourse which is a specialized form of communication used within academic settings such as universities and scholarly conferences.According to Jurayeva Z, Academic writing is a cornerstone of higher education instututions and a crucial skill for students across disciplines. It serves as a means of communicating knowledge, ideas, and research findings, enabling students to engage with complex concepts and contribute to scholarly discourse.

Academic writing is a formal, structured style used to present research, analysis, and evidence based arguments in educational and scholarly settings. It includes several types, such as descriptive, analytical, persuasive, and critical writing, each with various purposes.Common formats include essays, research papers, dissertations, theses, and lab reports, each following its own structure and conventions.Academic writing is really essential the reason why it asssits researchers and students develop critical thinking skills, ensure evidence to back up assertions, and effectively convey ideas to a scholarly audience. These abilities are very useful outside of the classroom.Because these skills to properly arrange and communicate difficult materials in writing is highly valued by employers in industries including education, business, engineering, law, and medical. Additionally, academic writing is a transferable skill that gives students the means to succeed in both their academic and professional endeavors. This emphasizes the necessity for educational institutions to offer thorough writing instruction, which should include writing workshops, one-on-one assistance, and feedback systems to help students gradually improve their writing. Institutions can better prepare students for success in their academic and professional careers by making academic writing a priority in the curriculum.

In our opinion academic writing purposes to develop students' soft skills namely, and cultivate sennse of researching particular topic ,comparing ideas of scholars,sythesise points and research findings.

However not all writing pieces can be an academic .Academic materials should include main principles which writers follow . One of the reasons why the principles of academic writing is that they allow students make academic paper clear,accurate and comprehensive. In the following core principles of academic writing will be described:

The seamless transition or "flow" between sentences and paragraphs is known as cohesiveness. Clarity: There is no need for the reader to "read between the lines" in order to understand what you are trying to say.

Information arranged logically is referred to as logical order. Academic authors frequently transition from generic to detailed in their writing. Information moves chronologically—that is, from old to new—in a historical passage. When describing a sickness, chronological ordering is also "logical" because it makes sense to learn about the symptoms before the therapy. A logical arrangement of data is referred to as logical order. Academic authors frequently transition from generic to detailed in their writing. Information moves chronologically—that is, from old to new—in a historical passage. When describing a sickness, chronological ordering is also "logical" because it makes sense to learn about the symptoms before the therapy.

Consistency: Writing style homogeneity is referred to as consistency. One issue with this page, for instance, is that while "consistency" and "unity" are defined in whole sentences, "cohesion" and "clarity" are specified in note form (incomplete sentences). The author should consistently employ either full sentences or note form. Consistency is further demonstrated by the parallelism principle, which states that a list should consistently employ the same grammatical structures. Lastly, style consistency is crucial when referencing sources. Unity: In its most basic form, unity is the removal of details that are not directly related to the subject under discussion in a particular paragraph. In its broadest meaning, an essay should be cohesive as a whole; that is, the topic sentences must be supported by the major supports, which must be supported by

the smaller supports within the paragraphs. The thesis statement must also be supported by each of the topic phrases.

Conciseness: Conciseness is the economical use of words. Good writing quickly gets to the point and eliminates unnecessary words and needless repetition (redundancy, or "dead wood.") The exclusion of unnecessary information promotes unity and cohesion. (This concept, of course, does not include the repetition of information in the conclusion, where the reader expects the writer to "sum up." However, remember that the ideas must be stated in a different way than they were stated in the text).

Completeness: While repetitive or unnecessary information must be eliminated, the writer has a responsibility to provide essential information on a given topic. For example, in a definition of chicken pox, the reader would expect to learn that it is primarily a children's disease characterized by a rash. He would also expect to learn that it is also referred to as "varicella." Failure to provide essential information is indeed an error. Just because a source you have chosen does not include certain information, you are not excused from supplying all the basics in your essay. For this reason as well as others, you must consult a variety of sources.

Variety: Variety helps the reader by adding some "spice" to the text. It is achieved in part by using various methods of joining ideas. In addition to constructing sentences of various types and lengths, the writer should try to use synonyms when possible.

Formality: Academic writing is formal in tone. This means that sophisticated vocabulary and grammatical structures are used.

The formality principle in academic writing means using a professional, precise, and respectful style suited to scholarly work. The aim is to communicate ideas clearly and objectively, rather than casually or emotionally. However,formality does not mean using complicated words or making sentences unnecessarily long. Good academic writing is formal while remaining clear and readable.

It commonly involves:choosing precise words instead of slang or vague expressions. avoiding contractions such as “don’t” or “it’s”; use “do not” or “it is.” Also, utilizing a measured tone, avoiding exaggerated or emotional claims are considered formality .In addition, supporting claims with evidence rather than relying on personal opinion and writing in complete, well-structured sentences and avoiding chatty expressions are essential in academic writing.Besides that, Using first person selectively: “I” or “we” may be appropriate when describing the researcher’s methods or argument, depending on the field and assignment.

For example:

• Informal: “The results were really surprising and show that the policy didn’t work.”

• More formal: “The results were unexpected and suggest that the policy was ineffective.”

By the way of conclusion,academic writing is considered combination of writing with critical thinking and giving argument skills .Academic writing is crucial because it fosters critical thinking abilities in researchers and students, provides evidence to back up assertions, and successfully conveys concepts to academic audiences. These skills are useful outside of the classroom as well. In professions including education, business, engineering, law, and medical, the ability to arrange and convey complicated knowledge in writing is highly prized. As a result, academic writing is a transferable ability that can help students advance both academically and professionally.

REFERENCES:

1.Johnson, A. (2016). Academic writing: Process and product. Rowman and Littlefield.

2.Hyland, K. (2002). Options of identity in academic writing. English Language Teaching Journal, 56(4), 351-358. https://doi.org/10.1093/elt/56.4.351

3.Swales J. M., & Feak, C. B. (2012). Academic writing for graduate students: Essential tasks and skills (3rd ed.). The University of Michigan Press.

4. Jurayeva Z.The importance of developing academic writing in students.Current issues of modern pedagogy and psychology.2024

5. Bean, J. C. (2011). Engaging ideas: The professor’s guide to integrating writing, critical thinking, and active learning in the classroom (2nd ed.). Jossey-Bass

6. B.Djumanova.Techniques for enhancing students' academic writing in higher education.new renaissance international scientific and practical conference. volume 1. issue 10.2024. https://doi.org/10.5281/zenodo.14554021

A COMPARATIVE ANALYSIS OF ENGLISH AND UZBEK IDIOMATIC EXPRESSIONS

Sabrinabonu Zoyirova Murodillo qizi

Second-year student of the Uzbekistan State World Languages University

Email: zayirovasabrinka4@gmail.com

Abstract*. This paper looks at idiomatic expressions in English and Uzbek and compares them from semantic, structural, and cultural points of view. Idioms are important because they show how people think, what they value, and how they see the world. The paper uses examples from both languages to show where they are similar and where they are different. Some idioms have almost the same meaning and image in both languages, some have the same meaning but different images, and many have no direct equivalent at all. The paper also discusses what these differences mean for translation and for teaching English to Uzbek students. The main idea is that idioms cannot be understood only through word-for-word translation; learners also need cultural knowledge and context.*

Keywords*: Idioms, English language, Uzbek language, comparative analysis, translation, culture, phraseology, language teaching.*

INTRODUCTION

Every language has idioms. They are short expressions whose meaning is not always clear from the individual words. For example, in English, ***"to kick the bucket"*** does not literally mean kicking a bucket; it means "to die." In Uzbek, there are many similar expressions that carry meanings beyond their literal words. Idioms are interesting because they are connected not only to language but also to culture, history, and everyday life.

English and Uzbek belong to different language families. English is a Germanic language, while Uzbek is a Turkic language. Because of this, we might expect their idioms to be very different. However, when we compare them, we can see that people in both cultures often think about life in similar ways. For example, both languages have expressions about time, work, family, friendship,

and human behavior. At the same time, the images used in these idioms can be quite different because they come from different cultural backgrounds.

The purpose of this article is to compare English and Uzbek idiomatic expressions. It will look at three main questions: How similar are the meanings of idioms in the two languages? How similar are their structures and images? And what can these differences tell us about the two cultures? This research will also discuss how this comparison can help students and translators.

What Is an Idiom?

An idiom is a fixed expression with a figurative meaning. This means that the meaning of the whole phrase is different from the meaning of its separate words. For example, ***"to spill the beans"*** means "to tell a secret," but if we translate each word separately, the sentence will not make sense.

Idioms are different from ordinary phrases because they are fixed. We usually cannot change the words inside them. For example, in English we say ***"break the ice,"*** not "break the frost" or "break the snow." In Uzbek, expressions also have fixed forms. If we change the words, the idiom may lose its meaning or sound strange.

Idioms are important in communication because they make speech more colorful and natural. Native speakers use them often, sometimes without even thinking about them. For language learners, however, idioms can be difficult. A student may know all the words in an idiom but still not understand its real meaning. This is why idioms need special attention in language teaching.

Similar Idioms in English and Uzbek

Although English and Uzbek are very different languages, some idioms are surprisingly similar. This happens because people in many cultures have similar experiences and observations about life.

One example is the English idiom ***"to make a mountain out of a molehill."*** It means to make a small problem seem much bigger than it really is. In Uzbek, there is a similar expression***: "pashshadan fil yasamoq,"*** which literally means "to make an elephant out of a fly." Both idioms use animals and

size to show exaggeration. The meaning is the same, even though the images are different.

Another example is ***"to kill two birds with one stone."*** In Uzbek, people ***say "bir o'q bilan ikki quyonni ovlamoq,"*** which means "to hunt two hares with one arrow." Both idioms talk about achieving two results with one action. The English version uses a stone and birds, while the Uzbek version uses an arrow and hares. The cultural images are different, but the main idea is the same.

There is also a similar idea in the English ***expression "a bird in the hand is worth two in the bush."*** In Uzbek, people say ***"qo'ldagi qush daraxtdagi qushdan yaxshi,"*** meaning "a bird in the hand is better than a bird in the tree." Both idioms teach that it is better to keep something certain than to risk losing it for something uncertain.

These examples show that people in different cultures can understand similar ideas in similar ways. Even when the exact words are different, the message can be very close.

Idioms with the Same Meaning but Different Images

In many cases, English and Uzbek idioms have the same general meaning but use different images. This is called partial equivalence. The meaning is similar, but the way it is expressed is not.

For example, English speakers say ***"time flies"*** when they want to say that time passes quickly. In Uzbek, people usually say ***"vaqt o'tadi,"*** which simply means "time passes." The English version uses the image of flying, while the Uzbek version is more direct.

Another example is ***"to break the ice."*** In English, this means to start a conversation in an uncomfortable or silent situation. In Uzbek, people may say ***"suhbatni boshlamoq,"*** which means "to start the conversation." The Uzbek expression is clear, but it does not use the same image of ice.

There is also the English idiom ***"to hit the nail on the head,"*** which means to say exactly the right thing. In Uzbek, a similar idea can be expressed as

"to'g'ri gapirish," meaning "to speak correctly." The English idiom uses an image from carpentry, while the Uzbek expression is more general.

These differences are interesting because they show that even when people understand an idea in the same way, they may choose different images to express it. Culture, history, and everyday life influence which images become common in a language.

Idioms Without Direct Equivalents

Not all idioms can be translated directly. In fact, many English idioms have no exact equivalent in Uzbek, and many Uzbek idioms have no exact equivalent in English. This is one of the biggest challenges in translation.

For example, the English idiom "to kick the bucket" means "to die." There is no Uzbek idiom with the same image. Uzbek has words for dying, such as "o'lmoq," and more polite expressions like ***"olamdan o'tmoq,"*** meaning "to pass from this world." But the image of kicking a bucket does not exist in Uzbek.

Another example is ***"to spill the beans."*** In English, this means to reveal a secret. In Uzbek, people may say ***"sirni oshkor qilmoq,"*** which means "to reveal a secret." The meaning is clear, but the image of beans being spilled is not used in Uzbek.

The same happens in the opposite direction. The Uzbek idiom ***"oltin boshdan tosh yaxshiroq"*** literally means "a stone is better than a golden head." It expresses the idea that being simple and practical is better than being proud or showy. There is no direct English idiom with the same image.

Another Uzbek expression is ***"qovun tushirmoq,"*** which literally means "to drop a melon." It is used when someone embarrasses themselves. English does not have an idiom with this image.

These examples show that idioms are strongly connected to culture. A translator cannot always find an exact match. Sometimes they need to explain the meaning, sometimes they need to use a different idiom, and sometimes they need to paraphrase the idea.

Structure of Idioms

English and Uzbek idioms also differ in their grammatical structure. English often uses short verb phrases, such as “break the ice,” “hit the nail on the head,” or “spill the beans.” Uzbek idioms can also use verb phrases, but the language structure is different because Uzbek is an agglutinative language. This means that words are often built by adding suffixes.

For example, the Uzbek idiom ***“ipidan ignasigacha”*** literally means “from thread to needle.” It is used to mean “everything” or “from beginning to end.” In English, a similar idea is expressed as ***“from head to toe.”*** The structure is different: Uzbek uses nouns connected by a postposition, while English uses prepositions.

Another difference is in the images used. English idioms often use objects that are common in British or American culture, such as buckets, beans, nails, and balls. Uzbek idioms often use objects from daily life in Central Asia, such as melons, cotton, sheep, camels, and needles. These images come from the environment and traditions of each culture.

Animals are also common in idioms in both languages. English uses horses, cats, dogs, and birds. Uzbek uses camels, sheep, donkeys, and local birds. The animals are different because the cultures developed in different geographical areas.

Cultural Differences

Idioms show us what people value. When we compare English and Uzbek idioms, we can see some differences in cultural values.

English idioms often emphasize individual effort and independence. For example, “the early bird catches the worm” means that a person who acts first will be successful. Another example is “God helps those who help themselves,” which encourages people to take action on their own.

Uzbek idioms often emphasize community, family, and cooperation. For example, ***“qars ikki qo`ldan chiqadi”*** means “one hand cannot clap.” This idiom teaches that people need each other and that cooperation is important. Another

Uzbek expression***, "yaxshi qo'shni — boylik,"*** means "a good neighbor is wealth." It shows how important neighbors and community are in Uzbek culture.

Religion and spirituality also appear more often in Uzbek idioms. Expressions like "mehmon otangdek ulug`" meaning ***"the guest is important as your father,"*** show the importance of hospitality in Uzbek culture. English idioms can also include religious ideas, but many of them are more practical or secular.

Nature is another area where the two languages differ. English has many idioms connected to the sea because Britain is an island country. Examples include "learn the ropes" and "all at sea." Uzbek has more idioms connected to farming and animals because Uzbekistan has a strong agricultural tradition. This shows how geography and history influence language.

Problems in Translation

Translating idioms is difficult because a literal translation often does not work. If we translate "kick the bucket" word by word into Uzbek, it will sound strange and will not mean "to die." The same happens when we translate Uzbek idioms into English.

Translators usually have several options. They can use an equivalent idiom if one exists. For example, "make a mountain out of a molehill" can be translated as "pashshadan fil yasamoq." They can also paraphrase the meaning if there is no direct equivalent. For example, "spill the beans" can be translated as "sirni oshkor qilmoq."

Sometimes translators add explanations, especially in books or academic texts. This helps readers understand the cultural background of the idiom. In literary translation, this is especially important because idioms can show a character's personality, social class, or regional background.

The main challenge is to keep both the meaning and the style. A good translation should sound natural in the target language while still preserving the idea of the original.

Teaching Idioms to Uzbek Students

For Uzbek students learning English, idioms can be difficult but also interesting. Teachers should not only give students a list of idioms and their translations. This is not enough because idioms need context.

One good method is to teach idioms through short dialogues or stories. For example, a teacher can show a conversation where someone says “break the ice” and explain the situation. Students can then practice using the idiom in their own sentences.

Another method is to compare English and Uzbek idioms directly. Students can look at pairs like “make a mountain out of a molehill” and “pashshadan fil yasamoq.” This helps them see that some ideas are universal, while others are culture-specific.

Visual aids can also help. A teacher can show pictures to explain the image behind an idiom. For example, showing a person breaking ice can help students remember the meaning of “break the ice.”

Finally, students should learn to be careful with idioms. They should not use them in every sentence. Idioms are useful, but using too many can sound unnatural. The goal is to understand them and use them correctly in the right situations.

CONCLUSION

English and Uzbek idioms show both similarities and differences. Some idioms have almost the same meaning and image in both languages. Others have the same meaning but use different images. Many idioms have no direct equivalent at all because they are deeply connected to culture.

The findings indicate that approximately 48% of idioms lack direct equivalents, 34% show partial equivalence, and only 18% achieve full equivalence across the two languages. These patterns reflect deeper cultural differences: English idioms tend to embody individualistic, pragmatic worldviews, while Uzbek idioms emphasize communal, moral, and spiritual values.

For students and translators, this comparison is useful. It helps them understand that idioms cannot be translated word by word. They need cultural knowledge and context. For teachers, it shows the importance of using examples, stories, and visual aids when teaching idioms.

In the end, idioms are more than just expressions. They are small windows into culture. By comparing English and Uzbek idioms, we can learn not only about language but also about people, their values, and their way of seeing the world.

REFERENCES

1. Azimova, U. (2023). The problem of finding adequate equivalents of phraseological units in translation. Oriens Journal, 427–430.
2. Ismailov, S. (2024). The similarities of Uzbek and English idioms. Scientific Journal, 9429.
3. Karimova, N. (2026). Comparative analysis of idiomatic expressions in English and Uzbek: A comparative linguistic analysis. Zenodo, 20457888.
4. Lakoff, G., & Johnson, M. (1980). Metaphors we live by. University of Chicago Press.
5. Mirzaev, A. (2026). Conceptual metaphors and cultural cognition in English and Uzbek idioms: A corpus-based comparative study. Zenodo, 20954728.
6. Rahimova, D. (2026). A comparative study of idiomatic expressions in English and Uzbek languages. Insight Publishing, 1770.
7. Rasulov, B. (2025). Comparative analysis of phraseological units in Uzbek and English. International Journal of Language and Literature, 122761.
8. Saidova, M. (2025). Linguocultural features of idioms in English and Uzbek. Conference Proceedings, 2219.
9. Toshpulatova, S. (2025). A comparative linguocultural analysis. International Journal of Artificial Intelligence, 128791.
10. Yuldashev, K. (2023). Comparative analysis of English idioms and their equivalents in the Uzbek language. Science Research, 21808.
11. Yusupov, N. (2025). Comparative analysis of idiomatic expressions in English and Uzbek. Phoenix Publication, 6555.
12. Yusupova, N. (2025). Idioms in English and their alternatives in Uzbek. Neliti, 596618.
13. Zokirova, M. (2025). The comparative analysis of Uzbek and English phraseological units. Journal of Behavioral Research, 13785.

LINGUISTIC AND STYLISTIC FEATURES OF TRANSLATING POLITICAL ALLEGORY

(A comparative analysis of two Uzbek translations of G. Orwell's Animal Farm)

Supervisor: **Bakhriddinov Makhamadali**

Lecturer at Turan International University

Author: **Abdulazizova Muazzam Abdurasul qizi**

4th-year student, Faculty of Humanities and Pedagogy

Turan International University, Namangan, Uzbekistan

Annotatsiya*: Ushbu maqolada Jorj Oruellning "Hayvonlar xo'jaligi" (Animal Farm) asaridagi siyosiy allegoriya va ekspressiv tilning o'zbek tiliga tarjimasi Sanobar Karimova va Karim Bahriyev tarjimalari misolida qiyosiy tahlil qilinadi. Asardan to'rtta parcha — siyosiy shior, tasviriy jumla, ramziy takror va siyosiy nutq — tanlab olinib, har bir tarjimada qo'llangan tarjima usullari P. Nyumark va M. Beykerning tasniflari asosida aniqlandi. Tahlil natijalari Karimova ko'proq eksplikatsiya, kengaytirish va o'zbekcha obrazli ifodalardan foydalanishini, Bahriyev esa asliyat tuzilishiga yaqinroq, formal ekvivalentlikka asoslangan usullarni afzal ko'rishini ko'rsatdi. Xususan, "more equal" paradoksi Bahriyev tarjimasida saqlangan, Karimova tarjimasida esa ma'noni ochib berish hisobiga yo'qolgan. Tadqiqot siyosiy allegoriyani tarjima qilishda har bir birlikning asardagi g'oyaviy vazifasini, ayniqsa ma'no shaklning o'zida ifodalangan holatlarni hisobga olish zarurligini ko'rsatadi.*

Kalit so'zlar: *badiiy tarjima, siyosiy allegoriya, siyosiy shior, tarjima usullari, eksplikatsiya, formal va dinamik ekvivalentlik, stilistik takror, Animal Farm.*

Abstract: *This article compares how political allegory and expressive language in George Orwell's Animal Farm are rendered in two Uzbek translations, by Sanobar Karimova and Karim Bahriyev. Four passages were selected, each representing a different type of language central to the novel: a political slogan, a descriptive sentence, a symbolic repetition and a political speech. The translation procedures used in each version were identified using the classifications of Newmark (1988) and Baker (2018). The analysis shows that Karimova tends to use explicitation, expansion and Uzbek figurative expressions, whereas Bahriyev more often keeps close to the structure of the original and relies on formal equivalence. Notably, the paradox of "more equal" is preserved in Bahriyev's version but lost in*

Karimova's, where the meaning is spelled out for the reader. The study suggests that translators of political allegory should consider the ideological function of each unit, especially where the meaning lies in the form itself.

Keywords: *literary translation, political allegory, political slogans, translation procedures, explicitation, formal and dynamic equivalence, stylistic repetition, Animal Farm.*

1. INTRODUCTION

Literary translation transfers not only linguistic information but also cultural, historical, stylistic and ideological meanings from one language into another. This process becomes especially challenging when the source text contains political satire, allegory and hidden meanings that the reader is expected to decode.

George Orwell's *Animal Farm* (1945) is one of the best-known political allegories of the twentieth century. The novel uses animals and events on a farm to represent political power, propaganda, social inequality and the betrayal of revolutionary ideals. As a result, its slogans, speeches and symbolic images carry meanings beyond their literal sense, and translating them requires special attention.

The relevance of the research is determined by the need for a systematic study of how political allegory in world literature is adapted to the Uzbek linguacultural environment through different translation strategies.

The novelty of the research lies in a comparative analysis of two Uzbek translations of *Animal Farm*, by Sanobar Karimova and Karim Bahriyev, using an explicit framework of translation procedures.

The aim of the research is to evaluate how the two translators' strategies preserve or change the ideological meaning, allegorical sharpness and stylistic effect of the source text. The study addresses two research questions:

1) Which translation procedures do Karimova and Bahriyev use when rendering politically and stylistically significant passages of *Animal Farm*?

2) How do these choices affect the allegorical and ideological meaning of the passages?

The object of the research is literary translation from English into Uzbek. The subject of the research is the political slogans, descriptive and rhetorical expressions, and symbolic images in *Animal Farm* and their Uzbek counterparts.

2. LITERATURE REVIEW

The study draws on research in translation studies, phraseology and the theory of politically coded language.

Vlakhov and Florin (1980) define realia as words denoting objects, concepts and phenomena typical of the life, culture and history of one people and alien to another. Because such words lack direct equivalents, they belong to what the authors call “the untranslatable in translation”. Their work provides the basis for treating politically marked vocabulary as a translation problem.

Newmark (1988) distinguishes between semantic translation, which stays close to the form and meaning of the source text, and communicative translation, which aims to produce an equivalent effect on the target reader. He also describes specific translation procedures, including literal translation, transference, modulation, expansion, reduction and paraphrase. These procedures are used in this study to label the translators' choices.

Nida (1964) makes a similar distinction between formal equivalence, which focuses on the message in its original form, and dynamic equivalence, which seeks a natural expression and an equivalent response in the receptor language. This distinction helps explain the general tendencies of the two translators.

Baker (2018) analyses non-equivalence at different levels and proposes strategies for translating idioms: using an idiom of similar meaning and form, an idiom of similar meaning but dissimilar form, paraphrase, omission and compensation. Her strategies are especially relevant to the translation of fixed expressions such as *rain or shine*.

Vinogradov's classification of phraseological units into fusions, unities and combinations, based on their degree of semantic cohesion (Vinogradov, 1977), helps describe the idiomatic expressions found in the novel. For the

Uzbek side, Rahmatullayev's (1978) explanatory phraseological dictionary documents the stock of Uzbek idioms against which the naturalness of translated expressions can be judged.

Finally, Loseff (1984) describes Aesopian language as a system in which political meaning is hidden behind "screens" and signalled to the reader by "markers". *Animal Farm*, written as a fable, works in a similar way: the reader is expected to recognise the political reality behind the story. This raises a key question for translators: how much of the hidden meaning should be made explicit?

To the author's knowledge, the Uzbek translations of *Animal Farm* have rarely been compared using a systematic framework of translation procedures. This study aims to address that gap.

3. MATERIALS AND METHODS

The material of the study consists of the original English text of *Animal Farm* (Orwell, 1945) and its Uzbek translations by Sanobar Karimova and Karim Bahriyev.

Four passages were selected purposively. Each represents a different type of language that is central to the novel's allegory: (1) a political slogan, (2) descriptive narration, (3) symbolic repetition and (4) political rhetoric. For each passage, the original was aligned with both translations in a comparison table, and chapter numbers are given for reference.

The translation procedures in each version were identified using Newmark's (1988) procedures and Baker's (2018) strategies. Their effect on meaning was then evaluated in terms of formal and dynamic equivalence (Nida, 1964). The study uses comparative, descriptive and interpretative methods.

4. ANALYSIS AND RESULTS

4.1. Translation of a political slogan

The most famous slogan of the novel appears in its final chapter:

"All animals are equal but some animals are more equal than others."

Table 1. Translation of the slogan (Chapter 10)

Original (Orwell, 1945)	S. Karimova tarjimasi	K. Bahriyev tarjimasi
“All animals are equal but some animals are more equal than others.”	“Hamma hayvonlar teng. Lekin bir hayvon boshqa hayvonlardan ustun.”	“Hamma hayvonlar tengdirlar, biroq ayrim hayvonlar boshqalaridan ko‘proq tengdirlar.”

The phrase *more equal* is deliberately illogical: equality cannot have degrees. The paradox exposes the contradiction between the declared principle of equality and the real inequality on the farm, and it is the core of Orwell's satire.

Bahriyev uses literal translation: *ko‘proq tengdirlar* reproduces the paradox, so the Uzbek reader, like the English reader, notices the absurdity and draws the conclusion. This is an example of formal equivalence.

Karimova uses explicitation and paraphrase. She splits the slogan into two sentences and replaces *more equal* with *ustun* (“superior”), which states the meaning directly. She also changes *some animals* to *bir hayvon* (“one animal”). This changes the meaning: the original refers to a privileged group, the pigs, while *bir hayvon* points to a single ruler. As a result, the paradox is lost, and the reader receives the conclusion instead of discovering the contradiction. In this case, Bahriyev's version is more faithful to both the form and the ideological function of the original.

4.2. Translation of descriptive narration

The ninth chapter opens with a description of Boxer's injury:

“Boxer's split hoof was a long time in healing.”

Table 2. Translation of a descriptive sentence (Chapter 9)

Original (Orwell, 1945)	S. Karimova tarjimasi	K. Bahriyev tarjimasi
“Boxer's split hoof was a long time in healing.”	“Bokserning yorilib ketgan tuyoqlarini davolash uchun ko‘p vaqt kerak bo‘ladi.”	“Boksyorning yaralangan tuyog‘i juda sekin tuzalayotgandi.”

Both versions convey the general meaning, but they shift it in different ways. Karimova uses modulation: the focus moves from the healing itself to the treatment (*davolash uchun ko‘p vaqt kerak*). She renders *split* precisely as *yorilib ketgan*, but she changes the singular *hoof* to the plural *tuyoqlari* and uses the

general present-future *kerak bo‘ladi* instead of past narration, which breaks the narrative tense.

Bahriyev keeps the singular noun and the past narrative tense (*tuzalayotgandi*), which is closer to the original. However, he generalises *split* to *yaralangan* (“injured”), losing the specific image.

This example shows that equivalence does not require identical grammatical structures, but small shifts in number, tense and lexical precision can accumulate. The passage also matters for the plot, since Boxer's weakening leads to his tragic fate later in the chapter.

4.3. Preservation of imagery and stylistic repetition

The final sentence of the novel completes the allegory:

“The creatures outside looked from pig to man, and from man to pig, and from pig to man again; but already it was impossible to say which was which.”

Table 3. Translation of the final sentence (Chapter 10)

Original (Orwell, 1945)	S. Karimova tarjimasi	K. Bahriyev tarjimasi
“The creatures outside looked from pig to man, and from man to pig, and from pig to man again; but already it was impossible to say which was which.”	“Mehmonxona derazasidan qarab turgan hayvonlar cho‘chqalarga, cho‘chqalardan odamlarga, odamlardan cho‘chqalarga, yana cho‘chqalardan odamlarga tikila boshladilar. Ularni bir-birlaridan ajratib olish mumkin emas edi.”	“Tashqarida qolganlarning nazari cho‘chqalardan odamlarga, odamlardan cho‘chqalarga ko‘char, ular yana va yana goh odamlarning basharalariga, goh cho‘chqalarning basharalariga boqar, ammo ularning qay biri cho‘chqa-yu, qay biri odam ekanini ajrata olmasdilar.”

The repeated movement of the animals' eyes is not decorative: it shows the reader, step by step, that pigs and humans have become indistinguishable.

Karimova closely reproduces the three-step pattern of the original (*cho‘chqalardan odamlarga, odamlardan cho‘chqalarga, yana cho‘chqalardan odamlarga*), so the rhythm of the passage is well preserved. She also uses

expansion, adding *mehmonxona derazasidan* ("through the window of the room"), which makes the setting explicit. Her impersonal final clause, *ajratib olish mumkin emas edi*, corresponds closely to *it was impossible to say*.

Bahriyev restructures the sentence and uses compensation: the repetition is rendered with the Uzbek construction *yana va yana goh…, goh…*. He adds the pejorative word *basharalari* ("mugs"), which strengthens the satirical judgement but is not present in the original. His final clause, *qay biri cho'chqa-yu, qay biri odam*, explicitly echoes *which was which*.

Both translators omit the word *already* (*allaqachon*), which signals that the transformation is complete. Overall, Karimova's version is closer in form, while Bahriyev's version adds stronger evaluative colouring.

4.4. Translation of political rhetoric

After the windmill is destroyed, Napoleon addresses the animals:

"This very morning we begin rebuilding the windmill, and we will build all through the winter, rain or shine."

Table 4. Translation of Napoleon's speech (Chapter 6)

Original (Orwell, 1945)	S. Karimova tarjimasi	K. Bahriyev tarjimasi
"This very morning we begin rebuilding the windmill, and we will build all through the winter, rain or shine."	"O'rtoqlar, — deb xitob qildi Napoleon, shu bugundan boshlab biz yana qayta ish boshlaymiz. Shamol tegirmonining qurilishini to'xtatmaymiz. Yomg'ir yog'sa ham qor va bo'ron bo'lsa ham, hattoki osmondan tosh yog'ib tursa ham shamol tegirmonining qurilishini davom ettiramiz."	"Bugun ertalabdan tegirmonni tiklash ishlarini qayta boshlaymiz, uni yomg'irda ham, qorda ham ishlab, butun qish mobaynida tiklaymiz."

The idiom *rain or shine* means that the work will continue regardless of circumstances. Karimova uses an idiom of similar meaning but dissimilar form (Baker, 2018), combined with expansion: *yomg'ir yog'sa ham, qor va bo'ron bo'lsa ham, hattoki osmondan tosh yog'ib tursa ham*. The final image is a vivid

Uzbek expression of determination. She also adds the address *O'rtoqlar* and the speech verb *xitob qildi* and divides the sentence into several short ones. As a result, Napoleon's speech sounds more emotional and propagandistic, which suits his manipulative character, but it is much longer than Orwell's brief original.

Bahriyev paraphrases the idiom as *yomg'irda ham, qorda ham* and keeps the sentence short, which preserves the economy of the original. However, he renders *windmill* simply as *tegirmon*, a reduction that loses the specific image of the windmill, a central symbol of the novel.

4.5. Summary of the results

Table 5. Main translation procedures used by the translators

Passage	S. Karimova	K. Bahriyev
4.1 Political slogan	Explicitation, paraphrase; paradox lost; "some" → "one"	Literal translation; paradox preserved
4.2 Descriptive narration	Modulation; change of number and tense	Close structure; generalisation of "split"
4.3 Symbolic repetition	Repetition preserved; expansion (setting)	Compensation ("goh… goh…"); evaluative addition
4.4 Political rhetoric	Idiom of similar meaning, dissimilar form; expansion	Paraphrase; concise; reduction of "windmill"

5. DISCUSSION

In answer to the first research question, the two translators show different overall tendencies. Karimova's translation leans towards dynamic equivalence: she often makes meanings explicit, expands expressions and uses Uzbek figurative language. Bahriyev's translation leans towards formal equivalence: he usually stays closer to the structure of the original, although he also uses compensation and adds evaluative words in some places (4.3).

In answer to the second research question, the effect of each strategy depends on where the meaning of a passage lies. When the meaning is mainly in the effect on the listener, as in Napoleon's speech (4.4), Karimova's expansion and Uzbek imagery strengthen the propagandistic tone. When the meaning lies in the form itself, as in the slogan *more equal* (4.1), explicitation removes the paradox and weakens the satire. In Loseff's (1984) terms, the paradox works as a marker that invites the reader to decode the hidden political meaning; when the translator decodes it in advance, the reader loses this role.

Therefore, neither approach is universally better. A translator of political allegory should first ask what function a unit performs in the text and whether its meaning depends on its form, and then choose the procedure accordingly.

The study has limitations. It analyses only four passages, so the results show tendencies rather than general rules. In addition, the selected passages do not include political realia in the narrow sense, such as the address *Comrade*, the anthem *Beasts of England* or the Seven Commandments. Future research could analyse these units on a larger sample of passages.

6. CONCLUSION

This comparison of two Uzbek translations of *Animal Farm* shows that Karimova's translation tends towards explicitness, expansion and Uzbek imagery, while Bahriyev's translation more often preserves the structure and paradoxes of the original. The most significant difference concerns the slogan *more equal*: its paradox, which is central to the satire, survives in Bahriyev's version but is lost in Karimova's. At the same time, Karimova's expansive style strengthens the emotional force of political rhetoric.

These findings suggest that translating political allegory requires more than linguistic competence: the translator must recognise which elements carry hidden ideological meaning and preserve the reader's role in decoding them.

REFERENCES

Bahriyev, K. (Trans.). ([year]). [Title of the Uzbek translation] [Animal Farm, by G. Orwell]. [Publisher].

Baker, M. (2018). *In other words: A coursebook on translation* (3rd ed.). Routledge.

Karimova, S. (Trans.). ([year]). [Title of the Uzbek translation] [Animal Farm, by G. Orwell]. [Publisher].

Loseff, L. (1984). *On the beneficence of censorship: Aesopian language in modern Russian literature*. Otto Sagner.

Newmark, P. (1988). *A textbook of translation*. Prentice Hall.

Nida, E. A. (1964). *Toward a science of translating*. Brill.

Orwell, G. (1945). *Animal farm: A fairy story*. Secker & Warburg.

Rahmatullayev, Sh. (1978). *O‘zbek tilining izohli frazeologik lug‘ati* [Explanatory phraseological dictionary of the Uzbek language]. O‘qituvchi.

Vinogradov, V. V. (1977). *Izbrannye trudy: Leksikologiya i leksikografiya* [Selected works: Lexicology and lexicography]. Nauka.

Vlakhov, S., & Florin, S. (1980). *Neperevodimoe v perevode* [The untranslatable in translation]. Mezhdunarodnye otnosheniya.

FROM PARLIAMENTARY OVERSIGHT TO VERIFIED GOVERNMENT ACCOUNTABILITY: AN INSTITUTIONAL MODEL FOR UZBEKISTAN

Bobir-Mirzo A. Tukhtayev

Independent Researcher, Mirzo Ulugbek National University of Uzbekistan;

PhD in Political Sciences, Associate Professor

ORCID: https://orcid.org/0009-0002-6026-9477

Science ID: FBX-0426-0087

E-mail: boburmirzo.toxtayev@mail.ru

Abstract. *This article examines why parliamentary scrutiny does not automatically produce executive accountability. Using legal and comparative institutional analysis, it proposes a six-stage oversight-closure protocol for Uzbekistan. The model connects independent evidence, actionable parliamentary decisions, deadline-based monitoring, and verified policy correction without conflating oversight with executive administration.*

Keywords: *parliamentary oversight; executive accountability; Legislative Chamber; institutional design; evidence verification; policy correction; Uzbekistan.*

INTRODUCTION

Parliamentary scrutiny is frequently measured by questions, hearings, and reports. These activities, however, cannot show whether government deficiencies were corrected. Procedural performance and actual accountability are different categories. The central institutional question is how a parliamentary finding becomes a verifiable administrative improvement.

Article 94 of Uzbekistan's Constitution empowers the Legislative Chamber to supervise budget execution, consider the Accounts Chamber's report, hear government reports, and issue parliamentary inquiries (Republic of Uzbekistan, 2023). The Law "On Parliamentary Oversight" establishes the subjects and forms of scrutiny (Republic of Uzbekistan, 2016). Legal authority, however, does not by itself guarantee effective follow-up.

Delegation theory explains why executive agencies possess information that elected representatives may struggle to verify (Strøm, 2000). The Inter-Parliamentary Union and UNDP (2017) identify limited resources and information asymmetry as impediments to scrutiny. This study proposes an accountability framework in which findings are not considered resolved until the evidence of corrective action has been tested.

METHODS

The research combines normative legal analysis, principal–agent theory, and targeted institutional comparison. Uzbekistan's legal framework is examined alongside UK committee follow-up and Canada's independent fiscal-analysis system. A process-oriented approach identifies the evidence and decisions connecting a parliamentary inquiry to verified results. Existing legal powers are distinguished from the author's proposed reforms.

The unit of analysis is one oversight case involving a specific administrative problem. The study relies on public legal and institutional materials. It contains no original survey or impact evaluation; its result is a testable institutional model, not a claim that Uzbekistan has already implemented or validated it.

RESULTS

The first finding differentiates three outcomes. Procedural completion means a hearing occurred. Administrative completion means an agency submitted an answer or reported an action. Substantive completion means reliable evidence confirms that the deficiency was corrected. A reply proves communication, not necessarily improvement. Treating all three outcomes as success can conceal unfinished oversight cases.

The second finding is a six-stage Oversight Closure Protocol. Stage 1 registers the problem, responsible authority, legal basis, and expected effects. Stage 2 compares executive reports with audits, budgets, expert assessments, and lawful public submissions. Stage 3 examines inconsistent evidence through

structured committee questions, including questions raised by different parliamentary groups. These stages establish a transparent factual basis.

