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THE CONCEPT OF IRONY IN JANE AUSTEN'S NOVELS

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Abstract

Jane Austen's novels are widely recognized for their sophisticated and purposeful use of irony, which serves as an important literary device for social commentary, character development, and the exploration of major themes. This study investigates the different forms of irony—verbal, situational, and dramatic—in three of Austen's most celebrated novels: *Pride and Prejudice* (1813), *Emma* (1815), and *Persuasion* (1817). Through close textual analysis, the paper demonstrates how Austen employs irony to expose the contrast between appearance and reality in Regency society, particularly in relation to marriage, social class, and gender expectations. Her distinctive narrative voice, often conveyed through free indirect discourse, creates an ironic distance that encourages readers to critically evaluate social values while appreciating her subtle humor. The findings suggest that irony in Austen's fiction serves a purpose beyond entertainment, acting as a moral and ethical instrument that encourages self-awareness, personal growth, and critical reflection among both the characters and the audience. Consequently, Austen's consistent and skillful use of irony significantly contributes to the enduring appeal, literary significance, and intellectual depth of her novels.

Keywords: Jane Austen; irony; verbal irony; situational irony; dramatic irony; social satire; Regency society; free indirect discourse.

Introduction

Jane Austen (1775–1817), one of the most celebrated writers of the English Regency period, completed six novels that continue to attract both general readers and literary scholars. Her writing is distinguished by its refined wit, balanced style, and insightful portrayal of human behavior within the social environment of the provincial gentry. Among the defining features of Austen's narrative technique is her masterful use of irony, which functions as both a rhetorical device and an organizing principle. Through irony, she critically examines the values and institutions of her society without relying on direct moral commentary.

In literature, irony generally emerges when there is a contrast between expectation and reality or between what is stated and what is actually intended. Austen employs this technique to challenge accepted social conventions, particularly those concerning marriage as an economic arrangement, rigid class divisions, and the limited opportunities available to women. As Marvin Mudrick argues, Austen's irony serves the dual purpose of "defense and discovery," allowing her to address controversial social issues indirectly while revealing deeper truths about individual behavior and social values.

The famous opening sentence of Pride and Prejudice demonstrates this technique effectively: *"It is a truth universally acknowledged, that a single man in possession of a good fortune, must be in want of a wife."* Although presented as an unquestionable fact, the statement is gradually exposed as ironic because the novel reveals that society is more concerned with securing wealthy husbands for women than with the desires of wealthy men themselves. Similar examples of irony appear in Emma and Persuasion, where misunderstandings, false assumptions, and misguided decisions produce both humorous situations and meaningful emotional transformations.

This study investigates the different forms and functions of irony in these three novels. It argues that Austen's use of irony transforms her works from simple social comedies into profound examinations of morality, personal development, and human relationships. Through close textual analysis, the paper demonstrates that irony enhances characterization, enriches thematic meaning, and encourages readers to engage critically with both the characters and the society they inhabit.

METHODS

This research employs qualitative literary analysis grounded in close reading of primary texts. The selected novels—Pride and Prejudice, Emma, and Persuasion—represent Austen's mature works and offer rich examples of ironic techniques. Standard editions (Oxford World's Classics or Penguin Classics) were consulted for accuracy in quotations.

The methodology follows traditional literary criticism, identifying instances of verbal irony (sarcasm or understatement in dialogue and narration), situational irony (discrepancy between expected and actual outcomes), and dramatic irony (reader's superior knowledge over characters). Particular attention is paid to Austen's use of free indirect discourse, a narrative mode that blends character thoughts with the omniscient narrator's ironic commentary.

Secondary sources, including critical studies by Marvin Mudrick (Jane Austen: Irony as Defense and Discovery, 1952), D.W. Harding ("Regulated Hatred: An Aspect of the Work of Jane Austen," 1940), and more recent analyses from feminist and

narratological perspectives, inform the interpretation. Examples were systematically categorized by type of irony and novel, with cross-comparisons to identify patterns in Austen's evolving style from the exuberant Pride and Prejudice to the subtler Persuasion.

No quantitative methods were applied, as the focus remains on interpretive depth rather than statistical occurrence of ironic instances.

RESULTS

Verbal Irony

Verbal irony plays a dominant role in Jane Austen's dialogue and narrative commentary. In Pride and Prejudice, Mr. Bennet frequently relies on ironic understatement as a means of managing the frustrations of his marriage. When Mrs. Bennet laments her nerves, his seemingly respectful response—praising them as long-standing "friends"—ironically exposes the persistence of domestic discord while preserving a tone of amused detachment.Elizabeth Bennet similarly adopts this ironic mode, particularly in her sarcastic remarks about Darcy. Her assertion that Darcy possesses "no defect" because he openly admits to them communicates not admiration but criticism, emphasizing the misunderstandings that shape their early interactions.In Emma, verbal irony often emerges through the contrast between the heroine's confident judgments and the narrator's subtle corrections. Emma's praise of Mr. Elton as an ideal match for Harriet is undermined by narrative cues such as "Emma imagined" or "Emma could not resist," which gently signal the unreliability of her perceptions and foreshadow ironic reversal.By contrast, Persuasion employs a more restrained form of verbal irony. Sir Walter Elliot's excessive self-regard is quietly ridiculed through his admiration of his own reflection in shop windows, presented with mock seriousness that heightens the sense of absurdity.

Situational Irony

Situational irony in Austen's novels is generated through the subversion of expectations. In Pride and Prejudice, Darcy's dismissive remark that Elizabeth is merely "tolerable" becomes deeply ironic when he later proposes marriage, having come to love her profoundly. Likewise, Charlotte Lucas's sensible decision to marry Mr. Collins overturns romantic ideals, ironically ensuring material security while exposing the economic realities underlying marriage.Emma is structured almost entirely around situational irony. Emma's attempts at matchmaking repeatedly misfire: her efforts to unite Harriet with Mr. Elton culminate in his proposal to Emma, while her discouragement of Harriet's attachment to Mr. Martin ultimately results in a successful and socially advantageous marriage. The most striking irony occurs when Emma recognizes her own feelings for Mr. Knightley only upon suspecting Jane

Fairfax as a potential rival.In Persuasion, Anne Elliot's youthful decision to reject Captain Wentworth, influenced by family pressure, leads to prolonged regret. Wentworth's later return as a prosperous and respected naval officer reverses earlier power relations, rendering the cautious advice once given to Anne misguided and shortsighted.

Dramatic Irony

Dramatic irony strengthens reader involvement by granting insight that characters lack. In Pride and Prejudice, readers become aware of Darcy's growing affection well before Elizabeth, particularly through his discreet intervention in Lydia's elopement, thereby intensifying the irony of Elizabeth's lingering bias.In Emma, readers detect Mr. Knightley's jealousy and deepening attachment long before Emma herself, which lends her misunderstandings a comic yet sympathetic quality.Persuasion utilizes dramatic irony with notable subtlety, especially through Wentworth's letter. Readers recognize the persistence of his love through his behavior long before Anne fully understands, culminating in his emotionally charged confession of unwavering affection.

Narrative Techniques Enhancing Irony

Austen's use of free indirect discourse is essential to her ironic method. In Emma, passages frequently merge the heroine's private reflections—such as her assumptions about Harriet's plans—with the narrator's gently ironic commentary, exposing self-deception. Comparable narrative blending in Pride and Prejudice and Persuasion produces complex layers of meaning, allowing irony to operate simultaneously at the levels of character consciousness and narrative judgment.

DISCUSSION

Austen's use of irony fulfills several closely related purposes. To begin with, it enables pointed social critique without distancing or offending her contemporary audience. By indirectly ridiculing financially motivated marriages and exaggerated class consciousness, Austen avoids the explicit moral instruction typical of sentimental fiction.Secondly, irony functions as a catalyst for character development. Central figures such as Elizabeth Bennet and Emma Woodhouse progress through moments of self-recognition, often prompted by ironic reversals. Elizabeth's acknowledgment of her own misjudgment—"Till this moment I never knew myself"—and Emma's humiliation following the incident at Box Hill both represent turning points in moral awareness.Furthermore, irony actively engages readers by aligning them with the narrator's perspective. This shared ironic stance encourages readers to evaluate both individual behavior and broader social values, fostering ethical reflection rather than uncritical sympathy.When compared with contemporaries such as Fanny Burney or Maria Edgeworth, Austen's ironic method appears notably more restrained and less

overtly instructional. In contrast to the harsh pessimism of Swiftian satire, Austen's irony retains a tone of humor and optimism, implying the possibility of personal reform through insight rather than despair.From a feminist critical standpoint, Austen's irony reveals the restrictive conditions shaping women's lives, where limited autonomy necessitates subtle and strategic social maneuvering. At the same time, her ironic lens remains evenly balanced, subjecting male arrogance and self-importance to comparable scrutiny.An examination of Austen's novels also reveals a clear progression in ironic style. Pride and Prejudice is marked by lively verbal exchanges, Emma by complex patterns of situational irony, and Persuasion by a quieter, more reflective irony that mirrors its themes of loss, endurance, and emotional maturity.
Ultimately, irony elevates Austen's fiction beyond the realm of light romance, transforming it into a sustained examination of social behavior and human error.

Conclusion

Irony permeates Jane Austen's novels as their central artistic and intellectual principle. Through its verbal, situational, and dramatic manifestations—reinforced by the technique of free indirect discourse—Austen uncovers the gap between outward appearances and underlying realities within Regency society while guiding her characters toward greater self-awareness.Her ironic perspective converts depictions of provincial life into broadly applicable reflections on pride, prejudice, vanity, and fidelity. By drawing readers into a position of ironic distance, Austen promotes active moral interpretation rather than passive emotional response.This enduring narrative strategy accounts for the continued relevance of her work, as modern audiences readily identify comparable social contradictions in their own contexts. Austen's irony remains a model of subtle yet incisive literary critique, confirming her place among the most accomplished satirists in English literature.Future scholarship may further examine how Austen's irony is reshaped in film and television adaptations or explore comparative studies with later practitioners of irony, such as Henry James and Edith Wharton.

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ГРАФИКА ВЫРАЖАЕТ ОТНОШЕНИЕ ХУДОЖНИКА К ИЗОБРАЖАЕМОМУ ПРЕДМЕТУ И СОБЫТИЮ СРЕДСТВАМИ ЧЁРНОГО И БЕЛОГО

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Аннотация

В статье рассматривается графика как один из важнейших видов изобразительного искусства, раскрываются её художественные особенности, выразительные средства и основные направления. Особое внимание уделяется роли линии, тона и контраста чёрного и белого цветов в передаче авторского замысла и эмоционального содержания произведения. Представлена классификация графики на станковую, книжную, плакатную и прикладную, а также рассмотрено современное развитие графического искусства в Узбекистане.

Ключевые слова: графика, изобразительное искусство, линия, тон, станковая графика, книжная графика, плакат, прикладная графика, художественное творчество, Узбекистан.

Abstract

This article examines graphic art as one of the most important forms of visual art. It discusses its artistic features, expressive means, and main directions. Special attention is paid to the role of line, tone, and the contrast of black and white in conveying the artist's idea and the emotional content of the artwork. The paper presents the classification of graphic art into easel graphics, book graphics, poster art, and applied graphics, and also highlights the current development of graphic art in Uzbekistan.

Keywords: graphic art, visual arts, line, tone, easel graphics, book graphics, poster art, applied graphics, artistic creativity, Uzbekistan.

Введение

Изобразительное искусство является важной частью мировой культуры и играет значительную роль в эстетическом воспитании общества, формировании художественного вкуса и сохранении культурного наследия. Одним из наиболее выразительных и древних видов изобразительного искусства является графика. Благодаря лаконичности художественных средств, богатству выразительных

возможностей линии, штриха, пятна и тональных отношений графика позволяет художнику наиболее точно передавать свои мысли, эмоции и отношение к окружающему миру.

В современном искусстве графика занимает особое место благодаря широкому спектру своего применения. Она используется не только для создания самостоятельных художественных произведений, но и в книжном оформлении, рекламе, полиграфии, дизайне, плакатном искусстве и декоративно-прикладном творчестве. Несмотря на ограниченную цветовую гамму, графические произведения обладают высокой художественной выразительностью и способны глубоко раскрывать содержание образов и событий.

Актуальность исследования обусловлена возрастающим интересом к развитию графического искусства, совершенствованию художественного образования и сохранению национальных традиций изобразительного искусства. Изучение особенностей графики позволяет глубже понять её художественный язык, выразительные средства и значение в современной культуре.

Раскрыть особенности графики как вида изобразительного искусства, определить её основные выразительные средства, рассмотреть классификацию графики и показать её значение в художественной практике и культурной жизни современного общества.
Графика является одним из наиболее распространённых видов изобразительного искусства. Основным выразительным средством графики являются чёрный и белый цвета, а работы чаще всего выполняются на бумаге. Другие цвета используются очень редко. Если они и применяются, то главным образом в плакатной графике. Графические художники выражают свои произведения преимущественно средствами чёрного и белого, поскольку именно они позволяют наиболее полно раскрыть сущность произведения, его содержание, внутренний мир, чувства и характер человека. В некоторых плакатных работах также раскрывается внутренняя сущность событий и личности.
Графический художник выражает своё отношение к изображаемым предметам и событиям посредством различных выразительных средств: толстых и тонких, грубых и изящных, длинных и коротких, непрерывных и прерывистых, цветных и бесцветных, гладких и шероховатых линий. Кроме того, при создании произведений художник использует тональные возможности красок, белизну бумаги и различные оттенки чёрного цвета.

Основу графического искусства составляют декоративно-оформительские работы. К ним относятся плакаты, книжные иллюстрации, орнаменты, этикетки для упаковок различных товаров, почтовые марки, денежные знаки и другие виды графической продукции.

Графическое искусство подразделяется на четыре основных вида.

. Станковая графика

Станковая графика представляет собой самостоятельный вид искусства, выражающий передовые идеи, мысли и чувства в виде самостоятельного художественного произведения.

Как и в других видах искусства, здесь события окружающей действительности передаются через определённый сюжет, а идейное содержание произведения отражает наиболее актуальные проблемы и темы современности.

Произведения станковой графики создаются на специальных мольбертах или станках с использованием карандаша, угля, туши, акварели, темперы и гуаши. Они выполняются в жанрах портрета, натюрморта и пейзажа.

Книжная графика (книги, журналы, газеты)

В отличие от станковой графики, книжная графика предназначена для того, чтобы сделать содержание книг, журналов и газет более понятным, выразительным и интересным. Она помогает раскрыть сюжет произведения, облегчить его восприятие и внести необходимые пояснения.

К книжной графике относятся:

- оформление обложек;
- тематические иллюстрации;
- заставки в начале текста;
- концовки в конце текста;
- инициалы в начале абзацев.

Иллюстрации создаются для наиболее важных, сложных и кульминационных моментов произведения. Они выполняются опытными художниками по рекомендации автора или после консультаций с ним. Поэтому изображения полностью соответствуют содержанию, сюжету, цели и задачам произведения.

Перед началом работы художник внимательно читает произведение, обсуждает его содержание с автором и специалистами, после чего создаёт иллюстрации. Обычно изображаются главные герои, их портреты, основные события и окружающая обстановка.

К книжной графике относится также жанр карикатуры. Карикатуры носят критический характер и создаются в сатирической или юмористической форме.

В них наиболее характерные черты событий или персонажей намеренно преувеличиваются, чтобы вызвать улыбку и подчеркнуть авторскую мысль.

Плакатное искусство

Плакат является одним из самых оперативных и актуальных видов графического искусства. Он отражает современные проблемы, отвечает на насущные вопросы общества и служит важным средством информирования населения.

Плакаты выполняют различные функции:

- разъяснительную;
- призывную;
- рекламную;
- агитационно-пропагандистскую;
- культурно-просветительскую.

Особое место занимает политический плакат. Он посвящён наиболее важным общественным, экономическим и политическим вопросам, актуальным для государства и общества.

Плакаты служат основным средством быстрого доведения до населения государственных обращений, призывов, политических событий, а также информации по внутренним и международным вопросам.

Художник-плакатист должен обладать высоким художественным мастерством, хорошо понимать жизнь общества, политику и социальные процессы, объективно оценивать происходящие события.

Плакат должен привлекать внимание людей, побуждать их к размышлению, вызывать эмоциональный отклик и помогать формировать определённое отношение к изображаемым событиям.

Прикладная графика

К прикладной графике относятся изображения для поздравительных открыток, телеграмм, конвертов, этикеток, почтовых марок, эмблем и другой оформительской продукции.

Такие произведения создаются главным образом для декоративного оформления различных предметов.

Прикладная графика выполняет важную общественную функцию: помогает распространять полезную информацию, рекомендации, знакомить людей с важными событиями, а также доносить до населения обращения государства и правительства.

Развитие графики в Узбекистане

В годы независимости графическое искусство Узбекистана получило значительное развитие. Большой вклад в его развитие внесли такие художники, как М. Кагаров, В. Апухтин, П. Анненков, Г. Бойматов, Л. Ибрагимов, А. Мамажонов, М. Карпузас, М. Садыков, Б. Исмаилов, С. Редькин, С. Исаков, И. Васильев, Л. Тиора, Л. Зуфари, Т. Аюпов, Т. Ахмадалиев, Ю. Алигер, Р. Азизов, А. Лигай, М. Фозилов и другие, которые успешно продолжают свою творческую деятельность.

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CLIMATE CHANGE AND WATER DIPLOMACY IN THE SYR DARYA BASIN: CHALLENGES FOR KAZAKHSTAN AND UZBEKISTAN

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Keywords: *climate change, water diplomacy, Syr Darya basin, Toktogul reservoir, ICWC (Interstate Commission for Water Coordination), hydro-hegemony, transboundary water resources, Central Asia.*

The Syr Darya basin, the largest transboundary water system in Central Asia, has in recent decades become one of the regions most visibly affected by climate change. The retreat of glaciers in the Tian Shan mountains, the shrinking snowpack, and increasingly erratic precipitation patterns are fundamentally altering the seasonal distribution of river flow. These natural shifts are placing additional strain on the water diplomacy mechanisms between Kazakhstan and Uzbekistan, testing the adaptive capacity of existing institutional frameworks.

The relevance of this study lies in the fact that the water-allocation system built on the 1992 Almaty Agreement and the 1998 Bishkek Agreement (Naryn–Syr Darya cascade) was designed under the relatively stable hydrological conditions of the Soviet era and does not fully correspond to today's climate variability. The conflict between the energy and irrigation regimes of the Toktogul reservoir — with water released for winter electricity generation — is intensifying water shortages during the growing season in southern Kazakhstan and in Uzbekistan's Syr Darya and Fergana regions.

The purpose of this research is to analyze the institutional and legal capacity of Kazakh–Uzbek water diplomacy under conditions of climate change, and to assess the potential of existing mechanisms — such as the ICWC (Interstate Commission for Water Coordination) and the Syr Darya Basin Water Organization (BVO) — to transition toward climate-adaptive governance. The study applies hydro-hegemony theory and the TWINS (Transboundary Waters Interaction NexuS) model as its analytical framework, allowing for a simultaneous assessment of the power asymmetry between upstream and downstream states and their potential for cooperation.

The analysis shows that existing bilateral and regional mechanisms remain focused primarily on quantitative water allocation and do not adequately incorporate climate risk management, early-warning systems, or adaptive allocation formulas. Furthermore, the consensus-based decision-making within the ICWC reinforces

institutional inertia, complicating rapid climate adaptation measures. At the same time, recent years have shown positive momentum in cooperation under a Water-Energy-Food (WEF) nexus approach, including joint hydrometeorological monitoring and investment projects.

In conclusion, building sustainable water diplomacy in the Syr Darya basin requires enriching the existing treaty framework with climate-adaptation principles, strengthening the institutional capacity of the ICWC, and introducing confidence-building measures between the two states, such as real-time hydrological data exchange. This would strengthen not only water security but also regional stability and the strategic partnership between Kazakhstan and Uzbekistan.

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THE PEDAGOGICAL FOUNDATIONS OF EDUCATIONAL MANAGEMENT: BRIDGING ADMINISTRATION AND THE SCIENCE OF LEARNING

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Abstract: Historically, educational management has frequently borrowed its frameworks from corporate and industrial management models, prioritizing efficiency, compliance, and resource optimization. However, the core mission of any educational institution is fundamentally pedagogical: the facilitation of human learning and development. This paper explores the "pedagogical foundations of the concept of management in education," arguing that effective educational administration must be inextricably linked to the sciences of pedagogy, psychology, and didactics. By examining how learning theories (constructivism, cognitivism, humanism), developmental psychology, and andragogy inform management practices, this article redefines the educational manager not merely as an administrator, but as a "pedagogical leader." The paper outlines how pedagogical principles should dictate organizational structure, teacher evaluation, resource allocation, and institutional culture, ultimately proposing a paradigm where management serves as the scaffolding for optimal teaching and learning.

Keywords: pedagogical management, instructional leadership, educational administration, learning theories, andragogy, school culture, pedagogical leadership, didactics.

Introduction. The conceptualization of management in education has long been a subject of epistemological tension. On one hand, management is inherently concerned with organizational efficiency, structural hierarchy, and resource allocation—concepts largely derived from the private sector. On the other hand, education is a profoundly human, developmental, and pedagogical endeavor. When educational management relies exclusively on corporate paradigms (such as Taylor's scientific management or Fayol's administrative theory), it risks "decoupling" administrative routines from the actual realities of teaching and learning, a phenomenon famously described by Meyer and Rowan (1977).

To achieve genuine educational excellence, the concept of management in education must be fundamentally re-rooted in its pedagogical foundations. Pedagogical management posits that every administrative decision—from budget allocation and timetabling to teacher evaluation and facility design—must be justified by its impact

on the teaching and learning process. This paper delves into the pedagogical underpinnings of educational management, exploring how the science of learning dictates the art of leading educational institutions.

To understand the pedagogical foundations of educational management, one must first distinguish between "management" and "leadership" in an educational context, and subsequently merge them under the umbrella of "pedagogical leadership."

Traditional management focuses on maintaining the status quo, ensuring compliance, and optimizing existing processes. In education, this translates to maintaining discipline, managing budgets, and ensuring standardized testing metrics are met. However, pedagogy is inherently dynamic, creative, and focused on human transformation. Therefore, educational management cannot be a static administrative function; it must be a dynamic, pedagogically driven process that fosters an environment where learning thrives.

The shift toward pedagogical management is best encapsulated in the concept of "Instructional Leadership." Pioneered by researchers like Philip Hallinger and James Murphy, instructional leadership shifts the principal's role from a building manager to the "lead learner" of the school. According to Robinson, Lloyd, and Rowe's (2008) seminal meta-analysis, instructional leadership has a significantly higher impact on student outcomes than transformational leadership alone. The pedagogical foundation of this concept is that the manager's primary function is to promote, participate in, and evaluate the instructional core—the interaction between the teacher, the student, and the content.

The concept of management in education is built upon several foundational pillars derived from pedagogical sciences. These pillars dictate how institutions should be structured, managed, and evaluated.

Management decisions in education must be aligned with established theories of how human beings learn.

Constructivism and Collaborative Management: Rooted in the works of Piaget and Vygotsky, constructivism posits that learners actively build knowledge through experiences and social interaction. From a management perspective, this necessitates the creation of Professional Learning Communities (PLCs). If students learn best through social constructivism, teachers must also be managed in a way that allows them to collaboratively construct pedagogical knowledge. The manager's role is to design the schedule, allocate resources, and foster a culture that allows for this collaborative teacher learning.

Cognitivism and Information Management: Cognitivism focuses on the internal mental processes of learning, emphasizing memory, information processing, and

metacognition. Pedagogical management applies this by ensuring that the cognitive load on both students and teachers is managed effectively. This translates into administrative decisions regarding class sizes, the pacing of the curriculum, and the implementation of data-driven decision-making systems that help teachers track student cognitive progress without overwhelming them with bureaucratic data entry.

Humanism and School Climate: Drawing from Maslow and Rogers, humanistic pedagogy emphasizes self-actualization, emotional well-being, and the affective domain of learning. A manager grounded in humanistic pedagogy recognizes that cognitive learning cannot occur if basic psychological and safety needs are unmet. Therefore, managing the "school climate" and ensuring a psychologically safe, inclusive environment is not merely a "soft" HR function, but a core pedagogical imperative.

Educational management must be deeply informed by developmental psychology. The cognitive, social, and emotional stages of learners dictate how a school should be organized.

For instance, managing an early childhood center requires a pedagogical approach vastly different from managing a high school. In early childhood, management must prioritize play-based learning environments, low student-to-teacher ratios, and flexible, unstructured spaces. In secondary education, management must address the adolescent need for autonomy, identity formation, and peer socialization. A pedagogically grounded manager designs disciplinary policies, extracurricular programs, and advisory systems that align with the developmental realities of their specific student demographic, rather than applying a one-size-fits-all administrative rulebook.

Didactics—the art and science of teaching—provides the framework for curriculum management. A manager cannot effectively evaluate a teacher’s performance without a deep understanding of didactic principles.

Pedagogical management requires the alignment of curriculum, instruction, and assessment (the "instructional triangle"). Managers must ensure that the resources provided (textbooks, technology, laboratory equipment) directly support the didactic methods employed by the teachers. Furthermore, when managing curriculum implementation, the administrator must understand pedagogical concepts like "scaffolding," "differentiated instruction," and "formative assessment," ensuring that school-wide policies support, rather than hinder, these evidence-based teaching practices.

A critical, often overlooked pedagogical foundation of educational management is the application of andragogy (the pedagogy of adult learning) to the management of

teaching staff. Malcolm Knowles' principles of andragogy state that adults are self-directed, draw on life experiences, and need to know why they need to learn something. When a principal or district leader mandates professional development (PD) or a new instructional strategy, treating teachers like children (using pedagogy) leads to resistance and superficial compliance. Pedagogical management requires treating teachers as adult learners. This means involving them in the decision-making process regarding new initiatives, providing PD that is immediately relevant to their classroom contexts, and creating a management culture that respects their professional autonomy and experiential knowledge.

The integration of pedagogical foundations into management transforms the identity of the educational administrator. The manager is no longer just a CEO of a school building; they are the chief architect of the learning environment.

In a pedagogically grounded management concept, the budget is a moral and pedagogical document. How a manager allocates funds reveals the institution's true pedagogical priorities. If a school claims to prioritize STEM education and experiential learning, but the budget disproportionately favors administrative compliance and standardized test prep materials, there is a fundamental misalignment. Pedagogical management ensures that every dollar spent—from hiring instructional coaches to designing flexible learning spaces—directly serves the science of learning.

Traditional teacher evaluation often relies on checklist-based observations that measure compliance. Pedagogical management shifts evaluation toward a model of continuous pedagogical growth. Utilizing frameworks like Danielson's Framework for Teaching or Hattie's "Visible Learning," managers conduct evaluations that focus on the cognitive engagement of students and the pedagogical reasoning of the teacher. The post-observation conference becomes a pedagogical dialogue rather than an administrative judgment, fostering a growth mindset among the faculty.

The school timetable is one of the most powerful management tools, yet it is often designed purely for logistical convenience. A pedagogical approach to management views time as a critical educational resource. Managers must design schedules that allow for deep, uninterrupted learning blocks (protecting against fragmented instructional time), provide common planning time for teacher collaboration (supporting constructivist teacher learning), and allow for flexible grouping of students based on their pedagogical needs rather than just their age.

The rapid integration of digital technologies into education has further complicated the management landscape. However, the pedagogical foundations remain the guiding compass.

George Siemens' theory of Connectivism posits that learning in the digital age occurs across networks. Pedagogical management in this context involves breaking down the physical and conceptual walls of the classroom. Managers must facilitate networked learning by integrating global collaborations, managing digital infrastructure that supports seamless information flow, and encouraging teachers to build Personal Learning Networks (PLNs).

With the advent of Artificial Intelligence and automated learning platforms, there is a temptation for managers to rely on algorithms for instructional decisions. Pedagogical management strongly resists this dehumanization. While AI can manage data, track progress, and personalize drill-and-practice exercises, the core pedagogical elements—empathy, moral development, critical facilitation, and socio-emotional support—require human interaction. The manager's role is to ensure that technology is used to automate the administrative and routine cognitive tasks, thereby freeing up the teacher's time for high-level, human-centric pedagogical interactions.

Despite the clear theoretical imperative for pedagogical management, the reality in many educational systems is fraught with tension. Educational managers often face immense pressure from external stakeholders (government bodies, policymakers, parents) to prioritize quantifiable metrics, standardized test scores, and strict regulatory compliance. This "performativity" culture can force managers to adopt corporate management styles that alienate teachers and stifle pedagogical innovation.

To overcome this, educational managers must develop what Fullan (2014) calls "systemness"—the ability to navigate complex external demands while protecting the pedagogical core of the school. This requires Pedagogical Courage: The willingness of the manager to push back against administrative mandates that contradict sound pedagogical practices, advocating for what is best for the learner.

Translational Leadership: The ability to translate external policy demands into pedagogical language for the teachers, and conversely, to translate pedagogical needs into the data-driven, accountability language demanded by policymakers.

Distributed Pedagogical Leadership: Recognizing that the manager cannot be the sole pedagogical expert. By distributing leadership, the manager empowers master teachers to lead curriculum design, peer mentoring, and instructional innovation, creating a resilient pedagogical culture that can withstand administrative fluctuations.

Conclusion. The concept of management in education cannot be fully realized if it is divorced from the science of teaching and learning. The pedagogical foundations of educational management dictate that administration is not an end in itself, but a vital mechanism to support, enhance, and protect the instructional core.

By grounding management practices in learning theories, developmental psychology, didactics, and andragogy, educational leaders can transform their institutions from rigid bureaucratic structures into vibrant, adaptive learning ecosystems. The modern educational manager must be a master of both the organizational and the pedagogical domains. They must understand the intricacies of cognitive load and constructivist collaboration just as deeply as they understand budget forecasting and legal compliance.

Ultimately, when management is rooted in pedagogy, the institution ceases to be a place where students are merely "processed," and becomes a dynamic environment where human potential is intentionally, scientifically, and compassionately cultivated. The future of educational management lies not in adopting the latest corporate fad, but in returning to its foundational purpose: optimizing the conditions for human learning.

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ГЎШТХЎРЛАР ЎЛАТИ

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Аннотация: *Ушбу матнда гўштхўрлар ўлати (итлар ва бошқа гўштхўр ҳайвонлар чумаси) касаллигининг этиологияси, эпизоотологияси, патогенези, клиник белгилари, патологоанатомик ўзгаришлари, диагностикаси, дифференциал диагностикаси, даволаш ҳамда олдини олиш чора-тадбирлари батафсил ёритилган. Касалликнинг қўзғатувчиси РНК сақловчи парамиксовирус бўлиб, ташқи муҳит омилларига нисбатан анча чидамли ҳисобланади. Касаллик асосан бир ёшгача бўлган эмланмаган итлар ва бошқа гўштхўр ҳайвонларда учрайди ҳамда нафас олиш, овқат ҳазм қилиш ва асаб тизимининг зарарланиши билан кечади. Диагностикада эпизоотологик маълумотлар, клиник белгилари ва лаборатория текширувлари муҳим аҳамиятга эга. Даволаш комплекс равишда олиб борилиб, вирусга қарши, антибактериал, симптоматик ҳамда иммунитетни қўллаб-қувватловчи воситалар қўлланилади. Касалликнинг олдини олишда ўз вақтида эмлаш, ветеринария-санитария қоидаларига қатъий риоя қилиш ва карантин тадбирларини амалга ошириш асосий профилактик чоралар ҳисобланади.*

Калит сўзлар: *Септицемия, карбункула, зооантропоноз, бацилла, спорадик, атипик, антибиотик, учоқ, махсус ва умумий, гемофилия.*

Гўштхўрлар ўлати - ўткир кечадиган, ўта контагиоз юқумли касаллик бўлиб, тери экзантемаси, шиллиқ пардаларнинг яллиғланиши, иситма кўтарилиши, пневмония ва нерв системасининг зарарланиши билан ўтади. А. Краевский 1882 йили Россияда биринчи марта ўлат касаллигини қайд қилган. Касалликнинг қўзғатувчисини 1905 йилда Карре, 1912 йили И. Энгейн аниқлаган. Собиқ СССР да 1932 йилда итларда И. Миролюбов ўлат касаллигини топади. В. А. Панков 1938 йилда қора кузан ва тулкиларда ўлатни аниқлади. Н. В. Сюрин, В. А. Панков ва С. Я. Любошенколар 1953-1957 йилларда қатор илмий ишларни эълон қиладилар. Ҳозирги пайтда гўштхўрлар ўлати дунёнинг қатор мамлакатларида, жумладан бизнинг Ўзбекистонда ҳам тез-тез учраб туради.

Бизда бу касаллик билан асосан зотли итлар касалланади. Касалликнинг эпизоотологияси, килиник белгилари, диагноз қўйиш ва даволаш борасида проф. М. П. Пармонов ва Г. Ярошенколар томонидан илмий ҳамда амалий ишлар олиб борилган.

Касалликнинг қўзғатувчиси фильтрланувчи вирус бўлиб, РНК сақлайди ва парамиксовируслар гуруҳига киради. Вирус иммунобиологик хусусияти жиҳатдан бир хил бўлиб, одамларнинг қизамиқ қўзғатувчи вируси ва қорамоллар ўлатининг вируси билан антигенлик алоқасига эгадир. Агар итлар қизамиқ вируси билан инфекцияланган бўлса, ўзининг ўлат вирусига чидамли бўлади. Бунинг акси ҳам кузатилади, яъни ўлат билан касалланган итларда қизамиқ вирусига антитело пайдо бўлади. В. Г. Слугиннинг (1984) маълумотига асослангудек бўлсак, қорамол ўлати учун тайёрланган зардоб итлар ўлатининг вирусини нейтраллайди.

Гўштхўрлар ўлатининг вируси ташқи муҳит омилларига анча чидаамли. Вирус минус ҳароратда беш йилгача ўз хусусиятини сақлайди. Ўлган ҳайвонларнинг аъзоларида 20 °С да олти ойгача яшай олади. Қонда 3 ой, бурундан оққан шилимшиқ суюқликларда 2 ойгача вирулентлик хусусиятини сақлайди. Қайнаш ҳароратида дарҳол ўлади. 60°С қиздирилганда эса 30 минутда ҳалок бўлади. 1% ли лизол ва ультрабинафша нурларда 30 минутда, *2%* ли ишқор эритмасида эса 60 минутда инактивацияланиб ўлади. Вирусга антибиотиклар таъсир қилмайди.

Ўлат касаллигидан мўйначиликка ихтисослашган хўжаликлар жуда катта иқтисодий зарар кўради, чунки мўйна дунё бозорида фақат валютага сотилади. Ўлим 10-50 фоизни ташкил этади. Махсус ит урчитиш ва кўпайтириш хўжаликларида эса ўлим 60-90 фоизга боради. Бир неча минг сўмга сотиб олиб келинган хонаки зотдор итлар эмланмаса, 100 фоиз ўлади. Бундан ташқари, карантин чора-тадбирлари учун ҳам жуда катта маблағ талаб этилади.

Гўштхўрлар ўлатига ит, тулки, қора кузан, сассиқ кузан, собол, борсуқ, чиябўри, бўри, мушук ва бошқа ҳайвонлар мойилдир.

Ўлатга асосан бир ёшгача бўлган гўштхўрлар чалинади. Эмадиган ёш ҳайвонлар камроқ касалланади, бунинг сабаби она сути орқали иммунитет ўтишидир. Ёш гўштхўрлар эмланмаган ёки касалланиб тузалмаган урғочидан туғилган бўлса, тез касалланади. Колострал иммунитет икки ҳафтага етади, кейин дарҳол эмланиши зарур. Касалликка мойиллик ва унинг кечиши қатор омилларга боғлиқ. Озиқлантириш ва боқиш тўлиқ балансли бўлмаса, яшаш шароити талаб даражасида амалга оширилмаса, гўштхўрлар организмининг резистентлиги тушиб кетади. Натижада касаллик зўраяди. Мўйначилик хўжаликларида об-ҳавонинг тез-тез ўзгариши, шамол, ёмғир-қорли кунлар ҳайвонлар орасида

шамоллашнинг кўпайишига олиб келади. Бу ҳам ўз навбатида касалликка мойилликни ошириб юборади. Касаллик қўзғатувчисининг манбаи касал ҳайвон ҳисобланади. Касаллик асосан контакт йўли билан, баъзан эса инфекцияланган озуқалар орқали юқади. Мўйначилик хўжаликларида ҳайвонлар катакчаларга кўтарилганда, қочиришга қўйилганда ва ветеринария-санитария ҳолати издан чиққанда юқиш кўпаяди.

Вирус организмга шиллиқ пардалар орқали тушгач, лимфоид тўқималарда кўпайиб ривожланади. Кейин қон ва лимфага тушиб, бутун организмга тарқалади. Натижада ҳарорат кўтарилиб, кўз, нафас аъзолари, ошқозон-ичак йўлида яллиғланиш юзага келади. Айни пайтда жигар, буйрак, бош ва орқа мия ҳамда терида яллиғланиш ва дегенератив ўзгаришлар содир бўлади. Бош ва орқа миядаги жароҳат ҳаракат аъзолари ишига таъсир қилади.

Вирусга қарши антителолар қонда 10 кундан кейин пайдо бўлиб,, 2 ойгача сақланади. Касалликнинг патогенезида секундар инфекциянинг қўзғатувчилари: сальмонелла, эшерихиа, пастерелла, токсоплазма, кокклар ва бошқалар муҳим роль ўйнайди. Касаллик гепатит ва паравирус билан бирга кечиши ҳам мумкин. Секундар ва аралаш инфекциялар, гельминтозлар организмнинг иммунобиологик хусусиятини ўзгартириб юбориб, унинг ўлатга қарши мойиллигини оширади, кечишини оғирлаштиради, ўлимни кўпайтиради.

Касалликнинг яширин даври бир ойгача давом этади. Клиник белгиларнинг намоён бўлишига қараб, ўпка, ичак, асаб, тери ва аралаш шакллар фарқ қилинади. Ўлатнинг қайси ҳолатда намоён бўлиши организмнинг реактивлиги ва қўзғатувчининг вирулентлигига боғлиқ. Шунинг учун бир типга мансуб бўлган вирус бир неча хил клиник ҳолатдаги (ҳарорат кўтарилишидан тортиб, нерв системасининг бузилишига қадар) касалликни намоён қилиши мумкин. Шунинг учун айрим ҳолларда диагноз қўйиш анча қийин бўлади.

Итларда касаллик ўткир, ярим ўткир ва сурункали кечади. Одатда касаллик ҳароратнинг 1-3°С кўтарилиши билан бошланиб, 1,5 ойлик итчаларда эса атипик кўринишда намоён бўлиб, иситма чиқмайди.

Ўткир кечиш. Бунда клиник белгилар яққол намоён бўлади. Касаллик ҳарорат кўтарилиши билан бошланади (39,7-41°С). Бир-икки кун ўтгач, ҳарорат бир оз тушади. Агар пневмония бошланса, ҳарорат яна кўтарилади. Касаллик бошланганда ҳайвоннинг хулқи ўзгаради, фаоллиги пасайиб, қалтирайди, худди бир нарсадан қўрққандек ёки кучли ҳадиксирагандек бўлиб туради. Кўпинча юқори нафас йўлларининг катари бошланади, итлар тумшуғини тирноғи билан қашийди. Бурундан шилимшиқ суюқлик (экссудат) оқади. Нафас олишда бурун битиб қолганлиги сезилади. Йўтал тутиб, аввалига қисқа, кейинчалик кучлироқ

ва балғамли бўлади. Кейинроқ бориб пневмония, плеврит, конъюнктивит, қовоқларда эса яра пайдо бўлади. Кўзнинг рангдор пардаси кучли яллиғланиб, йиринг оқиб туради. Ошқозон-ичак йулининг зарарланиши иштаҳанинг бўғилишига олиб келади. Оғир фарангит, тонзиллит, гастроэнтерит бошланади. Баъзан қусиш қайта ҳуруж қилса, шилимшиқ сариқ масса тушади.

Ярим ўткир кечиш. Бу ҳолатда ҳам ҳарорат кўтарилади ва 1-2 кун давом этади. Депрессия, ҳолсизланиш, ҳадиксираб чўчиш, ёруғликдан қочиш, иштаҳа бўғилиши, тумшуқ қуриши, бурун битиб нафас олиш қийинлашиши кузатилади. Тез-тез акса уради, оёқлари билан тумшуғини қашийди. Нафас олиш тезлашади ва қийинлашади. Ўпка аускультация қилиб кўрилса, хириллаш эшитилади. Пулъс тезлашиб, аритмия кузатилади. Кўз йиринг бойлайди, қуриб қовоқлар бир-бирига ёпишиб қолади. Конъюнктивит ва кератит бўлади. Шу билан бирга ошқозон-ичак ўткир яллиғланиб, аввалига ич қотади, қусади, кейин ич кетади.

Ўлат экзантемаси. Бурун, лаб, қулоқ ва қорин териларида, сонда, чот соҳасида кичкина қизил доғли тошмалар пайдо бўлади. Кейинчалик улар ўрнида мошдек, катталари эса бир тийинлик тангадек пуфакчалар вужудга келиб, уларнинг сирти ялтироқ, ичида сарғиш суюқ йиринг бўлади. Кейинчалик бу пуфакчалар ёрилиб, қурийди ва кўнғир рангли пўстлоқлар билан қопланади. Экссудат чиқиб турган экзема қулоқ тешиги атрофида ҳам учрайди. Баъзи итларда бўғимлари букиладиган жойларда терининг устки қисми кучли гиперкератозга учрайди (мугузсимон қоплама).

