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# MANAGEMENT APPROACHES TO THE IMPLEMENTATION OF DIGITAL TECHNOLOGIES IN ENTERPRISE BUSINESS PROCESSES: CONCEPTUAL FOUNDATIONS, RISKS, AND PROSPECTS

# УПРАВЛІНСЬКІ ПІДХОДИ ДО ВПРОВАДЖЕННЯ ЦИФРОВИХ ТЕХНОЛОГІЙ У БІЗНЕС-ПРОЦЕСИ ПІДПРИЄМСТВ: КОНЦЕПТУАЛЬНІ ОСНОВИ, РИЗИКИ ТА ПЕРСПЕКТИВИ

***Summary.*** *Introduction. The digital transformation of business is rapidly changing the concept of effective enterprise management. Modern organisations are faced with the need to make quick decisions in an increasingly complex business environment, which necessitates the search for new technological solutions. In this context, artificial intelligence (AI) and blockchain emerge not only as separate optimisation tools, but also as powerful complementary components capable of ensuring a new quality of management processes. AI opens up opportunities for automation, forecasting and adaptive decision-making, while blockchain ensures transparency, reliability and data security. Their integration forms the concept of digital synergy, which can change traditional approaches to building business models. At the same time, the effective implementation of such solutions requires a thorough analysis of the advantages, limitations and risks associated with technological, infrastructural and ethical aspects. These issues are the subject of this article.*

*Purpose. The purpose of this article is to explore conceptual approaches to integrating digital technologies, in particular artificial intelligence and blockchain, into the business process management system of enterprises, to identify the key advantages and risks of such integration, and to outline the prospects for their implementation, considering the challenges of digital transformation.*

*Materials and methods. This study is theoretical in nature and is based on the analysis of scientific literature, analytical reports, statistical data, and materials from leading consulting firms (such as McKinsey Global Institute). The*

*research methodology includes comparative analysis, induction and deduction, and a systems approach to assessing the impact of digital technologies on enterprise management processes. Particular attention is paid to the analysis of the synergy between artificial intelligence and blockchain technologies in the context of improving efficiency, security, and innovation in business operations.*

*Results. One of the main problems with AI is the 'black box' of algorithms, which makes it challenging to explain decisions and reduces the trust of users and regulators. Blockchain, on the other hand, ensures transaction transparency but has scalability limitations and risks of personal data leaks due to the openness of the environment. The sharp increase in cyber threats, particularly due to Ukraine's military action, confirms the relevance of the security issues. Despite the existing challenges - scalability, privacy, data control - the synergy of AI and blockchain creates conditions for improving business efficiency, transparency of decisions, and the stability of information systems. When properly integrated, these tools can optimise business processes and contribute to the country's GDP growth.*

*Discussion. Integrating blockchain technologies with artificial intelligence tools opens up new opportunities for improving transparency, trust and data manageability in digital business processes. When implemented correctly, combining AI and blockchain will help optimise routine operations, improve information security and stimulate economic growth.*

***Key words:*** *management, business processes, management approach, digitalisation, artificial intelligence, blockchain, digital tools, business process management.*

***Аннотація.*** *Вступ. Цифрова трансформація бізнесу стрімко змінює уявлення про ефективне управління підприємствами. Сучасні організації стикаються з необхідністю оперативного прийняття рішень в умовах зростаючої складності бізнес-середовища, що зумовлює пошук нових технологічних рішень. У цьому контексті штучний інтелект (ШІ) та*

*блокчейн постають не лише як окремі інструменти оптимізації, але й як потужні взаємодоповнюючі компоненти, здатні забезпечити нову якість управлінських процесів. ШІ відкриває можливості для автоматизації, прогнозування та адаптивного прийняття рішень, тоді як блокчейн гарантує прозорість, надійність і захищеність даних. Їхня інтеграція формує концепцію цифрової синергії, що здатна змінити традиційні підходи до побудови бізнес-моделей. Водночас ефективне впровадження таких рішень вимагає глибокого аналізу переваг, обмежень і ризиків, пов'язаних із технологічними, інфраструктурними та етичними аспектами. Саме ці питання і є предметом розгляду в даній статті.*

