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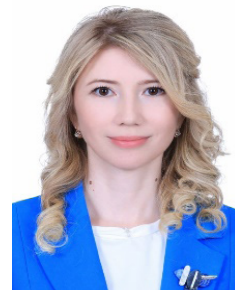
ANALYSIS OF THE CURRENT STATE OF IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN THE PRODUCTION INFRASTRUCTURE OF ENTERPRISES OF NAVOI REGION

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Abstract: This article analyzes the state of introduction of artificial intelligence technologies in the production infrastructure of enterprises of Navoi region. The study highlights the impact of artificial intelligence use on productivity, automation levels, rational resource utilization, and product quality. The proposals also include developing digital infrastructure in enterprises, widely introducing modern technologies, training qualified specialists, and increasing the efficiency of using artificial intelligence solutions, as well as scientifically substantiating existing problems and promising development directions.

Keywords: Navoi region, industrial enterprises, production infrastructure, artificial intelligence, digital transformation, digital technologies, industrial digitalization.

Annotatsiya: Mazkur maqolada Navoiy viloyatidagi korxonalarning ishlab chiqarish infratuzilmasiga sun'iy intellekt texnologiyalarini joriy etish holati tahlil qilingan. Tadqiqotda sun'iy intellektdan foydalanishning mehnat unumdorligi, avtomatlashtirish darajasi, resurslardan oqilona foydalanish va mahsulot sifatiga ta'siri yoritilgan. Shuningdek, korxonalarda raqamli infratuzilmani rivojlantirish, zamonaviy texnologiyalarni keng joriy etish, malakali mutaxassislarni tayyorlash hamda sun'iy intellekt yechimlaridan foydalanish samaradorligini oshirish, mavjud muammolar va istiqbolli rivojlanish yo'nalishlarini ilmiy jihatdan asoslash bo'yicha takliflar ishlab chiqilgan.

Kalit so'zlar: Navoiy viloyati, sanoat korxonalari, ishlab chiqarish infratuzilmasi, sun'iy intellekt, raqamli transformatsiya, raqamli texnologiyalar, sanoatni raqamlashtirish.

Аннотация: В статье анализируется состояние внедрения технологий искусственного интеллекта в производственную инфраструктуру предприятий Навоийской области. В исследовании освещается влияние использования искусственного интеллекта на эффективность производства, уровень автоматизации, рациональное использование ресурсов и качество продукции. Также разработаны предложения по развитию цифровой инфраструктуры на предприятиях, широкому внедрению современных технологий, подготовке квалифицированных специалистов и повышению эффективности использования решений искусственного интеллекта, научно обоснованы существующие проблемы и перспективные направления развития.

Ключевые слова: Навоийская область, промышленные предприятия, производственная инфраструктура, искусственный интеллект, цифровая трансформация, цифровые технологии, цифровизация промышленности.

INTRODUCTION

The digital transformation taking place in the global economy is changing the principles of organizing and managing the production infrastructure of industrial enterprises. In this process, artificial intelligence enables the processing of large volumes of production data, real-time monitoring of technological processes, prediction of equipment conditions, quality control of products, and optimization of resource utilization. The integration of machine learning, computer vision, and predictive analytics tools into production processes contributes to improving the operational efficiency and technological competitiveness of enterprises. Therefore, the introduction of artificial intelligence into production infrastructure is becoming one of the key areas of modern

industrial development.

