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Issues and Prospects for the Development of Digitalization in Kazakhstan

Abstract

Main problem: In today's environment, economic growth is closely tied to the adoption of digital technologies across various reproductive processes, giving rise to the concept of the "digital economy." Recently, there has been an increasing interest from researchers and experts in this area, leading to a multitude of scientific and media publications. Nonetheless, even with the growing number of studies, the understanding of digitalization processes within the economy is still at a relatively superficial level.

Objective: This article analyzes the current level of digitalization in Kazakhstan's industry and explores the prospects for its further development. It identifies key challenges the country faces in the process of digitalization, including the lack of qualified personnel, the need for infrastructure modernization, and the creation of conditions to stimulate investment in new technologies.

Methods: To comprehensively analyze the challenges and prospects of digitalization in Kazakhstan, qualitative data assessment, analytical methods, and deduction were used, including indepth studies with key stakeholders, examination of international experience, and analysis of infrastructure, educational initiatives, and regulatory frameworks.

Results and Their Significance: In conclusion, the importance of a comprehensive approach to addressing these issues is emphasized for achieving success in the digital transformation of Kazakhstan's economy.

Key terms: Economic system, management informatization, process automation, digital economy, digital transformation, industrial production.

Introduction

The rapid advancement of digital technologies has transformed economies worldwide, marking a new era known as the "digital economy." In Kazakhstan, this shift presents both significant opportunities and substantial challenges. As the country seeks to integrate digital solutions into its industrial processes, it faces a unique set of obstacles, including the need for skilled workforce development, infrastructural modernization, and effective policy frameworks.

Despite the increasing recognition of digitalization's importance, there remains a gap in understanding the core processes and implications of this transformation within the context of Kazakhstan's economy. The complexity of implementing digital initiatives often hinders strategic decision-making, leading to inconsistencies in progress and development [1].

This article aims to explore the current state of digitalization in Kazakhstan, identifying the key problems that impede its growth and the potential avenues for future advancement. By examining existing barriers and evaluating the country's readiness for digital transformation, we seek to provide insights that can guide policymakers and industry leaders in crafting effective strategies. Ultimately, a well-structured approach to digitalization can pave the way for sustainable economic growth and enhanced competitiveness on the global stage.

Materials and Methods

To comprehensively analyze the challenges and prospects of digitalization in Kazakhstan, a mixed-methods approach was employed, combining both quantitative and qualitative research techniques. This methodology allows for a robust examination of the current landscape of digital technologies in the country, facilitating a nuanced understanding of the issues at hand [2].

During the writing of the article, several methods were employed, including qualitative data assessment, analytical methods, and deduction. The qualitative data assessment method involved indepth studies with key stakeholders, incorporating international experiences, insights from industry experts, and representatives of technology companies. The analysis was structured around several core

themes identified during the preliminary research, including the assessment of the skills gap and educational initiatives necessary for developing digital competencies, evaluation of the current state of technological infrastructure, and analysis of existing policies and regulatory frameworks that either support or hinder efforts toward digital transformation.

At present, digitalization stands as a key strategic priority for development in numerous countries. Leading global experts predict that by 2020, digital components will constitute a quarter of the world economy. The adoption of digital technologies that facilitate effective interactions between governments, businesses, and society is becoming a more expansive and dynamic endeavor [3].

Nations worldwide are implementing national digitalization strategies, including Denmark, Norway, the United Kingdom, Canada, Germany, Saudi Arabia, India, Russia, China, South Korea, Malaysia, Singapore, Australia, New Zealand, and Kazakhstan.

China's "Internet Plus" initiative seeks to merge digital industries with traditional sectors. Singapore is working on establishing a "Smart Economy," while Canada is creating an ICT hub in Toronto. South Korea's "Creative Economy" initiative emphasizes the development of human capital, entrepreneurship, and the promotion of ICT advancements, and Denmark focuses on public sector digitalization [4].

For Kazakhstan, the "Digital Kazakhstan" program plays a vital role. The success of this initiative heavily relies on the involvement of government bodies, the marketplace, and the general population in the digitalization effort. By systematically advancing the ICT sector, fostering a supportive environment for attracting innovative digital technologies, and nurturing talented youth, the goals set forth in the government program can be realized.

The economic growth of any nation and the attainment of sustainable economic advancement can only occur through the development of real sectors of the economy, where the primary focus is on production processes and the creation of high-value-added products for both intermediate and end consumers [5].

In light of global competitive trends and progress in science and technology, along with the shift to the fourth phase of the scientific and technological revolution, the growth of a nation's manufacturing sector cannot be approached from a singular perspective. It is essential that multiple subsystems participate in the production activities of industrial firms and the execution of investment and innovation initiatives.

