ECONOMIC SYSTEM RESILIENCE: ARTIFICIAL INTELLIGENCE IN CRISIS MANAGEMENT AND POST-WAR RECOVERY OF UKRAINE

Oleksandr Cherep[1], Svitlana Markova[2], Anatolii Leshchenko[3]

Abstract. The *research focuses* on the role and potential of artificial intelligence in strengthening the state's economic security, enhancing the national economy's resilience, and optimising crisis management processes in the context of Ukraine's war and post-war recovery. This paper considers artificial intelligence to be a strategic resource that ensures the adaptability and self-regulation of economic systems. It also forms the basis for transitioning to a neo-industrial model of development where knowledge, innovation and human capital are the primary growth factors. The theoretical basis is provided by the work of contemporary researchers in digital transformation, economic security and innovative development, as well as by official analytical materials from the OECD, World Bank and European Commission. The *objective* of the research is to provide a robust foundation for integrating intellectual technologies into Ukraine's economic security system, and to ascertain their potential to enhance the resilience of economic processes and the efficacy of management decisions. *Research methodology.* In order to achieve the set aim, a range of approaches were used, including systemic, structural-functional, and comparative methods. These methods enabled the revelation of the relationship between digital transformation, innovation activity, and the formation of a new economic management architecture. A range of methodological approaches, including logical, analytical, and synthetic methods, as well as inductive-deductive analysis, were employed to identify patterns in the development of the digital economy and to assess the impact of artificial intelligence on financial stability and risk management. The *findings* demonstrate that artificial intelligence is a pivotal instrument in the modernisation of Ukraine's economic system, as it facilitates the automation of management processes, enhances the transparency of financial transactions, and ensures a swift response to crisis situations. A structural and functional model of an AI-based risk management system has been developed, covering the production, financial, commercial, and reputational risks of an enterprise. Concurrently, impediments to large-scale digitalisation have been identified, including infrastructure fragmentation, personnel shortages, inadequate funding, and a paucity of regulatory frameworks in the domain of AI. The *conclusions* emphasise that the integration of artificial intelligence into state and corporate policy is a prerequisite for building a resilient, innovative, and secure economy. Prospects for further research include the formulation of a national AI development strategy, the development of models for assessing its impact on economic security, and the definition of ways to establish Ukraine's digital sovereignty.

Keywords: artificial intelligence, economic security, digital transformation, innovation, crisis management, post-war recovery, economic resilience.

JEL Classification: M10, M20, M21

[1] Zaporizhzhia National University, Ukraine
E-mail: cherep2508@gmail.com
ORCID: https://orcid.org/0000-0002-3098-0105
ResearcherID: https://www.webofscience.com/wos/author/record/ABG-9991-2021
[2] Zaporizhzhia National University, Ukraine
E-mail: masvvi@outlook.com
ORCID: https://orcid.org/0000-0003-0675-0235
ResearcherID: https://www.webofscience.com/wos/author/record/KBB-2685-2024
[3] Zaporizhzhia National University, Ukraine *(corresponding author)*
E-mail: anatoliycrome@gmail.com
ORCID: https://orcid.org/0000-0002-8718-3836
ResearcherID: https://www.webofscience.com/wos/author/record/MGW-3925-2025

1. Introduction

The contemporary Ukrainian economy is functioning in a state of considerable turbulence, precipitated by military actions, structural deformations, and the imperative for expeditious adaptation to digital realities. The recovery of the national economy is predicated not only on the reconstruction of physical infrastructure, but above all, the creation of a new model of economic development based on knowledge, innovation, and technological solutions. The introduction of artificial intelligence as a strategic resource is a pivotal aspect of this transformation, with the objective of enhancing economic security and the resilience of the economic system.

The present study focuses on the analysis of the role of intelligent technologies in shaping a risk-oriented management model, their potential for ensuring anti-crisis stability, and the acceleration of post-war recovery processes. This study focuses on the utilisation of artificial intelligence systems in the domains of risk management, compliance control and financial security for enterprises. This is a pivotal factor in determining their competitiveness in international markets.

