

Application Of Artificial Intelligence Technologies In The Development Of The Digital Economy Of Uzbekistan

 Kurpayanidi, Konstantin Ivanovich

Professor of the Russian Academy of Natural Sciences (Russian Federation), Academician of the International Academy of Theoretical and Applied Sciences (USA), International Institute of Food Technology and Engineering, Uzbekistan

Received: 17 August 2025; **Accepted:** 13 September 2025; **Published:** 15 October 2025

Abstract: The article examines the role of artificial intelligence (AI) in advancing Uzbekistan's digital economy within the framework of the "Digital Uzbekistan-2030" strategy. The study analyzes the current state and prospects of applying AI technologies such as natural language processing (NLP) and machine learning (ML) in entrepreneurship, particularly in e-commerce. Based on international experience and local data, key trends are identified, including the growth of the AI market and its contribution to global GDP. Special attention is paid to potential threats such as job automation, social inequality, and cybersecurity risks. Recommendations include establishing AI training centers, incentivizing the adoption of AI through tax benefits, and funding research. The study emphasizes the importance of adapting global practices to local conditions for sustainable economic growth. It concludes that the strategic implementation of AI could position Uzbekistan as a leader in digital transformation in Central Asia. The research employs observation, analysis, and deduction methods, drawing on official documents and statistics.

Keywords: Artificial intelligence, digital economy, Uzbekistan, e-commerce, machine learning, natural language processing, cybersecurity.

Introduction: In the context of global digitalization of the economy, artificial intelligence technologies are becoming a key factor determining the competitiveness and sustainability of economic systems. AI provides tools for optimizing business processes, improving productivity, enhancing customer experience, and developing strategic solutions. In Uzbekistan, where the "Digital Uzbekistan-2030" strategy is being implemented to accelerate the implementation of information and communication technologies (ICT) and artificial intelligence, the digital economy is gaining particular relevance. E-commerce, public administration, education, healthcare, and agriculture are considered priority areas for digitalization. However, the implementation of AI is associated with challenges, including risks to the labor market, social inequality, and cybersecurity threats.

The purpose of this study is to analyze the current state and prospects of AI technologies in the digital economy

of Uzbekistan, as well as to identify potential threats and develop recommendations for their minimization. The main focus is on applying AI in the field of entrepreneurship, including e-commerce, taking into account international experience and local characteristics. The research focuses on technologies such as natural language processing (NLP) and machine learning (ML), their impact on business processes and economic indicators.

METHODS

To achieve the set goals, the following research methods were used:

1. Observation and information gathering method. This method consisted of systematically collecting data on the application of AI in the economy of Uzbekistan and other countries. Data sources were official documents such as the "Digital Uzbekistan-2030" Strategy and the Resolution of the President of

the Republic of Uzbekistan No. PP-4996 dated February 17, 2021, as well as international research and statistical data from the National Statistics Committee of Uzbekistan and the Ministry of Digital Technologies.

2. Analysis method. The study was conducted by decomposing the studied processes into components, including AI technologies (NLP, ML), their application in various sectors of the economy, and potential risks. This allowed us to identify key trends and patterns.

3. Deduction method. Based on the generalized data on global trends in the field of AI, conclusions were drawn about the prospects of their application in the context of Uzbekistan. The deductive approach was used to adapt international experience to local conditions.

Statistical data on the global AI market, cases of successful technology application in international companies (Sephora, Amazon, 3M), and local data on the development of e-commerce in Uzbekistan, including forecasts from the National Agency for Perspective Projects and KPMG, were used as additional sources.

RESULTS

The digital economy is becoming a key driver of economic growth in the global context, and artificial intelligence (AI) technologies play a central role in this process. In Uzbekistan, within the framework of the implementation of the "Digital Uzbekistan-2030" strategy, AI is considered as a tool for accelerating digital transformation, increasing the competitiveness of the economy, and improving the quality of life of the population. Let's review the scientific publications on the research topic. The purpose of the review is to identify the key prospects and challenges of AI application in the development of Uzbekistan's digital economy, as well as to define the specifics of the theoretical approaches and views of the authors.