In Uzbekistan, the legal and institutional framework for the widespread introduction of artificial intelligence technologies across various sectors of the economy is also being consistently developed. In particular, Decree of the President of the Republic of Uzbekistan No. DP-189¹ dated October 22, 2025, "On additional measures for the further development of artificial intelligence" [1], and Resolution of the President of the Republic of Uzbekistan No. RP-320² dated October 30, 2025, "On additional measures to support projects based on Artificial Intelligence technologies" [2], establish mechanisms for the development of these technologies and the support of relevant projects. Law of the Republic of Uzbekistan No. LRU-1115³ dated January 21, 2026, "On making additions and changes to certain legislative acts of the Republic of Uzbekistan in connection with the regulation of relations arising from the use of artificial intelligence" [3], further developed the legal regulation of relations in this field. Meanwhile, Resolution of the President of the Republic of Uzbekistan No. RP-393⁴ dated December 27, 2025, "On measures to develop the social and production infrastructure of the Republic of Uzbekistan in 2026 — 2028" [4], provides an important foundation for the development of production infrastructure and the widespread introduction of modern technologies.

This issue is of particular importance for the Navoiy Region. Resolution of the President of the Republic of Uzbekistan No. RP-430⁵ dated December 12, 2024, "On additional measures for the socio-economic development of the Navoi Region" [5], is aimed at expanding the economic and infrastructural capacities of the region. Furthermore, Resolution of the President of the Republic of Uzbekistan No. RP-58⁶ dated February 11, 2026, "On measures for the sustainable socio-economic development of the Navoi region in 2026" [6], sets out objectives related to investment utilization, export and industrial development, and the creation of appropriate infrastructural conditions. The high industrial potential of the Navoiy Region, the technological complexity of its production processes, and the need for efficient resource utilization reinforce the necessity of systematically analyzing the current state of artificial intelligence technology implementation in the production infrastructure of regional enterprises and investigating ways to improve the efficiency of their application.

REVIEW OF LITERATURE ON THE SUBJECT

The rapid integration of artificial intelligence technologies into production is expanding opportunities for automating technological processes, analyzing data, monitoring equipment conditions, ensuring efficient resource utilization, and improving managerial decision-making. Therefore, scientific research increasingly focuses on production efficiency, the utilization of enterprise production potential, regional industrial development, and the management of production infrastructure based on artificial intelligence.

Among local researchers, D.O.Matyoqubova studied mechanisms for improving production efficiency through innovative activity [7], while B.S.Jalilov examined the econometric and statistical assessment of enterprises' production potential [8]. X.N.Baqoyev investigated the development of small business and private entrepreneurship in the Navoiy Region [9], I.B.Murtazayev studied priority areas for regional economic development [10], and G.I.Norkuvatova examined organizational and economic mechanisms for the development of the light industry [11]. A synthesis of these studies indicates that improving the production efficiency of regional enterprises is closely associated with innovative activity, rational utilization of available resources, assessment of production potential, and consideration of regional characteristics. Artificial intelligence technologies complement these processes by providing opportunities for data-driven management and forecasting.

A.N.Volkov studied the development of communication infrastructure based on artificial intelligence [12], E.P.Sesitskiy examined the legal protection of outcomes generated by artificial intelligence [13], while D.A.Rogachev investigated the management of complex infrastructure based on information systems [14]. These approaches demonstrate that integrating artificial intelligence into production infrastructure requires not only technological capabilities but also appropriate levels of information security, legal regulation, and the preparedness of management systems.

Foreign studies have paid greater attention to the direct impact of artificial intelligence on production efficiency. W.Liu, L.Guo, X.Lu, and H.Zhang explored the potential of artificial intelligence for optimizing production and supply chains [15]. B. Yingngam, A.Navabhatra, and C.Chaiburi investigated the possibilities of optimizing production and reducing waste and carbon footprints through artificial intelligence [16]. U. Ali, P.

1 <https://lex.uz/ru/docs/-7789403>

2 <https://lex.uz/ru/docs/7806900>

3 <https://lex.uz/uz/docs/8011930>

4 <https://lex.uz/ru/docs/7963471>

5 <https://lex.uz/uz/docs/7269211>

6 <https://lex.uz/ru/docs/8053079>

Naveen, E.W.Al-Shalabi, and H.Ait Abderrahmane examined the potential of artificial intelligence and machine learning technologies for forecasting and optimizing production in the oil and gas industry [17]. These studies demonstrate that artificial intelligence is an important tool for real-time monitoring, forecasting, resource efficiency, and the optimization of production processes.