The methodological basis of the research is systemic and structural-functional approaches, which made it possible to comprehensively consider artificial intelligence as a factor in strengthening economic security and the resilience of the national economy in conditions of war and post-war recovery. This approach enabled the integration of analyses of technological, organisational, financial, and institutional dimensions of digital transformation, facilitating the identification of the relationship between the introduction of intelligent technologies and the enhanced adaptability of economic systems.

The study employed logical, analytical, and comparative methods to summarise the theoretical foundations of artificial intelligence systems, assess their role in ensuring economic security, and identify relevant international experience. The empirical basis consists of analytical materials from international organisations (OECD, World Bank, European Commission) and contemporary scientific publications from 2019-2025, which made it possible to trace AI development trends in the context of digital transformation. The research logic involved a phased analysis, beginning with a theoretical understanding of the role of intelligent technologies and concluding with a practical model of their integration into the system of risk management, compliance control, and financial security of enterprises.

The article combines theoretical substantiation and practical analysis of the application of intelligent technologies in the economic security system. This finding demonstrates that artificial intelligence is not merely a technological apparatus, but rather a pivotal element in the digital reconstruction and sustainable development of Ukraine in the post-war era.

2. Artificial Intelligence in the Economic Security System

The present study explores the necessity for novel approaches to ensure the resilience and economic security of the national economy in conditions of constant threats, high levels of uncertainty, and multi-vector crisis impacts. In this context, intellectual technologies, in particular artificial intelligence (AI), are increasingly regarded as a strategic resource for enhancing the adaptability of economic systems and their capacity for self-regulation. In accordance with contemporary scientific methodologies, artificial intelligence serves as the foundation for the development of an innovative, risk-oriented management model. This model has the capacity to neutralise both real and potential threats, enhance decision-making efficiency, and establish the conditions necessary for sustainable development (Brynjolfsson & McAfee, 2017; Furman & Seamans, 2019; Bobro et al., 2025).

It is important to note that the category of "artificial intelligence" is not a recent development. The notion was initially conceptualised in 1956 during a seminar at Dartmouth University, where John McCarthy defined it as the science of creating intelligent machines and computer programmes (McCarthy, 1956). In subsequent works by Edward Feigenbaum and Avron Barr, emphasis was placed on the notion that AI is a branch of computer science that focuses on the development of systems capable of exhibiting human-like cognitive abilities, including perception, learning, recognition, and decision-making (Feigenbaum & Barr, 1981). Contemporary scientific thought has expanded this definition, viewing artificial intelligence as a multidisciplinary phenomenon that integrates algorithmic, cognitive, and socio-economic mechanisms to achieve the goals of managing complex systems (Cherep & Voronkova, 2024; Kortemeyer, Dittmann-Domenichini & Merki, 2025).

From a theoretical standpoint, the amalgamation of self-learning, adaptation, and predictive analytics within artificial intelligence (AI) renders it a universal tool in decision-making, risk management, and economic security (Muhammad et al., 2025). The architectural design of the system is founded on the principles of neural networks, whereby the output of one element functions as the input signal for the subsequent element, thereby establishing a complex network of interconnected nodes. Such a system has been demonstrated to possess the capacity to emulate human cognitive functions, and moreover to exceed them in the velocity of big data analysis, the identification of patterns, and the formulation of well-founded forecasts (Nahar et al., 2024).

The establishment of a robust and reliable economic framework within the paradigm of digital transformation necessitates a shift towards a neo-industrial model of development, wherein knowledge, innovation, and technological solutions assume a pivotal role (Brynjolfsson & McAfee, 2017). The competitive advantages of countries and enterprises are increasingly determined not by the volume of material resources but by the ability to integrate intellectual technologies, develop human potential, and ensure effective interaction between the technological, organisational, and social components of the economy (OECD, 2024).

