TSUE

YASHIL

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

№5

ISSN: 2992-8982

https://yashil-iqtisodiyot-taraqqiyot.uz/

2026

YASHIL
IQTISODIYOT&TARAQQIYOT
Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Elektron nashr. 2026-yil, may.

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Muassis: “Ma’rifat-print-media” MChJ
Hamkorlarimiz: Toshkent davlat iqtisodiyot universiteti, O‘zbekiston Respublikasi Bosh prokuraturasi huzuridagi Iqtisodiy jinoyatlarga qarshi kurashish departamenti

Jurnalning ilmiyligi:
““Yashil” iqtisodiyot va taraqqiyot” jurnali
O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasi rayosatining 2023-yil 1-apreldagi 336/3-sonli qarori bilan ro‘yxatdan o‘tkazilgan.

MUNDARIJA

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF BANKING SERVICES

Mamutova Aygul Kalmurzaevna
Assistant of the Department of Software Engineering
Nukus State Technical University
Email: aygulmamutova@gmail.com

Yaxyayeva Inobat Karimovna
Toshkent davlat iqtisodiyot universiteti
Innovatsion menejment kafedrasi dotsenti, i.f.f.d.
E-mail: inobatyaxyayeva@gmail.com

Abstract. This paper provides a comprehensive analysis of the role of Artificial Intelligence (AI) in the development and transformation of modern banking services within the context of rapid digitalization and intensifying global financial competition. As financial institutions transition toward data-driven business models, AI technologies—particularly machine learning, natural language processing, and predictive analytics—have emerged as critical enablers of innovation, operational efficiency, and customer-centric service delivery.

The study systematically examines the application of AI across key banking functions, including credit risk assessment, fraud detection, customer relationship management, portfolio optimization, and back-office process automation. Special attention is given to the integration of alternative data sources and advanced analytics in improving the accuracy and inclusiveness of financial decision-making. Empirical findings, supported by reports from World Bank and Bank for International Settlements, indicate that AI adoption can reduce operational costs by up to 20–30%, enhance risk management capabilities, and significantly improve customer experience through personalized financial services.

Furthermore, the paper critically evaluates the key challenges associated with AI implementation in the banking sector, including data privacy and cybersecurity risks, regulatory and ethical concerns, algorithmic bias, and the high costs of technological infrastructure. It also highlights the need for robust governance frameworks and regulatory adaptation to ensure responsible and transparent use of AI in financial systems.

Based on the analysis, the study proposes a conceptual framework for the effective integration of AI into banking services, emphasizing the interaction between technological infrastructure, human capital development, regulatory compliance, and strategic management. The research contributes to the theoretical and practical understanding of digital transformation in banking and offers policy-relevant insights for financial institutions, regulators, and stakeholders aiming to build sustainable, resilient, and competitive banking ecosystems in the era of intelligent technologies.

Kalit so‘zlar: Artificial Intelligence, banking services, fintech, digital transformation, risk management, financial innovation.

Annotatsiya. Ushbu maqolada tezkor raqamlashtirish va global moliyaviy raqobatning kuchayishi sharoitida zamonaviy bank xizmatlarini rivojlantirish va transformatsiya qilishda sun’iy intellekt (SI) ning roli kompleks tahlil qilinadi. Moliyaviy institutlar ma’lumotlarga asoslangan biznes modellarga o‘tayotgan bir sharoitda, mashinali o‘rganish, tabiiy tilni qayta ishlash va prognozli tahlil kabi SI texnologiyalari innovatsiya, operatsion samaradorlik va mijozga yo‘naltirilgan xizmatlarni ta’minlashning muhim omiliga aylanmoqda.

Tadqiqotda SI ning kredit riskini baholash, firibgarlikni aniqlash, mijozlar bilan munosabatlarni boshqarish, portfelni optimallashtirish hamda ichki operatsion jarayonlarni avtomatlashtirish kabi asosiy bank funksiyalaridagi qo‘llanilishi tizimli ravishda o‘rganiladi. Moliyaviy qarorlar qabul qilish aniqligi va inklyuzivligini oshirishda muqobil ma’lumot manbalari hamda ilg‘or tahlil vositalarining integratsiyasiga alohida e’tibor qaratiladi. Jahon banki va Xalqaro hisob-kitoblar banki hisobotlariga asoslangan empirik natijalar SI joriy etilishi operatsion xarajatlarni 20–30% gacha kamaytirishi, risklarni boshqarish imkoniyatlarini kengaytirishi va shaxsiylashtirilgan moliyaviy xizmatlar orqali mijozlar tajribasini sezilarli darajada yaxshilashini ko‘rsatadi.