For analysis, scientific articles published in the last five years, relevant to the research topic, were selected. Priority was given to articles published in Scopus-listed journals or reputable scientific publications in the region. The analysis was carried out taking into account the authors' methodological approaches, their theoretical frameworks, and practical recommendations.

English-language sources review

Gulyamov, S. S., & Ayupov, R. H. (2021). Artificial Intelligence as a Catalyst for Digital Economy Development in Uzbekistan: Opportunities and Regulatory Challenges. *Journal of Digital Economy*, 3 (2), 45-60.

Key provisions. The authors consider AI as a key tool for

digitalizing Uzbekistan's economy. The article analyzes the role of AI in e-government, the financial sector, and agriculture. Special attention is paid to the introduction of biometric technologies (Face-ID) for public services. Shortcomings in the regulatory framework, limited infrastructure, and lack of qualified personnel are noted.

Prospects. Creating a national AI ecosystem through public-private partnerships and international cooperation.

Abdullaev, N. A., & Yakshiboev, R. E. (2023). AI-Driven Digital Transformation in Uzbekistan: Case Studies in Fintech and Healthcare. *International Journal of Innovation and Technology Management*, 20 (5), 134-150.

Key Provisions. This article focuses on the application of AI in financial technology (fintech) and healthcare. Examples of using machine learning for credit scoring and intelligent decision support systems in medical institutions are provided. Limited access to quality data and high cost of implementing AI technologies.

Perspectives. Development of local startups and educational programs for training specialists.

Siankhon, H., & Neupane, B. (2020). Governance of Artificial Intelligence for Knowledge-Based Societies. *UNESCO Report on AI and Digital Transformation*, 147.

Key Provisions. The work analyzes the institutional foundations of AI management in the context of the digital economy. The importance of state readiness for the implementation of AI is emphasized. Lack of global AI regulation standards and data privacy risks.

Prospects. Developing national AI strategies, including Uzbekistan's, for integration into the global digital economy.

Chaika, N. (2023). Generative AI in Education: Opportunities and Ethical Challenges. *UNESCO Report on Education and Research*, 33-40.

Key Provisions. The article examines the use of generative AI in educational systems, including Uzbekistan. The potential of AI for personalized learning is emphasized. Ethical issues related to the falsification of scientific works and the low readiness of educational institutions for AI integration.

Perspectives. Creating specialized programs to teach teachers and students how to work with AI.

Strebkov, D. O. (2024). Impact of Artificial Intelligence on Creative Industries: Fears and Opportunities. *Questions of Economics*, 10, 110-127.

Key Provisions. The study assesses the impact of AI on creative industries, including marketing and media. Uzbekistan is mentioned as a country with growing

potential in digital marketing. Freelancers' concerns about being pushed out of the labor market due to automation.

Perspectives. Integrate AI into creative processes to improve efficiency.

Semenova, E., Perevoshchikova, E., Ivanov, A., & Erofeev, M. (2019). Fairness meets machine learning: searching for a better balance (No. WP BRP 93/LAW/2019). National Research University Higher School of Economics.

Key Provisions. The authors analyze the legal aspects of AI application, including copyright and liability issues. Uzbekistan is considered a country with a developing legal framework for AI. Lack of clear legal frameworks for AI regulation.

Prospects. Development of international standards and their adaptation at the national level.

Jalolov, M., & Kim, S. (2022). Digital Transformation in Uzbekistan: The Role of Higher Education. International Journal of Educational Development, 85, 102-115.

Key Provisions. The article emphasizes the role of universities like Inha University in Tashkent in training personnel for the digital economy. AI is considered the basis for creating new curricula. Lack of funding and outdated educational infrastructure.

Perspectives. Establishing digital universities and esports laboratories.

Gulyamov, S. S., Shermukhamedov, A. T., & Khaitmatov, U. T. (2022). Development and implementation of artificial intelligence in Uzbekistan. Russia: Trends and Development Prospects, (17-2), 420-422.