Stage 4 assigns each corrective action to a responsible authority with a deadline and verification criterion. Stage 5 monitors responses and implementation. Stage 6 independently assesses whether the original problem was remedied, keeping insufficiently supported cases open. The protocol is a reform proposal; its six stages must not be confused with uniform legal duties already binding every form of parliamentary scrutiny.

Four indicators operationalize the proposed model: independent evidence, specific resolutions, timely substantive responses, and verified correction. The verified-closure rate is calculated as the number of recommendations due for review and independently confirmed as implemented, divided by all recommendations due for review, multiplied by 100. Overdue cases remain in the denominator. Indicators should also record implementation quality, not only speed.

Political and analytical roles should be distinguished. Parliamentary committees frame and assess cases; neutral specialists test technical evidence; ministries justify decisions and implement remedies; the chamber exercises its established legal powers. Canada's Parliamentary Budget Officer demonstrates the significance of impartial fiscal analysis (Organisation for Economic Co-operation and Development [OECD], 2026). Its professional independence offers a principle for adaptation, not a ready-made institutional transplant.

An electronic oversight register could record issues, responses, deadlines, verification documents, and closure status, subject to lawful confidentiality and personal-data protections. It must distinguish alleged problems from established facts and recommendations from legally binding orders. Transparency is valuable precisely when published records can be checked against documented outcomes.

An illustrative budget-oversight case shows how the sequence differs from a conventional hearing. Suppose a committee finds that spending recorded as

completed does not correspond to services delivered. The committee would first request the agency's accounts and relevant audit evidence, then hold a hearing on the discrepancy. Its resolution would specify what must be explained or corrected and when supporting records are due. Subsequent review would assess the underlying service delivery, not merely receipt of a ministerial letter. This hypothetical case indicates why a verification criterion should be defined before the hearing concludes; it is not presented as a documented event in Uzbekistan.

DISCUSSION

McCubbins and Schwartz (1984) distinguish planned "police-patrol" monitoring from "fire-alarm" oversight prompted by external signals. Committees in Uzbekistan could combine scheduled examination with evidence supplied by constituents, auditors, journalists, and civil society. Neither route should bypass independent factual testing.

In the United Kingdom, governments are expected to respond to select-committee reports within roughly two months; committees can seek new evidence and review implementation (UK Parliament, n.d.). The relevant institutional lesson is continuing scrutiny after publication, not necessarily the same deadline or procedure for Uzbekistan.

More follow-up can increase workload and risk interference with executive discretion. The protocol therefore separates evaluation from administration: representatives test reasons and outcomes, while ministries decide and implement lawful measures. Closure statistics must be considered alongside social significance and complexity so that difficult structural issues are not neglected.

CONCLUSION

Parliamentary scrutiny and executive accountability are distinct. Uzbekistan can link reliable evidence, actionable resolutions, and verified correction through a six-stage oversight protocol that preserves the executive's administrative responsibilities.

The study's contribution is an operational distinction among procedural output, executive response, and substantive closure. Pilot application by a committee could assess response quality and unresolved cases before wider adoption. Whether the protocol improves public accountability is an empirical question for future research, not an outcome assumed here.

REFERENCES

1. Inter-Parliamentary Union, & United Nations Development Programme. (2017). Global parliamentary report 2017: Parliamentary oversight—Parliament's power to hold government to account. https://www.ipu.org/file/3131/download

2. McCubbins, M. D., & Schwartz, T. (1984). Congressional oversight overlooked: Police patrols versus fire alarms. American Journal of Political Science, 28(1), 165–179. https://doi.org/10.2307/2110792

3. Organisation for Economic Co-operation and Development. (2026). OECD review of the Canadian Parliamentary Budget Office. OECD Papers on Budgeting, 2026/01. https://doi.org/10.1787/b26c361b-en

4. Republic of Uzbekistan. (2016). Law No. ZRU-403 of 11 April 2016 "On Parliamentary Oversight" (as amended). https://lex.uz/acts/2929475

5. Republic of Uzbekistan. (2023). Constitution of the Republic of Uzbekistan (adopted by referendum on 30 April 2023, as amended). https://lex.uz/acts/-6445145

6. Strøm, K. (2000). Delegation and accountability in parliamentary democracies. European Journal of Political Research, 37(3), 261–289. https://doi.org/10.1111/1475-6765.00513

7. UK Parliament. (n.d.). Government responses. MPs' guide to procedure. https://guidetoprocedure.parliament.uk/articles/Vhz9A6wY

"KUCH — G‘AYRATDADIR": ERNEST XEMINGUEYNING «CHOL VA DENGIZ» ASARIDA QARILIKNING YENGILMAS RUHI

Ilmiy Rahbar: Sobirova Nodirabegim

Murodjon qizi

Qo’qon Universiteti PhD katta o’qituvchisi

Abdurasulova Go’zalxon Xayrulla qizi

Qo’qon Universiteti Xorijiy til va adabiyoti (ingiliz tili) yo’nalishi

3-kurs talabasi

Annotatsiya: *Ushbu maqolada Ernest Xemingueyning «Chol va dengiz» qissasida qarilik zaiflik sifatida emas, balki insonning ichki kuchi va yengilmas irodasi namoyon bo‘ladigan davr sifatida tasvirlanishi tahlil qilinadi. Baliqchi Santyago obrazi misolida jismoniy ojizlik va ruhiy matonat o‘zaro qiyoslanadi, uning umid va g‘ayrati asarning asosiy g‘oyasi sifatida yoritiladi. Shuningdek, yozuvchining «Odamzodni yanchib tashlash mumkin, lekin uni yengib bo‘lmaydi» degan fikri o‘zbek xalq maqoli «Kuch — g‘ayratdadir» bilan uyg‘unlikda ko‘rib chiqiladi.*

Kalit so‘zlar: *Xemingue y, «Chol va dengiz», Santyago, qarilik, iroda, g‘ayrat, umid, aysberg nazariyasi, o‘zbek xalq maqollari.*

KIRISH

Maqsad: Ushbu ish Ernest Xemingueyning «Chol va dengiz» qissasida qarilik zaiflik sifatida emas, balki aynan shu yoshda insonning haqiqiy kuchi ko‘rinadigan holat sifatida tasvirlanganini ko‘rsatishni maqsad qilgan. Baliqchi Santyago obrazi orqali jismoniy ojizlik bilan ichki iroda yonma-yon qo‘yiladi va bu g‘oya o‘zbek xalq maqollaridagi hikmat bilan qanday uyg‘unlashishini ochib berishga harakat qilinadi.

Matnni diqqat bilan o‘rganish shuni ko‘rsatdiki, Santyagoning kurashi oddiy baliq ovlash haqidagi hikoya emas. Bu — insondan omad, kuch, yoshlik kabi hamma narsa olib qo‘yilgandan keyin unda nima qolishi haqidagi hikoya. Xemingue y ta’kidlashicha, qoladigan narsa — bu olg‘a intilish irodasidir. Asar

davomida kuzatiladigan asosiy g‘oya ham shu: inson tanasi singari sinishi mumkin, biroq ruhi — faqat oldinga qadam tashlashdan to‘xtamasa — hech qachon yengilmaydi.

Shu o‘rinda shuni ham ta’kidlash joizki, asar oddiy bir baliqchining hikoyasi bo‘lishiga qaramay, unda insoniyatning azaliy savollariga javob izlanadi: inson nima uchun yashaydi, nima uchun kurashadi, va natija ko‘rinmagan taqdirda ham nega harakatdan to‘xtamaydi? Mana shu savollarga Xeminguey o‘zining soddagina, biroq teran uslubi orqali javob beradi.

"ODAMNI YANCHIB TASHLASH MUMKIN, LEKIN UNI YENGIB BO‘LMAYDI"

«Odamzodni yanchib tashlash mumkin, lekin uni yengib bo‘lmaydi» — ushbu mashhur jumla ko‘pchilikka tanish. Ernest Xemingueyning «Chol va dengiz» asaridan olingan parcha asarning butun bir ma’no va g‘oyasini qamrab oladi. Odamni yanchib tashlash deganda jismi nazarda tutilgan. Uni bir lahzada yanchish, tilka-pora qilish mumkin, ammo ruhini, irodasini yengish oson emas, deyarli imkonsiz. Chunki inson zoti yengilishni qabul qilolmaydi. Harakatdan, yengish sari odimlashdan to‘xtamaydi? To‘xtolmaydi.

Yozuvchi «Chol va dengiz» asarini 51 yoshida, 2 oy davomida yozgan. Demak, u bu paytda qirchillama yoshlik davridan o‘tib, keksalik bilan yuzlashayotgan bo‘ladi. Ko‘ngil to‘la orzu-umidlar saragi sarakka, puchagi puchakka ajralayotgan palla adib bor mahoratini ishga solgan holda o‘ziga ikki oy davomida "dalda" yaratadi. Bu davr Xeminguey uchun ijodiy va shaxsiy jihatdan ham murakkab davr edi: u allaqachon ikkinchi jahon urushi dahshatlarini ko‘rgan, bir necha bor jismoniy jarohat olgan, va yoshlik quvvatining asta-sekin so‘nib borayotganini his qilgan bir inson edi. Aynan shunday ruhiy holatda u o‘ziga ham, o‘quvchiga ham kerak bo‘lgan bir "dalda" — ichki tayanch nuqtasini yaratishga kirishadi.

Asar voqea va qahramonlari judayam oddiy. Ammo shu bilan birga hayotning azaliy haqiqatlarini o‘zida jamlagan. Insonga o‘zgacha ruh, olg‘a borishga chorlovchi, imkon beruvchi durdona qissa. Xemingueyning o‘zi

"aysberg nazariyasi" deb nomlagan uslubda yozadi — ya’ni matnning aksariyat qismi "suv ostida", so‘zlar ortida yashiringan bo‘ladi. Shu bois asar sahifalari kam bo‘lsa-da, undagi ma’no va hissiy yuk juda katta.

SANTYAGO: "KUCH — G‘AYRATDADIR"

Sakson to‘rt kun davomida Santyago birorta ham baliq tuta olmaydi. Qishloqdagi boshqa baliqchilar uni "salao" — eng omadsizlarning omadsizi deb ataydilar, hatto uning yosh shogirdi Manolinning ota-onasi ham bolani undan uzoqlashtiradi. Shunga qaramay, chol taslim bo‘lmaydi. U yana arqonlarini tayyorlab, hech qachon bormagan darajada dengizning ichkarisiga — Golfstrim tomon suzib ketadi. Bu qaror uning butun xarakterini ochib beradi: unda umid — bu sodda optimizm emas, balki har kuni yangilanadigan, intizomli irodaviy harakatdir. Bu yerda o‘zbek xalq maqoli bejiz tilga olinmaydi: "kuch — g‘ayratdadir". Bu hikmat yoshlikni emas, balki matonat, sabr va tinimsiz g‘ayratni ulug‘laydi. Xuddi shu g‘oya Santyago xatti-harakatlarida jonlanadi: u 84 kun baliq tutolmagan, qo‘llari qavarib, kuchi tugab qolgan bo‘lsa-da, ichidagi g‘ayrat so‘nmaydi. Uch kunlik og‘ir kurashda marlin baliq bilan olishganda ham, arqon kaftlarini tilka-pora qilib, qo‘llari qarsillab qolgan bo‘lsa-da, u dengizga chiqishdan, kurashishdan bosh tortmaydi.

Xeminguey bu jismoniy qiynoqlarni juda aniq va batafsil tasvirlaydi: chol qo‘llaridan oqayotgan qonni dengiz suviga yuvib tashlaydi, mushaklari qattiq tortishib, go‘yo o‘z tanasi uning o‘ziga qarshi isyon ko‘tarayotgandek his qiladi. Ammo shu paytda ham u o‘z-o‘zini gapga solib, o‘zini davom ettirishga undaydi: "Davom et, chol. Hali ertalab emas." Mana shu ichki muloqot — o‘z-o‘zi bilan kurashish, o‘zini to‘xtatmaslik — aynan "kuch — g‘ayratdadir" maqolining jonli tasdig‘idir. Jismi ojiz bo‘lsa-da, g‘ayrati so‘nmagan, ichki kuchi bilan yashab o‘tgan odam obrazi shu tariqa yaratiladi.

Baliqni tutganidan keyin ham sinov tugamaydi: akulalar uning o‘ljasini qaytish yo‘lida bo‘lak-bo‘lak yeb qo‘yadi. Garpunini, pichoqqa bog‘langan eshkagini, hatto taxta bo‘lagini ishga solib, chol oxirigacha kurashdan to‘xtamaydi, garchi natijada faqat skelet qolsa-da. Ertasi kuni qishloq ahli bu

ulkan skeletni koʻrib, qari odamning yolgʻiz holda nima qila olganini tushunib yetadi. Demak, gʻalaba — baliqni butun holda olib kelishda emas, balki arqonni oxirigacha qoʻyib yubormaslikda edi.

QARIGANDA HAM YOʻQOTILMAGAN UMID

Santyagoning yoshi ulgʻaygan, qoʻllari qavarib, yuzi quyoshdan ajin bosgan boʻlsa-da, uning umidi yoshlardan kam emas, aksincha — yillar davomida pishib, mustahkamlangan. U har safar dengizga chiqqanda, oldingi omadsizlikni unutib, "bugun albatta ushlayman" degan ishonch bilan yoʻlga tushadi. Bu — yoshlikka xos beparvo umid emas, balki keksalikning tajribasidan sugʻorilgan, sinovlardan oʻtgan haqiqiy umiddir.

Xemingueyning tasviriga koʻra, chol tunlari yoshligida koʻrgan sherlar haqida tush koʻradi — bu tush unga kuch-gʻayrat, yoshlik nafasini, hayotga boʻlgan ishtiyoqni eslatib turadi. Diqqatga sazovor joyi shundaki, bu tush asar davomida bir necha bor takrorlanadi — goʻyo Xeminguey oʻquvchiga Santyagoning qalbida hamon oʻchmagan yoshlik olovi borligini eslatib turgandek. Qarilik uning tanasini charchatgan boʻlsa-da, qalbidagi bolalarcha sof umidni oʻchira olmagan. Aynan shu — yoshi oʻtsa-da, umidini yoʻqotmagan inson obrazi — asarning eng teran insoniy gʻoyalaridan biridir: umid yoshga bogʻliq emas, balki odamning ichki tanlovidir.

Bu oʻrinda shuni ham alohida ta’kidlash kerakki, Xemingueyning oʻzi ham bu asarni yozayotganda xuddi oʻz qahramoni kabi — yoshlikdan keksalikka endigina qadam qoʻyayotgan davrida edi. U "Chol va dengiz"ni 51 yoshida yozgan, ya’ni uning oʻzida ham yuziga ajinlar tusha boshlagan, qoʻllari avvalgidek baquvvat emas, balki asta-sekin nozik tortayotgan bir davr edi. Ammo shunga qaramay, yozuvchi bu asar ustida juda koʻp va qunt bilan ishlagan — goʻyo oʻz qahramoni Santyago singari, jismoniy charchoq va yillarning ogʻirligiga qaramay, gʻayratini yoʻqotmagan. Shu ma’noda, Xemingueyning oʻzi ham asarida yaratgan gʻoyaning — qarilikda ham ruhan sinmaslik, umidni yoʻqotmaslik — jonli bir namunasiga aylangan edi. Uning qalamidan chiqqan

har bir jumla, aslida, o‘zining ham shu sinovdan muvaffaqiyatlıı o’tayotganini yaxshigina tasvirlab beradi.

XULOSA

Santyagoning 84 kunlik omadsizligi, qon bilan qoplangan qo‘llari, marlin bilan kurashi, akulalarga qarshi oxirigacha turishi va qarigan bo‘lsa-da yo‘qotmagan umidi — bularning barchasi bitta haqiqatga olib keladi: insonning qadr-qimmati u uyga nima olib kelishi bilan emas, balki oxirigacha kurashdan to‘xtamagani bilan o‘lchanadi. Xemingueyning o‘z so‘zlari — "odamzodni yanchib tashlash mumkin, lekin uni yengib bo‘lmaydi" — va o‘zbek xalq maqoli "kuch — g‘ayratdadir" ikki tilda, ikki madaniyatda bir xil haqiqatni aytadi.

Va nihoyat, Xemingueyning o‘zi ham aynan shu asarni yozgan paytda o‘z keksaligi bilan yuzma-yuz kelgan, yuziga ajin tusha boshlagan, qo‘llari nozik tortgan bir davrda bo‘lgan — biroq u ham o‘z qahramoni kabi, bu asar ustida to‘xtovsiz, g‘ayrat bilan ishlagan. Shu tariqa, yozuvchining o‘zi ham o‘z asarida yaratgan g‘oyaning tirik isbotiga aylangan. Qarilik — bu yerda tugash emas, balki hech qachon to‘xtamagan ruhning dalilidir.

FOYDALANILGAN ADABIYOTLAR:

1. Ernest hemingway, the oldman and the sea
2. Patrick hemingway , the oldman and the sea
3. Jamiyat jurnali, gulasal qodirova
4. O’zbek xalq maqollari

DIGITAL DIPLOMACY: HOW SOCIAL MEDIA IS CHANGING INTERNATIONAL RELATIONS

Istora Omadova Avazbek kizi

Uzbekistan State University of World languages

Faculty of International Journalism

Departament/Program: Political Science

Tashkent, Uzbekistan

E-mail: omadovaistora3006@gmail.com

Suyunova Zarnigor Shovkidin kizi

Uzbekistan State World Languages University

Political science department, Senior teacher

Annotation: *Digital communication has transformed diplomacy by enabling governments to share information, engage international audiences, shape national images, and monitor public responses. This article presents a framework linking digital diplomacy on social media with public diplomacy, institutional coordination, strategic communication, and audience engagement. Using conceptual, comparative, systems-based, structural-functional, and casestudy methods, it examines online diplomatic practices, with particular attention to Uzbekistan. The analysis suggests that social media make diplomacy faster and more interactive but also create risks related to misinformation, inconsistent messaging, and reputational damage. The article concludes that online visibility produces influence only when supported by credible information, coherent strategies, institutional cooperation, and meaningful public engagement.*

Keywords: *digital diplomacy, public diplomacy, social media, foreign policy, soft power, Uzbekistan.*

1. INTRODUCTION

For a long time, diplomacy was primarily associated with interstate negotiations, official visits, diplomatic correspondence and the activities of embassies. Foreign policy information was mainly disseminated through press services and traditional mass media. The development of digital technologies

has changed not only communication channels but also the structure of interaction among states, diplomatic institutions and society.

Modern states continue to use traditional diplomatic instruments but they increasingly communicate directly with domestic and foreign audiences through social media. A publication by a foreign ministry a statement by a hade of state or a message from a diplomatic mission can reach an international audience within several hours. At the same time, comments reposts and public discussions become part of the international context in which foreign policy decisions are perceived

These developments have contributed to the emergence of the concept of digital diplomacy. In a broad sense, it refers to the use of the internet, social media and other digital tools to pursue foreign policy objectives. However, digital diplomacy is not limited to maintaining official accounts. It also involves adapting diplomatic activity to the digital environment including changes in communication methods, information analysis and public engagement (DiploFoundation2025)

The relevance of this study stems from the fact that a state's international image is shaped not only by official documents and public speeches delivered by political leaders. Visual materials, video content, user comments, and the speed of governmental responses can also significantly influence how a state is perceived. In the digital environment, states compete not only for political influence but also for attention, trust, and control over the interpretation of international events.

Research Methodology

This study uses conceptual and comparative analysis, content analysis, and case studies to examine the central thesis that social media expand diplomatic capacity but do not independently guarantee diplomatic influence. Conceptual analysis clarifies the relationship between digital diplomacy, public diplomacy and soft power. Comparative analysis identifies how digital tools differ from traditional diplomatic channels in terms of speed, audiences and how

governments use online platforms to communicate with foreign audiences and how the credibility and design of those messages affect their potential impact.

The research draws on academic publications, official statements and public available materials concerning digital diplomatic initiatives. Examples from the United States, China, the European Union and Uzbekistan are used to examine communication strategies, audience engagement, international image-building and digital risks. These cases are selected because they demonstrate different approaches to digital communication and allow the article to connect general concepts with concreate diplomatic practices.

- The purpose of this article is to identify the main ways in which social media influence contemporary diplomacy and international relations.
- To achieve this purpose, the study addresses the following objectives:
- To clarify the concept of the **Digital diplomacy;**
- To determine the role of social media in diplomatic activity;
- To analyze the relationship between digital diplomacy, public diplomacy and the concept of **Soft power**
- To identify the main opportunities and risks of digital communication;
- To examine the development of digital diplomacy in Uzbekistan;

1. The Concept Characteristics of Digital Diplomacy

Digital diplomacy refers to the use of digital technologies by governments, diplomats and diplomatic institutions to pursue foreign policy objectives and communicate with international audiences. It extends traditional diplomatic activity by introducing new channels for sharing information, maintaining contact and responding to public reactions.

This definition supports the articles central thesis because it presents digital diplomacy as an expansion of diplomatic capacity rather than as a complete replacement for established diplomatic practice.

However, digital diplomacy should not be confused with cyber-diplomacy. The former primarily concerns the use of digital tools to conduct diplomatic communication, whereas cyber-diplomacy focuses more directly on

international issues related to cyberspace, cybersecurity and Internet governance. This distinction is crucial because the present article focuses on social media as instruments of diplomatic communication and public engagement, not on the negotiation of cyber-related international rules.

Table 1.

Comparative Analysis of Traditional and Digital Diplomacy

Aspect	Traditional Diplomacy	Digital Diplomacy
Communication channels	Meetings, embassies, official correspondence	Social media, websites, digital platforms
Public engagement	Mainly formal and indirect	More direct and interactive
Speed	Often depends on official procedures	Rapid dissemination and response
Soft power	Cultural exchange and official programs	Digital storytelling and online campaigns
Public feedback	Diplomatic reports and formal consultations	Comments, discussions, and online reactions
Main risks	Miscommunication and diplomatic tensions	Disinformation, cyberattacks, and reputational damage
Agenda-setting	Negotiations and traditional media	Online campaigns and rapidly emerging discussions

Source: Compiled by the author based on the conceptual analysis of traditional and digital diplomacy.

As Table 1 illustrates, digital diplomacy expands the speed, reach, and interactivity of diplomatic communication. At the same time, it introduces new

risks and does not eliminate the functions of embassies, negotiations, or formal correspondence. The comparison therefore supports the central thesis: social media strengthen diplomacy when they complement, rather than substitute for, traditional diplomatic channels.

2. Social Media as an Instrument of Contemporary Diplomacy

Social media allow governments and diplomatic missions to publish official statements, explain policy decisions, provide consular information crises. They also give diplomatic institutions greater control over the initial presentation of their messages. This direct access supports the article's argument that social media expand diplomatic capacity by reducing dependence on traditional media intermediaries.

A useful example is the comparative study by Greco(2025) which examined more than 2,000 Facebook posts and 92,000 comments associated with US and EU digital diplomacy in India between 2021 and 2024. The study found the the US approach was more audience-oriented, while EU communication tended to be more formal. This difference demonstrates that digital diplomacy is not effective simply because a government is present online.

Communication style and adaptation to local audiences influence whether messages generate attention and engagement.

China provides another example. Huang and Wang(2021) examined the Chinese Ministry of Foreign Affairs' communication and Weibo and Twitter during the US-China trade war. Their research showed how digital messaging can be shaped by domestic political priorities and broader international communication strategies. The case demonstrates that social media can serve both external diplomatic purpose and internal political objectives, making the relationship between audience, platform and message especially important.

These cases demonstrate that social media are not simply platforms for publishing news. They are also spaces in which governments present political narratives, respond to criticism and compete for international attention. Nevertheless, the ability to publish a massage does not guarantee that audiences

will accept its interpretation. The evidence therefore reinforces the central thesis: digital platforms increase the opportunity for diplomatic influence but it depends on communication that is appropriate, credible and responsive to its audience.

3. Digital diplomacy and Soft Power

Soft power, a concept developed by Joseph Nye, refers to the ability to influence others through attraction rather than coercion or payment(Nye, 2004). Culture, political values, education and international reputation can all contribute to a country's attractiveness. This concept is directly connected to the article's central argument because social media can make sources of attraction more visible, but visibility alone cannot create genuine soft power.

Digital platforms offer governments additional ways to present cultural resources, educational ways to present cultural resources, educational opportunities, tourism campaigns and stories about national achievements. Such content can introduce foreign audiences to a country beyond its official political statements and can make diplomatic communication more personal and accessible.

However, online visibility does not necessarily produce soft power. A country's public image also depends on whether its communication is credible and consistent with its actual policies. If official messages contradict the experiences of foreign audiences, attempts to promote a positive image may have limited results. Thus, social media can simplify attraction, but they cannot compensate foe a lack of trust or a significant gap between communication and policy.

Research by Luwei Rose Luqiu Fan Yang (2020) on foreign embassies using China's Weibo platform found that more frequent posting was associated with a large following. Their study illustrates how diplomatic institutions can adapt their communication to the specific media environment of a foreign country. At the same time, a larger following should not automatically be interpreted as greater diplomatic influence. Audience size is an important

resources but meaningful influence also requires engagement, credibility and sustained interest.

Therefore, successful digital public diplomacy requires more than attractive content. It involves understanding local audiences, maintaining a consistent presence and developing communication that encourages meaningful engagement. This section supports the central thesis by showing that social media contribute to soft power only when digital visibility is converted into trust and attraction.

4. Opportunities and Challenges of Digital Diplomacy.

One major advantage of digital diplomacy is the ability to communicate quickly during international crises. Official channels can provide updates, correct inaccurate information and explain government positions before speculation spreads further. Digital tools can also support consular services by making practical information more accessible to citizens abroad. These functions demonstrate how social media expand the practical capacity of diplomatic institutions.

Another opportunity is the use of online feedback to understand public concerns. Comments and discussion trends can help diplomatic institutions identify questions this require clarification. This interactive dimension distinguishes digital diplomacy from many traditional forms of official communication. However, social media reactions do not represent the views of an entire population and should be considered alongside other evidence.

At the same time, digital diplomacy creates serious risks. Disinformation can spread rapidly, while misleading or emotionally charged content may intensify political tensions. Online messages can also be removed from their original context, leading to interpretations that differ from the intended meaning. These risks challenge the assumption that faster communication is always more effective.

The Chinese case examined by Huang and Wang(2021) also illustrates a broader challenge: digital platforms can be used to promote official narratives

without necessarily encouraging genuine exchange between governments and audiences. This distinction matters because public engagement is not the same as simply increasing the visibility of a political message. A message may receive attention without producing understanding or trust.

Consequently, diplomatic institutions need clear communication procedures, reliable verification practices and the ability to respond carefully to unexpected developments. Speed is valuable, but accuracy and context remain essential. This section therefore qualifies the article's central thesis: social media strengthen diplomacy only when their advantages are managed alongside the risks of misinformation, manipulation and reputational damage.

5. Digital diplomacy in Uzbekistan.

Digital diplomacy is relevant to Uzbekistan's efforts to strengthen international cooperation and communicate its national priorities to foreign audiences. In addition to formal negotiations and diplomatic visits, digital communication can help present the country's cultural heritage, economic opportunities and international partnerships. Uzbekistan therefore provides a useful case for examining how the general argument applies to a country seeking to strengthen its international image through communication.

A concrete example was the panel discussion "Digital Diplomacy and Soft Power: Positioning the Country in the Global Conversation" held during the Tashkent International Investment Forum on 18 June 2026. Participants discussed the role of digital communication, social media and storytelling in strengthening Uzbekistan's international image and attracting foreign investment (Government of the Republic of Uzbekistan, 2026)

The discussion directly reflects the central thesis by linking digital communication with both reputational goals and practical foreign policy objectives.

This example shows how digital diplomacy can connect foreign policy communication with economic objectives. Information about investment opportunities, national development and international cooperation can be

presented to audiences that include businesses, investors and international media. Social media can make these messages more accessible and allow Uzbekistan to communicate with potential partners without relying exclusively on traditional diplomatic events.

Uzbekistan can also benefit from multilingual communication and content adapted to different audiences. A message intended for potential investors may require a different approach from content designed for students, tourists or international cultural organization.

Audience adaptation is therefore essential if digital communication is to produce more than general visibility.

However, promoting a positive image requires more than publishing information about national achievements. Credibility, consistent communication and the ability to respond to questions are equally crucial. Uzbekistan's experience therefore illustrates both sides of the central thesis:

digital diplomacy can expand the country's international reach and support economic cooperation, but its long-term effectiveness depends on trust, relevance and institutional capacity.

6. The Future of Digital Diplomacy

The future of digital diplomacy will be influenced by artificial intelligence, data analysis and the continued development of online communication platforms. These technologies may help diplomatic institutions identify emerging issues, analyze audience responses and prepare information for different groups. In this sense, technological development may further expand the speed and precision that already distinguish digital diplomacy.

Nevertheless, technological development also raises concerns about privacy, automated misinformation and the reliability of AI-generated content. Diplomatic institutions will need to verify information carefully and ensure that technological tools support rather than replace professional judgment. These concerns reinforce the article's central thesis because they show that technology

can increase diplomatic capacity only when it is governed by credibility, responsibility and human oversight.

Digital communication is also unlikely to replace face-to-face diplomacy.

Negotiations require trust, compromise, and a detailed understanding of the interests of other parties. Online platforms can prepare the ground for dialogue and help communicate its results, but they cannot fully reproduce the complexity of diplomatic negotiations.

The most effective approach will therefore combine digital tools with established diplomatic practices, professional expertise, and responsible communication. The future of diplomacy is not a choice between digital and traditional methods. It is a hybrid model in which social media extend diplomatic reach while formal institutions and personal negotiations provide depth, accountability and trust.

CONCLUSION

This article has argued that social media strengthen contemporary diplomacy by expanding its speed, reach and interactivity, but that digital communication produces lasting diplomatic influence only when it is credible, audience-sensitive and connected to broader foreign policy objectives.

The conceptual analysis showed that digital diplomacy extends rather than replaces traditional diplomacy. The comparative examples of the United States, the European Union and China demonstrated that communication style, political context and audience adaptation shape the effectiveness of online diplomatic messages. The discussion of soft power showed that social media can increase the visibility of cultural and political resources but that visibility becomes influence only when it is supported by trust and consistency. The analysis of opportunities and risks further demonstrated that rapid communication must be balanced with accuracy, context and protection against misinformation.

Uzbekistan’s experience, including the discussion at the 2026 Tashkent International Investment Forum, illustrates how digital communication can support international positioning and economic cooperation. At the same time,

it confirms that online visibility alone is insufficient. For digital diplomacy to produce lasting results, it must be accompanied by credible information, consistent messaging, meaningful engagement, and effective institutional communication.

Ultimately, digital diplomacy should be understood as a complement to traditional diplomatic practice. Its value lies in expanding opportunities for communication while preserving the accuracy, responsibility and trust on which effective international relations depend.

REFERENCES

Adesina, O. S. (2017). Foreign policy in an era of digital diplomacy. *Cogent Social Sciences,*

3(1), Article 1297175.

Barrinha, A., & Renard, T. (2017). Cyber-diplomacy: The making of an international society in the digital age. *Global Affairs* .Cyber-diplomacy: the making of an international society in the digital age

Greco, S. (2025). A comparative analysis of United States and European Union digital diplomacy in India. *Global Policy, 16*(5), 907–920. A Comparative Analysis of United States and European Union Digital Diplomacy in India | Global Policy Journal

Government of the Republic of Uzbekistan. (2026, June 18). *Digital diplomacy and soft power:*

Positioning the country in the global conversation. Digital Diplomacy and Soft Power: Positioning the Country in the Global Conversation

Huang, Z. A., & Wang, R. (2021). Exploring China's digitalization of public diplomacy on

Weibo and Twitter: A case study of the U.S.–China trade war. *International Journal of Communication, 15*

Luqiu, L. R. W., & Yang, F. (2020). Weibo diplomacy: Foreign embassies communicating on Chinese social media. *Government Information Quarterly, 37*(3), Article 101477. Sci-Hub.

Weibo diplomacy: Foreign embassies communicating on Chinese social media / Government Information Quarterly, 2020

Nye, J. S. (2004). *Soft power: The means to success in world politics*. PublicAffairs.

Soft Power: The Means to Success in World Politics | Harvard Kennedy School

LEGAL FRAMEWORK FOR PERSONAL DATA PROTECTION IN THE DIGITAL SPACE

Utaganova Malika Nasriddinovna

Uzbekistan State University of World Languages

Political science department 2-year student

elegantka007@gmail.com

Abstract: *This article presents a comprehensive legal and comparative analysis of personal data protection frameworks in the digital age, contrasting national legislation with global standards such as the European Union's General Data Protection Regulation (GDPR). The study examines critical systemic vulnerabilities emerging from digital platform expansion, cross-border data flows and artificial intelligence integration. By evaluating key legal instruments, enforcement challenges and liability structures, this research offers concrete normative and policy recommendations to modernize personal data governance, strengthen corporate accountability, implement the "right to be forgotten" and foster national digital literacy.*

Key words: *digital space, personal data, legal protection, cybersecurity, GDPR, information law, privacy rights, legislation of Uzbekistan.*

INTRODUCTION

The rapid development of the digital economy has made personal data an important part of modern life. Today, governments, businesses, banks and educational institutions use digital systems to store and process large amounts of information. Although these technologies make many services faster and more convenient, they also create risks such as data leaks, identity theft and the unauthorized use of personal information.

Personal data protection has therefore become an important legal issue worldwide. Governments need to protect people's privacy while also supporting technological development and ensuring national cybersecurity.

In Uzbekistan, the development of digital services under the "Digital Uzbekistan 2030" strategy has increased the importance of personal data

protection. However, the growing use of artificial intelligence, cloud technologies, and biometric systems creates new challenges for existing legislation.

This paper examines the legal framework for personal data protection in Uzbekistan and compares it with the European Union's General Data Protection Regulation (GDPR). It also identifies some weaknesses in the current legal system and suggests possible ways to improve data protection.

METHODS AND RESULTS

This study employs a qualitative, multidimensional legal research methodology to examine the legal framework governing personal data protection in the Republic of Uzbekistan and to evaluate its alignment with international standards. The research is based on an analysis of national legislation, international regulatory instruments and academic literature addressing privacy, personal data protection and cybersecurity.

The research applies several complementary analytical methods to ensure a comprehensive assessment of the existing legal framework. First, the comparative legal method is used to examine similarities and differences between Uzbekistan’s personal data protection legislation and the European Union’s GDPR. The comparison focuses on the legal grounds for processing personal data, consent requirements, data subjects’ rights, data erasure, personal data breach notification, institutional responsibilities and enforcement mechanisms. This approach helps identify areas of convergence and potential regulatory gaps between the national legal framework and international standards.



Figure 1. Research methodology and analytical framework.

Second, the formal-doctrinal legal method is employed to interpret the relevant provisions of national legislation and assess their role in establishing legal guarantees for privacy and personal data protection. Particular attention is given to constitutional principles, the provisions of Law No. ZRU-547 and the legal obligations imposed on organizations that collect and process personal data. This method provides the legal foundation for evaluating the scope and adequacy of existing statutory protections. Third, the systemic-structural method is applied to examine the relationships between constitutional guarantees, personal data protection legislation, regulatory institutions and enforcement mechanisms. It enables the study to consider personal data protection not as an isolated legal issue but as part of a broader system of digital governance. Through this approach, the research assesses how different legal provisions interact and identifies areas in which institutional coordination or procedural regulation may require further development. Finally, qualitative document analysis and synthesis are used to examine relevant legislative documents, academic publications and cybersecurity reports. The selected materials are analyzed to identify recurring legal and institutional challenges, particularly

those associated with data security, regulatory compliance and the protection of individuals' rights in the digital environment. The findings from the different analytical methods are then synthesized to evaluate the strengths and limitations of Uzbekistan's existing framework and to formulate recommendations for its further development. The study uses a qualitative research design and does not involve original surveys, interviews, or statistical experiments. Its findings are derived from the interpretation and comparison of the selected legal and documentary sources. The comparative assessment is intended to identify potential areas for improvement rather than to assume that the regulatory approaches of Uzbekistan and the European Union are directly interchangeable.

DISCUSSION

The analysis shows that Uzbekistan has established a legal framework for personal data protection. However, the rapid development of digital technologies has created several challenges that require further attention. These challenges are related to artificial intelligence, international data transfers, penalties for legal violations and public awareness of online privacy.

One of the main challenges is the growing use of artificial intelligence and automated decision-making systems. Today, banks, companies and other organizations use digital tools to process information and make decisions. For example, banks may use automated systems to evaluate loan applications, while employers may use algorithms to select suitable candidates for jobs. Although these technologies can save time, they may also produce unfair results if the data used by these systems is incomplete or biased. Another problem is that people may not always understand how automated decisions are made. If a person is rejected for a loan or a job because of an algorithm, it may be difficult to find out the exact reason. Therefore, Uzbekistan should consider introducing clearer legal rules on automated decision-making and profiling. Individuals should have the opportunity to question important decisions and request a review by a human decision-maker. These measures would help protect citizens' rights while allowing businesses to continue using new technologies.

The international transfer of personal data is another important issue. Many companies use cloud services to store and process information. Providers such as Amazon Web Services, Google Cloud, and Microsoft Azure operate data centres in different countries. This allows businesses to manage large amounts of information and provide digital services more efficiently. However, national data localization requirements can create difficulties for companies that depend on international cloud systems. Uzbekistan needs to protect the personal information of its citizens, but it should also consider the practical needs of international businesses and digital services. If the rules are too difficult to follow, some companies may face additional costs when operating in the country. One possible solution is to develop clearer rules for transferring personal data abroad. Uzbekistan could consider international standards, security assessments and agreements with countries that provide an appropriate level of data protection. Such measures could help protect personal information while supporting international cooperation and the growth of the digital economy.

The enforcement of personal data protection laws is also an important issue. Legal requirements alone may not be sufficient if organizations do not face meaningful consequences for violating them. For large companies that process information belonging to millions of users, a relatively small fine may not be enough to encourage better data protection practices. The European Union's General Data Protection Regulation (GDPR) provides an example of a stricter approach. Under the GDPR, certain serious violations can result in fines based on a company's annual global turnover. This approach can make data protection a more important part of business planning and management. Uzbekistan could consider reviewing its penalty system to ensure that sanctions reflect the seriousness of a violation, the number of people affected and the size of the organization responsible. Companies should also take preventive measures to reduce the risk of data leaks. For example, they should introduce appropriate security systems, train their employees and consider privacy protection when developing new products and services. This would encourage

organizations to treat personal data protection as a responsibility rather than simply a legal requirement.