Considering the global trends in the scientific and technological revolution and the development of the internet, information technologies are progressively taking on one of the most important roles in the operations of industrial enterprises in Kazakhstan from year to year. Nevertheless, there remain opportunities to enhance the implementation of digital economy principles in the industrial sector. The primary issues of digitalizing the economy of industrial enterprises in the Republic of Kazakhstan are presented in Figure 1.



Figure 1 – Key Challenges in the Digitalization of the Industrial Economy of the Republic of Kazakhstan

The execution of business projects in industrial enterprises that involve an IT component often occurs without adequate evaluation of alternatives, economic viability, and feasibility. As a result, most IT projects face delays, budget overruns, and quality issues. On the one hand, the IT budget of an industrial enterprise is substantial, enabling the execution of high-cost projects. However, on the other hand, it remains insufficient to elevate the enterprise's IT infrastructure to the desired level. Furthermore, due to the lack of a clearly defined strategic plan for IT system development, funding is often directed towards "image-driven" and "politically motivated" projects at the expense of the core IT department's functions [6].

Another factor influencing the digitalization of industrial enterprises is the nature of Kazakhstan's digital technology market.

The national IT market can be characterized as relatively uncompetitive, as it does not fully operate according to the principles of a free market economy. This leads to several negative phenomena in the IT sector:

- A shortage of qualified professionals meeting the modern market's requirements;

- Poor technical equipment of market participants;

- Limited access to telecommunications and information dissemination channels, especially in regional areas;

- Market participants operate with extremely low profitability;

- The market, including the IT sector, has limited capacity;

- Underdeveloped local, regional, and national telecommunications and information dissemination infrastructure.

Moreover, a significant challenge facing the IT market is the inadequate adoption of innovations. Analyzing the current condition and challenges of digitalization within Kazakhstan's industrial sector enables the establishment of strategic priorities for its future growth [7].

Results

Developing a comprehensive strategy for building IT systems for digital management in industrial enterprises should be an ongoing scientific process. This strategy must be reviewed, analyzed, and updated annually, considering external environmental factors. A modern IT strategy cannot be a static document that remains unchanged and unadaptable to the evolving conditions of industrial enterprises. Instead, it should be a flexible tool for achieving strategic objectives.

The most effective approach for designing an IT strategy is the "rolling wave" method. As illustrated in Figure 3.2, this involves setting a general direction for digitalization over the next 4-5 years, while focusing on implementing the most critical and high-priority IT projects within the next 2 to 2.5 years.

Current IT investment initiatives aimed at industrial digitalization should encompass the following:

– A thorough modernization and upgrade of the information and communication platforms across all industrial enterprises.

- Scientific analysis and development of digital (information) logistics.

- Choosing partners (system integrators) who offer information, engineering, and consulting services.

- Extensive training and retraining programs for human resources to assist teams within industrial enterprises in adapting to innovative management systems

In the long-term (4-4.5 years), the focus of the digitalization strategy should be on the following elements:

- Complete digitalization of management, accounting, and tax reporting systems, removing fragmented automated systems and moving to a unified system;

- Comprehensive digitalization of the production process;

- Management of customer relationships;

- Full digitalization of all investment processes;

- Implementation of a centralized data storage system.

Discussion

In our view, the most economically efficient solution for establishing digital management systems in Kazakhstan's industrial enterprises is the implementation of the SAP IT platform, developed by the German company SAP AG. Currently, SAP is one of the most widely-used IT platforms in Western markets. SAP AG ranks third among the largest software companies in the world. The company employs tens of thousands of people and has offices in more than 50 countries.

The system is used by over 10,000 clients across 120+ countries, and more than 10 million users work with SAP. More than half of the world's top 500 companies rely on SAP solutions.

The SAP system mirrors the organizational structure of various types of enterprises through fundamental components (such as "company," "accounting unit," "corporation," and "business area") and supports core business processes.

The strategic advantages of utilizing SAP's electronic management information system include:

- Added value from the high quality of information exchanged between internal and external stakeholders (such as clients, suppliers, and subsidiaries);

- Increased efficiency of transaction processing (incoming messages that trigger file changes);

- Accelerated cash flow management due to streamlined financial transfers, contract signing procedures, and fund management processes;

- Enhanced profitability through access to a wider range of clients and more profitable customer segments, leveraging opportunities provided by telecommunications;

- Development of a competitive strategy by delivering better, more timely, and advantageous offers to customers through the use of IT and telecommunications;

- Increased competence in core areas by drawing on expertise from leading companies through electronic media;

- Faster access to information on market opportunities, suppliers, pricing, offers, and resources.

The emergence of digital flows signifies that information and knowledge are becoming key factors of production. Consequently, in the modern economy, IT technologies, digitalization, and the automation of industrial processes have become critically important.