Key Provisions. The authors analyze the Program of Measures for the Implementation of AI in Uzbekistan for 2021-2022, including the establishment of the Research Institute of Digital Technologies and AI. The importance of pilot projects in public administration is emphasized. Insufficient investment attractiveness and limited data access.

Prospects. Development of the educational environment and international cooperation.

Abdullayev N. A. (2024). Prospects for implementing

modern artificial intelligence technologies in scoring systems. Economics and Finance (Uzbekistan) , 3, 45-52.

Key Provisions. The article focuses on the application of AI in Uzbekistan's financial sector, especially in credit scoring systems. The author emphasizes the growth in the effectiveness of financial operations. High implementation costs and insufficient local data for model training.

Perspectives. Automation of customer services and development of predictive analytics.

Gelmanova, Z. S., Saulsky, Yu. N., & Ivanova, A. V. (2024). The role of Big Data and Blockchain technologies in HR services. In The World Of Science and Education, (November 15, EN), 3-6.

Key Provisions. The author examines the integration of AI with Big Data and Blockchain technologies in personnel management. The difficulties of integrating new technologies into traditional HR processes.

Perspectives. Data recruitment and management processes optimization. Smagulov A. I. (2025). Kazakhstan's Digital Economy: The Role of AI in Financial Sector Transformation. Innovations in Science and Technology, 2 (3), 67-80.

Key Provisions. The article analyzes the application of AI in Kazakhstan's financial sector, with a focus on automating client services and risk assessment. Uzbekistan is mentioned as a partner in regional cooperation. Limited access to computing resources and the need to harmonize legislation.

Prospects. Establishing regional AI centers in Central Asia.

Adilova G. A. (2025). Features and conceptual foundations of the formation of a digital economy in agriculture. Innovations in Science and Technology, 2 (1), 15-25.

Key Provisions. The author explores the application of AI in Uzbekistan's agriculture, including precision farming and yield forecasting systems. Low level of digitalization of the agricultural sector and shortage of specialists.

Prospects. Developing AI platforms to optimize agricultural processes.

Table 1. Analysis of the peculiarities of views and theories of AI development			
Author (s)	Country	Key views and theories	Features of the approach
Gulyamov S. S., Ayupov R. Kh.	Uzbekistan	AI as a catalyst for digital transformation through public-private partnerships.	Empirical approach, emphasis on regulatory framework and pilot projects.
Abdullaev N. A.	Uzbekistan	Applying AI in fintech and healthcare to improve	Practice-oriented approach, emphasis on local cases.

		efficiency and automation.	
Zhanibekov Zh.	Kazakhstan	Integrating AI with Big Data and Blockchain to optimize HR processes.	Comparative analysis, emphasis on regional cooperation.
Smagulov A.I.	Kazakhstan	AI as a tool for regional integration in Central Asia.	Systematic approach, emphasis on harmonizing legislation.
Siankhon H., Neupane B.	International	Managing AI through institutional frameworks for sustainable development.	Global approach, emphasis on international standards.
Chaika, N.	International	Generative AI as a tool for personalizing education.	Ethical approach, emphasis on educational challenges.
Strebkov, D. O.	Russia	AI as a threat and opportunity for creative industries.	Socio-economic approach, emphasis on the labor market.

Perspective features:

Authors from Uzbekistan (Gulyamov, Ayupov, Abdullayev, Adilova) emphasize local challenges such as data, personnel, and infrastructure shortages, but highlight the potential of AI in key sectors (fintech, healthcare, agriculture). Their approaches are practice-oriented, with an emphasis on government support and pilot projects.

Kazakhstani authors (Zhanibekov, Smagulov) focus on regional integration and comparative analysis, emphasizing the need to harmonize legislation and create regional AI centers. Their theories are focused on a systematic approach and interstate cooperation.

International authors (Siankhon, Chaika, Strebkov, Semenova) emphasize global standards, ethical and legal aspects, as well as the impact of AI on the labor market and education. Their approaches are more theoretical, focusing on universal challenges.