Нерв формаси. Кўпинча ўлатнинг нерв формаси учрайди. Асаб бузилиши қисқа муддатли ҳаяжонланиш билан бошланиб, баъзан важоҳатли ҳолат кузатилади. Бутун бадан, баъзида айрим мускуллар учиб, қалтироқ босади.

Касал итларнинг юриши ўзгаради. Вақти-вақти билан тутқаноқ тутади ва у чала фалажга айланади. Кўпинча орқа оёғи фалаж бўлиб, юра олмай қолади. Қовоқ, тўғри ичак сфинктери ва бошнинг юза қисмидаги нервлар фалажланади. Қон таркиби ҳам маълум даражада ўзгаради, лейкоцитоз кузатилиб, эритроцитлар ва гемоглобин кўпаяди. Касаллик авж олганда анемия кузатилади. Ўлат енгил кечганда бирор ҳафтада тузалиши мумкин, оғир кечганда эса ойлаб давом этади. Одатда 2-3 ҳафтадан кейин асаб бузилиши ҳолати кузатилиб, касалланиб тузалган ҳайвонларда айрим мускулларнинг учиб туриши, чала ёки тўлиқ фалаж билан бирга кар ва кўр бўлиб қолиш, ҳид билиш сезгисини йўқотиш кузатилади. Итларда ўлим 50-85 фоиз атрофида бўлади.

Патологоанатомик ўзгаришлар. Агар ўлим ўта ўткир ёки ўткир кечиш даврида содир бўлмаса, ўлакса жуда ҳам озғин бўлади. Кўз ва бурун атрофида йиринг қотиб қолган, кўз қорачиғи катталашиб, кўз ичига тортган, лаб ва бурун

атрофида майда эрозия ва яралар бўлади. Қорин терисида везикуляр ва пустуллёз дерматит кўзга ташланади. Тери эпидермисида пустула ва везикула бўлиб, лимфоид инфилътрация учрайди. Нафас йўллари яллиғланиб, катарал ва йирингли экссудат билан бекилиб қолган бўлади. Ўпкада кўкимтир ўчоқлар вужудга келади. Яллиғланиш ўпканинг олдинги, ўрта ҳамда краниал томонларини эгаллайди. Айрим ҳолларда бронхопневмония ўчоқлари ўпканинг ҳамма қисмларида учрайди. Альвеола ва бронхларда эритроцит, лейкоцит, лимфоцит, нейтрофиллар кўплаб топилади (микроскопда текширилади). Ошқозон-ичакнинг шиллиқ пардалари кучли яллиғланиб, эрозия ва яра бўлади. Талоқ катталашиб, кучли гиперемияга учрайди. Кўкрак қафаси ва қорин бўшлиғидаги ички лимфатик тугунлар шишган ва кесиб кўрилганда кўкимтир-қизғиш рангли шилимшиқ суюқлик оқади. Бош ва орқа мияда йирингсиз энцефаломиелит кўрилади, томирлар қон билан тўла, бир оз шишиб, қон қуйилган бўлади.

Диагноз. Ўлат касаллигига диагноз қўйишда унинг эпизоотологияси, клиник белгилари, патологоанатомик ўзгаришлари ҳисобга олинади. Вирусологик текшириш ўтказилиб, лаборатория усулларига мурожаат қилинади. Эпизоотологик маълумотларга унинг ёши (бир ёшгача), зоти, танлаб ёки ёппасига эмлаш ишлари олиб борилганлиги киради. Клиник белгиларига респиратор аъзоларнинг зарарланиши, кўз ва бурун шиллиқ пардаларининг катарал яллиғланиши, тананинг гиперкератози, нерв системасининг жароҳатланиши асос қилиб олинади. Касаллик энди бошланган пайтда йўтал, фотофобия, ҳароратнинг кўтарилиши, иштаҳа бўғилиши ва бошқаларга эътибор берилади. Баъзан ҳарорат нормада, иштаҳа яхши бўлиши ҳам мумкин. Шу билан бирга асаб бузилишига ҳам эътибор берилади. Юқорида қайд этилган белгилар диагноз қўйиш учун асосий белгилар деб қабул қилинган (В. С. Слугин, 1994). Энг характерли патологоанатомик ўзгаришларга қовоқ, ўн икки бармоқ ичак, тўғри ичаклардаги қон қуйилишлар киради.

Лаборатория амалиётида биосинама ўтказилади. РСК, РДП, иммунофермент реакцияси, пассив гемагглютинация реакцияси (РПГА), РЗГА лардан фойдаланиш тавсия этилади.

Дифференциал диагноз. Ўлатни лептоспироз, қутуриш, ауески касаллиги, парвовирус, энтерит, сальмонеллёздан ажратиш керак. Лептоспироз геморрагик ва сарғайиш кўринишида намоён бўлади. Геморрагик кўриниш тез ривожланиб, касал ҳайвон 2-3 кунда ҳалок бўлади. Сарғайиш кўринишида эса шиллиқ пардалар жуда сарғайиб кетади. Асосий ажратиш усули бактериологак текширишдир. Бунда лептоспиралар топилиб аниқланади. Қолаверса

лептоспирозда гипериммунли қон зардоби ва стрептомицин яхши фойда беради. Юқумли гепатит асосан бир ёшгача бўлган итларда учрайди. Ёриб кўрилганда жигар жуда ҳам катталашиб, сап-сарғайиб кетган бўлади.

Ўлатнинг нерв формасини қутуришдан ажратилади. Ўлатда кўпик оқади, қутуришда эса кучли безовталаниш кузатилади, иштаҳа очилиб, одатда емайдиган нарсаларни ҳам еб, ютиб юборади. Пастки жағ фалаж бўлиб, ёриб кўрилганда ичидан ҳар хил нарсалар чиқади. Қутуришда гистосрез қилиб, Бабеш-Негри таначаси топилади.

Ауески касаллигида асаб бузилиши билан бирга кучли қичишиш ва қашиниш кузатилади.

Парвовирус энтерит бирданига бошланиб, қусиш кузатилади. Ҳарорат юқори бўлиб, чўчқалар эритроцити билан РГА, РТГА реакциялари қўйилади.

Сальмонеллёзни аниқлашда бактериологик текшириш асосий усул ҳисобланса, пироплазмада пироплазма топилади.

Даволаш. Ўлат касаллигини даволаш учун чет элларда гипериммунли қон зардоби қўлланилади. Касалликнинг бошланиш даврида қизамиққа қарши одамларда ишлатиладиган гамма-глобулин яхши натижа беради. Препарат мускул орасига 1-3 мл миқдорда юборилади. Интерферонлар жуда фойдалидир. Бир вақтнинг ўзида ёки бўлак-бўлак уч гуруҳ дориларни қўллаш тавсия этилади: антибактериал (секундар инфекция қўзғатувчиларига қарши), симптоматик (иситма тушириш, юрак фаолиятини тиклаш учун, шунингдек сургилар), стимуляцион («В» гуруҳ витаминлар, кокарбоксилёза, аскорбат кислота ва бошқалар). Антибактериал препаратлардан пенициллин-10000 ТБ да тери ости ёки мускул орасига кунига 3-4 марта, экмоновоциллин – 1 кг оғирликка 10-15000 ТБ дан мускул орасига суткада бир марта, стрептомицин – 1 кг тирик вазнга 10-20000 ТБ дан, сульфадимезин, сульфадиметоксин, норсульфазол 0,5-1,0 дан кунига 3-4 марта берилиши яхши натижага олиб келади. Ошқозон-ичак фаолиятининг бузилишига қарши фталазол, левомицетин, энтеросептол ва церукаллар 0,25-0,5 г дан 1 кг оғирликка суткасига 3-4 марта берилади, симптоматик даволаш мақсадида таъсир доираси кенг дорилар қўлланилади: ацетилацил кислота - 0,2-0,5 г дан ичирилади; 50% ли анальгин эритмаси - венага 25 мл дан юборилади; тери остига 2-3 мл 20% ли кофеин, 0,5-1,5 мл 20% ли камфора мойи юборилади. Мускул орасига 1-5 мл кальций глюконат, 1 мл 1% ли димедрол тавсия этилади. Чала фалажга қарши тери остига 10 кун мобайнида 1 мл 0,05% ли прозерин юборилади.

Конъюнктивит бўлганлиги учун кўз ҳар куни бор кислота эритмаси билан 2-3 марта ювиб турилади. Агар ўлат терида экзантема пайдо бўлиши билан кечса,

тери 5% ли йод эритмаси билан суртиб даволанади ёки қуритувчи порошоклар (висмут, рух оксид ва тальк) сепилади. Агар ўлат нерв формасида рўй берса, комплекс порошок препаратларни қўллаш зарур (0,05 люминал, 0,25 глютамин кислота, 0,03 дифенин, 0,05 спазмолитин, 0,015 кофеин). 15-30 кун давомида ҳар куни 2-3 марта порошок ичириб турилади. Бир пайтнинг ўзида 10 кун тери остига 1% ли новокаин эритмаси юборилади. Агар мускуллар фалажланган бўлса, массаж тавсия этилади, физиотерапия усули қўлланилиб, тери остига 0,001 стрихнин юборилади. Марказий нерв системаси фаолиятини нормал ушлаб туриш учун мускул орасига 30 кун мобайнида ҳар куни бир марта 1 мл дан церебролизин юбориб турилади. Парҳез асосий муолажалардан бири ҳисобланади. Шу давр мобайнида гўшт, жигардан тайёрланган қийма, пишлоқ, гуручни қайнатиб бериш яхши натижа беради. Ит овқатида В гуруҳига мансуб витаминлар бўлиши зарур. Хоналар ҳар доим шамоллатиб туршиши зарур. Касал ҳайвонларни вақти-вақти билан очиқ ҳавода айлантириб келиш тавсия этилади. Дезинфекция учун 2% ли ишқор, 5% ли хлорли оҳак эритмаси, 5% ли лизоллар ишлатилади. Уй шароитида эса 2% ли хлорамин тавсия этилади. Мўйначилик хўжаликларида махсус иситилган изоляторлардан фойдаланилади.

Олдини олиш. Умумий профилактика қуйидагилардан иборат: эпизоотик носоғлом хўжаликдан ит ва мўйналарни олиб келиш қатъий ман этилади. Рухсат фақат соғлом хўжаликларга берилади. Улар олиб келингач 30 кун профилактик карантинда саҳланади. Кўргазма ёки виставкаларда қатнашадиган ҳамма гўштхўрлар аввалига эмланиб, кейин рухсат этилади. Умумий ветеринария-санитария тадбирлари, зоотехник параметрлар фаол иммунизациянинг фойдали даражасини оширади. Фақат соғлом ҳайвонлар эмланади. Иссиқ, совуқ ва ёғингарчилик пайтларида эмлаш мумкин эмас.

Ҳозирги пайтда 668-КФ, «Вакчум», ЭПМ, «Тетровак» вакциналари қўлланилади. 668-КФ вакцина мускул орасига юборилади (2 ойликдан бошлаб 2 мл дан 3 кг огирлик учун 3 мл миқдорда). «Вакчум» 5 кг оғирликка 1 мл ҳисобида мускул орасига юборилади, кейин 2-3 мл дан тавсия этилади. Қолган вакциналар ҳам кўрсатма бўйича қўлланилади. Ўлат чиққудек бўлса, карантин эълон қилинади. Касал ҳайвонлар изоляция қилинади. Асбоб-ускуна ва катакчалар 2% ли формалин билан дезинфекция қилинади. Шартли соғломларининг ҳарорати ўлчаб турилади. Қолганларини эмлаб ташланади ҳамда волъерларга кириш олдидан дезоковриклар қўйилади ва 2% ли ишқор эритмаси билан ҳўллаб турилади. Идишлар дезинфекцияловчи эритмалар билан ювиб борилади. Бегона одамларнинг кириши қатъий ман этилиб, махсус кийим-кечаклар дезинфекция қилинади. Касаллик даврида тортиш, тамға босиш ва бошқа тадбирлар

ўтказилмайди. Махсус мўйначилик хўжаликлари ва питомникларда карантин эълон қилиниб, охирги касал ҳайвон тузалгач ёки ўлгач 1 ойдан кейин бекор қилинади. Чеклаш эса 2 ой давом этади.

Хулоса:

Гўштхўрлар ўлати ветеринария амалиётида катта иқтисодий зарар келтирувчи, ўта юқумли вирусли касалликлардан бири ҳисобланади. У касалликнинг тез тарқалиши, турли клиник шаклларда намоён бўлиши ва юқори ўлим кўрсаткичлари билан тавсифланади. Айниқса, ёш ва эмланмаган ҳайвонлар касалликка жуда мойил бўлади. Касалликни эрта аниқлаш, лаборатория усуллари билан тасдиқлаш ва комплекс даволаш унинг оғир асоратлари ҳамда ўлим ҳолатларини камайтиришда муҳим аҳамиятга эга. Бироқ энг самарали кураш усули профилактика бўлиб, мунтазам эмлаш, карантин чораларини амалга ошириш, дезинфекция ишларини олиб бориш ва ветеринария-санитария талабларига қатъий амал қилиш касаллик тарқалишининг олдини олади ҳамда ҳайвонлар соғлиғини сақлаш ва хўжаликларнинг иқтисодий барқарорлигини таъминлайди.

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O‘ZBEKISTONDA ISTE’MOLCHILAR HUQUQLARINI HIMOYA QILISH TIZIMINI TAKOMILLASHTIRISH YO‘LLARI

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Annotatsiya. Ushbu tezisda O‘zbekiston Respublikasida iste’molchilar huquqlarini himoya qilish tizimining hozirgi holati, uning huquqiy, institutsional va amaliy asoslari tahlil qilingan. So‘nggi yillarda mamlakatda raqobatni rivojlantirish va iste’molchilar huquqlarini himoya qilish qo‘mitasi faoliyat yuritayotgani, “Iste’molchilarning huquqlarini himoya qilish to‘g‘risida”gi qonunga bir qator o‘zgartirish va qo‘shimchalar kiritilgani ko‘rib chiqilgan. Tadqiqotda raqamli iqtisodiyot va elektron tijoratning jadal rivojlanishi, xorijiy tajriba va Birlashgan Millatlar Tashkilotining iste’molchilarni himoya qilish bo‘yicha yo‘riqnomalari asosida milliy tizimni takomillashtirish yo‘nalishlari, jumladan huquqiy baza, nazorat mexanizmlari, elektron murojaat tizimlari va aholining huquqiy savodxonligini oshirish masalalari yoritilgan. Tezis yakunida iste’molchilar huquqlarini himoya qilish samaradorligini oshirishga qaratilgan aniq takliflar shakllantirilgan.

Kalit so‘zlar: *iste’molchilar huquqlari, iste’molchilarni himoya qilish, raqobat qo‘mitasi, elektron tijorat, sifat nazorati, huquqiy savodxonlik, davlat nazorati, tovarlar va xizmatlar sifati, jamoatchilik nazorati, raqamli iqtisodiyot.*

Kirish

Bozor iqtisodiyoti sharoitida iste’molchilarning huquq va manfaatlarini himoya qilish davlatning ijtimoiy-iqtisodiy siyosatining muhim yo‘nalishlaridan biri hisoblanadi. Tovar va xizmatlar bozorining kengayishi, elektron tijoratning jadal rivojlanishi hamda iste’molchilar bilan tadbirkorlik subyektlari o‘rtasidagi munosabatlarning murakkablashuvi ushbu sohada samarali huquqiy va institutsional mexanizmlarni shakllantirishni taqozo etadi.

O‘zbekistonda iste’molchilar huquqlarini himoya qilishning huquqiy asosi 1996-yilda qabul qilingan “Iste’molchilarning huquqlarini himoya qilish to‘g‘risida”gi qonun bilan belgilangan bo‘lib, keyingi yillarda ushbu qonunga bir qator muhim o‘zgartirish va qo‘shimchalar kiritildi. 2019-yilda O‘zbekiston Respublikasi Prezidenti farmoniga asosan Raqobatni rivojlantirish va iste’molchilar huquqlarini himoya qilish qo‘mitasi tashkil etilib, unga tegishli davlat nazorati, huquqbuzarliklarning oldini olish va aholi murojaatlarini o‘rganish vazifalari yuklatildi. Shunga qaramay, amaliyotda iste’molchilar huquqlarining buzilish holatlari, ayniqsa chakana savdo, kommunal

xizmatlar, elektron tijorat va pullik xizmatlar ko‘rsatish sohalarida hali ham uchrab turibdi.

Tadqiqotning dolzarbligi shundan iboratki, raqamli iqtisodiyotning rivojlanishi, onlayn-savdo hajmining o‘sishi va iste’molchilarning xatti-harakatlari o‘zgarishi mavjud huquqiy-institutsional tizimning yangi sharoitlarga moslashtirilishini talab etmoqda. Ushbu tezisning maqsadi - O‘zbekistonda iste’molchilar huquqlarini himoya qilish tizimining mavjud holatini tahlil qilish, unda uchraydigan muammolarni aniqlash va tizimni takomillashtirish bo‘yicha ilmiy asoslangan takliflar ishlab chiqishdan iborat. Tadqiqot vazifalari sifatida quyidagilar belgilandi: milliy qonunchilik va institutsional tizimni tahlil qilish; xorijiy tajriba va xalqaro standartlarni o‘rganish; mavjud muammolarni tizimlashtirish; tizimni takomillashtirish yo‘nalishlarini ishlab chiqish.

Tadqiqot natijalari shuni ko‘rsatadiki, O‘zbekistonda iste’molchilar huquqlarini himoya qilish tizimi so‘nggi yillarda institutsional jihatdan sezilarli darajada rivojlandi. Raqobatni rivojlantirish va iste’molchilar huquqlarini himoya qilish qo‘mitasi va uning hududiy boshqarmalari orqali nazorat xaridi, ekspertiza va aholi murojaatlarini o‘rganish kabi mexanizmlar joriy etilgan. Shu bilan birga, quyidagi muammoli jihatlar aniqlandi:

Birinchidan, huquqiy baza takomillashtirilayotgan bo‘lsa-da, elektron tijorat, masofaviy xizmatlar va raqamli platformalar orqali amalga oshiriladigan bitimlarda iste’molchilar huquqlarini himoya qilishning aniq mexanizmlari yetarli darajada ishlab chiqilmagan. Xususan, onlayn-do‘konlarda tovarni qaytarish, pulni qaytarib berish muddatlari va onlayn shartnomalarning shaffofligi masalalari alohida tartibga solinishga muhtoj.

Ikkinchidan, iste’molchilarning huquqiy savodxonligi darajasi hali ham past bo‘lib, aholining katta qismi o‘z huquqlaridan to‘liq xabardor emas va shikoyat bildirish tartib-taomillarini bilmaydi. Bu esa huquqbuzarliklarning bir qismi o‘z vaqtida aniqlanmay qolishiga olib kelmoqda.

Uchinchidan, nodavlat notijorat tashkilotlari - iste’molchilar jamiyatlari va uyushmalarining faoliyati yetarli darajada rivojlanmagan. Rivojlangan mamlakatlar tajribasida (masalan, Yevropa Ittifoqi davlatlarida) mustaqil iste’molchilar uyushmalari nazorat va ma’rifat ishlarida muhim rol o‘ynaydi, O‘zbekistonda esa bunday tashkilotlarning institutsional va moliyaviy imkoniyatlari cheklangan.

To‘rtinchidan, davlat nazorati asosan reaktiv xarakterga ega, ya’ni ko‘pincha murojaat va shikoyatlar asosida amalga oshiriladi, proaktiv monitoring va raqamli tahlil tizimlaridan yetarli foydalanilmaydi. Zamonaviy raqamli nazorat vositalari - masalan,

onlayn shikoyatlar platformasi, sun’iy intellekt asosidagi tahlil tizimlari kabi yechimlar joriy etilishi tizim samaradorligini oshirishi mumkin.

Xalqaro tajribaga nazar tashlaganda, Birlashgan Millatlar Tashkilotining Iste’molchilarni himoya qilish bo‘yicha yo‘riqnomalari (UNGCP) milliy qonunchilikni takomillashtirishda mamlakatlarga muhim yo‘nalishlardan biri sifatida xizmat qilmoqda. Ushbu yo‘riqnomalar iste’molchilarning xavfsizligi, iqtisodiy manfaatlari, ma’lumot olish huquqi, ta’lim va adolatli hal etish (redress) tizimlariga alohida e’tibor qaratishni tavsiya etadi. O‘zbekiston milliy tizimini ushbu xalqaro tamoyillar asosida moslashtirish quyidagi yo‘nalishlarda amalga oshirilishi maqsadga muvofiq:

- elektron tijorat va raqamli xizmatlar sohasida iste’molchilar huquqlarini tartibga soluvchi alohida normativ-huquqiy hujjatlarni ishlab chiqish;
- yagona elektron murojaat va shikoyatlarni ko‘rib chiqish platformasini yaratish, bunda murojaatlarning ko‘rib chiqilish muddatlari va natijalari shaffof tarzda kuzatib borilishi;
- maktab va oliy ta’lim dasturlariga iste’molchilik madaniyati va huquqiy savodxonlikka oid mavzularni kiritish orqali profilaktik ishlarni kuchaytirish;
- nodavlat notijorat tashkilotlari va iste’molchilar uyushmalarini moliyaviy va institutsional qo‘llab-quvvatlash mexanizmlarini ishlab chiqish;
- tadbirkorlik subyektlari uchun iste’molchilar bilan ishlash bo‘yicha ichki nazorat standartlarini joriy etish va ularga rag‘batlantiruvchi choralar (masalan, “ishonchli sotuvchi” sertifikati) qo‘llash;
- raqamli monitoring va sun’iy intellekt texnologiyalaridan foydalangan holda bozorni proaktiv nazorat qilish tizimini yo‘lga qo‘yish.

Ushbu chora-tadbirlarning amalga oshirilishi nafaqat iste’molchilar huquqlarining himoya qilinish samaradorligini oshiradi, balki tadbirkorlik muhitida halol raqobatni rivojlantirish, iste’molchilar ishonchini mustahkamlash va milliy iqtisodiyotning barqaror rivojlanishiga ham ijobiy ta’sir ko‘rsatadi.

Xulosa. O‘tkazilgan tahlil shuni ko‘rsatadiki, O‘zbekistonda iste’molchilar huquqlarini himoya qilish tizimi so‘nggi yillarda institutsional va huquqiy jihatdan izchil rivojlanib bormoqda, biroq raqamli iqtisodiyot sharoitida yangi vazifalar va muammolar yuzaga kelmoqda. Tizimni yanada takomillashtirish uchun huquqiy bazani elektron tijorat talablariga moslashtirish, aholining huquqiy savodxonligini oshirish, nodavlat tashkilotlarning ishtirokini kengaytirish hamda raqamli nazorat vositalarini joriy etish zarur. Ushbu yo‘nalishlarda amalga oshiriladigan kompleks chora-tadbirlar iste’molchilar huquqlarining to‘liq va samarali himoya qilinishini ta’minlashga, shuningdek, mamlakatda barqaror va adolatli bozor munosabatlarini shakllantirishga xizmat qiladi.

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ISLAMIC FINTECH AND THE DIGITAL TRANSFORMATION OF ISLAMIC FINANCE: GLOBAL TRENDS, CHALLENGES AND PROSPECTS FOR UZBEKISTAN

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Abstract. The rapid digitalization of financial services is reshaping the structure, delivery and governance of Islamic finance. This thesis critically reviews the development of Islamic fintech and examines how blockchain, artificial intelligence (AI), digital payments, crowdfunding, peer-to-peer (P2P) financing and other digital technologies interact with Shariah requirements. The study is based on a structured narrative review of academic and institutional literature published primarily during 2018–2026, with earlier foundational works retained where they provide essential theoretical context. The review identifies five interrelated findings. The Uzbekistan case demonstrates a rapidly developing institutional environment: the Central Bank has introduced regulatory arrangements for Islamic financing services provided by microfinance organizations, created functions for regulating Islamic finance and is working with the Islamic Financial Services Board on a 2026–2030 national development roadmap. These developments indicate that Uzbekistan is moving from exploratory discussion toward institutional implementation. The thesis therefore argues that the development of Islamic fintech in Uzbekistan should follow a coordinated model combining regulatory modernization, Shariah governance, controlled experimentation, digital infrastructure, consumer protection and professional capacity building.

Keywords: Islamic fintech; digital transformation; Islamic finance; Shariah compliance; blockchain; artificial intelligence; crowdfunding; peer-to-peer financing; financial inclusion; Shariah governance; Uzbekistan; regulatory sandbox.

Introduction

Islamic finance has developed from a specialized segment serving Shariah-conscious customers into a global financial industry whose principles emphasize the avoidance of riba, excessive gharar and maysir, alongside asset-backing, contractual clarity, ethical investment and risk-sharing. Its digital transformation is therefore not simply a question of transferring conventional financial services to online channels. Digital technologies can alter how contracts are formed, how risks are assessed, how compliance is monitored and how financial institutions interact with customers.

The literature increasingly treats Islamic fintech as a distinct field at the intersection of financial technology and Islamic financial principles. A bibliometric and content review of Scopus-indexed literature identified 85 Islamic FinTech documents for 2017–2022 and grouped the field into several streams including crowdfunding, payments, blockchain and cryptocurrency. The review also identified legal regulation and financial literacy as major obstacles to wider adoption (Aysan and Unal, 2022). More recent reviews similarly emphasize regulatory harmonization, Shariah governance, financial inclusion, technological innovation and the need for stronger empirical evidence (Shahzadi, 2025; 'Emerging trends in Fintech and Islamic finance', 2026).

The central research problem is that technological innovation can simultaneously create efficiency gains and new forms of Shariah, legal and consumer risk. A blockchain platform may improve transaction traceability while its underlying asset or settlement mechanism remains non-compliant. An AI model may improve credit assessment while embedding bias or operating without sufficient explainability. Crowdfunding may expand financial inclusion while creating conflicts of interest or weak investor protection. Consequently, the relevant question is not whether Islamic finance should digitalize, but under what institutional and governance conditions digitalization can support the objectives of Islamic finance.

The Uzbekistan case is particularly important because the country's institutional position has changed rapidly. The Central Bank now identifies regulation and supervision of Islamic finance, development of the relevant legal framework, Islamic-finance accounting rules and capacity building among its functions (Central Bank of the Republic of Uzbekistan, 2026a). In 2024, the Central Bank approved a regulation governing Islamic financing services provided by microfinance organizations, including Ijarah, Mudarabah, Murabahah, Musharakah and Salam, based on AAOIFI standards and adapted to the national context (Central Bank of the Republic of Uzbekistan, 2024). In 2026, the Central Bank and IFSB also discussed a draft 2026–2030 roadmap for development of Uzbekistan's Islamic finance industry (Central Bank of the Republic of Uzbekistan, 2026b). These developments make Uzbekistan a relevant emerging-market case for examining the transition from conceptual interest to institutional development.

Table 1.

Key Opportunities, Risks and Policy Implications of Islamic Fintech for Uzbekistan

Theme	Main opportunity	Main risk/gap	Implication for Uzbekistan
Blockchain	Traceability, automation, transparent records	Asset, contract and legal enforceability questions	Develop controlled pilot with legal and Shariah review
Artificial intelligence	Compliance monitoring, risk management, efficiency	Bias, opacity, privacy and accountability	Adopt human-in-the-loop Shariah and AI governance
Crowdfunding/P2P	SME finance and financial inclusion	Weak oversight, disclosure and investor protection	Create proportionate licensing, disclosure and Shariah standards
Digital payments	Lower transaction costs and wider access	Cybersecurity and consumer vulnerability	Strengthen digital identity, cybersecurity and literacy

Islamic finance governance	Standardization and trust	Fragmented interpretations and limited specialists	Build national Shariah governance and professional capacity

Source: Compiled by the author based on Aysan and Unal (2022), Hassan et al. (2021), IFSB (2023), Omar and Sa'ad (2024), Shafii, Alwi and Salleh (2025), Desky and Hye (2025), and Central Bank of the Republic of Uzbekistan (2024, 2026).

The Uzbekistan case requires a more nuanced interpretation than the earlier version of this thesis suggested. It is no longer accurate to characterize the country simply as lacking an Islamic finance regulatory framework. Since 2024, the Central Bank has had a specific regulation governing Islamic financing services offered by microfinance organizations. The regulation recognizes services including Ijarah, Mudarabah, Murabahah, Musharakah and Salam and was developed with reference to AAOIFI standards and national conditions (Central Bank of the Republic of Uzbekistan, 2024).

The institutional framework is continuing to develop. The Central Bank's current functions explicitly include regulating and supervising Islamic finance services, developing the associated regulatory and legal framework, improving supervision according to international standards, developing accounting rules for Islamic finance operations and strengthening staff capacity (Central Bank of the Republic of Uzbekistan, 2026a). The Central Bank also reports that its licensing functions include applications for banks conducting Islamic banking activities and approval of candidates for Islamic Finance Boards (Central Bank of the Republic of Uzbekistan, 2026c).

At the strategic level, the Central Bank and the IFSB discussed a draft roadmap for developing Uzbekistan's national Islamic finance industry for 2026–2030. The process involved financial, governmental, educational and religious institutions and addressed Islamic banking, the Islamic capital market, takaful, legislation and capacity building (Central Bank of the Republic of Uzbekistan, 2026b). This indicates that Uzbekistan is moving toward an ecosystem approach rather than a narrow product-level reform.

For Islamic fintech specifically, the principal opportunity is to connect this emerging regulatory infrastructure with digital delivery channels. Uzbekistan can use controlled pilots for digital Islamic financing, digital onboarding, automated compliance monitoring and Shariah-compliant crowdfunding while building consumer-protection requirements into the design stage. The country's policy sequence should therefore be: regulatory clarification; Shariah governance; pilot implementation; technology-risk supervision; and gradual scaling.

The strongest near-term opportunities are likely to be digital Islamic microfinance for SMEs, digital Murabahah and Ijarah processes, Shariah-compliant crowdfunding, digital zakat and waqf infrastructure, and technology-supported Shariah compliance. These areas should be developed through supervised experimentation rather than unrestricted market entry. The objective should be to establish trust and demonstrable compliance before pursuing rapid scale.

Conclusion

The literature indicates that Islamic fintech represents more than the digital delivery of conventional financial products. It is a structural transformation that can alter contractual processes, risk management, compliance, distribution and financial inclusion. Blockchain, AI, digital payments, crowdfunding and P2P technologies offer meaningful efficiency and inclusion benefits, but none is inherently Shariah-compliant merely by virtue of being digital.

The principal finding of this review is that technology and governance must develop together. Blockchain requires asset and contract governance; AI requires explainability, accountability and human Shariah oversight; crowdfunding and P2P platforms require strong disclosure and investor protection; and digital inclusion requires cybersecurity and financial literacy. The literature therefore supports a governance-centered rather than technology-centered model of Islamic fintech development.

Uzbekistan provides an emerging example of this institutional transition. The regulatory environment has moved beyond simple absence: Islamic financing services for microfinance organizations are regulated, the Central Bank has explicit Islamic-finance supervisory and developmental functions, and a 2026–2030 national roadmap is being developed with IFSB support (Central Bank of the Republic of Uzbekistan, 2024; Central Bank of the Republic of Uzbekistan, 2026a; Central Bank of the Republic of Uzbekistan, 2026b). The next challenge is to connect these institutional advances with responsible digital innovation. If Uzbekistan combines regulatory clarity, Shariah governance, supervised experimentation, consumer protection, cybersecurity and professional capacity, Islamic fintech can become a practical instrument for financial inclusion and SME financing rather than merely an emerging technological concept.

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ADVANTAGES OF FORECASTING ECONOMIC PROCESSES USING THE ARIMA MODEL IN PYTHON

Normamatova Yulduz Ravshan qizi

Abstract. This thesis highlights the advantages of forecasting economic processes using the AutoRegressive Integrated Moving Average (ARIMA) model implemented in the Python programming language. The empirical part of the study uses official statistical data on wheat production in the Surkhandarya Region for 2010–2024. Using the pandas, NumPy, Matplotlib, and statsmodels libraries in Python, the stationarity of the time series was tested using the Augmented Dickey–Fuller (ADF) test, the optimal ARIMA model was selected, and forecast values for 2027–2028 were calculated. The results of the study demonstrate that Python is an open-source, fast, and effective platform for economic forecasting.

Keywords: Python, ARIMA model, econometric modeling, forecasting, time series, wheat, agriculture, statsmodels.

Introduction

In the context of the digital economy, modeling and forecasting economic processes have become important components of managerial decision-making. In particular, forecasting agricultural production volumes in advance is essential for ensuring food security, using resources rationally, and developing regional development programs.

In recent years, the use of open-source software tools has become increasingly widespread in scientific research. One such tool is the Python programming language, which integrates economic data processing, statistical analysis, econometric modeling, and forecasting capabilities within a single platform. Python libraries such as pandas, NumPy, Matplotlib, and statsmodels are widely used to analyze economic indicators.

One of the most widely used classical methods for time-series forecasting is the ARIMA model. This model makes it possible to identify the underlying patterns

of a time series based on historical observations and forecast future values. The ARIMA model is considered one of the reliable methods for short-term forecasting in economics, finance, energy, and agriculture.

The purpose of this thesis is to highlight the advantages of forecasting economic processes using the ARIMA model in Python and to present empirical results using wheat production in the Surkhandarya Region as an example.

Research Methodology. Official statistical data on wheat production in the Surkhandarya Region for the period 2010–2024 were used for the study. The data were imported into Python using the pandas library, followed by an initial descriptive statistical analysis.

The Augmented Dickey–Fuller (ADF) test was applied to determine the stationarity of the time series. After obtaining a stationary series, ACF and PACF plots were used to identify the parameters of the ARIMA model. The model was evaluated using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Log-Likelihood criteria. Based on the optimal model, forecast values for 2027–2028 were calculated.

The general form of the ARIMA model is expressed as follows:

$$Y_t = c + \varphi_1 Y_{t-1} + \ldots + \varphi_p Y_{t-p} + \theta_1 \varepsilon_{t-1} + \ldots + \theta_s \varepsilon_{t-s} + \varepsilon_t$$

where Y_t denotes the current value of the time series, φ denotes the autoregressive coefficients, θ denotes the moving-average coefficients, and ε_t denotes the random error term.

Research Results and Their Analysis. In this study, official statistical data on wheat production in the Surkhandarya Region for the period 2010–2024 were analyzed using the Python programming environment. Initially, the data were

imported from an Excel file using the pandas library, and a time series was constructed. Subsequently, the dynamics of the time series were analyzed graphically.

According to the analysis, certain fluctuations in wheat production were observed during 2010–2024. In particular, production declined sharply in 2018, while a stable upward trend was recorded in 2021–2023. Although production decreased slightly in 2024, the overall trend remained at a high level.

Table 1

Wheat Production Volume in the Surkhandarya Region (2010–2024)[1]

Year	Wheat production volume (thousand tons)
2010	595,2
2011	576,1
2012	594,8
2013	600,6
2014	606,4
2015	607,9
2016	604,2
2017	577,5
2018	476,8
2019	554,2

[1] O'zbekiston Respublikasi Prezidenti huzuridagi Statistika agentligi ma'lumotlari asosida muallif ishlanmasi.

2020	598,7
2021	631,5
2022	645,4
2023	659,2
2024	653,6

In the next stage, the stationarity of the time series was tested using the Augmented Dickey–Fuller (ADF) test. The ADF test results for the original series indicated that the series was non-stationary. Therefore, first-order differencing was performed, and the differenced series was tested again. The results confirmed that the series had become stationary, thereby satisfying the necessary condition for constructing the ARIMA model.

Several ARIMA models were estimated in order to select the optimal model. The models were compared based on the Akaike Information Criterion (AIC).

Table 2

Comparison of ARIMA Model Results [2]

Model	AIC
ARIMA(1,1,0)	146,189
ARIMA(0,1,1)	**146,188**
ARIMA(1,1,1)	148,173
ARIMA(2,1,0)	147,980

[2] Python dasturida muallifning hisob-kitoblari

ARIMA(2,1,1)	148,465

As shown in Table 2, the lowest AIC value is 146.188, corresponding to the ARIMA(0,1,1) model. Therefore, this model was selected as the optimal model for forecasting.

Based on the selected model, forecast values for 2025–2028 were calculated using Python's forecast() function.

```
import pandas as pd
from statsmodels.tsa.arima.model import ARIMA

data = pd.read_excel("bugdoy.xlsx")

series = data["Bugdoy"]

model = ARIMA(series, order=(0,1,1))
result = model.fit()

forecast = result.forecast(steps=4)

print(forecast)
```

The following forecast values were obtained from the calculations.

Table 3

Forecast Values of Wheat Production in the Surkhandarya Region [3]

[3] Python dasturida muallifning hisob-kitoblari

Year	Forecast (thousand tons)
2025	653,52
2026	653,52
2027	**653,52**
2028	**653,52**

The forecast results indicate that no substantial changes in wheat production are expected in the coming years. Taking into account the dynamics of the existing time series, the ARIMA(0,1,1) model forecasts that production will stabilize at around 653 thousand tons. These results have practical significance for regional agricultural planning, resource allocation, and management decision-making aimed at ensuring food security.

Conclusion. This study analyzed the possibilities of forecasting economic processes using the ARIMA model in the Python programming language and conducted an empirical study based on wheat production in the Surkhandarya Region during 2010–2024. Official statistical data from the Statistics Agency under the President of the Republic of Uzbekistan were used for the study.

The time series was initially processed using Python's pandas library, and its stationarity was tested using the Augmented Dickey–Fuller (ADF) test. After obtaining a stationary time series, several ARIMA models were estimated, and the optimal model was selected based on the Akaike Information Criterion (AIC). The calculations showed that the ARIMA(0,1,1) model was the most appropriate.

Based on the selected model, forecast values for 2025–2028 were calculated. The results indicate that wheat production is expected to stabilize at approximately 653.52 thousand tons in the coming years. This result suggests that wheat production

in the Surkhandarya Region is not expected to undergo substantial changes in the near future.

The following advantages of Python in econometric modeling were identified during the study:

1. being an open-source and free software platform;
2. rapid processing of large volumes of statistical data;
3. the ability to estimate ARIMA models simply and reliably using the statsmodels library;
4. convenient graphical visualization of forecasting results;
5. ensuring the reproducibility of scientific research;
6. the ability to rapidly update the model when new economic data are added.

Thus, the Python programming language was confirmed to be a modern, convenient, and effective tool for modeling and forecasting economic processes. The ARIMA model, in turn, can be widely applied in empirical research in economics and agriculture because it provides reliable results for short-term forecasting.

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AN ANALYSIS OF THE FOREIGN TRADE AND ECONOMIC RELATIONS OF THE KOKAND KHANATE IN THE EIGHTEENTH AND NINETEENTH CENTURIES BASED ON THE REPORTS OF RUSSIAN TRAVELERS AND DIPLOMATIC ENVOYS

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Abstract

This article examines, on the basis of the memoirs and official reports of Russian travelers and diplomatic envoys, how the Kokand Khanate emerged from the eighteenth century onward as an intermediary state that established extensive commercial relations with the peoples of Central Asia as well as with China and Eastern Turkestan. Particular attention is devoted to the movement of Chinese goods through the Kokand Khanate to the Bukhara and Khiva Khanates and, subsequently, to other countries of the East. The study also analyzes the development of the Khanate's relations with the Russian Empire, especially the process by which Russia expanded its influence following the incorporation of Tashkent into the Kokand Khanate. Drawing upon the reports of F. Nazarov, V. V. Velyaminov-Zernov, A. N. Teterevnikov, and other Russian travelers and diplomatic representatives, the article identifies the scope and principal directions of the Kokand Khanate's trade and economic relations with Bukhara, Khiva, Afghanistan, Iran, the Ottoman Empire, India, and Russia. Furthermore, it demonstrates, through quantitative evidence, the intermediary role of the city of Tashkent within these commercial networks.

Keywords: China, India, Bukhara, Central Asia, Russia, Khiva, Afghanistan, Dasht-i Qipchaq, Eastern Turkestan, Tashkent, Kokand paper, F. Nazarov, V. V.

The relevance of this study lies in the fact that, during the years of Uzbekistan's independence, objective research into the history of national statehood, including the foreign political and economic relations of the Kokand Khanate, has received support at the level of state policy. Nevertheless, the scholarly potential of sources based on the direct observations of foreign travelers and

diplomatic envoys has not yet been fully utilized in reconstructing the commercial and economic history of the Khanate.

Following Uzbekistan's independence, historical scholarship underwent profound methodological changes, providing researchers with broad opportunities to present an objective interpretation of the past. This article therefore focuses on the memoirs and accounts of diplomatic envoys and travelers concerning the commercial, economic, socio-cultural, and diplomatic relations maintained by the Russian Empire, Great Britain, and neighboring states with Central Asia, particularly the Kokand Khanate. For centuries, the states of Central Asia maintained economic, political, and cultural relations with China, India, Iran, Afghanistan, and other countries of the East, as well as with Russia. The friendly relations that contemporary Uzbekistan maintains with its neighboring countries have their historical roots in this long-standing tradition.

Trade relations between the Kokand Khanate and neighboring states during the eighteenth and nineteenth centuries have not yet been examined comprehensively, despite the fact that the reports of Russian travelers and diplomatic envoys contain valuable information for reconstructing the economic history of this period. Earlier commercial contacts between Central Asia, Eastern Turkestan, and China during the sixteenth and seventeenth centuries are reflected in such historical works as Baburnama by Zahir al-Din Muhammad Babur, Bahr al-Asrar by Mahmud ibn Wali, and Tarikh-i Shahrukhi by Niyaz Muhammad Khoqandi. Babur's observation that a caravan arriving in Andijan from China consisted of approximately one thousand people provides convincing evidence of the long-standing commercial relations between the two regions.