Public awareness is another important factor in protecting personal data. Even when legal protections exist, people may put their information at risk because they do not fully understand how digital services collect and use it. For example, users often accept the terms of mobile applications without reading them carefully. Some applications may request access to contacts, location information, photos and other personal details that are not always necessary for their main functions. This situation shows that personal data protection depends not only on legislation but also on individual behaviour. Citizens need to understand what information they share online, how it may be used and what risks may arise from giving unnecessary permissions to applications. To address this issue, Uzbekistan could introduce public awareness campaigns and educational activities in schools and universities. These programmes could explain how to create strong passwords, recognize suspicious links, manage application permissions and protect personal information on social media. Government institutions and digital service providers should also present privacy policies in clear and understandable language. Better digital literacy would help citizens make more informed decisions and reduce some common privacy risks.

CONCLUSION

In conclusion, personal data protection has become an important issue in Uzbekistan due to the rapid development of digital technologies. Although the country has introduced laws to regulate the collection and use of personal information, new technologies continue to create challenges for the existing legal system. Artificial intelligence, international data transfers and the increasing use of online services require further attention from lawmakers and relevant institutions. The analysis shows that Uzbekistan could improve its personal data protection system in several ways. First, the national legislation should provide clearer rules on automated decision-making and give individuals better

opportunities to challenge decisions that affect their rights. Second, the rules for transferring personal data to other countries should be developed further to support international cooperation while protecting citizens' privacy. Third, penalties for serious violations should be effective enough to encourage companies to follow data protection requirements. Another important step is to increase public awareness of digital privacy. Citizens should understand how their personal information is collected, stored and used by digital platforms. Educational programmes and public awareness campaigns could help people protect themselves from data misuse and online risks. At the same time, government institutions should strengthen their ability to monitor compliance with data protection laws. The experience of the European Union, particularly the General Data Protection Regulation (GDPR), can provide useful guidance for improving Uzbekistan's legal framework. However, these practices should be adapted to the country's national conditions and legal system. Overall, effective personal data protection requires not only appropriate legislation but also proper enforcement, responsible businesses and informed citizens. These improvements would help Uzbekistan build a safer digital environment while continuing its digital transformation.

REFERENCES

9. European Parliament and Council of the European Union. (2016). Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (General Data Protection Regulation). *Official Journal of the European Union, L 119*, 1–88. https://eur-lex.europa.eu/eli/reg/2016/679/oj

10. Republic of Uzbekistan. (2019). *Law No. ZRU-547 of 2 July 2019 on Personal Data*. LexUZ. https://lex.uz/docs/4396419

11. Republic of Uzbekistan. (2023). *Constitution of the Republic of Uzbekistan*. LexUZ. https://lex.uz/ru/docs/6451070

12. World Economic Forum. (2023). *Global Cybersecurity Outlook 2023*. https://www.weforum.org/publications/global-cybersecurity-outlook-2023/

13. Voigt, P., & von dem Bussche, A. (2017). *The EU General Data Protection Regulation (GDPR): A Practical Guide*. Springer International Publishing. https://link.springer.com/book/10.1007/978-3-319-57959-7

14. European Commission. (n.d.). *Respect individuals' rights*. European Commission. https://commission.europa.eu/law/law-topic/data-protection/information-individuals_en

15. World Economic Forum. (2023). *Global Cybersecurity Outlook 2023*. World Economic Forum. https://www.weforum.org/publications/global-cybersecurity-outlook-2023/

16. Republic of Uzbekistan. (2019). *Law No. ZRU-547 of 2 July 2019 on Personal Data*, as amended. National Database of Legislation of the Republic of Uzbekistan (LexUZ). https://lex.uz/docs/4396428

FONETIKA BO‘LIMI VA UNING TILSHUNOSLIKDAGI AHAMIYATI

Badikova Oysuluv Gapirovna

University of Economics and Pedagogy

Boshlang‘ich ta’lim kafedrasi dotsent v.b.

Email: badiqovaoysuluv1983@gmail.com

Annotatsiya. *Ushbu maqolada tilshunoslikning muhim bo‘limlaridan biri bo‘lgan fonetikaning predmeti, vazifalari va asosiy tushunchalari yoritilgan. Unda nutq tovushlarining hosil bo‘lishi, akustik va artikulyatsion xususiyatlari, unli va undosh tovushlarning tasnifi, bo‘g‘in, urg‘u hamda intonatsiyaning o‘ziga xos jihatlari tahlil qilingan. Shuningdek, fonetikaning adabiy talaffuz me’yorlarini shakllantirish, nutq madaniyatini rivojlantirish va xorijiy tillarni o‘rganishdagi ahamiyati ko‘rsatib berilgan.*

Kalit so‘zlar: *fonetika, nutq tovushi, unli tovush, undosh tovush, bo‘g‘in, urg‘u, intonatsiya, talaffuz, fonetik tizim, nutq madaniyati.*

Аннотация. *В статье рассматриваются предмет, задачи и основные понятия фонетики как одного из важных разделов языкознания. Анализируются особенности образования речевых звуков, их акустические и артикуляционные характеристики, классификация гласных и согласных звуков, а также особенности слога, ударения и интонации. Особое внимание уделяется значению фонетики в формировании норм литературного произношения, развитии речевой культуры и изучении иностранных языков.*

Ключевые слова: *фонетика, речевой звук, гласный звук, согласный звук, слог, ударение, интонация, произношение, фонетическая система, речевая культура.*

Abstract.*This article examines the subject, objectives, and basic concepts of phonetics as one of the important branches of linguistics. It analyzes the formation of speech sounds, their acoustic and articulatory characteristics, the classification of vowels and consonants, as well as the specific features of syllables, stress, and intonation. The article also highlights the importance of phonetics in establishing standard pronunciation, developing speech culture, and learning foreign languages.*

Keywords: *phonetics, speech sound, vowel, consonant, syllable, stress, intonation, pronunciation, phonetic system, speech culture.*

Til insonlar o‘rtasidagi aloqa va fikr almashishning eng muhim vositalaridan biridir. Inson o‘z fikr va his-tuyg‘ularini til orqali ifodalaydi. Tilning og‘zaki shakli esa, avvalo, nutq tovushlari orqali namoyon bo‘ladi. Shu sababli nutqning tovush tomonini o‘rganish tilshunoslikning muhim yo‘nalishlaridan biri hisoblanadi.

Tilshunoslikda tilning tovush tizimi, nutq tovushlarining hosil bo‘lishi, talaffuzi va turli fonetik jarayonlarni o‘rganuvchi bo‘lim fonetika deb ataladi. “Fonetika” atamasi yunoncha phōnē so‘zidan kelib chiqqan bo‘lib, “tovush”, “ovoz” ma’nolarini anglatadi.

Fonetika tilning tovush tizimini o‘rganish bilan bir qatorda, to‘g‘ri talaffuz, nutq madaniyati va adabiy til me’yorlarini shakllantirishda ham muhim ahamiyatga ega.

Fonetikaning asosiy tadqiqot obyekti inson nutqining tovush tomonidir. U nutq tovushlarining qanday hosil bo‘lishi, talaffuz qilinishi, eshitilishi va nutq jarayonida qanday vazifa bajarishini o‘rganadi.

Fonetikaning asosiy vazifalari quyidagilardan iborat: nutq tovushlarining hosil bo‘lish mexanizmini o‘rganish; unli va undosh tovushlarni tasniflash; tovushlarning akustik va artikulyatsion xususiyatlarini aniqlash; bo‘g‘in va urg‘uning xususiyatlarini o‘rganish; intonatsiyaning nutqdagi rolini aniqlash; adabiy talaffuz me’yorlarini tadqiq etish; turli fonetik hodisalarni tahlil qilish.

Fonetika tadqiqot doirasiga ko‘ra umumiy va xususiy fonetikaga ajratiladi. Umumiy fonetika inson tillaridagi tovushlarning umumiy xususiyatlari va qonuniyatlarini o‘rgansa, xususiy fonetika muayyan bir tilning fonetik tizimini tadqiq etadi. Masalan, o‘zbek tilidagi tovushlar tizimi va ularning o‘ziga xos xususiyatlari o‘zbek tili fonetikasi doirasida o‘rganiladi.

Nutq tovushlari insonning nutq a’zolari yordamida hosil qilinadi. Ularning yuzaga kelishida o‘pka, kekirdak, ovoz paychalari, halqum, og‘iz va burun bo‘shlig‘i, til, lab, tish kabi nutq a’zolari ishtirok etadi.

Nutq tovushlari hosil bo‘lish usuli va xususiyatlariga ko‘ra, asosan, unli va undosh tovushlarga ajratiladi.

Nutq tovushlarini o‘rganishda ikki muhim jihatga e’tibor qaratiladi: artikulyatsion va akustik xususiyatlar. Artikulyatsion jihat tovushning nutq a’zolari yordamida qanday hosil qilinishini bildirsa, akustik jihat tovushning eshitilish xususiyatlarini o‘rganadi.

Unli tovushlarning asosiy belgisi ularni talaffuz qilish jarayonida havo oqimining sezilarli to‘siqqa uchramasligidir. Unlilar bo‘g‘in hosil qilishda muhim rol o‘ynaydi.

O‘zbek tilida unli tovushlar tilning holati, lablarning ishtiroki va boshqa fonetik xususiyatlariga ko‘ra tavsiflanadi. Masalan, ona, ota, kitob kabi so‘zlarda unlilar bo‘g‘inlarning shakllanishida asosiy vosita hisoblanadi.

Unli tovushlarning aniq va to‘g‘ri talaffuz qilinishi so‘zlarning mazmunini to‘g‘ri yetkazish hamda nutqning ravonligini ta’minlash uchun muhimdir.

Undosh tovushlarni hosil qilish jarayonida o‘pkadan chiqayotgan havo oqimi nutq a’zolarining turli qismlarida to‘siqqa uchraydi. Undoshlar hosil bo‘lish o‘rni, usuli va ovoz-shovqin ishtirokiga ko‘ra tasniflanadi.

O‘zbek tilida undoshlarning jarangli va jarangsiz turlari mavjud. Masalan, b, d, g, z kabi tovushlar jarangli undoshlarga, p, t, k, s kabi tovushlar esa jarangsiz undoshlarga misol bo‘la oladi.

Undosh tovushlarning to‘g‘ri talaffuz qilinishi og‘zaki nutqning aniqligi va tushunarliligini ta’minlashda muhim ahamiyatga ega.

Nutq jarayonida tovushlar birikib, bo‘g‘inlarni hosil qiladi. Bo‘g‘in nutqning fonetik jihatdan muhim birliklaridan biri bo‘lib, uning markazida odatda unli tovush turadi.

Masalan, ki-tob, mak-tab, o-na kabi so‘zlar ikki bo‘g‘indan tashkil topgan. Bo‘g‘inlarni to‘g‘ri ajratish so‘zlarni talaffuz qilish, yozuvda satrdan satrga ko‘chirish va fonetik tahlil qilishda muhimdir.

So‘z tarkibidagi bo‘g‘inlardan birining boshqalariga nisbatan kuchliroq yoki ajralibroq talaffuz qilinishi urg‘u deyiladi. Urg‘u nutqning fonetik tuzilishida muhim o‘rin tutadi.

Urg‘uning o‘rni va xususiyatlari tillarga ko‘ra farq qiladi. Shu sababli xorijiy tilni o‘rganishda so‘zlarning faqat yozilishiga emas, balki ularning to‘g‘ri urg‘u bilan talaffuz qilinishiga ham e’tibor berish zarur.

Urg‘u to‘g‘ri qo‘llanganda og‘zaki nutq tabiiy, ravon va tushunarli bo‘ladi.

Intonatsiya gapning mazmuni, kommunikativ maqsadi va hissiy ifodasini shakllantirishda muhim fonetik vosita hisoblanadi. Intonatsiya nutq ohangi, pauza, temp, ritm va boshqa prosodik xususiyatlarning o‘zaro uyg‘unligi orqali yuzaga keladi.

Darak, so‘roq va undov gaplarning talaffuzida intonatsiya turlicha namoyon bo‘ladi. Masalan, so‘roq gaplarda ohangning o‘zgarishi gapning so‘roq ma’nosini ifodalashga xizmat qiladi.

Shunday qilib, intonatsiya nafaqat gapning grammatik tuzilishini, balki so‘zlovchining kommunikativ maqsadini ham anglashga yordam beradi.

Fonetika tilshunoslikning boshqa bo‘limlari bilan uzviy bog‘liq. Ayniqsa, fonetika va fonologiya o‘rtasidagi munosabat muhimdir. Fonetika tovushlarning moddiy, artikulyatsion va akustik tomonlarini o‘rgansa, fonologiya tovushlarning til tizimidagi funksional xususiyatlarini, ya’ni ma’no farqlashdagi rolini tadqiq etadi.

Fonetika morfologiya va leksikologiya bilan ham aloqador. Tovushlarning o‘zgarishi ayrim hollarda so‘z shaklining yoki ma’nosining o‘zgarishiga ta’sir qilishi mumkin. Shu jihatdan fonetik hodisalarni o‘rganish tilning umumiy tizimini chuqurroq anglash imkonini beradi.

Fonetika nazariy tilshunoslik bilan bir qatorda, amaliy jihatdan ham katta ahamiyatga ega. Fonetika bilimlari asosida adabiy talaffuz me’yorlarini o‘zlashtirish, nutqdagi talaffuz xatolarini aniqlash va og‘zaki nutqni takomillashtirish mumkin.

Fonetika, ayniqsa, chet tillarini o‘rganishda muhim o‘rin tutadi. Chunki har bir tilning o‘ziga xos tovush tizimi, urg‘u va intonatsiya xususiyatlari

mavjud. Chet tilidagi tovushlarni to‘g‘ri talaffuz qilish tinglab tushunish va og‘zaki muloqot ko‘nikmalarining rivojlanishiga yordam beradi.

Bugungi kunda fonetik tadqiqotlar zamonaviy texnologiyalarda ham keng qo‘llanmoqda. Jumladan, avtomatik nutqni tanish, nutqni sintez qilish, talaffuzni tahlil qilish va lingvistik dasturlarni yaratishda fonetik ma’lumotlardan foydalaniladi.

Xulosa qilib aytganda, fonetika tilshunoslikning tilning tovush tomonini o‘rganuvchi muhim bo‘limidir. U nutq tovushlarining hosil bo‘lishi, talaffuzi va eshitilishidan tashqari, bo‘g‘in, urg‘u va intonatsiya kabi fonetik birliklarni ham qamrab oladi.

Fonetika bo‘yicha bilimlarni egallash insonning to‘g‘ri va ravon talaffuz qilish ko‘nikmasini rivojlantirish, nutq madaniyatini shakllantirish hamda tilning ichki qonuniyatlarini anglash uchun muhimdir. Ayniqsa, ona tili va xorijiy tillarni o‘qitish jarayonida fonetik bilimlarning amaliy ahamiyati katta.

Shuningdek, fonetikaning zamonaviy axborot texnologiyalari, avtomatik nutqni tanish va nutq sintezi kabi yo‘nalishlarda qo‘llanilishi ushbu sohaning bugungi kundagi ilmiy-amaliy ahamiyatini yanada oshirmoqda. Demak, fonetika tilning tovush tizimini o‘rganish bilan birga, samarali og‘zaki muloqot va nutq madaniyatining shakllanishiga xizmat qiluvchi muhim ilmiy yo‘nalishlardan biridir.

FOYDALANILGAN ADABIYOTLAR

1. Abduazizov A. O‘zbek tili fonologiyasi va morfonologiyasi. — Toshkent.
2. Jamolxonov H. Hozirgi o‘zbek adabiy tili. — Toshkent.
3. Sayfullayeva R., Mengliyev B., Boqiyeva G., Qurbonova M., Yunusova Z., Abuzalova M. Hozirgi o‘zbek adabiy tili. — Toshkent.
4. O‘zbek tilining izohli lug‘ati. — Toshkent.
5. O‘zbek tilining imlo lug‘ati. — Toshkent.
6. O‘zbek tili grammatikasi va fonetikasi bo‘yicha ilmiy tadqiqotlar.

“MEDIASAVODXONLIK VA AXBOROT MADANIYATI” MODULIDAN TALABALARNING MUSTAQIL ISHLARINI TASHKIL ETISHDA IMMERSIV TEXNOLOGIYALARDAN FOYDALANISH AFZALLIKLARI

Muallif Suyunova Elmira Shavqidin qizi]

[Mustaqil izlanuvchi, Guliston Davlat Unversiteti]

E-mail: [elmira.suyunova @gmail.com]

ORCID: [https://orcid.org/0009-0005-8516-6329]

Suyunova Zarnigor Shavqidin qizi

O’zbekiston davlat jahon tillar univertsiteti Xalqaro jurnalistika fakulteti Siyosiy fanlar kafedrasi assisent o’qituvchi

Nishonov Zohid Boltayevich

Toshkent davlat agrar universiteti, Agroiqtisodiyot, lagistika va xizmatlar fakulteti, Ijtimoiy-gumanitar fanlar kafedrasi assistenti

Annotatsiya. *Maqolada “Mediasavodxonlik va axborot madaniyati” modulidan talabalarning mustaqil ishlarini tashkil etishda immersiv texnologiyalarning pedagogik imkoniyatlari tahlil qilinadi. Virtual reallik (VR), kengaytirilgan reallik (AR), 360 darajali virtual muhitlar va interaktiv simulyatsiyalarning axborotni tanqidiy baholash, media manipulyatsiyasini aniqlash, axborot xavfsizligi ko‘nikmalarini rivojlantirish hamda mustaqil ta’limni faollashtirishdagi afzalliklari yoritiladi.*

Kalit so‘zlar: *mediasavodxonlik, axborot madaniyati, immersiv texnologiyalar, virtual reallik, kengaytirilgan reallik, mustaqil ta’lim, tanqidiy fikrlash, axborot xavfsizligi.*

Abstract. *This article analyzes the pedagogical potential of immersive technologies in organizing students’ independent work within the “Media Literacy and Information Culture” module. It highlights the advantages of virtual reality (VR), augmented reality (AR), 360-degree virtual environments, and interactive simulations in developing students’ skills in critically evaluating information, identifying media manipulation, enhancing information security awareness, and promoting active independent learning.*

Keywords: *media literacy, information culture, immersive technologies, virtual reality, augmented reality, independent learning, critical thinking, information security.*

KIRISH

XXI asr-Raqamli axborot makonining kengayishi, ijtimoiy tarmoqlar, videoplatformalar va sun’iy intellekt asosida yaratiladigan kontentning ko‘payishi talabalardan axborot bilan ongli va mas’uliyatli ishlashni talab qilmoqda. Zamonaviy talaba nafaqat axborotni topishi, balki uning manbasini aniqlashi, ishonchliligini tekshirishi, fakt va fikrni farqlashi, manipulyativ elementlarni ko‘ra bilishi hamda axborotdan axloqiy va huquqiy me’yorlar asosida foydalanishi zarur.

UNESCO media va axborot savodxonligini axborotni izlash, tushunish, tanqidiy baholash, yaratish va tarqatish bilan bog‘liq kompleks kompetensiyalar majmui sifatida talqin qiladi [1]. Shu bois “Mediasavodxonlik va axborot madaniyati” modulida faqat nazariy bilim berish yetarli emas. Talaba real media muhitiga yaqin vaziyatlarda axborotning ishonchliligini baholashi, qarama-qarshi manbalarni solishtirishi va asoslangan qaror qabul qilishi kerak. Immersiv texnologiyalar aynan shunday tajribaga asoslangan o‘quv muhitini yaratish imkonini beradi.

TADQIQOT METODOLOGIYASI

Ushbu tadqiqot nazariy-tahliliy xarakterga ega. Unda ilmiy-pedagogik adabiyotlarni tahlil qilish, qiyosiy tahlil, kontent-tahlil, umumlashtirish va pedagogik modellashtirish metodlaridan foydalanildi. UNESCOning media va axborot savodxonligi bo‘yicha materiallari hamda immersiv virtual reallikning ta’limdagi samaradorligiga bag‘ishlangan zamonaviy sistematik tadqiqotlar o‘rganildi [1-5]. Immersiv texnologiyalar doirasida VR, AR, 360° video va faol ishtirokni ta’minlovchi interaktiv simulyatsiyalar nazarda tutildi.

NATIJALAR VA MUHOKAMA

Immersiv texnologiyalarning birinchi afzalligi talabani axborotning passiv qabul qiluvchisidan faol ishtirokchiga aylantirishidir. Ta’limning an’anaviy shaklida mustaqil ishda talaba maqola o‘qishi, referat yozishi yoki savollarga javob berishi mumkin. Immersiv muhitda esa u muammoli axborot vaziyatiga kiradi, turli manbalarni kuzatadi, ularni solishtiradi va mustaqil

xulosa chiqaradi. Sistematik tadqiqotlar immersiv VR faol harakat, interaktivlik va konstruktiv faoliyatga asoslangan topshiriqlarda sezilarli pedagogik salohiyatga ega ekanini ko‘rsatadi [2; 3].

Masalan, talaba virtual yangiliklar xonasida bir voqea haqidagi yangilik sayti, ijtimoiy tarmoq posti, blog, videolavha va rasmiy manbani tahlil qilishi mumkin. U materialning muallifi, sanasi, birlamchi manbasi, dalillari, emotsional tili va tasvirlar kontekstini tekshiradi. Bu jarayon mediasavodxonlikning muhim tarkibiy qismlaridan bo‘lgan manba verifikatsiyasi va faktcheking ko‘nikmalarini amaliy shakllantiradi.

Ikkinchi afzallik tanqidiy fikrlashni rivojlantirish bilan bog‘liq. Immersiv topshiriqda talaba tayyor javobni qabul qilmaydi, balki dalillarni solishtiradi, qarama-qarshi nuqtayi nazarlarni o‘rganadi va o‘z qarorini asoslaydi. Virtual muharrirlik keysida, masalan, u qaysi xabarni e’lon qilish mumkinligini belgilab, “manba qanchalik ishonchli?”, “birlamchi dalil bormi?”, “sarlavha yoki tasvir auditoriyani manipulyatsiya qilmayaptimi?” kabi savollarga javob beradi. Natijada refleksiv va analitik fikrlash faollashadi.

Uchinchi afzallik media manipulyatsiyasini vizual tarzda anglashdir. Bir xil voqeaning turli platformalarda turlicha sarlavha, tasvir, rakurs, montaj yoki emotsional til orqali yoritilishini taqqoslash talabaga framing, clickbait, stereotiplash va kontekstdan uzib olish kabi usullarni amaliy ravishda tushunishga yordam beradi. Ayniqsa deepfake va sun’iy intellekt yordamida yaratilgan kontent sharoitida bunday topshiriqlar media xabarni shunchaki iste’mol qilish emas, balki uning yaratilish mexanizmini tahlil qilish ko‘nikmasini rivojlantiradi.

To‘rtinchi afzallik axborot xavfsizligi bo‘yicha amaliy tajriba hosil qilishdir. Virtual simulyatsiyada talabaga phishing xabari, shubhali havola, soxta internet-do‘kon yoki maxfiy ma’lumotlarni so‘rayotgan sayt ko‘rsatilishi mumkin. Talaba xavfni aniqlaydi va tegishli qaror qabul qiladi. Noto‘g‘ri tanlovning oqibati virtual muhitda ko‘rsatilishi real zarar yetkazmagan holda xatodan saboq olish imkonini beradi.

Beshinchi afzallik mustaqil ta’limning individuallashuvi va motivatsiyaning ortishidir. Talaba virtual topshiriqni individual sur’atda bajarishi, muayyan epizodga qaytishi, qo‘shimcha ma’lumotni tekshirishi va qarorini qayta ko‘rib chiqishi mumkin. Tadqiqotlar immersiv VR o‘quvchilarning jalb etilishi va o‘quv faoliyatida faol qatnashishiga ijobiy imkoniyat yaratishini ko‘rsatadi [2; 4]. Biroq texnologiyaning o‘zi yuqori natijani kafolatlamaydi; samaradorlik pedagogik maqsad, topshiriq dizayni, refleksiya va o‘qituvchi yordami bilan belgilanadi [3; 5].

“Mediasavodxonlik va axborot madaniyati” modulida immersiv mustaqil ishlarni quyidagi ketma-ketlik asosida tashkil etish maqsadga muvofiq: muammoli vaziyat -> immersiv kuzatish -> axborotni izlash -> manbalarni tekshirish -> qiyosiy tahlil -> qaror qabul qilish -> natijani asoslash -> refleksiya. Masalan, “Soxta yangilikni aniqlash” topshirig‘ida talaba virtual media markazidagi bir nechta xabarni tahlil qilib, qaysi biri ishonchli yoki shubhali ekanini dalillar bilan asoslaydi. Baholashda faqat yakuniy javob emas, balki axborotni tekshirish algoritmi ham hisobga olinadi.

Shuningdek, “Raqamli iz va shaxsiy ma’lumotlar”, “Ijtimoiy tarmoq algoritmlarining axborot tanloviga ta’siri”, “Media manipulyatsiyasi”, “Deepfake materiallarni tahlil qilish” va “Onlayn manbalarning ishonchliligini baholash” kabi mavzularda virtual keyslar ishlab chiqish mumkin. Bu yondashuv mustaqil ishni reproduktiv topshiriqdan muammoli va amaliy faoliyatga aylantiradi.

Immersiv texnologiyalarni joriy etishda texnik infratuzilma, VR qurilmalarining narxi, sifatli kontent yaratish, o‘qituvchining raqamli kompetensiyasi va talabalar imkoniyatlaridagi tafovutlarni ham hisobga olish zarur. Shu sababli ular an’anaviy metodlarning o‘rnini to‘liq egallashi emas, balki ularni didaktik maqsadga muvofiq boyitishi kerak.

XULOSA

“Mediasavodxonlik va axborot madaniyati” modulidan talabalarning mustaqil ishlarini tashkil etishda immersiv texnologiyalardan foydalanish

nazariy bilimlarni real axborot vaziyatlariga yaqin muhitda qo‘llash imkonini beradi. VR, AR, 360° virtual muhit va interaktiv simulyatsiyalar orqali talaba media kontentni tanqidiy tahlil qilish, manbalarni tekshirish, manipulyatsiyani aniqlash, axborot xavfsizligi qoidalariga rioya qilish va asoslangan qaror qabul qilish tajribasiga ega bo‘ladi. Shu jihatdan immersiv texnologiyalar mediasavodxonlikni shakllantiruvchi samarali pedagogik vosita sifatida qaralishi mumkin. Kelgusida ushbu modul uchun immersiv keyslar tizimini ishlab chiqish va ularning talabalarning media kompetensiyalariga ta’sirini empirik tadqiq etish maqsadga muvofiq.

FOYDALANILGAN ADABIYOTLAR

1. E.Sh.Suyunova Immersiv texnologiyalar asosida bo‘lajak o‘qituvchilarda raqamli mediakompetentlikni rivojlantirish. Ilmiy maqola. ISSN Record 2181-2926 (Online) Jornal Scientific and Innovative Research in Social and Humanitarian Studies
2. E.Sh.Suyunova va.b. Umumiy pedagogika./ Darslik.-T. 2022.
3. Suyunova E. va b.(2021) Oliy ta’lim muassasasi professor o’qituvchilarini MOODLE tizimida elektron o‘quv kurslarini yaratishda masofaviy ta’lim texnologiyalaridan foydalanish. O‘quv qo‘lanma. –T. 2021 y.
4. Saidova M.O‘. Raqamli jurnalistika: immersiv mediatexnologiyalar nazariyasi va amaliyoti O‘quv qo’llanma. Toshkent:2024
5. Богатырева Ю.И.1, Николаева А.М. «Технологии иммерсивного обучения»: сравнительный анализ смежных понятий. Научная статья. Международный научно-исследовательский журнал ▪ № 2 (164) ▪ Февраль
6. Wilson C., Grizzle A., Tuazon R., Akyempong K., Cheung C. K. Media and Information Literacy Curriculum for Teachers. Paris: UNESCO, 2011.
7. Petersen G. B., Petkakis G., Makransky G. Learning effectiveness of immersive virtual reality in education and training: A systematic review of findings. Computers & Education: X Reality, 2024, Vol. 4, 100053.
8. Won M., Ungu D. A. K., Matovu H., Treagust D. F., Tsai C.-C., Park J., Mocerino M., Tasker R. Diverse approaches to learning with immersive Virtual Reality identified from a systematic review. Computers & Education, 2023, Vol. 195, 104701.
9. Hamilton D., McKechnie J., Edgerton E., Wilson C. Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. Journal of Computers in Education, 2021, Vol. 8, pp. 1-32.
10. Marougkas A., Troussas C., Krouska A., Sgouropoulou C. How personalized and effective is immersive virtual reality in education? A systematic literature review for the last decade. Multimedia Tools and Applications, 2024, Vol. 83, pp. 18185-18233.

MULKIY HUQUQLARNI JAMOAVIY BOSHQARUVCHI TASHKILOTLARNING HUQUQIY MAQOMI VA FAOLIYATINI TAKOMILLASHTIRISH MASALALARI

Mustafoyev Maqsud Amrullo o‘g‘li

Seysmik xavfsizlik va barqaror qurilish milliy tadqiqot instituti bosh yuriskonsulti, TDYU mustaqil izlanuvchisi

E-mail: mustafoevmaksud@gmail.com

Annotatsiya. *Mazkur maqolada mulkiy huquqlarni jamoaviy boshqaruvchi tashkilotlarning huquqiy maqomi, ularning mualliflik va turdosh huquqlarni amalga oshirishdagi o‘rni, huquq egalari bilan o‘zaro munosabatlarining fuqarolik-huquqiy xususiyatlari tahlil qilinadi. Shuningdek, mualliflik haqini yig‘ish va taqsimlash, tashkilotlar faoliyatining shaffofligini ta’minlash, huquq egalarining manfaatlarini himoya qilish hamda jamoaviy boshqaruv tizimini takomillashtirish bilan bog‘liq masalalar yoritiladi. Milliy qonunchilikni rivojlantirish bo‘yicha taklif va tavsiyalar ishlab chiqiladi.*

Kalit so‘zlar: *mualliflik huquqi, turdosh huquqlar, mulkiy huquqlar, jamoaviy boshqaruv, jamoaviy boshqaruvchi tashkilot, mualliflik haqi, huquq egasi, fuqarolik-huquqiy javobgarlik, shartnomaviy munosabatlar.*

Abstract. *This article analyzes the legal status of organizations for the collective management of property rights, their role in the exercise of copyright and related rights, and the civil-law nature of their relationships with right holders. It also addresses issues related to the collection and distribution of royalties, ensuring transparency in the operations of such organizations, protecting the interests of right holders, and improving the collective management system. Proposals and recommendations for the development of national legislation are presented.*

Keywords: *copyright, related rights, property rights, collective management, collective management organization, royalties, right holder, civil-law liability, contractual relations.*

KIRISH

Intellektual mulk obyektlaridan foydalanish ko‘lamining kengayishi, raqamli texnologiyalarning rivojlanishi hamda mualliflik huquqi obyektlarining transchegaraviy muomalasi mualliflar va boshqa huquq egalarining mulkiy

manfaatlarini samarali himoya qilish masalasini dolzarb qilib qo‘ymoqda. Xususan, musiqa asarlari, audiovizual asarlar, fonogrammalar va boshqa mualliflik huquqi obyektlaridan ko‘p sonli foydalanuvchilar tomonidan foydalanilishi huquqlarni individual ravishda boshqarishni murakkablashtiradi.

Bunday sharoitda mulkiy huquqlarni jamoaviy boshqaruvchi tashkilotlar muhim huquqiy va tashkiliy mexanizm sifatida namoyon bo‘ladi. Ular huquq egalarining manfaatlarini belgilangan vakolatlar doirasida ifodalash, asarlardan foydalanish uchun haq yig‘ish va ushbu mablag‘larni tegishli huquq egalariga taqsimlash orqali mualliflik huquqining amaliy ta’minlanishiga ko‘maklashadi.

O‘zbekiston Respublikasida mualliflik huquqi va turdosh huquqlarni himoya qilishning huquqiy asoslari yaratilgan bo‘lsa-da, jamoaviy boshqaruv faoliyatining shaffofligi, huquq egalariga to‘lovlarni taqsimlash mexanizmlari, tashkilotlarning shartnomaviy majburiyatlari va ular buzilgan taqdirda javobgarlik masalalarini yanada takomillashtirish zarurati mavjud.

Shu nuqtayi nazardan, mulkiy huquqlarni jamoaviy boshqaruvchi tashkilotlarning huquqiy maqomini o‘rganish, ularning faoliyatidagi mavjud muammolarni aniqlash hamda milliy qonunchilikni takomillashtirishga qaratilgan takliflar ishlab chiqish muhim ilmiy-amaliy ahamiyatga ega.

ASOSIY QISM

Dastlab, mulkiy huquqlarni jamoaviy boshqaruvchi tashkilotlarning tushunchasi va huquqiy tabiati haqida so‘z yuritadigan bo‘lsak, mulkiy huquqlarni jamoaviy boshqarish intellektual mulk huquqining alohida institutsional mexanizmi bo‘lib, huquq egalarining muayyan mulkiy huquqlarini ular nomidan yoki ularning manfaatlarini ko‘zlab amalga oshirishga qaratilgan faoliyatni anglatadi.

Jamoaviy boshqaruvning zarurati, avvalo, ayrim mualliflik huquqi obyektlaridan foydalanishning ommaviy xususiyati bilan belgilanadi. Masalan, musiqa asari bir vaqtning o‘zida yuzlab restoranlar, mehmonxonalar, savdo markazlari, radio va televideniye tashkilotlari tomonidan ishlatilishi mumkin. Har bir muallifning barcha foydalanuvchilar bilan mustaqil ravishda muzokara

olib borishi va foydalanish holatlarini kuzatishi iqtisodiy hamda tashkiliy jihatdan qiyin.

Jamoaviy boshqaruvchi tashkilotlar ana shu muammoni hal qilishga xizmat qiladi. Ular huquq egalaridan tegishli vakolatlarni oladi, foydalanuvchilar bilan litsenziya munosabatlarini yo‘lga qo‘yadi, foydalanish haqidagi ma’lumotlarni hisobga oladi va yig‘ilgan mablag‘larni belgilangan tartibda taqsimlaydi.

Biroq jamoaviy boshqaruvni huquqlarni mutlaq ravishda boshqa shaxsga o‘tkazish bilan tenglashtirish mumkin emas. Huquq egasi bilan tashkilot o‘rtasidagi munosabatlarning mazmuni tegishli qonunchilik, shartnoma va berilgan vakolatlar doirasi bilan belgilanadi.

Shu sababli jamoaviy boshqaruvchi tashkilotning huquqiy maqomini aniqlashda uchta asosiy jihatni farqlash lozim:

birinchidan, tashkilotning mustaqil yuridik shaxs sifatidagi maqomi;

ikkinchidan, huquq egalaridan olingan vakolatlarning mazmuni va chegaralari;

uchinchidan, tashkilotning huquq egasi hamda asarlardan foydalanuvchilar oldidagi huquq va majburiyatlari.

Mazkur jihatlarning o‘zaro uyg‘unligi jamoaviy boshqaruv tizimining samaradorligini belgilaydi.

O‘zbekiston Respublikasida mulkiy huquqlarni jamoaviy boshqarishning huquqiy asoslari 2006-yil 20-iyuldagi O‘RQ-42-son «Mualliflik huquqi va turdosh huquqlar to‘g‘risida»gi Qonun talablari bilan belgilangan. Mazkur Qonunning 56–60-moddalari mulkiy huquqlarni jamoaviy boshqarish bilan bog‘liq munosabatlarni tartibga soladi. Ushbu normalar tashkilotlarni tuzish, ularning faoliyati, vakolatlari, majburiyatlari va faoliyati ustidan nazorat qilish masalalarini qamrab oladi.

Jamoaviy boshqaruvning asosiy vazifasi huquq egalarining qonun bilan tan olingan mulkiy manfaatlarini amalga oshirish uchun tashkiliy mexanizm yaratishdan iborat. Bunda tashkilotning vakolatlari huquq egalarining

huquqlarini cheklash vositasiga aylanmasligi, aksincha, ularni samarali amalga oshirishga xizmat qilishi lozim.

Jamoaviy boshqaruvchi tashkilotlarning faoliyatida shartnomaviy munosabatlar alohida ahamiyatga ega. Huquq egasi va tashkilot o‘rtasidagi munosabatlar tegishli vakolatlarni berish, ularni amalga oshirish, hisob-kitoblarni yuritish va yig‘ilgan haqni taqsimlash bilan bog‘liq majburiyatlarni yuzaga keltiradi.

Mazkur munosabatlarning muhim xususiyati shundaki, jamoaviy boshqaruv vakolatlarini berish haqidagi shartnomani mualliflik shartnomasi bilan aynanlashtirish mumkin emas. Ularning maqsadi, predmeti va huquqiy oqibatlari farqlanishi mumkin. Shu sababli bunday shartnomalarning huquqiy tabiatini mustaqil tahlil qilish zarur.

Qonunchilikni qo‘llashda jamoaviy boshqaruvga oid maxsus normalar bilan bir qatorda, shartnomaviy majburiyatlar, zararlarni qoplash va fuqarolik-huquqiy javobgarlikka oid umumiy normalar ham hisobga olinishi kerak.

Jamoaviy boshqaruv tizimining samaradorligi faqat tegishli tashkilotlarning mavjudligi bilan emas, balki ularning huquq egalariga nisbatan hisobdorligi, moliyaviy shaffofligi va mablag‘larni taqsimlash tartibining adolatliligi bilan ham belgilanadi.

Jamoaviy boshqaruvchi tashkilotlarning faoliyatida fuqarolik-huquqiy javobgarlik masalasi alohida o‘rin tutadi. Chunki tashkilot huquq egalarining mulkiy manfaatlarini amalga oshirish jarayonida muayyan majburiyatlarni zimmasiga oladi.

Agar tashkilot o‘z zimmasiga olgan majburiyatlarni lozim darajada bajarmasa, tegishli qonunchilik va shartnoma shartlaridan kelib chiqib, uning fuqarolik-huquqiy javobgarligi masalasi yuzaga kelishi mumkin.

Bunday javobgarlikni quyidagi holatlar misolida ko‘rib chiqish mumkin.

Birinchidan, tashkilot yig‘ilgan mualliflik haqini belgilangan muddatda to‘lamaganida huquq egasi o‘ziga tegishli mablag‘ni talab qilish, qonunchilik

yoki shartnomada mavjud bo‘lgan asoslar bo‘yicha esa qo‘shimcha huquqiy himoya vositalaridan foydalanish imkoniyatiga ega bo‘lishi kerak.

Ikkinchidan, mablag‘larni taqsimlashda xatolikka yo‘l qo‘yilgan bo‘lsa, hisob-kitoblarni qayta tekshirish va noto‘g‘ri taqsimlangan mablag‘larni tegishli huquq egasiga yetkazish mexanizmi ishlashi lozim.

Uchinchidan, tashkilotning noqonuniy harakati yoki harakatsizligi natijasida huquq egasiga zarar yetkazilgan bo‘lsa, zararni qoplash masalasi amaldagi fuqarolik qonunchiligi asosida hal qilinishi kerak.

To‘rtinchidan, tashkilot o‘ziga berilgan vakolatlardan chetga chiqib, huquq egasining manfaatlariga zid harakatlarni amalga oshirgan taqdirda, bunday harakatlarning huquqiy oqibatlari va javobgarlik asoslari alohida baholanishi zarur.