*Мета. Мета статті – це дослідити концептуальні підходи до інтеграції цифрових технологій, зокрема штучного інтелекту та блокчейн, у систему управління бізнес-процесами підприємств, визначити ключові переваги та ризики такої інтеграції, а також окреслити перспективи їхнього впровадження з урахуванням викликів цифрової трансформації.*

*Матеріали і методи. Дослідження має теоретичний характер та базується на аналізі наукової літератури, аналітичних звітів, статистичних даних та матеріалів провідних консалтингових компаній (зокрема, McKinsey Global Institute). У процесі дослідження застосовано методи порівняльного аналізу, індукції та дедукції, системного підходу до оцінки впливу цифрових технологій на управлінські процеси підприємств. Особливу увагу приділено аналізу синергії між технологіями штучного інтелекту та блокчейн у контексті підвищення ефективності, безпеки та інноваційності бізнес-процесів.*

*Результати. Однією з головних проблем штучного інтелекту є «чорний ящик» алгоритмів, що ускладнює пояснення рішень і знижує довіру користувачів та регуляторних органів. З іншого боку, блокчейн забезпечує прозорість транзакцій, але має обмеження щодо масштабованості та ризики витоку персональних даних через відкритість середовища. Різке*

*зростання кіберзагроз, зокрема через військові дії України, підтверджує актуальність питань безпеки. Незважаючи на існуючі виклики — масштабованість, конфіденційність, контроль даних — синергія ШІ та блокчейну створює умови для підвищення ефективності бізнесу, прозорості рішень та стабільності інформаційних систем. При правильній інтеграції ці інструменти можуть оптимізувати бізнес-процеси та сприяти зростанню ВВП країни.*

*Перспективи. Інтеграція технологій блокчейн з інструментами штучного інтелекту відкриває нові можливості для підвищення прозорості, довіри та керованості даними в цифрових бізнес-процесах. При правильному впровадженні поєднання ШІ та блокчейну допоможе оптимізувати рутинні операції, підвищити інформаційну безпеку та стимулювати економічне зростання.*

***Ключові слова:*** *управління, бізнес-процеси, управлінський підхід, цифровізація, штучний інтелект, блокчейн, цифрові інструменти, управління бізнес-процесами.*

**Formulation of the problem.** The dynamic development of the digital space determines the need to use modern approaches and tools for making management decisions and managing business processes. Moreover, using modern tools allows for increased efficiency and transparency in the decisions made. Among such approaches and tools, it is advisable to consider the role of artificial intelligence and blockchain technologies. This article discusses the feasibility of integrating blockchain technologies and artificial intelligence into modern business management practices.

Blockchain and artificial intelligence are relatively young technologies that have only recently entered the business management market. Blockchain became widely known in 2008 after Satoshi Nakamoto launched the cryptocurrency Bitcoin [1]. Blockchain technology has only begun to be widely used in the

construction and management of business processes in recent years. According to financial experts [2], the blockchain technology market was worth $717.2 million in 2023 and is expected to grow by 51.3% to $29.71 billion by 2032. Artificial intelligence represents a much wider range of management operations, enabling machines to perform labour-intensive calculations to make the most effective decisions. According to research by the McKinsey Global Institute, using artificial intelligence could bring an additional $13 trillion in economic impact to the US economy by 2030, increasing the country's GDP by an additional 1.2% each year [3]. Moreover, using artificial intelligence in combination with blockchain technologies allows human resources to be redistributed and redirected to more creative rather than routine processes.

Accordingly, integration not only promotes innovation but also supports the stable development of digital practices in management. However, existing research requires further analysis of the use of artificial intelligence and blockchain, as well as the synergy of these technologies in management activities.