The present study is based on three principal methodological approaches. First, it undertakes a comparative analysis of the official reports and personal travel diaries of nineteenth-century Russian travelers and diplomatic envoys as primary historical sources. Second, it systematizes the quantitative information contained in these sources, including data on trade volumes, caravan traffic, and commodity prices. Third, these historical materials are evaluated in the light of contemporary historiographical scholarship in order to provide a comprehensive understanding of the Kokand Khanate's position within the regional and international trading system. Such an approach makes it possible to demonstrate that the Khanate maintained not only commercial relations

with its immediate neighbors but also a complex and multilayered network of economic connections extending to distant regions.

The rapid development of the Kokand Khanate was largely determined by its favorable geographical location, the convergence of major caravan routes, and its long-established agricultural economy. Rebuilt in 1709, the city of Kokand became the capital of the Khanate in 1740 and subsequently developed into its principal political, economic, and cultural center. From this strategically advantageous position, the Khanate established extensive commercial relations with Bukhara, Khiva, Afghanistan, Iran, the Ottoman Empire, and India in the west and south; with China through Kashgar in the east; with the nomadic tribes of Dasht-i Qipchaq in the north; and, most importantly, with the Russian Empire. Certain historical sources even mention commercial contacts involving Japanese and British merchants.

The principal exports of the Kokand Khanate included raw silk, silk textiles, cotton, leather products, precious stones, and articles made of gold and silver. Imported commodities consisted primarily of tea, metals, porcelain, finished textiles, and clothing. Large urban centers such as Kokand, Tashkent, Andijan, and Namangan became renowned for numerous branches of handicraft production, including copper craftsmanship, jewelry making, weaving, and other specialized industries. The remarkable development of these crafts significantly contributed to the expansion of commercial relations with neighboring countries.

Particular importance should be attached to the production of Kokand paper. Following the migration of skilled papermakers from Samarkand to Kokand, the Khanate evolved into the principal center for paper production across a vast territory stretching from the Aral Sea to China. As a result, Kokand acquired an almost monopolistic position in the regional paper trade, while Kokand paper was exported to Kashgar and even to northern Afghanistan.

The trade and economic relations of the Kokand Khanate with foreign countries are extensively reflected in the reports of Russian diplomatic envoys and travelers. During his mission to Kokand in 1813-1814, Filipp Nazarov compiled valuable information that was later published in 1821 under the title Zapiski o nekotorykh narodakh i zemlyakh sredney chasti Azii (Notes on Certain Peoples and Lands of Central Asia). His work provides detailed observations on Kokand's commercial relations with Kashgar, China, Khiva, Bukhara, and Eastern Iran. Likewise, the journal Aziatskii Vestnik (1826)

contains important information concerning Kokand's cotton and silk production, as well as its commercial relations with China, Khiva, and Iran.

Another significant source is Istoricheskiye izvestiya o Kokandskom khanstve (Historical Information on the Kokand Khanate) by V. V. Velyaminov-Zernov, prepared on the basis of the diary of the merchant S. Ya. Klyucharev, who visited Tashkent in 1852. This work records detailed information concerning caravans arriving in Tashkent from Bukhara, the daily sale of as many as 20,000 sheep, and the remarkable profitability of the opium trade. Equally valuable is A. N. Teterevnikov's Ocherk vnutrenney torgovli Kirgizskoy stepi (Essay on the Internal Trade of the Kirghiz Steppe, 1867), in which he estimated that Tashkent's total annual trade turnover could reach approximately ten million rubles and provided a detailed analysis of the commercial routes through which British Indian goods entered Central Asia via the Peshawar-Kabul-Bukhara-Kokand corridor.

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The trade and economic relations of the Kokand Khanate with foreign countries are extensively reflected in the reports of Russian diplomatic envoys and travelers. During his mission to Kokand in 1813-1814, Filipp Nazarov compiled valuable information that was later published in 1821 under the title Zapiski o nekotorykh narodakh i zemlyakh sredney chasti Azii (Notes on Certain Peoples and Lands of Central Asia). His work provides detailed observations on Kokand's commercial relations with Kashgar, China, Khiva, Bukhara, and Eastern Iran. Likewise, the journal Aziatskii Vestnik (1826)

contains important information concerning Kokand's cotton and silk production, as well as its commercial relations with China, Khiva, and Iran.

Another significant source is Istoricheskiye izvestiya o Kokandskom khanstve (Historical Information on the Kokand Khanate) by V. V. Velyaminov-Zernov, prepared on the basis of the diary of the merchant S. Ya. Klyucharev, who visited Tashkent in 1852. This work records detailed information concerning caravans arriving in Tashkent from Bukhara, the daily sale of as many as 20,000 sheep, and the remarkable profitability of the opium trade. Equally valuable is A. N. Teterevnikov's Ocherk vnutrenney torgovli Kirgizskoy stepi (Essay on the Internal Trade of the Kirghiz Steppe, 1867), in which he estimated that Tashkent's total annual trade turnover could reach approximately ten million rubles and provided a detailed analysis of the commercial routes through which British Indian goods entered Central Asia via the Peshawar–Kabul–Bukhara–Kokand corridor.

The reports and memoirs of Russian travelers and diplomatic envoys examined in this study constitute indispensable primary sources for reconstructing the foreign trade and economic relations of the Kokand Khanate. Their significance lies not only in the extensive quantitative data they provide but also in the fact that they were compiled by contemporary observers who directly witnessed the commercial and political realities of the period. The official mission report of Filipp Nazarov, the travel diary of S. Ya. Klyucharev, and the analytical observations of A. N. Teterevnikov each illuminate different aspects of the Khanate's external commercial system from distinct chronological and methodological perspectives. Consequently, only a comparative examination of these diverse sources makes it possible to reconstruct the commercial and economic life of the Kokand Khanate in an objective, comprehensive, and historically balanced manner, since each source reflects particular regions, periods, and social environments within the broader economic landscape.

Conclusion

The present study demonstrates that the Kokand Khanate maintained an extensive network of foreign trade and economic relations with the Central Asian khanates, China (including Eastern Turkestan), India, Iran, the Ottoman Empire, Russia, and several other countries. Beyond conducting direct trade with Kashgar, the Khanate also functioned as an important intermediary in commercial exchanges between China and the Central Asian khanates, as well as between China and India, Iran, and the Russian Empire. This intermediary

role substantially enhanced the economic and geopolitical importance of the Kokand Khanate within the regional trading system.

The accounts of Russian travelers and diplomatic envoys-including Filipp Nazarov, V. V. Velyaminov-Zernov, A. N. Teterevnikov, and others-represent unique and highly valuable historical sources that enable scholars to reconstruct these commercial processes on the basis of reliable quantitative evidence. Their observations not only provide statistical information regarding trade volumes, caravan routes, and commodities but also offer first-hand descriptions of the mechanisms governing international commerce in nineteenth-century Central Asia.

Particular emphasis should also be placed on the strategic position of Tashkent, which emerged as the principal intermediary commercial center linking the Kokand Khanate with the Russian Empire and other neighboring regions. Owing to its advantageous geographical location and well-developed commercial infrastructure, Tashkent became one of the most influential trade hubs in Central Asia, facilitating the movement of goods between East and West while strengthening the Khanate's position within the broader Eurasian trading network.

Overall, the evidence examined in this article confirms that the Kokand Khanate occupied a prominent place in the international commercial system of Central Asia during the eighteenth and nineteenth centuries. Its economic prosperity was sustained by a diversified network of caravan routes, active diplomatic engagement, and its ability to function as an intermediary between the major commercial centers of Asia. Consequently, the reports of Russian travelers and diplomatic envoys remain among the most reliable and informative historical sources for studying the foreign trade, economic development, and international relations of the Kokand Khanate.

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Hududlar iqtisodiyotini rivojlantirishda raqamli transformatsiyaning roli

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Hozirgi davrga kelib nafaqat O‘zbekiston Respublikasida, balki ko‘plab davlatlarda, ayniqsa global iqtisodiyot rivojlanishida raqamli transformatsiya jarayonlari muhim ahamiyat kasb etmoqda. Hududlar iqtisodiyotini rivojlantirishda raqamli texnologiyalarning joriy etilishi ishlab chiqarish samaradorligini oshirish, yangi ish o‘rinlarini yaratish, aholi daromadlarini ko‘paytirish va mintaqaviy nomutanosibliklarni kamaytirishda muhim omil sanalmoqda. Shulardan misol qiladigan bo‘lsak, «Raqamli O‘zbekiston – 2030» strategiyasi doirasida amalga oshirilayotgan islohotlar, internet infratuzilmasining kengayishi, elektron hukumat xizmatlari va IT-parklar tarmog‘ining rivojlanishi hududiy iqtisodiyotga sezilarli darajada ijobiy ta’sir ko‘rsatmoqda. Lekin yetarli imkoniyatlar va qulayliklar yaratilishiga qaramay, raqamli transformatsiyaning hududlar kesimidagi samaradorligi va mintaqaviy tafovutlar haqida ilmiy tahlillar hali to‘liq emas. Shu masalaning o‘zi ham mavzuning qanchalik dolzarbligini bildiradi.

Tadqiqotdan ko‘zlangan maqsad – O‘zbekiston hududlari iqtisodiyotini rivojlantirishda raqamli transformatsiyaning roli tahlili orqali o‘rganish va uning samaradorligini baholash bilan birga, mintaqaviy raqamli tengsizlikni kamaytirish uchun takliflar ishlab chiqishdan iborat.

So‘nggi yillarda raqamli iqtisodiyot taraqqiyoti muhim rol o‘ynamoqda. Bunga sabab – hozirgi kunga kelib raqamli texnologiyalar davlatning rivojlanishiga sezilarli ta’sir ko‘rsatmoqda va shu bilan birga raqobat ham rivojlanmoqda, bu esa raqobatbardosh iqtisodiyotni yaratishga yanada keng imkoniyat va davlat farovonligi yo‘lida muhim omillardan biri bo‘lib kelmoqda. Shu sababli davlatimiz rahbari ham raqamli transformatsiyaga alohida e’tibor qaratmoqdalar (Mirziyoyev, 2020; 2025).

Tadqiqot zamini misolida hozirgi kunda hududlar iqtisodi uchun olib borilayotgan keng ko‘lamdagi davlat siyosati, moliyaviy qarorlar, turli xil islohotlarni ko‘rish mumkin. Shu bilan birga davlatimiz rahbari tomonidan ishlab chiqilgan qarorlar, sohaga oid turli siyosiy manbalar va xorij tajribasidan ham kerakli ma’lumotlardan foydalanilgan. Ushbu tadqiqotni amalga oshirish jarayonida iqtisodchilar, olimlar va tadqiqotchilarning ilmiy ishlari tahlil qilindi. Raqamli transformatsiyaning hududiy iqtisodiyotdagi o‘rni haqida ko‘plab mahalliy va xorijiy olimlar fikrlari ko‘rib chiqildi.

Xorijiy tadqiqotlarda raqamli infratuzilma va mintaqaviy rivojlanish o‘rtasidagi bog‘liqlik alohida ta’kidlanadi. OECD va Jahon banki hisobotlariga ko‘ra, keng polosali internet qamrovi 10 foizga oshganda YaIM o‘sishi 0,5–1,5 foizga tezlashtirilishi mumkin. ASEAN mamlakatlari tajribasida kichik va o‘rta biznesning raqamli platformalarga integratsiyasi eksport salohiyatini sezilarli oshirgan (Sudibyo va boshq., 2023). Rossiya va Qozog‘iston tajribasida ham «raqamli mintaqa» dasturlari orqali qishloq va shahar o‘rtasidagi raqamli tafovutni qisqartirishga e’tibor qaratilgan.

O‘zbekistonlik olimlar (Ashurbayev va Ismailova, 2026; Sattorov, 2025; Khalilov, 2023) raqamli infratuzilmaning hududiy nomutanosibligi, internet penetratsiyasi va AKT investitsiyalarining iqtisodiy o‘sishga ta’sirini o‘rganishgan. Ularning tadqiqotlariga ko‘ra, Toshkent shahri va Samarqand viloyatida raqamli investitsiyalar yuqori bo‘lsa, Qoraqalpog‘iston, Surxondaryo va Jizzax viloyatlarida bu ko‘rsatkich nisbatan past qolmoqda. Bu esa mintaqaviy raqamli tengsizlik muammosini dolzarblashtiradi.

So‘nggi yillarda O‘zbekistonda raqamli iqtisodiyot dolzarb ahamiyatga ega bo‘lib kelmoqda. 2019-yilda internet foydalanuvchilar soni taxminan 18–20 million atrofida bo‘lgan bo‘lsa, 2024–2025-yillarga kelib bu ko‘rsatkich 32 milliondan oshib, aholining 87–94 foizini tashkil etdi. Raqamli iqtisodiyotning YaIMdagi ulushi 2020-yildagi taxminan 2 foizdan 2024–2025-yillarda 5–5,5 foizgacha oshdi. AKT xizmatlari eksporti 2020-yildagi 140–170 million AQSH dollaridan 2023–2025-yillarda 400–1000 million dollargacha yetdi. Elektron tijorat bozori hajmi 2024-yilda taxminan 1,2 milliard dollarni tashkil etib, yillik o‘sish sur’ati 40 foiz atrofida saqlanmoqda.

«Raqamli O‘zbekiston – 2030» strategiyasi doirasida 1600 dan ortiq loyihalar amalga oshirilmoqda. Jumladan, 2025–2026-yillarda hududlarni raqamli

transformatsiya qilish bo‘yicha ustuvor loyihalar tasdiqlangan (PQ-286-son qaror, 2025). Optik tolali aloqa tarmog‘i uzunligi sezilarli oshirilib, yuqori tezlikdagi internet qamrovi 85–100 foizga yetkazish maqsad qilingan. IT-Park rezidentlari soni 2019-yildagi 300–370 tadan 2025-yilda 2900–3500 tagacha oshdi. 15 ta hududda IT-shaharchalar tashkil etish tashabbusi amalga oshirilmoqda.

Hududlar kesimida raqamli iqtisodiyotga yo‘naltirilgan investitsiyalar tahlili mintaqaviy nomutanosiblikni ko‘rsatadi (2024-yil ma’lumotlari bo‘yicha):

Hudud	**Investitsiya hajmi (mlrd so‘m)**
Toshkent shahri	150
Samarqand viloyati	95
Farg‘ona viloyati	70
Buxoro viloyati	55
Xorazm viloyati	40

1-jadval. 2024-yilda hududlar kesimida raqamli iqtisodiyotga investitsiyalar (taxminiy)

Manba: Bank-moliya akademiyasi tahliliy materiallari va ochiq ma’lumotlar asosida.

Ushbu ma’lumotlardan ko‘rinib turibdiki, eng katta investitsion faollik Toshkent shahri va Samarqand viloyatida qayd etilgan. Farg‘ona, Andijon va Namangan viloyatlarida o‘rtacha daraja kuzatilsa, Qoraqalpog‘iston Respublikasi, Surxondaryo va Jizzax viloyatlarida raqamli iqtisodiyotga yo‘naltirilgan sarmoya miqdori nisbatan past. Bu holat qishloq joylarda internet sifati pastligi, kadrlar salohiyatining yetarli emasligi va raqamli savodxonlik darajasining pastligi bilan bog‘liq.

Raqamli transformatsiya nafaqat infratuzilma, balki xizmatlar sektori, qishloq xo‘jaligi (AgroData kabi platformalar), sanoat (IoT monitoring) va turizm sohalariga ham ta’sir ko‘rsatmoqda. Masalan, Samarqandda turizm uchun raqamli platformalar, Farg‘onada elektron qishloq xo‘jaligi tizimlari, Navoiyda sanoat IoT

yechimlari samaradorlikni 10–15 foizga oshirgan hollar qayd etilgan. Davlat xizmatlari portalida (my.gov.uz) xizmatlar soni 2017-yildagi 49 tadan 2025-yilda 775–850 tagacha yetgan, foydalanuvchilar soni esa 11,6 milliondan oshgan.

Xulosa qilib aytganda, bugungi kunda aynan raqamli transformatsiya nafaqat milliy, balki hududiy iqtisodiyotni rivojlantirishda eng muhim omillardan biri bo‘lib sanamoqda. «Raqamli O‘zbekiston – 2030» strategiyasi va unga asoslangan qarorlar (jumladan, 2025-yildagi PQ-286) hududlarda raqamli infratuzilmani mustahkamlash, elektron xizmatlarni kengaytirish va IT-ekotizimni rivojlantirishga qaratilgan. Natijada internet penetratsiyasi, raqamli to‘lovlar, e-tijorat va IT-eksport sezilarli o‘sdi. Shu bilan birga, hududlar o‘rtasidagi raqamli tafovut (Toshkent va ayrim viloyatlar bilan qolgan hududlar o‘rtasida) hali ham saqlanib qolmoqda. Bu esa investitsiyalarni teng taqsimlash, qishloq joylarda keng polosali internetni kengaytirish, raqamli savodxonlikni oshirish va mahalliy kadrlar tayyorlashni talab etadi.

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1-jadval. 2024-yilda hududlar kesimida raqamli iqtisodiyotga investitsiyalar (taxminiy)

Manba: Bank-moliya akademiyasi tahliliy materiallari va ochiq ma’lumotlar asosida.

Ushbu ma’lumotlardan ko‘rinib turibdiki, eng katta investitsion faollik Toshkent shahri va Samarqand viloyatida qayd etilgan. Farg‘ona, Andijon va Namangan viloyatlarida o‘rtacha daraja kuzatilsa, Qoraqalpog‘iston Respublikasi, Surxondaryo va Jizzax viloyatlarida raqamli iqtisodiyotga yo‘naltirilgan sarmoya miqdori nisbatan past. Bu holat qishloq joylarda internet sifati pastligi, kadrlar salohiyatining yetarli emasligi va raqamli savodxonlik darajasining pastligi bilan bog‘liq.

Raqamli transformatsiya nafaqat infratuzilma, balki xizmatlar sektori, qishloq xo‘jaligi (AgroData kabi platformalar), sanoat (IoT monitoring) va turizm sohalariga ham ta’sir ko‘rsatmoqda. Masalan, Samarqandda turizm uchun raqamli platformalar, Farg‘onada elektron qishloq xo‘jaligi tizimlari, Navoiyda sanoat IoT yechimlari samaradorlikni 10–15 foizga oshirgan hollar qayd etilgan. Davlat xizmatlari portalida (my.gov.uz) xizmatlar soni 2017-yildagi 49 tadan 2025-yilda 775–850 tagacha yetgan, foydalanuvchilar soni esa 11,6 milliondan oshgan.

Xulosa qilib aytganda, bugungi kunda aynan raqamli transformatsiya nafaqat milliy, balki hududiy iqtisodiyotni rivojlantirishda eng muhim omillardan biri bo‘lib sanamoqda. «Raqamli O‘zbekiston – 2030» strategiyasi va unga asoslangan qarorlar (jumladan, 2025-yildagi PQ-286) hududlarda raqamli infratuzilmani mustahkamlash, elektron xizmatlarni kengaytirish va IT-ekotizimni rivojlantirishga qaratilgan. Natijada internet penetratsiyasi, raqamli to‘lovlar, e-tijorat va IT-eksport sezilarli o‘sdi. Shu bilan birga, hududlar o‘rtasidagi raqamli tafovut (Toshkent va ayrim viloyatlar bilan qolgan hududlar o‘rtasida) hali ham saqlanib qolmoqda. Bu esa investitsiyalarni teng taqsimlash, qishloq joylarda keng polosali internetni kengaytirish, raqamli savodxonlikni oshirish va mahalliy kadrlar tayyorlashni talab etadi.

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STRESS-TESTING METHODOLOGY FOR THE LIQUIDITY AND FINANCIAL STABILITY OF COMMERCIAL BANKS UNDER MACROECONOMIC SHOCKS

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Abstract: The thesis systematises the modern methodology of stress testing the liquidity and financial stability of commercial banks under macroeconomic shocks, and proposes directions for its improvement. Stress testing is treated as an integrated framework that combines macroeconomic scenario design, translation of shocks into balance-sheet metrics, and aggregation of results into supervisory-level indicators. Drawing on the works of Borio, Drehmann and Tsatsaronis, Schuermann, Acharya, Berger and Bouwman, Adrian and Shin, Basel Committee documents and the practices of the ECB, Federal Reserve and IMF, the paper distinguishes four generations of banking stress tests — top-down macroeconomic scenarios, bottom-up bank-by-bank projections, integrated solvency-liquidity stress tests and macroprudential system-wide stress tests. A summary table of the four generations is presented. The paper concludes that under the conditions of digital banking and increasing macroeconomic uncertainty, the modern methodology must combine forward-looking scenarios, dynamic-balance-sheet modelling, network contagion analysis and real-time supervisory analytics.

Keywords: commercial bank, stress testing, macroeconomic shocks, liquidity risk, financial stability, Basel III, EBA/ECB stress tests, macroprudential policy, dynamic balance sheet, network contagion.

Introduction

Stress testing has emerged as one of the central instruments of prudential banking supervision in the aftermath of the 2008 global financial crisis. It provides supervisors, banks and investors with a forward-looking assessment of the resilience of the banking system to adverse macroeconomic shocks and supports the calibration of capital and liquidity buffers. The COVID-19 pandemic in 2020, the interest-rate cycle of 2022–2023, the 2023 collapse of U.S. mid-sized banks and the current geopolitical uncertainty of 2024–2026 have all reinforced the importance of a robust, coherent and dynamic stress-testing framework.

The relevance of the topic is reinforced by three factors. First, the traditional Basel III LCR and NSFR ratios provide only a static picture of a bank's liquidity position and do not capture the dynamic interaction of liquidity and solvency shocks under adverse macroeconomic scenarios. Second, the digital transformation of banking has qualitatively changed the speed of deposit outflows and requires new stress-testing horizons and behavioural assumptions. Third, in the Republic of Uzbekistan the Central Bank has since 2020 been developing its stress-testing capacity, and the systematic review of international best practice is a necessary methodological basis for its further improvement.

The aim of this thesis is to systematise the modern methodology of stress testing the liquidity and financial stability of commercial banks under macroeconomic shocks and to propose directions for its improvement, with particular reference to the banking system of the Republic of Uzbekistan. The methodology relies on scientific abstraction, comparative and structural analysis, the historical-logical method and content analysis of publications indexed in Scopus and Web of Science over the last decade, as well as regulatory documents of the Basel Committee, EBA, ECB, Federal Reserve and IMF.

Main body

The methodology of banking stress testing has evolved through four consecutive generations. The first generation — top-down macroeconomic scenarios — emerged in the late 1990s and early 2000s and consisted in the design of a small number of adverse macroeconomic scenarios (a mild recession, a severe recession, a deflationary shock) and their translation into aggregate banking-sector projections through a small set of macro-financial elasticities. Sorge (2004) and Foglia (2009) systematised the early experience with this generation of stress tests. Its main advantage was simplicity and comparability across countries, while its main limitation was the neglect of bank-specific heterogeneity.

The second generation — bottom-up bank-by-bank stress tests — emerged after 2009 in the form of the U.S. Federal Reserve's Supervisory Capital Assessment Program (SCAP) and the European Banking Authority's stress-testing exercises. Under this approach, each bank projects its balance sheet and profit-and-loss statement three years ahead under a common macroeconomic scenario provided by the supervisor, using its own internal models. Acharya, Engle and Pierret (2014) and Schuermann (2014) demonstrated the value of this generation of stress tests as a supervisory disclosure and market-discipline instrument. Its main limitation is the potential inconsistency of models across banks and the lack of endogenous behavioural responses.

The third generation — integrated solvency-liquidity stress tests — has emerged over the past decade in response to the 2008 crisis's lesson that liquidity and solvency shocks are deeply interconnected. Barnhill and Schumacher (2011), Puhr and Schmitz (2014) and the ECB Macroprudential Bulletin (2019) proposed frameworks that combine the projection of solvency ratios with the projection of liquidity ratios (LCR, NSFR) under a common macroeconomic scenario, allowing supervisors to assess the joint distribution of shocks. This generation of stress tests explicitly recognises that a solvency shock can trigger a liquidity shock through the confidence channel, and vice versa. Basel Committee (2018) documented the emergence of this generation as a supervisory standard.

The fourth — macroprudential system-wide — generation has been shaped by the works of Borio, Drehmann and Tsatsaronis (2014), Adrian and Shin (2010), Acharya (2009) and Cont, Moussa and Santos (2013). Under this approach, stress tests explicitly incorporate network contagion, fire-sale externalities, feedback loops between banks and the real economy, and behavioural responses of depositors and creditors. The IMF Financial Sector Assessment Program (FSAP) has adopted elements of this generation for global systemic assessments. The comparison of the four generations is summarised in Table 1.

Table 1. Evolution of the methodology of banking stress tests under macroeconomic shocks

Generation	Key representatives (year)	Central idea and instruments
Top-down macroeconomic	Sorge (2004); Foglia (2009)	Small set of adverse macro scenarios translated into aggregate banking projections through elasticities
Bottom-up bank-by-bank	Acharya, Engle & Pierret (2014); Schuermann (2014); EBA/Fed practice	Each bank projects own balance sheet under a common macro scenario using its internal models
Integrated solvency-liquidity	Barnhill & Schumacher (2011); Puhr & Schmitz (2014); ECB (2019)	Joint projection of capital, LCR and NSFR under a common macro scenario with confidence-channel feedback
Macroprudential system-wide	Borio, Drehmann & Tsatsaronis (2014); Adrian & Shin (2010); Cont, Moussa & Santos (2013)	Network contagion, fire-sale externalities, macro-financial feedback and behavioural responses

For the banking system of the Republic of Uzbekistan, the improvement of the stress-testing framework should be organised along five directions. First, the introduction of a national three-scenario stress-testing suite (baseline, adverse and severely adverse) covering three-year horizons and updated annually. Second, the integration of liquidity and solvency projections into a single dynamic-balance-sheet model. Third, the development of a network module capable of tracing contagion through the domestic interbank market. Fourth, the inclusion of digital-run scenarios in which mobile-banking withdrawal rates and social-media signalling are explicitly modelled. Fifth, the systematic publication of stress-test results as an element of supervisory transparency. These directions align the national framework with the modern fourth-generation international practice.

The methodological choice between static and dynamic balance-sheet assumptions has fundamental implications for the reliability of stress-test results. Under the static-balance-sheet approach, banks are assumed to maintain their balance sheet unchanged over the stress horizon; this is the approach traditionally used by the EBA in its stress-testing exercises. Under the dynamic-balance-sheet approach, banks are allowed to adjust their balance sheet in response to the stress scenario; this approach is used by the Federal Reserve in the DFAST and CCAR programs. Kohn and Liang (2019) systematically compared the two approaches and concluded that dynamic-balance-sheet assumptions produce more realistic projections but require significantly more supervisory resources and modelling expertise.

The integration of climate-related and geopolitical risks into stress-testing frameworks has emerged as an important new frontier. The European Central Bank conducted its first climate stress test

in 2022, and the Bank of England in 2023 published an extensive climate stress-testing exercise. Geopolitical risks — including sanctions, cyber-warfare and supply-chain disruptions — have been increasingly incorporated into the adverse scenarios of major supervisors. The IMF Global Financial Stability Report (April 2024) recommends that emerging-market supervisors, including the Central Bank of the Republic of Uzbekistan, gradually incorporate these new risk dimensions into their stress-testing programs.

Conclusion

The conducted study leads to four generalising conclusions. First, the methodology of banking stress testing has evolved through four generations — top-down macro, bottom-up bank-by-bank, integrated solvency-liquidity and macroprudential system-wide — each of which enriched rather than replaced the previous one. Second, the modern generation of stress tests must combine forward-looking macroeconomic scenarios, dynamic-balance-sheet modelling, network contagion analysis and behavioural responses to digital shocks. Third, the 2023 collapse of U.S. mid-sized banks demonstrated that traditional LCR-based stress tests significantly underestimate the true speed of deposit outflows in banks with a high share of uninsured deposits and require the introduction of digital-run scenarios.

Fourth, for the banking system of the Republic of Uzbekistan the priority directions of further work are the development of a national three-scenario stress-testing suite, the integration of liquidity and solvency projections into a unified dynamic-balance-sheet model, the introduction of network contagion and digital-run modules and the systematic publication of stress-test results. The consistent implementation of these directions will substantially strengthen the resilience of the national banking system to macroeconomic shocks and align it with modern international standards.

In addition to the four generalising conclusions above, the study identifies several implementation priorities for the Republic of Uzbekistan. First, the establishment of a dedicated stress-testing unit within the Central Bank, staffed by specialists in macro-financial modelling, network analytics and behavioural economics. Second, the development of a national macroeconomic scenario generator drawing on the experience of the ECB, the Federal Reserve and the IMF. Third, the introduction of an annual bottom-up stress-testing exercise covering all systemically important commercial banks. Fourth, the systematic publication of stress-test results and the establishment of a mandatory response protocol for banks that fall short of supervisory thresholds. The consistent implementation of these priorities will substantially strengthen the resilience of the national banking system to macroeconomic shocks.

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THE ROLE OF DIGITAL TECHNOLOGIES IN THE DEVELOPMENT OF PILGRIMAGE TOURISM

Digitalization and Tourism Innovation

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ABSTRACT

This article analyzes the role of digital technologies in developing pilgrimage tourism. Based on monitoring of shrines' digital platforms, a pilgrim survey, and expert interviews, existing digital services (websites, mobile applications, e-ticketing) were found to be underdeveloped, while pilgrim demand for such services remains high. Drawing on international experience (Saudi Arabia, Turkey), recommendations are proposed for creating a unified national digital platform, introducing multilingual audio guides, and implementing AI-based personalized services.

Keywords: digital technologies, pilgrimage tourism, smart tourism, mobile application, artificial intelligence, digital platform, Uzbekistan.

Introduction

The rapid development of digital technologies is affecting all areas of tourism, including pilgrimage tourism. Mobile applications, virtual and augmented reality (VR/AR) technologies, electronic ticketing systems, and AI-based recommendation systems not only create convenience for pilgrims but also make it possible to deliver information about sacred sites to a wide audience. In recent years, the world's leading pilgrimage destinations, including Mecca and Medina, have succeeded in ensuring the safety and comfort of millions of pilgrims through the active introduction of digital technologies.

On a global scale, the concept of a "smart tourism destination" is increasingly being adopted by more countries, whereby information and communication

technologies are becoming an integral part of tourism infrastructure. Such an approach not only improves the pilgrim experience but also enables government agencies to monitor tourist flows in real time, ensure safety, and allocate resources efficiently.

In Uzbekistan, the digitalization process has been declared one of the priority areas of state policy, and within the framework of the "Digital Uzbekistan — 2030" strategy, digitalizing the tourism sector has been identified as a separate task. However, scientific research on the level and effectiveness of introducing digital technologies in the pilgrimage tourism sector remains insufficient. In order to fill this gap, this article analyzes the role of digital technologies in developing pilgrimage tourism and the current level of their use.

The relevance of the research lies in the fact that modern pilgrims, especially representatives of the younger generation, increasingly rely on digital tools when planning and carrying out their travel. For this reason, the digital infrastructure of shrines is becoming an important factor determining their competitiveness in the international market. The purpose of the research is to assess the current state of existing digital services, to study pilgrims' experience of using digital technologies, and to develop recommendations for developing this field.

The research tasks were defined as follows: monitoring the availability of official digital platforms of major shrines; studying pilgrims' experience of and demand for digital services; analyzing advanced digital solutions from international experience; identifying existing technical and financial constraints; and developing practical proposals that could be implemented in the context of Uzbekistan.

Theoretical Foundations and Literature Review

The concept of "smart tourism" has become widespread in tourism studies over the past decade, referring to the use of information and communication technologies to improve the tourist experience, manage resources efficiently, and increase the competitiveness of tourist destinations. The smart tourism concept includes three main components: smart experience, smart business ecosystem, and smart destination.

In the context of pilgrimage tourism, smart tourism technologies are of particular importance, as they help pilgrims obtain deeper information about sacred sites,

improve queue and crowd management, and perform religious rites correctly and respectfully. In international practice, the digital systems used by Saudi Arabia in managing the Hajj and Umrah pilgrimages (such as electronic permits, crowd-density sensors, and multilingual mobile applications) are recognized as among the most advanced examples in this field.

Virtual and augmented reality technologies are also opening new opportunities in pilgrimage tourism. Through these technologies, pilgrims can virtually familiarize themselves with sacred sites before traveling, a "virtual pilgrimage" option can be created for those unable to visit in person, and the educational effect can be enhanced by interactively recreating historical events. The literature review shows that the introduction of such technologies, especially in developing countries, is still at an early stage, and there is significant potential in this area.

In the literature on the integration of artificial intelligence technologies into tourism, particular attention is given to "personalized recommendation systems." Such systems suggest routes, services, or products suited to a user based on their previous choices, interests, and behavior. In the context of pilgrimage tourism, such systems can provide deeper information about particular sites or rites in line with a pilgrim's religious and spiritual interests.

Research Methodology

The research combined content analysis, monitoring, and survey methods. In the first stage, monitoring was carried out on the existence, content quality, and update frequency of official websites, mobile applications, and official social media pages of 20 major shrines in Uzbekistan. For each site, a digital readiness index was calculated, taking into account criteria such as the existence of a website, multilingualism, mobile responsiveness, and the availability of interactive services.

In the second stage, an online and in-person survey was conducted with 200 local and foreign pilgrims. The survey questionnaire included questions on the information sources pilgrims used when planning their trip, their experience of obtaining digital information about a shrine, and their readiness to use virtual tour or audio-guide services. In the third stage, a comparative analysis of digital solutions in the pilgrimage tourism sector of Saudi Arabia, Turkey, and Israel was carried out in order to study international experience.

In the fourth stage, 15 expert interviews were conducted with local tourism-sector IT specialists and representatives of government bodies to identify the technical and financial constraints in developing the existing digital infrastructure. All collected data were processed using quantitative and qualitative analysis methods. The expert interviews were conducted in a semi-structured format, which allowed respondents to freely express their opinions.

Results and Analysis

Level of Digital Readiness: Monitoring Results

According to the monitoring results, of the 20 major shrines in Uzbekistan, only 7 (35%) have a fully functional, multilingual official website, and of these, only 3 (15%) have a mobile application. Information about most sites is placed on general tourism portals or third-party platforms, which often contain outdated or incomplete information.

Type of digital service	Share of sites with the service, %
Official multilingual website	35
Mobile application	15
Electronic ticketing system	20
Virtual tour / 360° view	10
Active official social media page	45
Online payment option	18

Pilgrims' Experience of Using Digital Services

According to the survey results, 63% of respondents used internet sources when planning their trip, but only 18% obtained information about a shrine through an official mobile application. Most pilgrims (57%) said they searched for information via social media and general search engines, which sometimes led them to encounter inaccurate or outdated information.

Information source	Share of users, %
Social media	57
General search engines (Google, etc.)	63
Official mobile application	18
Tour operator/guide recommendation	48
Recommendation from friends/acquaintances	39

In addition, 71% of respondents said they would be willing to use a virtual tour or audio-guide service if one were available, indicating significant demand in this area. Among younger respondents (18–30 years old), this figure was even higher — 84% — showing that the younger generation of pilgrims has a strong need for digital services. Among respondents over 40, this figure was 58%, indicating that while digital services are important for this group as well, they should be offered in combination with traditional forms of service.

Comparative Analysis with International Experience

A comparative analysis conducted using Saudi Arabia as an example showed that official digital platforms such as "Nusuk," used in managing the Hajj and Umrah pilgrimages, ensure that millions of pilgrims can register, plan their routes, and pass through security control. Such centralized digital systems not only create convenience for pilgrims but also greatly assist government bodies in crowd management and ensuring safety. It was found that Uzbekistan currently has no similar centralized national platform.

In the case of Turkey, the digital audio-guide systems introduced at the Mevlana Museum in Konya and other religious and educational sites are particularly notable. Through these systems, pilgrims can obtain audio information in more than 15 languages, which has served to significantly increase the flow of international pilgrims. According to the expert interviews, the main obstacles to introducing such a system in Uzbekistan were identified as a lack of financial resources and a shortage of technical specialists.

In the case of Israel, the integrated ticketing and queue-management system introduced around the holy sites in Jerusalem is also noteworthy; through this system, the flow of pilgrims belonging to different denominations is managed separately, with a specific time slot allocated to each group. Such experience could also be useful for Uzbekistan, particularly in regulating the pilgrimage flows of different groups during major religious holidays.

Technical and Institutional Constraints

According to the expert interviews, the main obstacles to introducing digital technologies are as follows: local IT companies' insufficient experience in developing solutions specialized for the tourism sector; unclear mechanisms for financing digital projects between the public and private sectors; and the absence of unified standards for data exchange among various government bodies. 73% of respondents emphasized the need for the state to introduce grant or subsidy programs to implement digital projects.

In addition, 51% of experts noted a shortage of qualified personnel able to manage digital projects within local government bodies, which has resulted in some digital initiatives being left unfinished. This indicates the need to train or attract dedicated project managers for digital transformation projects, as well as to establish clear accountability and deadlines at every stage of such projects.

The Role of Social Media and User-Generated Content

The research separately analyzed the role of social media in promoting pilgrimage tourism. User-generated video content about shrines in Uzbekistan on platforms such as Instagram, YouTube, and TikTok has increased significantly over the past two years; however, much of this content is informal, spontaneous in nature, and is not coordinated by the state or official tourism organizations. Of 120 social media posts analyzed, only 15% contained accurate and complete historical information about the shrines, with the rest mainly emphasizing visual appeal.

While this situation, on the one hand, helps promote shrines naturally, on the other hand it creates a risk of spreading inaccurate or confusing information. For this reason, it is recommended that the state establish official partnership programs with popular bloggers and content creators, providing them with accurate and

verified information in order to encourage the creation of high-quality, precise content.

Mobile Communications and Internet Infrastructure Constraints

Another important factor affecting the effectiveness of using digital services is the quality of mobile communications and internet infrastructure. According to the survey results, 34% of respondents noted that the quality of internet connectivity at some shrines, particularly those located on the outskirts of cities or in rural areas, is poor, making it difficult to use mobile applications and online services. To address this problem, it is recommended to develop, in cooperation with telecom operators, special programs to introduce free Wi-Fi networks at major shrines and to improve mobile communication infrastructure.

Discussion

The research results show that there are significant opportunities for integrating digital technologies into pilgrimage tourism. The currently low indicators can, on the one hand, be viewed as a problem, but on the other hand, they indicate that this field has considerable "room" for development. Creating a unified national pilgrimage tourism platform — one that combines multilingual, regularly updated information about all major shrines, electronic ticketing and queue management, as well as transport- and accommodation-related services — should be regarded as the primary task.

Providing multilingual audio guides, particularly in Arabic, Urdu, Persian, English, and Russian, through a mobile application would allow pilgrims to independently obtain complete information without needing a guide, which is especially important for individual travelers. In addition, it is recommended to expand opportunities to reach international audiences by conducting targeted marketing campaigns on social media and creating high-quality video content on religious and educational themes.

Introducing an AI-based personalized route recommendation system could further enrich the pilgrim experience. Such a system could suggest an optimal route based on a pilgrim's interests, available time, and budget, and could also provide real-time information on queues and crowd density. International experience, particularly Saudi Arabia's centralized digital platforms, could serve as a roadmap

for Uzbekistan as well, though implementation should proceed gradually, taking national conditions and resources into account.

To overcome institutional constraints, it is recommended to establish a dedicated fund to finance digital tourism projects on a public-private partnership basis, as well as to introduce special grant programs to attract local IT specialists to the tourism sector. In addition, developing a unified data-exchange standard among government bodies responsible for tourism and digitalization would lay the groundwork for creating a unified national platform in the future.

At the same time, in the digitalization process it is necessary to take into account the needs of all groups of pilgrims, including older pilgrims with low digital literacy. For this reason, alongside digital services, traditional forms of service (printed maps, physical information centers) should also be preserved, ensuring equal opportunities for different groups of pilgrims.

User Typology (Persona) Analysis

Based on the survey and interview results, three main user typologies (personas) can be identified with regard to pilgrims' needs for digital services. The first type is the "digitally active young pilgrim" (18–35 years old), who plans their trip entirely independently, actively relies on mobile applications and social media, and shows high demand for virtual tours and personalized recommendations. The second type is the "traditional group pilgrim" (over 40 years old), who usually travels through a tour operator, uses digital services, but views them as a supplementary rather than a primary tool.

The third type is the "family pilgrim," a category that includes family members of different age groups, for whom child-friendly routes, information about family recreation areas, and simplified navigation are particularly important. Adapting the digital platform's interface and content for each user typology could significantly improve the overall user experience.

Cost-Benefit Analysis

According to expert estimates, the approximate initial cost of creating and implementing a unified national platform would be around USD 1.5–2.5 million, with annual technical maintenance costs of USD 300,000–500,000. If such a

platform were able to increase pilgrim flow by even 10%, this could generate several million dollars of additional economic impact in major cities such as Bukhara and Samarkand, indicating that the investment could pay for itself relatively quickly. Such preliminary estimates confirm the economic justification for investing in the platform, though it is recommended to develop a detailed feasibility study for precise financial and economic justification.