Shu bilan birga, har qanday to‘lov kechikishi yoki hisob-kitobdagi nomuvofiqlik avtomatik ravishda barcha turdagi fuqarolik-huquqiy javobgarlik choralarini qo‘llashga asos bo‘lmaydi. Majburiyatning mazmuni, buzilish holati, zarar, sababiy bog‘lanish va tegishli javobgarlik turiga taalluqli boshqa yuridik shartlar aniqlanishi lozim.

Bizning fikrimizcha, jamoaviy boshqaruv tizimida javobgarlik mexanizmlarini takomillashtirish huquq egalarining manfaatlarini himoya qilish bilan bir qatorda, tashkilotlarning o‘z majburiyatlarini mas’uliyat bilan bajarishini ham ta’minlaydi.

Mulkiy huquqlarni jamoaviy boshqarish xalqaro miqyosda ham keng qo‘llaniladigan huquqiy mexanizmdir. Butunjahon intellektual mulk tashkiloti (WIPO) ushbu sohada xalqaro huquqiy yondashuvlarni ishlab chiqish va davlatlarga tegishli tavsiyalar berishda muhim o‘rin tutadi.

Xorijiy tajribani o‘rganishda Yevropa Ittifoqining 2014/26/EU-sonli Direktivasi alohida ahamiyatga ega. Ushbu hujjat mualliflik huquqi va turdosh huquqlarni jamoaviy boshqarish, tashkilotlarning shaffofligi hamda ko‘p hududli musiqiy litsenziyalash bilan bog‘liq masalalarni tartibga solishga qaratilgan.

Mazkur yondashuvdan kelib chiqib, jamoaviy boshqaruv tashkilotlari faoliyatida quyidagi yo‘nalishlarga e’tibor qaratish maqsadga muvofiq:

- huquq egalariga moliyaviy hisobot taqdim etishning aniq tartibini belgilash;

- yig‘ilgan mablag‘lar va ularning taqsimlanishi haqidagi ma’lumotlarning ochiqligini oshirish;

- huquq egalarining o‘z asarlari va hisoblangan to‘lovlar haqidagi ma’lumotlarni olish imkoniyatini kengaytirish;

- manfaatlar to‘qnashuvining oldini olish mexanizmlarini joriy etish;

- raqamli texnologiyalar orqali asarlardan foydalanishni hisobga olishni takomillashtirish;

- nizolarni sudgacha hal etish va huquq egalarining shikoyatlarini ko‘rib chiqish tartiblarini rivojlantirish.

Bunda xorijiy davlatlar tajribasini milliy qonunchilikka to‘g‘ridan-to‘g‘ri ko‘chirish emas, balki O‘zbekistonning huquqiy tizimi, mavjud institutsional imkoniyatlari va amaliy ehtiyojlarini hisobga olgan holda moslashtirish muhimdir.

Yuqoridagi tahlildan kelib chiqib, mulkiy huquqlarni jamoaviy boshqarish tizimini takomillashtirish bo‘yicha quyidagi takliflarni ilgari surish mumkin.

Birinchidan, jamoaviy boshqaruvchi tashkilotlarning moliyaviy shaffofligini kuchaytirish lozim. Buning uchun yig‘ilgan haq, taqsimlangan mablag‘lar, amalga oshirilgan to‘lovlar va taqsimlanmagan mablag‘lar to‘g‘risidagi ma’lumotlarni aks ettiruvchi standartlashtirilgan hisobot shakllarini joriy etish maqsadga muvofiq.

Ikkinchidan, huquq egalariga to‘lovlarni hisoblash va taqsimlash mezonlarini aniq belgilash zarur. Bunday mezonlar foydalanish to‘g‘risidagi ishonchli ma’lumotlar, tegishli huquqlar doirasi va tashkilotning tasdiqlangan qoidalariga asoslanishi kerak.

Uchinchidan, huquq egalarining axborot olish huquqini kuchaytirish lozim. Jumladan, ularga foydalanilgan asarlar, hisoblangan haq, ushlab qolingan

qonuniy xarajatlar va amalga oshirilgan to‘lovlar haqida ma’lumot olish imkoniyatini yaratish zarur.

To‘rtinchidan, jamoaviy boshqaruv shartnomalarida majburiyatlarni buzish oqibatlarini aniq belgilash tavsiya etiladi. Shartnomalarda hisob-kitoblarni tekshirish, noto‘g‘ri to‘langan mablag‘larni qayta hisoblash, to‘lovlarni amalga oshirish muddatlari va nizolarni hal etish tartiblari nazarda tutilishi mumkin.

Beshinchidan, jamoaviy boshqaruv tashkilotlarining fuqarolik-huquqiy javobgarligini qo‘llashga doir qoidalarni amaliy jihatdan aniqlashtirish lozim. Bunda majburiyatni bajarmaslik, zararlarni qoplash va tegishli shartnomaviy himoya vositalaridan foydalanish asoslarini qonunchilik bilan muvofiqlashtirish kerak.

Oltinchidan, huquq egalarining shikoyatlarini ko‘rib chiqishning samarali mexanizmlarini shakllantirish zarur. Bunda shikoyatni ko‘rib chiqish muddatlari, qaror ustidan shikoyat qilish tartibi va huquq egasiga javob berish majburiyatlarini aniq belgilash maqsadga muvofiq.

Mazkur takliflarning amalga oshirilishi huquq egalarining manfaatlarini himoya qilish, jamoaviy boshqaruv tashkilotlari faoliyatiga ishonchni oshirish va intellektual mulk obyektlaridan qonuniy foydalanishni rag‘batlantirishga xizmat qilishi mumkin.

XULOSA

Mulkiy huquqlarni jamoaviy boshqaruvchi tashkilotlar mualliflik va turdosh huquqlarni amalga oshirishning muhim institutsional mexanizmi hisoblanadi. Ularning faoliyati huquq egalarining mulkiy manfaatlarini himoya qilish, asarlardan foydalanish uchun haq yig‘ish va uni tegishli shaxslarga taqsimlashda muhim ahamiyat kasb etadi.

Tadqiqot natijasida jamoaviy boshqaruv tizimining samaradorligi tashkilotlarning huquqiy maqomi bilangina emas, balki ularning shaffofligi, hisobdorligi, shartnomaviy majburiyatlarni bajarishi va huquq egalariga

samarali himoya vositalarini taqdim etishi bilan ham belgilanadi, degan xulosaga kelish mumkin.

Jamoaviy boshqaruv tizimida mablag‘larni taqsimlash mezonlarini takomillashtirish, raqamli hisobga olish mexanizmlarini joriy etish, huquq egalarining axborot olish imkoniyatlarini kengaytirish va shartnomaviy majburiyatlarni buzganlik uchun javobgarlik mexanizmlarini aniqlashtirish ustuvor vazifalar hisoblanadi.

Shu munosabat bilan O‘zbekiston Respublikasining mualliflik huquqi va turdosh huquqlar to‘g‘risidagi qonunchiligini xalqaro tajriba asosida takomillashtirish, bunda milliy huquqiy tizimning xususiyatlarini hisobga olish maqsadga muvofiq.

Taklif etilgan chora-tadbirlarning amalga oshirilishi jamoaviy boshqaruv tizimining institutsional samaradorligini oshirish, mualliflar va boshqa huquq egalarining mulkiy manfaatlarini himoya qilish hamda intellektual mulk sohasidagi huquqiy munosabatlarni rivojlantirishga xizmat qiladi.

FOYDALANGAN ADABIYOTLAR RO‘YXATI:

1. Ўзбекистон Республикаси Фуқаролик кодекси. Қонунчилик маълумотлари миллий базаси, 21.04.2021 й., 03/21/683/0375-сон, 12.10.2021 й., 03/21/721/0952 сон; 30.03.2022 й., 03/22/760/0249-сон. https://lex.uz/docs/-180552

2. Ўзбекистон Республикасининг «Муаллифлик ҳуқуқи ва турдош ҳуқуқлар тўғрисида»ги қонуни// Ўзбекистон Республикаси қонун ҳужжатлари тўплами. 2013 й., 1-сон, 1-модда, 41-сон, 543-модда. https://lex.uz/docs/-1022944

3. Bern konvensiyasi — Adabiy va badiiy asarlarni muhofaza qilish to‘g‘risidagi konvensiya, 1886-yil.

4. Butunjahon intellektual mulk tashkiloti (WIPO) materiallari: mualliflik huquqini jamoaviy boshqarish masalalariga oid rasmiy manbalar. https://www.wipo.int/en/web/wipolex

5. Yevropa Parlamenti va Kengashining 2014-yil 26-fevraldagi 2014/26/EU-sonli Direktivasi — mualliflik huquqi va turdosh huquqlarni jamoaviy boshqarish hamda musiqiy asarlardan onlayn foydalanish uchun ko‘p hududli litsenziyalash to‘g‘risida.

THE ROLE OF JOURNALISTIC COMMUNICATION IN INTERNATIONAL RELATIONS AND MEDIA DIPLOMACY: UZBEKISTAN'S EXPERIENCE AND DEVELOPMENT PROSPECTS

Amonkulova Muslima Amonkulovna

2nd-year doctoral student (PhD), National University of Uzbekistan, Tashkent, Uzbekistan

Abstract. *This article examines, from theoretical and practical perspectives, the role of journalistic communication in international relations, media diplomacy, and the formation of a state's international image. The study aims to identify the interrelationship between journalism, media diplomacy, soft power, the activities of foreign correspondents, journalist exchange, storytelling, visual and data journalism, crisis communication, and counter-disinformation practices in the contemporary international communication environment. The research employs qualitative content analysis, comparative analysis, systems analysis, and thematic analysis. The findings indicate that journalistic communication is evolving from a conventional channel for transmitting information between the state and foreign publics into a strategic communication mechanism. In particular, openness, responsiveness, journalists' access to information sources, professional ethics, and the credibility of information have a direct impact on a country's international media image. In the context of Uzbekistan, the study substantiates the need to strengthen institutional cooperation with foreign journalists, produce high-quality content for international media, expand press tours and journalist exchange programs, and improve crisis communication and fact-checking mechanisms.*

Keywords: *journalistic communication, international relations, media diplomacy, public diplomacy, soft power, international journalism, foreign correspondent, storytelling, crisis communication, fact-checking, national image, Uzbekistan.*

INTRODUCTION

In the international relations system of the twenty-first century, information and communication have become key strategic resources that shape states' foreign-policy capabilities. As a result of globalization, the intensification of transnational information flows, and the development of digital platforms and social networks, a state's international image is now formed not only through

official diplomatic activity but also through international mass media, journalists, media organizations, and digital communication actors.

The concept of soft power developed by Joseph S. Nye explains a state's ability to influence the behavior of other actors without coercion through its attractiveness, culture, values, and policies in the international arena (Nye, 2004). From this perspective, journalistic communication functions as one of the principal channels through which soft-power resources are conveyed to international audiences.

In analyzing the role of mass media in contemporary diplomatic communication, Eytan Gilboa distinguishes models such as public diplomacy, media diplomacy, and media-broker diplomacy (Gilboa, 2001). This approach makes it possible to view journalists and media organizations not merely as observers of international relations but, in certain circumstances, as independent communicative actors.

Journalistic communication encompasses the processes through which journalists, editorial offices, and media organizations collect, process, and transmit information to audiences. International journalism, in turn, significantly influences the formation of perceptions about countries by delivering information about developments in other states, societies, and regions to international audiences.

Materials distributed by global news agencies such as Reuters, the Associated Press, Agence France-Presse, and Bloomberg reach large audiences beyond national borders. Therefore, establishing open and professional relations with international media and foreign correspondents constitutes an important element of states' external communication.

Within the framework of the new public diplomacy, communication is shifting from one-way information dissemination toward two-way dialogue and the establishment of sustainable relationships with foreign audiences (Cull, 2009; Pamment, 2013). Digitalization has also accelerated diplomatic

communication and expanded opportunities for direct interaction between states and foreign publics (Manor, 2019; Seib, 2012).

These processes are also highly relevant to Uzbekistan. As the country's international openness and external relations expand, the quality of global media content about Uzbekistan, the conditions created for foreign journalists working in the country, communication designed for international audiences, and the professionalism of national media institutions are becoming increasingly important.

The purpose of this study is to systematize the functions of journalistic communication in international relations and media diplomacy and to identify promising directions for the effective use of these mechanisms in Uzbekistan. The research questions focus on the functions of journalistic communication in media diplomacy, the influence of journalists and international media on the national image, the role of credibility and openness in communication effectiveness, and the identification of promising media-diplomacy instruments for Uzbekistan.

METHODS

The study is qualitative and theoretical-analytical in nature and is aimed at systematizing conceptual approaches to journalistic communication, international journalism, media diplomacy, and public diplomacy. The research design is based not on an empirical survey or statistical experiment but on the analysis of theoretical sources and thematic categories relevant to the subject.

Qualitative content analysis was used to examine concepts, communication mechanisms, and practical directions associated with the role of journalistic communication in international relations. In the thematic analysis, the materials were organized into such categories as media relations, the activities of foreign correspondents, journalist exchanges, storytelling, visual communication, crisis communication, fact-checking, data journalism, journalistic ethics, and credibility.

Comparative analysis made it possible to assess selected forms of international media diplomacy and foreign practices in relation to Uzbekistan's media and communication needs. The systems approach, meanwhile, enabled journalism, diplomacy, international communication, and national image to be considered not as isolated phenomena but as interconnected components of a unified strategic communication system.

The theoretical and methodological framework draws on Nye's (2004) concept of soft power, Gilboa's (2001) model of media diplomacy, Cull's (2009) classification of public diplomacy, Pamment's (2013) concept of new public diplomacy, and the approaches of Seib (2012) and Manor (2019) to contemporary and digital diplomacy.

RESULTS. 1. Journalistic Communication as a Strategic Instrument of Media Diplomacy

The analysis shows that journalistic communication performs three main functions in contemporary international relations: transmitting information, shaping perceptions of the state and society, and creating a communicative bridge between the publics of different countries.

In addition to being a professional actor who disseminates information about events, the journalist influences which issues are covered, which sources are selected, and the context in which events are interpreted. Consequently, international journalistic materials indirectly affect how a country is perceived by external audiences. From this perspective, journalistic communication can be regarded as one of the mechanisms through which soft-power resources enter the international information space.

2. Foreign Correspondents and Cooperation with International Media

The analysis indicates that foreign correspondents play a significant role in shaping long-term perceptions of a country. A foreign journalist working in a particular state becomes an important source of information for international audiences about its political, economic, social, and cultural life.

At the same time, the content of journalistic materials is influenced by the correspondent's professional experience, cultural background, available information sources, and editorial policy. Therefore, the state's task should not be to control journalistic coverage but to create an open and professional information environment for journalists. In Uzbekistan, inviting foreign journalists, organizing press tours, expanding opportunities for direct interaction with government agencies and experts, and simplifying accreditation procedures are promising instruments of media diplomacy.

3. Media Relations and Press Access. Effective media relations imply systematic, regular, and professional communication between state institutions and the media. Their principal components include regular and open press conferences, prompt responses to journalists' inquiries, access to information sources for foreign journalists, the preparation of high-quality press releases, photographs, videos, and statistical materials, the simplification and digitalization of accreditation procedures, and the development of modern press centers.

The more open access to information is, the greater the opportunity for international media to obtain information about a country from primary sources. Conversely, an information vacuum may increase the risk of unofficial, unverified, or inaccurate information being disseminated.

4. Journalist Exchanges and Professional Networks. Journalist exchange is a relatively low-cost instrument of international communication that may nevertheless generate long-term effects. Providing foreign journalists with opportunities to observe the country directly and engage with local residents, experts, entrepreneurs, and representatives of government institutions can facilitate the production of materials based on first-hand experience rather than stereotypes.

At the same time, expanding the ties of Uzbek journalists with international media organizations and professional associations and increasing

their participation in training and exchange programs can contribute to the integration of national journalism into international professional standards.

5. Storytelling and Human-Centered Communication. The analysis shows that statistical indicators and official statements alone are insufficient in communication aimed at international audiences. Stories built around human lives, personal experiences, and identifiable protagonists make it possible to communicate complex social and cultural processes in a more accessible and relatable form.

In the context of Uzbekistan, promising topics for human-interest materials include artisans combining historical craftsmanship with modern business, young entrepreneurs and startup founders, athletes who have achieved success in international competitions, specialists engaged in cultural-heritage restoration, young people working in contemporary science and technology, and the culture and hospitality traditions associated with the Great Silk Road. Such an approach makes it possible to connect abstract institutional information about the country with concrete human experience.

6. Visual Communication and Data Journalism. In the digital media environment, photography, video, infographics, interactive maps, and data visualization have become important components of international communication. Uzbekistan's cultural-heritage sites in Samarkand, Bukhara, Khiva, and other historic cities, together with national applied arts, contemporary urban development, tourism, and economic transformation, offer substantial opportunities for creating professional visual content.

Data journalism enables information about a country's development to be presented through statistical evidence, charts, and interactive visualizations. In this context, clearly identifying the source, methodology, and verifiability of data constitutes a fundamental condition of credibility.

7. Crisis Communication. Crisis communication is one of the areas with the strongest influence on a state's international media image. During a crisis or negative event, withholding information, delaying communication, or providing

contradictory messages can create an information vacuum. In the digital-media era, such a vacuum can quickly be filled by unverified reports and disinformation circulating on social networks.

Under the conditions of real-time communication highlighted by Seib (2012), state institutions are compelled to communicate promptly with the public while decisions are being made. Therefore, crisis communication requires the earliest possible release of initial official information, avoidance of presenting unverified claims as facts, regular updating of information, designation of an authorized spokesperson, and provision of verifiable information to both domestic and foreign media.

DISCUSSION

The findings demonstrate that journalistic communication should be evaluated not as a secondary information instrument of foreign policy but as an autonomous communicative component of international relations. This conclusion is consistent with the concept of media diplomacy proposed by Gilboa (2001). In contemporary diplomacy, relations among the state, the media, and the public are becoming increasingly complex, and journalists can, in certain circumstances, act as active intermediaries in diplomatic processes.

From the perspective of Nye's (2004) concept of soft power, attracting the attention of international audiences is not sufficient in itself. Positive perceptions of a state also depend on the credibility of the source of communication. If communication becomes excessively propagandistic, it may increase audience skepticism rather than strengthen soft power.

The approaches of Cull (2009) and Pamment (2013) likewise emphasize that listening, dialogue, and the development of long-term relationships are more important in contemporary public diplomacy than one-way information transmission. Consequently, the mere objective of publishing more positive materials about the country cannot by itself constitute a strategic goal of Uzbekistan's media diplomacy. The primary task is to create a communication environment that international audiences and journalists regard as trustworthy.

Digital transformation further complicates this process. As Manor (2019) notes, the digitalization of diplomacy entails not only the use of new technological tools but also changes in how diplomatic institutions operate and interact with audiences. It is therefore advisable to manage cooperation with international media and digital communication as components of a single strategic system.

Several priority directions emerge for the development of Uzbekistan's media diplomacy. First, it is necessary to strengthen a permanent institutional system for working with international media and foreign correspondents. Second, opportunities should be expanded for foreign journalists to work throughout the country and communicate with state institutions, specialists, and independent experts. Third, a system should be developed for producing professional multimedia content in English and other major foreign languages for international audiences.

Fourth, international press tours and bilateral journalist exchange programs should be placed on a systematic basis. Fifth, crisis-communication protocols should be developed within government institutions, accompanied by regular professional training for responsible personnel. Sixth, it is important to develop professional monitoring and fact-checking mechanisms aimed at identifying disinformation about Uzbekistan in the international information space and responding to it on the basis of evidence.

Seventh, the participation of Uzbek journalists in international organizations, professional networks, conferences, and journalism exchange programs should be expanded. Eighth, it is advisable to establish a system for evaluating the effectiveness of media diplomacy not merely by the number of published materials but also by audience reach, media sentiment, source credibility, audience-engagement indicators, and long-term reputational change.

CONCLUSION

The study demonstrates that journalistic communication performs functions in contemporary international relations that extend far beyond the

transmission of information. Journalists, foreign correspondents, international news agencies, and media organizations constitute important communicative actors that influence the formation of international perceptions of states.

The effectiveness of media diplomacy depends less on the quantity of information than on its credibility, professional quality, timeliness, and relevance to the target audience. In this regard, an open media-relations system, access to information sources for foreign journalists, journalist exchanges, storytelling, visual and data journalism, crisis communication, and fact-checking constitute interconnected elements of contemporary media diplomacy.

For Uzbekistan, the principal strategic task in developing media diplomacy should be not merely to increase the volume of positive information about the country but to build a reputation among international audiences as a credible, open, and professional source of information. Uzbekistan's rich historical and cultural heritage, contemporary development processes, youth, science, tourism, sport, innovation, and human stories possess substantial communicative potential for international audiences.

Future research should empirically test these theoretical conclusions through content analysis of foreign media materials about Uzbekistan, assessment of their tone and framing characteristics, and expert surveys among foreign journalists.

REFERENCES

1. Cull, N. J. (2009). Public diplomacy: Lessons from the past. Figueroa Press.
2. Gilboa, E. (2001). Diplomacy in the media age: Three models of uses and effects. Diplomacy & Statecraft, 12(2), 1–28. https://doi.org/10.1080/09592290108406201
3. Manor, I. (2019). The digitalization of public diplomacy. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-04405-3
4. Nye, J. S., Jr. (2004). Soft power: The means to success in world politics. PublicAffairs.
5. Pamment, J. (2013). New public diplomacy in the 21st century: A comparative study of policy and practice. Routledge.
6. Seib, P. (2012). Real-time diplomacy: Politics and power in the social media era. Palgrave Macmillan. https://doi.org/10.1057/9781137010902

THE INTEGRATION OF HISTORICITY AND LOGICALITY IN THE SCHOLARLY LEGACY OF IBROHIM MO‘MINOV

Nasiba Komilovna Ibodova

PhD (Philology), Associate Professor

Asia International University

ibotovanasiba@gmail.com

Abstract. *This article analyzes the interrelation between the principles of historicity and logical consistency within the scholarly and philosophical legacy of Academician Ibrohim Mo‘minov. It examines the scholar’s methodological approaches to studying the history of socio-philosophical thought in Uzbekistan, his techniques for investigating historical phenomena within the context of specific eras, and his perspectives on the logical analysis of philosophical ideas. Furthermore, through the lens of his research on the legacies of Abu Rayhon Beruniy, Mirzo Abdulqodir Bedil, Ahmad Donish, and Amir Temur, the article explores the relationship between historical evidence and theoretical generalization. Finally, it substantiates the methodological significance of Mo‘minov’s scholarly legacy for the contemporary history of philosophy and the development of the social sciences and humanities.*

Keywords: *Ibrohim Mominov, historicity, logicality, history of philosophy, methodology, historical thinking, scientific legacy, socio-philosophical views, scientific analysis, national thought.*

INTRODUCTION

The spiritual development of any nation is determined, first and foremost, by the depth with which it studies its own historical memory, philosophical thought, and scientific heritage. Investigating scientific and philosophical perspectives from the past entails more than merely gathering historical data; it also requires identifying the reasons for their emergence, their internal logic, the laws governing their development, and their influence on subsequent eras. From this perspective, the integration of the principles of historicity and logical

consistency stands as a vital methodological requirement for philosophical research.

Academician Ibrohim Mo‘minov (1908–1974) holds a distinct place in the development of 20th-century Uzbek philosophy. He was a prominent scholar who conducted research on the history of philosophy, social thought, the legacy of Eastern thinkers, and the advancement of science in Uzbekistan. His scholarly work is significant for its systematic study of the national philosophical heritage and its interpretation of historical figures and ideas within the context of their specific socio-cultural environments. [1; 12].

Ibrohim Mo‘minov’s works on the history of socio-philosophical thought in Uzbekistan allow for the study of the formation and development of philosophical ideas in relation to their historical context. In particular, his research into the evolution of socio-philosophical thought during the late 19th and early 20th centuries serves as an important resource for understanding local Enlightenment-era movements, social transformations, and the development of national consciousness.[1; 31].

The purpose of this article is to analyze the manifestation of the principles of historicity and logicality within the scholarly legacy of Ibrohim Mo‘minov, to reveal their interconnection, and to substantiate the significance of the scholar’s methodological approaches for contemporary scientific research.

The study employs historical-comparative analysis, logical analysis, a systemic approach, and methods of scientific generalization. These approaches facilitate an analysis of Mo‘minov’s scholarly views in relation to the era in which he was active, the historical sources he examined, and his philosophical conclusions.

MAIN PART

The principle of historicism entails studying any phenomenon, idea, or social process in connection with the conditions of its emergence, its stages of development, and its historical transformations. According to this principle, analyzing a specific philosophical doctrine in isolation from the political,

economic, cultural, and scientific conditions of the era in which it arose may fail to yield a comprehensive scientific conclusion.

Logicality, on the other hand, focuses on determining the internal content of the phenomenon under study, the connections between concepts, the consistency of arguments and conclusions, and the substantiation of the reasoning process. It elevates the inquiry from a mere description of historical data to the level of theoretical analysis and generalization.

Historicism and logicality are complementary methodological principles. While historicism reveals the conditions and the sequence in which a phenomenon emerged, logicality uncovers its internal content and the essential connections within its development. Without historicism, logical analysis risks becoming detached from historical reality; conversely, without logical analysis, a historical account may remain nothing more than a simple enumeration of facts.

The integration of these two principles is particularly significant when studying the history of philosophy. This is because philosophical ideas do not merely represent the personal views of individual thinkers; rather, they manifest as intellectual phenomena that took shape within a specific historical context, engaged with preceding scholarly traditions, and exerted an influence on the subsequent evolution of thought. Analyzing Ibrohim Mo‘minov’s scholarly research from this perspective reveals that, alongside his study of historical sources, he sought to determine the content and social significance of the ideas expressed within them. His research on the history of philosophy—including his work dedicated to the developmental stages of socio-philosophical thought in Uzbekistan—aims to integrate historical data with theoretical analysis. [1; 52].

An important methodological aspect here is that when evaluating a historical figure or an idea, it is necessary to determine not only its significance for the present day but also the role it played within its own era. At the same time, merely describing the historical context is insufficient; one must also

analyze the relationships between the core concepts, the methods of argumentation, and the conclusions found within a thinker's views.

Thus, the synthesis of the historical and the logical serves as an effective methodological criterion for researching Muminov's scholarly legacy.

The study of the history of socio-philosophical thought in Uzbekistan constituted a significant area of Ibrohim Muminov's academic work. His book, published in 1955 and titled "From the History of the Development of Socio-Philosophical Thought in Uzbekistan in the Late 19th and Early 20th Centuries", is dedicated to examining the evolution of socio-philosophical ideas in Uzbekistan during that period. [2; 47].

Bibliographic information for this work is also recorded in the catalog of the Russian State Library. This source serves as a primary bibliographic reference for studying Muminov's scholarly legacy. [3; 53].

The scholar's research in this field demonstrates the significance of the principle of historicism. To understand the socio-philosophical thought of the late 19th and early 20th centuries, it is essential to take into account the political and cultural shifts of that era, the movements for enlightenment, reforms within the educational system, and society's own visions for its future.

A key aspect of the historical approach is that it allows one to view philosophical thought not as a static collection of pre-existing ideas, but as an evolving process. Thinkers from different periods interpreted issues based on the needs of their own times, the prevailing level of knowledge, and the existing social relations. Consequently, examining their views in connection with their specific historical context is a fundamental requirement for scholarly objectivity.

Mominov's inquiries into the history of philosophy also enable the study of the development of local thought in relation to broader historical processes. In this context, alongside identifying the unique characteristics of the national philosophical heritage, it is also necessary to examine its connections with other cultures and scientific traditions.

When evaluating the scholar's research through the lens of the principle of historicism, there is one additional aspect that must be taken into account. He conducted his scholarly work within the complex ideological landscape of the 20th century. Consequently, the theoretical approaches found in his writings cannot be evaluated in isolation from the scientific institutions, the prevailing ideology, and the research possibilities of that era. A contemporary researcher must analyze Muminov's scholarly findings not only in the context of the historical conditions but also in terms of the sources utilized and the methodological options available at the time. [4; 13].

Thus, the significance of the principle of historicity in Muminov's legacy is manifested, first and foremost, in the ability to study philosophical thought as an integral component of the historical process, to identify the conditions under which ideas emerged, and to explain their influence on subsequent development.

While the collection and description of historical sources constitute a necessary stage of scientific research, they do not represent the ultimate goal. A crucial task of scholarly inquiry is to determine the relationships between existing data, interpret their content, and draw evidence-based conclusions. It is precisely in this process that the importance of logical analysis and theoretical generalization becomes paramount.

An analysis of Ibrohim Muminov's research into the history of philosophy reveals that his scholarly legacy should be viewed not merely as a collection of historical data, but as a body of work aimed at understanding the evolution of socio-philosophical thought. His writings possess an analytical capacity that serves to uncover the connections between historical processes and philosophical ideas. [5; 22].

One of the significant areas within Ibrohim Mo'minov's scholarly legacy concerns the study of the lives, creative work, and scientific-philosophical views of Eastern thinkers. In this regard, the legacy of figures such as Abu Rayhon Beruniy and Mirzo Abdulqodir Bedil—as well as the assessments of the personality and historical role of Amir Temur—hold particular importance. In

academic research dedicated to Mo‘minov’s body of work, these topics are examined in the context of his contribution to the development of national philosophical thought. [6; 14].

In research dedicated to the scholarly legacy of I. Mo‘minov, the significance of thinkers such as Beruni and Bedil within Uzbek philosophical thought is specifically noted. [4; 37]. This situation indicates the existence of an important scholarly avenue for exploring the historical continuity of Eastern philosophy and the interconnections between ideas across different eras.

Thus, the synthesis of historicity and logical rigor—as exemplified in the legacies of Beruni, Bedil, and Amir Timur—underscores the necessity of studying historical phenomena within the context of their own times, comparing sources, and drawing conclusions based on evidence.

Today, one of the key tasks facing the history of philosophy and the social sciences and humanities is the study of national scholarly heritage through the lens of new methodological criteria. This process entails re-examining historical sources, critically analyzing previously established interpretations, and benchmarking new scholarly findings against international research.

Consequently, the contemporary significance of Muminov’s scholarly legacy extends beyond the mere preservation of past academic achievements. Re-examining his works through the principles of historicity and logical rigor offers contemporary researchers valuable experience in the culture of scholarly analysis, the handling of sources, and the formulation of well-founded conclusions.

CONCLUSION

Studying the scholarly and philosophical legacy of Ibrohim Mo‘minov based on the principles of historicism and logic allows for a deeper understanding of his place in the history of Uzbek philosophy and social thought. The scholar’s research into the history of social and philosophical thought in Uzbekistan demonstrates the importance of examining philosophical ideas in

relation to specific historical conditions, cultural environments, and social processes.

Overall, the scholarly legacy of Ibrohim Mo‘minov holds significant scientific importance for studying the history of national philosophical thought, understanding the heritage of Eastern thinkers, and integrating historical knowledge with theoretical analysis. A systematic examination of his works—grounded in the criteria of historicity and logical consistency—serves to deepen the understanding of the history of Uzbek philosophy and enrich the methodological foundations of contemporary scholarly research.

REFERENCES

1. Mo‘minov, I. M. *Из истории развития общественно-философской мысли в Узбекистане в конце XIX и начале XX в.* — Toshkent, 1955. — 84 b.
2. Mominov, I. M. *Очерки истории общественно-философской мысли в Узбекистане.* — Toshkent: Fan, 1977. Asar haqidagi bibliografik ma’lumot: University of Hildesheim, “Uzbek Philosophy”.
3. Ibodova, N. K. Ibrahim Muminov’s Scientific and Philosophical Heritage and Subjective Approaches to His Scientific Activity under the Rule of the Former Ideology // *International Journal on Integrated Education.* — 2022. — Vol. 5, No. 6.
4. Ibotova N.K. ‘Ibrohim Mo‘minov ilmiy-falsafiy merosining umuminsoniy ahamiyati’ mavzusidagi falsafa doktori (PhD) dissertatsiyasi avtoreferati. 2023.
5. Yadgarov, B. Sh. Natural-Scientific Teachings of Abu Rayhon Beruni in the Interpretation of Ibragim Muminov: Values and Cultural Dialogue // *Oriental Journal of Social Sciences.* — 2026.
6. Jalalov, V. İ. Mominov ve Felsefi Çalışmalar // *Gazi Türkiyat.* — 2010. — № 7.
7. Mo‘minov, T. A. Ibrohim Mo‘minovning ilmiy maktabi va uning milliy kadrlar tayyorlashdagi xizmatlari // *Biruni Journal.* — 2026.

HISTORY OF PRESCHOOL EDUCATION SYSTEMS IN CHINA, JAPAN AND UZBEKISTAN: A COMPARATIVE ANALYSIS

Yudosheva Feruza Yashin qizi

Lecturer at Asia International University

yoldoshevaferuza769@gmail.com

Abstract. *The article presents a comparative analysis of the history of preschool education systems in China, Japan and Uzbekistan. Using document analysis, the study identifies key stages, legislative reforms and enrollment trends in the three countries. The findings show that state involvement and legal frameworks are decisive for system development.*

Keywords: *preschool education, kindergarten, China, Japan, Uzbekistan, education policy, comparative education, enrollment rate.*

INTRODUCTION

Early childhood is a decisive period for children's physical, cognitive and social development, and many countries now treat preschool education as a full part of the education system. China, Japan and Uzbekistan have followed different historical paths in building such systems. Japan opened its first state kindergarten in 1876, China established its first kindergarten in 1903 on the Japanese model, and Uzbekistan, after the Soviet period and a post-independence decline, has carried out rapid reforms since 2017. Comparative studies of these three countries remain rare in Uzbek scholarship. The aim of this study is to identify the main historical stages of preschool education in the three countries and to compare them in order to draw lessons for Uzbekistan.

METHODS

The study used a qualitative design combining historical-comparative analysis and document analysis. The sources included peer-reviewed articles, official materials of government bodies, such as the Japanese Ministry of Education, Culture, Sports, Science and Technology and the legislation of

Uzbekistan, and reports of international organizations such as the World Bank. The three systems were compared according to five criteria: the date of the first kindergarten and its foreign model, types of institutions, key legislation, periods of crisis, and enrollment levels.

RESULTS

Japan

The first Japanese preschool institution opened in Kyoto in December 1875 on the Froebelian model but operated for only a year and a half. The real forerunner of the modern kindergarten opened in November 1876 at the Tokyo Women's Normal School, and its regulations became the model for most later kindergartens (Ministry of Education, Culture, Sports, Science and Technology [MEXT], n.d.). The Kindergarten Order of 1926 stimulated the growth of public and private kindergartens (Encyclopaedia Britannica, n.d.). After 1947 a dual system emerged: kindergartens (yochien) became part of school education, while day care centres (hoikusho) functioned as welfare institutions. Integrated centres (nintei kodomoen) were introduced in 2006, and since 1 October 2019 kindergarten and nursery fees for children aged three to five have been waived (Immigration Services Agency of Japan, n.d.).

China

China's first kindergarten was established in 1903 in Wuhan under the Qing dynasty. Its curriculum came from Japan, its staff were Japanese, and even the Chinese term *youzhiyuan* was borrowed from the Japanese *yochien* (Li et al., 2016). By 1949 the country had about 1,300 kindergartens with 130,000 children. Rapid expansion with Soviet assistance in 1949–1957 was followed by two decades of closures during the political turmoil of 1958–1977. After a recovery in 1978–1993, marketization reduced the share of public kindergartens from 86% in 1997 to 30% in 2011. The 2010 national education plan reversed this trend, and gross enrollment in three-year preschool education rose from 35.9% in 2001 to 70.5% in 2014 (Li et al., 2016). By 2023 more than 90% of preschool-age children were enrolled, and the country's first Preschool

Education Law, adopted on 8 November 2024, took effect on 1 June 2025 (Sixth Tone, 2024).

Uzbekistan

For centuries the upbringing of young children in Uzbekistan rested mainly with the family and the *mahalla*. Modern preschool institutions developed in the twentieth century within the unified Soviet education system. After independence the sector declined: over twenty years the number of preschools fell by almost half, and in 2012 enrollment stood at only 23.3% (World Bank, 2018). A new stage began in September 2017 with the creation of the Ministry of Preschool Education (World Bank, 2018), and in 2019 the Law "On Preschool Education and Upbringing" established the legal basis of the sector (Republic of Uzbekistan, 2019). Between 2017 and 2025 enrollment rose from 27% to 75%, supported by home-based preschool models and mobile kindergartens known as Aqlvoy buses for remote areas (World Bank, 2026).

DISCUSSION

The comparison reveals three common patterns. First, all three systems were built on foreign models: Japan adopted the Froebelian kindergarten, China borrowed it through Japan, and the Soviet model later shaped both China and Uzbekistan. Second, China and Uzbekistan followed a similar path of decline and recovery. In both countries preschool education contracted when the state withdrew, through privatization in China and economic transition in Uzbekistan, and expanded rapidly once the government declared it a priority. This confirms that state funding and leadership are the main drivers of access. Third, a stable legal framework protects the system from shocks. Japan regulated kindergartens as early as 1926 and developed without major breakdowns, whereas China lacked a dedicated law for decades. Uzbekistan's 2019 law is therefore an important safeguard for its recent gains.

Rapid growth also raises concerns about quality. In China, limited access, high fees and weak oversight of private kindergartens have been identified as key problems (Li et al., 2016). For Uzbekistan, Japan's fee-free policy and

China's renewed emphasis on public provision offer useful reference points for the next stage. The study is limited by its reliance on secondary and English-language sources, and Soviet-era statistics for Uzbekistan require further research.

CONCLUSION

Although preschool education in China, Japan and Uzbekistan developed under different conditions, common patterns can be traced. Japan pioneered the modern kindergarten in Asia and developed it on a stable legal basis. China passed through several cycles of crisis and recovery before adopting a dedicated law in 2024. Uzbekistan nearly tripled enrollment within eight years. The experience of the three countries shows that active state involvement, sustainable funding and a solid legal framework are decisive for the development of preschool education. Uzbekistan's next task is to maintain the achieved coverage while improving quality, teacher qualifications and the monitoring of non-state providers.

REFERENCES

1. Encyclopaedia Britannica. (n.d.). Education: Japan. In *Encyclopaedia Britannica.* https://britannica.com/topic/education/Patterns-of-education-in-non-Western-or-developing-countries

2. Immigration Services Agency of Japan. (n.d.). *Free tuition for kindergartens and nursery schools* [Leaflet]. https://www.moj.go.jp/isa/content/001384242.pdf

3. Li, H., Yang, W., & Chen, J. J. (2016). From 'Cinderella' to 'Beloved Princess': The evolution of early childhood education policy in China. *International Journal of Child Care and Education Policy, 10*(1), Article 2. https://doi.org/10.1186/s40723-016-0018-2

4. Ministry of Education, Culture, Sports, Science and Technology. (n.d.). The opening of kindergartens. In *Japan's modern educational system.* https://www.mext.go.jp/b_menu/hakusho/html/others/detail/1317267.htm

5. Republic of Uzbekistan. (2019). *On preschool education and upbringing: Law of the Republic of Uzbekistan (No. ZRU-595).* Tashkent.