The traditional paradigm, which is based on the two classic factors of production – labour and capital – is giving way to a new growth logic, in which intellectual capital is the central factor. This concept is centred on the capacity of knowledge, skills and technologies to generate new economic value and bolster the resilience of economic systems in the face of external challenges (Edvinsson & Malone, 1997; Stewart, 1998). In accordance with contemporary conceptualisations, the notion of intellectual capital comprises two interconnected components: human capital, which encompasses professional competencies, creativity, and learning ability, and organisational (structural) capital, which includes management technologies, information resources, partner networks, and digital assets (Choong, 2008).

The growth of intangible assets in the structure of national and corporate wealth is indicative of the transition to a neo-industrial economy. In numerous instances, the value of software, databases, patents, and customer platforms has been found to exceed that of tangible capital (Brynjolfsson, Rock & Syverson, 2019). This suggests that, within the prevailing conditions, knowledge, intellectual technologies and digital management tools form the foundation of economic security and determine the competitiveness of the state and business.

3. Innovation and Digitalisation in Post-War Economic Recovery

In the context of Ukraine's post-war economic recovery, the development of digital management tools that are designed to ensure transparency, accountability, and compliance with international standards for economic activities is of paramount importance. A significant aspect of such digital transformation pertains to the implementation of compliance control systems, which are designed to ensure that enterprises and financial institutions adhere to the stipulations of legislation, regulations, corporate governance standards, and business ethics principles (OECD, 2024; Cherep & Voronkova, 2024).

Despite the adequate development of compliance risk management mechanisms in the financial sector, there are a number of unresolved issues in the real sector of the economy related to the practical application of these tools. In the process of constructing a contemporary risk management system for an enterprise, it is recommended that four fundamental components be identified: production risks associated with technological processes and product quality; commercial risks encompassing contractual obligations and business relationships; financial risks pertaining to cash flow stability, creditworthiness, and liquidity; and reputational risks that determine the level of trust in the enterprise within the market (see Figure 1).

As posited by the proposed model, the utilisation of artificial intelligence facilitates a thorough examination of the intricacies inherent to production processes. A thorough analysis will provide precise data regarding the degree to which technological operations align with the stipulated standards and technological regulations of an enterprise. Concurrently, the artificial intelligence system is responsible for monitoring the stocks of materials and components necessary for the continuous operation of production, with consideration for quality and compliance with technical documentation. Should deviations from the established parameters be identified, the AI will automatically generate a number of management decision options for the management team to address potential threats. For instance, in the event of a shortage of warehouse stocks, the system not only notifies the relevant services but also initiates the automatic generation of an order for the delivery of missing materials. The ideal function of artificial intelligence would be twofold: firstly, to detect deviations in the production cycle, and secondly, to prevent the misuse of the enterprise's material resources. Concurrently, the utilisation of AI in itself has the potential to engender a state of risk, given that unauthorised interference with software has the capacity to inflict substantial harm, thereby underscoring the imperative for the fortification of information and cybersecurity measures.