Price-Quality Analysis of Existing Digital Services

An analysis of the price-quality ratio of existing digital services found that paid audio-guide applications offered by certain private companies vary significantly in quality. 44% of survey participants noted that the price of existing paid applications does not match their quality, with content often being shallow or outdated. This once again points to the need to create a state-approved, quality-standard-compliant, free or affordable official audio-guide service.

With such an official state platform in place, private companies would also be compelled to improve the quality of their products, as they would need to compete with a free, quality alternative. This, in turn, would have a positive effect on the overall quality of digital services in the market.

Proposal for Digital Platform Architecture

In creating a unified national pilgrimage tourism platform, it is recommended to include the following functional modules: the first module — a multilingual database of information about shrines, containing each site's history, opening hours, entry requirements, and location map. The second module — an electronic ticketing and queue management system, allowing pilgrims to book time slots in advance and track queues in real time. The third module — an audio-guide and virtual-tour service, providing audio content in various languages and 360-degree virtual tour capability.

The fourth module — a personalized route recommender, which suggests an optimal pilgrimage route based on the user's profile and preferences. The fifth module — a directory of local services, containing information about hotels, restaurants, and craft shops, with the option to place online orders. It would be advisable to introduce such a comprehensive platform in stages, starting with the

most important module (the database and ticketing system) and then moving on to more complex functions (AI-based recommendations).

Regarding platform financing, it is recommended to combine the state budget, grants from international development organizations (such as the Islamic Development Bank), and public-private partnerships with private IT companies. Such a mixed financing model could ensure the stable, long-term development of the project.

In designing the platform architecture, it is recommended to use a flexible (modular) architecture that allows for adding further modules in the future (such as integration with shrines in other Central Asian countries or a blockchain-based ticketing system). This approach would ensure the platform's long-term technological sustainability and scalability.

Cybersecurity and Data Protection Issues

In introducing digital platforms, protecting pilgrims' personal and payment data is of particular importance. According to the expert interviews, 60% of local IT specialists noted that cybersecurity standards are not currently sufficiently implemented in the tourism sector's digital systems. For this reason, requirements in line with international data protection standards (such as GDPR principles) must be taken into account from the outset when developing new platforms.

Furthermore, when integrating payment systems with international bank cards and local payment systems, it is recommended to implement data encryption standards (such as PCI DSS), conduct regular cybersecurity audits, and provide users with transparent information about how their data is stored and used. Such measures not only ensure technical security but also strengthen foreign pilgrims' trust in the platform.

From a cybersecurity standpoint, it is necessary to establish a clear legal and regulatory framework and oversight mechanisms to prevent the unlawful disclosure to third parties of pilgrims' personal data held by government bodies. In this regard, it is recommended to bring Uzbekistan's legislation "On Personal Data" into line with international standards and to develop special guidelines for digital platforms in the tourism sector.

Data Analysis and Forecasting Tourist Flows

Using big data and artificial intelligence technologies to create a system for forecasting pilgrim flows in advance is a particularly promising direction. Such a system could forecast the expected number of pilgrims in coming weeks or months by analyzing anonymized location data from mobile network operators, visit statistics from previous years, and booking system data. This, in turn, would allow hotels, transport organizations, and government bodies to plan resources in advance.

68% of expert respondents noted that such a forecasting system could bring great practical benefit, particularly in managing queues and staff scheduling. However, it was also noted that implementing such a system would require developing legal and technical agreements on data exchange among various organizations (telecom operators, hotels, government bodies).

In international experience, similar forecasting systems — such as Japan's systems for managing tourist flows — are already being applied successfully, enabling government bodies to allocate additional public transport and security personnel in advance during seasonal peak periods. It is recommended that Uzbekistan introduce a similar system, adapted to national conditions, gradually, first as a pilot project in the cities of Bukhara and Samarkand, which have the highest visitor density.

System for Collecting User Feedback

To continuously improve the quality of digital services, it is important to introduce a system for collecting feedback from pilgrims. Currently, most shrines in Uzbekistan lack a mechanism for systematically collecting and analyzing visitor feedback, which leads to decisions on improving service quality being based more on assumptions than on concrete data. It is recommended to introduce a simple, quick rating system via a mobile application (for example, a five-point rating scale and the option to leave a short comment after a visit).

Automatically analyzing collected feedback using artificial intelligence, identifying the most common problems and suggestions, and regularly reporting the results to relevant government bodies and service providers would help create a cycle of

continuous improvement. Such a system could also increase pilgrims' overall satisfaction by making them feel that their opinions are being taken into account.

International Cooperation and Technology Transfer

For faster development in the field of digital tourism, establishing cooperation with countries and technology companies with international experience is of great strategic importance. In particular, it is recommended to organize knowledge and technology exchange programs with companies that have developed digital tourism platforms in Saudi Arabia, the United Arab Emirates, and Turkey, and to direct local IT specialists to learn from their experience.

In addition, ensuring the active participation of Uzbekistan's representatives in international technology exhibitions and conferences, as well as establishing joint research and educational programs with foreign universities, could help build a pool of qualified personnel capable of independently developing the local digital tourism ecosystem in the long term. Such international cooperation would also ensure that Uzbekistan stays timely informed of the latest trends in digital tourism.

Digital Equity and Accessibility

In the digitalization process, the issue of "digital equity" deserves special attention. It is important that digital services be convenient and understandable for pilgrims with disabilities, elderly people, and those with little experience using digital tools. According to the survey results, 76% of respondents with disabilities noted that existing digital platforms do not meet their needs (for example, compatibility with screen-reading software, large-font text).

For this reason, it is recommended that new digital platforms be developed in accordance with universal design principles, creating interfaces that are convenient for all user groups, including people with disabilities. Such an approach is important not only from the standpoint of social justice but is also economically beneficial, as it expands the potential user base.

In addition, it was found that digital literacy levels among local pilgrims from rural areas are also lower than among urban residents, indicating the need to design digital services not only for urban residents but for all socio-geographic groups. Features such as a simplified interface, voice-command control, and offline

functionality for core features would make the platform more convenient for users with lower digital literacy.

Human Capacity Development

To successfully carry out digital transformation, it is necessary to introduce special training programs to raise digital literacy in the tourism sector. It is recommended to organize short-term courses for local guides, hotel staff, and small business owners on using mobile applications and online platforms and conducting marketing on social media. Such capacity-building programs would particularly accelerate integration into the digital economy for small entrepreneurs in rural areas.

Likewise, opening tourism-technology specializations at local IT educational institutions and involving students in working on real tourism-sector projects during their internships could help build a pool of qualified specialists able to work in this field in the future. This, in turn, would help reduce dependence on foreign IT companies and develop the local digital tourism solutions ecosystem.

Another important aspect of human capacity development is training existing civil servants to use digital management tools. Organizing regular professional development courses for staff of the Tourism Committee and the tourism departments of local government bodies on data analysis, maintaining electronic reports, and using digital monitoring systems would increase the public sector's readiness for digital transformation.

Conclusion and Recommendations

In conclusion, digitalization serves as an important tool for adapting pilgrimage tourism to modern requirements. The following are proposed as key recommendations: creating a unified national digital platform for pilgrimage tourism; introducing multilingual mobile application and audio-guide services at major shrines; expanding electronic ticketing and queue management systems; conducting targeted international marketing campaigns on social media; gradually introducing AI-based personalized services; establishing a public-private partnership fund to finance digital projects; introducing a system for collecting and analyzing user feedback; and expanding international technology transfer programs.

Implementing these recommendations could significantly improve the pilgrim experience, increase the country's competitiveness in the international pilgrimage tourism market, and open up new directions for future research in the field of digital tourism. Future research should more deeply and quantitatively measure the direct impact of digital technologies on pilgrim satisfaction levels, as well as assess the practical effectiveness of AI-based systems.

As a limitation of the study, it should be noted that the monitoring was limited to only 20 major shrines and did not cover all sacred sites in the country. It is recommended that future research include broader monitoring as well as additional studies assessing the precise economic effectiveness of digital services.

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THE IMPORTANCE OF MUSICAL ACTIVITIES IN THE UPBRINGING OF CHILDREN WITH SPECIAL EDUCATIONAL NEEDS

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Abstract. This article examines the importance of musical activities in the upbringing and holistic development of children with special educational needs. Music is considered as an effective pedagogical tool that contributes to children’s emotional, cognitive, communicative and social development. The article highlights the potential of singing, listening to music, rhythmic exercises, playing musical instruments and creative musical activities to support children’s self-expression, attention, memory, coordination and interpersonal communication. Particular attention is paid to creating an inclusive educational environment in which musical activities are adapted to the individual abilities, needs and developmental characteristics of each child. The pedagogical significance of systematic musical activities in increasing children’s social participation, emotional stability and interest in learning is also discussed.

Keywords: children with special educational needs, musical activity, inclusive education, musical education, upbringing, emotional development, cognitive development, social adaptation, communication skills, creative activity.

Аннотация. В статье рассматривается значение музыкальной деятельности в воспитании и всестороннем развитии детей с особыми образовательными потребностями. Музыка рассматривается как эффективное педагогическое средство, способствующее эмоциональному, познавательному, коммуникативному и социальному развитию ребёнка. Раскрываются возможности таких видов музыкальной деятельности, как пение, слушание музыки, ритмические упражнения, игра на музыкальных инструментах и творческая музыкальная деятельность, в развитии самовыражения, внимания, памяти, координации движений и навыков межличностного общения детей. Особое внимание уделяется созданию инклюзивной образовательной среды, в которой музыкальная деятельность адаптируется к индивидуальным возможностям, потребностям и особенностям развития каждого ребёнка. Также рассматривается педагогическое значение систематических музыкальных занятий в повышении социальной активности, эмоциональной устойчивости и интереса детей к обучению.

Ключевые слова: дети с особыми образовательными потребностями, музыкальная деятельность, инклюзивное образование, музыкальное воспитание, воспитание, эмоциональное развитие, познавательное развитие, социальная адаптация, коммуникативные навыки, творческая деятельность.

INTRODUCTION. In modern education, ensuring equal opportunities for the development and education of every child, regardless of their individual abilities and developmental characteristics, has become one of the important priorities of inclusive education. Children with special educational needs require particular pedagogical attention, an appropriate educational environment, and teaching approaches that take into account their individual developmental characteristics. In this context, the organization of various types of creative activities can play an important role in supporting children's emotional, cognitive, social, and communicative development. Among these activities, music occupies a special place because it provides opportunities for children to express their emotions, communicate with others, develop creative abilities, and participate actively in the educational process. Musical activity is a multifaceted pedagogical process that includes singing, listening to music, rhythmic movements, playing simple musical instruments, musical games, and creative exercises. These activities can be adapted to the abilities and needs of children with different developmental characteristics. Regular participation in musical activities can contribute to the development of auditory perception, attention, memory, coordination, speech-related abilities, and emotional responsiveness. In addition, musical experiences create a favorable environment for children to demonstrate their individual abilities and strengthen their confidence in their own capabilities.

For children with special educational needs, music can serve not only as an artistic and educational medium but also as an important means of social interaction. Joint singing, rhythmic exercises, musical games, and group performances encourage children to interact with peers, follow common rules, listen to others, and coordinate their actions with the group. Such activities can help reduce social isolation and create conditions for children to feel themselves as active members of the educational community. The emotional nature of music also makes it possible to create a positive atmosphere in which children can experience joy, interest, satisfaction, and a sense of achievement. An important characteristic of musical activity is its flexibility. Musical tasks can be selected according to the child's age, developmental level, interests, physical

abilities, and individual educational needs. For example, some children may participate primarily through listening and rhythmic movements, while others may demonstrate their abilities through singing, playing percussion instruments, or performing simple musical compositions. Therefore, an individualized approach to musical education allows educators to involve children in activities according to their capabilities rather than focusing primarily on their limitations.

The role of the music teacher is particularly significant in this process. The teacher should create a supportive and emotionally comfortable environment, select accessible musical materials, provide clear and simple instructions, and encourage every child's participation. The use of repetitive rhythms, familiar songs, musical games, movement-based activities, and visual or tactile supports can make musical experiences more accessible and meaningful. Positive reinforcement and encouragement can further strengthen children's motivation, self-confidence, and willingness to participate in collective activities. Musical activities can also contribute to the development of important personal qualities. Through systematic participation in musical games and creative exercises, children can develop patience, independence, responsibility, attention, cooperation, and the ability to follow instructions. Rhythmic activities can support the coordination of movements, while singing and musical communication can create additional opportunities for the development of speech and communication skills. At the same time, musical creativity allows children to express feelings and ideas that may be difficult for them to communicate through conventional verbal forms. The importance of musical activity is particularly relevant in preschool education, where the foundations of a child's personality, communication culture, emotional responsiveness, and social behavior are established. A properly organized musical environment can make the educational process more engaging and accessible for children with special educational needs. It can also contribute to strengthening cooperation among children, educators, parents, and specialists involved in the child's development.

Thus, musical activity should be regarded as an important component of the upbringing and education of children with special educational needs. Its educational potential extends beyond the acquisition of musical skills and encompasses emotional, cognitive, communicative, social, and creative development. The purposeful and individualized organization of musical activities can create favorable conditions for children to demonstrate their

abilities, participate in collective experiences, develop positive emotional states, and gradually strengthen their social adaptation. Therefore, examining the pedagogical possibilities of musical activity and its role in the upbringing of children with special educational needs is an important issue for contemporary preschool and inclusive education.

RESULTS. Musical activity has considerable educational potential in working with children who have special educational needs. Unlike many conventional educational activities, music allows children to participate through different forms of perception and expression. A child does not necessarily need advanced verbal, reading, or writing abilities to become actively involved in a musical experience. Rhythm, melody, tempo, movement, sound, and repetition provide diverse ways of participating in educational activities. This flexibility makes music particularly valuable for creating accessible learning experiences for children with different developmental characteristics. The content and organization of musical activities should correspond to the individual abilities of each child. Simple rhythmic patterns, familiar melodies, short musical fragments, movement exercises, and instrumental activities can be introduced gradually. Tasks that are initially performed with the teacher can later be completed independently or together with peers. Such gradual progression allows children to experience success and develop a positive attitude toward participation.

Musical activities can also create opportunities for children to discover their individual strengths. One child may demonstrate greater interest in singing, another in rhythmic movement, while another may respond more actively to musical instruments. Recognizing these differences is important because inclusive education should provide opportunities for every child to demonstrate their abilities rather than requiring all children to achieve identical results. Emotional development is one of the important areas supported by musical activity. Music has a strong connection with emotional experience and can help children recognize, express, and regulate different emotional states. Through changes in melody, tempo, dynamics, and rhythm, children encounter a variety of emotional impressions. The teacher can use these characteristics intentionally to create calm, joyful, energetic, or reflective musical experiences. For children who have difficulties expressing emotions verbally, music can provide an alternative form of communication. Facial expressions, body movements, rhythmic responses, vocalizations, and participation in musical games can demonstrate a child's emotional reaction. Consequently, musical

activity can provide educators with additional opportunities to understand children's interests and emotional responses. Musical games can be especially useful for creating positive emotional experiences. Activities involving clapping, movement, imitation, repetition, and response to musical signals encourage children to participate actively. When children successfully complete a musical task, they experience achievement, which can strengthen motivation and confidence. A supportive emotional environment is particularly important for children who may experience difficulties

Rhythmic activities represent an important component of musical education. Clapping, walking, jumping, body percussion, and simple dance movements in accordance with musical patterns can help children coordinate their actions with auditory stimuli. These activities can be organized from simple to more complex forms depending on the child's developmental level. Rhythm-based exercises may also contribute to the development of attention and concentration. When children are asked to reproduce a particular rhythm or respond to a specific musical signal, they must listen carefully and remember the sequence of actions. Repeated practice can gradually improve their ability to focus on auditory information and respond appropriately.

Movement accompanied by music can further connect auditory perception with physical activity. For example, children can move slowly when the music is calm and gradually increase their movements when the tempo becomes faster. Such exercises combine listening, perception, movement, and self-regulation. They can therefore be incorporated into inclusive educational programs as accessible and engaging activities. Communication is another important area in which musical activities can provide pedagogical support. Group singing, musical dialogues, question-and-answer songs, rhythmic imitation, and musical games create situations in which children interact with teachers and peers. These activities encourage children to listen, wait for their turn, respond to signals, and participate in shared actions. Songs with repetitive structures can be particularly useful for children who experience difficulties with verbal communication. Repeated words, phrases, sounds, and rhythmic patterns provide children with predictable structures that can make participation easier. The teacher can gradually encourage children to complete individual words, short phrases, or musical responses. Musical activities can also promote non-verbal communication. Children communicate through gestures, eye contact, body movements, facial expressions, and instrumental sounds. For

some children, these forms of interaction may provide an important step toward broader social and verbal communication.

Participation in collective musical activities can contribute to children's social development. When children sing together, perform rhythmic exercises, or play simple musical instruments as a group, they learn to coordinate their actions with others. They must pay attention to common instructions, observe the rhythm, wait for appropriate moments, and respect the participation of their peers. Group musical activities can create a sense of belonging. Children who may experience difficulties in other social situations can become active participants in a shared musical experience. This participation can strengthen peer relationships and encourage cooperation. The teacher can organize activities in pairs, small groups, and larger groups to gradually expand children's social interaction.

Musical performances can also provide children with opportunities to demonstrate their abilities in front of others. Even a simple performance, such as singing one short phrase, playing a percussion instrument, or performing a rhythmic movement, can represent a meaningful achievement. The emphasis should be placed on participation and personal progress rather than comparison between children. Effective musical education for children with special educational needs requires individualization. The same activity may not be equally appropriate for every child. Therefore, the teacher should consider the child's developmental characteristics, level of attention, communication abilities, sensory responses, motor skills, interests, and previous musical experience.

Discussion. Individualization may involve changing the duration of an activity, simplifying instructions, reducing the number of steps, selecting appropriate musical instruments, or providing additional visual and physical cues. For example, a child who has difficulty maintaining attention may participate in short musical tasks with frequent changes of activity. Another child may require repeated demonstrations before independently completing the task. The principle of gradual progression is also important. Activities should begin with achievable tasks and become more complex as children develop confidence and skills. Positive reinforcement, encouragement, and recognition of individual achievements can motivate children to continue participating.

Simple musical instruments can expand opportunities for creative participation. Percussion instruments such as drums, tambourines, bells, maracas, and rhythm sticks are generally accessible and can be used for various

educational activities. Children can reproduce rhythms, accompany songs, respond to musical signals, or create their own simple rhythmic patterns. Instrumental activities can support independence because children directly produce and control sounds. The teacher can provide structured tasks at first and gradually introduce opportunities for free musical expression. For example, children may be invited to select an instrument and create a rhythm corresponding to a particular emotion, movement, or image.

Such activities can also strengthen children's sense of agency. When a child realizes that their own actions can produce meaningful musical results, they may become more willing to experiment, participate, and express personal ideas. The effectiveness of musical activities largely depends on the professional approach of the music teacher. The teacher should create an atmosphere characterized by respect, patience, acceptance, and encouragement. Children should not feel that their abilities are being negatively compared with those of their peers. The teacher should also observe children's responses to different types of musical activities. Some children may prefer predictable and repetitive music, while others may respond positively to more dynamic and varied musical experiences. Observation allows the teacher to identify appropriate activities and adjust teaching methods accordingly.

Clear instructions are essential. Instead of giving several instructions simultaneously, the teacher can present one task at a time and demonstrate it visually or physically when necessary. Repetition can provide children with a sense of predictability, while gradual variation prevents activities from becoming monotonous. Cooperation between the music teacher, classroom teacher, parents, and other specialists can further improve the organization of musical activities. Sharing information about children's interests, abilities, and progress makes it possible to create more consistent educational support. Musical activities should not be limited to special music lessons. Their elements can be incorporated into different aspects of preschool education. Short songs can be used during transitions between activities, rhythmic exercises can accompany physical development activities, and musical games can support social interaction. For example, counting songs can reinforce basic mathematical concepts, songs about colors and objects can support vocabulary development, and movement-based musical activities can be connected with physical education. In this way, music becomes an interdisciplinary educational resource.

An important outcome is the formation of a positive attitude toward learning and participation. When children experience success in musical activities, they may become more confident in approaching other educational tasks. Therefore, the value of musical activity should not be assessed only by the development of musical abilities. Its broader contribution lies in creating opportunities for children with special educational needs to communicate, express themselves, cooperate with others, and participate meaningfully in the educational environment.

CONCLUSION. Musical activity is an important pedagogical resource in the upbringing and development of children with special educational needs. The analysis of its educational possibilities demonstrates that music can support not only children's musical abilities but also their emotional, cognitive, communicative, social, motor, and creative development. Singing, listening to music, rhythmic movements, musical games, and playing simple musical instruments provide children with accessible opportunities to participate actively in the educational process and express their individual abilities.

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"BANKS AND CYRPTOCURRENCIES:ADVANTAGES AND DISADVANTAGES"

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Annotation:This article explores the evolving relationship between traditional banking institutions and cryptocurrencies. It examines how banks are adapting to the rise of digital currencies, the challenges they face in terms of regulation, security, and market volatility, and the potential opportunities for innovation in financial services. The study highlights the impact of blockchain technology on conventional banking operations, including payment systems, lending, and asset management.

Keywords: Banks, Cryptocurrencies, Digital assets, Blockchain technology, Investment strategies, Cryptocurrency risks, Regulatory compliance, Bitcoin, Stablecoins, Digital asset custody

1. Standard Chartered: According to well-known trade experts like Blockdata, the London-based Standard Chartered bank has made a staggering $380 million investment in cryptocurrencies. Investments at the bank include the blockchain network, Ripple. XRP is currently one of the top cryptocurrencies in the market.

2. Morgan Stanley: Morgan Stanley, another prominent player in the banking industry, has embraced cryptocurrency as part of its investment strategy.

3. Citibank: is the fourth-largest bank in the US by assets has invested in SETL, whose ledger technology is used to move cash and other assets.

4. JPMorgan Chase: One of the most active institutions in the cryptocurrency and blockchain field is JPMorgan Chase. JP Morgan has focused on developing digital blockchain assets.

5. Goldman Sachs: For some years, Goldman Sachs has been researching blockchain technology and cryptocurrencies.

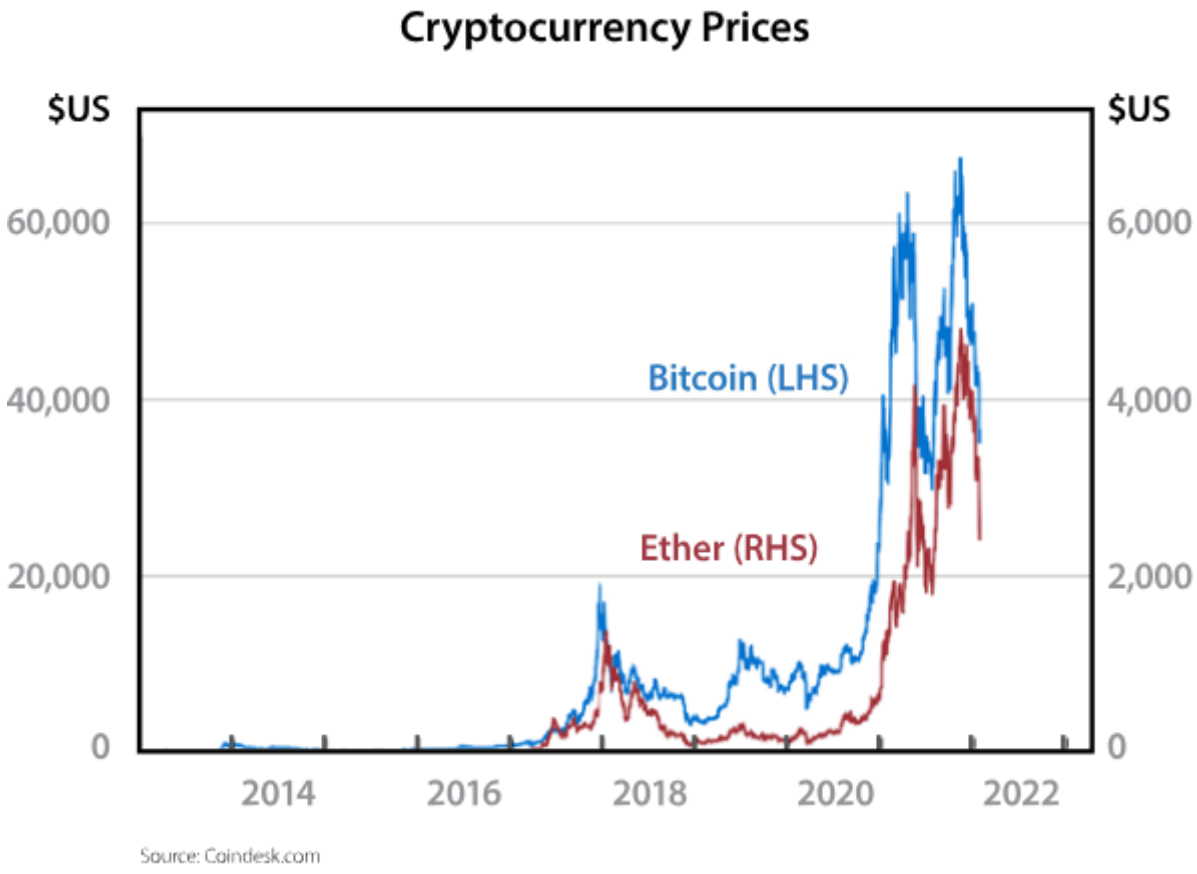
6. DBS Bank: DBS Bank, based in Singapore, is one of the largest banks in Asia.

7. BBVA: BBVA, a Spanish multinational banking group, has actively explored the potential of blockchain technology and cryptocurrencies.

8. Banks of Wells Fargo, United States: After the recent crash in the crypto market, the central US bank planned to introduce cryptocurrency funds.

9. UBS: UBS is making great strides with private stablecoins. UBS' financial institutions Santander, Lloyds Banking have developed utility tokens for cross-border transactions.

10. BNP Paribas: is a French financial gro up that owns its crypto startup known as the Curv. The institution's securities services are currently experimenting with the transfer of security tokens, taking a step forward to provide custodial services for digital assets.



Activity in cryptocurrency markets has increased significantly. The fascination with these currencies appears to have been more speculative (buying cryptocurrencies to make a profit) than related to their use as a new and unique system for making payments. Related to this, there has also been a high degree of volatility in the prices of many cryptocurrencies. For example, the price of Bitcoin increased from about US$30,000 in mid 2021 to almost US$70,000 toward the end of 2021 before falling to around US$35,000 in early 2022. Rival cryptocurrencies like Ether have experienced similar volatility. The extraordinary interest in cryptocurrencies has also seen a growing amount of computing power used to solve the complex codes that many of these systems use to help protect them from being corrupted. Despite the increased level of

interest in cryptocurrencies, there is scepticism about whether they could ever replace more traditional payment methods or national currencies.

Cryptocurrency Risks

There are many ways that paying with cryptocurrency is different from paying with a credit card or other traditional payment methods. Cryptocurrency payments do not come with legal protections. Credit cards and debit cards have legal protections if something goes wrong. For example, if you need to dispute a purchase, your credit card company has a process to help you get your money back. Cryptocurrencies typically do not come with any such protections. Cryptocurrency payments typically are not reversible. Once you pay with cryptocurrency, you can usually only get your money back if the person you paid sends it back. Before you buy something with cryptocurrency, know the seller's reputation, by doing some research before you pay.

Protect Your Money and Avoid Investment Scams

Investments tied to cryptocurrencies and digital assets were cited by state securities regulators as a top threat to investors in 2025, according to the North American Securities Administrators Association (NASAA). Investors are urged to practice the following tips to identify and avoid investment scams: Anyone can be anyone on the Internet. Scammers are spoofing websites and using fake social media accounts to obscure their identities. Investors should always take steps to identify phony accounts by looking closely at content, analyzing dates of inception and considering the quality of engagement. To ensure investors do not accidentaly deal with an imposter firm, pay careful attention to domain names and learn more about how to protect your online accounts.

Conclusion

Cryptocurrencies have emerged as a significant force in the global financial landscape, compelling traditional banks to rethink their strategies and explore digital assets as both investment opportunities and operational tools. Leading banks such as Standard Chartered, Morgan Stanley, JPMorgan Chase, Citibank, and Goldman Sachs have made strategic moves to integrate blockchain technology, develop digital tokens, and provide cryptocurrency services to institutional and retail clients. This adoption reflects not only the growing demand for decentralized assets but also the recognition of blockchain as a transformative technology capable of enhancing transaction efficiency, security, and transparency. However, despite these opportunities, the cryptocurrency ecosystem presents substantial risks, including high volatility,

lack of legal protections, cybersecurity threats, and regulatory uncertainties. Investors must approach digital assets with caution, conducting thorough research, verifying the credibility of platforms, and employing protective measures to mitigate potential losses. As banks continue to innovate and regulatory frameworks evolve, a more structured and secure environment for cryptocurrency adoption is likely to emerge.

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IJTIMOIY HIMOYA TIZIMI MOLIYAVIY BARQARORLIGINI TA'MINLASH UCHUN FISKAL MUHITNI YARATISH

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Kalit so'zlar: *ijtimoiy himoya, fiskal makon, moliyaviy barqarorlik, manzilli yordam, ijtimoiy sug'urta badallari, byudjet transfertlari.*

Ijtimoiy himoya tizimi davlat moliyasining eng yirik va eng qat'iy majburiyat yuklovchi bo'g'iniga aylandi. Xalqaro mehnat tashkiloti baholashiga ko'ra, O'zbekiston ushbu sohaga yalpi ichki mahsulotning qariyb 7 foizini yo'naltirmoqda — bu daromad darajasi o'xshash iqtisodiyotlar o'rtachasidan sezilarli past. Muammo xarajatlarning miqdorida emas, balki ularning tarkibida: mablag'larning katta qismi barqaror soliq va badal manbalari bilan emas, byudjet transfertlari hisobidan qoplanmoqda. Natijada tizimning kengayishi bevosita byudjet taqchilligi dinamikasiga bog'lanib qolgan.

Bu bog'liqlik raqamlarda yaqqol ko'rinadi. Konsolidatsiyalashgan byudjet taqchilligi 2022-yildagi 4,1 foizdan 2023-yilda 5,8 foizga ko'tarildi va faqat energiya subsidiyalarini qisqartirish hamda ijtimoiy xarajatlarning manzilliligini oshirish evaziga 2024-yilda 3,2 foizga tushirildi. Pensiya jamg'armasi misolida esa yuk sur'ati aniq o'lchanadi: 2024-yilda jamg'arma xarajatlari 64,0 trln so'mga yetib, o'z daromadlaridan oshib ketdi, pensiya oluvchilar soni 4,246 million kishini tashkil etdi. 2018–2024-yillarda byudjet transfertlari hisobidan qoplanadigan farq 1,2 trln so'mdan 8,2 trln so'mga, ya'ni deyarli yetti barobar kengaydi.

Mamlakatda islohot uchun huquqiy zamin yaratilgan. PF-175-son Farmon (2022) bilan Aholini ijtimoiy himoya qilish strategiyasi tasdiqlanib, Ijtimoiy sug'urta jamg'armasi tashkil etildi; PF-82-son Farmon (2023) bilan Prezident huzurida Ijtimoiy himoya milliy agentligi tuzilib, oltita vazirlikka tarqoq bo'lgan xizmatlar yagona tizimga birlashtirildi; PF-185-son Farmon (2024) bolalar nafaqalarining byudjet manbalarini aniqlashtirdi. Biroq mazkur hujjatlarning birortasi ham tizimning barqaror daromad manbalarini — maqsadli badal stavkalari, jamg'arma aktivlarini boshqarish tartibi va o'rta muddatli xarajat shiftlarini — belgilamaydi. Institutsional islohot moliyaviy mexanizmlar islohotidan ilgarilab ketgan.

Ijtimoiy xarajatlar ish haqi bilan birgalikda davlat xarajatlarining qariyb 50 foizini tashkil etadi va ijtimoiy sabablarga ko'ra ularni qisqartirish amaliy jihatdan mumkin emas. Shu bois yagona ishonchli yechim — xarajatni kesish emas, fiskal makonni (fiscal space) kengaytirish. Xellerning ta'rifiga ko'ra, fiskal makon davlatning moliyaviy holati barqarorligiga putur yetkazmagan holda maqsadli xarajatlarni oshirish imkonini beradigan byudjet imkoniyatidir. Ortis, Kammins va Karunanetiy 187 mamlakat tajribasi asosida ijtimoiy himoya uchun fiskal makonni kengaytirishning sakkiz yo'nalishini ajratgan. Ushbu metodologiya O'zbekiston sharoitiga moslashtirilganda quyidagi natija olindi (1-jadval).

1-jadval. Ijtimoiy himoya uchun fiskal makon manbalari va O'zbekistondagi salohiyati

Fiskal makon manbai	Salohiyat (YaIM %)	Asosiy chora-tadbir
Manzilsiz subsidiyalarni qayta ko‘rib chiqish	1,4—2,0	Energiya subsidiyalarini manzilli kompensatsiyaga o‘tkazish
Ijtimoiy sug‘urta badallari qamrovi	1,1—1,6	O‘zini o‘zi band qilganlar uchun soddalashtirilgan badal rejimi
Soliq bazasini kengaytirish	0,8—1,2	Mulk va yer soliqlari bazasini qayta baholash
Norasmiy iqtisodiyotni qisqartirish	0,7—1,1	Raqamli to‘lovlar ulushini oshirish
Byudjet xarajatlarini qayta taqsimlash	0,6—0,9	Kvazi-fiskal xarajatlarni qisqartirish
Boshqa manbalar (qarzni boshqarish, rivojlanish hamkorlari, jamg‘arma daromadlari)	0,7—1,2	Imtiyozli moliyalashtirish, maqsadli grantlar, bo‘sh mablag‘larni investitsiyalash
Jami	5,3—8,0	Xarajatlarni YaIMga nisbatan 11,5 foizgacha ko‘tarish imkoniyati

Manba: Ortiz va boshq. (2017) metodologiyasi asosida muallif hisob-kitobi.

Jadval natijalari shuni ko‘rsatadiki, sakkiz manbaning jami salohiyati YaIMga nisbatan 5,3—8,0 foizni tashkil etadi va uning eng katta qismi qo‘shimcha soliq yuki yaratmaydi: manzilsiz subsidiyalarni qayta taqsimlash hamda badal bazasini kengaytirish mavjud resurslar hisobiga ishlaydi. Salohiyatning quyi chegarasi ro‘yobga chiqarilgan taqdirda ham ijtimoiy himoya xarajatlarini YaIMga nisbatan 7,0 foizdan 11,5 foizga yetkazish mumkin.

Besh mamlakat kesimidagi olti yillik panel ma’lumotlari ($n = 30$) asosida o‘tkazilgan chiziqli regressiya tahlili ushbu xulosani statistik jihatdan tasdiqladi. Ijtimoiy himoya moliyaviy barqarorlik indeksiga (IHBI) eng kuchli musbat ta’sirni fiskal makon indeksi ko‘rsatmoqda ($\beta = 21,47$; $p < 0,001$), undan keyin manzilli yordam ulushi ($\beta = 11,35$; $p < 0,01$) va rasmiy bandlik ulushi ($\beta = 9,62$; $p < 0,01$) turadi; demografik qaramlik koeffitsienti manfiy ta’sir beradi ($\beta = -6,18$; $p < 0,05$). Model IHBI dagi o‘zgaruvchanlikning 85 foizini tushuntiradi ($R^2 = 0,847$). Korrelyatsiya tahlili natijalari xulosani

mustahkamlaydi: r(IHBI, FISK) = 0,884, norasmiy iqtisodiyot ulushi bilan esa bog‘liqlik manfiy — r = −0,693, ya’ni badal bazasining torayishi barqarorlikka bevosita zarar yetkazadi.

Tadqiqot natijalari asosida quyidagi tavsiyalar ilgari suriladi. Birinchidan, ijtimoiy himoya xarajatlari bo‘yicha uch yillik o‘rta muddatli xarajat shiftlarini belgilovchi hujjat qabul qilinishi lozim — bu byudjet rejalashtirishda ijtimoiy majburiyatlarning prognozliligini ta’minlaydi. Ikkinchidan, manzilsiz energiya subsidiyalarini “Ijtimoiy himoya yagona reyestri” asosidagi manzilli kompensatsiyaga bosqichma-bosqich o‘tkazish zarur. Uchinchidan, o‘zini o‘zi band qilgan shaxslar uchun soddalashtirilgan ijtimoiy badal rejimini joriy etib, uni raqamli to‘lov tizimlari bilan bog‘lash talab etiladi. To‘rtinchidan, Ijtimoiy himoya davlat jamg‘armasining vaqtincha bo‘sh mablag‘larini past risk darajasidagi davlat qimmatli qog‘ozlariga joylashtirish tartibi Vazirlar Mahkamasining 687-son qarori doirasida belgilanishi kerak. Beshinchidan, ijtimoiy himoya xarajatlarining uzoq muddatli aktuar prognozini har uch yilda tayyorlash amaliyoti Strategiyaning yillik “Yo‘l xaritasi” bilan bog‘lanishi maqsadga muvofiq.

Xulosa qilib aytganda, O‘zbekistonda ijtimoiy himoya tizimining moliyaviy barqarorligi qo‘shimcha byudjet transfertlari bilan emas, aynan fiskal muhitni tizimli qayta qurish orqali ta’minlanadi. Bu yondashuv PF-175 va PF-82 Farmonlarida hamda “O‘zbekiston — 2030” Strategiyasida belgilangan maqsadlar bilan to‘liq uyg‘undir.

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XALQARO MOLIYA MEXANIZMLARIDAN FOYDALANISHDA IJTIMOIY XAVFSIZLIKNI TA'MINLASH TAJRIBASI

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Annotatsiya. Mazkur tezisda ijtimoiy xavfsizlik tizimini mustahkamlashda xalqaro moliya institutlari - Jahon banki, Xalqaro valyuta fondi, Osiyo taraqqiyot banki, Xalqaro mehnat tashkiloti va Birlashgan millatlar tashkilotining ixtisoslashgan tuzilmalari tomonidan qo‘llanilayotgan moliyalashtirish mexanizmlari tahlil qilinadi. O‘zbekiston misolida ushbu mexanizmlarning amaliy natijalari, jumladan, ijtimoiy himoya tizimini institutsional isloh qilish va raqamlashtirish jarayonlari yoritiladi. Tadqiqot davomida xalqaro tashkilotlar tomonidan ajratilgan kredit mablag‘lari, texnik ko‘maklashuv dasturlari va me'yoriy tavsiyalarning milliy ijtimoiy himoya tizimiga ta'siri qiyosiy tahlil asosida ko‘rib chiqiladi. Tadqiqot natijalariga ko‘ra, xalqaro moliyaviy hamkorlik rivojlanayotgan mamlakatlarda ijtimoiy xavfsizlik tarmog‘ini kengaytirish, moliyaviy resurslar tanqisligini qoplash va institutsional salohiyatni oshirishda muhim ahamiyat kasb etadi.

Kalit so‘zlar: ijtimoiy xavfsizlik, ijtimoiy himoya, xalqaro moliya mexanizmlari, Jahon banki, Xalqaro Mehnat Tashkiloti, ijtimoiy sug‘urta, kredit liniyasi, Ijtimoiy himoya agentligi.

Annotation. This thesis examines the financing mechanisms employed by international financial institutions - the World Bank, the International Monetary Fund, the Asian Development Bank, the International Labour Organization and specialized United Nations agencies - in strengthening national social security systems. Using Uzbekistan as a case study, it reviews the practical outcomes of these mechanisms, including the institutional reform and digitalization of the social protection system. The study offers a comparative analysis of how credit resources, technical assistance programmes and policy recommendations provided by international organizations affect the national social protection system. The findings suggest that international financial cooperation plays a substantial role in expanding social safety nets, covering financing gaps, and building institutional capacity in developing countries.

Key words: social security, social protection, international financial mechanisms, World Bank, International Labour Organization, social insurance, credit line, Social Protection Agency.

KIRISH

Ijtimoiy xavfsizlikni ta’minlash har qanday davlatning ijtimoiy siyosati markazida turadi va aholining keksalik, nogironlik, ishsizlik, kasallik hamda boshqa ijtimoiy xavf-xatarlardan himoyalanishini kafolatlaydi. Xalqaro mehnat tashkilotining so‘nggi hisobotiga ko‘ra, 2023-yilda dunyo aholisining atigi 52,4 foizi kamida bitta ijtimoiy himoya dasturi bilan qamrab olingan bo‘lib, qolgan qariyb 3,8 milliard kishi bunday himoyadan mahrum. Bu holat, ayniqsa, rivojlanayotgan mamlakatlarda ijtimoiy xavfsizlik tizimini mustahkamlash uchun qo‘shimcha moliyaviy resurslar va institutsional ko‘makning zarurligini ko‘rsatadi.

Milliy byudjet imkoniyatlari cheklangan sharoitda ko‘plab rivojlanayotgan davlatlar, jumladan O‘zbekiston, ijtimoiy himoya tizimini isloh qilish va kengaytirish jarayonida xalqaro moliya institutlarining kredit resurslari, grantlari va texnik ko‘maklashuv dasturlariga murojaat qilmoqda. 2017-yildan boshlab O‘zbekistonda amalga oshirilayotgan tub islohotlar doirasida ijtimoiy soha ustuvor yo‘nalishlardan biri sifatida belgilandi, natijada Jahon banki, Osiyo taraqqiyot banki, Xalqaro mehnat tashkiloti va YUNISEF kabi tashkilotlar bilan hamkorlik faollashdi.