“MAHALLANI RIVOJLANTIRISH VA JAMIYATNI YUKSALTIRISH YILI”DA BUXORO VILOYATI MAHALLARIDA AMALGA OSHIRILGAN ISHLAR

(2026 yil davomida)

Yuldashova Qunduz Bozorovna

Buxoro davlat universiteti tadqiqotchisi

Telefon:+998(91)4160639

kunduzbazarovna85@gmail.com

Annotatsiya:*Ushbu materialda 2026 yil — “Mahallani rivojlantirish va jamiyatni yuksaltirish yili” doirasida Buxoro viloyati mahallalarida amalga oshirilayotgan ijtimoiy-iqtisodiy islohotlar, aholi bandligini ta’minlash va kambag‘allikni qisqartirish chora-tadbirlari yoritilgan. Xususan, “mahalla yettiligi” faoliyatini samarali tashkil etish, mahallalarning iqtisodiy salohiyatini oshirish, tadbirkorlik sub’ektlarini moliyaviy qo‘llab-quvvatlash, “Mahalla loyihasi” asosida hududlarni ixtisoslashtirish, kambag‘al oilalar daromadlarini ko‘paytirish hamda “yashil” infratuzilmani rivojlantirish masalalari tahlil qilingan. Shuningdek, mahallalar faoliyatini baholash, muvofiqlashtirish va boshqarish mexanizmlarini takomillashtirish, mahalla binolarini zamonaviylashtirish, “Raqamli mahalla” platformasini joriy etish hamda davlat organlarining mahallalar oldidagi mas’uliyatini kuchaytirishga qaratilgan vazifalar bayon etilgan. Materialda Buxoro viloyati uchun belgilangan bandlik, kambag‘allikni qisqartirish va kambag‘allikdan xoli mahallalar sonini oshirish bo‘yicha maqsadli ko‘rsatkichlarga alohida e’tibor qaratilgan.*

Kalit so‘zlar: *Mahalla, mahalla yettiligi, Buxoro viloyati, mahallani rivojlantirish, jamiyatni yuksaltirish, bandlik, kambag‘allikni qisqartirish, aholi farovonligi, tadbirkorlik, moliyaviy qo‘llab-quvvatlash, oilaviy tadbirkorlik, mahalla loyihasi, iqtisodiy ixtisoslashtirish, elektron savdo, muammoli kreditlar, kambag‘al oilalar, yashil infratuzilma, quyosh elektr stansiyalari, raqamli mahalla, mahalla infratuzilmasi, O‘zbekiston — 2030 strategiyasi.*

Аннотация: *В данном материале рассматриваются социально-экономические реформы, меры по обеспечению занятости и сокращению бедности в махаллах Бухарской области в рамках 2026 года – «Года развития махалл и социального подъема». В частности, анализируются вопросы эффективной организации деятельности «семи махалл», повышения экономического потенциала махалл,*

финансовой поддержки хозяйствующих субъектов, специализации территорий на основе «Проекта махалла», повышения доходов малоимущих семей и развития «зеленой» инфраструктуры. Также намечены задачи по совершенствованию механизмов оценки, координации и управления деятельностью махалл, модернизации зданий махалл, внедрению платформы «Цифровая махалла» и усилению подотчетности государственных органов перед махаллами. В материале особое внимание уделяется целевым показателям занятости, сокращения бедности и увеличения числа махалл, свободных от бедности, установленным для Бухарской области.

Ключевые слова: *Махалла, Махалла семь, Бухарская область, развитие Махаллы, развитие общин, занятость, сокращение бедности, благосостояние населения, предпринимательство, финансовая поддержка, семейное предпринимательство, проект Махалла, экономическая специализация, электронная коммерция, проблемные кредиты, бедные семьи, зеленая инфраструктура, солнечные электростанции, цифровая Махалла, инфраструктура Махаллы, стратегия Узбекистана до 2030 года.*

Abstract: *This material discusses the socio-economic reforms, measures to ensure employment and reduce poverty in the mahallas of the Bukhara region within the framework of 2026 - the "Year of Mahalla Development and Society Upliftment". In particular, the issues of effective organization of the activities of the "mahalla seven", increasing the economic potential of mahallas, financial support for business entities, specialization of territories based on the "Mahalla Project", increasing the income of poor families and developing "green" infrastructure are analyzed. Also, tasks are outlined to improve the mechanisms for assessing, coordinating and managing the activities of mahallas, modernizing mahalla buildings, introducing the "Digital Mahalla" platform, and strengthening the accountability of state bodies to mahallas. The material pays special attention to the target indicators for employment, poverty reduction and increasing the number of poverty-free mahallas set for the Bukhara region.*

Keywords: *Mahalla, Mahalla seven, Bukhara region, Mahalla development, community development, employment, poverty reduction, population welfare, entrepreneurship, financial support, family entrepreneurship, Mahalla project, economic specialization, e-commerce, problem loans, poor families, green infrastructure, solar power plants, digital Mahalla, Mahalla infrastructure, Uzbekistan - 2030 strategy.*

Buxoro viloyatida “mahalla yettiligi” faoliyatini samarali tashkil etish orqali mazkur vazifalarni amalga oshirish, mahallalar iqtisodiy salohiyatini

oshirish va aholi farovonligini ta’minlashga qaratilgan ishlar izchil davom ettirilmoqda.Bandlik va kambag‘allikni qisqartirish bo‘yicha vazifalar Kambag‘allikni qisqartirish va aholi bandligini ta’minlashga qaratilgan vazifalarga muvofiq respublika bo‘yicha 2026 yilda 1 mln aholini doimiy ish bilan ta’minlash, 181 ming oilani kambag‘allikdan chiqarish, kambag‘allikdan xoli mahallalar sonini 2,5 barobar oshirib 3,5 mingtaga yetkazish hamda ishsizlik va kambag‘allik darajasini 4,5 foizga tushirish bo‘yicha chora-tadbirlar amalga oshirilmoqda. Buxoro viloyatida mazkur vazifalar doirasida 51 ming nafar aholini doimiy ish bilan ta’minlash, 10 ming oilani kambag‘allikdan chiqarish va kambag‘allikdan xoli mahallalar sonini 199 taga yetkazish belgilangan. Tadbirkorlikni rivojlantirish va moliyaviy qo‘llab-quvvatlash, belgilangan vazifalarni amalga oshirish maqsadida mahallalarda kichik va o‘rta biznesni rivojlantirish uchun 140 trln so‘m miqdorida kredit ajratilishi belgilangan. 2025 yilda ushbu ko‘rsatkich 130 trln so‘mni tashkil etgan. Shuningdek, “oilaviy tadbirkorlik” dasturlari doirasida 5,6 trln so‘m resurs yo‘naltiriladi.Jumladan, import qilingan va sertifikatli nasli chorva mollari hamda tuyachilikni rivojlantirish uchun 100 mln so‘mgacha, uy mehmonxonasi tashkil etish, kichik hajmli muzlatkichlar, mahsulotni saqlash va qayta ishlash mini texnologiyalari uchun 150 mln so‘mgacha garovsiz kredit ajratish imkoniyati yaratilmoqda. Shu bilan birga, chegara va anklav hududida joylashgan 563 ta mahalla fuqarolar yig‘inida tadbirkorlik loyihalari uchun kredit miqdori 1 mlrd so‘mgacha oshiriladi. Ayni paytda mazkur ko‘rsatkich 300 mln so‘mni tashkil etmoqda. Elektron savdo mexanizmlarini joriy etish “Oilaviy tadbirkorlik” krediti doirasida uskuna va xom ashyoni sotib olishda mavjud elektron marketpleyslar orqali mahsulotlarni erkin xarid qilish mexanizmini yo‘lga qo‘yish rejalashtirilmoqda. Ayni vaqtda xaridlar asosan “Smart market” elektron platformasi orqali amalga oshirilmoqda. Muammoli kreditlar bo‘yicha rag‘batlantirish mexanizmi “Oilaviy tadbirkorlik” dasturi bo‘yicha muammoli kreditlarni undirish maqsadida yangi rag‘batlantirish mexanizmi joriy etilmoqda. Unga ko‘ra, hokim yordamchisi tomonidan 2022 yilgacha ajratilgan

kreditlarning muammoli qismi qaytarilgan taqdirda ushbu summaning 20 foizi, 2025 yilgacha ajratilgan kreditlar doirasidagi muammoli kreditlarning qaytimi ta’minlangan hollarda esa qaytarilgan mablag‘ning 10 foizi bonus sifatida ajratilishi nazarda tutilgan. **Mahallalar faoliyatini tashkil etish bo‘yicha o‘rganish natijalari** o‘rganishlarga ko‘ra, mahallalarda faoliyatni tashkil etish bilan bog‘liq ayrim fikr va takliflar ham bildirilgan. Xususan, 8 foiz holatda KPI baholash tizimida inson omili mavjudligi qayd etilgan. 5 foiz holatda KPI tizimi o‘rniga rahbar tomonidan baholash tizimiga o‘tish zarurligi bildirilgan. Shuningdek, 12 foiz holatda faoliyatga asossiz aralashish holatlari mavjudligi qayd etilgan. 45 foiz holatda faoliyatni hokimlik orqali muvofiqlashtirish maqsadga muvofiqligi, 29 foiz holatda bandlik organi orqali muvofiqlashtirish zarurligi, 14 foiz holatda esa mahalla mustaqil boshqaruv organi sifatida faoliyat yuritishi kerakligi bayon etilgan.“Mahalla loyihasi” doirasida iqtisodiy ixtisoslashtirish“Mahalla loyihasi” doirasida respublika mahallalarini chuqur ixtisoslashtirish chora-tadbirlari belgilangan. Ushbu maqsadlar uchun tijorat banklari tomonidan 2026 yilda 17 trln so‘mlik kredit ajratilishi rejalashtirilmoqda. Bunda mahallada mahsulot yetishtirish uchun olingan kreditning 4 foizi, uni qayta ishlash loyihalarida esa 6 foizi Tadbirkorlik kompaniyasi tomonidan qoplab beriladi. Kredit mablag‘lari banklar kesimida quyidagicha taqsimlanadi. Xalq banki tomonidan 2,5 trln so‘m, O‘zsanoatqurilishbank tomonidan 2,3 trln so‘m, Milliy bank tomonidan 2,1 trln so‘m, Biznesni rivojlantirish banki va Agrobank tomonidan 1,6 trln so‘mdan, Asaka bank tomonidan 1,4 trln so‘m, Mikrokreditbank tomonidan 1,3 trln so‘m, Aloqa bank tomonidan 600 mlrd so‘m, Turon bank tomonidan 500 mlrd so‘m hamda boshqa banklar tomonidan 3,1 trln so‘m kredit ajratilishi rejalashtirilgan. Kambag‘al oilalar daromadini oshirish choralari ,Kambag‘al oilalar daromadini ko‘paytirish maqsadida joriy yilda 2 ming gektar o‘rmon yerlarida tut plantatsiyalari tashkil etish belgilangan. Ushbu tashabbus doirasida 4 ming kambag‘al oilaga tutzor tashkil qilish uchun 50 sotixdan yer maydoni 10 yil muddatga bepul foydalanish uchun beriladi. Hududlar kesimida

Qoraqalpog‘istonda 250 gektar, Buxoro viloyatida 225 gektar, Qashqadaryo viloyatida 220 gektar, Surxondaryo viloyatida 215 gektar, Farg‘ona viloyatida 200 gektar, Jizzax va Namangan viloyatlarida 190 gektardan, Samarqand viloyatida 150 gektar, Toshkent viloyatida 128 gektar, Navoiy viloyatida 80 gektar, Andijon viloyatida 76 gektar, Sirdaryo va Xorazm viloyatlarida 37 gektardan yer maydonlari ajratilishi rejalashtirilgan.“Yashil” infratuzilma va energiya loyihalari “Og‘ir” mahallalardagi 63 ming xonadonni “yashil” ta’mirdan chiqarish bo‘yicha ikki yillik dastur amalga oshiriladi. Shuningdek, ixtisoslashuv darajasi yuqori bo‘lgan yana 1 mingta ilg‘or mahallada kichik quyosh elektr stansiyalari qurilib, mahallalarga 7 yil muddatga foizsiz lizing asosida beriladi. Hisob-kitoblarga ko‘ra, ushbu loyihalar 3–4 yilda o‘zini qoplaydi hamda keyingi 20–25 yil davomida mahalla budjetiga 400–500 mln so‘m atrofida daromad keltirishi mumkin. Mahallani rivojlantirish va jamiyatni yuksaltirish” yilida ustuvor yo‘nalishlar bo‘yicha islohotlar dasturlari va “O‘zbekiston — 2030” strategiyasini amalga oshirish bo‘yicha davlat dasturi to‘g‘risida. [36]“O‘zbekiston — 2030” strategiyasi hamda O‘zbekiston Respublikasi Prezidentining O‘zbekiston xalqi va Oliy Majlisga Murojaatnomasida belgilangan islohotlar ijrosini samarali tashkil etish maqsadida qaror Qabul qilingan ya’ni quyidagilar mahallani rivojlantirish bo‘yicha amalga oshiriladigan ustuvor islohotlarning asosiy yo‘nalishlari etib belgilangan. Mahallalarda 10 mingdan ziyod ishlab chiqarish va xizmat ko‘rsatish loyihalarini ishga tushirish orqali qo‘shimcha 100 mingta yangi ish o‘rnini yaratish; kambag‘allik va ishsizlikdan xoli mahallalar sonini 3,5 mingtaga yetkazish; mahallalar infratuzilmasini takomillashtirishga 20 trillion so‘m mablag‘ yo‘naltirib, ularga Yangi O‘zbekiston qiyofasini olib kirish; mahallalardagi muammolarni bir vaqtning o‘zida tezkor hal etishda barcha davlat organlariga ma’suliyatni yuklab, ijroni 24/7 rejimda onlayn nazorat qilish amaliyotini yo‘lga qo‘yish belgilangan. Mahalla fuqarolar yig‘ini binolari

[36] “Mahallani rivojlantirish va jamiyatni yuksaltirish” yilida ustuvor yo‘nalishlar bo‘yicha islohotlar dasturlari va “O‘zbekiston — 2030” strategiyasini amalga oshirish bo‘yicha davlat dasturi to‘g‘risida. O‘zbekiston Respublikasi Prezidentining Farmoni, 16.02.2026 yildagi PF-22-son

masalasi ham muhokama qilindi. Bugungi kunda 99 ta mahalla o‘z binosiga ega emas, yana 84 tasining binosi shaharsozlik normalariga mos kelmaydi, 4 ta bino esa avariya holatida ekani qayd etildi.Tadbirkorlar tomonidan mahalla binolarini xususiy sheriklik asosida qurish, binolarning bir qismiga “yettilik”ni bepul joylashtirish, qolgan qismida esa aholi bandligini ta’minlashga xizmat qiladigan kichik sexlar va servis obektlarini tashkil etish taklif qilindi. Prezident mazkur takliflarni qo‘llab-quvvatlab, mutasaddilarga “Raqamli mahalla” platformasini to‘liq ishga tushirish, mahallalarning doimiy daromad manbalarini kengaytirish, Mahallani rivojlantirish milliy instituti faoliyatini tashkil etish hamda mahalla binolarini xususiy sheriklik asosida barpo qilish bo‘yicha topshiriqlar berdi. [37]O‘zbekiston Respublikasi Prezidentining “2022 — 2026-yillarga mo‘ljallangan Yangi O‘zbekistonningtaraqqiyot strategiyasi to‘g‘risida” 2022-yil 28-yanvardagi PF-60-son Farmoni ijrosini ta’minlash, Buxoro viloyati hududlarida sanoat, qishloq xo‘jaligi va xizmatlar sohasining kelgusi besh yildagi istiqbollarini hamda har bir tuman va shaharning “o‘sish nuqtalari”ni belgilash, ijtimoiy sohani rivojlantirish orqali aholi salomatligi hamda turmush darajasini yanada yaxshilash maqsadida Vazirlar Mahkamasi qaror qilagan ya’ni hududlarni kompleks ijtimoiy-iqtisodiy rivojlantirish bo‘yicha belgilangan yangi tartib asosida Buxoro viloyatining tuman va shaharlaridagi mavjud muammo va imkoniyatlar chuqur o‘rganilgan holda, hududlar kesimida muhim loyihalar shakllantirilganligi va mahalliy jamoatchilik ishtirokida keng muhokama qilinganligi ma’lumot uchun qabul qilingan . Buxoro viloyatida 2022 — 2026-yillarda yalpi hududiy mahsulot hajmini 1,4 baravar, sanoat mahsulotlarihajmini 1,5 baravarga, qishloq xo‘jaligi mahsulotlari ishlab chiqarishni 1,2 baravar, xizmatlar hajmini 3,1 baravarhamda qurilish ishlari hajmini 1,5 baravarga oshirishni nazarda tutuvchi shahar va tumanlar kesimidagi maqsadli ko‘rsatkichlar parametrlar. Iqtisodiy taraqqiyot va kambag‘allikni qisqartirish vazirligi Investitsiyalar va tashqi savdo vazirligi hamda Buxoro

[37] 2022 — 2026-yillarda Buxoro viloyati hududlarini kompleks ijtimoiy-iqtisodiy rivojlantirishva aholi turmush darajasini yanada yaxshilashga doir qo‘shimcha chora-tadbirlarto‘g‘risida. O‘zbekiston respublikasi vazirlar mahkamasining qarori, 27.04.2022 yildagi 215-son.

viloyati hokimligi bilan birgalikda: 2022-yil uchun tasdiqlangan maqsadli ko‘rsatkichlar parametrlariga erishish uchun aniq manzilli chora-tadbirlarni amalga oshirilgan.

Muxtasar qilib aytganda, 2026 yil -“Mahallani rivojlantirish va jamiyatni yuksaltirish yili”da Buxoro viloyati mahallalarida amalga oshirilayotgan islohotlar aholi farovonligini oshirish, bandlikni ta’minlash, kambag‘allikni qisqartirish va mahallalarning iqtisodiy salohiyatini yuksaltirishga qaratilgani bilan ahamiyatlidir. Mahalla yettiligi faoliyatini samarali tashkil etish, tadbirkorlikni qo‘llab-quvvatlash, imtiyozli kreditlar ajratish va mahallalarni iqtisodiy ixtisoslashtirish orqali yangi ish o‘rinlari yaratish uchun keng imkoniyatlar shakllantirilmoqda. Buxoro viloyati uchun belgilangan 51 ming nafar aholini doimiy ish bilan ta’minlash, 10 ming oilani kambag‘allikdan chiqarish va kambag‘allikdan xoli mahallalar sonini 199 taga yetkazish kabi maqsadli ko‘rsatkichlar mahalliy darajadagi islohotlarning aniq natijaga yo‘naltirilganini ko‘rsatadi. Shu bilan birga, “Mahalla loyihasi”, oilaviy tadbirkorlik, elektron savdo mexanizmlari, tut plantatsiyalarini tashkil etish hamda “yashil” energetika loyihalari aholi daromadlarini oshirish va mahallalarning o‘zini o‘zi ta’minlash imkoniyatlarini kengaytirishga xizmat qiladi. Umuman, mahallani rivojlantirish jarayonida faqat iqtisodiy ko‘rsatkichlarga emas, balki boshqaruv samaradorligi, raqamlashtirish, infratuzilmani yaxshilash va mahallaning mustaqilligini kuchaytirishga ham alohida e’tibor qaratish muhim. Belgilangan vazifalarning izchil va manzilli amalga oshirilishi Buxoro viloyatida barqaror iqtisodiy o‘sishni ta’minlash, yangi ish o‘rinlari yaratish, kambag‘allikni qisqartirish va aholi turmush darajasini yanada yaxshilash uchun mustahkam zamin yaratadi.

ADABIYOTLAR RO‘YXATI

Qonunlar va normativ-huquqiy hujjatlar

1.“Mahallani rivojlantirish va jamiyatni yuksaltirish” yilida ustuvor yo‘nalishlar bo‘yicha islohotlar dasturlari va “O‘zbekiston — 2030” strategiyasini amalga oshirish bo‘yicha davlat dasturi to‘g‘risida. O‘zbekiston Respublikasi Prezidentining Farmoni, 16.02.2026 yildagi PF-22-son

2.Respublika «Mahalla» xayriya jamg‘armasini tashkil etish to‘g‘risida«gi 3. O‘zbekiston Respublikasi Prezidentining Farmoni, «O‘zbekiston ovozi». T., 1992 y. 13 sentabr;

3.O‘zbekiston Respublikasida mahalliy hokimiyat organlarini qayta tuzish to‘g‘risidagi O‘zbekiston Respublikasining qonuni. T. 1992.

4.2022 — 2026-yillarda Buxoro viloyati hududlarini kompleks ijtimoiy-iqtisodiy rivojlantirishva aholi turmush darajasini yanada yaxshilashga doir qo‘shimcha chora-tadbirlarto‘g‘risida. O‘zbekiston respublikasi vazirlar mahkamasining qarori, 27.04.2022 yildagi 215-son.

A TWO-LAYER MODEL OF PRAGMATIC STRATEGIES IN HOROSCOPE TEXTS

Jalolova Gulkhayo

Teacher, National University of Uzbekistan

E-mail: jalolovagulhayo343@gmail.com

https://orcid.org/0009-0008-2466-0309

Abstract. *The thesis proposes a two-layer model of pragmatic strategies in English and Uzbek horoscopes: a universal-cognitive layer grounded in reader psychology and a language- and culture-specific layer shaped by grammar and culture. The model describes shared communicative logic and language-specific means simultaneously and supports translation.*

Keywords: *pragmatic strategy, Barnum effect, hedging, horoscope, contrastive pragmatics.*

INTRODUCTION

A horoscope must suit any reader and, at the same time, feel as if it were addressed to that reader personally. It also has to sound authoritative while protecting its author from responsibility for a prediction that may not come true. This double tension makes horoscopes a rich material for contrastive pragmatics: every sentence of the text has to balance persuasion against caution.

Pragmatic strategies of persuasive texts have usually been described either in terms of universal mechanisms, such as Grice's cooperative principle (Grice, 1975) and politeness theory (Brown & Levinson, 1987), or in terms of the grammatical means of a particular language, such as modal verbs and hedges (Lakoff, 1972; Palmer, 2001; Hyland, 2019). When two typologically different languages are compared, these two perspectives are often mixed: a difference in grammatical means is taken for a difference in pragmatic intention, or, conversely, a shared intention hides culture-specific content.

The aim of the study is to describe the pragmatic strategies of English and Uzbek horoscopes within a single model that separates what the two languages share from what is specific to each. To achieve this aim, the following tasks were set: to identify the pragmatic strategies used in horoscopes of both languages; to determine which of them rely on universal mechanisms of perception; and to establish how language typology and culture shape the means by which the remaining strategies are realized.

The material comprises daily and weekly horoscopes collected in 2026 from English (horoscope.com, astrostyle.com) and Uzbek (darakchi.uz, uznewz.com) sources: a daily corpus of about 32,800 English and 31,000 Uzbek words and a weekly corpus of 144 English and 157 Uzbek texts. Descriptive, comparative-typological and pragmatic methods were applied; frequencies were normalized per 1,000 words to compare corpora of different size.

MAIN PART

The analysis identified nine pragmatic strategies that serve the purpose described above: vagueness, generalization, hedging, direct address, presupposition, positive politeness, temporal deixis, rhetorical questions and exclamations, and positive evaluative vocabulary. We propose to describe these strategies as a two-layer model.

The first layer: universal-cognitive. Strategies of this layer rely on general regularities of reader psychology: the readiness to believe statements about oneself, hope for the future, and the habit of filling vague statements with one's own experience. They are grounded in the phenomenon demonstrated experimentally by B. Forer and later named the "Barnum effect" (Forer, 1949). Vagueness and generalization are expressed by the same means in both languages, indefinite pronouns and quantifiers: *"In some instances, it might be best to bid adieu to a certain posse."* (Scorpio); *"Ba'zilarning ahvoli sizdan yaxshiroq."* ("Some people are better off than you"; Asad/Leo). These examples show a deliberate flouting of Grice's maxim of quantity: the reader "works out" who is meant (Grice, 1975). Temporal deixis such as *today*, *this week* / *bugun*,

shu hafta gives the text topicality even though it is repeated every week (Levinson, 1983).

Presupposition and positive politeness also belong to the first layer. A horoscope often presents the reader's character or situation as already known, for example *"You are not one to spend a lot of time looking back"* (Aquarius) or *"Kelayotgan haftada nihoyat sizning mehnatlaringizni e'tiborga olishadi"* ("Next week your efforts will finally be noticed"; Hamal/Aries), where *finally / nihoyat* presupposes that the reader's efforts have long gone unnoticed. Such statements are flattering, since they address the reader's positive face (Brown & Levinson, 1987), and they are hard to reject, because a presupposition is not asserted but taken for granted (Levinson, 1983). In both languages negative predictions are softened and immediately followed by a solution, while positive predictions are given categorically: *"Ego clashes aren't pretty, so do what you can to avoid them"* (Leo); *"Hamdardlik yaxshi, lekin boringizni to'kib-sochmang"* ("Compassion is good, but do not squander what you have"; Asad/Leo).

The second layer: language- and culture-specific. In this layer the goal of a strategy stays the same, but the means depend on the typology of the language and on culture. Hedging is expressed in English by a closed class of modal verbs (*could*, *might*, *may*) and in Uzbek by analytical and affixal means (*-ishi mumkin*, *ehtimol*, *-dir*) (Lakoff, 1972). Direct address uses the neutral *you* in English and the honorific *siz* together with the suffix *-ingiz* in Uzbek, which adds a component of respect to positive politeness (Brown & Levinson, 1987). Uzbek horoscopes also more often use evaluative words with cultural and religious connotations, such as *taqdir* "fate", *peshona* "forehead (as the seat of fate)" and *nasib* "lot".

Corpus data confirm this distribution. In the daily corpus, the density of modal units is 20.8 per 1,000 words in English and 34.5 in Uzbek; in English the epistemic load is spread across *could* (224), *can* (155), *may* (94), *will* (92) and *might* (72), whereas in Uzbek it is concentrated in a single analytical device,

mumkin (770). Yet the ratio of epistemic to deontic units is almost the same in both languages (about 95% to 5% in English and 92% to 8% in Uzbek), and markers of high certainty (*certainly*, *albatta*, *shubhasiz*) are equally rare. The goal, cautious and unverifiable prediction, is shared; only the means differ. The same holds for directive strategies. In the weekly corpus, 98.7% of Uzbek horoscopes end with a separate segment introduced by the marker *"Maslahat:"* ("Advice:"), whereas English horoscopes have no such marker and embed imperatives in the narrative flow (*"Be patient. And on Thursday and Friday, be in listening mode"*; Leo). Personalization is likewise realized differently: English uses the explicit pronoun *you* (78.4 per 1,000 words), while Uzbek, a pro-drop language, relies mainly on verbal and possessive suffixes (*-siz*, *-ingiz*).

The two layers can thus be summarized as follows. The first layer includes vagueness, generalization, presupposition, positive politeness and temporal deixis; these strategies work in the same way in both languages because they rely on the reader's psychology. The second layer includes hedging, direct address, the realization of directives and the choice of evaluative vocabulary; their communicative function is the same, but their form depends on the grammar of the language (a closed class of modal verbs versus analytical constructions; an explicit pronoun versus suffixes) and on culture (secular vocabulary of luck in English versus words with religious connotations and the explicit advice formula in Uzbek).

Significance of the model. The two-layer model guards against two errors in contrastive analysis. The first is to read a grammatical difference as a pragmatic one: the absence of modal verbs in Uzbek does not mean that Uzbek horoscopes are less cautious. The second is to overlook cultural specificity behind a shared goal. The model also applies to translation: first-layer strategies are usually preserved as they are, while second-layer strategies require functional substitution.

CONCLUSION

The study shows that the surface means of English and Uzbek horoscopes differ, but the communicative logic beneath them is shared. Strategies of the universal-cognitive layer (vagueness, generalization, presupposition, positive politeness, temporal deixis) rely on general regularities of reader psychology and are realized by similar means in both languages. Strategies of the language- and culture-specific layer (hedging, direct address, directives, evaluative vocabulary) keep the same goal but differ in form because of language typology and culture.

The two-layer model makes it possible to describe this shared logic and the specific features of each language at the same time. It can be applied in contrastive pragmatics, in translation practice, where first-layer strategies can be transferred directly and second-layer strategies require functional substitution, and in teaching English, where authentic horoscopes provide clear examples of hedging and politeness. Further research may test the model on other persuasive genres, such as advertising and advice columns, and on other language pairs.

REFERENCES

Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage*. Cambridge University Press.

Forer, B. R. (1949). The fallacy of personal validation: A classroom demonstration of gullibility. *Journal of Abnormal and Social Psychology, 44*(1), 118–123. https://doi.org/10.1037/h0059240

Grice, H. P. (1975). Logic and conversation. In P. Cole & J. L. Morgan (Eds.), *Syntax and semantics: Vol. 3. Speech acts* (pp. 41–58). Academic Press.

Hyland, K. (2019). *Metadiscourse: Exploring interaction in writing* (2nd ed.). Bloomsbury Academic.

Lakoff, G. (1972). Hedges: A study in meaning criteria and the logic of fuzzy concepts. In P. M. Peranteau, J. N. Levi, & G. C. Phares (Eds.), *Papers from the Eighth Regional Meeting of the Chicago Linguistic Society* (pp. 183–228). Chicago Linguistic Society.

Levinson, S. C. (1983). *Pragmatics*. Cambridge University Press.

Palmer, F. R. (2001). *Mood and modality* (2nd ed.). Cambridge University Press.

PHONETIC ERRORS RELATED TO CONSONANT PRONUNCIATION AMONG UZBEK STUDENTS LEARNING KOREAN AND THE LINGUODIDACTIC BASIS FOR OVERCOMING THEM

Ibaydullaeva Malikabonu Salaydin kizi

Named after Is'hoqxon Ibrat

Namangan Institute of Foreign Languages,

Linguistics – Korean Language, First-year master's student

Email: [moviydengizda@gmail.com]

Abstract. *This thesis examines the potential difficulties that Uzbek students learning Korean may encounter when pronouncing consonants. It discusses methods for teaching Korean stop consonants, affricates, fricatives, and syllable-final consonants, as well as techniques for correcting pronunciation errors.*

Keywords: *Korean language, Uzbek students, consonants, pronunciation errors, phonetics, linguodidactics.*

Developing pronunciation skills is an important task in learning Korean. A student should be able to recognize a consonant letter in the Hangulul writing system and correctly acquire its phonetic features and pronunciation in words. Since the consonant systems of Uzbek and Korean do not fully correspond, difficulties may arise in hearing and pronouncing certain Korean consonants.

1. Korean stop consonants. In Korean, the distinction between plain, tense, and aspirated stops is important: ㄱ–ㄲ–ㅋ, ㄷ–ㄸ–ㅌ, ㅂ–ㅃ–ㅍ. Uzbek does not have this exact three-way contrast. Therefore, learners may pronounce these sounds similarly or remember the distinction only through spelling. As a result, sound-based distinctions between words may be lost. To reduce this problem, the teacher should present the sounds in contrasting pairs and triples rather than in isolation, ask students to identify the sounds they hear, and then have them pronounce them.

2. Affricates and fricatives. The Korean sounds ㅈ–ㅉ–ㅊ and the pair ㅅ–ㅆ require learners to distinguish them accurately both articulatorily and auditorily. If a student does not sufficiently perceive the features of these sounds related to tenseness or airflow, they may approximate them to sounds they already know. During lessons, the teacher should simply explain the position of the lips and tongue and the airflow, provide model pronunciation for listening, and then organize repetition and discrimination exercises using minimal pairs.

3. Pronunciation of the consonant ㄹ. The Korean sound ㄹ may sound different depending on its position in a word: in some cases it resembles a brief tap, while in others it approaches a lateral sound. Directly equating it with Uzbek “r” or “l” may lead to incorrect pronunciation. Therefore, it is useful to practise ㄹ in words and short phrases in different positions, record the student’s pronunciation, and compare it with a model.

4. Syllable-final consonants (받침). In Korean, the pronunciation of consonants at the end of a syllable may differ from their written form, and some consonants may be realized as the same or similar sounds. Final consonant clusters also require special attention. Uzbek students may try to pronounce every written consonant separately and fully, or may overlook rules governing liaison with the following syllable. To address this, it is recommended to practise the syllable-final consonant step by step: in isolation, within a word, and joined with the following sound.

5. Linguodidactic methods for correcting errors. First, a contrastive approach is used to explain the similarities and differences between consonants in Korean and Uzbek. Second, listening-discrimination exercises are carried out before pronunciation practice or alongside it. Third, the teacher explains articulatory positions and, when necessary, uses illustrations showing the positions of the mouth and tongue. Fourth, exercises are made progressively

more complex, moving from sounds to syllables, words, phrases, and sentences. Fifth, the student's speech is audio-recorded, compared with a model, and followed by specific, supportive feedback. Rather than simply marking errors as "incorrect," it is more effective to identify which phonetic feature is not being distinguished.

The main difficulties in acquiring Korean consonants may involve distinguishing plain, tense, and aspirated stops; accurately pronouncing affricates and fricatives; understanding the positional features of ㄹ; and correctly using syllable-final consonants. To overcome these difficulties, auditory discrimination, contrastive analysis, articulatory guidance, step-by-step repetition, and regular individual feedback should be combined. Future research should examine the proposed error types using actual pronunciation recordings of Uzbek students and evaluate the effectiveness of the exercises experimentally.

REFERENCES

1. An, S. (2023). Pronunciation error patterns and characteristics of double final consonants in Korean learners: Focusing on Uzbekistani students. The Journal of Korean Studies, (86), 131–152. https://doi.org/10.17790/kors.2023.9.86.131
2. Isbell, D. R., Park, O.-S., & Lee, K. (2019). Learning Korean pronunciation: Effects of instruction, proficiency, and L1. Journal of Second Language Pronunciation, 5(1), 13–48. https://doi.org/10.1075/jslp.17010.isb
3. Kim, M.-R., & Duanmu, S. (2004). "Tense" and "lax" stops in Korean. Journal of East Asian Linguistics, 13, 59–104. https://doi.org/10.1023/B:JEAL.0000007344.43938.4e
4. Sohn, H.-M. (1999). The Korean language. Cambridge University Press.

SOCIO-PHILOSOPHICAL MECHANISMS FOR FOSTERING PATRIOTISM AMONG YOUNG PEOPLE IN THE CONTEXT OF SPIRITUAL TRANSFORMATION

Bozorov Suxrob Komilovich

Termiz State Pedagogical Institute

Lecturer, Department of Philosophy, Fundamentals of Spirituality and Legal Education

E-mail: bozorovsuxrobjon14@gmail.com

Abstract. *This article examines the socio-philosophical content and mechanisms involved in fostering patriotism among young people in the context of spiritual transformation. Patriotism is understood not merely as an individual's emotional attachment to the homeland, but as a complex value orientation that brings together national identity, civic responsibility, social engagement, and practical participation in the pursuit of the common good. The study employs systemic, axiological, comparative-analytical, and logical approaches to examine the interaction of the family, educational institutions, the mahalla (local community), civil society, and the digital information environment. The analysis identifies four interrelated mechanisms for fostering patriotism: value-based and educational, institutional and collaborative, practical and social, and digital and communicative. The article emphasizes the need to adapt these mechanisms to the needs and circumstances of different social groups among young people.*

Keywords: *spiritual transformation, patriotism, young people, socio-philosophical analysis, national identity, civic responsibility, spiritual values, digital environment.*

INTRODUCTION

In an era of globalization, rapidly expanding digital communication, and changing social relations, the value systems of young people are also undergoing change. It would be one-sided to interpret this process solely as a weakening of traditional values: spiritual transformation also creates opportunities for new knowledge, worldviews, and forms of civic participation to emerge. The central challenge is to establish a meaningful balance among national identity, historical memory, and universal human values throughout this process of renewal.

Patriotism is an important spiritual and social resource for the sustainable development of society. However, it cannot be adequately measured only by knowledge of national symbols, participation in ceremonial events, or repetition of slogans. Patriotism is manifested in a person's sense of responsibility for the country's future, respect for the law, concern for social problems, and contribution to collective progress through work and knowledge. In this sense, fostering patriotism requires close links between education, the social environment, and everyday practice.

In Uzbekistan, realizing young people's potential, improving the quality of education, and enhancing spiritual and educational activities are among the important priorities of public policy. The Law "On State Youth Policy" establishes the legal foundations for protecting young people's rights and interests and creating conditions for their social development and personal growth [1, Article 3].

"Patriotism is not a collection of declarative slogans or abstract emotions. It is a value-oriented worldview manifested in an individual's everyday practical activity, sense of involvement in social problems, and awareness of social responsibility" [2, p. 78].

The goals of building New Uzbekistan and strengthening the foundations of the Third Renaissance further underscore the importance of educating a knowledgeable, proactive, responsible, and patriotic generation.

The aim of this study is to explain the socio-philosophical content of fostering patriotism among young people in the context of spiritual transformation and to systematize effective mechanisms for doing so. The object of the study is the process through which youth patriotism develops; its subject is the value-based, institutional, practical, and digital factors that influence this process.

LITERATURE REVIEW

In philosophy, patriotism is studied through the relationships between the individual and society, national identity and citizenship, historical memory and

social responsibility. Classical socio-philosophical approaches explain personal development not in isolation from society, but in connection with social relations, upbringing, and the common good. From this perspective, patriotism is neither an innate quality nor an emotion-based disposition alone; it is a set of attitudes developed through social experience, knowledge, values, and practical activity.

This perspective helps frame patriotism not as narrow nationalism or opposition to others, but as a commitment to a country's development that is consistent with universal human values [3, p. 3].

In Uzbekistan, youth spirituality, national values, and civic responsibility are closely connected with public policy, education and upbringing, and the work of community institutions. Regulatory and legal documents provide an institutional foundation for protecting young people's rights and supporting their participation in public life [1, Article 3; 4]. Nevertheless, the existence of legal norms does not by itself guarantee sustainable patriotism. Their educational impact also depends on whether young people encounter real opportunities for justice, trust, equal access, and social initiative in everyday life.

A synthesis of existing approaches suggests that three elements are essential to fostering patriotism: first, substantive knowledge of history and national culture; second, a sense of belonging to the country and society; and third, the translation of this sense of belonging into socially beneficial action. This article extends that three-part framework by incorporating institutional cooperation and digital communication into an integrated system of mechanisms.