The literature review indicates that local studies have extensively examined the industrial potential, production capacity, and regional development of the Navoiy Region, whereas foreign studies have focused largely on AI-based production and infrastructure management. However, the current level of artificial intelligence implementation in the production infrastructure of enterprises in the Navoiy Region, the readiness of digital infrastructure, and technological disparities among enterprises have not yet been sufficiently examined in an integrated manner. Therefore, systematically assessing the current situation and identifying effective approaches to integrating artificial intelligence technologies into production infrastructure remain relevant scientific and practical research tasks.

RESEARCH METHODOLOGY

During the research, systematic analysis, comparative analysis, and methods of grouping and summarizing statistical data were used to study the state of implementation of artificial intelligence technologies in the production infrastructure of enterprises in Navoi region. The digital infrastructure of enterprises, the level of automation of production processes, and the potential for using artificial intelligence technologies were also compared. Based on the results obtained, existing problems were identified and scientific and practical conclusions were formulated on the effective implementation of artificial intelligence technologies in the production infrastructure.

ANALYSIS AND RESULTS

In the Navoiy Region, industry is one of the key sectors of the regional economy, while the state of production infrastructure and structural changes in enterprise activities determine the region's opportunities for technological development. Analyzing the annual dynamics of the number of operating and newly established industrial enterprises is important for assessing the existing economic and organizational environment for introducing digital technologies, particularly artificial intelligence solutions, into production infrastructure. Changes in the number of enterprises do not directly indicate the level of artificial intelligence adoption; however, they represent an important indicator characterizing the scale of industrial entities and the intensity of new production initiatives in the region. In particular, when the number of enterprises declines, the economic importance of improving the technological efficiency of existing production capacities, expanding automated management systems, digitalizing production data, and applying AI-based analytical tools increases. The following figure illustrates the dynamics of changes in the number of operating and newly established industrial enterprises in the Navoiy Region during 2023–2025 (Figure 1):

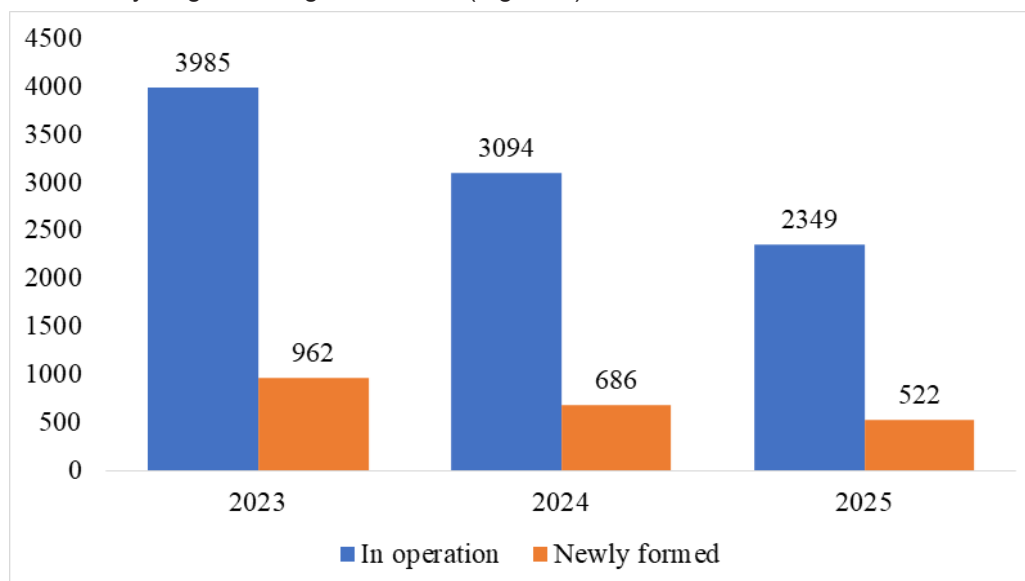


Figure 1. Operating and Newly Established Industrial Enterprises in the Navoiy Region, as of January 1⁷

