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THE ROLE OF THE DIGITAL ECONOMY IN THE DEVELOPMENT OF THE ENERGY AND OIL AND GAS SECTORS OF THE REPUBLIC OF UZBEKISTAN

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Abstract

This paper examines the impact of the digital economy on the development of the energy and oil and gas sectors of the Republic of Uzbekistan in the context of implementing the national socio-economic development strategy and the long-term "Uzbekistan–2030" program. The study highlights the role of digital technologies in improving management efficiency, optimizing production processes, and strengthening the investment attractiveness of strategic industries. Based on an analysis of theoretical approaches and practical trends, it is shown that digitalization acts as a key driver of sustainable economic growth and international competitiveness. The paper formulates conclusions and practical recommendations for the further development of digital transformation in the country's energy and oil and gas sectors.

Keywords: Digital economy, digitalization, energy sector, oil and gas industry, investment, economic growth, innovation, management, sustainable development, Uzbekistan-2030.

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Introduction

The current stage of global economic development is characterized by the accelerated digitalization of all spheres of economic activity. The digital economy is becoming a system-forming factor that determines the competitiveness of states, the sustainability of industries, and the quality of economic growth. For the Republic of Uzbekistan, which is implementing large-scale reforms aimed at economic modernization, the transition to digital development models represents one of the key priorities of public policy.

The development strategy of Uzbekistan and the "Uzbekistan–2030" program are focused on building an innovative, technologically advanced, and open economy capable of effective integration into global value chains. In this context, the energy and oil and gas sectors play a particularly important role as fundamental industries that ensure energy security, generate export revenues, and support the stability of the state budget. Their digital transformation directly affects the pace of industrialization, investment attractiveness, and environmental sustainability of the country.

Literature Review

In preparing this article, academic studies, analytical reports of international organizations, and strategic documents devoted to the development of the digital economy, the digital transformation of the energy and oil and gas sectors, and the integration of digital technologies into national economic systems were used.

World Bank (2024), Digital Transformation of Energy Systems provides an analysis of the impact of digital technologies on energy systems, including the implementation of smart grids, digital management platforms, and automated monitoring systems, which is used in this study to substantiate the economic effects of energy digitalization.

International Energy Agency (IEA) (2023), Digitalization and Energy shows that digital technologies can reduce operating costs of energy companies by 10–15%

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and increase the reliability of energy supply through the use of big data and predictive analytics.

International Renewable Energy Agency (IRENA) (2022), Digitalization and the Energy Transition considers digitalization as a key factor in the transition to sustainable and efficient energy systems, which is used to justify the role of digital platforms in sectoral modernization.

McKinsey & Company (2023), Digital Transformation in Oil and Gas analyzes the impact of digital solutions on the oil and gas industry, including the use of artificial intelligence and digital twins, which increase hydrocarbon recovery rates and reduce production costs.

Deloitte (2023), Energy and Resources Digital Transformation examines digitalization as a tool for enhancing the investment attractiveness of energy and oil and gas companies, which is applied in this article to analyze the impact of digital technologies on capital inflows.

OECD (2024), Digital Economy Outlook explains the role of digital technologies in increasing productivity and national competitiveness, supporting the macroeconomic assessment of digitalization effects.

Asian Development Bank (ADB) (2024), Digital Economy in Central Asia analyzes the level of digitalization in Central Asian countries, including Uzbekistan, and emphasizes the importance of digital reforms for energy and industrial development in the region.

United Nations Economic Commission for Europe (UNECE) (2023), Digitalization for Sustainable Energy demonstrates the relationship between digital solutions and sustainable energy development, including improvements in energy efficiency and loss reduction.

Ministry of Digital Technologies of the Republic of Uzbekistan (2025), Strategy for the Development of the Digital Economy defines national priorities for digital transformation of industries, including energy and industry, which is used to assess national directions of digitalization.

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Strategy "Uzbekistan–2030" is a national policy document that provides for the digital transformation of the energy and industrial sectors as a key element of sustainable economic growth and international integration.

The use of these sources made it possible to assess international experience in the digitalization of the energy and oil and gas sectors, identify the economic effects of digital technologies, and determine prospects for their adaptation and development in the Republic of Uzbekistan.

Methodology

The study is based on a comprehensive approach that combines comparative analysis, the examination of strategic and regulatory documents of the Republic of Uzbekistan, and analytical reports of international organizations, including the World Bank, the International Energy Agency (IEA), the OECD, and the Asian Development Bank (ADB).

Quantitative methods were applied to assess the economic effects of digitalization in the energy and oil and gas sectors, including the analysis of productivity dynamics, operating costs, and investment activity. Aggregated sectoral indicators were used to reflect the impact of digital technologies on the efficiency of production and management processes.

In addition, qualitative research methods were employed, including the analysis of digital development strategies, expert publications, and industry reports, which made it possible to identify the institutional and technological factors determining the pace of digital transformation.

The combination of these methods ensured a systematic examination of the role of the digital economy in the development of the energy and oil and gas sectors and provided a basis for substantiating its impact on the economic growth of the Republic of Uzbekistan.