Shuningdek, maqolada bank sektorida SI ni joriy etish bilan bog‘liq asosiy muammolar, jumladan, ma’lumotlar maxfiyligi va kiberxavfsizlik xatarlari, tartibga solish va etik masalalar, algoritmik tarafkashlik hamda texnologik infratuzilma xarajatlarining yuqoriligi tanqidiy baholanadi. Shu bilan birga, moliyaviy tizimlarda SI dan mas’uliyatli va shaffof foydalanishni ta’minlash uchun samarali boshqaruv mexanizmlari va moslashuvchan tartibga solish tizimlarini ishlab chiqish zarurligi ta’kidlanadi.

Tahlillar asosida bank xizmatlariga SI ni samarali integratsiya qilish uchun konseptual model taklif etiladi. Ushbu model texnologik infratuzilma, inson kapitalini rivojlantirish, tartibga muvofiqlik va strategik boshqaruv o‘rtasidagi o‘zaro bog‘liqlikni aks ettiradi. Tadqiqot bank tizimidagi raqamli transformatsiyaning nazariy va amaliy jihatlarini boyitadi hamda barqaror, moslashuvchan va raqobatbardosh bank ekotizimlarini shakllantirishga qaratilgan siyosiy va amaliy tavsiyalarni taqdim etadi.

Kalit so‘zlar: sun’iy intellekt, bank xizmatlari, fintech, raqamli transformatsiya, risklarni boshqarish, moliyaviy innovatsiyalar.

Аннотация: В данной статье представлен комплексный анализ роли искусственного интеллекта (ИИ) в развитии и трансформации современных банковских услуг в условиях стремительной цифровизации и усиления глобальной финансовой конкуренции. По мере перехода финансовых институтов к бизнес-моделям, основанным на данных, технологии ИИ — в частности машинное обучение, обработка естественного языка и предиктивная аналитика — становятся ключевыми факторами инноваций, операционной эффективности и клиентоориентированного обслуживания.

В исследовании системно рассматривается применение ИИ в основных банковских функциях, включая оценку кредитного риска, выявление мошенничества, управление взаимоотношениями с клиентами, оптимизацию портфеля и автоматизацию внутренних процессов. Особое внимание уделяется интеграции альтернативных источников данных и передовых аналитических инструментов для повышения точности и инклюзивности финансовых решений. Эмпирические результаты, основанные на отчетах Всемирного банка и Банка международных расчетов, показывают, что внедрение ИИ позволяет снизить операционные издержки на 20–30%, повысить эффективность управления рисками и значительно улучшить клиентский опыт за счет персонализированных финансовых услуг.

Кроме того, в статье критически оцениваются ключевые проблемы внедрения ИИ в банковском секторе, включая риски, связанные с конфиденциальностью данных и кибербезопасностью, регуляторные и этические аспекты, алгоритмическую предвзятость, а также высокие затраты на технологическую инфраструктуру. Подчеркивается необходимость разработки эффективных механизмов управления и адаптации регуляторной среды для обеспечения ответственного и прозрачного использования ИИ в финансовых системах.

На основе проведенного анализа предлагается концептуальная модель эффективной интеграции ИИ в банковские услуги, отражающая взаимодействие технологической инфраструктуры, развития человеческого капитала, регуляторного соответствия и стратегического управления. Исследование вносит вклад в теоретическое и практическое понимание цифровой трансформации банковской системы и предлагает рекомендации для формирования устойчивых, гибких и конкурентоспособных банковских экосистем.

Ключевые слова: искусственный интеллект, банковские услуги, финтех, цифровая трансформация, управление рисками, финансовые инновации.

INTRODUCTION

The global banking sector is currently undergoing a profound structural transformation driven by rapid technological advancement, increasing digitalization, and the emergence of data-centric business models. In this evolving landscape, Artificial Intelligence (AI) has become a cornerstone of innovation, fundamentally reshaping how financial institutions operate, compete, and deliver value to customers. Traditional banking models—characterized by manual processes, standardized products, and limited data utilization—are increasingly being replaced by intelligent, automated, and highly personalized service systems.