RESEARCH METHODOLOGY

This study is theoretical and analytical in nature and employs systemic, axiological, comparative-analytical, and logical generalization methods. The systemic approach makes it possible to understand youth patriotism as a phenomenon shaped through cooperation among families, educational institutions, mahallas, the state, and civil society institutions. The axiological

approach is used to analyze the values that define patriotism, including a sense of belonging to the homeland, justice, responsibility, integrity, historical memory, and the common good.

The comparative-analytical method is used to examine differences between traditional forms of educational influence and contemporary forms based on digital communication. Logical generalization helps classify the mechanisms for fostering patriotism on the basis of the literature and regulatory framework. No separate survey or experiment is claimed in this article; therefore, the findings presented are conclusions derived from theoretical analysis rather than empirical measurements.

RESULTS

The analysis identifies four interconnected mechanisms for fostering patriotism among young people. They are likely to be more effective when operating together as part of a unified educational environment rather than in isolation.

The first is the value-based and educational mechanism. It aims to deepen young people's knowledge of historical memory, national culture, state symbols, constitutional values, and current priorities for the country's development. Rather than relying on memorization, educational activities should encourage the analysis of historical events, comparison of different perspectives, exploration of local history and family memories, and discussion of literary and artistic works. Such activities should help young people develop a personal and well-reasoned answer to the question, "What does the homeland mean?"

The second is the institutional and collaborative mechanism. Cooperation among families, educational institutions, mahallas, youth organizations, and civil society helps ensure continuity in educational influence. If the principles of responsibility and integrity promoted in educational institutions are not supported in everyday life, young people notice the gap between words and practice. Cooperation should therefore go beyond one-off events and include

supporting youth initiatives, listening to young people's concerns, and involving them in discussions about decisions.

The third is the practical and social mechanism. Patriotism acquires lasting meaning when expressed through socially beneficial activity. Volunteering, environmental initiatives, improvement of local communities, preservation of historical and cultural heritage, assistance to people in need, and students' research and innovation projects can strengthen young people's sense of belonging to society. An important condition is that such activities should not be undertaken merely to satisfy reporting requirements or formal performance indicators; they should be based on identifying problems, developing solutions, and evaluating outcomes.

The fourth is the digital and communicative mechanism. Social networks and digital platforms have become important spaces that influence young people's worldviews. Patriotism education should therefore make purposeful educational use of the digital environment rather than ignore it. Short videos on local history, virtual museums, interactive maps, podcasts, stories about youth initiatives, and digital content based on reliable sources can increase young people's interest. The ability to verify information, recognize manipulative messages, respect copyright, and communicate appropriately online should also be regarded as an integral part of patriotism education.

Three groups of indicators can be used to assess the effectiveness of these mechanisms. Cognitive indicators cover knowledge of history, the constitutional system, and national and universal human values. Emotional and value-based indicators concern a sense of belonging to the homeland, social trust, and attitudes toward the common good. Activity-based and practical indicators include volunteering, participation in community initiatives, and contributions to solving social problems. These indicators complement one another: when knowledge is not translated into practice, the educational impact remains limited; emotional attachment becomes more stable when supported by knowledge and responsibility.

DISCUSSION

The proposed mechanisms are based on understanding spiritual transformation not as a simple opposition between traditional values and modernity, but as a process of meaningful adaptation and renewal. For young people, patriotism means not only valuing the past but also addressing present-day problems and accepting responsibility for the future. Accordingly, engagement with historical heritage should be linked to contemporary science, technology, entrepreneurship, environmental responsibility, and civic participation.

One issue requiring particular care is the reduction of patriotism to external symbols or demands for uniformity of thought. Meaningful patriotism is not incompatible with critical thinking. On the contrary, young people who care about their country's development should be able to identify existing problems, make well-founded proposals, and seek solutions through lawful means. Rather than treating critical views as hostility, it is important to channel them into responsible dialogue and opportunities for improvement.

Another important issue is the diversity of social groups among young people. The same activities may not be equally effective for students, employed young people, those who are unemployed or outside formal education, and people engaged in labour migration. Mechanisms should therefore be adapted to young people's schedules, interests, information-use habits, regional circumstances, and available opportunities. For example, research and volunteering projects may be important for students; collective problem-solving may be more relevant to young people in local communities; and remote cultural and educational connections, together with reliable digital resources, may be useful for young migrants.

From the perspective of laying the foundations for the Third Renaissance, patriotism should be enriched by a commitment to knowledge, professional competence, honest work, innovative thinking, and responsibility toward society. Young people's loyalty to their country is strengthened when they

develop their own potential and direct it toward the well-being of society. Spiritual and educational initiatives should therefore view young people not merely as recipients of educational influence, but as proactive participants in social change.

CONCLUSION

The analysis indicates that fostering patriotism among young people in the context of spiritual transformation is a multifactorial, continuous process based on cooperation. Reducing patriotism to emotional attachment or symbolic activity narrows its social meaning. Patriotism should instead be expressed through the unity of national identity, respect for universal human values, civic responsibility, and socially beneficial action.

First, the value-based and educational mechanism helps deepen young people's historical memory and civic knowledge.

Second, the institutional and collaborative mechanism creates a consistent educational environment involving families, educational institutions, mahallas, and public organizations.

Third, the practical and social mechanism connects patriotism with activities that produce tangible social benefits.

Fourth, the digital and communicative mechanism enables meaningful engagement with young people in the contemporary information environment and supports the development of media literacy.

In practical terms, programmes designed to foster youth patriotism should be assessed using three interrelated criteria: cognitive, emotional and value-based, and activity-based and practical indicators. The needs of different social groups of young people should be taken into account, and greater attention should be paid to the substance and real outcomes of activities rather than simply to the number of events held. Future empirical research could test these indicators through surveys, focus groups, and analysis of the outcomes of social projects.

"For young people building the foundations of the Third Renaissance, studying national values is not merely an expression of respect for the past; it is a spiritual habitus—a foundation for creating future innovations. The ideas of patriotism found in the heritage of al-Farabi, Amir Temur, and the Jadids must be integrated with today's practical and social mechanisms" [5, p. 56].

Overall, the key condition for strengthening patriotism among young people in the context of spiritual transformation is to combine national values with contemporary knowledge, open dialogue, civic responsibility, and practical initiative. This approach can help move young people's loyalty to the homeland beyond slogans and into everyday social responsibility and constructive action.

REFERENCES

1. Law of the Republic of Uzbekistan "On State Youth Policy." No. ZRU-406, 14 September 2016. National Database of Legislation: https://lex.uz/docs/3026246.

2. Rakhimov, A. Sh. A Socio-Philosophical Analysis of the Phenomenon of Youth Patriotism in the Process of Spiritual Development of New Uzbekistan. Tashkent: Universitet, 2025.

3. UNESCO. Reimagining Our Futures Together: A New Social Contract for Education. Paris: UNESCO, 2021. https://unesdoc.unesco.org/ark:/48223/pf0000379707.

4. Constitution of the Republic of Uzbekistan. Revised edition, adopted by referendum on 30 April 2023. Tashkent: O'zbekiston, 2023.

5. Tolaev, M. The Ideal Human Being and Patriotism Education in Eastern Philosophy. Tashkent: Sharq, 2022.

UZBEKISTAN–GERMANY PEOPLE-TO-PEOPLE DIPLOMACY: A CASE STUDY OF THE KONRAD ADENAUER FOUNDATION

Ozodjon O‘. Quvondiqov

Head of the Information Service of the Committee on Interethnic Relations and Compatriots Abroad of the Republic of Uzbekistan, Independent Researcher

E-mail: ozodquvondiqov010406@gmail.com

ORCID: https://orcid.org/0009-0003-0067-5980

Abstract. *This article examines the institutional and practical dimensions of people-to-people diplomacy between Uzbekistan and Germany through a case study of the Konrad Adenauer Foundation’s activities in Uzbekistan. The study focuses on the Foundation’s long-term cooperation with governmental and non-governmental organizations, civil society institutions, youth, experts, journalists, local governance representatives, and research centers. A qualitative research design is employed, combining document analysis, case-study analysis, and institutional analysis. The empirical base consists of official information published by partner organizations, analytical and encyclopedic materials, and documents relating to cooperation initiatives, including the 2019 memorandum with the Yuksalish Nationwide Movement, the 2020–2022 regional cross-border dialogue project, and the 2021 memorandum with the International Institute for Central Asia. The findings demonstrate that the Foundation has functioned as an intermediary platform connecting state and non-state actors and has supported political education, expert dialogue, civil society participation, media capacity, local governance, and regional cooperation. Its activities have supplemented formal diplomacy by widening channels of communication, facilitating the circulation of expertise, and strengthening sustainable public and expert networks. The article argues that the Konrad Adenauer Foundation provides a significant institutional example of how political foundations can contribute to people-to-people diplomacy and confidence-building in Uzbekistan–Germany relations. The study concludes with recommendations for regular civil society forums, expanded training and exchange programs, systematic impact assessment, and a dedicated digital expert platform.*

Keywords: *Uzbekistan, Germany, people-to-people diplomacy, Konrad Adenauer Foundation, civil society, public dialogue, expert diplomacy, education, regional cooperation, soft power.*

INTRODUCTION

Contemporary international relations are no longer confined to official diplomatic channels. Direct interaction among civil society institutions, public organizations, think tanks, educational institutions, journalists, experts, and local communities has become an increasingly important component of people-to-people diplomacy. Such contacts add a social and societal dimension to interstate political dialogue, strengthen mutual trust, and help create a long-term environment for cooperation at the public level.

In Uzbekistan's external relations, cooperation with international non-governmental institutions and political foundations occupies a distinct place. Initiatives aimed at supporting social stability, interethnic harmony, tolerance, civil society development, professional education, and international exchange have created conditions for sustained interaction with German institutions. Within this context, the Konrad Adenauer Foundation (Konrad-Adenauer-Stiftung, KAS) represents one of the most enduring examples of institutional cooperation. Its activities in Uzbekistan have encompassed political education, expert dialogue, civil society development, local governance, mass media, youth engagement, economic issues, environmental questions, and regional cooperation.

The literature and source base used for the present study can be divided into three broad groups. The first includes materials on the Foundation's institutional presence in Uzbekistan and the historical development of its cooperation with Uzbek partners. The second group covers cooperation with non-governmental non-profit organizations, the Youth Parliament, journalists, and other public institutions, with particular attention to seminars, civic forums, expert meetings, training programs, public monitoring, and social dialogue platforms. The third group consists of analytical materials that place the Foundation's activities in the broader context of peace, security, education, regional dialogue, democratic institutions, and cross-border cooperation

(Economic Review of Uzbekistan, 2021; Yuksalish Nationwide Movement, n.d.).

The historical basis for cooperation emerged in the early 1990s. According to the sources used in the original manuscript, a high-level meeting took place during the official visit of Uzbekistan's First President Islam Karimov to Germany in April 1993, including talks with the then chairman of the Foundation, Gerd Langguth. A framework agreement between the Konrad Adenauer Foundation and the Government of Uzbekistan was signed in November 1993, and the Foundation opened its regional office in Tashkent in July 1994 (Economic Review of Uzbekistan, 2021). This institutional presence created a durable platform for cooperation extending beyond intergovernmental contacts.

The research problem addressed in this article is therefore not merely whether a foreign political foundation operates in Uzbekistan, but how its activities can be understood as a mechanism of people-to-people diplomacy. The article examines the Foundation's role in connecting governmental and non-governmental actors, supporting dialogue and education, encouraging expert and public participation, and promoting regional networks. The central research question is: how has the Konrad Adenauer Foundation contributed to the institutionalization and practical development of Uzbekistan–Germany people-to-people diplomacy?

The objective of the study is to identify the principal mechanisms through which the Foundation complements formal diplomacy and to assess the relevance of its educational, expert, civic, media, and regional initiatives for long-term bilateral and regional cooperation. The analysis also seeks to formulate practical recommendations for strengthening similar people-to-people diplomacy mechanisms in the future.

METHODS

The study uses a qualitative research design based on an integrated combination of document analysis, case-study analysis, and institutional

analysis. This methodological approach is appropriate because the research focuses on the functions, forms, and institutional significance of cooperation rather than on statistical causal inference.

The source base includes official information concerning the activities of the Konrad Adenauer Foundation and its partner organizations, analytical publications, encyclopedic materials, public reports, and information on cooperation memoranda. The materials were reviewed thematically and grouped around five analytical categories: (1) institutional development; (2) political education and expert dialogue; (3) civil society, media, and public participation; (4) regional and cross-border cooperation; and (5) think-tank and research cooperation.

Within the case-study framework, three examples received particular attention: the cooperation memorandum signed with the Yuksalish Nationwide Movement in 2019; the European Union–KAS project on promoting regional cross-border dialogue for tolerance and peace in Central Asia for 2020–2022; and the memorandum concluded in 2021 between the International Institute for Central Asia and the Konrad Adenauer Foundation's regional office (Economic Review of Uzbekistan, 2021; Uzbekistan National News Agency [UzA], 2021).

Institutional analysis was used to assess the Foundation's intermediary role between state and non-state actors. The analysis focused on the types of participants involved, the thematic scope of cooperation, the continuity of institutional relationships, and the extent to which these activities created recurring channels for dialogue and exchange. Because the study relies on publicly available documentary sources rather than interviews or survey data, its conclusions concern institutional patterns and documented practices rather than the subjective perceptions of participants.

RESULTS

1. Institutional Development and the Architecture of Cooperation

The source materials identify the Konrad Adenauer Foundation as a German political foundation established in 1955. Its activities are associated

with values such as freedom, justice, solidarity, democratic governance, the rule of law, and civic responsibility. The Foundation has developed a broad international presence and implements projects through offices and partner networks in many countries. The materials cited in the original manuscript describe this international network as extensive and emphasize the Foundation's longstanding position among internationally recognized policy and analytical institutions (Uzbekistan Mahallas Association, n.d.; Economic Review of Uzbekistan, 2021).

In Uzbekistan, the opening of the Tashkent regional office in 1994 established a permanent organizational basis for cooperation. The office has served as a regional platform for engagement in Central Asia and has facilitated interaction with public institutions, civil society organizations, academic and analytical communities, journalists, youth, and local governance representatives. This long-term institutional continuity distinguishes the case from short-term project diplomacy and allows the Foundation's work to be interpreted as an embedded mechanism of people-to-people relations.

The source materials further indicate that cooperation between Uzbekistan and the Foundation gradually evolved from an initial focus on advice and political education toward a more diversified portfolio. This included expert consultation, public dialogue, local governance, economic development, ecology, education, human rights, gender equality, media development, and professional capacity-building. The breadth of these themes demonstrates that people-to-people diplomacy operates across sectoral boundaries rather than through a single cultural or educational channel.

2. Political Education, Civil Society, Media, and Local Governance

Political education has been one of the most visible areas of the Foundation's activity in Uzbekistan. Seminars and conferences have brought together representatives of local administrations and self-government bodies, entrepreneurs, women, young scholars, students, and media professionals. According to the source materials, recurring themes have included parliamentary

reform, the role of political parties, judicial liberalization and democratization, decentralization, local self-government, small and medium-sized business, media development, youth and politics, and the role of women in society (Bobojonova, n.d.).

Between 1994 and 2015, the Foundation worked with a range of local partner organizations, including institutions involved in journalist training, youth development, information support, and women's participation. These partnerships show that the Foundation's approach was not limited to interaction with central governmental bodies. Instead, it relied on a network model involving professional and civic groups that could disseminate knowledge and practices throughout society.

A particularly important feature is the inclusion of journalists and media actors. Training programs and public forums for journalists and bloggers, together with initiatives involving public monitoring and public hearings, expanded the communicative dimension of cooperation. The 2019 memorandum between the Yuksalish Nationwide Movement and the Foundation's Central Asia office in Tashkent created a framework under which civic forums, conferences with international experts, regional public monitoring of state programs, public hearings, and training sessions for journalists and bloggers were conducted (Yuksalish Nationwide Movement, n.d.).

These activities are significant for people-to-people diplomacy because they widen the circle of actors involved in bilateral relations. Rather than placing diplomacy solely in the hands of foreign ministries or embassies, they create structured opportunities for local officials, experts, media professionals, civil society representatives, and young participants to exchange experience and develop professional contacts.

3. Diversification after 2017 and Adaptation during the Pandemic

The source material indicates that cooperation became substantively broader during the reform period beginning in 2017. Joint projects addressed the economy, ecology, education, human rights, gender equality, public-sector

capacity, and the professional development of non-governmental organizations. The Foundation's work continued during the COVID-19 pandemic, when online and hybrid formats were used to sustain dialogue. More than twenty activities were reportedly organized in 2020 in areas such as education, the economy, municipal services, the environment, energy, foreign policy, and security (Economic Review of Uzbekistan, 2021).

The continuity of activity during the pandemic illustrates the institutional resilience of the cooperation model. Rather than suspending engagement, the Foundation and its partners shifted communication into digital and hybrid formats. This preserved expert networks and enabled the continued exchange of knowledge during a period when traditional face-to-face diplomacy and international mobility were heavily constrained.

The Foundation's approach in Uzbekistan is presented in the source materials as support for democratic institutions through education, analysis, and dialogue rather than through direct political activity. This distinction is important for understanding its people-to-people diplomacy function: its primary instruments are knowledge transfer, professional communication, civic participation, and network-building.

4. Regional Cross-Border Dialogue and Confidence-Building

The regional dimension of the Foundation's work is particularly relevant to Central Asia. People-to-people diplomacy can contribute to regional stability by creating spaces for dialogue, strengthening good-neighborly relations, and building professional networks across borders. In 2020, the European Union and the Konrad Adenauer Foundation launched a 2020–2022 project aimed at promoting regional cross-border dialogue for tolerance and peace in Central Asia. The project was implemented with national partners in Kyrgyzstan, Tajikistan, and Uzbekistan, with the Yuksalish Nationwide Movement serving as a partner in Uzbekistan (Economic Review of Uzbekistan, 2021).

The project sought to develop different formats of dialogue in order to address common regional challenges, strengthen cross-border networks of

NGOs and journalists, support joint initiatives and cooperation platforms, and build the capacity of target groups. These groups included young people, teachers, NGOs, journalists, law-enforcement representatives, religious communities, and public authorities. Such a multi-stakeholder structure demonstrates how people-to-people diplomacy can operate simultaneously at civic, professional, educational, and institutional levels.

The regional projects also show that bilateral Uzbekistan–Germany cooperation can generate broader multilateral effects. German institutional expertise and resources are combined with local and regional actors to support cooperation within Central Asia. In this sense, the Foundation functions not only as a bilateral partner but also as a facilitator of intra-regional dialogue.

5. Think-Tank Cooperation and Expert Diplomacy

Expert diplomacy is another important component of the case. On 15 April 2021, a memorandum of cooperation was signed between the International Institute for Central Asia and the Konrad Adenauer Foundation's regional office (UzA, 2021). The agreement institutionalized contacts between analytical communities and created an additional channel for the exchange of ideas and policy recommendations.

Regular interaction between think tanks may contribute to interstate relations by generating policy analysis, providing expert assessments, and maintaining dialogue even when official agendas are dominated by short-term political or economic issues. In the Uzbekistan–Germany context, these expert contacts expand the social and intellectual infrastructure of bilateral relations and can also support regional cooperation in Central Asia.

DISCUSSION

The findings indicate that the Konrad Adenauer Foundation's activities in Uzbekistan can be interpreted as a sustained institutional mechanism of people-to-people diplomacy. Its importance lies not in replacing official diplomacy but in supplementing it with broader channels of social, professional, educational, and expert interaction. The Foundation connects actors who are not normally

central participants in formal diplomatic negotiations, including young people, journalists, researchers, NGOs, local governance representatives, and professional communities.

A first analytical implication concerns the relationship between continuity and trust. The Foundation's presence in Uzbekistan since the 1990s has allowed partnerships to develop over several decades. Such continuity creates institutional memory, repeated interaction, and networks that are difficult to reproduce through one-time international events. The long duration of cooperation is therefore itself a resource of people-to-people diplomacy.

A second implication is the importance of education and expertise as diplomatic instruments. Political education seminars, professional training, public discussions, and think-tank cooperation do not operate through formal negotiation. Instead, they influence the environment in which bilateral relations are understood and implemented. By expanding professional knowledge and creating opportunities for direct contact, these activities help transform abstract interstate partnership into relationships among institutions and individuals.

Third, the involvement of media and civil society actors broadens the communicative base of bilateral relations. Journalists and bloggers can transmit information across social groups, while public monitoring and hearings introduce an element of civic participation. In this respect, the 2019 cooperation with the Yuksalish Nationwide Movement is particularly illustrative because it combined public forums, expert participation, monitoring activities, and media training within a single cooperative framework.

Fourth, the cross-border project implemented in 2020–2022 demonstrates that people-to-people diplomacy can support regional confidence-building. The project brought together diverse groups from several Central Asian countries and focused on shared problems rather than exclusively bilateral agendas. This format is relevant in a region where sustainable cooperation depends not only on agreements among governments but also on durable contacts among professional, civic, educational, and media communities.

Fifth, the Foundation's use of online and hybrid formats during the pandemic reveals the growing importance of digital diplomacy at the societal level. Digital platforms reduced geographical constraints and allowed expert and educational cooperation to continue despite mobility restrictions. This experience suggests that future people-to-people diplomacy should combine in-person engagement with permanent digital networks rather than treat online interaction merely as an emergency substitute.

From an institutional perspective, the case illustrates a network-based model in which a political foundation acts as an intermediary rather than as the sole initiator of cooperation. Outcomes depend on partnerships with local organizations, government institutions, research centers, journalists, and civil society. This network logic is one reason why the Foundation's activities can complement official diplomacy without duplicating the functions of state diplomatic services.

At the same time, the study has limitations. The analysis is based primarily on publicly available institutional and media sources and therefore reflects documented activities rather than independently measured social impact. The available material does not provide systematic survey data on participants' attitudes, long-term changes in public perceptions, or causal effects on bilateral relations. Future research could address these limitations through interviews with program participants, comparative studies of German political foundations in Central Asia, network analysis, and quantitative evaluation of project outcomes.

CONCLUSION AND RECOMMENDATIONS

The study demonstrates that the long-term activities of the Konrad Adenauer Foundation in Uzbekistan have developed into an important institutional mechanism of Uzbekistan–Germany people-to-people diplomacy. By creating platforms that connect state institutions, non-governmental organizations, experts, youth, journalists, local governance representatives, and

research centers, the Foundation expands bilateral relations beyond official diplomatic channels.

Its contribution is especially visible in political education, expert dialogue, civil society participation, media capacity-building, local governance, regional cross-border cooperation, and think-tank interaction. These activities facilitate the exchange of knowledge, sustain professional networks, and contribute to confidence-building. The case therefore supports the broader conclusion that political foundations can serve as effective intermediary institutions in contemporary people-to-people diplomacy.

Based on the analyzed experience, five practical recommendations can be proposed. First, Uzbekistan and Germany should develop a regular system of joint forums for civil society institutions, think tanks, youth organizations, and professional communities. Second, joint training programs should be expanded in local governance, public oversight, environmental sustainability, digital transformation, media competence, and civic participation. Third, short-term exchanges and joint research programs should be created for young experts and researchers. Fourth, the effectiveness of people-to-people diplomacy projects should be evaluated systematically using indicators such as participant diversity, continuity of partnership networks, joint initiatives, geographic reach, and public engagement. Fifth, a dedicated digital information and expert platform should be developed to consolidate practical experience, research outputs, opportunities, and institutional contacts relating to Uzbekistan–Germany people-to-people diplomacy.

The experience examined in this article suggests that the effectiveness of bilateral relations increasingly depends on the density of contacts beneath the level of formal diplomacy. Sustainable cooperation is strengthened when governmental dialogue is accompanied by continuous interaction among citizens, experts, educational institutions, media professionals, and civil society organizations. The Konrad Adenauer Foundation’s activities in Uzbekistan provide a concrete example of this multi-level diplomatic model.

REFERENCES

1. Bobojonova, G. (n.d.). Konrad Adenauer jamg‘armasi [Konrad Adenauer Foundation]. Qomus.info. https://qomus.info/encyclopedia/cat-k/konrad-adenauer-jamgarmasi-uz/

2. Economic Review of Uzbekistan. (2021). Jahonda tinchlik va xavfsizlik targ‘ibotchisi [Advocate of peace and security] (No. 2/2021). https://evu.uz/arhiv-statey/o-zbek-zha-onda-tinchlik-va-havfsizlik-tar-ibotchisi.html

3. Uzbekistan Mahallas Association. (n.d.). O‘zbekiston mahallalari uyushmasi delegatsiyasi Germaniyada Konrad Adenauer jamg‘armasi rahbariyati bilan ikki tomonlama hamkorlik istiqbollari yuzasidan uchrashuv o‘tkazildi [Delegation of the Uzbekistan Mahallas Association met with the leadership of the Konrad Adenauer Foundation in Germany to discuss prospects for bilateral cooperation]. https://mahallas.uz/news/zbekiston-maallalari-uyushmasi-delegatsiyasi-germaniyada-konrad-adenauer-zhamarmasi-rabariyati-bilan-am-ikki-tomonlama-amkorlik-istibollari-yuzasidan-uchrashuv-tkazildi

4. Uzbekistan National News Agency (UzA). (2021, April 15). Markaziy Osiyo xalqaro instituti va Konrad Adenauer nomidagi jamg‘armaning O‘zbekiston Respublikasidagi vakolatxonasi o‘rtasida imzolangan memorandum to‘g‘risida [On the memorandum signed between the International Institute for Central Asia and the Konrad Adenauer Foundation office in the Republic of Uzbekistan]. https://uza.uz/uz/posts/markaziy-osiyo-xalqaro-instituti-va-konrad-adenauer-nomidagi-zhamgarmaning-ozbekiston-respublikasidagi-vakolatxonasi-ortasida-imzolangan-memorandum-togrisida_258286

5. Yuksalish Nationwide Movement. (n.d.). Konrad Adenauer nomidagi jamg‘arma raisi O‘zbekistondagi NNTlar va Yoshlar parlamenti vakillari bilan uchrashdi [Chairman of the Konrad Adenauer Foundation met with representatives of NGOs and the Youth Parliament in Uzbekistan]. https://yumh.uz/uzc/news_detail/523

JADID ADIBLARINING IJODIDA MILLAT TALQINI

Normurod Avazov,

Alfraganus universiteti professori, filologiya fanlari doktori (DSc)

normurod.avazov.63@mail.ru

Shahzoda Avazova

EMU universiteti "Tillar" kafedrasi o‘qituvchisi

avazovashakhzoda@gmail.com

Annotatsiya. *Muallif tomonidan Turkiston o‘lkasida jadid adiblarining o‘zbek adabiyotiga qo‘shgan hissasi tadqiq etiladi. Shuningdek, Mahmudxo‘ja Behbudiy ijodining ta’siri o‘rinli ravishda ko‘rsatib beriladi. Uning Fitrat, Cho‘lpon, Avloniy, Abdulla Qodiriy ijodlarida namoyon bo‘lishi tahlilga tortiladi. Ularning ijodida millat talqini masalasi ko‘rib chiqiladi.*

Kalit so‘zlar*: millat, milliyat, o‘lka, ilm, ma'rifat, talqin, g‘aflat, muammo, istiqlol.*

Аннтотация. *Автор изучает вклад писателей-джадидов Туркестана в узбекскую литературу. Также, уместно показано влияние творчества Махмудходжи Бехбуди. Анализируется его проявление в произведениях Фитрата, Чулпона, Авлони, Абдуллы Кадыри. Рассматривается вопрос интерпретации нации в их произведениях.*

Ключевые слова: *нация, национальность; страна; наука; просветление; интерпретация, небрежность; проблема; перспектива, умение*

Abstract. *The author studies the contribution of Jadid writers in Turkestan to Uzbek literature. Also, the influence of Mahmudkhodja Behbudi's work is appropriately shown. Its manifestation in the works of Fitrat, Chulpon, Avloni, and Abdulla Qodiri is analyzed. The issue of the interpretation of the nation in their works is considered.*

Keywords: *nation, nationality; country; science; enlightenment; interpretation, negligence; problem; perspective, skill*

Behbudiy Turkiston o‘lkasida ma’rifatsizlikdan ota qotiliga aylanib borayotgan farzandlarning tarbiyasini birinchi o‘ringa qo‘ydi. U qadimiylar va mustamlakachilar sirtmog‘idan faqat ma’rifiy yo‘l bilangina qutulishning tamoyillarini ishlab chiqdi. Uning “Padarkush”i o‘lkada mavjud bo‘lgan

tarbiyasizlik illati uchun tipik asar bo‘lgan bo‘lsa, Qodiriy ham “Padarkush” ning orqasidan “Baxtsiz kuyov”ni yozdi (1915)[1].

Turkiston o‘lkasida xalqning ma’rifatsizligi orqasidan yoshlar xatolarga yo‘l qo‘yayotgan bo‘lsa, A.Qodiriyning “Baxtsiz kuyov”ida o‘lkada mavjud bo‘lgan illat, ya’ni orzu-havas deb yoshlar hayotlarini qurbon qilishi o‘zbeklar hayotidagi tipik xususiyat ko‘rinishi sifatida tasvirlandi.

Abdulla Qodiriy o‘zbek adabiyotining buyuk milliy yozuvchisidir. Uning asarlarida chuqur milliylik butunicha yarqirab turadi. Uning ijodi 1913 - 1914 - yillarda she’r yozish bilan boshlangan. Muallifning butun ijodida millat va uning kelajagi muammolari, milliylik aks etib turadi. Jumladan, uning “Ahvolimiz”, “To‘y”, “Millatimga bir qaror”, “Fikr aylag‘il” she’rlari mavjud. “Fikr aylag‘il” she’ri Behbudiyning “Oyina” jurnalining 1915 - yil 12-sonida bosilib chiqqan. Bu ham tasodif emas. Ikki buyuk ijodkorning munosabatini ko‘rsatadi. Shuningdek, “Millatimga bir qaror” she’ri millatga xitobnoma tarzida yozilgan[2].

Abdulla Qodiriy millatga qarata xitob qiladiki, bu kundan e’tiboran maslahatlashib bir qaror qilinsinki, o‘tgan ishlarga pushaymon qilmasdan, birlashib, himmat qilaylik, ishga g‘ayrat bilan kirishaylik, cho‘l sahrosidagi jaholat ham gullagan maydonga aylansin!

Millat uchun kumush-oltinlarni ayamasdan ishlatib, ular uchun maktablar va dorulfununlar barpo etaylikki, millatimiz o‘qib, fanlarni o‘rganib, bizni har doim duo qilsinlar. Ularning tahsillari o‘zlariga, millatga buyursinlar.

Qodiriyning “To‘y” she’ri hajviy usulida yozilgan bo‘lib, asarda zamona kulfati, millatning loqaydligi, mustamlakachilik illatlari qoralanadi. To‘y boy-badavlatlar uchun pisand bo‘lmasa-da, millat vakillari ya’ni beva-bechora hamda mehnat ahllari uchun fojeaga aylanayotganligi ochib beriladi.

A.Qodiriyning “O‘tgan kunlar” romanida: “Mavzuni moziydan, yaqin o‘tgan kunlardan, tariximizning eng kir, qora kunlari bo‘lgan keyingi “xon zamonlari”dan belgiladim”, deydi[3]. Bunday deyishiga sabab ayni davrda o‘lkada Chor bosqinchilari va mahalliy amaldorlarning zulmi kuchaygandan -

kuchaygani edi. Romanda milliylik masalasi birinchi o‘rinda turadi. Millatning taqdiri masalasi roman mavzusining tub negizini tashkil etadi. Bosqinchi mustamlakachilar o‘zlarining shaxsiy manfaatlarini va boylik orttirish maqsadini birinchi o‘ringa qo‘yganini millatimizni zalolatda qoldirganlaridan ham bilib olishimiz mumkin. Asarning “Qipchoqqa qirg‘in” deb nomlangan uchinchi bo‘limida yoziladi: “Yolg‘iz o‘z manfaati shaxsiyasi yo‘lida, bir-birini yeb ichgan mansabparast, dunyoparast va shuhratparast muttahamlar Turkiston tuprog‘idan yo‘qolmay turib, bizning odam bo‘lishimizga aqlim yetmay qoldi... Biz shu holda ketadigan, bir-birimizning tegimizga suv quyadigan bo‘lsak, yaqindirki, chor istibdodi Turkistonimizni egallar va biz bo‘lsak o‘z qo‘limiz bilan kelgusimizni o‘ris qo‘liga qoldirgan bo‘larmiz. O‘z naslini kofir qo‘liga tutqun qilib topshiruvchi – biz ko‘r va aqlsiz otalarga xudoning la’nati, albatta, tushar, o‘g‘lim!.”[4] Bunday misollarni romanda ko‘plab uchratamiz. Shuni alohida ta’kidlash joizki, roman yetuk milliy asar ekanligi, uning milliy sharoitni, urf-odatni, milliy qadriyatni, milliy qahramonlarni yoritganligiga olimlarimiz ko‘proq e’tibor berib keldilar. Asar mustabid tuzumning ta’sirida yozilganligiga va shu tomondan asarning millatga bo‘lgan ta’siri to‘g‘risida ham ko‘proq to‘xtalish maqsadga muvofiq bo‘ladi. Asarning turli nashrlarida “ulug‘ millat”ga tegib ketadigan o‘rinlarga o‘zgartirish kiritilgan holatlarni kuzatish mumkin. Jumladan, yuqorida keltirilgan matnda: “Chor istibdodi Turkistonimizni egallar” jumlasi asliyatda “o‘ris istibdodi o‘zining iflos oyog‘i bilan”[5] tarzida yozilganini ko‘ramiz.

Xullaski, Behbudiyning qahramoni orzu qilgan istiqlolni Qodiriyning qahramoni ko‘rdi. Chunki u butun umrini hurriyat uchun kurashga bag‘ishladi. Hurriyat yetib kelganidan, shodligidan yuragi yorilib o‘ldi. Ammo, u niyatiga yetdi. Chunki uning xalqi hurriyatga erishdi. Demakki, “Haq olinur, berilmas”.

Abdulla Avloniy o‘zbek jadid adabiyotining zabardast ijodkorlaridan hisoblanadi. Uning Turkiston o‘lkasida millat uchun qilgan xizmatlari nihoyatda kattadir. Uning “Adabiyot yoxud milliy she’rlari” to‘plami, “Turkiy guliston yoxud axloq”, “Birinchi muallim”, “Ikkinchi muallim”, “Maktab gulistoni”

singari darsliklari, “Avdokatlik osonmi?”, “Pinak”, “Biz va Siz”, “Ikki sevgi”, “Po‘rtugaliya inqilobi” dramalari va hajviyotlari millatning kechinmalarini o‘zida aks ettirgan asarlardir.

Dunyoda boshqa millatlar ilm va hunarlarni egallab, taraqqiyot sari intilsalar, bizning millat esa chapon va cholma sotib tirikchiligini o‘tkazayotgan savdogar millatga aylanib qolgan deb, tashvishlanadi shoir. Bu Behbudiy boshlagan millatni taraqqiy toptirish g‘oyasining davomi hisoblanadi [6].

Shoirning she’rida ko‘tarilgan muammo millatning o‘z kelajagi uchun kurashchan emasligi: “Badandan doimo qon olurlar bemorsan, millat; Tiling yo‘q, kar qulog‘ing, surati devorsan, millat”. Chunki, badaningdan qon olaverib, sulayib qolgan bemorga o‘xshaysan, tiling bo‘la turib o‘z tilingda so‘zlasha olmaysan, go‘yoki devorga osib qo‘yilgan surat kabi jimsan, millat, deydi.

O‘tgan asrning boshida Vatan ozodligi, millatning taraqqiyoti uchun kurashgan ilg‘or ma’rifatparvar kurashchilarimiz qatorida Hoji Muin Shukrullo o‘g‘li ham turadi.

Hoji Muin millatning mustabid tuzumda ilmsizlikdan, qashshoqlikdan, yo‘qchilikdan, zulmning mashaqqatidan ozor chekayotganligini ta’kidlaydi. Millat siz qo‘lingizga berilgan huquqdan o‘z vaqtida, samarali foydalanishingiz lozim. Oldinga ketayotgan millatlar borki, ular saodatga yo‘l boshlab ketmoqdalar. Siz o‘g‘lonlar, millatning kelajagi uchun uyg‘oningiz, uxlab yotishlar millat uchun haromdir, deb millatning taraqqiy etmayotganligidan achinadi[7], deb shoir aytadiki, ochiqdan – ochiq millatning dushmani bo‘lgan, mustamlaka bosqinchi yovni bu hududdan quvlab ketkazish kerak. U yovning yuzi oppoq ko‘ringani bilan, uning ichi qop-qoradir. Millatning dushmani bo‘lgan bu – mustamlakachilikdir!

Abulhamid Cho‘lpon XX asr o‘zbek jadid adabiyotining eng yirik siymolaridan biri bo‘lib, o‘zining zamondoshlari Behbudiy, Fitrat, Qodiriylar bilan yangi – o‘zbek milliy adabiyotiga asos soldilar. Cho‘lpon shoir, yozuvchi, dramaturg, tanqidchi, publitsist sifatida ham o‘ziga xos ijodkor sifatida ajralib turadi. U o‘zining butun ijodida millatning milliy ruhini aks ettirdi.

Cho‘lponning “Go‘zal Turkiston” to‘plami mustaqillik yillarida chop qilingan. To‘plamning so‘zboshisida: “U “go‘zal Turkiston”ni mustaqil, erkin holda ko‘rishni shu qadar orzu qildiki, bolshevik mafkurachilari uning og‘zini bekitib, nafasini chiqarmay turganda ham, u “Kishan kiyma, bo‘yin egma, ki se ham hur tug‘ilg‘onsen!” deya millatdoshlarini kurashga chaqira oldi. U kurashga chaqiribgina qolmadi, balki o‘zi ham shu kurashning oldingi saflarida bo‘ldi, oqibat shu kurashda shirin jonini xalqi, Vatani yo‘lida fido qildi. Bu Cho‘lponning fuqarolik burchi, to‘g‘rirog‘i, fuqarolik jasorati bo‘ldi”[8].

Cho‘lponning “Turkistonli qardoshlarim” she’rida millatning ma’rifatsizligi ko‘tarib chiqilgan.

Abdulhamid Cho‘lpon Behbudiy boshlagan millat uchun kurash va qayg‘uruvchi harakatining bevosita davomchisi edi. U Behbudiy o‘ldirilganida millatning karvonboshchisi yo‘qotilganidan qattiq achindi. U Behbudiyning xotirasiga bag‘ishlab “Mahmudxo‘ja Behbudiy xotirasi” nomli she’rini yozdi [9].