7 Prepared by the author based on data from the official website of the National Statistics Committee of the Republic of Uzbekistan: <https://stat.uz/>

According to the data, the number of industrial enterprises operating in the Navoiy Region was 3,985 in 2023, 3,094 in 2024, and 2,349 in 2025, reflecting a gradual transformation in the structure of the region's industrial sector. During the same period, the number of newly established industrial enterprises amounted to 962, 686, and 522, respectively. These dynamics provide an important basis for reassessing the existing production potential and identifying new opportunities for technological development. The observed changes further emphasize the importance of improving production efficiency through automation, digital management, and higher productivity. In this context, artificial intelligence provides significant opportunities for production monitoring, early prediction of equipment failures, efficient resource utilization, and strengthening the technological stability of industrial enterprises.

The composition and territorial distribution of industrial enterprises in the Navoiy Region are important for assessing production infrastructure and opportunities for introducing artificial intelligence technologies. Regional differences in the number of enterprises reveal disparities in industrial development and technological capacity and help identify priority areas for digital solutions. The concentration of enterprises also provides an economic basis for generating production data, implementing automated management systems, and developing digital infrastructure. Table 1 presents the number of operating industrial enterprises by cities and districts as of January 1, 2025, their distribution between large enterprises and small businesses, and the number of newly established industrial enterprises in January–December 2024 (Table 1):

Table 1

Number of industrial enterprises operating in the city and districts of Navoi region, as of January 1, 2025, in units⁸

Regions	Operating enterprises	Large enterprises	Small businesses	Newly established in January–December 2024
Total	2,349	31	2,318	522
Navoiy city	586	15	571	109
Zarafshon city	183	1	182	28
G'ozg'on city	174	–	174	38
Konimex district	58	1	57	30
Qiziltepa district	248	2	246	54
Navbahor district	171	4	167	75
Karmana district	414	4	410	72
Nurota district	164	1	163	32
Tomdi district	49	1	48	17
Uchquduq district	96	–	96	16
Xatirchi district	206	2	204	51

According to these data, as of January 1, 2025, a total of 2,349 industrial enterprises operate in the Navoiy Region, including 31 large enterprises and 2,318 small businesses. According to estimates, small businesses account for approximately 98.7% of all industrial enterprises, demonstrating the significant role of small businesses in the region's industrial structure. In terms of regional distribution, Navoiy city has the largest number of enterprises with 586, followed by Karmana district with 414, with these two regions together accounting for 42.6% of the total number of enterprises. In terms of newly established enterprises, Navoiy city leads with 109 enterprises, followed by Navbahor district with 75 and Karmana district with 72. The presence of 49 enterprises in Tomdi district and 96 in Uchquduq district reflects the diverse structure and distribution of the region's industrial base. This composition creates favorable opportunities for developing digital solutions tailored to the financial, technological, and human resources of small industrial enterprises and supports the effective implementation of artificial intelligence technologies.

The possibilities for intelligent control of technological processes, real-time monitoring of production parameters, detection of technological deviations, and data-based decision-making are expanding in industrial enterprises of Navoi region, especially in the mining and metallurgical industries. As part of the digital transformation programs being implemented at the Navoi Mining and Metallurgical Combine, projects have been formed to implement intelligent control of hydrometallurgical plants, analyze production data, and use

8 Prepared by the author based on data from the official website of the National Statistics Committee of the Republic of Uzbekistan: <https://stat.uz/>

elements of artificial intelligence. At the same time, prospects are being set for the development of modern technologies such as industrial Internet, big data processing, predictive maintenance, machine vision, and digital twin. These processes are creating new opportunities for industrial enterprises in Navoi region to increase production efficiency, reduce technological risks, use resources rationally, and strengthen the innovative potential of enterprises (Table 2):