Xalqaro amaliyotda ijtimoiy xavfsizlikni moliyalashtirishning bir necha shakli mavjud: imtiyozli shartlardagi kredit liniyalari, qaytarilmaydigan grantlar, texnik ko‘maklashuv (konsalting va institutsional rivojlantirish) hamda siyosat bo‘yicha maslahat va monitoring. Bunday mexanizmlar, odatda, Jahon banki, Osiyo taraqqiyot banki kabi moliya institutlari, shuningdek Xalqaro mehnat tashkiloti va BMTning ixtisoslashgan agentliklari (YUNISEF va boshqalar) tomonidan amalga oshiriladi.

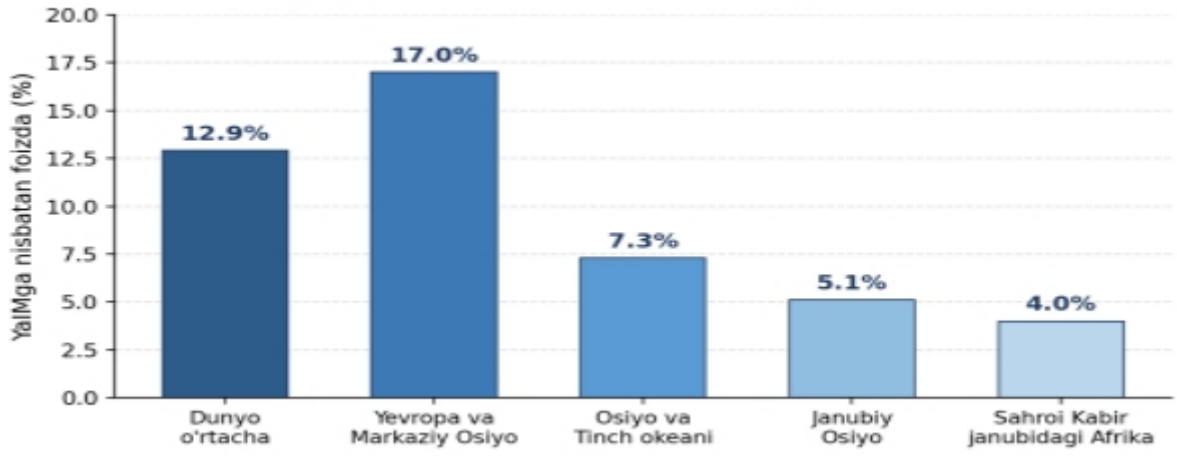
O‘zbekiston Respublikasi Moliya vazirligi va Jahon banki o‘rtasida 2019-yil 19-iyulda imzolangan 6446-UZ-son moliyalashtirish shartnomasiga muvofiq, Xalqaro taraqqiyot uyushmasi (IDA) tomonidan 50 million AQSH dollari miqdorida imtiyozli kredit ajratilgan. Ushbu mablag‘ “Aholini ijtimoiy muhofaza qilish tizimini mustahkamlash” loyihasini moliyalashtirishga yo‘naltirilgan bo‘lib, uning asosiy yo‘nalishlari qatoriga yagona ijtimoiy reestrni yaratish, ijtimoiy yordam ko‘rsatish jarayonlarini raqamlashtirish va manzillilik mezonlarini takomillashtirish kiradi.

Xalqaro mehnat tashkiloti, YUNISEF va Jahon banki 2023-yilda O‘zbekistonda Ijtimoiy himoya agentligining tashkil etilishini birgalikda ma’qullab, ushbu islohotni ijtimoiy himoya tizimidagi bo‘linib ketishlik va bo‘shliqlarni bartaraf etishda muhim qadam sifatida baholadi. Bunda xalqaro tashkilotlar moliyaviy resurslardan tashqari, institutsional loyihalash,

xodimlarni tayyorlash va me'yoriy-huquqiy bazani takomillashtirish bo‘yicha texnik ko‘maklashuv ko‘rsatgan. Osiyo taraqqiyot banki, o‘z navbatida, O‘zbekiston uchun 2019–2023-yillarga mo‘ljallangan Hamkorlik strategiyasida ijtimoiy rivojlanishni davlat boshqaruvini isloh qilish va iqtisodiy tarkibiy islohotlar qatorida uchinchi ustuvor yo‘nalish sifatida belgilagan.

Xalqaro moliyaviy ko‘maklashuvning ahamiyatini milliy va xalqaro ko‘rsatkichlarni qiyoslash orqali yanada yaqqol ko‘rish mumkin. Jahon bankining tahliliy ma'lumotlariga ko‘ra, 2017-yilda O‘zbekistonda ijtimoiy yordamga qilingan umumiy xarajatlar YaIMning atigi 0,76 foizini tashkil etgan bo‘lib, bu ko‘rsatkich Yevropa va Markaziy Osiyo mintaqasidagi eng past darajalardan biri hisoblangan. Xalqaro Mehnat Tashkilotining 2024–2026-yillar bo‘yicha Jahon ijtimoiy himoya hisobotida keltirilgan ma'lumotlarga ko‘ra, 2023-yilda dunyo bo‘yicha davlatlar ijtimoiy himoyaga (sog‘liqni saqlashsiz) o‘rtacha YaIMning 12,9 foizini, sog‘liqni saqlash bilan birgalikda esa 19,3 foizini sarflagan. Mintaqalar kesimida bu ko‘rsatkich sezilarli darajada farqlanadi: Yevropa va Markaziy Osiyoda - taxminan 17 foiz, Osiyo va Tinch okeani mintaqasida - 7,3 foiz, Janubiy Osiyoda - 5,1 foiz, Sahroi Kabir janubidagi Afrikada esa - 4,0 foizni tashkil etadi (1-jadval, 1-rasm).

1-rasm. Mintaqalar bo'yicha ijtimoiy himoyaga davlat xarajatlari (sog'liqni saqlashsiz, 2023-yil, YaIMga nisbatan %)



Manba: ILO, World Social Protection Report 2024-26 ma'lumotlari asosida muallif tuzgan.

Keltirilgan ma’lumotlar shuni ko‘rsatadiki, O‘zbekistondagi ijtimoiy xarajatlar darajasi mintaqaviy va jahon o‘rtacha ko‘rsatkichlaridan sezilarli darajada past bo‘lib, bu xalqaro moliya institutlari bilan hamkorlikni davom ettirishning obyektiv zaruriyatini tasdiqlaydi. Shu bilan birga, Jahon banki tomonidan 2018-yilda o‘tkazilgan baholashda ta’kidlanganidek, mavjud maqsadli ijtimoiy yordam dasturlari moliyalashtirish tanqisligi tufayli kam

ta'minlangan oilalarning yarmidan ko‘pini qamrab ololmagan. Bu holat xalqaro moliyaviy resurslarning nafaqat miqdoriy jihatdan, balki ularning manzilliligi va samaradorligini oshirishga qaratilgan institutsional islohotlar bilan uyg‘unlikda ishlatilishi zarurligini ko‘rsatadi.

Xalqaro moliya mexanizmlaridan foydalanishning yana bir muhim jihati - bu tashqi qarz barqarorligini saqlagan holda ijtimoiy sohani moliyalashtirishdir. Xalqaro Valyuta Fondi tomonidan berilayotgan makroiqtisodiy tavsiyalarda ijtimoiy himoya xarajatlarini byudjet konsolidatsiyasi jarayonida “himoyalangan” modda sifatida saqlab qolish tavsiya etiladi, bu esa inqiroz davrlarida aholining eng ehtiyojmand qatlamlarini qo‘llab-quvvatlashni ta'minlaydi. Shunday qilib, xalqaro moliyaviy ko‘maklashuvning samaradorligi nafaqat ajratilgan mablag‘ hajmiga, balki uning milliy institutsional salohiyat va boshqaruv sifati bilan qanchalik uyg‘unlashtirilganiga ham bog‘liq.

XULOSA

O‘tkazilgan tahlil shuni ko‘rsatadiki, xalqaro moliya mexanizmlari - imtiyozli kreditlar, texnik ko‘maklashuv va siyosat bo‘yicha tavsiyalar - rivojlanayotgan mamlakatlarda, jumladan O‘zbekistonda, ijtimoiy xavfsizlik tizimini mustahkamlashning muhim tarkibiy qismiga aylangan. Jahon banki, Osiyo taraqqiyot banki, Xalqaro mehnat tashkiloti va YUNISEF kabi tashkilotlar bilan hamkorlik ijtimoiy himoya tizimini institutsional jihatdan qayta tashkil etish, yagona ijtimoiy reestrni yaratish va xizmatlarni raqamlashtirishga xizmat qilmoqda. Shu bilan birga, mintaqaviy va jahon ko‘rsatkichlari bilan solishtirganda O‘zbekistonda ijtimoiy xarajatlar darajasining nisbatan pastligi xalqaro hamkorlikni yanada kengaytirish, shuningdek, ichki moliyaviy resurslarni - ijtimoiy sug‘urta badallari va soliq tushumlari orqali - mustahkamlash zarurligini ko‘rsatadi. Kelgusida xalqaro moliya mexanizmlaridan foydalanishning samaradorligini oshirish uchun ularni “Yagona milliy ijtimoiy himoya” axborot tizimi kabi milliy raqamli infratuzilma bilan uzviy bog‘lagan holda, manzillilik va monitoring mexanizmlarini yanada takomillashtirish maqsadga muvofiqdir.

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RAQAMLI TRANSFORMATSIYA SHAROITIDA O‘ZBEKISTONNING TASHQI SAVDO SIYOSATI: ELEKTRON TIJORAT VA XALQARO BOZORLARGA INTEGRATSIYA

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Annotatsiya: Mazkur tezisda raqamli transformatsiya sharoitida O‘zbekiston tashqi savdo siyosatining rivojlanish tendensiyalari, elektron tijoratning xalqaro bozorlarga chiqishdagi roli hamda raqamli xizmatlar eksportining iqtisodiy salohiyati tahlil qilinadi. Tadqiqotda elektron tijorat infratuzilmasining kengayishi, raqamli to‘lov tizimlari, elektron savdo platformalari, bojxona jarayonlarini raqamlashtirish va transchegaraviy elektron tijoratni rivojlantirish masalalariga alohida e’tibor qaratilgan. Milliy statistika ma’lumotlariga ko‘ra, O‘zbekistonda elektron tijorat hajmi 2025-yilda 31,55 trln so‘mga yetgan bo‘lib, 2024-yildagi 15,21 trln so‘mga nisbatan ikki barobardan ko‘proq oshgan. 2026-yilga kelib mamlakatda elektron tijorat hajmi 1,3 mlrd AQSh dollariga yetgani va raqamli platformalar soni 120 tadan oshgani qayd etilgan. Mazkur jarayonlar elektron tijoratning nafaqat ichki savdo, balki kichik va o‘rta biznesning xalqaro bozorlarga chiqish mexanizmi sifatidagi ahamiyati ortib borayotganini ko‘rsatadi.

Kalit so‘zlar: raqamli transformatsiya, elektron tijorat, tashqi savdo, raqamli savdo, eksport, elektron platformalar, raqamli xizmatlar, xalqaro bozor, O‘zbekiston.

Kirish: Raqamli texnologiyalarning jadal rivojlanishi xalqaro savdoning an’anaviy shakllarini sezilarli darajada o‘zgartirmoqda. Elektron tijorat, raqamli to‘lovlar, bulutli texnologiyalar, sun’iy intellekt, elektron hujjat aylanishi va raqamli logistika vositalari korxonalarga geografik masofalardan qat’i nazar yangi iste’molchilar va biznes hamkorlarga chiqish imkonini bermoqda. Natijada raqamli savdo milliy iqtisodiyotning xalqaro integratsiyasini chuqurlashtiruvchi muhim mexanizmlardan biriga aylanmoqda. O‘zbekiston uchun mazkur yo‘nalish ayniqsa dolzarbdir. Mamlakatda tashqi savdo hajmining o‘sishi bilan bir qatorda raqamli iqtisodiyot, elektron tijorat va IT xizmatlari eksportini rivojlantirish bo‘yicha institutsional islohotlar amalga oshirilmoqda. 2025-yilda O‘zbekistonning

tashqi savdo aylanmasi 81,2 mlrd AQSh dollariga yetgan, eksport hajmi esa 33,8 mlrd dollarni tashkil qilgan. Shu davrda IT xizmatlari eksporti 940 mln dollarga yetgan.

Elektron tijorat O‘zbekiston iqtisodiyotida tez rivojlanayotgan raqamli segmentlardan biridir. Milliy statistika qo‘mitasining rasmiy ma’lumotlariga ko‘ra, elektron tijorat hajmi 2024-yilda 15,21 trln so‘mni tashkil etgan bo‘lsa, 2025-yilda ushbu ko‘rsatkich 31,55 trln so‘mga yetgan. Shunday qilib, bir yil ichida elektron tijorat aylanmasi qariyb 2,1 barobarga oshgan. Mazkur o‘sish elektron savdoning iqtisodiyotdagi rolini kuchaytirayotganini ko‘rsatadi. 2026-yil aprel oyida taqdim etilgan hukumat ma’lumotlariga ko‘ra, mamlakatda elektron tijorat hajmi 1,3 mlrd AQSh dollariga yetgan, raqamli platformalar soni esa 120 tadan oshgan. Shu bilan birga, elektron tijoratning chakana savdodagi ulushi 4–4,6 foizni tashkil etgani qayd etilgan. Hukumat ma’lumotlarida ushbu ko‘rsatkichni 9–11 foizgacha oshirish imkoniyati mavjudligi ko‘rsatilgan. Elektron tijoratning rivojlanishi tashqi bozorlarga chiqish xarajatlarini kamaytirish imkonini beradi. An’anaviy eksport modelida korxona xorijiy distribyutorlar, savdo vakillari yoki boshqa vositachilar bilan ishlashga ehtiyoj sezishi mumkin. Raqamli platformalar esa ishlab chiqaruvchi va yakuniy iste’molchi o‘rtasidagi masofani qisqartirib, mahsulotni xorijiy xaridorlarga to‘g‘ridan-to‘g‘ri taklif qilish imkoniyatini kengaytiradi. Bu, ayniqsa, kichik va o‘rta biznes subyektlari uchun muhimdir. O‘zbekistonning xalqaro raqamli savdoga integratsiyalashuvida elektron tijorat bilan bir qatorda logistika va bojxona infratuzilmasining raqamlashtirilishi ham muhim ahamiyatga ega. Jahon banki O‘zbekistonning xalqaro savdo salohiyatini oshirish uchun bojxona rasmiylashtiruvini soddalashtirish, raqamli yechimlarni joriy etish va multimodal transport-logistika tarmoqlarini rivojlantirish zarurligini ta’kidlaydi. 2025-yilda Toshkentda o‘tkazilgan E-GATE konferensiyasi ham Markaziy Osiyoda transchegaraviy elektron tijoratni rivojlantirish masalasiga e’tibor kuchayganini ko‘rsatdi. Jahon banki ma’lumotlariga ko‘ra, E-GATE dasturi doirasida ishtirokchi mikro, kichik va o‘rta biznes korxonalari 70 dan ortiq yangi xalqaro bozorlardagi xaridorlar bilan aloqalar o‘rnatgan. Dastur doirasida tuzilgan yoki tuzilishi rejalashtirilgan eksport shartnomalarining umumiy qiymati 23 mln AQSh dollaridan oshgan. Bu jarayon O‘zbekiston korxonalarining xalqaro bozorlarga chiqishida elektron tijorat platformalaridan foydalanish imkoniyatlari kengayib borayotganini ko‘rsatadi. Ayniqsa, Markaziy Osiyo mamlakatlari o‘rtasidagi raqamli savdo

aloqalarining rivojlanishi mintaqaviy iqtisodiy integratsiyani kuchaytirishi mumkin.

Raqamli transformatsiyaning yana bir muhim yo‘nalishi — xizmatlar eksportining kengayishidir. O‘zbekistonda IT xizmatlari eksporti so‘nggi yillarda sezilarli darajada oshdi. Investitsiyalar, sanoat va savdo vazirligi ma’lumotlariga ko‘ra, 2025-yilda IT xizmatlari eksporti 940 mln AQSh dollarini tashkil qilgan.

2026-yilning birinchi choragida IT Park rezidentlarining eksport xizmatlari hajmi 191,8 mln AQSh dollarini tashkil etib, 2025-yilning shu davriga nisbatan 38,5 mln dollarga oshgan. Ushbu ko‘rsatkich raqamli xizmatlar, dasturiy ta’minot va autsorsing xizmatlarining xalqaro bozorlarga chiqish salohiyati ortib borayotganini ko‘rsatadi. Raqamli xizmatlar eksportining afzalligi shundaki, u moddiy mahsulot eksportidan farqli ravishda transport va fizik logistika xarajatlariga kamroq bog‘liq. Dasturiy ta’minot ishlab chiqish, biznes jarayonlarini autsorsing qilish, dizayn, konsalting va boshqa raqamli xizmatlar internet orqali xorijiy buyurtmachilarga yetkazilishi mumkin. Shu sababli raqamli transformatsiya O‘zbekistonning xizmatlar eksportini diversifikatsiya qilish uchun yangi imkoniyatlar yaratmoqda.

Shu bilan birga, xalqaro raqamli savdoning rivojlanishida ayrim cheklovlar mavjud. Jahon bankining O‘zbekiston bo‘yicha tahlillarida raqamli ulanish sifati, yuqori tezlikdagi internet infratuzilmasi va raqamli xizmatlar savdosining iqtisodiyotdagi ulushi bo‘yicha hali foydalanilmagan imkoniyatlar mavjudligi qayd etilgan. Raqamli yetkazib beriladigan xizmatlar savdosining YAIMga nisbati O‘zbekistonda 3,1 foizni tashkil etib, mintaqadagi ayrim davlatlarga nisbatan past darajada qolmoqda. Shu sababli raqamli tashqi savdo siyosatini takomillashtirishda faqat elektron platformalar sonini ko‘paytirish emas, balki raqamli savdo ekotizimining barcha tarkibiy qismlarini rivojlantirish talab etiladi. Bular qatoriga xavfsiz raqamli to‘lovlar, elektron shartnomalar, raqamli bojxona, xalqaro logistika, iste’molchilar huquqlarini himoya qilish, ma’lumotlar xavfsizligi va kiberxavfsizlik mexanizmlari kiradi. O‘zbekiston uchun yana bir muhim vazifa — mahalliy ishlab chiqaruvchilarni xalqaro elektron platformalarda faol ishtirok etishga tayyorlashdir. Buning uchun mahsulotlarni xalqaro standartlar asosida sertifikatlashtirish, xorijiy tillardagi raqamli marketing, xalqaro to‘lov tizimlaridan foydalanish, mahsulotni qadoqlash va logistika talablarini o‘rganish bo‘yicha amaliy ko‘nikmalarni rivojlantirish zarur.

Shuningdek, elektron tijoratni tashqi savdo siyosati bilan integratsiya qilish orqali kichik va o‘rta biznesning eksportdagi ishtirokini kengaytirish mumkin. Raqamli platformalar kichik korxonalarga an’anaviy eksport kanallariga nisbatan nisbatan past boshlang‘ich xarajatlar bilan xorijiy iste’molchilarni izlash va mahsulotlarini targ‘ib qilish imkonini beradi.

Xulosa. Tahlillar shuni ko‘rsatadiki, raqamli transformatsiya O‘zbekiston tashqi savdo siyosatining yangi yo‘nalishlarini shakllantirmoqda. Elektron tijorat hajmining 2025-yilda 31,55 trln so‘mga yetishi, 2026-yilda mamlakat elektron tijorat bozorining 1,3 mlrd AQSh dollariga yetgani hamda IT xizmatlari eksportining 2025-yilda 940 mln dollarni tashkil etgani raqamli savdo va xizmatlar eksportining iqtisodiy ahamiyati ortib borayotganini ko‘rsatadi.

O‘zbekistonning xalqaro bozorlarga raqamli integratsiyasini chuqurlashtirish uchun elektron tijorat infratuzilmasini rivojlantirish, bojxona va logistika jarayonlarini raqamlashtirish, transchegaraviy elektron to‘lovlarni kengaytirish, xalqaro standartlashtirish va sertifikatlashtirish mexanizmlarini takomillashtirish muhim hisoblanadi. Bundan tashqari, kichik va o‘rta biznes subyektlarini xalqaro elektron platformalarga olib chiqish, raqamli marketing va elektron eksport ko‘nikmalarini rivojlantirish hamda IT va raqamli xizmatlar eksportini qo‘llab-quvvatlash O‘zbekistonning global qiymat zanjirlaridagi ishtirokini kengaytirishi mumkin.

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The Green Light as a Symbol of Hope and the American Dream in F. Scott Fitzgerald's The Great Gatsby

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Abstract. This article examines the green light as one of the central symbols in F. Scott Fitzgerald's The Great Gatsby. The green light, which appears across the water from Gatsby's mansion, is closely connected with his dreams, hopes, love for Daisy, and desire to achieve an ideal future. At first, the light seems to represent a personal dream: Gatsby's hope of being reunited with Daisy and recovering their past relationship. However, a closer examination demonstrates that the symbol has a broader meaning and represents the American Dream, particularly the belief that individuals can achieve happiness, success, and social advancement through determination and ambition. The study argues that Fitzgerald presents the green light as both attractive and unattainable. Gatsby continually moves toward his dream, but the closer he comes to it, the more clearly its impossibility becomes. Through the symbolism of the green light, Fitzgerald explores the relationship between hope, desire, wealth, social class, and the American Dream. The article also examines how the meaning of the green light changes throughout the novel and how it contributes to the tragic development of Gatsby's character. The analysis suggests that Fitzgerald does not completely reject the idea of dreaming but critically examines a society in which material success and social status can transform genuine aspirations into impossible illusions.

Keywords: F. Scott Fitzgerald; The Great Gatsby; green light; American Dream; symbolism; Gatsby; Daisy; hope; wealth; social class; illusion

Introduction. Symbolism is one of the most important literary devices used by F. Scott Fitzgerald in The Great Gatsby. Published in 1925, the novel presents American society during the Jazz Age, a period characterized by economic growth, consumerism, changing social values, and increasing interest in wealth and pleasure. Behind the glamorous parties and luxurious lifestyles, however, Fitzgerald presents characters who struggle with loneliness, dissatisfaction, desire, and unrealistic expectations.One of the most important symbols in the novel is the green light at the end of Daisy Buchanan's dock. Gatsby frequently looks toward this light from his mansion across the water. Although it is physically small and distant, it represents something extremely important to him. It symbolizes his hope of being reunited with Daisy and recreating their romantic past.The green light can also be interpreted as a representation of the American Dream. Gatsby believes that through wealth, determination, and social success he can reach the life he desires. He creates an impressive identity and accumulates considerable wealth, believing that these achievements will enable him to become worthy of Daisy and recover the past.Therefore, this article examines the green light as a symbol of hope,

desire, the American Dream, and unattainable perfection. It focuses on the relationship between Gatsby's personal dream and the larger social ideals represented in Fitzgerald's novel.

Literature Review. The symbolic significance of the green light has received considerable attention from literary critics and scholars studying The Great Gatsby. Critics have generally connected the symbol with Gatsby's desire for Daisy, his hopes for the future, and the larger concept of the American Dream.Marius Bewley interprets Gatsby's dream as being connected with the larger American experience. From this perspective, Gatsby's desire is not simply a private romantic ambition. His belief in the possibility of achieving an ideal future reflects a broader cultural faith in progress and self-transformation.Matthew J. Bruccoli's scholarship on Fitzgerald emphasizes the importance of the author's social and historical context.The economic prosperity and material culture of the 1920s provide an important background for understanding Gatsby's relationship with wealth and social status. Gatsby appears to embody the possibility of self-creation, but his success also reveals the limitations of a society strongly influenced by class distinctions.Sarah Churchwell has also examined the cultural meanings surrounding The Great Gatsby and its representation of American society. The novel's images of wealth, parties, automobiles, and luxury reveal a society in which material success is frequently associated with happiness and personal achievement.The green light therefore has both personal and social significance. For Gatsby, it is connected with Daisy. At a broader level, however, it represents an ideal future that always remains slightly beyond reach. The distance between Gatsby and the green light mirrors the distance between desire and fulfillment.

Methodology. This study employs a qualitative literary analysis based on close reading and thematic interpretation of F. Scott Fitzgerald's The Great Gatsby. Particular attention is given to passages involving the green light, Gatsby's relationship with Daisy, his accumulation of wealth, his parties, and his understanding of the past and future.The research focuses on the recurring symbolism of light, distance, desire, and the future. The study also considers the relationship between Gatsby's personal dream and the American Dream in the historical context of 1920s America. A comparative interpretation is applied to Gatsby's dream and the experiences of other major characters, particularly Daisy Buchanan, Tom Buchanan, and Nick Carraway. The analysis considers how wealth and social class influence Gatsby's ability to achieve his goals. Critical perspectives on Fitzgerald and The Great Gatsby are also considered to place the interpretation within the broader scholarly discussion of symbolism, the American Dream, and American society.

Results / Findings. The analysis demonstrates that the green light performs several interconnected functions in The Great Gatsby. Most importantly, it represents Gatsby's hope and his desire for a future that he believes can be achieved. The first important meaning of the green light is its connection with Daisy. Gatsby stands outside his mansion and looks toward the light across the water. The physical distance between Gatsby and Daisy is represented by the distance between his position and the light. The light therefore becomes a visual representation of his desire. Gatsby does not simply want Daisy in the present; he wants to recover the past and recreate the relationship they once had. His belief that the past can be repeated is central to his understanding of his dream. The green light also represents the future. Gatsby continually believes that something better is waiting for him. He does not accept his present situation as final. Instead, he focuses on an imagined future in which his desires will finally be fulfilled. This characteristic connects Gatsby with the

American Dream. The American Dream traditionally emphasizes opportunity, individual achievement, progress, and the possibility of improving one's social and economic position. Gatsby appears to embody these ideals because he transforms himself from James Gatz, a young man from a poor background, into the wealthy Jay Gatsby. However, Fitzgerald presents this transformation as complicated. Gatsby gains enormous wealth, but his social position remains different from that of Daisy and Tom. His wealth allows him to enter their social world, but it does not completely erase the differences between them.

Discussion. The findings indicate that Fitzgerald uses the green light to present the American Dream as both attractive and problematic. Gatsby's dream gives his life direction and purpose. Without it, his enormous efforts to become wealthy would have little meaning. At the same time, the dream becomes dangerous because Gatsby refuses to recognize its limitations. He believes that he can completely recreate the past. His famous insistence that the past can be repeated demonstrates his inability to accept that time and human experience cannot simply be reversed. The green light is particularly effective as a symbol because it remains physically visible but emotionally distant. Gatsby can see it, but he cannot possess it. In the same way, the ideal future appears possible but continually remains beyond his reach. Another important aspect of the symbol is its relationship with wealth. Gatsby believes that his mansion, expensive clothes, car, and extravagant parties will help him attract Daisy. His material success is therefore connected with his emotional dream. However, the novel demonstrates that money cannot automatically provide love, acceptance, or happiness. Daisy herself is also associated with wealth and privilege. Gatsby's desire for her becomes partly connected with his desire to enter the social world she represents. Therefore, his personal dream and the American Dream become intertwined. The contrast between Gatsby and Tom Buchanan is particularly significant. Tom possesses wealth and social status by birth, while Gatsby has to create his wealth and identity. Although Gatsby becomes rich, he does not completely acquire the social legitimacy enjoyed by Tom. This difference demonstrates that the American Dream does not operate equally for everyone. Economic achievement can provide opportunities, but established social class and inherited privilege can remain powerful barriers. Nick Carraway's narration also contributes to the interpretation of the green light. Nick observes Gatsby's idealism with both admiration and criticism. Through Nick's perspective, readers can see that Gatsby's dream is unrealistic, but it also possesses a certain emotional power. The final image of the novel returns to the idea of striving toward an unreachable future. Gatsby's dream becomes part of a broader reflection on human beings who continually attempt to move forward while remaining connected to the past. The green light therefore represents more than Gatsby's love for Daisy. It symbolizes the human tendency to create ideal futures and pursue them despite uncertainty. Fitzgerald presents this tendency as both inspiring and tragic.

Conclusion. The green light in F. Scott Fitzgerald's The Great Gatsby is one of the most significant symbols in the novel. It represents Gatsby's hope, his love for Daisy, his desire to recover the past, and his belief in an ideal future. At the same time, the green light symbolizes the American Dream. Gatsby believes that through ambition, wealth, and self-transformation he can achieve the life he desires. His story, however, demonstrates the limitations of this belief. Wealth cannot completely overcome social class, time cannot be reversed, and an idealized dream cannot necessarily become reality. The physical distance between Gatsby and the green light reflects the emotional and social distance between Gatsby and his dream. He can see the symbol of his desire, but he cannot fully possess what it represents. Fitzgerald therefore presents the American Dream as a complex idea. It can inspire individuals to work toward a better future, but it can also create unrealistic expectations when material success is confused with personal happiness and social

acceptance. Ultimately, the green light represents the enduring human desire to reach something better. Gatsby's tragedy lies not simply in having a dream, but in believing that the past can be perfectly restored and that material success can make an ideal future possible. Through this symbol, Fitzgerald explores hope, ambition, love, wealth, class, and the fragile boundary between dreams and reality.

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Мактабгача таълим ташкилотларида ижтимоий ҳамкорликни самарали ташкил этиш механизмлари

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Аннотация. Мақолада мактабгача таълим ташкилотларида (МТТ) ижтимоий ҳамкорликни ташкил этишнинг ташкилий-педагогик шартлари таҳлил қилинган. Ижтимоий капитал, ко-продукция ва икки томонлама салоҳиятни ошириш назариялари асосида ҳамкорликнинг расмиятчиликка айланиб қолишига олиб келувчи омиллар аниқланган. «Оила — маҳалла — МТТ — мактаб» ҳамкорлик тармоғини шакллантириш учун зарур бўлган бешта ташкилий-педагогик шарт асосланган ва уларни амалга ошириш бўйича МТТ раҳбарлари учун амалий тавсиялар ишлаб чиқилган.

Калит сўзлар: мактабгача таълим ташкилоти, ижтимоий ҳамкорлик, ташкилий-педагогик шартлар, ижтимоий капитал, ко-продукция, маҳалла, ота-оналар иштироки, раҳбар.

Аннотация. В статье анализируются организационно-педагогические условия организации социального партнёрства в дошкольных образовательных организациях. На основе теорий социального капитала, ко-продукции и двустороннего развития потенциала выявлены факторы формализации партнёрства; обоснованы пять организационно-педагогических условий формирования партнёрской сети «семья — махалля — дошкольная организация — школа» и предложены практические рекомендации для руководителей.

Ключевые слова: дошкольная образовательная организация, социальное партнёрство, организационно-педагогические условия, социальный капитал, ко-продукция, махалля, вовлечённость родителей.

Abstract. The article analyses the organisational and pedagogical conditions for organising social partnership in preschool educational organisations. Drawing on theories of social capital, co-production and dual capacity-building, it identifies factors that turn partnership into a formality, substantiates five organisational and pedagogical conditions for building a “family — mahalla — preschool — school” partnership network, and offers practical recommendations for preschool leaders.

Keywords: preschool educational organisation, social partnership, organisational and pedagogical conditions, social capital, co-production, mahalla, parental involvement.

КИРИШ

Ўзбекистонда кейинги йилларда мактабгача таълим тизимида амалга оширилган ислоҳотлар натижасида МТТларнинг турлари кўпайди: давлат МТТлари билан бир қаторда нодавлат, оилавий ва давлат-хусусий шериклик (ДХШ) асосидаги ташкилотлар фаолият кўрсатмоқда. Мактабгача таълим соҳасида ДХШни янада ривожлантиришга қаратилган Президент қарори хусусий шерикларни соҳага жалб этиш ва уларни рағбатлантириш механизмларини белгилаб берди [1]. Бу жараён МТТ раҳбари олдига янги вазифани қўймоқда: турли мулкчилик шаклидаги ташкилотлар, оилалар, маҳалла ва бошқа муассасалар билан барқарор ҳамкорлик тармоғини яратиш.

«Ижтимоий шериклик тўғрисида»ги Қонун давлат органлари ва фуқаролик жамияти институтлари ўртасидаги ҳамкорликнинг ҳуқуқий асосларини, унинг шакллари ва тамойилларини белгилайди [2]. 2022 йилда Тошкентда бўлиб ўтган Эрта болалик даврида парвариш ва таълим бўйича Жаҳон конференцияси якунида қабул қилинган Тошкент декларацияси ҳам мактабгача таълимни ўзгартиришда турли тармоқлар ва ҳамкорлар ўртасидаги ҳамкорликни устувор вазифалардан бири сифатида қайд этади [3].

Шунга қарамай, амалиётда ҳамкорлик кўпинча ҳисоботда кўрсатиш учун ўтказиладиган бир марталик тадбирлар, байрамлар ёки ҳомийлик ёрдами билан чекланиб қолмоқда. Ота-оналар тадбирларга томошабин сифатида таклиф қилинади, маҳалла билан муносабатлар эса имзоланган режа доирасидан чиқмайди. Демак, муаммо ҳамкорликнинг йўқлигида эмас, балки уни самарали қиладиган шарт-шароитлар яратилмаганидадир. Мақоланинг мақсади — МТТларда ижтимоий ҳамкорликни ташкил этишнинг ташкилий-педагогик шартларини илмий асослаш ва уларни амалга ошириш йўлларини кўрсатиб беришдан иборат.

АДАБИЁТЛАР ТАҲЛИЛИ ВА МЕТОДОЛОГИЯ

Ижтимоий ҳамкорликнинг назарий асосларидан бири Ж. Коулман томонидан ишлаб чиқилган ижтимоий капитал концепциясидир. Олим одамлар ўртасидаги ўзаро мажбуриятлар, ишонч, ахборот алмашиш каналлари ва умумий нормалар оила ва жамоада болаларнинг таълим олиши учун муҳим ресурс бўлишини кўрсатиб берган [4]. Шу нуқтаи назардан МТТ фақат таълим хизмати кўрсатувчи ташкилот эмас, балки оилалар, маҳалла ва муассасалар ўртасида ишонч ва алоқаларни мустаҳкамловчи марказ бўла олади.

Э. Остромнинг ко-продукция ғояси давлат хизматларини фуқаролар билан биргаликда яратиш мумкинлиги ва бу давлат ҳамда жамият саъй-

ҳаракатлари ўртасида синергия ҳосил қилишини асослайди [5]. Мактабгача таълимга татбиқан бу шуни англатадики, бола тарбиясининг сифати фақат МТТнинг эмас, балки ота-оналар ва жамоатчиликнинг ҳам фаол иштироки маҳсулидир.

К. Мапп ва П. Каттнер икки томонлама салоҳиятни ошириш моделини таклиф қилиб, самарали ҳамкорлик учун нафақат ота-оналарни, балки педагогларнинг ҳам ҳамкорлик қилиш салоҳиятини — билими, алоқалари, қарашлари ва ўзига ишончини ривожлантириш зарурлигини кўрсатган [6]. Г. Хорнби ва Р. Лафаеле эса ота-оналар иштирокига тўсқинлик қилувчи омилларни тўрт гуруҳга ажратган: индивидуал ва оилавий омиллар, бола билан боғлиқ омиллар, ота-она ва педагог ўртасидаги муносабат омиллари ҳамда жамиятга оид омиллар [7]. Х. Вайсс ва ҳамкорлари оила, таълим муассасаси ва жамоа ҳамкорлиги тасодифий тадбирлар йиғиндиси бўлмасдан, тизимли ва таълим ислоҳотининг ажралмас қисми бўлиши кераклигини таъкидлайди [8].

Рус педагогикасида Т.Н. Доронова ва ҳаммуаллифлар МТТ ва оилани бола ривожланишининг ягона макони сифатида кўриш ғоясини илгари сурган [9]. О.Л. Зверева ва Т.В. Кротова педагог ва ота-оналар мулоқотидаги тўсиқларни таҳлил қилиб, мулоқотни ташкил этишнинг методик жиҳатларини очиб берган [10]. И. Сираж-Блэтчфорд ва Л. Манни мактабгача таълимда самарали раҳбарликни ўрганиб, ота-оналар ва жамоа билан шериклик муваффақиятли раҳбарнинг асосий хусусиятларидан бири эканини кўрсатган [11].

Тадқиқотда норматив-ҳуқуқий ҳужжатлар ва илмий адабиётларни тизимли таҳлил қилиш, қиёслаш, умумлаштириш ва педагогик моделлаштириш усулларидан фойдаланилди.

НАТИЖАЛАР

1. Ҳамкорликнинг расмиятчиликка айланишига олиб келувчи омиллар. Адабиётлар таҳлили ва Г. Хорнби ҳамда Р. Лафаеле тасниф асосида [7] МТТ шароитида ҳамкорлик самарасини пасайтирувчи омиллар гуруҳланди (1-жадвал).

1-жадвал

Омиллар гуруҳи	МТТ шароитидаги намоён бўлиши
Ташкилий	Ҳамкорлик учун масъул шахс ва аниқ режа йўқлиги; тадбирларнинг ҳисобот учун ўтказилиши; натижаларни баҳолаш мезонларининг йўқлиги
Кадрлар салоҳияти	Педагогларнинг ота-оналар билан мулоқот қилиш, низоли вазиятларни ҳал қилиш

	кўникмалари етарли эмаслиги; раҳбарнинг музокара ва тармоқ қуриш тажрибаси камлиги
Оилавий	Ота-оналарнинг банд бўлиши, ўзини тарбия жараёнига кераксиз деб ҳисоблаши, МТТга фақат хизмат кўрсатувчи сифатида қараши
Муносабат	Ота-оналарга «тарбия объекти» сифатида қараш, бир томонлама ахборот бериш, ўзаро ишончнинг етишмаслиги
Ижтимоий-ҳудудий	Маҳалла, мактаб ва бошқа муассасалар билан алоқаларнинг тарқоқлиги, ҳамкорнинг манфаатлари инобатга олинмаслиги

2. Ижтимоий ҳамкорликнинг ташкилий-педагогик шартлари. Юқоридаги омилларни бартараф этиш мақсадида бешта ўзаро боғлиқ шарт асосланди.

Биринчи шарт — ҳамкорликни институционаллаштириш. МТТда ҳамкорлик учун масъул ишчи гуруҳ (ҳамкорлик кенгаши) тузилади, унинг таркибига раҳбар, методист, педагоглар, ота-оналар ва маҳалла вакиллари киритилади. Ҳамкорлик йиллик режа, келишув ва меморандумлар билан расмийлаштирилади. Бу ҳамкорликни алоҳида шахсларнинг ташаббусига боғлиқ бўлмаган барқарор тизимга айлантиради.

Иккинчи шарт — ҳамкорликни ҳудуднинг ижтимоий ресурсларини ўрганишга асослаш. МТТ жойлашган ҳудуднинг «ижтимоий паспорти» тузилади: мактаблар, оилавий поликлиника, кутубхона, спорт ва маданият масканлари, корхоналар ва нодавлат ташкилотлар рўйхати ҳамда уларнинг имкониятлари аниқланади. Ж. Коулман ғоясига кўра, ижтимоий капитал алоқалар мавжуд бўлган жойда ҳосил бўлади [4]; шу боис ресурслар харитаси ҳамкорликни режалаштиришнинг бошланғич нуқтаси бўлиши лозим.

Учинчи шарт — ота-оналарни ҳамкорликнинг тенг ҳуқуқли субъектига айлантириш. Ота-оналар тадбирларда томошабин сифатида эмас, балки режалаштирувчи, ташкилотчи ва баҳоловчи сифатида иштирок этади: гуруҳ лойиҳаларини биргаликда танлаш, касбини болаларга таништириш, «оилавий топшириқлар»ни бажариш, қарор қабул қилишда қатнашиш. Бу Э. Остромнинг ко-продукция ғоясига мос келади [5].

Тўртинчи шарт — педагогларнинг ҳамкорлик салоҳиятини мақсадли ривожлантириш. МТТ ичидаги методик иш тизимига ота-оналар билан мулоқот, фаол тинглаш, низоли вазиятларни ҳал қилиш, турли тоифадаги оилалар билан ишлаш бўйича тренинглар киритилади. К. Мапп ва П. Каттнер

моделига кўра, ҳамкорлик педагоглар ва оилаларнинг салоҳияти бир вақтда ривожланганда самарали бўлади [6].

Бешинчи шарт — ҳамкорлик натижаларини мунтазам баҳолаш ва рефлексия. Ҳар бир ҳамкорлик йўналиши бўйича кутилаётган натижалар олдиндан белгиланади ва йил якунида қамров, фаоллик, натижавийлик, қониқиш ва барқарорлик мезонлари асосида баҳоланади. Баҳолаш натижалари ота-оналар ва ҳамкорлар билан муҳокама қилиниб, кейинги йил режасига тузатишлар киритилади.

3. «Оила — маҳалла — МТТ — мактаб» ҳамкорлик тармоғи. Юқоридаги шартлар асосида МТТни марказий бўғин сифатида кўрувчи ҳамкорлик тармоғининг мазмуни ишлаб чиқилди (2-жадвал).