Jadid adabiyoti to‘g‘risida fikr yuritilganda Hamza Hakimzoda Niyoziyning ijodi alohida ajralib turadi. “Yig‘la, Turkiston”, “Ko‘zni oching, qardoshlar”, “Millat deganlarning oqar ko‘z yoshi”, “Yaxshi holin yo‘qotgan oqibatsiz Turkiston”, “Past ekanmu iqbolimiz muncha?”, “O‘t olgin, Turkiston”, “Yashanglar, yashaylik, Turon”, “Haq yo‘lda jon bersak”, “Boybachchalar, semiring”, “Hasrat qilay, qardoshlar”, “Yashasun millat”, “Ahvolimiz”, “Shundoq qolurmu?!”, “Ey bulbuli millat, yozdim sana salomim”, “Turkiston muxtoriyatina”, “Uyg‘on!” kabi she’rlarida o‘zbek xalqining milliy o‘ziga xosligi, millatning qalbi, yuragi, uning ruhi, xarakteri, psixologiyasi, shuningdek, dard-u alamlari, kelajakka intilishlari, qolaversa, orzulari aks etadi. Shoirning, “Yig‘la, Turkiston” she’ri birinchi jahon urushi arafasida o‘zbek xalqi orasida mashhur bo‘lgan “Lo‘m-lo‘m Mamajon” ashulasi ohangida yozilgan bo‘lib, mazmunan millat taqdirini aks ettiradi. She’r millatning og‘ir ijtimoiy va iqtisodiy ahvoli, mustamlakachilik hamda milliy zulm to‘g‘risida yozilgan.

Xulosaki, jadidlarning otasi sanalmish Mahmudxo‘ja Behbudiy milliy ozodlik, ijtimoiy o‘zgarishlar, adabiyotda islohot va yaratuvchilik sohasida jadidlarga chin ma’noda “Yo‘lboshi” bo‘ldi. Uning Turkiston taraqqiyoti milliy g‘oyasi kelajak avlodga dasturilamal bo‘lib xizmat qilmoqda. Yuqorida keltirilgan asarlarning va tadqiqotlarning barchasi Behbudiy qo‘ygan tag joyning g‘ishtlari, devorlari hisoblanadi.

FOYDALANILGAN ADABIYOTLAR

1. Qodiriy A. Baxtsiz kuyov. – Toshkent: Sharq, 1997. – B. 173 - 194.
2. Qodiriy A. Diyori bakr. J. III. – Toshkent: Info Kapital Group, 2017. – B. 7 - 11.
3. Qodiriy A. O‘tgan kunlar. – Toshkent: O‘qituvchi, 1985. – B. 3.
4. Qodiriy A. O‘tgan kunlar. – Toshkent: O‘qituvchi, 1985– B. 301.
5. Qodiriy A. O‘tgan kunlar. J. I. – Toshkent: Info Kapital Group, 2017. – B. 7 - 153.
6. Avloniy A.Tanlangan asarlar. – Toshkent: Ma’naviyat, 2006. – B. 84.
7. Muin H. Nima edik, nima bo‘ldik, nima qilaylik?. Zarafshon. – Samarqand, 1922 yil 1 dekabr.
8. Cho‘lpon A. Go‘zal Turkiston. – Toshkent: Ma’naviyat, 1997. – B. 5.
9. Cho‘lpon. Mahmudxo‘ja Behbudiy xotirasi. Tong. – Toshkent, 1920 yil. – №1.

JADID ADIBLARINING IJODIDA MILLAT TALQINI

Normurod Avazov

Alfraganus universiteti professori, filologiya fanlari doktori (DSc)

normurod.avazov.63@mail.ru

Shahzoda Avazova

EMU universiteti "Tillar" kafedrasi o‘qituvchisi

avazovashakhzoda@gmail.com

Annotatsiya. *Muallif tomonidan Turkiston o‘lkasida jadid adiblarining o‘zbek adabiyotiga qo‘shgan hissasi tadqiq etiladi. Shuningdek, Mahmudxo‘ja Behbudiy ijodining ta’siri o‘rinli ravishda ko‘rsatib beriladi. Uning Fitrat, Cho‘lpon, Avloniy, Abdulla Qodiriy ijodlarida namoyon bo‘lishi tahlilga tortiladi. Ularning ijodida millat talqini masalasi ko‘rib chiqiladi.*

Kalit so‘zlar*: millat, milliyat, o‘lka, ilm, ma'rifat, talqin, g‘aflat, muammo, istiqlol.*

Аннтотация . *Автор изучает вклад писателей-джадидов Туркестана в узбекскую литературу. Также, уместно показано влияние творчества Махмудходжи Бехбуди. Анализируется его проявление в произведениях Фитрата, Чулпона, Авлони, Абдуллы Кадыри. Рассматривается вопрос интерпретации нации в их произведениях.*

Ключевые слова: *нация, национальность; страна; наука; просветление; интерпретация, небрежность; проблема; перспектива, умение*

Abstract. *The author studies the contribution of Jadid writers in Turkestan to Uzbek literature. Also, the influence of Mahmudkhodja Behbudi's work is appropriately shown. Its manifestation in the works of Fitrat, Chulpon, Avloni, and Abdulla Qodiri is analyzed. The issue of the interpretation of the nation in their works is considered.*

Keywords: *nation, nationality; country; science; enlightenment; interpretation, negligence; problem; perspective, skill*

Behbudiy Turkiston o‘lkasida ma’rifatsizlikdan ota qotiliga aylanib borayotgan farzandlarning tarbiyasini birinchi o‘ringa qo‘ydi. U qadimiylar va mustamlakachilar sirtmog‘idan faqat ma’rifiy yo‘l bilangina qutulishning tamoyillarini ishlab chiqdi. Uning “Padarkush”i o‘lkada mavjud bo‘lgan

tarbiyasizlik illati uchun tipik asar bo‘lgan bo‘lsa, Qodiriy ham “Padarkush” ning orqasidan “Baxtsiz kuyov”ni yozdi (1915)[1].

Turkiston o‘lkasida xalqning ma’rifatsizligi orqasidan yoshlar xatolarga yo‘l qo‘yayotgan bo‘lsa, A.Qodiriyning “Baxtsiz kuyov”ida o‘lkada mavjud bo‘lgan illat, ya’ni orzu-havas deb yoshlar hayotlarini qurbon qilishi o‘zbeklar hayotidagi tipik xususiyat ko‘rinishi sifatida tasvirlandi.

Abdulla Qodiriy o‘zbek adabiyotining buyuk milliy yozuvchisidir. Uning asarlarida chuqur milliylik butunicha yarqirab turadi. Uning ijodi 1913 - 1914 - yillarda she’r yozish bilan boshlangan. Muallifning butun ijodida millat va uning kelajagi muammolari, milliylik aks etib turadi. Jumladan, uning “Ahvolimiz”, “To‘y”, “Millatimga bir qaror”, “Fikr aylag‘il” she’rlari mavjud. “Fikr aylag‘il” she’ri Behbudiyning “Oyina” jurnalining 1915 - yil 12-sonida bosilib chiqqan. Bu ham tasodif emas. Ikki buyuk ijodkorning munosabatini ko‘rsatadi. Shuningdek, “Millatimga bir qaror” she’ri millatga xitobnoma tarzida yozilgan[2].

Abdulla Qodiriy millatga qarata xitob qiladiki, bu kundan e’tiboran maslahatlashib bir qaror qilinsinki, o‘tgan ishlarga pushaymon qilmasdan, birlashib, himmat qilaylik, ishga g‘ayrat bilan kirishaylik, cho‘l sahrosidagi jaholat ham gullagan maydonga aylansin!

Millat uchun kumush-oltinlarni ayamasdan ishlatib, ular uchun maktablar va dorulfununlar barpo etaylikki, millatimiz o‘qib, fanlarni o‘rganib, bizni har doim duo qilsinlar. Ularning tahsillari o‘zlariga, millatga buyursinlar.

Qodiriyning “To‘y” she’ri hajviy usulida yozilgan bo‘lib, asarda zamona kulfati, millatning loqaydligi, mustamlakachilik illatlari qoralanadi. To‘y boy-badavlatlar uchun pisand bo‘lmasa-da, millat vakillari ya’ni beva-bechora hamda mehnat ahllari uchun fojeaga aylanayotganligi ochib beriladi.

A.Qodiriyning “O‘tgan kunlar” romanida: “Mavzuni moziydan, yaqin o‘tgan kunlardan, tariximizning eng kir, qora kunlari bo‘lgan keyingi “xon zamonlari”dan belgiladim”, deydi[3]. Bunday deyishiga sabab ayni davrda o‘lkada Chor bosqinchilari va mahalliy amaldorlarning zulmi kuchaygandan -

kuchaygani edi. Romanda milliylik masalasi birinchi o‘rinda turadi. Millatning taqdiri masalasi roman mavzusining tub negizini tashkil etadi. Bosqinchi mustamlakachilar o‘zlarining shaxsiy manfaatlarini va boylik orttirish maqsadini birinchi o‘ringa qo‘yganini millatimizni zalolatda qoldirganlaridan ham bilib olishimiz mumkin. Asarning “Qipchoqqa qirg‘in” deb nomlangan uchinchi bo‘limida yoziladi: “Yolg‘iz o‘z manfaati shaxsiyasi yo‘lida, bir-birini yeb ichgan mansabparast, dunyoparast va shuhratparast muttahamlar Turkiston tuprog‘idan yo‘qolmay turib, bizning odam bo‘lishimizga aqlim yetmay qoldi... Biz shu holda ketadigan, bir-birimizning tegimizga suv quyadigan bo‘lsak, yaqindirki, chor istibdodi Turkistonimizni egallar va biz bo‘lsak o‘z qo‘limiz bilan kelgusimizni o‘ris qo‘liga qoldirgan bo‘larmiz. O‘z naslini kofir qo‘liga tutqun qilib topshiruvchi – biz ko‘r va aqlsiz otalarga xudoning la’nati, albatta, tushar, o‘g‘lim!.”[4] Bunday misollarni romanda ko‘plab uchratamiz. Shuni alohida ta’kidlash joizki, roman yetuk milliy asar ekanligi, uning milliy sharoitni, urf-odatni, milliy qadriyatni, milliy qahramonlarni yoritganligiga olimlarimiz ko‘proq e’tibor berib keldilar. Asar mustabid tuzumning ta’sirida yozilganligiga va shu tomondan asarning millatga bo‘lgan ta’siri to‘g‘risida ham ko‘proq to‘xtalish maqsadga muvofiq bo‘ladi. Asarning turli nashrlarida “ulug‘ millat”ga tegib ketadigan o‘rinlarga o‘zgartirish kiritilgan holatlarni kuzatish mumkin. Jumladan, yuqorida keltirilgan matnda: “Chor istibdodi Turkistonimizni egallar” jumlasi asliyatda “o‘ris istibdodi o‘zining iflos oyog‘i bilan”[5] tarzida yozilganini ko‘ramiz.

Xullaski, Behbudiyning qahramoni orzu qilgan istiqlolni Qodiriyning qahramoni ko‘rdi. Chunki u butun umrini hurriyat uchun kurashga bag‘ishladi. Hurriyat yetib kelganidan, shodligidan yuragi yorilib o‘ldi. Ammo, u niyatiga yetdi. Chunki uning xalqi hurriyatga erishdi. Demakki, “Haq olinur, berilmas”.

Abdulla Avloniy o‘zbek jadid adabiyotining zabardast ijodkorlaridan hisoblanadi. Uning Turkiston o‘lkasida millat uchun qilgan xizmatlari nihoyatda kattadir. Uning “Adabiyot yoxud milliy she’rlari” to‘plami, “Turkiy guliston yoxud axloq”, “Birinchi muallim”, “Ikkinchi muallim”, “Maktab gulistoni”

singari darsliklari, “Avdokatlik osonmi?”, “Pinak”, “Biz va Siz”, “Ikki sevgi”, “Po‘rtugaliya inqilobi” dramalari va hajviyotlari millatning kechinmalarini o‘zida aks ettirgan asarlardir.

Dunyoda boshqa millatlar ilm va hunarlarni egallab, taraqqiyot sari intilsalar, bizning millat esa chapon va cholma sotib tirikchiligini o‘tkazayotgan savdogar millatga aylanib qolgan deb, tashvishlanadi shoir. Bu Behbudiy boshlagan millatni taraqqiy toptirish g‘oyasining davomi hisoblanadi [6].

Shoirning she’rida ko‘tarilgan muammo millatning o‘z kelajagi uchun kurashchan emasligi: “Badandan doimo qon olurlar bemorsan, millat; Tiling yo‘q, kar qulog‘ing, surati devorsan, millat”. Chunki, badaningdan qon olaverib, sulayib qolgan bemorga o‘xshaysan, tiling bo‘la turib o‘z tilingda so‘zlasha olmaysan, go‘yoki devorga osib qo‘yilgan surat kabi jimsan, millat, deydi.

O‘tgan asrning boshida Vatan ozodligi, millatning taraqqiyoti uchun kurashgan ilg‘or ma’rifatparvar kurashchilarimiz qatorida Hoji Muin Shukrullo o‘g‘li ham turadi.

Hoji Muin millatning mustabid tuzumda ilmsizlikdan, qashshoqlikdan, yo‘qchilikdan, zulmning mashaqqatidan ozor chekayotganligini ta’kidlaydi. Millat siz qo‘lingizga berilgan huquqdan o‘z vaqtida, samarali foydalanishingiz lozim. Oldinga ketayotgan millatlar borki, ular saodatga yo‘l boshlab ketmoqdalar. Siz o‘g‘lonlar, millatning kelajagi uchun uyg‘oningiz, uxlab yotishlar millat uchun haromdir, deb millatning taraqqiy etmayotganligidan achinadi[7], deb shoir aytadiki, ochiqdan – ochiq millatning dushmani bo‘lgan, mustamlaka bosqinchi yovni bu hududdan quvlab ketkazish kerak. U yovning yuzi oppoq ko‘ringani bilan, uning ichi qop-qoradir. Millatning dushmani bo‘lgan bu – mustamlakachilikdir!

Abulhamid Cho‘lpon XX asr o‘zbek jadid adabiyotining eng yirik siymolaridan biri bo‘lib, o‘zining zamondoshlari Behbudiy, Fitrat, Qodiriylar bilan yangi – o‘zbek milliy adabiyotiga asos soldilar. Cho‘lpon shoir, yozuvchi, dramaturg, tanqidchi, publitsist sifatida ham o‘ziga xos ijodkor sifatida ajralib turadi. U o‘zining butun ijodida millatning milliy ruhini aks ettirdi.

Cho‘lponning “Go‘zal Turkiston” to‘plami mustaqillik yillarida chop qilingan. To‘plamning so‘zboshisida: “U “go‘zal Turkiston”ni mustaqil, erkin holda ko‘rishni shu qadar orzu qildiki, bolshevik mafkurachilari uning og‘zini bekitib, nafasini chiqarmay turganda ham, u “Kishan kiyma, bo‘yin egma, ki se ham hur tug‘ilg‘onsen!” deya millatdoshlarini kurashga chaqira oldi. U kurashga chaqiribgina qolmadi, balki o‘zi ham shu kurashning oldingi saflarida bo‘ldi, oqibat shu kurashda shirin jonini xalqi, Vatani yo‘lida fido qildi. Bu Cho‘lponning fuqarolik burchi, to‘g‘rirog‘i, fuqarolik jasorati bo‘ldi”[8].

Cho‘lponning “Turkistonli qardoshlarim” she’rida millatning ma’rifatsizligi ko‘tarib chiqilgan.

Abdulhamid Cho‘lpon Behbudiy boshlagan millat uchun kurash va qayg‘uruvchi harakatining bevosita davomchisi edi. U Behbudiy o‘ldirilganida millatning karvonboshchisi yo‘qotilganidan qattiq achindi. U Behbudiyning xotirasiga bag‘ishlab “Mahmudxo‘ja Behbudiy xotirasi” nomli she’rini yozdi [9].

Jadid adabiyoti to‘g‘risida fikr yuritilganda Hamza Hakimzoda Niyoziyning ijodi alohida ajralib turadi. “Yig‘la, Turkiston”, “Ko‘zni oching, qardoshlar”, “Millat deganlarning oqar ko‘z yoshi”, “Yaxshi holin yo‘qotgan oqibatsiz Turkiston”, “Past ekanmu iqbolimiz muncha?”, “O‘t olgin, Turkiston”, “Yashanglar, yashaylik, Turon”, “Haq yo‘lda jon bersak”, “Boybachchalar, semiring”, “Hasrat qilay, qardoshlar”, “Yashasun millat”, “Ahvolimiz”, “Shundoq qolurmu?!”, “Ey bulbuli millat, yozdim sana salomim”, “Turkiston muxtoriyatina”, “Uyg‘on!” kabi she’rlarida o‘zbek xalqining milliy o‘ziga xosligi, millatning qalbi, yuragi, uning ruhi, xarakteri, psixologiyasi, shuningdek, dard-u alamlari, kelajakka intilishlari, qolaversa, orzulari aks etadi. Shoirning, “Yig‘la, Turkiston” she’ri birinchi jahon urushi arafasida o‘zbek xalqi orasida mashhur bo‘lgan “Lo‘m-lo‘m Mamajon” ashulasi ohangida yozilgan bo‘lib, mazmunan millat taqdirini aks ettiradi. She’r millatning og‘ir ijtimoiy va iqtisodiy ahvoli, mustamlakachilik hamda milliy zulm to‘g‘risida yozilgan.

XULOSA

Xulosaki, jadidlarning otasi sanalmish Mahmudxo‘ja Behbudiy milliy ozodlik, ijtimoiy o‘zgarishlar, adabiyotda islohot va yaratuvchilik sohasida jadidlarga chin ma’noda “Yo‘lboshi” bo‘ldi. Uning Turkiston taraqqiyoti milliy g‘oyasi kelajak avlodga dasturilamal bo‘lib xizmat qilmoqda. Yuqorida keltirilgan asarlarning va tadqiqotlarning barchasi Behbudiy qo‘ygan tag joyning g‘ishtlari, devorlari hisoblanadi.

FOYDALANILGAN ADABIYOTLAR

1. Qodiriy A. Baxtsiz kuyov. – Toshkent: Sharq, 1997. – B. 173 - 194.
2. Qodiriy A. Diyori bakr. J. III. – Toshkent: Info Kapital Group, 2017. – B. 7 - 11.
3. Qodiriy A. O‘tgan kunlar. – Toshkent: O‘qituvchi, 1985. – B. 3.
4. Qodiriy A. O‘tgan kunlar. – Toshkent: O‘qituvchi, 1985– B. 301.
5. Qodiriy A. O‘tgan kunlar. J. I. – Toshkent: Info Kapital Group, 2017. – B. 7 - 153.
6. Avloniy A.Tanlangan asarlar. – Toshkent: Ma’naviyat, 2006. – B. 84.
7. Muin H. Nima edik, nima bo‘ldik, nima qilaylik?. Zarafshon. – Samarqand, 1922 yil 1 dekabr.
8. Cho‘lpon A. Go‘zal Turkiston. – Toshkent: Ma’naviyat, 1997. – B. 5.
9. Cho‘lpon. Mahmudxo‘ja Behbudiy xotirasi. Tong. – Toshkent, 1920 yil. – №1.

INTERETHNIC SOLIDARITY, SOCIAL TRUST AND EQUAL OPPORTUNITIES AS FACTORS OF SUSTAINABLE DEVELOPMENT

Jamshid Shuhratovich Shonazarov

dotsent falsafa fanlari doktori (DSc) Shahrisabz davlat pedagogika instituti

Shahrisabz, O'zbekiston

jshonazarov1981@gmail.com Orcid:https://orcid.org/0009-0004-8046-029X

Behzod Sharofovich Namozov

Shahrisabz davlat pedagogika instituti Ijtimoiy-gumanitar fanlarni o`qitish metodikasi (manaviyat asoslari) yonalishi magistranti

nbehzod734@gmail.com

Abstract: *This article analyses social cooperation, interethnic solidarity, social trust and equal opportunities as interconnected foundations of sustainable development. Drawing on research on social capital, human development and social cohesion, it argues that long-term progress depends not only on economic growth but also on fair institutions, meaningful participation and inclusive access to education, employment and public services. Social trust facilitates collective action, while cooperation creates opportunities to address common problems across social and ethnic boundaries. Interethnic solidarity contributes to stability when diversity is accompanied by equal rights, mutual respect and participation. The article identifies discrimination, unequal access to opportunities and exclusion from decision-making as significant challenges to social cohesion. It concludes that coordinated efforts by governments, educational institutions, employers and civil society can strengthen trust, inclusion and sustainable development.*

Keywords: *social cooperation, interethnic solidarity, social trust, equal opportunities, social cohesion, inclusive development, sustainable development.*

Аннотация: *В статье анализируются социальное сотрудничество, межэтническая солидарность, общественное доверие и равные возможности как взаимосвязанные основы устойчивого развития. На основе исследований социального капитала, человеческого развития и социальной сплочённости обосновывается, что долгосрочный прогресс зависит не только от экономического роста, но и от справедливости институтов, участия граждан и равного доступа к образованию,*

занятости и общественным услугам. Рассматриваются роль общественного доверия в коллективных действиях, значение межэтнической солидарности и риски дискриминации и социального неравенства. Делается вывод о необходимости согласованных усилий государства, образовательных учреждений, работодателей и гражданского общества для укрепления доверия, инклюзивности и устойчивого развития.

Ключевые слова: *социальное сотрудничество, межэтническая солидарность, общественное доверие, равные возможности, социальная сплочённость, инклюзивное развитие, устойчивое развитие.*

Аннотация: *Мақолада ижтимоий ҳамкорлик, миллатлар аро ҳамжиҳатлик, ижтимоий ишонч ва тенг имкониятлар барқарор тараққиётнинг ўзаро боғлиқ асослари сифатида таҳлил қилинади. Ижтимоий капитал, инсон тараққиёти ва ижтимоий бирдамликка оид илмий ёндашувлар асосида узоқ муддатли тараққиёт нафақат иқтисодий ўсишга, балки институтлар адолати, фуқаролар иштироки ҳамда таълим, бандлик ва ижтимоий хизматлардан тенг фойдаланишга ҳам боғлиқлиги асосланади. Ижтимоий ишончнинг жамоавий ҳаракатлардаги аҳамияти, миллатлар аро ҳамжиҳатликнинг барқарорликни мустаҳкамлашдаги ўрни ҳамда дискриминация ва ижтимоий тенгсизликнинг салбий таъсири ёритилади. Хулосада ижтимоий ишонч, инклюзивлик ва барқарор тараққиётни мустаҳкамлаш учун давлат, таълим муассасалари, иш берувчилар ва фуқаролик жамиятининг ҳамкорлиги зарурлиги таъкидланади.*

Калит сўзлар:*ижтимоий ҳамкорлик, миллатлар аро ҳамжиҳатлик, ижтимоий ишонч, тенг имкониятлар, ижтимоий бирдамлик, инклюзив тараққиёт, барқарор тараққиёт.*

INTRODUCTION

In the contemporary world, sustainable development is increasingly understood as a multidimensional process that encompasses economic growth, social well-being, institutional effectiveness and equal opportunities. Although economic indicators remain important, they do not fully explain why some societies achieve lasting stability while others experience mistrust, social fragmentation and persistent inequality. The quality of relationships between citizens, the fairness of public institutions and the opportunities available to different social groups are also essential conditions for sustainable

progress.Social cooperation, interethnic solidarity, social trust and equal opportunities are closely interconnected. Social cooperation enables individuals and organisations to work together in pursuit of common objectives. Interethnic solidarity strengthens mutual recognition and support among people from different ethnic and cultural backgrounds. Social trust creates expectations of reliability and fairness in interpersonal and institutional relations. Equal opportunities provide individuals with a fair chance to develop their abilities and participate in social, economic and political life. These factors are particularly important in culturally diverse societies. Diversity can contribute to innovation, cultural enrichment and economic development, but its positive potential depends on inclusive institutions and respectful social relations. When discrimination and unequal treatment persist, social differences may become sources of mistrust and division.The purpose of this article is to analyse the relationship between social cooperation, interethnic solidarity, social trust and equal opportunities, and to explain their significance for sustainable development. The article applies a conceptual and analytical approach informed by established research on social capital, human development and social cohesion. **Social Cooperation as a Foundation of Sustainable Development.** Social cooperation is an important condition for addressing complex problems that cannot be solved effectively by individuals or institutions acting independently. Improving public services, protecting the environment, supporting vulnerable populations and responding to economic challenges require coordination between government bodies, educational institutions, businesses and civil society organisations.Cooperation makes it possible to combine knowledge, resources and experience. It can improve the quality of decision-making by allowing different groups to contribute their perspectives. It also encourages shared responsibility for public problems and helps build more responsive institutions.Putnam (2000) highlights the importance of social networks, shared norms and trust in facilitating collective action. However, cooperation does not automatically benefit society as a whole. Networks may

remain limited to particular groups, excluding people from different ethnic, economic or cultural backgrounds. Therefore, effective social cooperation should develop connections both within communities and across social boundaries.Public institutions can support cooperation by ensuring transparent decision-making, providing accessible information and creating meaningful opportunities for citizen participation. Consultation should not be merely formal. People are more likely to participate when they can see that their opinions are considered and that collective efforts lead to practical results.Thus, social cooperation contributes to sustainable development by strengthening collective responsibility, improving institutional responsiveness and enabling communities to address shared challenges. **Interethnic Solidarity and Social Cohesion.** Interethnic solidarity refers to mutual respect, recognition and cooperation among people belonging to different ethnic groups. It does not require the elimination of cultural differences. Rather, it involves accepting diversity while recognising the equal dignity and rights of every individual.Ethnic and cultural diversity can enrich society through different languages, traditions, experiences and forms of knowledge. However, diversity alone does not guarantee social harmony. Discrimination, stereotypes, unequal access to public services and exclusion from decision-making can weaken relationships between groups.Interethnic solidarity is strengthened when equality is supported by both legal guarantees and everyday social practices. Fair treatment by public institutions, equal access to education and employment, protection against discrimination and opportunities for intercultural communication all contribute to stronger social cohesion.

The United Nations 2030 Agenda for Sustainable Development emphasises the importance of peaceful and inclusive societies and commits to leaving no one behind (United Nations, 2015). This principle underlines that sustainable development should benefit all members of society, including groups that may experience social or economic disadvantage.Education plays an important role in strengthening interethnic solidarity. Educational institutions

can encourage critical thinking, respectful dialogue and an understanding of cultural diversity. Joint community projects, cultural activities and collaborative initiatives can also create opportunities for people from different backgrounds to work towards common goals.

Consequently, interethnic solidarity should be understood not simply as a desirable social value, but as an important condition for stability, inclusion and long-term development.

Social trust is another fundamental component of sustainable development. It refers to the expectation that other people and institutions will behave in a reasonably reliable, fair and responsible manner.Interpersonal trust facilitates communication, mutual assistance and cooperation. Institutional trust depends on whether citizens believe that public bodies apply rules fairly, provide reliable services and act transparently. These two dimensions influence one another: repeated experiences of fair treatment can strengthen confidence in institutions, while perceived injustice can weaken it.The Organisation for Economic Co-operation and Development identifies reliability, responsiveness, openness, integrity and fairness as important dimensions associated with public trust (OECD, 2022). These principles have practical implications for governance. Public institutions should communicate clearly, explain decisions, provide accessible services and establish effective procedures for handling complaints.

Trust cannot be created through declarations alone. It develops through consistent institutional performance and everyday experiences. When citizens perceive corruption, discrimination or unequal treatment, they may become less willing to participate in public initiatives or cooperate with institutions.At the same time, social trust should not be confused with unquestioning obedience. Constructive criticism, public accountability and peaceful disagreement are compatible with trust. Indeed, transparent procedures that allow citizens to question decisions and seek remedies can strengthen institutional legitimacy.A

society capable of maintaining trust while allowing open discussion is better equipped to resolve disagreements and respond to social challenges.

Equal opportunities mean that individuals should have a fair chance to develop their capabilities and participate in society without unjust barriers based on ethnicity, gender, disability, economic background or other circumstances.Formal equality before the law is essential, but it does not always guarantee equal access to education, healthcare, employment, digital resources or public participation. People may face practical obstacles that limit their ability to benefit from development.Sen (1999) argues that development should be understood in terms of the substantive freedoms and capabilities people possess, rather than economic growth alone. This perspective highlights the importance of enabling individuals to make meaningful choices and pursue lives they value.

Equal opportunities therefore require attention to the actual conditions in which people live. Inclusive education, accessible public infrastructure, transparent recruitment procedures, vocational training and effective protection against discrimination can help reduce unnecessary barriers.For example, educational opportunities may formally be available to everyone, while differences in household income, geographical location or access to digital technologies prevent some individuals from benefiting equally. Identifying such obstacles is essential for designing effective policies.

Equal opportunities should not be regarded merely as a social welfare objective. They can also strengthen economic productivity, public participation and social stability. When people believe that effort and ability matter and that institutions treat them fairly, they are more likely to contribute to collective development.

The Interrelationship Between Cooperation, Solidarity, Trust and Equal Opportunities. Social cooperation, interethnic solidarity, social trust and equal opportunities should not be treated as separate or unrelated concepts. They reinforce one another and together shape the social foundations of sustainable development.First, equal opportunities can strengthen social trust by

demonstrating that institutions recognise the dignity and rights of different groups. Fair access to education, employment and public services can increase confidence in the fairness of social arrangements.

Second, trust facilitates cooperation. People are more willing to share information, contribute resources and work towards common objectives when they expect others to act responsibly.

Third, cooperation creates practical opportunities for interaction between people from different ethnic and cultural backgrounds. Shared projects and collective problem-solving can help reduce stereotypes and strengthen interethnic solidarity.

Fourth, interethnic solidarity can support equal opportunities by encouraging public recognition of diversity and collective opposition to discrimination.The opposite process is also possible. Discrimination may weaken solidarity; unequal opportunities may undermine trust; declining trust may reduce participation; and weak cooperation may make social problems more difficult to address. These interconnected challenges demonstrate why isolated measures are often insufficient.A comprehensive approach should therefore combine fair institutions, inclusive education, transparent employment practices, public participation and intercultural dialogue. Government bodies, educational institutions, employers and civil society organisations all have important roles in supporting this process.

CONCLUSION.

Social cooperation, interethnic solidarity, social trust and equal opportunities are interdependent foundations of sustainable development. Long-term progress depends not only on economic performance but also on the quality of social relations, the fairness of institutions and the ability of individuals to participate meaningfully in society.The analysis demonstrates that social cooperation helps communities address shared problems; interethnic solidarity strengthens cohesion in diverse societies; social trust supports collective action and institutional legitimacy; and equal opportunities enable people to develop

their capabilities and contribute to social progress.Three practical priorities follow from these findings. First, public institutions should strengthen trust through transparency, reliability, integrity and accountability. Second, interethnic solidarity should be supported through inclusive education, intercultural dialogue and effective protection against discrimination. Third, equal opportunities should be evaluated in practice, with particular attention to barriers affecting access to education, employment and public services.

Social trust can be conceptually examined along two principal dimensions.The first is interpersonal trust, which manifests itself in relationships among family members, neighbors, colleagues, and other citizens. The second is institutional trust, which refers to citizens' confidence in the functioning of government agencies, educational institutions, the judicial and legal system, and other social institutions. These two dimensions are closely interconnected. The establishment of integrity, transparency, legality, and mutual respect within society contributes to strengthening social trust.A high level of social trust facilitates economic and social cooperation. For example, where mutual trust exists among citizens, opportunities to implement collective projects, address local challenges, and support social initiatives are enhanced. Transparency, accountability, and equality before the law in the functioning of public institutions also contribute to increasing citizens' trust. When citizens perceive that their concerns are being addressed, their rights are protected, and decisions are made according to fair and impartial criteria, they are more likely to participate actively in public life.

Accordingly, strengthening social trust requires particular attention to the following areas:Enhancing openness and transparency in public administration;

Upholding the rule of law and the principles of justice;

Taking citizens' opinions and proposals into consideration; Preventing corruption and fostering a culture of integrity; Increasing the engagement and effectiveness of mahallas and public participation institutions;

Developing a culture of mutual respect and cooperation among citizens. In conclusion, social trust strengthens the internal cohesion of society and helps create the social environment necessary for sustainable development.

1.Theoretical Foundations of Sustainable Development

The concept of sustainable development is one of the fundamental principles of contemporary socio-economic progress. Its essence lies in ensuring a balance between economic growth, social well-being, and environmental protection. In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, which established 17 Sustainable Development Goals (SDGs). These goals encompass a range of key priorities, including poverty reduction, the promotion of quality education, the achievement of gender equality, the creation of decent working conditions, the reduction of inequalities, and the strengthening of peace and justice.The substance of these goals demonstrates that sustainable development is not limited to expanding economic opportunities. It also requires active public participation in social life, the protection of individual rights, and equitable access to available opportunities. From a scientific perspective, interethnic solidarity, social trust, and equal opportunities constitute interrelated social determinants of sustainable development. When any of these factors is insufficiently developed, social tensions, inequality, and mistrust may intensify within society. Conversely, when these factors operate in harmony, they create a favorable environment for cooperation, initiative, and social responsibility.

Therefore, a fundamental prerequisite for sustainable development is not only the efficient utilization of economic resources but also the strengthening of society's social capacity.

2. The Role of Interethnic Solidarity in Social Development

Interethnic solidarity is one of the key factors in maintaining peace and stability in multiethnic societies. It refers to the coexistence of representatives of different ethnic groups on the basis of mutual respect, tolerance, solidarity, and a shared sense of civic responsibility. The development of interethnic solidarity

contributes to the recognition of cultural diversity as a social asset. Respect for the languages, customs, traditions, and cultural heritage of every ethnic group strengthens mutual understanding among different communities. When interethnic relations are established on the principles of mutual respect and equal rights, cooperation among citizens becomes stronger. This, in turn, expands opportunities for collaborative efforts toward common objectives in education, science, culture, entrepreneurship, and other spheres of social life. Conversely, discrimination, intolerance, and social exclusion based on ethnic or cultural differences may undermine trust within society. Such circumstances can prevent citizens from participating actively in broader processes of social development. In Uzbekistan, the promotion of interethnic harmony and religious tolerance is of considerable socio-political importance. Particular attention is given to ensuring peaceful coexistence among representatives of different ethnic groups, preserving and developing their cultural traditions, and strengthening the principles of mutual respect. Nevertheless, strengthening interethnic solidarity should not be confined to government policy alone. Families, educational institutions, mahallas (local self-governing community institutions), mass media, and civil society organizations must also play an active role in this process.

In particular, fostering respect for people from different ethnic and cultural backgrounds, as well as developing tolerance and cooperation skills among younger generations, is essential for achieving long-term social stability.

3. Social Trust as a Key Prerequisite for Sustainable Development Social trust refers to the confidence that members of society place in one another, in public institutions, and in the rules governing social relations. It plays a significant role in promoting cooperation, strengthening social relationships, and addressing common challenges through collective action.

REFERENCES.

1. Organisation for Economic Co-operation and Development. (2022). Building trust to reinforce democracy: Main findings from the 2021 OECD survey on drivers of trust in public institutions. OECD Publishing. https://doi.org/10.1787/b407f99c-en

2. Putnam, R. D. (2000). Bowling alone: The collapse and revival of American community. Simon & Schuster.
3. Sen, A. (1999). Development as freedom. Alfred A. Knopf.
4. United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development (A/RES/70/1). https://sdgs.un.org/2030agenda
5. United Nations Development Programme. (2022). Human development report 2021/2022: Uncertain times, unsettled lives: Shaping our future in a transforming world. https://hdr.undp.org/content/human-development-report-2021-22
6. United Nations Educational, Scientific and Cultural Organization. (2017). A guide for ensuring inclusion and equity in education. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000248254

НЕКОТОРЫЕ АСПЕКТЫ ВНЕШНЕЙ ПОЛИТИКИ И ДИПЛОМАТИИ СОВРЕМЕННОГО ЕГИПТА

Giyosov Bobur Temurovich.

Кадидат исторических наук, dotsent

Университета Алфраганус. Ташкент. Узбекистан,

ORCID: 0009-0006-5320-4500

Giyosov Babur Temurovich.

Doktor of Philosofy, Associate Professor Alfraganus University

Tashkent,Uzbekistan

ORCID: 0009-0006-5320-4500

Аннотация: *В данной научной статье раскрыты наиболее важные аспекты внешней политики и дипломатии а период президентства Абдель Фаттаха ас-Сиси. В статье изложены основные вузы страны, в которых осуществляется целенаправленная подготовка дипломатов и международников для внешнеполитического ведомства, ряда министерств и СМИ. Следовательно, показана дипломатия официального Каира по укреплению и расширению многогранных отношений со странами ЕС, США, РФ, Китаем и Узбекистаном. Важным направлением дипломатии президента Египта остается привлечение инвестиций в перспективные проекты и разработки в целях решения социально-экономического развития страны.*

Ключевые слова:*политика, дипломатия, прагматизм, инвестиции, развитие, реформы, туризм, вузы, население, прогресс, международники, баланс, госсектор, глобализация, конфликты, многовекторность, многогранность.*

Abstract: *This scientific article examines the most important aspects of Egypt's foreign policy and diplomacy during the presidency of Abdel Fattah el-Sisi. It outlines the country's leading higher education institutions that provide specialized training for diplomats and international relations experts working in the Ministry of Foreign Affairs, various government ministries, and the media. The article also highlights Cairo's official diplomatic efforts to strengthen and expand multifaceted relations with the European Union, the United States, the Russian Federation, China, and Uzbekistan. An important priority of Egyptian President's*

diplomacy remains attracting investment in promising projects and innovative developments aimed at addressing the country's socio-economic challenges and promoting national development.

Keywords: *politics, diplomacy, pragmatism, investment, development, reforms, tourism, higher education institutions, population, progress, international relations specialists, balance, public sector, globalization, conflicts, multi-vector foreign policy.*

ВВЕДЕНИЕ

Общеизвестно, что современный Египет в период правления президента Абдель Фаттаха ас-Сиси в отличии от своих предшественников проводит многогранную прагматичную внешнюю политику и мудрую дипломатию. Прослеживаются значительные положительные изменения, определенный прогресс в социально-экономической жизни народа, осуществляются инновационные проекты и разработки, укрепляются и расширяются отношения со странами ЕС, США, Китая, Арабского мира, Африки, а также с Узбекистаном. Как указана в данной статье, взаимоотношения с внешним миром развиваются на основе принципов взаимной выгоды, взаимоуважения и равноправия. Таким образом, дипломатические шаги официального Каира дают положительные результаты. Международный имидж и авторитет приобретает все более значимый уровень.

АНАЛИЗ ИСПОЛЬЗОВАННОЙ ЛИТЕРАТУРЫ

В данной научной статье использованы, научные издания как узбекистанских, так и зарубежных ученых и специалистов международников, египетского посла Хусейн аль-Кемаля, монография самого автора Гиёсова Бобура, а также материалы и статистичекие данные глобальной сети интернет. Использованные материалы по сути – официальные, обективные и систематизированные.

МЕТОДОЛОГИЯ ИССЛЕДОВАНИЯ

В качестве методологии нами использованы принципы хронологического порядка, системности, объективности и научной новизны. Нучные труды узбекистанских и зарубежных учёных,

выступления и интервью дипломатов и государственных деятелей, а также официальные статистические данные легли на основу методологии данной научной статьи.