Tabla 2

Artificial intelligence technologies being implemented in industrial enterprises of Navoi region⁹

Enterprises	Artificial Intelligence Technology	Area of Application	Implementation Status
"Navoiy Mining and Metallurgical Company" JSC	Artificial intelligence-based intelligent control systems	Monitoring and analyzing production parameters and automating technological processes	Being implemented
NMMC Mining Administration No. 5 and No. 7	Intelligent management of metallurgical processes	Optimization of technological processes and automation of operational dispatch management	Implemented
NMMC Mines and Production Divisions	Predictive analytics and technical diagnostics	Monitoring equipment condition, early detection of failure risks, and optimization of technical services	Being developed
NMMC and Navoiy State University of Mining and Technologies	Artificial intelligence and digital twin solutions	Modeling, forecasting, and optimizing production processes	Prospective projects are being developed
NMMC Human Resources Management System	Artificial intelligence-based data analytics	Processing personnel data, assessing workforce potential, and supporting management decision-making	In practical use
"Navoiyazot" JSC	Integration of artificial intelligence and digital analytical technologies	Analysis of production, energy consumption, investment, and corporate data and digitalization of management	Being developed gradually

This situation shows that the integration of artificial intelligence technologies into industry in the Navoi region is mainly taking place at a high pace in the activities of NKMK. In particular, intelligent control of hydrometallurgical processes, analysis of production indicators, and predictive diagnostics are becoming important tools for increasing technological efficiency. Scientific and practical developments in digital twins and industrial artificial intelligence mark the next stage of this process. The development of digital analytical infrastructure at NavoiAzot JSC is forming the necessary information base for the future integration of artificial intelligence technologies into production and corporate governance. Overall, the use of artificial intelligence in the regional industry shows a trend of moving from simple automation to data-driven intelligent control. This process is important for optimizing production costs, increasing equipment reliability, reducing technological risks, and strengthening the innovative potential of industrial enterprises.

CONCLUSIONS AND SUGGESTIONS

In conclusion, the implementation of artificial intelligence technologies in the production infrastructure of enterprises in the Navoiy Region is one of the important areas for improving industrial efficiency. The article analyzed the current state of AI technology adoption, existing opportunities, and the factors influencing its implementation. The results indicate that artificial intelligence contributes to production automation, resource efficiency, improved product quality, and cost reduction.

Based on the results of the analysis, the following recommendations are proposed:

Assess the level of artificial intelligence implementation. A system of indicators should be developed to determine the level of digitalization, automation, and AI adoption in enterprises;

Modernize production infrastructure. Enterprises should be gradually equipped with modern sensors, automated control systems, and real-time data collection technologies;

Develop predictive maintenance. Artificial intelligence should be used to monitor equipment conditions, predict potential failures, and efficiently plan maintenance processes;

Optimize resource utilization. Excessive costs should be reduced by using AI-based systems to monitor

the consumption of electricity, fuel, and raw materials;

Strengthen experience sharing among enterprises. The experience of enterprises successfully applying artificial intelligence should be widely disseminated and adopted by other industrial enterprises in the region;

Assess economic efficiency. The effectiveness of AI projects should be regularly evaluated based on indicators such as labor productivity, production costs, energy consumption, production downtime, and product quality.

Overall, the application of artificial intelligence technologies in industrial enterprises of the Navoiy Region contributes to improving production efficiency, reducing costs, and enhancing product competitiveness. Therefore, developing digital infrastructure, training qualified specialists, and improving the economic efficiency of AI projects are among the key prerequisites for the innovative development of industrial enterprises in the region.

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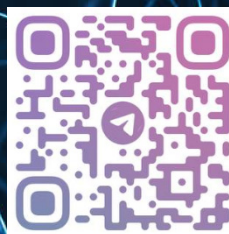
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