2-жадвал

Тармоқ бўғини	МТТнинг вазифаси	Ҳамкорнинг ҳиссаси
Оила	Бола ривожланиши ҳақида мунтазам ахборот бериш, ота-оналар учун маслаҳатлар ташкил этиш	Уйда ривожлантирувчи муҳит яратиш, гуруҳ ҳаётида ва қарор қабул қилишда иштирок этиш
Маҳалла	МТТга қамраб олинмаган болалар ва ёрдамга муҳтож оилалар ҳақидаги маълумотларни биргаликда таҳлил қилиш	Оилалар билан ишлашда кўмаклашиш, миллий қадриятларга асосланган тадбирларни биргаликда ўтказиш
Мактаб	Катта гуруҳ болаларини мактабга тайёрлашда узвийликни таъминлаш	Қўшма методик семинарлар, бўлажак ўқувчилар учун мактабга таништирув ташрифлари
Бошқа муассасалар ва ДХШ шериклари	Ҳамкорлик йўналишлари ва кутилаётган натижаларни аниқ белгилаш	Мутахассислар, моддий-техник ва маданий ресурслар билан кўмаклашиш

МУҲОКАМА

Таклиф этилган шартлар ижтимоий ҳамкорликни тадбирлар мажмуи сифатида эмас, балки бошқариладиган тизим сифатида кўриш имконини беради. Бу Х. Вайсс ва ҳамкорларининг ҳамкорлик «тасодифий ҳаракатлар»дан тизимли фаолиятга айланиши лозимлиги ҳақидаги хулосасига мос келади [8]. Ҳамкорлик кенгаши ва йиллик режа каби ташкилий механизмлар ҳамкорликнинг раҳбар ёки айрим педагогларнинг ташаббусига боғлиқ бўлиб қолишининг олдини олади.

Учинчи ва тўртинчи шартларнинг ўзаро боғлиқлиги алоҳида аҳамиятга эга. Ота-оналарни фаол иштирокка чорлаш учун педагогларнинг ўзи бунга

тайёр бўлиши керак: О.Л. Зверева ва Т.В. Кротова кўрсатганидек, мулоқотдаги тўсиқлар кўпинча педагогнинг ота-оналарга бир томонлама ахборот бериш одатидан келиб чиқади [10]. Шу боис педагогларнинг ҳамкорлик салоҳиятини ривожлантириш ота-оналарни жалб этишдан олдин ёки у билан бир вақтда амалга оширилиши лозим [6].

Ўзбекистон шароитида маҳалла институти ижтимоий капиталнинг кучли манбаи ҳисобланади. Маҳалла ва МТТ ўртасидаги ҳамкорлик ёрдамга муҳтож оилаларни қўллаб-қувватлаш ва болаларни мактабгача таълимга қамраб олишда катта имконият яратади. Бу Тошкент декларациясида қайд этилган тармоқлараро ҳамкорлик ғоясининг миллий кўриниши сифатида баҳоланиши мумкин [3]. ДХШ асосидаги МТТлар учун эса ҳамкорлик тармоғига кириш ҳудуддаги ишончни мустаҳкамлаш ва ота-оналар билан узоқ муддатли муносабатлар ўрнатишнинг муҳим воситасидир [1].

Шартларни амалиётга жорий этиш МТТ раҳбарининг бошқарув компетенциясига бевосита боғлиқ. И. Сираж-Блэтчфорд ва Л. Манни таъкидлаганидек, самарали раҳбар умумий мақсадни шакллантиради, очиқ мулоқотни таъминлайди ва ота-оналар ҳамда жамоа билан шерикликни ривожлантиради [11]. Шу сабабли МТТ раҳбарларининг малака ошириш дастурларида ҳамкорлик тармоғини режалаштириш, музокара олиб бориш ва натижаларни баҳолаш бўйича амалий машғулотларга кўпроқ ўрин ажратиш мақсадга мувофиқ. Кейинги тадқиқотларда таклиф этилган шартларнинг самарадорлигини тажриба-синов ишлари орқали текшириш кўзда тутилади.

ХУЛОСА

1. МТТларда ижтимоий ҳамкорликнинг самарасизлиги кўпинча ҳамкорликнинг йўқлиги билан эмас, балки уни тизимли қилувчи ташкилий-педагогик шартлар яратилмагани билан боғлиқ.

2. Ҳамкорликни расмиятчиликка айлантирувчи омиллар ташкилий, кадрлар салоҳияти, оилавий, муносабат ва ижтимоий-ҳудудий гуруҳларга ажралади.

3. Ижтимоий ҳамкорликни самарали ташкил этишнинг ташкилий-педагогик шартлари қуйидагилардан иборат: ҳамкорликни институционаллаштириш; уни ҳудуднинг ижтимоий ресурсларини ўрганишга асослаш; ота-оналарни тенг ҳуқуқли субъектга айлантириш; педагогларнинг ҳамкорлик салоҳиятини ривожлантириш; натижаларни мунтазам баҳолаш.

4. «Оила — маҳалла — МТТ — мактаб» ҳамкорлик тармоғи МТТни ҳудуддаги ижтимоий капиталнинг марказий бўғинига айлантиради ва бола ривожланиши учун ягона тарбиявий муҳит яратади.

5. Мазкур шартларни амалга ошириш учун МТТ раҳбарларининг малака ошириш дастурларига ижтимоий ҳамкорликни бошқаришга оид амалий модулларни киритиш тавсия этилади.

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КЛИНИКО-МОРФОЛОГИЧЕСКИЕ ОСНОВЫ РАЗВИТИЯ ГНОЙНО-СЕПТИЧЕСКИХ ОСЛОЖНЕНИЙ У РОДИЛЬНИЦ

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Резюме. У женщин с сепсисом выявлено несоответствие клинического течения лабораторным проявлениям: слабовыраженная лейкоцитарная реакция, быстрая инверсия местной воспалительной реакции, стремительное развитие синдрома полиорганной недостаточности на фоне слабой манифестации синдрома системного воспалительного ответа. У женщин с эндомиометритом клинические проявления начинаются с субинволютивных процессов в матке, и умеренной местной воспалительной реакцией (5-7 дней).

Ключевые слова: сепсис, клиника, морфология, родильниц.

Актуальность. В настоящее время, несмотря на огромные достижения современной медицины, активное развитие медицинских технологий, широкий выбор антибактериальных препаратов гнойно-септические осложнения после родоразрешения играют ведущую роль в материнской заболеваемости, и лидируют в структуре материнской смертности [1,2,3].

В мире ежегодно сепсис диагностируется у 1,5 млн. пациентов, а в экономически развитой стране Соединенных Штатах Америки - у 750 тыс. человек [1]. Сепсис с острой органной дисфункцией — актуальная проблема современного здравоохранения [2]. При тяжелом сепсисе уровень летальности достигает от 28 до 50% [5]. Тот факт, что более 500 тыс. больных умирает ежегодно от тяжелого сепсиса (более 1400 человек ежедневно) показывает, что до сих пор недооценивается влияние этой патологии на всю систему здравоохранения [4].

По данным ученых, акушерский сепсис стоит на третьем месте в структуре материнской смертности, на первом месте стоит смертность от абортов, на втором - гипертензивные нарушения беременности и кровотечения [2]. По данным официальной статистики Министерства Здравоохранения Казакской Республики в период с 2015 - 2025 гг. зарегистрировано 37 (0,03%); 35 (0,03%); 36 (0,03%) случаев гнойно-септических осложнений у пациенток - на 100 случаев

из общего числа родов, из них гнойно-септические осложнения после операции кесарева сечения были зарегистрированы у 8 (21,6%), 15 (42,9%), 16 (44,4%) родильниц - на 100 случаев из общего числа родов. В период с 2019 - 2026 гг. были зарегистрированы случаи материнской смертности от гнойно-септических осложнений в послеродовом периоде: 6 (10,0%), 5 (7,8%), 7 (10,4%) на 100 случаев из общего числа смертей, связанных с беременностью. В Казахстане гнойно-септические осложнения не имеют тенденции к снижению.

Кроме того, ожидается значительное увеличение числа больных с риском развития сепсиса в следующем десятилетии, в связи с развитием инвазивных медицинских технологий, бесконтрольным применением антибактериальных препаратов широкого спектра действия, увеличением' количества микробов, устойчивых к антибактериальным и антисептическим препаратам [3]. Материальные затраты при лечении сепсиса очень высоки, часто недоступные для больных, так как включают в себя не только курс интенсивной терапии, но и длительный курс реабилитации [2].

Сепсис является одной из актуальных проблем в акушерстве, поскольку до сих пор не приняты диагностические дефиниции сепсиса и эндометрита, нет четкой классификации таких патофизиологических состояний как эндометрит, сепсис и тяжелый сепсис (1).

Клиническое течение заболевания зачастую имеет стертую манифестацию за счет исходного изменения иммунного статуса роженицы, сниженной реактивности и нарушения адаптивных реакций. Зачастую сепсис развивается у женщин на фоне экстрагенитальных заболеваний, таких как тяжелая преэклампсия, анемия или тяжелая кровопотеря [6].

В Казахстане Республике не изучены клинико-патофизиологические особенности течения гнойно-септических осложнений у родильниц, а также не выявлены предикторы гнойно-септических осложнений у беременных женщин с различными осложнениями.

Несмотря на многочисленные публикации о патогенезе сепсиса с точки зрения провоспалительных и воспалительных факторов цитокинового каскада, не определены прогностические маркеры реализации сепсиса. Остается открытым вопрос о сопряжении атипичной клиники септического состояния и патофизиологических нарушений.

Цель исследования: выявить клинико-морфологические и иммуногистохимические критерии диагностики акушерского сепсиса, развивающегося в родах и послеродовом периоде.

Материалы и методы. В результате изучения анамнеза и клинических данных 15 случаев женщин, умерших от сепсиса в родах, были выявлены следующие особенности: преобладали женщины в возрасте 30-40 лет - 6 случаев (40,0%), в анамнезе – 3 беременности - 10 (66,6%>), 3-й роды - 7 (46,6%>).

Результаты и их обсуждение. В 9 случаях (60,0%>) отмечался преждевременный разрыв плодных оболочек с длительностью безводного периода в среднем 25-35 часов. Самостоятельные роды были в 11 случаях (73,3%о), в 5 (33,3%о) - наблюдалась первичная слабость родовой деятельности. В 6 случаях (40,0%) отмечалось плотное прикрепление плаценты, что потребовало ее ручного отделения и последующего кюретажа полости матки. Мертворождения встретились в 8 случаях (53,3%), в 50% из них диагностирована асфиксия с выраженной мацерацией кожных покровов.

Клиника характеризовалась следующими симптомами - в 8 случаях (53,5%) был подъем температуры (от 37,6°С до 39,5°С). В 10 случаях (66,6%) отмечена гипотония (55/10-80/50 мм рт. ст.), гипертензия (20,0%о) и нормальное артериальное давление (13,4%).

Проведенная оценка заключительного клинического диагноза установила, что в большинстве случаев не был поставлен диагноз «сепсис в родах», в 10 случаях (67,0Уо) фигурировал диагноз «септический метроэндометрит», «послеродовый сепсис»; а в 5 случаях (33,0%>), гнойно-септические заболевания вообще не упоминались.

При аутопсийном исследовании в посевах крови из полости сердца в 15 случаях была подтверждена септицемия: в 11 случаях (73,3%) - кишечная палочка, в 11 (73,3%>) - энтеробактерии, в 9 (60,0%>) неклостридиальные анаэробы, в 4 (26,6%) - стрептококки; следует отметить 100% встречаемость ассоциированной микробной флоры.

При патоморфологическом изучении всех компонентов репродуктивной системы мать - плацента - плод, а именно, матки и последа были выявлены

разнообразные изменения. В 13 случаях (86,6%) матка была обычных размеров, эндометрий - бурый, рыхлый с диффузно-очаговыми кровоизлияниями. С учетом послеродовой инволюции матки обнаруженная поверхностная воспалительная инфильтрация базального слоя расценена как «физиологический воспалительный валик». В 9 случаях (60,0%) в эндометрии и миометрии отмечалась очаговая, слабо выраженная, инфильтрация гранулоцитами (1,20±0,10 балла), Т-лимфоцитами (1,20±0,10), макрофагами (1,13±0,09). В воспалительном инфильтрате отсутствовали плазматические клетки, В-лимфоциты и фактор некроза опухоли (TNF-a).

Напротив, в плодных оболочках во всех случаях было отмечено обострение хронического мембранита в виде васкулитов, очагов склероза децидуального оболочки (при окраске по Массону), разнокалиберных кальцификатов и неравномерной толщины компактного слоя. При иммуногистохимическом исследовании воспалительный инфильтра был представлен большим количеством гранулоцитов (2,86±0,09 балла), макрофагов (2,86±0,09), плазматических клеток (1,93±0,12), единичными Т-лимфоцитами положительная реакция на TNF-a (1,86±0,09). В-лимфоциты в воспалительном инфильтрате отсутствовали. В межворсинчатом пространстве плаценты в инфильтрате преобладали гранулоциты, макрофаги, единичные В-лимфоциты, а в децидуальной пластинке наблюдалась очаговая инфильтрация гранулоцитами, макрофагами, Т-лимфоцитами.

Столь же демонстративна разница в наличии вторичных, метастатических гнойных очагов: они отсутствовали при сепсисе в родах и диагностированы примерно в 30,0-44,0% у женщин, умерших от послеродового сепсиса. Для финальной стадии обеих форм характерны патоморфологические проявления ДВС-синдрома и инфекционно-токсического шока, регистрируемых в 100% случаев при послеродовом сепсисе и в меньшей степени у женщин, погибших от сепсиса в родах (ДВС-синдром - 73,3%, инфекционно-токсический шок - 26,6%).

Выводы : 1. Все представленные выше клинико-морфологические материалы убеждают в необходимости дифференциального диагноза сепсиса в родах и послеродового сепсиса, как в клинической практике, так и при патологоанатомическом анализе причин материнских смертей.

2. У женщин с сепсисом выявлено несоответствие клинического течения лабораторным проявлениям: слабовыраженная лейкоцитарная реакция, быстрая

инверсия местной воспалительной реакции, стремительное развитие синдрома полиорганной недостаточности на фоне слабой манифестации синдрома системного воспалительного ответа. У женщин с эндомиометритом клинические проявления начинаются с субинволютивных процессов в матке, и умеренной местной воспалительной реакцией (5-7 дней).

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PEDAGOGICAL CONDITIONS FOR USING DIGITAL EDUCATIONAL TECHNOLOGIES TO DEVELOP THE PROFESSIONAL COMPETENCE OF PROSPECTIVE MATHEMATICS TEACHERS

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Abstract: Pedagogical conditions must be coordinated if digital educational technologies are to support the development of prospective mathematics teachers' professional competence. Clear learning objectives, alignment between mathematical content and digital tools, active student participation, individual support, connections across subjects and meaningful assessment form the basis of these conditions. Methodological support and an accessible digital environment enable students to connect mathematical knowledge with pedagogical decisions. The importance of these conditions in professional preparation lies in explaining content, organising learning activities and justifying independent instructional choices.

Key words: professional competence, prospective mathematics teacher, digital educational technologies, pedagogical conditions, methodological preparation, individual support, connections across subjects, assessment.

Introduction. The professional preparation of prospective mathematics teachers combines acquiring mathematical knowledge with applying it thoughtfully in teaching. Digital technologies offer opportunities to represent content, organise learning activities and work with responses. Whether these opportunities support professional development depends on how the educational process is organised. Alongside learning to operate a tool, students need to explain the mathematical and pedagogical reasons for using it. Pedagogical conditions are therefore regarded as factors that align the objectives, content and activities of preparation for teaching with digital technologies.

Pedagogical conditions encompass requirements for organising a learning environment that supports the development of professional competence. They concern clear objectives, academically sound content, professionally oriented tasks and support appropriate to learning needs. The availability of a particular tool does not ensure that these requirements are met. Technical capabilities acquire pedagogical significance when connected with explaining content and organising independent thinking. These conditions should therefore be considered together within the overall structure of educational activity. Works on mathematics teaching methodology by S. Alixonov and D.I. Yunusova provide learning resources for prospective teachers' subject and methodological preparation. The work on mathematics teaching technologies and design by M. Barakayev, M. Tojiyev, D. Yunusova and K. Mamadaliyev is also relevant to this area. Works by A.A. Xoliqov and by O'.Q. Tolipov and M. Usmonboyeva are used to study the general pedagogical aspects of professional preparation. When digital tools are employed, the requirements of mathematics teaching methodology and pedagogical practice need to remain aligned. The first condition is to define learning objectives in accordance with professional activity. The mathematical content students should understand, the learning activities they should organise and the way they

should justify their choices are specified in advance. An objective includes both operating a tool and the pedagogical task performed through its use. Learning tasks and assessment requirements are designed accordingly. Clear objectives provide a basis for students to plan their activities and check whether a completed teaching design fulfils its professional purpose.

The second condition is to align mathematical content with the didactic capabilities of digital tools. Tool selection takes account of the essential features of a concept, its forms of representation and the cognitive actions needed to understand it. A digital representation should accurately reflect mathematical content, reveal key relationships and support students' explanations. The availability of a technical function does not in itself justify using it. Prospective teachers need to explain the tool's role in a particular learning task and the limits of the conclusions that can be drawn from it. Mathematical accuracy is an essential requirement for aligning content. Logical consistency between definitions, notation, conditions of application and conclusions must be maintained. Representations in a digital environment should be connected with mathematical justification, and the roles of observation and proof should be distinguished. Alongside checking the accuracy of material, students consider how pupils might interpret it. This activity requires a critical approach to digital content and professional responsibility for the knowledge presented. The third condition is to ensure students' active and independent participation. Work with digital material should involve cognitive actions such as posing questions, identifying relationships, comparing and justifying conclusions. Learning tasks need to make students' decisions and the reasons for them evident. Independence emerges in moving from receiving prepared information to selecting content and adapting it to a pedagogical task. Organising such activity connects students' subject knowledge with their thinking about teaching.

The professional orientation of an activity is expressed in the task content. When preparing digital material, students identify its intended audience, the knowledge it requires and the difficulty it is meant to address. The pupil's expected thinking, necessary explanation and assessment requirement are aligned. Explaining this relationship turns a technical product into a teaching design. A professional task requires students both to know the content and to justify how it should be taught. The fourth condition is to organise individual support in accordance with students' preparation and needs. Mathematical knowledge, methodological skills and experience of using digital tools may differ. The content of support is determined by the specific area of difficulty. Additional guidance should support independent decision-making rather than complete the task for the student. Reducing support as understanding develops creates conditions for greater independence in professional activity. Individual support is provided while maintaining a common mathematical objective and professional requirement. The substantive complexity of a task and the amount of support are considered separately. Students need to identify their difficulty, select appropriate guidance and understand the outcome of using it. The university teacher provides support suited to a particular stage of activity. This arrangement accommodates differences in preparation while preserving a common direction for all students' further development.

The fifth condition is to organise connections across subjects coherently. Knowledge acquired in mathematical subjects becomes the content of explanations and learning tasks in mathematics teaching methodology. Pedagogical preparation clarifies requirements for organising pupils'

activities, communication and support. Each subject deepens the relevant aspect of professional preparation according to its purpose. When digital tools are used within these connections, continuity between mathematical content and its pedagogical application is maintained. Coordination across subjects also involves establishing common requirements for mathematical accuracy and sound instructional reasoning. Knowledge from one activity should support the next task, while tasks should target a new professional requirement rather than repeat exactly the same work. Students connect theoretical knowledge with explaining it to pupils, managing activities and responding to answers. This continuity allows preparation for using digital technologies to be organised as part of teacher preparation rather than as a separate technical exercise.

The sixth condition is to provide meaningful assessment and feedback. Assessment encompasses students' mathematical accuracy, justification of tool selection and ability to organise learning activities. Criteria are clearly communicated in advance and applied in accordance with learning objectives. The appearance of digital material or speed of completion does not provide a full account of professional preparation. Considering the content of a teaching design alongside the explanation of a pedagogical decision clarifies the areas in which a student needs support. Feedback should reveal the relationship between an identified difficulty and the next learning action. The nature of a shortcoming and the direction for correcting it are communicated clearly. Comments on mathematical content, the clarity of a question or the suitability of support provide a basis for revising a teaching design. When students explain the reasons for a correction, assessment becomes connected with reflection. Feedback thus serves to improve professional decisions as well as communicate an overall evaluation. Methodological support is necessary to apply these conditions coherently in the educational process. The university teacher and teaching practice supervisor listen to students' choices, ask substantive questions and help clarify their mathematical and pedagogical grounds. During preparation, complexity increases gradually, and the requirement for independence builds on previous activity. Students are guided to understand the possibilities and limitations of their decisions. This cooperation ensures that methodological support extends beyond providing a ready-made solution.

Collaborative discussion and a constructive attitude towards errors are important conditions of a professional learning environment. Discussion focuses on students' mathematical reasoning and pedagogical decisions rather than their personalities. Feedback is based on a specific substantive criterion, and alternative choices are explained together with their grounds. Such communication makes it possible to examine shortcomings openly and improve teaching designs. Explaining one's own decision and understanding another perspective are connected with prospective teachers' preparation for professional communication. An accessible digital environment should meet both technical and content requirements. Access to materials, legible notation and functioning essential features are organisational conditions for learning activities. The arrangement of information should make it easier to identify key content and return to a necessary explanation. Device, internet and time constraints are considered in advance. Although available conditions influence digital tool selection, the mathematical objective and the coherence of the main cognitive activity need to be maintained.

Responsible use of a digital environment requires acknowledging authorship, observing conditions of use and handling information about participants carefully. Students check the reliability of content and select the information required for a professional task. Discussion of a pupil's answer focuses on the cause of the mathematical difficulty. These requirements constitute the ethical dimension of pedagogical conditions. Professional responsibility is expressed at every stage of digital activity together with mathematical accuracy and appropriate pedagogical interaction. The interdependence of pedagogical conditions requires them to be organised as a whole. A clear objective guides content selection, content guides activity, and activity guides support and assessment. The technical environment and methodological support enable these connections to operate. The absence of one condition may limit the use of other opportunities. Professional preparation should therefore consider not only the availability of a digital tool but also the way it is used for a purpose, students' activity and the content of feedback.

Conclusion: Using digital educational technologies to develop prospective mathematics teachers' professional competence requires alignment between objectives, content, activities and assessment. Mathematical accuracy, active participation, individual support, connections across subjects and methodological support are the main pedagogical conditions for preparation to use digital technologies. An accessible and responsibly organised environment helps put these conditions into practice. Their professional significance lies in enabling students to connect mathematical knowledge with explaining content, organising learning activities and justifying pedagogical choices.

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Arrali tola ajratish mashinasida arrali silindr aylanish chastotasini chastota o‘zgartirgich, PID-rostlagich va SCADA asosida boshqarish.

Muallif: t.f.f.d Berdaliyeva Mohlaroyim Abdulhamid qizi.

Annotatsiya: Tezisda arrali jin mashinasining asosiy ish organi — arrali silindr aylanish chastotasini paxtaning navi, dastlabki namligi va ifloslik darajasiga moslab real vaqtda rostlash imkoniyati ko‘rib chiqilgan. Asinxron elektr yuritkich, vektorli boshqaruvga ega chastota o‘zgartirgich, dasturlanuvchi mantiqiy kontroller (PLC) va SCADA operator panelidan iborat yopiq konturli boshqaruv tizimi taklif etilgan. Tizim tola ifloslik darajasi yoki ish unumi bo‘yicha ikki xil rejimda tezlik topshirig‘ini avtomatik shakllantiradi, elektromotorni o‘ta yuklanishdan himoyalaydi va elektr energiya sarfini kamaytirishga xizmat qiladi.

Kalit so‘zlar: arrali jin, arrali silindr, chastota o‘zgartirgich, vektorli boshqaruv, PID-rostlagich, PLC, SCADA, tola sifati, energiya tejamkorligi.

Annotation: The paper considers real-time adjustment of the saw-cylinder speed of a saw gin stand according to cotton variety, initial moisture and trash content. A closed-loop control system comprising an induction motor, a vector-controlled variable frequency drive, a programmable logic controller and a SCADA operator panel is proposed. The system generates the speed reference automatically either from lint trash content or from the required throughput, protects the motor against overload and contributes to lower electricity consumption.

Keywords: saw gin, saw cylinder, variable frequency drive, vector control, PID controller, PLC, SCADA, fiber quality, energy efficiency.

Kirish: Arrali jin paxtani qayta ishlash texnologik zanjirining markaziy bo‘g‘ini hisoblanib, tolaning uzunligi, kalta tolalar ulushi va urug‘ning shikastlanishi aynan shu bosqichda ko‘p jihatdan shakllanadi. AQSh Qishloq xo‘jaligi departamenti tadqiqotchilari arra tezligining zavod tavsiyasidan bor-yo‘g‘i 20–25 ayl/min ga chetlashishi ham mashina unumdorligini sezilarli pasaytirishini, tavsiya qilingan tezlikdan katta og‘ish esa chigitni tozalash sifatini yomonlashtirishini qayd etgan [1]. Shu manbada keltirilishicha, Griffin tadqiqotlarida arra tezligi oshgani sari kalta tolalar ulushi ortishi aniqlangan [1; 2], ishlov berish tezligining (yuklanishning) oshishi esa ip nuqsonlarini ko‘paytiradi [3]. Peru tadqiqotchilari ham 700 ayl/min rejimida tolaning 2,5 % shtapel uzunligi eng kalta bo‘lganini, ya’ni arra tezligining ortishi tolaga mexanik ta’sirni kuchaytirishini ko‘rsatib, 580–650 ayl/min oralig‘ini tavsiya qilgan [4].

Ikkinchi tomondan, energiya xarajatlari jin korxonalari o‘zgaruvchan xarajatlarining taxminan to‘rtdan bir qismini tashkil etadi [5]. Demak, arrali silindr tezligini xom ashyo xossalariga qarab moslashuvchan boshqarish ham tola sifatini saqlash, ham energiya sarfini qisqartirish uchun dolzarb vazifadir.

Tadqiqot maqsadi:Arrali silindr aylanish chastotasini paxtaning texnologik ko‘rsatkichlari (seleksiya va sanoat navi, namlik, ifloslik) hamda talab etilgan ish unumiga mos ravishda avtomatik rostlovchi PLC–SCADA tizimini ishlab chiqish.

Tadqiqot usuli va tizim tuzilmasi: Asinxron motor rotorining aylanish chastotasi $n = 60 \cdot f \cdot (1 - s)/p$ ifoda bilan aniqlanadi (f — ta’minlovchi kuchlanish chastotasi, s — sirpanish, p — juft qutblar soni). Shu sababli tezlikni silliq rostlashning eng samarali vositasi ta’minot chastotasini o‘zgartiruvchi invertordir. Yuklama keskin o‘zgaradigan jarayonlarda (xom ashyo uzatilishi notekis bo‘lgan holat) momentni aniq ushlab turish uchun maydonga yo‘naltirilgan vektorli boshqaruv qo‘llanildi; u oddiy skalyar (U/f = const) usulga nisbatan murakkabroq bo‘lsa-da, past tezliklarda va yuklama o‘zgarishida yuqori dinamik aniqlik beradi [6].

Tizim tarkibi: uch fazali tarmoq kaliti, chastota o‘zgartirgich, 24 V li quvvat manbai, PLC, SCADA operator paneli va boshqaruv kalitlari. PLC operator panelidan RS-485 interfeysi orqali tarmoq o‘zgaruvchilarini qabul qiladi va ular asosida chastota o‘zgartirgichga raqamli tezlik topshirig‘ini uzatadi. Tarmoq o‘zgaruvchilari energiyaga bog‘liq bo‘lmagan xotirada saqlanishi tufayli qayta ishga tushirishda tizim oxirgi sozlamalar bilan ishlay boshlaydi.

SCADA interfeysida uch rejim nazarda tutilgan: (1) ish unumi bo‘yicha avtomatik boshqarish; (2) toladagi ifloslik va nuqsonli aralashmalarning massaviy ulushi bo‘yicha avtomatik boshqarish; (3) ikkala avtomatik rejim o‘chirilganda operator kiritgan qo‘lda topshiriq bo‘yicha boshqarish. Rejimlar o‘zaro istisno qiluvchi mantiqiy belgilar (0/1) orqali tanlanadi.

Natijalar: Ishlab chiqilgan tizim arrali silindr tezligini xom ashyo xossalari va texnologik topshiriqqa mos ravishda tanlash imkonini berdi. [Bu yerga tajriba natijalarini kiriting: tezlik diapazoni, ayl/min; ish unumi, kg/soat; ifloslik va kalta tola ulushi, %; solishtirma energiya sarfi, kVt·soat/t — boshqaruvsiz rejimga nisbatan o‘zgarish, %. Bundan tashqari, invertor himoya funksiyalari motorni o‘ta yuklanish va kuchlanish og‘ishlaridan himoyalab, uning kuyib qolish xavfini kamaytiradi.

Xulosa: Arrali silindr aylanish chastotasini vektorli chastota o‘zgartirgich, PID-rostlagich va PLC–SCADA majmuasi orqali boshqarish jin mashinasining ishini paxta navi, namligi va ifloslik darajasiga moslashtirishga, tola sifatini saqlashga hamda energiya sarfini kamaytirishga imkon beradi. Keyingi bosqichda ifloslikni uzluksiz o‘lchovchi datchiklar bilan tizimni to‘liq yopiq konturga o‘tkazish va ta’minlagich (pitatel) uzatish tezligini arra tezligi bilan birgalikda boshqarish maqsadga muvofiq.

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O‘ZBEKISTONDA EKSPORT TARKIBINI DIVERSIFIKATSIYALASHNING IQTISODIY O‘SISH VA TASHQI SAVDO BARQARORLIGIGA TA’SIRI

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THE IMPACT OF EXPORT DIVERSIFICATION IN UZBEKISTAN ON ECONOMIC GROWTH AND FOREIGN TRADE STABILITY

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Annotatsiya

Mazkur tezisda O‘zbekistonda eksport tarkibini diversifikatsiyalashning iqtisodiy o‘sish va tashqi savdo barqarorligini ta’minlashdagi ahamiyati o‘rganilgan. Eksportning ayrim xomashyo mahsulotlari va cheklangan tashqi bozorlarga bog‘liqligi mamlakat iqtisodiyotining jahon bozoridagi narxlar o‘zgarishi, tashqi talabning pasayishi va global iqtisodiy xavflarga nisbatan zaifligini oshirishi asoslab berilgan. Tadqiqotda yuqori qo‘shilgan qiymatli sanoat mahsulotlari, tayyor oziq-ovqat mahsulotlari, to‘qimachilik, farmatsevtika, elektrotexnika hamda xizmatlar eksportini rivojlantirishning iqtisodiy samaralari yoritilgan. Shuningdek, eksport geografiyasini kengaytirish, eksportchi korxonalarni moliyaviy qo‘llab-quvvatlash, xalqaro standartlarni joriy etish va transport-logistika infratuzilmasini takomillashtirish masalalari tahlil qilingan. Tadqiqot natijasida eksport tarkibini diversifikatsiyalash valyuta tushumlarini barqarorlashtirish, tashqi savdo saldosini yaxshilash, yangi ish o‘rinlarini yaratish va uzoq muddatli iqtisodiy o‘sishni ta’minlashga xizmat qilishi aniqlangan.

Kalit so‘zlar: eksport, diversifikatsiya, iqtisodiy o‘sish, tashqi savdo, eksport tarkibi, makroiqtisodiy barqarorlik, valyuta tushumlari, yuqori qo‘shilgan qiymat, raqobatbardoshlik, tashqi bozor.

Abstract

This thesis studies the importance of diversifying the export structure in Uzbekistan in ensuring economic growth and foreign trade stability. It is argued that the dependence of exports on certain raw materials and limited foreign markets increases the vulnerability of the country's economy to price fluctuations in the world market, a decrease in external demand, and global economic risks. The study highlights the economic effects of developing exports of high-value-added industrial

products, finished food products, textiles, pharmaceuticals, electrical engineering, and services. It also analyzes the issues of expanding the geography of exports, financial support for exporting enterprises, introducing international standards, and improving transport and logistics infrastructure. The study found that diversifying the export structure helps stabilize foreign exchange earnings, improve the foreign trade balance, create new jobs, and ensure long-term economic growth.

Keywords: export, diversification, economic growth, foreign trade, export structure, macroeconomic stability, foreign exchange earnings, high value added, competitiveness, foreign market.

TAHLIL VA NATIJALAR

O‘zbekistonda eksport tarkibini diversifikatsiyalash iqtisodiy o‘sishni jadallashtirish, tashqi savdo tushumlarini barqarorlashtirish va milliy iqtisodiyotning tashqi omillarga bog‘liqligini kamaytirishda muhim ahamiyatga ega. Eksport hajmining oshishi mamlakatga xorijiy valyuta tushumlarini ko‘paytiradi, ishlab chiqarish korxonalarining faoliyatini kengaytiradi, yangi ish o‘rinlarini yaratadi va davlat budjeti daromadlarining o‘sishiga yordam beradi.

Biroq eksportning iqtisodiy samarasi faqat uning umumiy hajmiga bog‘liq emas. Eksport tarkibida xomashyo va qimmatbaho metallarning yuqori ulushi saqlanib qolsa, mamlakat tashqi bozorlardagi narx o‘zgarishlariga kuchli bog‘lanib qoladi. Shu sababli tayyor sanoat mahsulotlari, oziq-ovqat, to‘qimachilik, kimyo, farmatsevtika, elektrotexnika va xizmatlar eksportining ulushini oshirish muhim hisoblanadi.

1-jadval

O‘zbekistonning 2021–2025-yillardagi asosiy tashqi savdo ko‘rsatkichlari

Yillar	Tashqi savdo aylanmasi, mlrd AQSH dollari	Eksport, mlrd AQSH dollari	Import, mlrd AQSH dollari	Tashqi savdo saldosi, mlrd AQSH dollari	Eksportning importni qoplash darajasi, %
2021	42,17	16,66	25,51	–8,85	65,3
2022	50,50	19,73	30,77	–11,04	64,1
2023	63,53	24,87	38,66	–13,79	64,3
2024	67,24	27,27	39,97	–12,70	68,2
2025	81,17	33,81	47,35	–13,54	71,4

Manba: O‘zbekiston Respublikasi Milliy statistika qo‘mitasi ma’lumotlari asosida muallif tomonidan tuzilgan. 2025-yil ma’lumotlari dastlabki hisoblanadi.

Jadval ma’lumotlariga ko‘ra, O‘zbekiston tashqi savdo aylanmasi 2021-yildagi 42,17 mlrd AQSH dollaridan 2025-yilda 81,17 mlrd AQSH dollariga yetgan. Natijada tashqi savdo aylanmasi besh yil davomida 39 mlrd dollarga yoki 92,5 foizga oshgan. Ushbu o‘sish O‘zbekistonning xalqaro savdo munosabatlaridagi ishtiroki kengayib borayotganini ko‘rsatadi.

Eksport hajmi 2021-yilda 16,66 mlrd dollarni tashkil etgan bo‘lsa, 2025-yilda 33,81 mlrd dollarga yetgan. Besh yil davomida eksport hajmi 17,15 mlrd dollarga yoki qariyb 103 foizga ko‘paygan. Demak, 2025-yildagi eksport hajmi 2021-yildagiga nisbatan ikki baravardan ortiq bo‘lgan.

Import hajmi ham tahlil qilinayotgan davrda yuqori sur’atlarda o‘sgan. U 2021-yildagi 25,51 mlrd dollardan 2025-yilda 47,35 mlrd dollarga yetgan. Importning o‘sishi iqtisodiyotda investitsion talabning, ishlab chiqarish uskunalari, texnologiyalar, xomashyo va iste’mol mahsulotlariga bo‘lgan ehtiyojning ortishi bilan bog‘liq.

Tahlil qilinayotgan barcha yillarda import eksportdan yuqori bo‘lganligi sababli tashqi savdo saldosi manfiy shakllangan. Tashqi savdo taqchilligi 2021-yilda 8,85 mlrd dollarni tashkil etgan bo‘lsa, 2023-yilda 13,79 mlrd dollargacha oshgan. 2024-yilda mazkur ko‘rsatkich 12,70 mlrd dollargacha kamaygan, 2025-yilda esa 13,54 mlrd dollarni tashkil etgan.

Tashqi savdo saldosining manfiy bo‘lishi har doim ham iqtisodiyot uchun faqat salbiy holatni anglatmaydi. Agar importning asosiy qismini ishlab chiqarish uskunalari, texnologiyalar va investitsion mahsulotlar tashkil etsa, bunday import kelajakda ishlab chiqarish va eksport salohiyatining oshishiga xizmat qiladi. Biroq iste’mol mahsulotlari importining yuqori bo‘lishi milliy ishlab chiqarishning rivojlanishini cheklashi va valyuta bozoriga qo‘shimcha bosim ko‘rsatishi mumkin.

Eksportning importni qoplash darajasi 2021-yilda 65,3 foizni tashkil etgan. Ushbu ko‘rsatkich 2022-yilda 64,1 foizga pasaygan, 2023-yilda 64,3 foiz, 2024-yilda 68,2 foiz va 2025-yilda 71,4 foizni tashkil etgan.

2025-yilda eksportning importni qoplash darajasining 71,4 foizga yetishi ijobiy natija hisoblanadi. Bu eksportning importga nisbatan tezroq o‘sganini ko‘rsatadi. Shunga qaramay, eksport daromadlari import xarajatlarini to‘liq qoplamayotgani tashqi savdo muvozanatini yaxshilash uchun eksportni yanada diversifikatsiyalash zarurligini bildiradi.

2-jadval

O‘zbekiston eksportining 2021–2025-yillardagi o‘sish dinamikasi

Yillar	Eksport hajmi, mlrd AQSH dollari	Oldingi yilga nisbatan mutlaq o‘zgarish, mlrd dollar	Eksportning yillik o‘sish sur’ati, %
2021	16,66	–	110,0
2022	19,73	3,07	118,4
2023	24,87	5,14	126,0
2024	27,27	2,40	109,7
2025	33,81	6,54	124,0

Manba: O‘zbekiston Respublikasi Milliy statistika qo‘mitasi ma’lumotlari asosida muallif hisob-kitoblari.

Eksportning yillik dinamikasiga ko‘ra, 2022-yilda eksport hajmi 2021-yilga nisbatan 3,07 mlrd dollarga oshgan. 2023-yilda o‘sish 5,14 mlrd dollarni tashkil etib, eksportning yillik o‘sish sur’ati 26 foizga yetgan. Bu tahlil qilinayotgan davrdagi eng yuqori nisbiy o‘sish ko‘rsatkichlaridan biridir.

2024-yilda eksport hajmi 2,40 mlrd dollarga yoki 9,7 foizga oshgan. O‘sish sur’ati oldingi yilga nisbatan sekinlashgan bo‘lsa-da, eksportning mutlaq hajmi ko‘payishda davom etgan.

2025-yilda eksport hajmi 2024-yilga nisbatan 6,54 mlrd dollarga oshib, 33,81 mlrd dollarga yetgan. Yillik o‘sish sur’ati 24 foizni tashkil etgan. Bu besh yillik davrdagi eng katta mutlaq o‘sish hisoblanadi.

Eksport hajmining barqaror oshishi O‘zbekistonda ishlab chiqarish va xizmat ko‘rsatish imkoniyatlarining kengayib borayotganini bildiradi. Biroq eksportning umumiy hajmidagi o‘sishni uning tarkibiy o‘zgarishlaridan ajratib baholash to‘g‘ri emas. Ayrim yillarda oltin eksporti yoki uning jahon bozoridagi narxi umumiy eksport ko‘rsatkichiga sezilarli ta’sir ko‘rsatishi mumkin.

Eksport tarkibini diversifikatsiyalash iqtisodiy o‘sishga bevosita va bilvosita ta’sir ko‘rsatadi. Tayyor va yuqori qo‘shilgan qiymatli mahsulotlarning eksport qilinishi mamlakat ichida qo‘shimcha ishlab chiqarish bosqichlarini yaratadi. Natijada korxonalar daromadi, ishchilarning ish haqi, soliq tushumlari va aholining iste’mol talabi oshadi.

Masalan, paxta tolasini xomashyo sifatida sotishdan ko‘ra, undan ip-kalava, mato, tayyor kiyim-kechak va boshqa to‘qimachilik mahsulotlarini ishlab chiqarib eksport qilish iqtisodiyot uchun ko‘proq daromad keltiradi. Bunda bitta xomashyo asosida bir nechta ishlab chiqarish bosqichi va ko‘plab ish o‘rinlari yaratiladi.

Qishloq xo‘jaligi mahsulotlarini yangi holda eksport qilish bilan bir qatorda, ularni quritish, muzlatish, konservalash, sharbat va boshqa tayyor mahsulotlarga

aylantirish eksport qiymatini oshiradi. Qayta ishlangan mahsulotlarning saqlash muddati uzoq bo‘lib, ularni uzoq masofadagi bozorlarga yetkazib berish imkoniyati ham yuqori bo‘ladi.

Kimyo, farmatsevtika, mashinasozlik va elektrotexnika sanoatida eksportni kengaytirish iqtisodiyotning texnologik rivojlanishiga yordam beradi. Ushbu tarmoqlar yuqori malakali mehnat, zamonaviy uskunalar, ilmiy ishlanmalar va innovatsion boshqaruv usullarini talab qiladi. Natijada ishlab chiqarish samaradorligi va mehnat unumdorligi oshadi.

Eksport tarkibining diversifikatsiyalashuvi tashqi savdo tushumlarining barqarorligini oshiradi. Eksport daromadlari bir yoki ikki turdagi mahsulotga bog‘liq bo‘lsa, ushbu mahsulotlar narxining pasayishi mamlakatning umumiy eksport tushumlariga keskin ta’sir qiladi.

Turli tovarlar va xizmatlar eksport qilinadigan sharoitda bir mahsulot bo‘yicha yuzaga kelgan yo‘qotish boshqa mahsulotlar eksportidan olinadigan daromad hisobidan qisman qoplanadi. Bu tashqi savdo tushumlarining keskin tebranishini kamaytiradi.