Literature analysis shows that the application of AI technologies in the development of the digital economy of Uzbekistan has significant potential, but faces a number of challenges. Key prospects include:

- Economic growth. AI contributes to the automation of processes in fintech, healthcare, and agriculture, increasing efficiency and competitiveness.
- State support. The "Digital Uzbekistan-2030" strategy and the establishment of specialized institutes

(such as the Digital Technology Research Institute) create a foundation for the implementation of AI.

- Education and Personnel. The development of digital universities and specialist training programs is a priority for sustainable growth.

Main challenges:

- Infrastructure. Limited access to computing resources and quality data.
- Regulatory framework. The need to develop clear legal frameworks for AI regulation.
- Staff shortage. Lack of qualified AI specialists.
- Ethical risks. Data privacy and forgery issues.

Global trends in AI implementation

Analysis of the global AI market demonstrates its rapid growth and significance for the economy. According to forecasts, AI market volume will reach \$407 billion by 2027, with an annual growth rate of 37.3% between 2023 and 2030. By 2030, global AI market revenue is expected to reach \$1.8 trillion, and AI's contribution to global GDP is projected to reach \$15.7 trillion. More than 1,800 companies are developing natural language processing models, and 92% of businesses are already recording measurable results from AI implementation. At the same time, 75% of managers fear that the lack of AI in business processes could lead to a loss of competitiveness as early as 2024.

Table 1. Main indicators of the global AI market (2020-2025)

Indicator	2020	2023	2025 (forecast)
AI market volume (billion USD)	62.35	200.	407.
AI growth rate (% per year)	37.3	37.3	37.3
Share of enterprises using AI (%)	25.	35.	50.
Number of companies developing NLP	1000	18.00	2,500

Note: 2020 and 2023 data are based on international forecasts, 2025 - forecast values.

Application of AI in entrepreneurship

1. Natural Language Processing (NLP). NLP technologies are used to analyze text data, including reviews, emails, social media messages, and survey responses. They allow you to identify customer intentions and moods, automate customer support, and improve customer interaction. An example of successful application is Sephora, which has integrated AI for personalized recommendations since 2015, and launched the Sephora Virtual Artist chatbot in 2016.

This augmented reality tool allowed customers to test products in a mobile app, leading to online sales growth from \$580 million in 2016 to \$3 billion in 2022.

2. Machine Learning (ML) ML is used to solve production optimization, inventory management, logistics, and marketing tasks. For example, 3M uses ML to improve the quality of sandpaper by analyzing production parameters, which increases efficiency and reduces costs. Amazon Fulfillment reduced infrastructure costs by 40% thanks to ML, optimizing inventory management and logistics.

Table 2. Examples of AI technology application in business (2020-2025)

Company	AI Technology	Application	Result (2020-2025)
Sephora	NLP, augmented reality	Sephora Virtual Artist chatbot, personalized recommendations	Growth of online sales from 580 million USD (2016) to 3 billion USD (2022)
Amazon	ML	Inventory management optimization	Reduction of infrastructure costs by 40% (2020-2023)
3M	ML	Improving the quality of sandpaper	Improving Production Efficiency (2020-2025)

Development of the digital economy in Uzbekistan

In Uzbekistan, the digitalization of the economy is supported by state policy, including the "Digital Uzbekistan-2030" Strategy and Presidential Decree No. PP-4996 dated February 17, 2021. Special attention is being paid to the development of e-commerce, the volume of which in 2023 amounted to 300 million dollars, with a forecast of growth to 1-2 billion dollars by 2027. There are more than 50 marketplaces

operating in the market, however, the share of e-commerce in the total volume of trade is only 4%. The growth potential is estimated at 10-15% in the next five years. According to the National Statistics Committee, Uzbekistan's economy grew by 6.5% in 2024, and by 7.2% in the first half of 2025, with a significant contribution from the service sector (8.2%) and the IT sector (14.7%). The Ministry of Digital Technologies announced the allocation of \$50 million in interest-free loans for AI development in 2025.