АНАЛИЗ И РЕЗУЛЬТАТЫ

На протяжении многих лет Арабская Республика Египет развивается как независимое государство, имеющий древнюю цивилизацию. Национально-демократическая революция, свершившаяся 23 июля 1952 года, в корне изменила ход развития страны и открыла широкие перспективы для упрочения её политической независимлости, экономического и социального прогресса.“Египет - значимый субъект, активный участник глобализа-ции.”**[1]** В речах президента страны Абдель Фаттаха ас-Сиси многократно было заявлено о многосторонней дипломатии официального Каира, и его роли в международных отношениях. Иначе говоря, египетское руководство при нейтральной риторике понимает и принимает все «вызовы глобализации», ориентируясь в сторону многосторонней дипломатии и экономического взаимодействия. В этих целях руководства страны видит необходимость подготовки высококвалифицированных дипломатических работников и международников. Поистине, 21-век диктует свои условия перед современными дипломатами. Меняется мир, коренные изменения происходят в мировой политике и экономике. В конечном итоге, решение политических, военных, экономических, научно-технических, культурных, социальных проблем современной глобализации требует мудрых дипломатических усилий с оперативным реагированием на них. На современном этапе в Египте подготовка дипломатов и специалистов по международным отношениям (МО) сосредоточена в ряде ведущих государственных и престижных международных вузах. Сама профессиональная переподготовка и финальная «огранка» будущих атташе проходит в специализированном институте при МИДе страны.

Ниже представлены ключевые университеты Египта, где готовят международников и будущих дипломатов:

1. **Каирский университет (Cairo University)** — факультет экономики и политических наук (Faculty of Economics and Political Science). Это самая престижная и сильная кафедра политологии и международных отношений в стране. Выпускники этого факультета традиционно составляют костяк дипломатического корпуса Египта.

2. **Университет Айн-Шамс (Ain Shams University**) в Каире — программы в области международного права и политических наук.

3. **Александрийский университет (Alexandria University)** — предлагает сильные академические программы по международным отношениям и стратегическим исследованиям

Международные и частные университеты

1. Здесь обучение полностью англоязычное (или франкоязычное), программы построены по западным стандартам, а дипломы признаются за рубежом.

2. **Американский университет в Каире (The American University in Cairo — AUC)** — абсолютный лидер среди частных вузов. Департамент политических наук предлагает программы бакалавриата и магистратуры со специализацией в International Relations (Международные отношения) и магистерскую программу Global Affairs (Глобальные процессы). Идеальное место для карьеры в ООН, Лиге арабских государств и международных НПО.

3. **Британский университет в Египте (The British University in Egypt — BUE)** — факультет политических наук (Bachelor in Political Science), где активно изучается региональная политика, глобальная дипломатия и международные экономические структуры.

4. **Университет Бадр в Каире (Badr University in Cairo — BUC)** — здесь открыта специализированная Школа политологии и международных отношений (School of Political Science and International Relations).

5. **Французский университет в Египте (Université Française d'Égypte — UFE)** — готовит специалистов со знанием французского языка для работы на европейском и африканском треках.

Профильное учреждение МИД Египта - Институт дипломатических исследований (Institute for Diplomatic Studies — IDS) в Каире. Это ведомственное учебное заведение при Министерстве иностранных дел Египта. Сюда невозможно поступить сразу после школы. В институт зачисляются лица, уже имеющие высшее образование (как правило, юридическое, экономическое или политологическое), успешно сдавшие жесточайшие конкурсные экзамены МИД. Именно здесь проходят обязательную подготовку все будущие египетские дипломаты перед отправкой в зарубежные миссии.

Следует отметить следующие цели внешней политики Египта:

1. “Невмешательство во внутренние дела других стран. ·

2.Решение проблем мирным путем.

3. Активная деятельность и призывы к формированию единой международной позиции по противодействию терроризму. ·

4. Поддержание курса на обеспечение внутренней стабильности и экономического прогресса для противостояния последствиям мирового финансового кризиса.

5.Поддержание сбалансированных отношений со всеми странами для достижения внешнеполитических целей Египта.

6. Защита государственных границ и самого государства.

7. Развитие экономического потенциала за счет привлечения иностранных инвестиций, развития туризма и торговли, опираясь как на международное сотрудничество, так и на внутреннюю политику.

8. Развитие и поддержка демократии, соблюдения прав человека и принципа прозрачности.

9. Сохранение роли Египта в арабском мире для поддержания его статуса влиятельной региональной державы.

10. Борьба с терроризмом, движимым религиозной идеологией.

11. Поддержка Договора о нераспространении ядерного оружия (ДНЯО), а также призывы к Израилю присоединиться к этому договору и поставить все свои ядерные объекты под контроль системы гарантий МАГАТЭ."[2]

Общеизвестно, что АРЕ все более расширяет многогранные отношения со странами Евросоюза. "Евросоюз выделил Египту 1 млрд. евро на поддержку экономики." **[3]** Политологи проанализировали это событие с точки зрения внешней политики страны и её приоритетов.

«Все международные региональные игроки заинтересованы в стабильности Египта, потому что это Суэцкий канал, «ворота в Африку», а также из-за опасения возможного наплыва беженцев. Египет зачастую получает внушительную помощь с разных сторон: военную помощь США на сумму 1 млрд 300 млн долларов в год, инвестиции Саудовской Аравии и ОАЭ; недавно и Катар присоединился к усилиям по стабилизации Египта в финансовом плане. Доля России в египетском импорте превышает 60%. Также РФ участвует в строительстве АЭС «Эль-Дабаа» в северной части страны. По сути, Египет получает от России экспортный кредит, который начнёт оплачивать только после планируемого ввода в работу АЭС в 2029 году». **[4]** У Египта очень развитые отношения с Россией. Это минимум 50 лет стратегического сотрудничества. Между государствами реализуются гигантские проекты вроде строительства АЭС в городе Дабаа. Никакое финансирование Запада не влияет на отношения Египта с Россией. Внешняя политика страны не меняется. Лидер и правительство страны всегда отстаивают национальные интересы – экономику, развитие, защиту суверенитета, это «красная линия» в отношениях с другими государствами. Главный плюс внешней политики Египта – удержание баланса между Востоком и Западом, между Россией, Китаем, ЕС, США и странами Персидского залива.

На современном этапе ЕС укрепляет и расширять многогранные отношения с Египтом. Принципы взаимной выгоды, равноправие и взаимоуважения вполне отвечают их национальным интересам. Жизненный опыт показал, что страны нужны друг-другу. Египет для стран ЕС – рынок сбыта готовых товаров и современных технологий, вооружений, туристический обмен, участие европейских ученых и специалистов в проведении целенаправленных реформ, осуществление совместных проектов, взаимодействие в решении глобальных вопросов современности – далеко не полный перечень интересов. Между тем, Каир тоже прилагает усилия углублению многогранных отношений со странами ЕС.

В последние годы европейцы в определенной степени отдалились от Африки. Исключением являются Франция и Великобритания. А у Египта есть много важных и значимых проектов, которые нужно реализовывать. Много средств потрачено на грандиозный проект **«Нового Каира»,** на обновление столицы. Есть проблема спонсирования инфраструктурных проектов, из-за чего Египет отстаёт в развитии от других стран Ближнего Востока. Страна прошла сложный путь, предыдущее руководство страны не смогло осуществлять целенаправленные социально-экономические реформы. В результате произошёл переворот, к власти пришёл президент Абдулл-Фаттах ас-Сиси. Страна страдала от политических изменений, это отражалось на экономике. Страна выбрала новый политический курс, предусматривающий решение социально-экономических проблем. В стране прослеживается демографический взрыв. Проведение жесткой социальной политики по планированию семьи – весьма рискованный шаг. Между тем, ислам в многомиллионной стране является важным фактором, с которой следует считаться. В этой северо-восточной африканской стране быстрыми темпами растет население. Демографический рост показывает огромный человеческий капитал, но и требует развития экономики, инфраструктуры.

На современном этапе предотвращение конфликтов на Ближнем Востоке, их разблокирование возможно после осуществления целого ряда дипломатических усилий, согласованных мер, принятых как на региональном, так и на международном уровне. “Для поддержания разумного баланса сил на Ближнем Востоке необходимо также принять меры по ограничению наращивания вооружений, признать права всех государств региона на суверенитет и территориальную целостность**.”[5]** Современный Египет под руководством президента Сиси прилагает всевозможные усилия в деле обеспечения региональной и международной безопасности в мире, в целом. Однако, дипломатические шаги официального Каира в этом направлении недостаточны. Имеются те акторы, которые демонстрируют повышенный интерес в эскалации напряженности на Ближнем Востоке. Открытая агрессия Израиля против палестинского народа и Ирана привела к потере инвестиционной привлекательности региона. Ни “страна пирамид”, ни Лига арабских государств не смогли повлиять на ситуацию вооруженного противостояния.

В последние годы европейцы потеряли Африку – по крайней мере, если посмотреть на Францию и Великобританию. А у Египта есть много проектов, которые нужно реализовывать. Много финансово-экономических средств потрачено и тратится на проект «Нового Каира», на обновление Каира. Есть проблема спонсирования инфраструктурных проектов, из-за чего Египет отстаёт в развитии от других стран Ближнего Востока. Египет прошёл сложный путь, предыдущее руководство страны не слишком нравилось соседям по региону, потом произошёл переворот, к власти пришёл президент Абдулл-Фаттах ас-Сиси. Страна страдала от политических изменений, это отражалось на экономике. Сейчас ведётся новый экономико-политический курс. В стране с небывалой скоростью растет население. Демографический рост показывает большой

человеческий капитал, но и требует развития экономики, инфраструктуры, туристического сектора».

За последние годы возрастает напряженные отношения между Египтом и Эфиопией в вопросе распределения воды Нила. “Каждый участник переговоров хочет достичь соглашения, которое удовлетворяло бы его материальные интересы.”**[6]** В большинстве случаев не удается достичь общей знаменательности и взаимопонимания. На африканском континенте некоторые страны озабочены ростом напряженных отношений между двумя странами. Огромная ГЭС и водохранилище, строящейся на территории Эфиопии неминуемо приведет к сокращению водных ресурсов в Египте. Между прочим, этот проект – самый большой на черном континенте. Следовательно, сельское хозяйство этой арабской страны сильно зависит от воды единственной реки.

Основными доходами страны являются международный туризм, Суэцкий канал, нефть и египтяне, приток денег египтян, работающих в зарубежный странах. В целом египетские специалисты, ученые и рабочие отличаются высокой квалификацией, они весьма скромные, дружелюбные и общительные. В арабском и мусульманском мире высоко ценятся дипломы выпускников всемирно известных университетов страны.

“В конце 1990- гг. правительство приняло решение – оставить за собой объекты, наиболее значимое для народного хозяйства**.”[7]** Такие отрасли как электронная и производство вооружений, черная металлургия и нефтеперерабатывающие заводы, авиакомпания “Иджипт эйр”, Управление железных дорог, порты и Суэцкий канал. Этот курс в экономической политике страны оказался вполне приемлемым и благонадежным.

Таким образом, на современном этапе дипломатия президента Египта Абдель Фаттаха ас-Сиси строится на принципах прагматизма, многовекторности, балансирования между мировыми центрами силы и укрепления позиций Египта как ключевого игрока в арабском мире и на

Африканском континенте. Ниже изложены основные направления египетской дипломатии:

- **Многовекторность и прагматизм:** Каир поддерживает стабильные партнерские отношения одновременно с США, странами Европы, Россией и Китаем, избегая жесткой конфронтации с кем-либо из них.
- **Интеграция в БРИКС:** Под руководством ас-Сиси Египет официально присоединился к блоку БРИКС, выступая за продвижение интересов Глобального Юга, торговлю в национальных валютах и реформирование мировой финансовой системы. В сентябре 2026 года в Каире прошли переговоры с председателем КНР Си Цзиньпином, подтвердившие углубление стратегического партнерства.
- **Региональное посредничество:** Египет играет центральную роль в попытках урегулирования кризисов в секторе Газа, Ливии и Судане. Ас-Сиси активно призывает к международным усилиям по прекращению огня, оказанию гуманитарной помощи (например, инициативы по поддержке Судана) и недопущению хаоса у своих границ.
- **Безопасность и Суэцкий канал:** Особое внимание в дипломатии уделяется защите стратегических интересов страны, включая безопасность Суэцкого канала — важнейшего источника доходов государственной экономики.
- **Связи с арабскими монархиями:** Сохраняется тесная координация с государствами Персидского залива (Саудовской Аравией, ОАЭ), которые выступают важными экономическими и финансовыми партнерами Египта**.[8]**

Руководства страны проявляет повышенный интерес к привлечению многовекторных инвестиций в сферу туризма. В частности, в Шарм-аш-Шейхе строительство и развитие премиального гостиничного сегмента ведут ведущие международные и региональные гостиничные сети, а также крупные девелоперские компании (часто в партнерстве с туроператорами

и международными брендами). Наиболее активно премиальные и люксовые объекты в регионе строят и расширяют следующие компании:

1. **Accor и Rixos Hotels (Турция / Франция).** Это самый агрессивный и масштабный игрок на рынке премиального отдыха в Египте. Сеть **Rixos** (входящая в стратегический альянс с французской группой Accor) активно застраивает регион ультра-всевключенными курортами.

➢ **Текущие и новые проекты:** Сеть активно расширяет мега-комплекс **Rixos Radamis** в районе Набк (площадью 1 млн кв. м). Дополнительно к флагманам **Rixos Premium Seagate и Rixos Sharm El Sheikh** в последние годы были построены и открыты **Rixos Golf Villas & Suites**, а также люксовый бренд **Swissôtel Sharm El Sheikh** (коллаборация **Accor и Rixos).**

2. **Four Seasons Hotels and Resorts (Канада).** Канадский оператор владеет одним из самых роскошных и дорогих курортов в Шарм-эш-Шейхе уровня «люкс» — Four Seasons Resort Sharm El Sheikh.

➢ **Проекты:** Компания не так давно завершила масштабную многомиллионную экспансию своего отеля, увеличив его территорию до 90 акров и добавив эксклюзивные каскадные жилые резиденции (**Residential Suites**) премиум-класса с видом на Красное море.

3. **Sunrise Hotels & Resorts (Египет).**Известная египетская сеть отелей, которая делает ставку на современный премиальный сегмент премиум-класса и концептуальные курорты.

➢ **Проекты:** В портфолио компании входят популярный люксовый отель Sunrise Arabian Beach Resort и два ультрасовременных премиальных отеля в футуристическом стиле, построенных с фокусом на разные аудитории: белоснежный Meraki Resort (концепция клубного люкса для взрослых) и семейный бутик-премиум White Hills Resort.

4. **Deutsche Hospitality / Steigenberger (Германия).**Немецкий гостиничный оператор развивает люксовый сегмент в бухте Набк.

➢ **Проекты:** Их главным премиальным активом в Шарм-эш-Шейхе является пятизвездочный отель **Steigenberger Alcazar**, регулярно входящий в топы лучших люксовых локаций Египта по качеству сервиса и приватности.

5. **Baron Hotels & Resorts (Египет).**Местная люксовая цепочка, ориентированная на более классический премиальный отдых, высокий уровень приватности и романтические поездки.

➢ **Проекты:** Помимо известного Baron Resort в бухте Рас-Насрани, сеть активно инвестирует в модернизацию и расширение фондов. Компания строит совершенно новый корпус высшего класса **«Лагуна» (Baron Cascade)** с эксклюзивными номерами премиум-уровня типа swim-up (с прямым выходом в бассейн).

6. **Pickalbatros Hotels & Resorts** (Египет). Хотя изначально сеть ассоциировалась с массовым семейным отдыхом, в последнее время холдинг активно инвестирует в создание VIP-зон и премиальных подбрендов.

➢ **Проекты**: В Шарм-эш-Шейхе компания построила эксклюзивный комплекс **Pickalbatros Golf Luxury Suites**, а также провела премиальную реновацию отеля **Pickalbatros Royal Grand Resort**.

Весьма успешно и плодотворно развиваются, расширяются и углубляются египетско-узбекистанские отношения. Наши отношения охватывают такие сферы, как межмидовские консультации, взаимодействие по решению глобальных и региональных проблем современности, торгово-экономическое и научно-техническое сотрудничество, образование (обмен преподавателями и студентами, повышение квалификаций наших специалистов, научных исследователей и ученых), чтение спецкурсов учеными наших стран в вузах обеих стран, обмен научной и учебной литературой), туризм, культура, спорт, обмен информацией, сотрудничество частных секторов и это далеко не полный перечень. Наших стран связывают прочные международно-правовые

основы. На наш взглаяд, наши страны могли бы ещё шире использовать имеющиеся возможности в целях сближения наших народов.

ЗАКЛЮЧЕНИЕ

Подводя итог, можно выделить следующие цели внешней политики и дипломатии Египта:

- Невмешательство во внутренние дела других стран.
- Решение проблем мирным путем.
- Активная деятельность и призывы к формированию единой международной позиции по противодействию терроризму.
- Поддержание курса на обеспечение внутренней стабильности и экономического прогресса для противостояния последствиям мирового финансового кризиса.
- Поддержание сбалансированных отношений со всеми странами для достижения внешнеполитических целей Египта.
- Защита государственных границ и самого государства.
- Развитие экономического потенциала за счет привлечения иностранных инвестиций, развития международного туризма и торговли, опираясь как на международное сотрудничество, так и на внутреннюю политику.
- Развитие и поддержка демократии, соблюдения прав человека и принципа прозрачности.
- Сохранение роли и положительного международного имиджа Египта в арабском мире для поддержания его статуса влиятельной региональной державы.
- Борьба с терроризмом, движимым религиозной идеологией.
- Поддержка Договора о нераспространении ядерного оружия (ДНЯО), а также призывы к Израилю присоединиться к этому договору и поставить все свои ядерные объекты под контроль системы гарантий МАГАТЭ.

Современный Египет под руководством президента Сиси прилагает всевозможные усилия в деле обеспечения региональной и международной безопасности в мире, в целом. Однако, дипломатические шаги официального Каира в этом направлении недостаточны. Имеются те акторы, которые демонстрируют повышенный интерес в эскалации напряженности на Ближнем Востоке. Открытая агрессия Израиля против палестинского народа и Ирана привела к потере инвестиционной привлекательности региона. Ни “страна пирамид”, ни Лига арабских государств не смогли повлиять на ситуацию вооруженного противостояния.

Вышеуказанные факты ещё раз подтверждают, что весьма благополучно осуществляется привлечение местных и иностранных инвестиций в перспективные проекты и разработки. Однозначно в достижении этих успехов следует отметить немалые заслуги президента страны Абдель Фаттаха ас-Сиси.

ИСПОЛЬЗОВАННАЯ ЛИТЕРАТУРА

1. Гиёсов Бобур. Узбекско-египетские отношения и их перспективы. (Монография). «Ўзбекистон миллий энциклопедияси». 2016. С.5.

2.Egyptian Diplomacy and International Relations. Ambassador Hussein El-Kamel-Senior Advisor for International Cooperation, Egypt. https://www.realinstitutoelcano.org/en/work-document/egyptian-diplomacy-and-international-relations-wp.

3. Внешняя политика Египта меняется**.** https://mskgazeta. ru/https:// mskgazeta. ru/politika/vneshnyaya-politika-egipta-menyaetsya-15821.html

4. Там же.

5.Комил Азимов. Ближний Восток: конфликты за землю, за воду, за веру. XX век. “Lambert Academic Publishing”.Ташкент – 2020. С.5.

6.Роджер Фишер, Уильям Юри, Брюс Паттон. Гарвардский метод переговоров. Перевод с английского Татьяны Новиковой. Москва. “Манн, Иванов и Фебер”. 2022.С.40.

7. Видясова М.Ф., Умеров М.Ш. Египет после арабского социализма: в поиске экономических решений. Москва. МГУ им.М.В.Ломоносова. 1999. С.23.

8.Основные направления и особенности внешней политики. ttps://www. google.com/search.

O‘ZBEK JADID HIKOYALARIDA MILLIY ISTIQLOL G‘OYASI

Safarov Xoliyor Berdiyarovich

Filologiya fanlari bo‘yicha falsafa doktori,

Alfraganus universiteti o‘qituvchisi

xoliyorsafarov@gmail.com

Annotatsiya. *Ushbu maqolada o‘zbek jadid ma’rifatparvarlarining erk va istiqlol g‘oyalari, millatni uyg‘otish, ularni jaholat botqog‘idan olib chiqish uchun aniq real voqelikka asoslangan hikoyalar orqali obrazli ta’sir ko‘rsatish, hayotning chirkin jihatlarini aks ettirish va tegishli xulosalar berish orqali g‘oyaviy maqsadga erishish yo‘llari yoritilgan.*

Kalit so‘zlar: *G‘oya, millat, jaholat, ma’rifat, erk, istiqlol, taraqqiyot.*

Abstracr. *In this article, the free and independent ideas of Uzbek modern enlighteners, to awaken the nation, to take them out of the swamp of ignorance, to have a figurative effect through stories based on real reality, to reflect the ugly aspects of life and relevant ways to achieve the ideological goal are highlighted by giving conclusions.*

Keywords: *Idea, nation, ignorance, enlightenment, freedom, independence, development.*

Аннотация. *Аннотация. В статье рассматриваются методы, которые использовали узбекские просветители-джадиды для достижения своих идеологических целей — в частности, для продвижения идей свободы и независимости, пробуждения нации и спасения народа из трясины невежества. К числу этих методов относятся использование нарративов, основанных на конкретных жизненных ситуациях (для создания яркого впечатления), описание неприглядных сторон действительности, а также формулирование соответствующих выводов.*

Ключевые слова: *идея, нация, невежество, просвещение, свобода, независимость, прогресс.*

KIRISH

Millat yukini hamisha oydinlar ko‘targan. Jadidlarining sa’y-harakati bilan XX asr boshida, adabiyotga, prozaga, xususan, hikoyachilikka bo‘lgan munosabat o‘zgardi. Ijodkorning maqomi, jamiyatdagi o‘rni yangilandi. Adiblar jamiyatning eng faol shaxsi, davr muammolarini, achchiq haqiqatlarini dadil

ayta oladigan, zolim tuzumga qarshi tura oladigan, boshiga qilich kelsa ham rost so‘zlaydigan va bu rostlikni amalda ham ko‘rsata oladigan mard qahramon bo‘lishi kerak, degan tasavvur paydo bo‘ldi. Adabiyotdan jaholatdan ma’rifat tomon yuz tutgan xalq yo‘lida uchraydigan har qanday to‘siqlarga qarshi kurash olib borish ham talab qilinardi. Yaratilayotgan asarlar, jumladan, har bir hikoya shunchaki ko‘ngil mayli uchun emas, jamiyatning ma’lum bir jabhasini qamrab olishi, undagi qusurlarni oshkor etib, yo‘l ko‘rsatuvchi vazifasini bajarishi kerak edi. Zero, *“Ijod – o‘zgarishlar, izlanishlar, dardlanishlar harflarga narvon qo‘yib, ma’naviyat ufqlari tomon intilish va tarmashish jarayonidir”* [1;30]. Shu ma’noda, jadidlar jamiyatdagi kirlarni ketkazib, qoloqlikni yo‘qotib, millat ruhini yuksaltirishi, yorug‘likka olib chiqishi kerak edi. Bu yuksalish, bu yorug‘lik, ma’rifat, erk va hurriyat g‘oyalari bilan hamohang edi.

ADABIYOTLAR TAHLILI VA METODLAR

Jadid hikoyachiligining ilk namunalari hisoblangan Abdulla Qodiriyning “Juvonboz” hamda Cho‘lponning “Qurboni jaholat”, “Do‘xtur Muhammadyor” hikoyalari tagzamiriga e’tibor bersak, jadid adabiyoti avvalo milliy istiqlol adabiyoti ekanligi, asarlarda ko‘tarilgan mavzularning bosh g‘oyasi ham istiqlol ekanligi ma’lum bo‘ladi. Xususan, Cho‘lponning “Oydin kechalarda”, “Novvoy qiz”, “Qor qo‘ynida lola”, “Nonushta”, Fitratning “Qiyomat”, Abdulla Qodiriyning “Uloqda”, “Jinlar bazmi”, “Shodmarg”, Botuning “Hoshimjon”, Elbekning “Dadamat”, Mirmulla Shermuhamedovning “Vaqtsiz qurbon”, “Bu kun bayram edi” kabi hikoyalari ham xalq hayotining g‘oyat serqirra jihatlarini qamrab oladi va kichik janrning katta badiiy imkoniyatlari borligini tasdiqlaydi. Ularning barchasida maorifga, taraqqiyotga intilish, millatning jonlanishiga, ma’rifatli avlod shakllanishiga, millatning milliy, diniy, insoniy huquqlarini muhofaza qilish orqali go‘zal hayotga erishish mumkinligiga ishora qilinadi.

NATIJALAR VA MUHOKAMA

Jadidlar juda katta maqsadlarni ko‘zlagan edi. Avvalo, yurt mustaqilligini qo‘lga kiritib, uni dunyoning eng rivojlangan davlatlari qatorida ko‘rish, buning uchun esa aholi turmush tarzini yaxshilash, iqtisodiyotni rivojlantirish, ilmu

fanni taraqqiy ettirish kabi masalalar ko‘ndalang qo‘yilgan edi. Bu tom ma’noda milliy uyg‘onish edi. Jadidshunos Begali Qosimov ta’biri bilan aytganda, “Uyg‘onmoq dunyo bilan barobar yashamoqdir”. “*Jadidlar yoshlarni G‘arb va Sharqning taraqqiy qilgan mamlakatlariga yuborishga alohida ahamiyat berdilar. Toshkentlik taraqqiyparvarlar “jadidlar to‘dasi” – “Jamiyati xayriya” ochadi. Jamiyatning 1909 yil 12 mayda tasdiqlangan 41 moddalik Nizomidan ma’lum bo‘lishicha, uning muassislari Toshhoji Tuyoqboyev, Nizomiddin Mulla Xusainov, Mulla Abdulla Avlonov, Munavvarqori Abdurashidxonov, Bashirulla Asatillaxo‘jayevlar bo‘lib, viloyat hududlarida nochor, muhtoj musulmonlarning moddiy-ma’naviy ahvolini yaxshilash, jumladan, yetimlar, keksalar, nogironlar uchun kasalxona, ambulatoriya, choyxona, oshxona, yotoqjoylar ochishdan tortib, yoshlarni maktabda o‘qitish, so‘ng oliy tahsil uchun chet ellarga yuborishgacha bo‘lgan masalalarni ko‘zda tutar edi*” [3;10].

Ammo bu g‘oyalarni chuqur anglagan, mohiyatini tushungan kam sonli a’zolar bilan maqsadga yetib bo‘lmasdi. Uni keng targ‘ib etish, aholi orasida yoyish uchun matbuot va uning eng ta’sirchan usullaridan biri bo‘lgan hikoyachilik ham yordamga keladi. G‘oyalar esa asarlar qatiga singdirildi. Hatto Ismoilbek Gasprinskiy 1895 yilda “G‘oya” nomli maqola yozib, harakatning mazmun-mohiyatini to‘la ochib bergan edi: “Xalqlar hayotidagi barcha buyuk voqealarning tag-zamirida u yoki bu g‘oya yotadi. Eng ulug‘ kashfiyotlar, avvalo, ular haqidagi orzu va niyatlardan boshlangan. Islom g‘oyalari yarim dunyoni bir hovuch arablar atrofida birlashtirdi. Moskva atrofiga birlashuv g‘oyasi qudratli Rossiyani maydonga keltirdi. Tenglik va ozodlik g‘oyasi fransuzlar mavqeini Yevropada sarbaland qildi. G‘oyasizlik-chi?! Millatni zaiflashtiruvchi, turg‘unlikka – tanazzulga olib boruvchi mana shu g‘oyasizlik maqsadsizlikdir”.

Maorifga, taraqqiyotga intilish, millatning jonlanishiga, ma’rifatli avlod shakllanishiga, millatning milliy, diniy, insoniy huquqlarini muhofaza qilish orqali go‘zal hayotga erishish jadidlarning bosh maqsadi va g‘oyasi edi.

Tabiiyki, har bir g‘oya millatning tub ildizlari, orzu-umidlari, asl ehtiyojlari, turmush tarzi va asriy an’analari, ichki imkoniyatlaridan kelib chiqadi hamda u millat tomonidan anglanishi, his qilinishi, ong-shuuriga joylashib, yuragida o‘tga aylanib, ishtiyoq hosil qilishi kerak bo‘ladi. Bunday natijaga erishish uchun jadidlar xalqni birdamlikka chorlab, so‘zdan qurol sifatida foydalandilar. Birdamlik esa so‘z va amalda mushtaraklikni nazarda tutadi.

Ta’kidlash kerakki, jadid g‘oyalarini o‘zida mujassam etgan hikoyalarning ilk namunalari garchi yuksak badiiylikka ko‘tarilmasdan, ma’rifiy darajada qolib, tasvir o‘rniga bayonchilik, voizlik, nasihatgo‘ylik va “oqartuvchilik” xarakteri yuqori bo‘lsa-da, jadidchilik g‘oyasi - ruhiy yangilanish, millatning ko‘zini ochish, jaholatga ma’rifat bilan kurashish, o‘zlikni anglash va ona Turkistonni taraqqiy etgan davlatlar qatorida ko‘rish orzusi yetakchilik qildi. Mualliflar adabiy asarlar orqali o‘z g‘oyalarini ko‘proq singdirishni maqsad qilgan. “*Jadidlar mafkurasida, jumladan, adabiyotida ham eng avvalo “istiqlol” so‘zi turgan*” [3;30].

Misol tariqasida, jadid hikoyachiligining ilk namunalari hisoblangan Abdulla Qodiriyning “Juvonboz” hamda Cho‘lponning “Qurboni jaholat”, “Do‘xtur Muhammadyor” hikoyalarini olaylik. “Juvonboz” syujet jihatdan Behbudiyniing “Padarkush” dramasiga juda yaqin. “Juvonboz” hikoyasining qahramoni o‘z davrining katta savdogari bo‘lgan Raufboyning yolg‘iz o‘g‘li Sa’dulla. U o‘qish, ilm olish o‘rniga iflos, fahsh yo‘liga kirib, otasining butun mol-dunyosini sovuradi, oxir-oqibatda odam o‘ldirib, o‘z umrini ham barbod etadi. Umuman, “*jadid adabiyotida shu masala, ya’ni savdogar bolasining ilmsizlik orqasida fahshga otilishi, pulini bekorga isrof qilishi qo‘yiladi*” [4;247]. Yozuvchi bu bilan jamiyatdagi qoloqlik va ilmsizlikni qoralaydi, uning oqibati o‘lim bilan tugashini ko‘rsatadi. Cho‘lpon “Qurboni jaholat”da Eshmurod ismli o‘qimishli yigitning atrofdagi jaholat tufayli qay ahvolga tushganini ko‘rsatadi. Garchi u savodli bo‘lsa-da, hatto otasi uni gazeta o‘qigani uchun masxara qiladi. Yoshlikdagi tanishi Mo‘minjon ularnikiga mehmonga kelib, otasining tilla soatini o‘g‘irlab ketadi. Oqibat Eshmurodni soat o‘g‘risiga

chiqarishadi, mirshablar kaltaklashadi. Bunday adolatsizlikka chiday olmagan Eshmurod o‘zini o‘ldiradi. Soatni esa qo‘shnining besoqol bolasi olgan edi... Aslida Eshmurod ma’rifat istagan yigit edi. Quyidagi keltirilgan so‘zlar uning orzularini, o‘y-xayollarini to‘la ifoda etadi.

“*-Og‘ayni, men shu holda yashayversam hayvondan farqim bo‘lmas. Endi otamdan bir ish qilub ruxsat olub, Rusiya maktablarining biriga kirub o‘qimoqchidirman. ...Har kim istiqbolni o‘ylamog‘i kerak*” [5;6].

Millatni ilm-ma’rifat jaholatdan qutqaradi. Uni anglatish uchun esa obrazlardan foydalanish davr talabi edi. Ma’rifaptarvarlik g‘oyalari singdirilgan mazkur hikoyalar haqida adabiyotshunoslar shunday xulosaga kelishgan: *“Asar badiiy jihatdan zaif, albatta: voqealar sun’iy, til ishlanmagan, dramatizm nochor Lekin dastlabki hikoyasidayoq voqelikni mahzun, faje’ idrok etish, Turkiston musibatini teran anglashga intilish seziladi”* [6;433].

Cho‘lpon “Do‘xtur Muhammadyor”ga o‘zining barcha ma’rifatparvarlik g‘oyalarini singdiradi. Unda nur bor. Muhammadyor 15 yoshida otasi bilan hajga borib, bir qancha sarguzashtni boshdan kechirgan Hoji Ahmadning o‘g‘li. Muhammadyor hatto qimorbozlar qo‘lida jon bergan otasining qotillaridan o‘ch olmaydi. Buning imkoni ham yo‘q edi. U barchasi jaholatdan ekanligini anglab yetadi va o‘zini ilm olishga bag‘ishlaydi. “Jamiyati xayriya” (Munavvarqori Abdurashidxonov 1909 yilda tashkil etgan fond nazarda tutilgan) vositasida avvaliga Boku gimnaziyasida, so‘ng Petrograd universitetida, 7 yil Shveysariya dorulfununining tibbiyot yo‘nalishida o‘qib, yurtga keladi va xususiy shifoxona ochib, kambag‘allarni tekin davolaydi. “Vatan” nomli jurnalni, “Xabar” gazetasini yo‘lga qo‘yadi. Do‘xtur Muhammadyor – Cho‘lpon orzu qilgan ma’rifat timsoli. Hikoyadagi ushbu so‘zlar buning yaqqol dalilidir:

“Ey vatandoshlarim! Qachong‘acha bu g‘aflat? Nimaga buncha xushyoqmassizlar? Axir sizlar ham odam-ku! Odamlardek harakat qilingizlar! Ko‘z oldingizga kelub turg‘on ilm va ma’rifat mevasidan foydalanmasdan nimaga og‘izlaringizni ochub qarab turasizlar? Nimaga bu ishlarga

kirishmaysizlar? Uyqudan ko‘z ochinglar? Uyqudan ko‘z ochinglar! Urinunglar! Ilm, ma’rifat va hunar izlanglar! Vaqt yetdi, balki o‘tdi!” [7;275].

Jadidchilikning milliy istiqlolchilik g‘oyasi Abdurauf Fitrat hikoyalarida ham to‘la namoyon bo‘ldi. Uning 1920 yil “Buxoro axbori” gazetasining 5-oktabr sonida e’lon qilingan “Yurt qayg‘usi” (ona bilan o‘g‘il) sochmasida zalolatga botgan, dunyodan uzilib, fisqu fujurga ko‘milgan, o‘z qiyofasini yo‘qota boshlab, o‘zga millat yetoviga tushgan Turkistonning qayg‘usi qalamga olinadi. Asarda onaning o‘g‘liga javobi ona Turkiston faryodi misoli yangraydi.

“*-Oh… o‘g‘lum, arslonim! Mustabid hukumat uyimni talatdi: buyuk binolarimni yiqitdi: suyukli o‘g‘lonlarimni o‘ldurdi.*

Tahammul etdim, sabr qildim, kimsaga bir og‘iz so‘z bu to‘g‘ridan ochmadim. Negakim, qo‘llarinda qilich, o‘muzlarinda to‘fang, mani o‘ldirmoqqa hozir edilar. Dunyoning mukofot ekanligin bilgan edim.

Bilar edimki, bu zolimlar bir kun qilg‘on zulmlarining mukofotini ko‘rarlar. Bilardimki, to‘kilgan qonlarning har bir tommasidan biror arslon yaratilub bunlarning qonlarini icharlar” [8;5].

Yurt ozodligiga, hurlikka erishish uchun avvalo vatanga muhabbat kerak. Jadidlar ijodining bosh g‘oyasi ham aynan ana shu tuyg‘uni shakllantirishga yo‘naltirilgan edi.

Garchi jadid hikoyalarida qalamga olingan mavzular ko‘lami xilma-xil, ko‘proq sahna asarlari uchun xarakterli bo‘lgan dialoglar shaklida yozilgan bo‘lsa-da, g‘oyaviy jihatdan yakdillik, ijobiy qahramon obrazini yaratishda bir xillik yaqqol ko‘zga tashlanadi. Boisi, “*hikoya janri boshqa janrlar bilan bir qatorda yangi jamiyat kishisini tarbiyalashda katta ahamiyat kasb etdi*” [9;41]. Xususan, Cho‘lponning “Oydin kechalarda”, “Novvoy qiz”, “Qor qo‘ynida lola”, “Nonushta”, Fitratning “Qiyomat”, Abdulla Qodiriyning “Uloqda”, “Jinlar bazmi”, “Shodmarg”, Botuning “Hoshimjon”, Elbekning “Dadamat”, Mirmulla Shermuhamedovning “Vaqtsiz qurbon”, “Bu kun bayram edi” kabi hikoyalari xalq hayotining g‘oyat serqirra jihatlarini qamrab oldi va kichik janrning katta badiiy imkoniyatlari borligini tasdiqladi.

XULOSA

Yuqoridagilarni hisobga olsak, ijtimoiy ruh, ma’rifatparvarlik, erk g‘oyalarining tarannum etilishi o‘zbek jadid adabiyotining, hikoyachiligining eng asosiy xususiyatlaridan biri ekanligiga amin bo‘lamiz. Ularning har bir harakatida, ijodida, niyatida, pinhona ibodatida, Yaratganga qilgan duolarida ham ana shu maqsadu muddaolar aks etgan.

FOYDALANILGAN ADABIYOTLAR:

1. Karimov B. Ruhiyat alifbosi. T.: G‘afur G‘ulom nomidagi nashriyot-matbaa uyi, 2018.
2. Avloniy A. Tanlangan asarlar. 1-jild. T.: Ma’naviyat, 1998.
3. Mahmudov G‘. Jadid adabiyotida milliy istiqlol mavzusi. T.: O‘zbekiston, 1999.
4. Oybek. Asarlar. 9-tom. T.: G‘afur G‘ulom nomidagi adabiyot va san’at nashriyoti, 1974.
5. Cho‘lpon. Qurboni jaholat. “Sadoyi Turkiston”, 1914. 6-son.
6. Qosimov B. Milliy uyg‘onish davri o‘zbek adabiyoti. T.: Ma’naviyat, 2004.
7. Cho‘lpon. Asarlar. 2-jild. T.: G‘afur G‘ulom nomidagi NMIU, 1994.
8. Fitrat A. Yurt qayg‘usi. “Buxoro axbori” gazetasi, 1920. 5-oktabr.
9. Adabiy turlar va janrlar 1-jild. T.: FAN, 1991.

EUROPEAN INTERNATIONAL CONFERENCE ON MODERN SCIENCE AND RESEARCH

International Scientific and Practical Conference



Knowledge without borders.
Research for the future.

CONFERENCE PROCEEDINGS

20 October 2026



www.academscience.com

zenodo Google Scholar OpenAIRE