Eksportning barqaror o‘sishi valyuta bozorida xorijiy valyuta taklifini ko‘paytiradi. Valyuta taklifining oshishi milliy valyuta kursining keskin o‘zgarishlari xavfini kamaytirishga xizmat qiladi. Milliy valyuta kursining barqarorligi esa import qilinadigan mahsulotlar narxi va umumiy inflyatsiya darajasiga ijobiy ta’sir ko‘rsatadi.

Eksport tushumlarining o‘sishi mamlakatning tashqi qarz majburiyatlarini bajarish imkoniyatini ham yaxshilaydi. Shu sababli eksport tarkibini diversifikatsiyalash to‘lov balansi va tashqi iqtisodiy xavfsizlikni mustahkamlashning muhim sharti hisoblanadi.

O‘zbekiston eksportini diversifikatsiyalashda xizmatlar sohasi katta imkoniyatlarga ega. Xizmatlar eksportiga transport, turizm, axborot texnologiyalari, ta’lim, tibbiyot, moliya va professional maslahat xizmatlari kiradi.

Axborot texnologiyalari xizmatlari eksporti katta hajmdagi transport va ombor xarajatlarini talab qilmasligi bilan ajralib turadi. Dasturiy ta’minot ishlab chiqish, masofaviy xizmatlar ko‘rsatish, biznes jarayonlarini autsorsing qilish va raqamli mahsulotlarni sotish orqali yuqori qo‘shilgan qiymat yaratish mumkin.

Turizm eksporti xorijiy turistlarning O‘zbekistonda qilgan xarajatlari orqali shakllanadi. Tarixiy shaharlar, ziyorat turizmi, ekologik va gastronomik turizm yo‘nalishlarini rivojlantirish turizm daromadlarini oshiradi. Turizm mehmonxona,

transport, umumiy ovqatlanish, savdo va hunarmandchilik kabi boshqa tarmoqlarni ham rivojlantiradi.

Transport xizmatlari eksportini rivojlantirishda O‘zbekistonning Markaziy Osiyodagi geografik joylashuvidan foydalanish mumkin. Xalqaro avtomobil va temir yo‘l yo‘nalishlarini kengaytirish, zamonaviy logistika markazlarini tashkil etish va tranzit jarayonlarini soddalashtirish mamlakatning transport xizmatlaridan oladigan daromadini oshiradi.

Eksportning importni qoplash darajasi 2021-yildagi 65,3 foizdan 2025-yilda 71,4 foizga oshgan. Bu eksport o‘sishining import xarajatlarini qoplash imkoniyatini yaxshilayotganini ko‘rsatadi.

Shunga qaramay, tashqi savdo saldosining manfiy bo‘lib qolayotgani eksportni miqdoriy oshirish bilan bir qatorda uning tarkibiy sifatini ham yaxshilash zarurligini bildiradi.

Eksport tarkibida yuqori qo‘shilgan qiymatli sanoat mahsulotlari, qayta ishlangan oziq-ovqat, farmatsevtika, elektrotexnika va xizmatlar ulushining oshishi iqtisodiy o‘sishni barqarorlashtiradi.

Eksport mahsulotlari va bozorlarining ko‘payishi tashqi savdo tushumlarining ayrim mahsulotlar narxi yoki cheklangan savdo hamkorlariga bog‘liqligini kamaytiradi.

XULOSA

O‘zbekistonda eksport tarkibini diversifikatsiyalash iqtisodiy o‘sishni jadallashtirish va tashqi savdo barqarorligini ta’minlashning muhim omillaridan biri ekanini ko‘rsatdi. Eksport hajmining oshishi mamlakatga xorijiy valyuta tushumlarini ko‘paytiradi, ishlab chiqarish faoliyatini kengaytiradi, yangi ish o‘rinlarini yaratadi hamda davlat budjeti daromadlarining o‘sishiga xizmat qiladi. Biroq eksportning iqtisodiyotga ta’siri faqat uning umumiy hajmi bilan emas, balki tovar tarkibi, geografik yo‘nalishi, texnologik darajasi va qo‘shilgan qiymati bilan ham belgilanadi.

2021–2025-yillardagi statistik ma’lumotlar tahliliga ko‘ra, O‘zbekiston eksport hajmi 16,66 mlrd AQSH dollaridan 33,81 mlrd AQSH dollariga yetib, qariyb ikki baravardan ortiq oshgan. Eksportning importni qoplash darajasi 65,3 foizdan 71,4 foizgacha ko‘tarilgan. Mazkur natijalar mamlakatning eksport salohiyati kengayib borayotganini ko‘rsatsa-da, tashqi savdo balansida manfiy saldoning saqlanib qolishi eksport tarkibini yanada takomillashtirish zarurligini bildiradi.

Tahlillar eksport tarkibida ayrim xomashyo mahsulotlari va qimmatbaho metallarning ulushi yuqori bo‘lib qolayotganini ko‘rsatdi. Bunday holat eksport tushumlarini jahon bozoridagi narxlar tebranishi va tashqi talabning o‘zgarishiga

bog‘lab qo‘yadi. Shu sababli xomashyoni chuqur qayta ishlash, tayyor va yuqori qo‘shilgan qiymatli mahsulotlar ishlab chiqarish hamda eksport qilishni kengaytirish muhim hisoblanadi.

To‘qimachilik, oziq-ovqat, kimyo, farmatsevtika, elektrotexnika, mashinasozlik va qurilish materiallari sanoatida tayyor mahsulotlar eksportini oshirish milliy iqtisodiyotda qo‘shimcha qiymat yaratadi. Bu esa ishlab chiqarish hajmi, bandlik, korxonalar foydasi va soliq tushumlarining ko‘payishiga olib keladi. Natijada eksportning iqtisodiy o‘sishga ta’siri yanada kuchayadi.

Eksport tarkibini diversifikatsiyalashda xizmatlar sohasi ham katta imkoniyatlarga ega. Axborot texnologiyalari, turizm, transport, logistika, ta’lim va tibbiyot xizmatlari eksportini rivojlantirish valyuta tushumlarining yangi manbalarini shakllantiradi. Ayniqsa, IT xizmatlari eksporti katta transport xarajatlarini talab qilmasligi va yuqori qo‘shilgan qiymat yaratishi bilan O‘zbekiston uchun istiqbolli yo‘nalish hisoblanadi.

Eksport geografiyasini kengaytirish ham tashqi savdo barqarorligini ta’minlashning muhim shartidir. Eksportning cheklangan miqdordagi davlatlar bozoriga bog‘lanib qolishi tashqi iqtisodiy xavflarni oshiradi. Shu sababli an’anaviy savdo hamkorlari bilan bir qatorda Yevropa, Yaqin Sharq, Janubiy Osiyo, Janubi-Sharqiy Osiyo va Afrika bozorlarini o‘zlashtirish zarur.

Tadqiqot davomida eksportni diversifikatsiyalashga to‘sqinlik qilayotgan qator muammolar ham aniqlandi. Jumladan, transport-logistika xarajatlarining yuqoriligi, dengiz portlariga bevosita chiqish imkoniyatining mavjud emasligi, xalqaro sertifikatlashtirishdagi qiyinchiliklar, eksportni moliyalashtirish imkoniyatlarining cheklanganligi va tashqi bozorlar haqidagi axborotlarning yetarli emasligi eksportchi korxonalar faoliyatiga salbiy ta’sir ko‘rsatmoqda.

Mazkur muammolarni bartaraf etish uchun xalqaro transport yo‘laklarini rivojlantirish, bojxona jarayonlarini raqamlashtirish, eksport kreditlari va sug‘urta xizmatlarini kengaytirish, xalqaro sertifikatlarni olish xarajatlarini qo‘llab-quvvatlash hamda eksportchi korxonalarga marketing va axborot xizmatlarini taqdim etish lozim.

Kichik biznes va xususiy tadbirkorlik subyektlarini eksport faoliyatiga keng jalb qilish ham muhim ahamiyatga ega. Ularni moliyaviy, maslahat, marketing va logistika xizmatlari bilan qo‘llab-quvvatlash yangi eksport mahsulotlarining paydo bo‘lishiga, hududlarning eksport salohiyati oshishiga hamda tashqi savdo tushumlarining ko‘payishiga xizmat qiladi.

Umuman olganda, O‘zbekistonda eksport tarkibini diversifikatsiyalash uzoq muddatli iqtisodiy o‘sish, valyuta tushumlari barqarorligi va tashqi savdo muvozanatini yaxshilashning asosiy shartlaridan biridir. Eksport hajmini oddiy oshirishdan yuqori qo‘shilgan qiymatli, texnologik murakkab va barqaror talabga ega mahsulot hamda xizmatlar eksportiga o‘tish mamlakat iqtisodiyotining tashqi shoklarga chidamliligini kuchaytiradi.

Shu bois eksport siyosatini sanoat, investitsiya, innovatsiya, transport-logistika va hududiy rivojlanish siyosati bilan uyg‘un holda amalga oshirish zarur. Bunday kompleks yondashuv O‘zbekistonning xalqaro bozordagi raqobatbardoshligini oshirish, tashqi savdo barqarorligini mustahkamlash va barqaror iqtisodiy o‘sishni ta’minlashga xizmat qiladi.

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UDK: 632,4

TOKNING SOXTA UN-SHUDRING YOKI MILDYU KASALLIGI ZARARI VA UNI O'RGANISHNING AHAMIYATI.

YAZDURDIYEV SIROJIDDIN DILSHOD O'G'LI

Anotatsiya. Tokning asosiy kasalliklaridan biri bu soxta un-shudring yoki mildyu kasalligidir. Ushbu kasallik tokga sezirarli darajada zarar yetkazadi. Shuning uchun ushbu maqolada soxta un-shudring yoki mildyu kasalligining zararini tahlil qilish va o'rganish haqida gap yuritilgan.

Аннотация. Одной из основных болезней винограда является мучнистая роса. Это заболевание существенно повреждает лозу. Поэтому данная статья посвящена анализу и изучению вреда, причиняемого мучнистой росой.

Kalit so'zlar. Tok, uzum, kasallik, qo'zg'atuvchi, zamburug; , zarar, hosil, un-shudring.

Ключевые слова. Виноград, болезнь, патоген, гриб, повреждать, урожай, повреждатьмучная роса.

KIRISH. Respublikamizda yetishtiriladigan uzum navlari jahon standarti talabiga javob bermayapti. Mavjud kishmish navlariga ham bir qancha kasalliklar zarar etkazish natijasida hosildorlikni 60-80% qismi nobud bo'ladi. Chunki ularning sifat ko'rsatkichi past bo'lib, asosan 50-60% jahon standarti talabiga javob beradi. Shuning uchun mikroorganizmlar qo'zg'atadigan kasalliklarni chuqur o'rganish va yuqori sifatli uzum navlarini tanlash, ishlab chiqarishga tadbiq qilish hozirgi kunning dolzarb muammolaridan biridir.

Tokning *Plazmapara viticola* (Berk, et Cart) Berl, et de Toni qo'zg'atadigan mildyu kasalligi ilgari Evropada noma'lum bo'lgan. Faqat XIX asrning ikkinchi yarmida, bu kasallik 1878 yili Fransiyaning janubiy hududlarida aniqlangan. Bu kasallik Fransiyaga Amerikadan keltirilgan tok navlari bilan kelib qolgan. Fon Timani va Plansh, bu ikki olim bir vaqtning o'zida mildyu kasalligini qo'zg'atuvchi zamburug', 1863 yili De Bari tokning amerika navlarida aniqlagan va *Perenospora*

viticola deb nomlagan kasallik qo‘zg‘atuvchi bilan bir xil zamburug‘ ekanligini aniqlashgan.

Mildyu bilan tokning barcha yashil qismlari zararlanadi. Barglarda tomirlar orasida, oldin sarg‘ish, moysimon, so‘ngra qizg‘ish-qo‘ng‘ir, qirrali, kengligi 2-3 sm keladigan, ba’zan atrofida xlorozli dog‘lar paydo bo‘ladi. YUqori namlikda bargning ostki tomonida, ustidagi dog‘larning qarshisida, mayin, qalin, zich, baroq, oq tusli mog‘or qatlami rivojlanadi. Bu qatlam qo‘zg‘atuvchi zamburug‘ning sporangiofora va sporangiylaridan iborat bo‘lib, ular qo‘zg‘atuvchi uzum bog‘ida tarqalishi, novda, gul va mevalarni zararlashi va qishlashi uchun muhim manbaa hisoblanadi. Kuchli zararlangan barglar ko‘pincha to‘kiladi. Natijada uzumda qand moddasi kam hosil bo‘ladi va qishlovchi kurtaklarning sovuqqa chidamliligi kamayadi.Zararlangan yashil novdalarda qo‘ng‘ir, biroz botiq dog‘lar paydo bo‘ladi. Novdaning uch qismi zararlanganida u yo‘g‘onlashadi, qing‘ir-qiyshiq bo‘lib qoladi, yuqori namlik sharoitida usti oq qatlam bilan qoplanadi (bunday novda “bayroq novda” deb ataladi), oxiri qo‘ng‘ir tus oladi va nobud bo‘ladi. Bunga o‘xshash belgilar barg bandi, gajaklari, yosh to‘pgullar va gul bandlarida ham rivojlanadi va ularni nobud qiladi.



1-rasm. **Soxta un-shudring yoki mildyu kasalligining uzum bargidagi zarari.**

Meva tugunchalari va g‘o‘ralar kuchli zararlanadi, usti noaniq-kulrang tus oladi va baroq g‘ubor bilan qoplanadi. Vaqt o‘tishi bilan uzumning kasallikka chidamliligi ortadi, ammo qo‘zg‘atuvchi zamburug‘ etilgan mevaga zararlangan shingilning o‘qlaridan o‘tishi va zararlashi mumkin. Zararlangan mevalarda g‘ubor hosil

bo‘lmaydi, ular qo‘ng‘ir tus oladi va chiriydi. Zararlangan mevasi oq uzumlar noaniq-kulrang-yashil, mevasi qoralari esa nimrang-qizg‘ish tus oladi. Sog‘lom uzumdan farqli o‘laroq zararlanganlari yumshamaydi, eti qattiq bo‘lib qoladi, ularning ayrimlari yoki butun uzum bosh to‘kilib ketishi mumkin.



2-rasm. **Soxta un-shudring yoki mildyu kasalligining uzum mevasidagi zarari.**

Yozi nam va iliq mamlakatlarda kasallik kuchli rivojlanganda va kurash choralari qo‘llanilmaganda uzum hosili butunlay yo‘qotilishi mumkin. O‘zbekistonning mildyu tarqalgan viloyatlarida sernam 2001-2003 yillarda kasallik tokning xo‘raki navlari barglarining 75-80 foizi zararlanishi va 25-30 foizi to‘kilishi, to‘pgullarning 95-97 foizi qurib qolishiga olib kelgan; kamroq zararlangan vinobop navlar hosili o‘rtacha 25-45% ga kamaygan. May-iyun oylari quruqroq kelgan 2004 yili xo‘raki navlarda kasallik kamroq rivojlanishi, to‘pgul va g‘o‘ralarning 5-10 foizi qurib qolishi kuzatilgan.

Qo‘zg‘atuvchi Peronosporales tartibiga mansub oomitset tuban zamburug‘i *Plasmopara viticola*. Zamburug‘ obligat parazit, gifalari hujayralar orasida, hujayralar ichiga diametri 4-10 mkm keladigan gaustoriylari bilan kiradi va ozuqa moddalarni so‘rib oziqlanadi. Jinssiz ko‘payish bosqichining sporangioforalari ustitsalardan dastalarda chiqadi, ostki qismi biroz kengroq, 140-850x8-12 mkm, ustki qismi bir necha marta shoxlangan, shoxchalarining uchlaridagi tishchalarda (bir sporangioforada 200 tagacha) sporangiylar paydo bo‘ladi. Sporangiylari tuxum yoki ellipsoid shaklli, rangsiz, 12-30x8-17 mkm. Har bir sporangiy ichida 1-10 ta buyrak shaklli, ichiga

bukilgan joyidan chiqadigan ikkita xivchinchali, o‘lchami 6-8x4-5 mkm keladigan zoosporalari mavjud. Har xil jinsiy belgili zoosporalar qo‘shiladi va geterokariotik mitseliy hosil qiladi.



3-rasm. **Soxta un-shudring yoki mildyu kasalligi qo’zg’atuvchisining mikroskopik ko’rinishi.**

Zamburug‘ning jinsiy ko‘payishi o‘simlik (barg va ehtimol, boshqa zararlangan organlar) to‘qimalari ichida o‘tadi. Oogoniylari dumaloq, deyarli rangsiz yoki sarg‘ish qobiqli. Anteridiyning suyuqligi oogoniyga oqib o‘tadi va ko‘p miqdorda (1 mm^2 da 250 tagacha) oosporalar hosil bo‘ladi. Oosporalar diametri 20-120 mkm, ikkita qobig‘i, ularning sirtida oogoniydan qolgan usti burushiq qobig‘i ham bor. Oosporalar suv tomchisida keyingi bahorda o‘sadi va bir yoki ikkita ingichka (kengligi 2-3 mkm) murtak naycha paydo qiladi, ularning uchida o‘lchami 35-55x25-28 mkm keladigan, nok shaklli sporangiylar va ularning ichida esa 30-56 ta buyrak shaklli zoosporalar paydo bo‘ladi. Ular qo‘shiladi va hosil bo‘lgan geterokariotik mitseliy tok to‘qimasiga kirib, zararlaydi.

Xulosa. Tokning soxta un-shudring kasalligini qo‘zg‘atuvchisi *Plasmopara viticola* zamburug‘i *Perenosporales* tartibiga mansub. Kasallik bilan tokni hamma er ustki qismlari kasallanadi. Bahorda yosh barglarni ustki qismida ko‘kish rangga kirib sarg‘ish dog‘lar paydo bo‘lib, keyinchalik qo‘ng‘ir rangga aylanadi. Samarali kurash choralarini amalga oshirish uchun agrotexnik tadbiriy choralarni yuqori darajada o‘tkazish, sifatli xomtok qilish, tarash, qator oralig‘ini yumshatish, me’yorida sug‘orish, shamollatish ishlarini sifatli qilib o‘tkazish kerak.

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Clinical Significance of Anti-Müllerian Hormone and Antral Follicle Count in Ovarian Reserve Assessment: An Integrative Evidence Review of Reproductive Prediction, Real-World Analytics, and Precision Care

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Abstract

Background: Anti-Müllerian hormone (AMH) and antral follicle count (AFC) are widely used to estimate the quantitative component of ovarian reserve, but their interpretation is frequently distorted when ovarian stimulation response is conflated with natural fertility or live-birth probability. Objective: To critically synthesize the clinical utility, technical limitations and implementation implications of AMH and AFC, including their role in assisted reproductive technology, reproductive aging, polycystic ovary syndrome, fertility preservation and real-world evidence generation. Methods: This integrative evidence review uses publicly verifiable professional guidance and peer-reviewed methodological and clinical publications, with emphasis on the 2020 American Society for Reproductive Medicine committee opinion, the updated European Society of Human Reproduction and Embryology ovarian-stimulation guidance and World Health Organization infertility guidance. Sources were interpreted narratively; no de novo participant-level dataset, pooled meta-analysis or prospectively registered systematic search was conducted. Results: AMH and AFC offer clinically useful and broadly comparable estimates of expected oocyte yield and risk of an unexpectedly low or excessive ovarian response. Neither is a stand-alone measure of oocyte competence; chronological age and contextual clinical factors remain central to counseling about pregnancy and live birth. Discordance between assays and ultrasonography, hormonal contraceptive exposure, PCOS, recent ovarian interventions and laboratory platform variation complicate thresholds. Real-world registries may inform calibration and equity of implementation but require careful handling of confounding, missingness, selection and treatment changes. Artificial intelligence can improve image measurement and risk stratification only when externally validated and clinically governed. Conclusions: Clinical benefit comes from

indication-specific testing, standardized analytical procedures, transparent uncertainty and respect for reproductive autonomy, rather than categorical labels based on a single threshold. The proposed Uzbekistan research framework prioritizes longitudinal registries, ultrasound quality assurance, assay traceability, fertility-treatment linkage and patient-centered outcomes.

Keywords

anti-Müllerian hormone; antral follicle count; ovarian reserve; infertility; ovarian stimulation; IVF; assisted reproductive technology; reproductive aging; diminished ovarian reserve; real-world evidence; causal inference; artificial intelligence; fertility preservation; precision medicine

1. Introduction

Conceptual boundaries

Ovarian reserve denotes the remaining pool of ovarian follicles, whereas reproductive potential depends on the much broader joint biology of follicle number, oocyte competence, ovulation, sperm factors, tubal function, endometrial receptivity, lifestyle, reproductive history and time. A biomarker that correlates with the number of oocytes retrieved under pharmacological stimulation need not accurately predict conception without treatment. This distinction is essential to prevent unnecessary anxiety, expensive interventions and misleading claims about a personalized biological clock. Professional guidance cautions against using ovarian reserve testing as a general fertility test. [1,2]

Why two complementary markers matter

AMH is secreted predominantly by granulosa cells of early developing follicles and measured from blood, whereas AFC counts ultrasound-visible small antral follicles across both ovaries. The two measures reflect overlapping yet nonidentical aspects of ovarian biology. AMH is affected by assay calibration, ovarian pathology and medication exposure; AFC depends on imaging equipment, follicle-size definition, examination technique and observer training. Their clinical value therefore emerges from their measurement context, not from apparently precise isolated numbers. [1,2]

Real-world data and evidence

Real-world data (RWD) are routinely collected clinical or patient-generated observations such as electronic records, laboratory results, ultrasound metadata, prescribing histories, treatment-cycle logs and patient-reported outcomes. Real-

world evidence (RWE) comprises inferences about intervention use, effectiveness or safety derived through analysis of RWD. A large registry is not automatically causal evidence: credible RWE needs clear eligibility criteria, endpoint definitions, measurement timing, data completeness and analytical assumptions. FDA and EMA frameworks describe the role of such evidence in regulatory decisions, but do not imply that every observational association establishes clinical effectiveness. [7–10]

RCTs versus implementation evidence

Randomized controlled trials (RCTs) estimate intervention effects under allocation procedures that, when properly conducted, minimize confounding. They can test whether AMH-guided gonadotropin dosing reduces ovarian hyperstimulation or changes live-birth outcomes. RWD studies can evaluate how such protocols perform across clinics, payer groups, laboratory platforms and populations under routine practice. Yet observational comparisons of AMH-guided versus conventional treatment are vulnerable to confounding by baseline risk, physician preference, treatment accessibility and treatment changes during follow-up. Both designs answer distinct and complementary questions. [7,8,14]

Efficacy and effectiveness

Efficacy describes performance under controlled trial conditions; effectiveness denotes benefit under ordinary practice. A dosing strategy may have high efficacy in a specialist trial but lower effectiveness when ultrasound expertise varies, medications are unavailable, laboratory turnaround is slow or follow-up is incomplete. By contrast, a simpler pathway relying on a well-performed AFC may yield comparable real-world utility in settings without standardized AMH testing. The appropriate assessment includes costs, safety, patient burden, equitable access, treatment delays and live birth—not predictive discrimination alone. [1,2,8]

Regulation and computational medicine

WHO stresses fair access to infertility services and responsible AI governance. FDA RWE guidance and EMA DARWIN EU illustrate how structured health data can support evaluation while demanding data reliability. Machine learning may automate follicle counting and integrate multidimensional risk profiles; deep learning may extract sonographic image features; language models may facilitate structured record abstraction. None of these technologies removes the need for careful target definition, external validation, calibration, equity evaluation and appropriate clinical oversight. [3,7–12]

2. Materials and Methods

Study design. This article is a critical integrative narrative review rather than a registered systematic review or original clinical cohort. Evidence was prioritized from ASRM, ESHRE and WHO practice documents, followed by indexed peer-reviewed research and authoritative FDA/EMA methodological guidance. The sources cited were identified through targeted public-source retrieval and reference chaining; a comprehensive reproducible search of subscription-only Embase, Scopus and Web of Science was not performed. Journals including Fertility and Sterility and Human Reproduction were prioritized when relevant; naming a journal or database does not mean all holdings were searched. No invented study counts, pooled effects, participant datasets or database-search flow chart are reported.

Eligibility and appraisal. Included material addressed biological or analytical validity of AMH/AFC, prediction of ovarian response or clinical outcomes, contextual factors (PCOS, hormonal medication, surgery, age), assisted reproduction, causal study designs, digital health, safety or implementation. Greater evidentiary weight was assigned to guideline synthesis, systematic methods and clinical designs with appropriate comparators and endpoints. Exclusions covered unverified claims, noninterpretable cutoff thresholds, commercially promoted tests without independent validation and data unable to separate ovarian response from live-birth prediction.

Synthesis procedure. We separated construct validity (what the assay measures), technical reproducibility, prediction of oocyte yield, prediction of patient-important outcomes, effects of test-guided treatment decisions and implementation feasibility. Where primary sources reported numerical statistics, those values are explicitly attributed rather than re-pooled. In the absence of a comparable endpoint and reference population, numbers were not averaged. Tables offer interpretive matrices instead of fictitious pooled effect estimates.

Propensity score matching (PSM)

Estimate probability of exposure to a particular testing pathway conditional on pre-exposure covariates, match treated and comparator cases on overlap, then inspect standardized mean differences and loss of unmatched individuals. Do not condition on variables measured after treatment initiation or treat matching as eliminating unmeasured confounding.

Inverse probability weighting (IPW)

Weight observations by the inverse estimated probability of received treatment, and for follow-up by inverse censoring probabilities. Check propensity positivity, extreme weights, stabilizing and truncation choices. In IVF registers, time-varying treatments and selection into embryo transfer demand separate consideration.

Cox regression and survival analysis

Define an origin, event, censoring process and risk set before fitting hazards for time to pregnancy, treatment discontinuation or live birth. Check proportional hazards and competing risks; hazard ratios are not simple probability ratios. Recurrent stimulation cycles or competing cessation decisions complicate independence.

Kaplan–Meier methodology

Estimate event-free survival when right censoring is approximately noninformative. Do not use a naive cumulative live-birth curve if fertility treatment discontinuation, competing pregnancy outcomes or informative dropout bias interpretation.

Target-trial emulation

Specify eligibility, treatment strategies (for instance AMH-guided versus AFC-guided dosing), assignment time, grace period, follow-up, outcome, estimand and analysis plan. Align time zero to avoid immortal-time bias. Approximating randomized assignment requires explicit assumptions about confounding.

Causal inference

Use directed acyclic graphs to decide adjustment sets, distinguish total from direct effects, consider collider bias from selecting IVF patients, and report sensitivity analyses for unmeasured confounding. Observed predictive relationships are not themselves causal effects.

Machine learning (ML)

Use regularized regression, gradient boosting or other models to forecast oocyte yield, high response or cancellation. Split by patient and clinic in temporal validation, avoid cycle leakage, and report calibration, discrimination, clinical utility and subgroup fairness.

Deep learning (DL)

Automated ultrasound segmentation/counting may reduce some observer workload but needs reliable labels, external equipment validation, reproducibility audits, quality flags and escalation pathways for atypical ovaries.

Natural language processing (NLP) and large language models

Convert narrative ultrasound and reproductive histories to structured variables only with supervised error audits. Negation, missing sides, measurement units, historic results and copied notes are common failure modes; generated text cannot replace verified data.

Reinforcement learning

Policy optimization for adaptive dosing is exploratory: reward functions must explicitly penalize ovarian hyperstimulation, excessive intervention and inequity. Offline policy evaluation requires behavior-policy overlap and safeguards; no autonomous clinical dosing is recommended.

3. Results: Structured Synthesis of Clinical and Methodological Evidence

3.1 Biological interpretation of AMH

AMH predominantly reflects the number and activity of growing small follicles rather than a direct microscopic census of primordial follicles. A serum result therefore measures an indirect biological phenotype, not remaining reproductive lifespan. Follicular development, granulosa-cell physiology and population differences complicate the mapping from laboratory concentration to anatomical reserve. Biological interpretation is particularly fragile when a testing platform changes or when serial results from different laboratories are juxtaposed as though interchangeable.

Clinical interpretation: The relevant comparison is not merely whether this information can be measured, but whether acting on the measurement improves outcomes for the specific patient population. Analysis should distinguish pretest probability, measurement error, treatment-selection processes and downstream decisions. A robust protocol should predefine the decision threshold, document meaningful harms from incorrect classification and make uncertainty visible to clinicians and patients. Routine care datasets can test the transportability of the result, provided eligibility, exposure timing and outcome ascertainment are not confused with the biology of reserve. [1,2,7,8]

Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.2 AFC as an imaging-derived phenotype

AFC enumerates ultrasound-visible small follicles, often using a two-to-ten-millimeter range under established protocols. The count is jointly determined by follicle visibility, sonographer technique and the actual follicular population. Measurements benefit from defined cycle timing, high-resolution transvaginal scanning where appropriate and explicit bilateral documentation. In patients in whom transvaginal scanning is unsuitable, alternative approaches have different measurement performance and should not be considered interchangeable without validation.

Clinical interpretation: The relevant comparison is not merely whether this information can be measured, but whether acting on the measurement improves outcomes for the specific patient population. Analysis should distinguish pretest probability, measurement error, treatment-selection processes and downstream decisions. A robust protocol should predefine the decision threshold, document meaningful harms from incorrect classification and make uncertainty visible to clinicians and patients. Routine care datasets can test the transportability of the result, provided eligibility, exposure timing and outcome ascertainment are not confused with the biology of reserve. [1,2,7,8]

Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a

seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.3 Relative prediction of ovarian response

ESHRE's updated ovarian-stimulation guidance recommends either AMH or AFC for predicting low and high stimulation response. This recommendation pertains to response stratification, not direct prediction of pregnancy. Quantitative prediction can guide initial counseling and risk mitigation, but cutoff values must be tied to a specific assay, study population, stimulation protocol and response definition. A model accurately classifying extreme oocyte yields may still fail to improve outcomes if acting on its predictions changes only dose without meaningful patient benefit. [2]

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3.4 Pregnancy, live birth and patient counseling

ASRM concludes that ovarian-reserve markers are poor independent predictors of natural reproductive potential and do not justify denying infertility treatment. Chronological age provides major prognostic information about reproductive quality that AMH and AFC cannot replace. A low AMH concentration may coexist with viable

oocytes and a successful pregnancy; conversely, a high level does not guarantee embryo euploidy or implantation. Counseling should communicate conditional probabilities rather than label patients fertile or infertile based on an isolated biomarker. [1]

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3.5 Discordance between AMH and AFC

The two measurements can diverge because of biological, technical or timing factors, and apparent disagreement may be exaggerated near arbitrary cutoff thresholds. Discordance requires a review of original reports, laboratory units, test platform, follicle-count protocol and prior ovarian surgery rather than reflexive repeated testing. A repeat measurement is clinically defensible only if it can alter a consequential decision and if reproducibility can be improved by using a consistent assay or experienced scanner.

Clinical interpretation: The relevant comparison is not merely whether this information can be measured, but whether acting on the measurement improves outcomes for the specific patient population. Analysis should distinguish pretest

probability, measurement error, treatment-selection processes and downstream decisions. A robust protocol should predefine the decision threshold, document meaningful harms from incorrect classification and make uncertainty visible to clinicians and patients. Routine care datasets can test the transportability of the result, provided eligibility, exposure timing and outcome ascertainment are not confused with the biology of reserve. [1,2,7,8]

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3.6 Age-specific risk assessment

The same absolute AMH or AFC may have different implications at different ages. Population percentiles are not individualized chances of pregnancy, and they may not transport across ethnic, clinical or laboratory populations. Interpretation should start with the reason for testing, age, menstrual and treatment history, and the patient's reproductive priorities. Age-by-marker interactions should be evaluated before adopting uniform action thresholds for broad reproductive populations.

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Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant

medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.7 AMH, AFC and PCOS

Polycystic ovary syndrome frequently features increased small follicle number and elevated AMH, but high reserve markers do not necessarily indicate higher fertility because anovulation may dominate the clinical picture. Use of AMH in adult PCOS diagnostic algorithms has separate requirements from its use for predicting ovarian response. The stimulation context also includes elevated risk of excessive response, reinforcing the need for protocol-specific interpretation and prevention-oriented counseling.

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3.8 Hormonal contraception and temporal variability

Hormonal contraception may suppress measurable AMH or AFC in some circumstances. Testing undertaken during exposure should be interpreted cautiously and clinical decisions should consider whether retesting after a suitable interval would change treatment. Menstrual-cycle phase matters less for AMH than for some other hormones, but analytical or within-person fluctuations remain possible. Serial trajectories assembled from different assay generations can create false impressions of accelerated follicle loss.

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3.9 Endometriosis and ovarian surgery

Endometriomas and their treatment can alter ovarian structure and measured reserve. A postoperative decline in AMH may reflect diminished function or tissue injury, yet a single concentration does not fully capture subsequent fertility options. Decision-making must weigh pain, malignancy concern, accessibility of follicles, surgical risk and preservation of tissue. There is a major difference between predicting biochemical change and demonstrating better fertility outcomes after a particular intervention.

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3.10 Gonadotoxic exposures and fertility preservation

Before potentially gonadotoxic chemotherapy or other ovarian interventions, AMH and AFC can contribute to contextual counseling but cannot precisely forecast individual fertility recovery. Treatment regimen, dose, age and fertility goals remain relevant. Measurement should never be used to delay a time-sensitive cancer treatment without a multidisciplinary plan. Longitudinal post-treatment values require consistent sampling and careful interpretation because temporary treatment-related suppression can be misread as irreversible depletion.

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3.11 Assisted reproduction and individual dosing

A patient entering IVF needs a clinically meaningful forecast of low or excessive response, an account of adverse events and transparent explanation of treatment options. Biomarker-guided protocols may rationalize initial dosing, yet larger oocyte numbers are only intermediate endpoints. An ideal treatment decision minimizes ovarian hyperstimulation and unnecessary cancellations while preserving cumulative live-birth opportunity, patient autonomy and affordability. Reporting embryo-transfer-only outcomes can distort the assessment if poorly responding patients are excluded before transfer.

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Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time

would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.12 Biomarker accuracy and data transportability

Predictive discrimination must be interpreted alongside calibration, decision thresholds and local disease prevalence. A model that generalizes within one center may miscalibrate in a population with different age distribution, PCOS burden, laboratory platform or stimulation practice. Every clinical model should be audited in an external setting and periodically recalibrated. Reports should distinguish cross-validated apparent performance from independent prospective evaluation rather than describing both as validation.

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3.13 Electronic health records and clinic workflow

EHRs can join the indication for AMH testing, menstrual history, ultrasound measurements, hormonal medication and treatment outcome. However, ovarian-reserve testing is often ordered selectively, introducing confounding by indication. Referral-only data may underrepresent women who conceive without treatment. Recording whether values were collected before stimulation, after prior cycles or during contraception is necessary for a scientifically interpretable registry.

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3.14 Electronic prescribing and pharmacy datasets

Electronic prescriptions allow tracking of gonadotropin type, starting dose, dose escalation, trigger selection and adjunctive therapy. Dispensing is not equivalent to administration or adherence; medication changes require dates. Comparisons of regimens must account for physician decisions informed by AMH and AFC. Treatment-effect questions should not simply compare patients assigned high versus low doses without addressing baseline response risk.

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3.15 Laboratory databases and assay harmonization

Laboratory systems contribute AMH results, units, assay manufacturer, reference ranges and quality-control flags. Values from different assay generations are not automatically exchangeable. Research-grade harmonization requires explicit version control, calibrated conversion only where scientifically justified and laboratory participation in external quality assurance. Missing platform identifiers can compromise multicenter comparisons even when specimen counts are large.

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3.16 National reproductive registries

National ART registries can follow initiation, oocyte retrieval, embryo development, transfer and eventual birth, allowing analysis of cumulative outcomes. Registries must capture patients with canceled cycles and disconnected follow-up; otherwise survival analyses inflate success probabilities. Cross-clinic linkage and deduplication matter when patients change providers. Collecting only treatment successes produces severe selection bias.

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3.17 Insurance data and access inequity

Insurance claims reveal service utilization and financial barriers but do not reliably capture follicle imaging quality or ovarian biology. Reimbursement incentives may alter who is tested, who receives IVF and whose pregnancy outcome remains observed. Socioeconomic measures, referral pathways and regional access therefore belong in models of treatment uptake. Equity audits should examine whether biomarker-based triage disadvantages rural patients or people unable to afford repeated assays.

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3.18 Wearables, mobile apps and patient-generated evidence

Wearables and reproductive-health apps can contribute menstrual-cycle tracking, treatment symptoms and some longitudinal patient-reported measures. They do not directly count ovarian follicles and should not be marketed as equivalent to AMH or AFC. Self-reported events are vulnerable to selective participation, missingness and device changes. Their greatest research contribution may lie in capturing symptom burden, care continuity and patient priorities between clinic visits.

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3.19 Pharmacovigilance and ovarian stimulation safety

Safety surveillance should focus on ovarian hyperstimulation syndrome, medication reactions, procedural harms and clinically significant treatment discontinuation. Passive adverse-event reports can detect signals but cannot establish incidence without a denominator. Electronic prescribing and outcomes registries can support stronger active surveillance if exposure, person-time and clinical severity are consistently defined. AMH and AFC serve as contextual risk markers, not pharmacovigilance endpoints in themselves.

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3.20 Machine learning for oocyte-yield prediction

Prediction algorithms can integrate age, AMH, AFC, body mass index, stimulation dose, prior response and diagnosis. The design must distinguish baseline models, built from information available before therapy, from dynamic models that incorporate treatment responses. Including actual later-cycle follicle counts in a pretreatment model creates target leakage. Models should report patient-level uncertainty and clinical value, not only a high area under the receiver-operating-characteristic curve.

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as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.21 Computer vision for follicle counting

Deep-learning systems may assist ovarian ultrasound segmentation and identification of follicles in static frames or cine loops. They are vulnerable to shadowing, overlapping follicles, hardware domain shifts and inconsistent annotation criteria. Expert adjudication, ultrasound phantom quality control and multicenter test sets are necessary. The correct output includes confidence, image-quality flags and recommended manual review where the algorithm cannot count reliably.

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3.22 Natural language processing and LLMs

Clinic notes often contain AMH, AFC and stimulation outcomes in free text, with duplicate or copied measurements. NLP can retrieve these data but must identify negation, measurement date, laterality and contextual meaning. Large language models may summarize counseling or facilitate registry abstraction, yet hallucinated

quantities or untraceable summaries are unacceptable. Human verification and source-linked extraction should precede any consequential use.

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3.23 Precision and pharmacogenomics

Pharmacogenetics and genomic variants may eventually refine gonadotropin sensitivity estimates, but clinical utility requires evidence that genotype-informed decisions improve patient outcomes over simpler strategies. A genomic association with ovarian reserve does not validate a medication-dosing rule. Precision reproductive care should combine explanatory biology, clinically calibrated prediction, access constraints and shared decision-making while avoiding premature stratification into deterministic categories.

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3.24 Cross-specialty prediction and transfer limits

Methods developed for diabetes, cardiovascular diseases, oncology, infectious disorders and neurology can teach general lessons about robust RWD analysis. Nevertheless, a model trained on drug response in another specialty does not transfer to ovarian-reserve evaluation simply because both involve electronic records. Biological mechanisms, intervention timing, target events, censoring and utility differ. Cross-specialty methods are transferable; disease-specific empirical performance is not.

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3.25 Clinical policy scenarios and economic value

Testing policies should compare AMH alone, AFC alone, both tests, and indication-specific no testing against meaningful alternatives. Incremental information may justify dual testing for selected discordant or difficult cases, but routine duplication increases cost and can magnify confusion. Cost-effectiveness must consider local unit prices, specialist availability, procedural safety and loss from unnecessary treatment delays. Without such information, assertions of universal economic superiority are not warranted.

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3.26 Uzbekistan: proposed interoperable reproductive-health pathway

A feasible implementation roadmap for Uzbekistan would establish a standardized ovarian-reserve minimum dataset, compatible ultrasound reporting templates, assay metadata capture and a consent-based linkage of reproductive services. A pilot could assess between-center differences in AMH platform, AFC reporting and treatment indication before modeling outcomes. Electronic prescriptions and regional referral tracking could enable prospective quality measures. This is a proposal, not a claim that nationwide linked registries currently exist.

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3.27 Uzbekistan: clinical pharmacology and AI governance

National practice could involve professional societies, the Ministry of Health, laboratory services, reproductive clinics and clinical pharmacology teams in defining minimum data quality and adverse-event monitoring. AI adoption should be phased: retrospective technical validation, prospective silent deployment, clinician-in-the-loop evaluation and post-implementation audits. Data privacy, documentation of model updates, cybersecurity and informed patient communication must be funded alongside software procurement.