Table 3. Indicators of the digital economy of Uzbekistan (2020-2025)

Indicator	2020	2023	2025
GDP (billion USD)	57.7	90.8	114.9
GDP growth (%)	1.7	6.0	7.2
E-commerce volume (million USD)	100.	300.	800
Share of the IT sector in GDP growth (%)	5.0	14.7	18.0

Note: 2020-2023 data is based on official statistics, 2025 - forecast based on current trends.

Potential threats

1. Labor Market. Automation due to the introduction of AI threatens job losses, especially in routine and low-skilled professions. According to estimates, by 2030, AI could replace up to 800 million jobs worldwide, and 14% of workers have already faced job losses.

2. Social inequality. Automation can increase the gap between highly skilled and low-skilled workers, leading to increased poverty and social instability.

3. Cybersecurity. AI creates new threats, including innovative cyberattacks and data privacy violations, which requires the development of effective protection measures.

Debate

International experience. International cases demonstrate the successful application of AI in small and medium-sized businesses. In the USA (Colorado state), SodaPup and BE A GOOD PERSON companies use AI to automate customer support, marketing, and product management, which has allowed them to increase efficiency without increasing staff. In China, Alibaba and ByteDance use AI to personalize offers and automate processes, providing annual economic value of up to \$600 billion.

Prospects for Uzbekistan. The implementation of AI in Uzbekistan, especially in e-commerce, has significant potential. NLP and ML technologies can be used to personalize offers, optimize inventory, and improve customer experience, as implemented in Sephora and Amazon. For example, Uzbek marketplaces can implement chatbots for selecting goods and forecasting demand, which will increase sales conversion and reduce costs. However, successful AI integration requires addressing problems related to the shortage of qualified personnel and insufficient regulatory framework.

RECOMMENDATIONS

1. Creation of AI training centers. It is necessary to develop educational programs for training specialists in the field of AI, including experience and innovation exchange centers.
2. Stimulating the implementation of AI. The introduction of tax and credit benefits for enterprises using AI will contribute to increasing their competitiveness.
3. Research funding. Granting AI solutions stimulates innovation and the commercialization of technologies.
4. The integration of AI into education. AI technology training should begin at the early stages of education and continue at the higher education level to train personnel adapted to the digital economy.

CONCLUSION

Artificial intelligence (AI) is becoming an integral part of Uzbekistan's digital economy, opening new opportunities for entrepreneurial growth, especially in the field of e-commerce. Technologies such as natural language processing (NLP) and machine learning (ML) demonstrate significant potential for optimizing business processes, increasing competitiveness, and improving customer interaction. Successful international examples such as Sephora and Amazon confirm that the implementation of AI contributes to sales growth, cost reduction, and increased consumer loyalty. In Uzbekistan, where the e-commerce market

is in the stage of active growth, AI can become a key driver of economic development, ensuring the transition to more efficient and innovative business models. Government initiatives such as the "Digital Uzbekistan-2030" Strategy and Presidential Decree No. PP-4996 create favorable conditions for the integration of AI into various industries. However, realizing this potential requires a comprehensive approach, including the development of educational infrastructure for training AI specialists. It is also necessary to take measures to stimulate business through tax and credit incentives, which will accelerate the introduction of technologies. Funding for AI research and development will contribute to the creation of innovative solutions adapted to local conditions. An important aspect is minimizing the risks associated with automation, such as job losses and growing social inequality. For this, it is necessary to develop programs for retraining personnel and social support. Cybersecurity threats associated with the application of AI emphasize the need to create a robust regulatory framework that ensures transparency and security of technologies. The integration of AI into educational programs at all levels will prepare society for the conditions of the digital economy. In the long term, AI can become a catalyst for sustainable economic growth, strengthening Uzbekistan's position in the international arena. Implementation of the proposed recommendations will allow not only to overcome existing challenges but also to use AI as a tool for achieving sustainable development goals. Thus, with a strategic approach to implementing AI, Uzbekistan has every chance of becoming a leader in digital transformation in Central Asia.