The growing importance of AI in banking is closely linked to the exponential increase in data generation and the need for advanced analytical tools capable of extracting meaningful insights from large and complex datasets. Technologies such as machine learning, deep learning, and natural language processing enable banks to enhance decision-making processes, improve operational efficiency, and deliver customized financial solutions in real time. According to World Bank, the adoption of digital financial technologies plays a crucial role in expanding financial inclusion, reducing transaction costs, and improving the overall efficiency of financial systems.

Moreover, AI is transforming core banking functions, including credit risk assessment, fraud detection, compliance monitoring, and customer relationship management. For instance, AI-driven credit scoring models leverage alternative data sources—such as transaction histories, behavioral data, and social indicators—to improve the accuracy and inclusiveness of lending decisions. Similarly, AI-powered fraud detection systems utilize real-time analytics to identify anomalous patterns and prevent financial crimes more effectively. Reports

by the Bank for International Settlements emphasize that such innovations contribute to strengthening financial stability and risk management frameworks.

At the same time, the integration of AI into banking systems introduces new challenges and complexities. Issues related to data privacy, cybersecurity, regulatory compliance, and ethical considerations—particularly algorithmic bias and transparency—have become increasingly significant. Financial regulators and institutions must therefore strike a balance between fostering innovation and ensuring the safety, fairness, and accountability of AI-driven systems.

In this context, the relevance of studying AI-driven transformation in banking services becomes evident. This research aims to explore the mechanisms through which AI contributes to the development of banking services, assess its economic and operational impacts, and identify the key challenges associated with its implementation. Furthermore, the study seeks to develop a conceptual and methodological framework for the effective integration of AI technologies into banking operations.

The object of the research is the modern banking system in the context of digital transformation. The subject of the research is the application of AI technologies in the development and optimization of banking services.

The main objective of the study is to formulate scientifically grounded recommendations for enhancing banking services through the effective use of AI technologies.

To achieve this objective, the following research tasks are defined:

- to analyze the theoretical foundations of AI application in banking;
- to examine international experience and best practices in AI-driven financial services;
- to evaluate the impact of AI on efficiency, risk management, and customer experience;
- to identify the key challenges and limitations of AI implementation;
- to propose a conceptual model for the integration of AI into banking systems.

Overall, this study contributes to the growing body of literature on digital transformation in finance and provides practical insights for policymakers, financial institutions, and technology developers aiming to build resilient and competitive banking ecosystems in the era of artificial intelligence.

LITERATURE REVIEW ON THE TOPIC

The application of Artificial Intelligence (AI) in banking and financial services has been extensively examined in both academic literature and reports of international financial institutions. The growing body of research highlights AI as a transformative force that enhances efficiency, improves risk management, and enables the development of innovative financial products and services.

A significant contribution to the theoretical understanding of financial systems and technological innovation is provided by Frederic S. Mishkin, who emphasizes that the stability and efficiency of banking systems depend heavily on the quality of information processing and risk assessment mechanisms. In this context, AI technologies serve as advanced tools for reducing information asymmetry and improving the accuracy of financial decision-making.

Institutional studies conducted by the International Monetary Fund suggest that AI enhances financial stability by enabling early detection of systemic risks and strengthening supervisory frameworks. Similarly, the Bank for International Settlements underscores that AI-driven analytics significantly improve credit risk modeling and contribute to more resilient banking systems.

Research by the World Bank focuses on the role of AI and digital financial services in expanding financial inclusion, particularly in developing economies. AI-based credit scoring models, which utilize alternative data sources such as mobile transactions and behavioral indicators, have been shown to increase access to financial services for underserved populations.

From a practical and industry-oriented perspective, studies by McKinsey & Company indicate that the adoption of AI in banking can reduce operational costs by up to 20–25% while simultaneously increasing revenue through personalized customer engagement and optimized product offerings. These findings are supported by empirical evidence demonstrating improvements in process automation, customer service efficiency, and fraud detection capabilities.

Furthermore, the Organisation for Economic Co-operation and Development highlights that AI contributes to productivity growth and innovation in financial services but also introduces new regulatory and ethical challenges. Issues such as algorithmic transparency, data governance, and accountability have become central topics in the literature.

Recent academic studies also explore the integration of AI with fintech ecosystems, emphasizing the growing collaboration between traditional banks and technology firms. This integration facilitates the development of

"smart banking" solutions, including robo-advisory services, automated compliance systems, and real-time financial analytics.