In the financial sector, digital risks emerge from transactions with unreliable counterparties, late fulfilment of contractual obligations, or payments not provided for in contracts. Such infringements result in financial losses and engender reputational risks that directly impact the trust of partners and access to credit resources. Artificial intelligence (AI) tools can detect, block or prevent suspicious financial transactions by continuously monitoring the movement of funds and contractual relationships (Furman & Seamans, 2019; Nahar et al., 2024). Additionally, AI can analyse large volumes of economic data to identify potential threats to an enterprise's economic security and generate recommendations or action scenarios to neutralise them if such threats are identified.
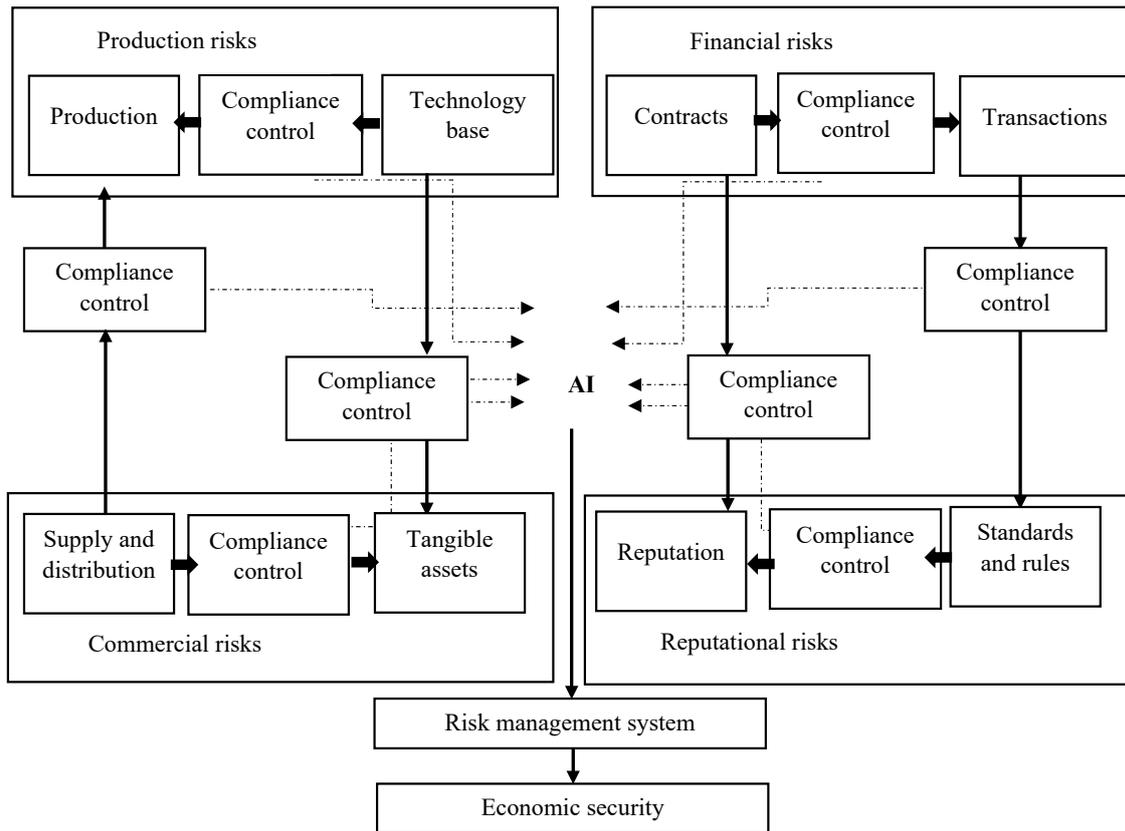
Figure 1. Structural and functional model of an artificial intelligence-based risk management system for ensuring economic security

Source: compiled by the authors based on their own research

Despite the evident advantages of introducing smart technologies, the process of large-scale digitalisation in the context of war and reconstruction in Ukraine is complicated by a number of organisational, technological, financial and human resource barriers. The principal management challenges are as follows: firstly, the absence of a comprehensive strategic planning system for digital transformation; secondly, the inadequate coordination between public and private structures; and thirdly, the absence of a sufficient culture of innovation management. A considerable number of enterprises have restricted access to the contemporary and organised data necessary for the development and training of artificial intelligence systems, thereby diminishing the efficacy of analytical and predictive decisions. From a technological standpoint, the issue of infrastructure modernisation remains critical. This is due to the fact that damage to energy, transport, and telecommunications networks during hostilities has resulted in uneven digital coverage and complicated the implementation of automated control systems.

From a scientific and technological standpoint, the issue can be attributed to the absence of domestic innovative solutions, inadequate integration of scientific institutions into economic recovery processes, and insufficient connections between research and practice. In the context of wartime conditions, constrained financial resources allocated to the IT sector, coupled with the emigration of skilled professionals to foreign shores, are impeding the acceleration of the domestic market for digital technologies and artificial intelligence. Concurrently, there is an increasing necessity to establish national data centres, construct cyber defence systems, and cultivate high-performance computing platforms that will serve as the foundation for digital sovereignty and state resilience. In order to facilitate the effective recovery of Ukraine's economy, it is necessary to combine technological modernisation with institutional reforms, human capital development, and international support in the field of digital reconstruction and security.