Conclusion. In conclusion, it can be stated that innovative flows lead to changes in the traditional behavior of enterprises and economic actors, which, in turn, affects competitive conditions. The development of the digital industry will significantly influence all other sectors. Therefore, it is necessary to address the task of creating new industries based on digital technologies.

The main direction for the country's development is digitalization, which involves the integration of modern technologies into all aspects of life, necessary for Kazakhstan to become a leader in the new world order. Currently, the population's level of computer (digital) literacy stands at 76.2 % – a commendable achievement. However, to meet the established objectives, it is crucial to enhance this figure both quantitatively and qualitatively.

To achieve this, training programs for specialists in the digital economy should prioritize skills in data analysis and the cultivation of creative thinking rather than simply memorizing facts and formulas. Plans are underway to revise educational programs in line with professional standards and the needs of the labor market in emerging high-demand areas such as data analytics, robotics, and nanotechnology, as well as to develop highly skilled professionals in fields like artificial intelligence, the Internet of Things, blockchain, and BIM technologies.

The modern aspects of developing the digital economy in the industrial sector of the Republic of Kazakhstan require a significant review and enhancement. Particular attention should be paid to the development and economic justification of a comprehensive IT strategy for enterprises, as well as the assessment of the integration and correlation of automated and information processes. This will significantly enhance the efficiency of production and economic activities and ensure the sustainable competitiveness of Kazakhstan's industry.

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Казақстан Республикасында цифрландыруды дамытудың проблемалары мен перспективалары

Қазіргі әлемде экономикалық өсу цифрлық технологияларды әртүрлі көбею процестеріне енгізумен тығыз байланысты, бұл "цифрлық экономика"тұжырымдамасының пайда болуына әкеледі. Жақында бұл салаға зерттеушілер мен сарапшылардың қызығушылығы артып, көптеген ғылыми және медиа басылымдардың пайда болуына әкелді. Дегенмен, өсіп келе жатқан зерттеулерге қарамастан, экономикадағы цифрландыру процестерін түсіну салыстырмалы түрде үстірт деңгейде қалып отыр.

Бұл мақалада Қазақстан өнеркәсібін цифрландырудың ағымдағы деңгейі талданады және оның одан әрі даму перспективалары зерттеледі. Цифрландыру процесінде ел алдында тұрған негізгі проблемалар, соның ішінде білікті кадрлардың жетіспеушілігі, инфрақұрылымды жаңғырту қажеттілігі және жаңа технологияларға инвестицияларды ынталандыру үшін жағдайлар жасау ерекшеленеді.

Қазақстанда цифрландырудың проблемалары мен перспективаларын жан-жақты талдау үшін деректерді сапалы бағалау әдістері, негізгі мүдделі тараптармен тереңдетілген зерттеулерді, халықаралық тәжірибені зерделеуді, сондай-ақ инфрақұрылымды, білім беру бастамаларын және нормативтік-құқықтық негіздерді талдауды қоса алғанда, Талдамалық әдістер мен дедукция пайдаланылды.

Нәтижелер және олардың маңыздылығы қорытындылай келе, Қазақстан экономикасын цифрлық трансформациялауда табысқа жету үшін осы мәселелерді шешуге кешенді көзқарастың маңыздылығы атап өтіледі.

Негізгі сөздер: Экономикалық жүйе, басқаруды ақпараттандыру, процестерді автоматтандыру, цифрлық экономика, цифрлық трансформация, өнеркәсіптік өндіріс.

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Проблемы и перспективы развития цифровизации в Республике Казахстан

В современном мире экономический рост тесно связан с внедрением цифровых технологий в различные процессы воспроизводства, что приводит к появлению концепции "цифровой экономики". В последнее время к этой области наблюдается повышенный интерес

со стороны исследователей и экспертов, что привело к появлению множества научных и медийных публикаций. Тем не менее, несмотря на растущее количество исследований, понимание процессов цифровизации в экономике остается на относительно поверхностном уровне.

В данной статье анализируется текущий уровень цифровизации промышленности Казахстана и исследуются перспективы ее дальнейшего развития. Выделяются ключевые проблемы, с которыми сталкивается страна в процессе цифровизации, включая нехватку квалифицированных кадров, необходимость модернизации инфраструктуры и создание условий для стимулирования инвестиций в новые технологии.

Для всестороннего анализа проблем и перспектив цифровизации в Казахстане использовались методы качественной оценки данных, аналитические методы и дедукция, включая углубленные исследования с ключевыми заинтересованными сторонами, изучение международного опыта, а также анализ инфраструктуры, образовательных инициатив и нормативно-правовых рамок.

В заключение подчеркивается важность комплексного подхода к решению этих вопросов для достижения успеха в цифровой трансформации экономики Казахстана.

Ключевые слова: Экономическая система, информатизация управления, автоматизация процессов, цифровая экономика, цифровая трансформация, промышленное производство.

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