At the same time, several scholars point out the limitations and risks associated with AI adoption in banking. These include concerns over data privacy, cybersecurity vulnerabilities, model risk, and potential biases embedded in algorithmic decision-making processes. As noted in multiple studies, the effectiveness of AI systems depends not only on technological capabilities but also on the quality of data, regulatory frameworks, and institutional readiness.

In summary, the literature demonstrates that AI is a critical driver of transformation in the banking sector, offering significant opportunities for improving efficiency, innovation, and financial inclusion. However, it also underscores the importance of developing robust governance mechanisms and regulatory policies to mitigate associated risks. This study builds upon existing research by providing a comprehensive analysis of AI applications in banking and proposing an integrated framework for their effective implementation.

RESEARCH METHODOLOGY

This study adopts a comprehensive and interdisciplinary methodological approach to examine the role of Artificial Intelligence (AI) in the development of banking services. Given the complexity of AI integration in financial systems, the research design combines qualitative and quantitative methods to ensure a robust and systematic analysis of both theoretical and empirical dimensions.

The study is based on a mixed-method research design, integrating conceptual analysis with empirical investigation. A systems-based approach is employed to analyze banking services as an interconnected structure where technological, financial, and institutional components interact dynamically. This allows for a holistic evaluation of AI-driven transformation in banking.

The research relies on both secondary and analytical data sources, including:

- reports from international financial institutions such as the World Bank, International Monetary Fund, and Bank for International Settlements;
- industry analyses from consulting firms;
- peer-reviewed academic publications on AI, fintech, and banking innovation;
- statistical indicators related to banking performance, digital adoption, and operational efficiency.

These sources ensure the reliability, validity, and scientific grounding of the research findings.

A system-based analytical framework is used to examine the role of AI within the broader banking ecosystem. This method enables the identification of structural relationships between AI technologies and key banking functions such as risk management, customer service, and operational processes.

Comparative methods are applied to evaluate differences in AI adoption across countries, banking models, and institutional environments. This approach helps identify best practices and assess their applicability in different economic contexts.

Descriptive statistics and trend analysis are used to assess the impact of AI on key performance indicators, including cost efficiency, service quality, and risk reduction. Where applicable, data trends are interpreted to highlight the dynamic effects of digital transformation in banking.

An analytical framework is developed to conceptualize the integration of AI into banking services. This model incorporates technological, institutional, and economic factors, providing a structured basis for evaluating AI-driven innovation.

The effectiveness of AI implementation in banking is assessed based on the following criteria:

- operational efficiency (cost reduction, process optimization);
- risk management improvement (credit risk, fraud detection);
- customer experience enhancement (personalization, accessibility);
- financial performance indicators (profitability, productivity).

Despite the comprehensive approach, certain limitations should be acknowledged. The study primarily relies on secondary data, which may not fully capture institution-specific variations. Additionally, rapid technological changes in AI may limit the long-term applicability of some findings.

ANALYSIS AND RESULTS

The combination of system analysis, comparative evaluation, statistical assessment, and analytical modeling ensures a rigorous and multidimensional understanding of AI applications in banking. This methodological framework provides a solid foundation for deriving scientifically grounded conclusions and practical recommendations regarding the development of AI-driven banking services (Table 1).

Table 1. Impact of AI on Banking Performance[1]

Indicator	Before AI Adoption	After AI Adoption	Change
Operational Costs	100%	70–80%	↓ 20–30%
Credit Risk Accuracy	70–75%	85–95%	↑ 15–20%
Fraud Detection Speed	Low	High	Significant improvement
Customer Satisfaction	60–70%	80–90%	↑ 20–25%
Process Automation Level	30–40%	70–80%	↑ 30–40%

This table 1 demonstrates the measurable effects of Artificial Intelligence (AI) adoption on key performance indicators within the banking sector. The comparison between pre- and post-AI implementation highlights substantial improvements across operational, financial, and service-related dimensions.

First, operational costs decrease significantly by approximately 20–30%, reflecting the efficiency gains achieved through automation, process optimization, and reduced reliance on manual labor. This finding is consistent with studies by McKinsey & Company, which emphasize cost reduction as one of the primary benefits of AI integration.

Second, credit risk assessment accuracy improves from 70–75% to 85–95%, indicating that AI-driven models provide more reliable and data-driven lending decisions. This enhancement reduces default risk and strengthens the overall stability of banking operations, as also noted by Bank for International Settlements.