**Review of recent literature and publications.** Scientists [4] note that artificial intelligence is a technology that can perform complex tasks requiring human intelligence and potentially exceed human capabilities. In addition, scientists [**Ошибка! Источник ссылки не найден.**] identify artificial intelligence as a leading driver of innovation and digital transformation in the Fourth Industrial Revolution.

Although the introduction of artificial intelligence (AI) has significant potential to improve efficiency in various areas, it is accompanied by several challenges, including personal data protection issues. Problems related to information leaks and misuse of user data remain remarkably relevant. One high-profile example is the situation with Facebook, where the data of millions of users was used by a third-party organisation, Cambridge Analytica, without proper consent.

In the context of such incidents, blockchain technology is increasingly being seen as a tool for improving security and transparency in data processing. It is already used in many industries and can potentially mitigate certain privacy risks [**Ошибка! Источник ссылки не найден.**].

Blockchain technologies play an important role in ensuring transparency, protecting personal information, and strengthening trust in systems that use artificial intelligence. For its part, AI contributes to the development of blockchain by expanding its capabilities in terms of scalability, individualisation of approaches, and improving the efficiency of management processes. This interaction forms a balanced digital ecosystem that combines intelligence and security. Thus, using artificial intelligence and blockchain separately or in synergy has a relatively broad and controversial overview in contemporary scientific literature.

**The purpose of this article is** to explore conceptual approaches to integrating digital technologies, in particular artificial intelligence and blockchain, into the business process management system of enterprises, to identify the key advantages and risks of such integration, and to outline the prospects for their implementation, considering the challenges of digital transformation.

**Materials and methods.** This study is theoretical in nature and is based on the analysis of scientific literature, analytical reports, statistical data, and materials from leading consulting firms (such as McKinsey Global Institute). The research methodology includes comparative analysis, induction and deduction, and a systems approach to assessing the impact of digital technologies on enterprise management processes. Particular attention is paid to the analysis of the synergy between artificial intelligence and blockchain technologies in the context of improving efficiency, security, and innovation in business operations.

**Results.** Currently, a new set of management tools is being added to the list of classic management approaches, ensuring the transformation of business

processes in digitalisation. These tools include artificial intelligence as a leading technology for optimising routine processes, blockchain as a robust data security technology, and their convergence as the next level of digital transformation of business processes.

The first stage of analysing concepts and identifying risks and prospects for applying the proposed tools is to compare them. From an infrastructure perspective, artificial intelligence is based on a centralised system. This means that data processing, model training and decision-making are carried out on centralised servers or cloud platforms, potentially creating security, privacy and control bottlenecks. At the same time, blockchain technology is based on a decentralised infrastructure, and all network participants have a copy of the register and corresponding access rights. Thus, all transactions are automatically recorded, and all participants agree to transactions by consensus. Therefore, artificial intelligence is the flagship of a single centre, while blockchain is based on distributed control.

One of the dilemmas of using artificial intelligence is transparency and trust. In this context, artificial intelligence makes its decisions based on algorithms, machine learning, and the interaction of neural networks. In modern science, these are not well researched and are often referred to as black boxes, as it is challenging to explain the logic behind the decision-making process for a particular process.

The problem with 'black boxes' in artificial intelligence lies in the complexity of explaining the logic behind decision-making, which undermines the trust of users and regulatory authorities. At the same time, the opacity of algorithms creates additional challenges in ensuring data security, as it is difficult to identify potential vulnerabilities or malfunctions in the decision-making process. Therefore, issues of privacy and information protection become particularly relevant, as the uncertainty of algorithmic mechanisms can lead to unexpected risks of leakage or misuse of personal data.

Blockchain technology does not have such complex decision-making algorithms. The main task of blockchain technology is to track and record actions in a chain of blocks with access for all network users. In other words, using artificial intelligence and blockchain helps to increase the trust and transparency of decisions generated by artificial intelligence.