Clinical interpretation: The relevant comparison is not merely whether this information can be measured, but whether acting on the measurement improves outcomes for the specific patient population. Analysis should distinguish pretest probability, measurement error, treatment-selection processes and downstream decisions. A robust protocol should predefine the decision threshold, document meaningful harms from incorrect classification and make uncertainty visible to clinicians and patients. Routine care datasets can test the transportability of the result, provided eligibility, exposure timing and outcome ascertainment are not confused with the biology of reserve. [1,2,7,8]

Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

3.28 Interpretation of recent guidelines

ASRM identifies robust prediction of ovarian response with poor ability to predict unassisted pregnancy. Updated ESHRE guidance endorses AMH or AFC when assessing expected ovarian response. WHO infertility guidance emphasizes evidence-based access to care. These messages are mutually consistent when endpoints remain distinct: a biomarker can be useful for treatment planning and still be inadequate for ruling out fertility. [1–3]

Clinical interpretation: The relevant comparison is not merely whether this information can be measured, but whether acting on the measurement improves outcomes for the specific patient population. Analysis should distinguish pretest probability, measurement error, treatment-selection processes and downstream decisions. A robust protocol should predefine the decision threshold, document meaningful harms from incorrect classification and make uncertainty visible to clinicians and patients. Routine care datasets can test the transportability of the result, provided eligibility, exposure timing and outcome ascertainment are not confused with the biology of reserve. [1,2,7,8]

Research implication: A prospective, multicenter dataset should capture baseline age and reproductive history, the assay platform or ultrasound protocol, relevant medication exposure, initial treatment decision, longitudinal intervention changes and patient-important endpoints. External validation by clinic and calendar time would be required before implementation. The analysis should report subgroup calibration and missing-data patterns, and avoid interpreting post-treatment values as baseline covariates. These methodological safeguards determine whether a seemingly precise risk estimate actually supports safe shared decision-making. [7,9,14]

Domain	Useful endpoint	Important limitation	Practice implication
AMH	Expected oocyte yield / response class	Assay/platform effects; not an oocyte-quality test	Use indication-specific thresholds
AFC	Response prediction and ovarian imaging context	Operator, device and follicle-size variability	Standardized bilateral count
Age	Reproductive counseling and live-birth context	Not adequate as sole stimulation-response marker	Interpret jointly with clinical factors
IVF registry	Cumulative live birth and adverse events	Cancellation and loss-to-follow-up selection	Include all cycle starts
ML imaging	Counting reproducibility	External device and labeling shifts	Human escalation
RWD treatment comparisons	Pragmatic comparative effectiveness	Confounding and missingness	Emulate well-specified target trial

4. Discussion

Synthesis and clinical boundaries

The key paradox is that the best measures of ovarian quantity are often misused as decisive measures of individual fertility. This is neither a laboratory failure nor a

reason to abandon reserve assessment. It is a mismatch between prediction target and clinical claim. AMH and AFC may be appropriate in preparation for stimulation while being inappropriate as general screening tools for the probability of unassisted conception. Reframing the question around planned action prevents the same numeric result from acquiring contradictory meanings.

A practical implication is that measurement protocols and clinical decision pathways must be audited together. If one center uses a different laboratory platform, treatment threshold or counting convention, a difference in apparent ovarian reserve may be operational rather than biological. Model deployment should therefore incorporate calibration monitoring, prospective evaluation, explicit rules for atypical cases and a mechanism for reviewing unintended effects. Reproductive counseling must prioritize patient goals and protect against categorical or stigmatizing language.

Bias, data quality and missingness

Routine datasets are particularly vulnerable to selection into fertility care: who presents for assessment, who can afford treatment, who proceeds to stimulation, who cancels and who remains observable at birth. Missingness is often informative rather than random. Complete-case analyses may systematically discard unsuccessful or financially constrained pathways. Multiple imputation should reflect a plausible missingness model; sensitivity analysis for nonrandom missingness is needed when key reproductive outcomes may be absent for reasons linked to prognosis.

A practical implication is that measurement protocols and clinical decision pathways must be audited together. If one center uses a different laboratory platform, treatment threshold or counting convention, a difference in apparent ovarian reserve may be operational rather than biological. Model deployment should therefore incorporate calibration monitoring, prospective evaluation, explicit rules for atypical cases and a mechanism for reviewing unintended effects. Reproductive counseling must prioritize patient goals and protect against categorical or stigmatizing language.

Explainability, ethical AI and clinical decision support

Feature importance is not equivalent to a causal explanation. Explainable AI tools may communicate local drivers of a prediction, but must not obscure calibration failure or create false precision. Decision support should offer the model's intended population, data vintage, threshold and uncertainty, and should permit clinician override with audit logging. Responsible AI principles require clear accountability, safety testing,

data minimization, anti-discrimination safeguards and meaningful patient involvement.

A practical implication is that measurement protocols and clinical decision pathways must be audited together. If one center uses a different laboratory platform, treatment threshold or counting convention, a difference in apparent ovarian reserve may be operational rather than biological. Model deployment should therefore incorporate calibration monitoring, prospective evaluation, explicit rules for atypical cases and a mechanism for reviewing unintended effects. Reproductive counseling must prioritize patient goals and protect against categorical or stigmatizing language.

FDA, EMA, WHO and regulatory science

FDA promotes principled use of RWD and RWE in product evaluation; EMA has developed a distributed real-world research infrastructure through DARWIN EU. WHO's infertility and AI governance frameworks reinforce equitable access and appropriate oversight. Their roles differ: drug-safety evidence and regulatory RWE do not automatically establish a fertility biomarker's clinical utility. A biomarker pathway should be evaluated on analytical validity, clinical validity and demonstrated net benefit from acting on the test.

A practical implication is that measurement protocols and clinical decision pathways must be audited together. If one center uses a different laboratory platform, treatment threshold or counting convention, a difference in apparent ovarian reserve may be operational rather than biological. Model deployment should therefore incorporate calibration monitoring, prospective evaluation, explicit rules for atypical cases and a mechanism for reviewing unintended effects. Reproductive counseling must prioritize patient goals and protect against categorical or stigmatizing language.

Limits of this review

This manuscript does not claim exhaustive bibliographic retrieval, protocol registration, participant-level reanalysis or new effect estimates. It is designed as an evidence-based conceptual and implementation synthesis. Consequently, any apparent consensus should be viewed in light of the strength of the underlying guideline and study designs. Future formal reviews should pre-register source strategies and endpoint-specific meta-analysis, while local registry studies should pre-specify causal estimands and handle informative censoring.

A practical implication is that measurement protocols and clinical decision pathways must be audited together. If one center uses a different laboratory platform, treatment threshold or counting convention, a difference in apparent ovarian reserve may be operational rather than biological. Model deployment should therefore incorporate calibration monitoring, prospective evaluation, explicit rules for atypical cases and a mechanism for reviewing unintended effects. Reproductive counseling must prioritize patient goals and protect against categorical or stigmatizing language.

5. Conclusion

AMH and AFC are complementary, clinically useful quantitative markers for estimating ovarian response to stimulation. They are not direct measures of oocyte quality, independent guarantees of conception or valid stand-alone tests of natural fertility. Scientific and clinical progress depends on transparent indications, laboratory and sonographic standardization, endpoint-specific risk communication, appropriate causal designs and longitudinal outcome monitoring. In Uzbekistan, interoperable registries and carefully validated decision support could strengthen reproductive services, provided equitable access and patient rights are preserved. [1–3]

Declarations

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ALBUMIN BILIRUBIN SCORE ACROSS REDUCED AND PRESERVED EJECTION FRACTION PHENOTYPES IN CHRONIC HEART FAILURE

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The albumin–bilirubin (ALBI) score combines two routinely available laboratory measures. A between-phenotype difference may identify a distinct biochemical profile, but does not establish liver fibrosis or independent prognostic value.

Because ALBI is calculated from albumin and bilirubin, its interpretation depends on both the underlying measurements and their units. A comparison based on directly traceable numeric inputs is preferable to reconstructing ambiguous spreadsheet entries. The present work therefore focused on an auditable complete-case analysis rather than maximizing the nominal sample size.

Objective. To compare recalculated ALBI values between patients recorded as having reduced and preserved left ventricular ejection fraction in a single-centre chronic heart failure cohort.

Methods. Patients admitted to the cardiology department of Bukhara Regional Multidisciplinary Medical Centre in 2023–2024 were enrolled prospectively. The source cohort included 65 patients recorded as having reduced EF and 46 recorded as having preserved EF. This analysis examined baseline measurements. ALBI was recalculated as 0.66×log10(total bilirubin in µmol/L)−0.085×albumin in g/L. Two preserved-EF bilirubin cells were stored as dates and were excluded without reconstruction, leaving 65 and 44 evaluable patients. Means±SD and medians [Q1; Q3] were calculated; groups were compared using a two-sided Mann–Whitney test. This was a secondary exploratory analysis; no adjusted prediction model was fitted.

Age, was 64.3±8.2 years in the reduced-EF source group and 60.0±9.2 years in the preserved-EF source group. The analysis retained the source phenotype labels without reclassification. One reduced-EF-labelled record had an EF of 40.5%; consequently, the results describe the source groups rather than a newly adjudicated strict EF≤40% population. Patients were not selected according to ALBI category, and no threshold was optimized against the observed group difference.

Results. Mean ALBI was −2.306±0.276 in the reduced-EF group and −2.631±0.213 in the evaluable preserved-EF group. Median values were −2.306 [−2.514; −2.111] and −2.705 [−2.768; −2.475], respectively. The between-group difference was statistically significant ($p=7.30\times10^{-9}$). The less negative ALBI in reduced

EF was consistent with a less favourable combined albumin–bilirubin profile. The groups differed in age, and no adjustment for age, nutritional status, primary liver disease or treatment was performed. No fibrosis staging or ALBI-based treatment threshold was inferred.

The mean score difference was approximately 0.324 units. The upper and lower quartiles shifted in the same direction, although the distributions overlapped. This pattern supports a group-level difference while limiting the use of a single score to identify an individual patient's phenotype. Exclusion of two date-formatted bilirubin entries ensured that each included ALBI value could be traced to numeric albumin and bilirubin measurements.

The score was analysed continuously, without applying liver-cancer grading categories to this heart failure cohort. No sensitivity, specificity or clinical decision rule was derived from the baseline comparison. A higher ALBI should therefore be understood here as a less favourable combined laboratory profile, not as proof of impaired hepatic reserve, advanced fibrosis or a validated mortality risk category.

Conclusion. Patients recorded as having reduced EF had a higher, less negative ALBI than the preserved-EF comparison group. The association supports further assessment of ALBI within a multivariable clinical framework. This baseline comparison alone does not demonstrate independent prognostic value.

TIBBIY VA MOLEKULYAR BIOLOGIYA: GENETIK TADQIQOTLAR, IMMUNOGENETIKA VA HUJAYRA TEXNOLOGIYALARI

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ANNOTATSIYA: Mazkur ilmiy maqolada tibbiy va molekulyar biologiyaning zamonaviy rivojlanish yo‘nalishlari, genetik tadqiqotlarning kasalliklarni aniqlash va davolashdagi ahamiyati, immunogenetikaning inson immun tizimi faoliyatini o‘rganishdagi o‘rni hamda hujayra texnologiyalarining regenerativ tibbiyotdagi istiqbollari ilmiy-nazariy jihatdan tahlil qilinadi. Molekulyar diagnostika, genom sekvenslash, gen ekspressiyasi, genetik polimorfizmlar, immunologik moslik, ildiz hujayralar va hujayraviy terapiya texnologiyalarining biologik asoslari yoritiladi. Shuningdek, genetik axborotning klinik amaliyotdagi ahamiyati, individual tibbiyot konsepsiyasining shakllanishi, immunogenetik markerlardan foydalanish va hujayra muhandisligi asosida yangi davolash strategiyalarini ishlab chiqish imkoniyatlari ko‘rib chiqiladi. Maqolada molekulyar biologiya yutuqlarini tibbiyot amaliyotiga integratsiyalashning ilmiy ahamiyati, mavjud texnologik cheklovlar, bioetik muammolar va kelajakdagi rivojlanish istiqbollari umumlashtiriladi.

Kalit so‘zlar: tibbiy biologiya, molekulyar biologiya, genetika, genomika, immunogenetika, genetik polimorfizm, molekulyar diagnostika, ildiz hujayralar, hujayra texnologiyalari, regenerativ tibbiyot, gen terapiyasi, personalizatsiyalashgan tibbiyot.

АННОТАЦИЯ: В данной научной статье рассматриваются современные направления развития медицинской и молекулярной биологии, значение генетических исследований в диагностике и лечении заболеваний, роль

иммуногенетики в изучении функционирования иммунной системы человека, а также перспективы применения клеточных технологий в регенеративной медицине. Анализируются молекулярно-биологические основы геномного секвенирования, экспрессии генов, генетических полиморфизмов, иммунологической совместимости, стволовых клеток и клеточной терапии. Особое внимание уделяется клиническому значению генетической информации, развитию персонализированной медицины, использованию иммуногенетических маркеров и разработке новых терапевтических подходов на основе клеточной инженерии. Обобщаются научные достижения, технологические ограничения, биоэтические проблемы и перспективы интеграции молекулярной биологии в современную медицинскую практику.

Ключевые слова: медицинская биология, молекулярная биология, генетика, геномика, иммуногенетика, генетический полиморфизм, молекулярная диагностика, стволовые клетки, клеточные технологии, регенеративная медицина, генная терапия, персонализированная медицина.

ABSTRACT: This scientific article examines current developments in medical and molecular biology, emphasizing the importance of genetic research in disease diagnosis and treatment, the role of immunogenetics in understanding human immune system function, and the potential applications of cellular technologies in regenerative medicine. The article analyzes the molecular foundations of genome sequencing, gene expression, genetic polymorphisms, immunological compatibility, stem cells, and cell-based therapies. Particular attention is given to the clinical significance of genetic information, the advancement of personalized medicine, the application of immunogenetic markers, and the development of innovative therapeutic strategies based on cellular engineering. Furthermore, the study discusses scientific achievements, technological limitations, bioethical challenges,

and future prospects for integrating molecular biological discoveries into modern clinical practice.

Keywords: medical biology, molecular biology, genetics, genomics, immunogenetics, genetic polymorphism, molecular diagnostics, stem cells, cellular technologies, regenerative medicine, gene therapy, personalized medicine.

KIRISH

Zamonaviy tibbiyot taraqqiyoti biologik jarayonlarni molekulyar va hujayraviy darajada chuqur o‘rganish bilan bevosita bog‘liqdir. Inson organizmida kechadigan fiziologik va patologik jarayonlarning genetik, biokimyoviy hamda immunologik mexanizmlarini aniqlash kasalliklarning kelib chiqish sabablarini tushunish, ularni erta tashxislash va samarali davolash strategiyalarini ishlab chiqishda muhim ilmiy asos bo‘lib xizmat qilmoqda. XXI asrda molekulyar biologiya, genomika, proteomika, bioinformatika, immunogenetika va hujayra muhandisligi sohalarida erishilgan yutuqlar tibbiyotning diagnostik hamda terapevtik imkoniyatlarini sezilarli darajada kengaytirdi. Ayniqsa, inson genomining o‘rganilishi, yuqori samarali sekvenslash texnologiyalarining rivojlanishi va genetik axborotni tahlil qilish imkoniyatlarining ortishi irsiy kasalliklar, onkologik patologiyalar, immun tizimi buzilishlari va ko‘plab multifaktorial kasalliklarning molekulyar asoslarini aniqlashga xizmat qilmoqda. Tibbiy biologiya inson organizmining tuzilishi, rivojlanishi, irsiyati, o‘zgaruvchanligi va atrof-muhit bilan o‘zaro munosabatlarini o‘rgansa, molekulyar biologiya tirik tizimlarning faoliyatini nuklein kislotalar, oqsillar va boshqa biomolekulalar darajasida tadqiq etadi. Ushbu fanlarning o‘zaro integratsiyasi natijasida kasalliklarning molekulyar mexanizmlarini aniqlash va individual biologik xususiyatlarga asoslangan tibbiy yordam ko‘rsatish imkoniyatlari shakllanmoqda.

Genetik tadqiqotlar yordamida irsiy kasalliklarning molekulyar sabablarini aniqlash, ayrim kasalliklarga moyillikni baholash, farmakologik preparatlarga individual javob reaksiyalarini prognoz qilish hamda kasalliklarning rivojlanish mexanizmlarini chuqurroq tushunish mumkin. Shu bilan birga, immunogenetika inson immun tizimining genetik boshqarilishi, immunologik javoblarning individual farqlari va transplantatsiya jarayonidagi to‘qimalar mosligini o‘rganishda alohida ahamiyat kasb etadi. Hujayra texnologiyalari esa regenerativ tibbiyot, to‘qima muhandisligi, immunoterapiya va ayrim irsiy kasalliklarni davolashning yangi yo‘nalishlarini shakllantirmoqda. Ildiz hujayralar, induksiyalangan pluripotent hujayralar, genetik modifikatsiyalangan immun hujayralar va organoid modellaridan foydalanish biologik tadqiqotlarning klinik ahamiyatini yanada oshirmoqda. Shu nuqtayi nazardan, tibbiy va molekulyar biologiyaning genetik tadqiqotlar, immunogenetika va hujayra texnologiyalari bilan bog‘liq zamonaviy yutuqlarini kompleks o‘rganish ilmiy hamda amaliy jihatdan dolzarb hisoblanadi. Tadqiqotning maqsadi - tibbiy va molekulyar biologiyaning zamonaviy yo‘nalishlarini ilmiy-nazariy jihatdan tahlil qilish, genetik tadqiqotlar va immunogenetikaning klinik ahamiyatini yoritish, hujayra texnologiyalarining diagnostika va davolashdagi imkoniyatlarini baholash hamda ularning istiqbolli rivojlanish yo‘nalishlarini aniqlashdan iborat. Tadqiqot metodologiyasi. Mazkur maqola nazariy-tahliliy tadqiqot shaklida tayyorlangan bo‘lib, unda molekulyar biologiya, tibbiy genetika, immunologiya va hujayra biologiyasiga oid ilmiy adabiyotlarni o‘rganish, qiyosiy tahlil qilish, tizimlashtirish va umumlashtirish metodlaridan foydalanilgan.

Tibbiy va molekulyar biologiyaning zamonaviy tibbiyotdagi ilmiy ahamiyati. Molekulyar biologiya tirik organizmlarning hujayraviy faoliyatini boshqaruvchi genetik va biokimyoviy mexanizmlarni o‘rganadigan fundamental fan hisoblanadi. Uning asosiy tadqiqot obyektlari dezoksiribonuklein kislota (DNK), ribonuklein kislota (RNK),

oqsillar, fermentlar, retseptorlar va hujayra ichidagi signal uzatish tizimlaridir. Hujayra faoliyatining molekulyar asosini genetik axborotning saqlanishi, uzatilishi va amalga oshirilishi tashkil etadi. DNK molekulasida kodlangan irsiy axborot transkripsiya jarayonida RNKga ko‘chiriladi, keyinchalik esa translatsiya orqali oqsil sintezida ishtirok etadi. Mazkur jarayonlarning buzilishi hujayra funksiyasining izdan chiqishiga, metabolik o‘zgarishlarga va turli patologik holatlarning rivojlanishiga sabab bo‘lishi mumkin. Molekulyar biologik tadqiqotlar kasalliklarni faqat klinik belgilar asosida emas, balki ularning molekulyar mexanizmlariga ko‘ra ham tasniflash imkoniyatini yaratmoqda. Masalan, ayrim onkologik kasalliklarda hujayra o‘sishini boshqaruvchi genlardagi somatik mutatsiyalarni aniqlash maqsadli davolash vositalarini tanlashda muhim ahamiyatga ega. Shuningdek, molekulyar diagnostika infeksion kasalliklarni aniqlash, irsiy patologiyalarni tasdiqlash, o‘sma hujayralarining genetik xususiyatlarini o‘rganish va davolash samaradorligini kuzatishda qo‘llaniladi. Tibbiy va molekulyar biologiyaning integratsiyasi natijasida kasalliklarni aniqlashning sezgir va maxsus laboratoriya usullari, biomarkerlar hamda yangi terapevtik nishonlarni izlash imkoniyatlari kengaymoqda.

Genetik tadqiqotlarning kasalliklarni aniqlash va davolashdagi o‘rni. Genetik tadqiqotlar inson genomining tuzilishi, genlarning funksional faolligi, irsiy o‘zgaruvchanlik va genetik omillarning kasalliklar rivojlanishidagi rolini o‘rganishga qaratilgan. Inson genomi taxminan 3,2 milliard juft nukleotiddan tashkil topgan bo‘lib, unda organizmning rivojlanishi va faoliyatini boshqaruvchi genetik axborot saqlanadi. Genomdagi ayrim o‘zgarishlar organizmning normal biologik xilma-xilligini belgilasa, boshqalari irsiy kasalliklar yoki patologik holatlarga moyillik bilan bog‘liq bo‘lishi mumkin. Genetik tadqiqotlarning asosiy yo‘nalishlaridan biri monogen kasalliklarning molekulyar sabablarini aniqlashdir. Bunday kasalliklar muayyan genning patogen variantlari bilan bog‘liq bo‘lib, ularga ayrim gemoglobinopatiyalar, metabolik

kasalliklar va irsiy nerv-mushak patologiyalari misol bo‘la oladi. Multifaktorial kasalliklarda esa genetik omillar tashqi muhit, turmush tarzi va epigenetik mexanizmlar bilan o‘zaro ta’sirda namoyon bo‘ladi. Yurak-qon tomir kasalliklari, qandli diabetning ayrim shakllari, autoimmun patologiyalar va ko‘plab onkologik kasalliklarning rivojlanishida ushbu murakkab munosabatlar muhim o‘rin tutadi. Zamonaviy genetik tadqiqotlarda polimeraza zanjir reaksiyasi (PCR), real vaqt rejimidagi PCR, Sanger sekvenslash, yangi avlod sekvenslash texnologiyalari (NGS), mikroarray tahlili va boshqa molekulyar usullardan foydalaniladi. NGS texnologiyasi bir vaqtning o‘zida ko‘plab DNK fragmentlarini tahlil qilish imkonini beradi. Ushbu yondashuv butun genomni, ekzomni yoki muayyan genlar panelini tekshirishda qo‘llanilib, irsiy kasalliklarning molekulyar diagnostikasida muhim o‘rin egallaydi. Biroq genetik variantni aniqlash uning kasallik sababchisi ekanligini avtomatik ravishda anglatmaydi. Genetik natijalarni klinik belgilar, oilaviy anamnez, populyatsion ma’lumotlar va laboratoriya ko‘rsatkichlari bilan birgalikda talqin qilish zarur. Genetik tadqiqotlarning yana bir istiqbolli yo‘nalishi farmakogenomikadir. Ushbu soha bemorning genetik xususiyatlari dori vositalarining metabolizmi, samaradorligi va nojo‘ya ta’sirlariga qanday ta’sir qilishini o‘rganadi. Farmakogenomik yondashuv ayrim klinik vaziyatlarda dori tanlash va dozani individuallashtirishga yordam beradi.

Immunogenetika va immun tizimining molekulyar boshqarilishi, Immunogenetika immun tizimining shakllanishi, faoliyati va immunologik javoblarning individual farqlarini belgilovchi genetik mexanizmlarni o‘rganadigan fan yo‘nalishidir. Inson immun tizimi tug‘ma va orttirilgan immunitet mexanizmlaridan tashkil topgan murakkab biologik tizim bo‘lib, uning samarali faoliyati ko‘plab genlar va ularning o‘zaro muvofiqlashgan ekspressiyasiga bog‘liq. Immunogenetik tadqiqotlarda inson leykotsitar antigenlari tizimi - HLA (Human Leukocyte Antigen)

alohida ahamiyatga ega. HLA molekulalari antigenlarni T-limfotsitlarga taqdim etishda ishtirok etadi va immun tizimining o‘z hamda begona antigenlarni tanib olish jarayonida muhim vazifani bajaradi. HLA genlari yuqori darajadagi polimorfizm bilan tavsiflanadi. Bu xususiyat populyatsiyada immunologik javoblarning xilma-xilligini ta’minlaydi, shu bilan birga transplantatsiya va ayrim autoimmun kasalliklar bilan bog‘liq klinik masalalarda muhim ahamiyat kasb etadi. Organ va gematopoetik ildiz hujayra transplantatsiyasida donor va retsipiyent o‘rtasidagi immunogenetik moslikni baholash muhim jarayon hisoblanadi. Ayniqsa, gematopoetik ildiz hujayra transplantatsiyasida HLA mosligining darajasi transplantatsiya natijalariga ta’sir ko‘rsatuvchi asosiy omillardan biridir. Immunogenetik omillar ayrim autoimmun kasalliklarga moyillik bilan ham bog‘liq. Masalan, HLA-B27 alleli ankilozlovchi spondilit bilan kuchli assotsiatsiyaga ega. Biroq ushbu allelning mavjudligi kasallik albatta rivojlanishini anglatmaydi. Shuningdek, immunogenetika birlamchi immun tanqisliklar, allergik kasalliklar va immun tizimining tartibga solinishidagi buzilishlarni o‘rganishda ham muhimdir. Immun javobga ta’sir qiluvchi genetik variantlarni o‘rganish immunologik kasalliklarning patogenezini tushunish, ayrim xavf guruhlarini aniqlash va maqsadli davolash usullarini ishlab chiqish uchun ilmiy asos yaratadi.

Hujayra texnologiyalari va regenerativ tibbiyotning rivojlanishi. Hujayra texnologiyalari tirik hujayralarni ajratib olish, laboratoriya sharoitida ko‘paytirish, differensiyalash, modifikatsiya qilish va ulardan ilmiy yoki klinik maqsadlarda foydalanishga asoslangan biologik texnologiyalar majmuasidir. Zamonaviy hujayra biologiyasida ildiz hujayralarni o‘rganish alohida o‘rin tutadi. Ildiz hujayralar o‘zini yangilash va muayyan sharoitlarda ixtisoslashgan hujayra turlariga differensiyalanish xususiyatiga ega. Ularning asosiy turlariga embrional ildiz hujayralar, kattalar organizmidagi to‘qima ildiz hujayralari va induksiyalangan pluripotent ildiz hujayralar kiradi. Induksiyalangan pluripotent ildiz hujayralar (iPSC) somatik hujayralarni qayta

dasturlash orqali olinadi. Ushbu texnologiya hujayra differensiyalanishini o‘rganish, irsiy kasalliklarning laboratoriya modellarini yaratish va yangi dori vositalarini sinashda muhim imkoniyatlarga ega. Regenerativ tibbiyotning asosiy maqsadi shikastlangan to‘qima va organlarning tuzilishi yoki funksiyasini tiklashga qaratilgan biologik yondashuvlarni ishlab chiqishdir. Gematopoetik ildiz hujayra transplantatsiyasi ayrim gematologik va immunologik kasalliklarni davolashda klinik amaliyotga joriy etilgan muhim hujayraviy texnologiyalardan biridir. Boshqa ko‘plab hujayraviy davolash yo‘nalishlari esa hali klinik tadqiqot yoki eksperimental rivojlanish bosqichida bo‘lib, ularning xavfsizligi va samaradorligini alohida baholash talab etiladi. Hujayra muhandisligining yana bir muhim yo‘nalishi genetik modifikatsiyalangan immun hujayralardan foydalanishdir. Jumladan, CAR-T hujayra terapiyasida bemorning T-limfotsitlari maxsus antigenlarni tanib olishga moslashtiriladi. Ushbu texnologiya ayrim gematologik malign kasalliklarni davolashda qo‘llanilmoqda. Shu bilan birga, CAR-T terapiyasi sitokin ajralish sindromi, nevrologik toksiklik va boshqa jiddiy nojo‘ya ta’sirlar bilan bog‘liq bo‘lishi mumkin. Shuning uchun bunday davolash usullari maxsus tayyorgarlikka ega klinik markazlarda amalga oshiriladi.

Genetik tadqiqotlar, immunogenetika va hujayra texnologiyalarining o‘zaro integratsiyasi. Tibbiy va molekulyar biologiyaning ushbu uch yo‘nalishi mustaqil ilmiy sohalar bo‘lishiga qaramay, zamonaviy tibbiyotda ular o‘zaro uzviy bog‘liq holda rivojlanmoqda. Genetik tadqiqotlar kasallikning molekulyar sabablarini aniqlash imkonini bersa, immunogenetika organizmning immunologik javob xususiyatlarini tushuntiradi. Hujayra texnologiyalari esa ayrim hollarda ushbu bilimlar asosida yangi terapevtik yondashuvlarni yaratishga xizmat qiladi. Masalan, onkogematologiyada o‘sma hujayralarining molekulyar xususiyatlarini aniqlash, immunologik markerlarni baholash va genetik modifikatsiyalangan hujayralardan foydalanish bir-birini to‘ldiruvchi ilmiy-amaliy yo‘nalishlardir. Bundan tashqari, genom tahrirlash

texnologiyalari, jumladan CRISPR-Cas tizimi, genlarning funksiyalarini o‘rganish va ayrim irsiy kasalliklarni davolashga qaratilgan tadqiqotlarda qo‘llanilmoqda. CRISPR asosidagi ayrim somatik hujayra terapiyalari muayyan mamlakatlarda aniq kasalliklar uchun tartibga soluvchi organlar tomonidan tasdiqlangan. Biroq genom tahrirlashning barcha usullari klinik qo‘llash uchun yetarlicha o‘rganilgan deb hisoblanmaydi. Ushbu texnologiyalarni keng qo‘llashdan oldin genetik o‘zgarishlarning aniqligi, kutilmagan molekulyar ta’sirlar, uzoq muddatli xavfsizlik va bioetik talablar chuqur baholanishi zarur.

Molekulyar biologik texnologiyalarning qiyosiy tavsifi

Texnologiya	Asosiy biologik mexanizmi	Tibbiyotdagi qo‘llanishi
PCR	DNKning maqsadli fragmentlarini ko‘paytirish	Molekulyar diagnostika
NGS	Ko‘plab DNK fragmentlarining ketma-ketligini aniqlash	Irsiy va onkologik kasalliklarni tekshirish
HLA genotiplash	Immunogenetik variantlarni aniqlash	Transplantatsion moslikni baholash
CRISPR-Cas	Genomning maqsadli qismlarini tahrirlash	Gen funksiyasini o‘rganish va ayrim gen terapiyalari
iPSC texnologiyasi	Somatik hujayralarni pluripotent holatga qayta dasturlash	Kasalliklarni modellashtirish va regenerativ tadqiqotlar
CAR-T terapiyasi	T-limfotsitlarni genetik modifikatsiyalash	Ayrim gematologik o‘smalarni davolash
Organoid texnologiyasi	Hujayralardan uch o‘lchamli to‘qimasimon modellar yaratish	Kasallik mexanizmlarini o‘rganish va dori sinovlari

Tibbiy va molekulyar biologiyada bioetik muammolar va istiqbolli yo‘nalishlar. Molekulyar genetika va hujayra texnologiyalarining rivojlanishi bilan bir qatorda muhim bioetik va huquqiy masalalar ham yuzaga kelmoqda. Genetik tadqiqotlar natijasida olingan ma’lumotlar insonning irsiy xususiyatlari, ayrim kasalliklarga moyilligi va biologik qarindoshlik munosabatlari haqida ma’lumot berishi mumkin. Shu sababli genetik axborotning maxfiyligini ta’minlash, bemorning xabardor roziligini olish va genetik natijalarni mas’uliyat bilan talqin qilish muhim hisoblanadi. Hujayra texnologiyalarida esa biologik materialning kelib chiqishi, donor roziligi, hujayralarni uzoq muddat saqlash, laboratoriya xavfsizligi va eksperimental muolajalarni klinik amaliyotga joriy etish masalalari alohida e’tibor talab qiladi. Ayniqsa, inson embrioni genomini tahrirlash, irsiy o‘zgarishlarni keyingi avlodlarga uzatish ehtimoli va genetik texnologiyalardan foydalanishda ijtimoiy tenglikni ta’minlash masalalari xalqaro ilmiy hamjamiyatda keng muhokama qilinmoqda. Kelajakda tibbiy va molekulyar biologiyaning rivojlanishi ko‘p omilli kasalliklarning genetik mexanizmlarini chuqurroq tushunish, yagona hujayra darajasidagi genomik tahlillarni takomillashtirish, fazoviy transkriptomika, organoid modellar va sun’iy intellekt yordamida biologik ma’lumotlarni qayta ishlash bilan bog‘liq bo‘lishi kutilmoqda. Bunday yondashuvlar individual tibbiyot imkoniyatlarini kengaytirishi mumkin. Biroq ularning klinik samaradorligi va xavfsizligi yuqori sifatli ilmiy tadqiqotlar orqali tasdiqlanishi lozim.

XULOSA

Tibbiy va molekulyar biologiya zamonaviy tibbiyotning fundamental ilmiy asoslaridan biri bo‘lib, genetik tadqiqotlar, immunogenetika va hujayra texnologiyalarining rivojlanishi kasalliklarni aniqlash, ularning patogenezini tushunish va yangi davolash strategiyalarini ishlab chiqish imkoniyatlarini kengaytirmoqda. Genetik tadqiqotlar irsiy va orttirilgan kasalliklarning molekulyar xususiyatlarini

aniqlashda, immunogenetika immunologik moslik va immun javobning individual farqlarini o‘rganishda, hujayra texnologiyalari esa regenerativ tibbiyot va ayrim maqsadli terapiya yo‘nalishlarini rivojlantirishda muhim ahamiyatga ega. Ushbu yo‘nalishlarning integratsiyasi personalizatsiyalashgan tibbiyotning ilmiy asoslarini mustahkamlab, diagnostika va davolashni bemorning individual biologik xususiyatlariga moslashtirish imkoniyatini yaratadi. Shu bilan birga, molekulyar va hujayraviy texnologiyalarni klinik amaliyotga joriy etishda ilmiy asoslanganlik, xavfsizlik, samaradorlik, bioetik me’yorlar va genetik ma’lumotlarning maxfiyligini ta’minlash ustuvor ahamiyat kasb etishi zarur.

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QUANTITATIVE AND QUALITATIVE ANALYSIS OF THE RESULTS OF EXPERIMENTAL INSTRUCTION

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Abstract: This article examines the effectiveness of experimental instruction through the integration of quantitative and qualitative research approaches. Particular attention is given to evaluating students' academic performance, cognitive engagement, and learning outcomes using statistical indicators, classroom observations, and reflective feedback. The study explores how numerical measurements and qualitative interpretations complement each other in identifying changes in learners' knowledge, motivation, and independent thinking. Emphasis is placed on the methodological importance of combining measurable educational outcomes with contextual evidence to ensure a comprehensive and reliable assessment of instructional effectiveness.

Keywords: experimental instruction, quantitative analysis, qualitative analysis, educational effectiveness, learning outcomes, statistical assessment, cognitive engagement, mixed-methods research, pedagogical experiment, instructional evaluation.

INTRODUCTION

The effectiveness of educational innovation cannot be determined solely by introducing new teaching methods or observing immediate improvements in students' academic performance. A meaningful evaluation of experimental instruction requires systematic evidence that reflects both measurable learning outcomes and the underlying processes through which knowledge is acquired. In this regard, quantitative and qualitative analysis provides complementary perspectives for understanding the actual impact of instructional interventions on students' cognitive development, academic achievement, and learning behavior. Quantitative analysis focuses on measurable indicators such as assessment scores, achievement levels, task completion rates, and differences between experimental and control groups. These indicators make it possible to identify patterns of academic progress and evaluate the statistical significance of observed changes. However, numerical results alone cannot fully explain why particular instructional strategies succeed or fail. Students' motivation, classroom interaction, learning difficulties, and individual responses to teaching methods require qualitative investigation. Qualitative analysis addresses these dimensions through classroom observations, interviews, reflective feedback, and the interpretation of students' learning experiences. Integrating both approaches allows researchers to examine not only the outcomes of experimental instruction but also the

pedagogical conditions influencing those outcomes. Such methodological integration strengthens the interpretation of research findings and reduces the limitations associated with relying on a single source of evidence. The present study explores the methodological foundations of quantitative and qualitative evaluation in experimental instruction, emphasizing their complementary roles in assessing educational effectiveness. Particular attention is devoted to the interpretation of learning outcomes, the identification of meaningful instructional changes, and the development of evidence-based recommendations for improving teaching practices.

MAIN BODY

The evaluation of experimental instruction requires a systematic examination of changes in students' academic achievement, cognitive engagement, and learning behavior. Quantitative and qualitative approaches provide different but complementary forms of evidence, allowing researchers to determine not only whether instructional interventions produce measurable improvements but also how these changes emerge within the learning environment. Quantitative analysis focuses on comparing students' performance before and after experimental instruction. Pre-tests and post-tests help identify changes in knowledge acquisition, while comparisons between experimental and control groups provide a basis for assessing the effectiveness of the applied teaching methods. Statistical indicators, including mean scores, standard deviations, and measures of statistical significance, can be used to evaluate the magnitude and reliability of observed differences. However, improvements in test results should be interpreted cautiously, considering students' initial proficiency, sample size, and other factors that may influence academic performance. Qualitative analysis offers a deeper understanding of the learning processes underlying numerical outcomes. Classroom observations, student interviews, reflective journals, and teacher feedback reveal changes in motivation, participation, problem-solving strategies, and independent thinking. For example, increased classroom interaction may indicate greater cognitive engagement, even when improvements in assessment scores remain modest. Such findings help explain variations in students' responses to experimental teaching methods. The integration of quantitative and qualitative evidence is particularly valuable when research findings appear inconsistent. A statistically measurable improvement may coexist with difficulties in student motivation or independent task performance. Conversely, qualitative observations may reveal positive changes in confidence and collaborative skills that are not immediately reflected in standardized assessments. Examining these differences prevents overly simplified interpretations of instructional effectiveness. The reliability of experimental findings also depends on methodological consistency. Clearly defined assessment criteria, comparable learning

conditions, appropriate research instruments, and systematic data collection strengthen the credibility of the analysis. Qualitative evidence should be interpreted through transparent coding procedures, while quantitative results require suitable statistical methods and consideration of potential limitations. A combined analytical approach therefore provides a more comprehensive understanding of experimental instruction. By connecting measurable academic outcomes with students' actual learning experiences, researchers can identify effective pedagogical strategies, recognize areas requiring improvement, and develop evidence-based recommendations for future educational practice.

CONCLUSION

The integration of quantitative and qualitative analysis provides a comprehensive framework for evaluating the effectiveness of experimental instruction. While quantitative indicators reveal measurable changes in academic performance, qualitative evidence explains the cognitive, motivational, and behavioral factors underlying these outcomes. Their combined application enables a more accurate interpretation of instructional effectiveness and reduces the limitations of relying on isolated statistical results. Consequently, a methodologically balanced evaluation supports evidence-based pedagogical decisions, identifies opportunities for instructional improvement, and contributes to the development of more effective and learner-centered educational practices.

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CLOTHING AS AN EXPRESSION OF NATIONAL CULTURE AND ITS TIME

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Abstract. The article considers clothing as a cultural text that reflects both the identity of a nation and the spirit of a historical period. Using examples from Uzbek costume history, it shows how garments changed together with social life, economy and aesthetics, while keeping a recognizable national character. Particular attention is paid to the symbolic meaning of color, ornament and silhouette, and to the role of clothing in shaping the image of modern Uzbekistan.

Keywords: clothing, national culture, costume history, symbol, ornament, color, identity, epoch, Uzbek costume, semiotics of dress.

Introduction

The French philosopher Roland Barthes described fashion as a system of signs, and the sociologist Georg Simmel saw in it a balance between the wish to belong to a group and the wish to stand out. Both ideas help us understand why clothing is often called a "mirror of its time." A garment tells us about the climate and resources of a country, its religion and customs, its craft skills and its contacts with other peoples. At the same time, it changes as society changes.

The purpose of this article is to show how Uzbek clothing expresses national culture and how it has reflected different historical periods.

Main part

1. Clothing as a cultural code. In traditional Uzbek society, a person's clothing revealed age, marital status, region and social position. A young girl wore bright colors and many braids; a married woman wore a headscarf of a certain type; an elderly woman preferred calm, dark tones. Men's do'ppi differed from region to region, and an experienced eye could tell whether a man came from Chust, Margilan, Bukhara or Surkhandarya. Ornaments were believed to protect the wearer, and embroidered items such as suzani and wedding garments were prepared by the family for years.

2. Clothing and historical periods. Uzbek dress clearly reflects the major stages of the country's history:

Period	Main features of clothing
Great Silk Road era	Silk and cotton weaving; exchange of fabrics, dyes and patterns with China, India, Iran

Period	Main features of clothing
19th – early 20th century	Flourishing of ikat (abrbandi) weaving, layered robes, rich embroidery, regional schools
Soviet period	Spread of European-style factory clothing; national dress kept mainly for holidays and weddings
Independence (since 1991)	Revival of national crafts, interest in heritage, emergence of Uzbek fashion designers
Present day	Combination of national motifs with global trends, eco-materials and digital design

Each period added something new, but the core elements — love for bright silk, ornament and layered silhouette — were preserved.

3. The language of color and ornament. Color in Uzbek costume is never accidental. Blue and turquoise are associated with the sky and purity, green with life and spring, red with joy and protection, and white with peace and sincerity. The ikat pattern, called *abr* ("cloud"), with its blurred edges, symbolizes movement and changeability — a striking parallel to fashion itself. Ornaments such as the ram's horn (qo'chqor shoxi), the almond and the pomegranate carry wishes for strength, health and prosperity.

4. Clothing and the image of modern Uzbekistan. Today, national dress is visible at state celebrations, cultural festivals and international events. Uzbek ikat and embroidery have appeared on global runways and in museum exhibitions abroad. For the country, clothing has become part of its cultural diplomacy: through fabrics and costumes, the world learns about Uzbek history and hospitality. For young people, wearing elements of national dress is a way of expressing pride in their roots while remaining modern.

Conclusion

Clothing is a living document of culture. It preserves the memory of a nation and, at the same time, records the changes of each epoch. Uzbek costume shows that national identity can survive major historical changes if it is supported by craft traditions and understood by new generations. Modern designers, by reading the "language" of traditional dress, can create clothing that speaks both about the nation and about our time.

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