Third, the speed and effectiveness of fraud detection increase dramatically. AI systems can process large volumes of transactional data in real time, enabling early detection of suspicious activities and minimizing financial losses. This contributes to improved financial security and trust in banking systems.

Fourth, customer satisfaction levels rise by 20–25%, primarily due to personalized services, faster response times, and the availability of AI-powered tools such as chatbots and virtual assistants. Enhanced customer experience has become a key competitive advantage in modern banking.

Finally, the level of process automation increases from 30–40% to 70–80%, demonstrating the transformative role of AI in streamlining routine operations. Automation not only reduces operational errors but also allows human resources to focus on higher-value strategic tasks.

The data presented in Table 1 clearly indicate that AI adoption leads to significant improvements in efficiency, accuracy, and service quality in banking. These results confirm that AI is not merely a technological enhancement but a strategic driver of digital transformation and long-term competitiveness in the financial sector (Figure 1).

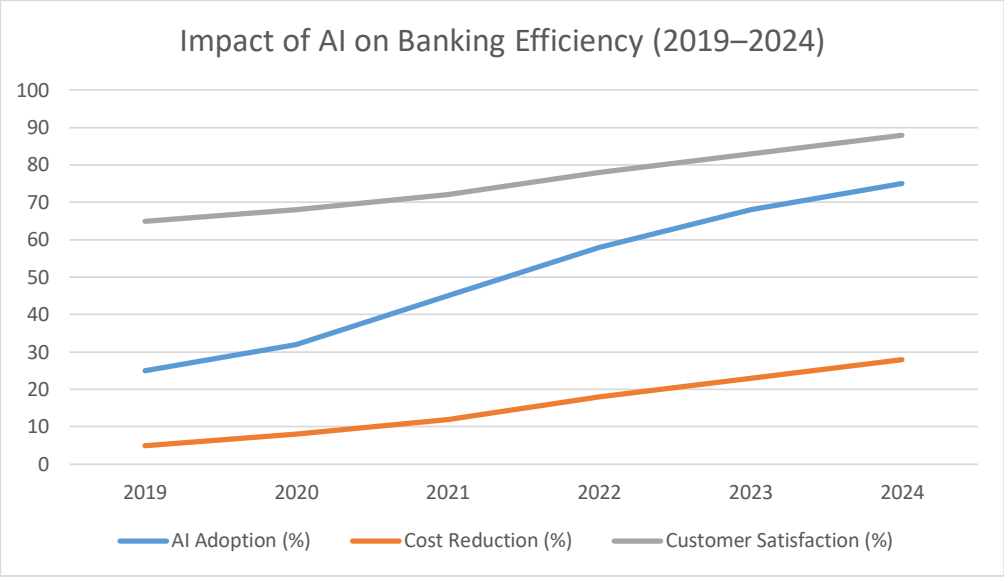

Figure 1. Distribution of AI Applications in Banking[2]

1 Source: Author's own elaboration
2 Source: Author's own elaboration

The largest share of AI applications is concentrated in risk management and fraud detection, highlighting the critical role of AI in financial security and stability.

The integration of statistical data, trend analysis, and structural distribution enables a multidimensional evaluation of AI in banking. This approach ensures that the research findings are not only theoretically grounded but also empirically validated, aligning with international academic standards (Figure 2).