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Analysis and Discussion of Results

The analysis of international experience in the digitalization of the energy and oil and gas sectors shows that the digital economy is becoming a key factor in increasing efficiency, investment attractiveness, and the sustainability of energy systems. In developed economies, digital technologies are already embedded in sectoral management models, whereas in developing economies, including Uzbekistan, this process is still at an active formative stage.

1. Level of digitalization of the energy and oil and gas sectors worldwide

According to the International Energy Agency (IEA, 2023), more than 70% of energy companies in OECD countries use digital asset management systems, predictive maintenance, and smart grids. In the United States and the European Union, the implementation of smart grids and digital platforms has reduced electricity losses in networks by 10–15% and decreased accident rates by 20–25%.

In the oil and gas industry, McKinsey (2023) reports that companies actively using artificial intelligence and digital twins of fields increase oil recovery rates by an average of 3–5%, which at the scale of large fields corresponds to hundreds of millions of dollars in additional revenue. In addition, the digitalization of logistics and drilling operations reduces operating costs by 10–30%.

In China, the government's energy digitalization program has led to the creation of national digital platforms for power system management, which has improved the efficiency of electricity distribution and accelerated the integration of renewable energy sources.

2. Impact of digitalization on investment attractiveness

According to Deloitte (2022), energy and oil and gas companies with a high level of digitalization have, on average, a 15–20% higher market capitalization than less digitalized peers due to greater operational efficiency and transparency.

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The World Bank (2022) notes that international investors increasingly require the presence of digital monitoring, accounting, and reporting systems when financing energy projects. This is driven by the need for risk management, compliance with ESG requirements, and control over the targeted use of capital. Thus, digitalization becomes not only a technological but also a financial factor determining access to international capital.

3. Uzbekistan's position in a comparative context

According to the Asian Development Bank (2022), the level of digitalization of Uzbekistan's energy sector is assessed as average for Central Asia but significantly lags behind the European Union and China. Less than 30% of energy and oil and gas enterprises use modern digital monitoring and analytics systems. At the same time, within the framework of the "Uzbekistan–2030" strategy, the digitalization of the energy sector is identified as a priority, including the introduction of smart grids, automated metering systems, and digital management of hydrocarbon extraction and processing. This creates an institutional foundation for an accelerated transition to a digital model of sectoral development.

However, key constraints remain at the current stage, including the fragmentation of digital solutions, limited access to sectoral data, a shortage of qualified digital specialists, and dependence on imported digital platforms.

4. Economic prospects of digital transformation for Uzbekistan

According to World Bank (2022) estimates, the implementation of intelligent management systems and digital metering in the energy sector can reduce technical and commercial electricity losses in developing countries by 10–15%, which for Uzbekistan implies savings of hundreds of millions of dollars annually. In the oil and gas sector, even a 2–3% increase in extraction efficiency achieved through digital technologies can significantly increase export revenues and tax receipts. OECD (2023) emphasizes that countries adopting digital technologies

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in the energy sector demonstrate more resilient macroeconomic performance due to lower cost dependence, higher productivity, and increased investor confidence.

Conclusions and Recommendations

The conducted analysis demonstrates that the digital economy acts as a system-forming factor in the development of the energy and oil and gas sectors, shaping a new model for managing production, investment, and infrastructure processes. The implementation of digital technologies makes it possible to significantly improve resource efficiency, reduce operating costs, mitigate technological and managerial risks, and enhance the transparency and controllability of these industries. International experience confirms that a high level of digitalization in the energy and oil and gas sectors provides access to long-term and lower-cost capital, which directly affects the investment attractiveness of both countries and companies.

In the context of the Republic of Uzbekistan, the digital transformation of these sectors acquires particular importance within the framework of the "Uzbekistan–2030" strategy, which is focused on technological modernization, export growth, and integration into global economic processes. Despite the existence of strategic programs and ongoing reforms, the current level of digital solution adoption in the energy and oil and gas complex remains limited and fragmented, constraining the potential for productivity growth and competitiveness. This indicates the need to move from isolated digitalization projects to a comprehensive sector-wide transformation encompassing asset management, production, logistics, financial flows, and investor relations.

Taking into account the identified trends and international experience, the further development of Uzbekistan's energy and oil and gas sectors should be built on the integration of digital technologies into state industrial and investment policy. The introduction of intelligent management systems, digital monitoring platforms, and data analytics should be regarded not as auxiliary tools but as

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mandatory components of the modernization of strategic industries. This will not only improve companies' operational efficiency but also ensure compliance with international standards of transparency, sustainability, and governance, which is particularly important for attracting international investors and financial institutions.

Additional importance is attached to the development of a national digital infrastructure for the energy and oil and gas sectors, including the establishment of unified sectoral data platforms and digital control systems capable of providing centralized management and enhancing the security of strategic assets. At the same time, it is necessary to strengthen the training of specialists in digital technologies, industrial analytics, and data management, as human capital is a key factor in the successful implementation of digital transformation.

Thus, the digital economy can become one of the key drivers of sustainable economic growth in the Republic of Uzbekistan by increasing the efficiency of the energy and oil and gas complex, strengthening investment attractiveness, and accelerating the country's integration into the international digital and economic space.

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