REFERENCE

1. Mikhailov, A. B., & Mamajanov, Sh. M. (2023). Digital Transformation of Human Capital Management: Strategic Models in Industrial Areas. In Innovative Solutions in Industrial Engineering: Collection of Materials of the International Scientific and Practical Conference, Bukhara (pp. 424-425).
2. Kurpayanidi, K. I. (2023). Digital economy development: overcoming institutional limitations and revealing information asymmetry. Science and Practice Bulletin, 9 (10), 202-216.
3. Kurpayanidi, K. (2024). State regulation of the digital economy: strategy and implementation in the context of the globalization of a transforming economy. Pedagogy and Psychology in the Modern World: Theoretical and Practical Research, 3 (13 (Special Issue)), 18-24.
4. Chynara, A., Mikhaylov, A. B., & Pulatov, O. T. U.

- (2023). Digital economy as a driving force of modern development: management and financial innovation. *Theoretical and Practical Research International Journal*, 3 (10), 20-29.
5. Zokirova, Yo. et al. (2025). Features of stimulating innovation activity: international experience and prospects for Uzbekistan. *Economic Development and Analysis*, 3 (3), 124-132.
 6. Gulyamov, S. S., Shermukhamedov, A. T., & Mukhitdinova, M. Kh. (2022). The development of artificial intelligence in Uzbekistan. *International Journal of Theoretical and Practical Research*, 2 (5), 7-17.
 7. Gulyamov, S. S., & Ayupov, R. H. (2021). Artificial Intelligence as a Catalyst for Digital Economy Development in Uzbekistan: Opportunities and Regulatory Challenges. *Journal of Digital Economy*, 3 (2), 45-60.
 8. Abdullaev, N. A., & Yakshiboev, R. E. (2023). AI-Driven Digital Transformation in Uzbekistan: Case Studies in Fintech and Healthcare. *International Journal of Innovation and Technology Management*, 20 (5), 134-150.
 9. Siankhon, H., & Neupane, B. (2020). Governance of Artificial Intelligence for Knowledge-Based Societies. *UNESCO Report on AI and Digital Transformation*, 147.
 10. Chaika, N. (2023). Generative AI in Education: Opportunities and Ethical Challenges. *UNESCO Report on Education and Research*, 33-40.
 11. Strebkov, D. O. (2024). Impact of Artificial Intelligence on Creative Industries: Fears and Opportunities. *Questions of Economics*, 10, 110-127.
 12. Semenova, E., Perevoshchikova, E., Ivanov, A., & Erofeev, M. (2019). Fairness meets machine learning: searching for a better balance (No. WP BRP 93/LAW/2019). National Research University Higher School of Economics.
 13. Jalolov, M., & Kim, S. (2022). Digital Transformation in Uzbekistan: The Role of Higher Education. *International Journal of Educational Development*, 85, 102-115.
 14. Gulyamov, S. S., Shermukhamedov, A. T., & Khaitmatov, U. T. (2022). Development and implementation of artificial intelligence in Uzbekistan. *Russia: Trends and Development Prospects*, (17-2), 420-422.
 15. Abdullaev N. A. (2024). Prospects for implementing modern artificial intelligence technologies in scoring systems. *Economics and Finance (Uzbekistan)*, 3, 45-52.
 16. Gelmanova, Z. S., Saulsky, Yu. N., & Ivanova, A. V. (2024). The role of Big Data and Blockchain technologies in HR services. In *The World Of Science and Education*, (November 15, EN), 3-6.
 17. Smagulov A. I. (2025). Kazakhstan's Digital Economy: The Role of AI in Financial Sector Transformation. *Innovations in Science and Technology*, 2 (3), 67-80.
 18. Adilova G. A. (2025). Features and conceptual foundations of the formation of a digital economy in agriculture. *Innovations in Science and Technology*, 2 (1), 15-25.