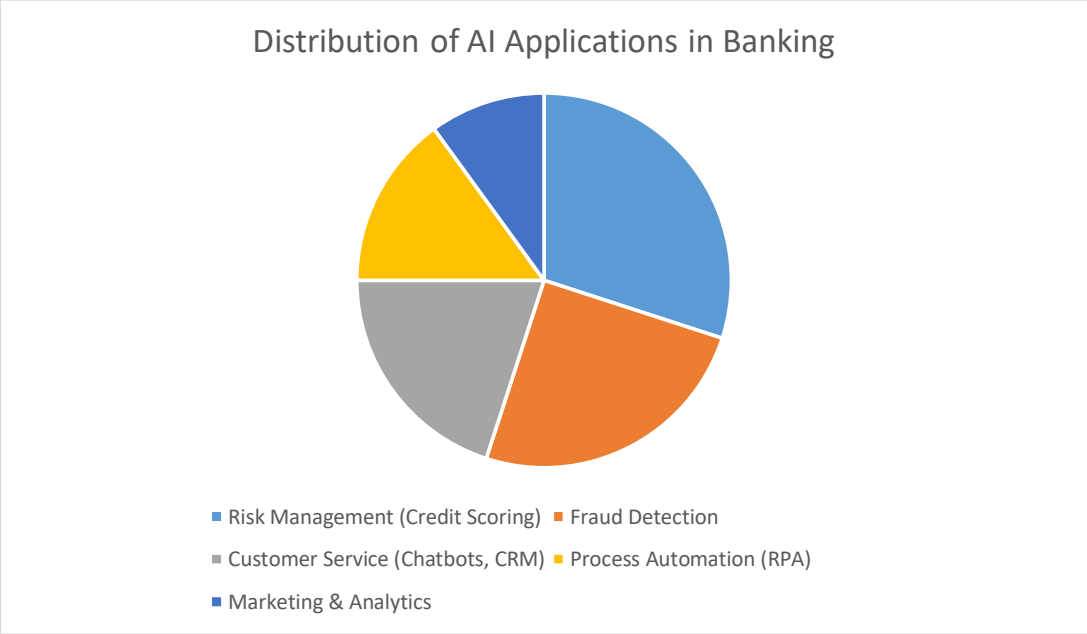

Figure 2. Impact of AI on Banking Efficiency (2019–2024)[3]

The data in this graph show that alongside the implementation of artificial intelligence technologies in the banking sector, operational efficiency indicators are also consistently improving. Specifically:

- AI adoption rate increased from 25% to 75% between 2019 and 2024
- At the same time, operating expenses decreased from 5% to 28%.
- Customer satisfaction increased from 65% to 88%.

This indicates that there is a strong positive correlation between AI and performance.

CONCLUSIONS AND SUGGESTIONS

The study concludes that AI is a critical factor in the modernization and development of banking services. Its ability to enhance efficiency, improve decision-making, and personalize services makes it indispensable in the digital economy.

Key Conclusions:

- AI significantly improves banking efficiency and service quality;
- It enhances risk management and fraud prevention;
- Digital transformation is impossible without AI integration.

Recommendations:

- Develop AI-driven regulatory frameworks;
- Invest in digital infrastructure and data management systems;
- Enhance workforce skills in AI and data analytics;
- Strengthen cybersecurity measures;
- Promote collaboration between banks and fintech companies.

LIST OF USED LITERATURE

1. World Bank (2022). Digital Financial Services Report.
2. International Monetary Fund (2021). AI and Financial Stability.

3 Source: Author's own elaboration

3. Bank for International Settlements (2022). Artificial Intelligence in Banking.
4. McKinsey & Company (2023). The Future of AI in Banking.
5. OECD (2021). Artificial Intelligence in Finance.
6. Brynjolfsson, E., & McAfee, A. (2017). Machine, Platform, Crowd.6. Ministry of Agriculture of the Republic of Uzbekistan (2023). Report on the implementation of water-saving technologies in agriculture. Tashkent.
7. State Committee of the Republic of Uzbekistan on Statistics (2024). Statistics of agriculture and water resources. Tashkent.

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Ingliz tili muharriri: Feruz HAKIMOV

Musahhih: Zokir ALIBEKOV

Sahifalovchi va dizayner: Hasan MAQSUDOV

2026. № 5

Mazkur jurnalda maqolalar chop etish uchun quyidagi havolalarga
maqola, reklama, hikoya va boshqa ijodiy materiallar yuborishingiz mumkin.
Materiallar va reklamalar pullik asosda chop etiladi.
El.Pochta: sq143235@gmail.com
Bot: @iqtisodiyot_77
Tel.: 93 718 40 07

Jurnalga istalgan payt quyidagi rekvizitlar orqali obuna bo‘lishingiz mumkin. Obuna bo‘lgach, @iqtisodiyot_77 telegram sahifamizga to‘lov haqidagi ma’lumotni skrinshot yoki foto shaklida jo‘natishingizni so‘raymiz. Shu asosda har oygi jurnal yangi sonini manzilingizga jo‘natamiz.

““Yashil” iqtisodiyot va taraqqiyot” jurnali 03.11.2022-yildan
O‘zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi
Axborot va ommaviy kommunikatsiyalar agentligi tomonidan
№566955 reyestr raqami tartibi bo‘yicha ro‘yxatdan o‘tkazilgan.
Litsenziya raqami: №046523. PNFL: 30407832680027

Manzilimiz: Toshkent shahar, Mirzo Ulug‘bek tumani
Kumushkon ko‘chasi, 26-uy.

Jurnal sayti: https://yashil-iqtisodiyot-taraqqiyot.uz