From a technological point of view, the artificial intelligence decision-making mechanism is based on forecasts and statistical processing, assessing probabilities. On the other hand, Blockchain technology is based on clear definitions of transactions, which is why this technology guarantees predictability.

However, it should be noted that the most heated discussions are currently taking place regarding the advisability of using artificial intelligence and blockchain in business process management. The principal risks of such use are, of course, privacy and security. This is especially true for artificial intelligence because it is an algorithm that learns, and it is not always clear whether there may be a privacy leak. However, this problem is characteristic not only of artificial intelligence but also of blockchain technology.

The sharp increase in cyberattacks (Fig. 1) confirms the existence of such risks and concerns. The number of cyberattacks on critical infrastructure increased by 271% in 2024 compared to 2020. Of course, the reason for this is the full-scale military invasion of Ukraine and military actions, and such cyberattacks help to destabilise the Ukrainian population. However, these statistics are indicative of data security in general.

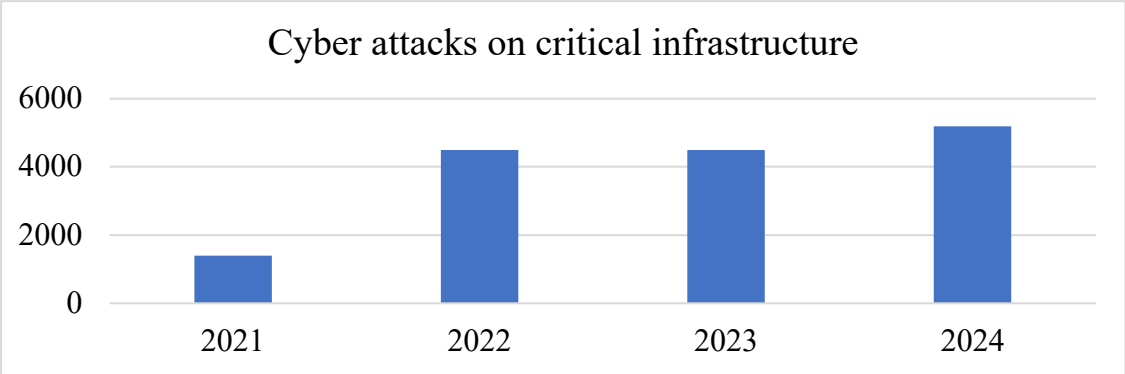


**Fig. 1. Number of cyber-attacks on critical infrastructure in 2020-2024**
*Source:* developed by the author

Another risk associated with using artificial intelligence and blockchain technologies is scalability. Decentralised solutions operate on blockchain platforms, whose performance determines their potential for expansion. If the level of scalability is insufficient, the widespread application of such solutions becomes impossible. The main limitations of blockchain system scalability are classified into three groups: consensus enforcement, network data transmission delays, and limited computing power. However, this risk only applies to blockchain technology. Integration with artificial intelligence algorithms, where data quality and accessibility play a key role, is becoming particularly relevant.

Problems related to limited access to data and its monopolisation or misuse complicate the development of AI. Using blockchain technologies in this context creates opportunities for increasing transparency and data manageability. The effectiveness of such integration depends on the coordinated functioning of the information system's on-chain and off-chain components. Despite the identified risks, the use of artificial intelligence and blockchain technologies, according to estimates by leading global agencies, determines significant growth not only in the efficiency of the company's activities through the optimisation of business processes. But also, in general, it can further increase the country's GDP by an average of 1.5%, depending on the intensity and correctness of use. In this context, integrating blockchain with artificial intelligence (AI) tools is a potentially promising direction for improving information security.

**Conclusions and prospects.** Overall, the adaptation of artificial intelligence and blockchain technology opens up vast opportunities for improving digital systems — from ensuring transparency to increasing energy efficiency and security. However, these solutions require further research and adaptation to specific implementation conditions.

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