4. Conclusions

The findings of the present study indicate that artificial intelligence is emerging as a pivotal instrument in enhancing economic security and resilience within the national economy, particularly in contexts characterised by uncertainty, crisis, and post-war recovery. Its integration into the management

311

system has been demonstrated to facilitate more effective decision-making, reduced risks, optimised use of resources, and greater flexibility in economic processes. AI is the foundation of the neo-industrial development model, in which knowledge, innovation, human capital and structural capital are the primary drivers of competitiveness. As intangible assets grow in importance, it is intellectual technologies that determine the ability of states and businesses to adapt to global changes and ensure sustainable development.

During Ukraine's post-war recovery, technological innovation and digitalisation are emerging as the driving forces behind economic reconstruction. The introduction of artificial intelligence systems in production, finance and management not only automates routine processes, but also creates analytical and predictive mechanisms for preventing crises. At the same time, the study revealed that the development of AI in Ukraine is being held back by several factors, including fragmented digital infrastructure, a lack of proprietary technological solutions, limited funding, a shortage of personnel and a lack of systemic regulatory support. Overcoming these barriers requires coordinated action from the state, businesses and the scientific community to form a national artificial intelligence ecosystem, modernise education, develop cybersecurity and attract international partnerships in digital reconstruction.

The potential for further research lies in the development of models for assessing the impact of artificial intelligence on the economic security of the state, determining the optimal architecture of digital risk management in the context of post-war transformation, and creating a concept for a national AI strategy as a component of Ukraine's sustainable economic development. Of particular importance are areas of research related to the use of AI in the public sector, financial monitoring, crisis management, and the establishment of the state's digital sovereignty.

References:

Bobro, N., Vasylieva, N., Suvorova, S., Golovina, O., & Hulinchuk, R. (2025). Effectiveness of digital integration in the economy and society amid ongoing economic transformation. *International Journal of Organizational Leadership, 14*(First Special Issue 2025), 145–158. DOI: https://doi.org/10.33844/ijol.2025.60469

Brynjolfsson, E., & McAfee, A. (2017). *Machine, platform, crowd: Harnessing our digital future.* W. W. Norton & Company.

Brynjolfsson, E., Rock, D., & Syverson, C. (2019). Artificial intelligence and the modern productivity paradox: A clash of expectations and statistics. In A. Agrawal, J. Gans, & A. Goldfarb (Eds.), *The economics of artificial intelligence: An agenda* (pp. 23–57). University of Chicago Press.

Cherep, A., & Voronkova, V. (2024). Impact of artificial intelligence on the level of socio-economic security of Ukraine in the conditions of current European integration challenges. In *Navigating the technological tide: The evolution and challenges of business model innovation* (pp. 320–333). Springer. DOI: https://doi.org/10.1007/978-3-031-67434-1_30

Choong, K. K. (2008). Intellectual capital: Definitions, categorization and reporting models. *Journal of Intellectual Capital, 9*(4), 609–638.

Edvinsson, L., & Malone, M. S. (1997). *Intellectual capital: Realizing your company's true value by finding its hidden brainpower.* HarperBusiness.

Feigenbaum, E. A., & Barr, A. (1981). *The handbook of artificial intelligence* (Vol. 1, pp. 1–42). Addison-Wesley.

Furman, J., & Seamans, R. (2019). AI and the economy. *Innovation Policy and the Economy, 19*(1), 161–191. DOI: https://doi.org/10.1086/699936

Kortemeyer, G., Dittmann-Domenichini, N., & Merki, C. (2025). Attending lectures in person, hybrid or online at a technical university: How do students choose after the pandemic, and what about the outcome? *Discover Education, 4*(1), 94. DOI: https://doi.org/10.1007/s44217-025-00500-y

McCarthy, J. (1956). *Proceedings of the Dartmouth Summer Research Project on Artificial Intelligence* (pp. 1–15). Dartmouth College.

Muhammad, S. S., et al. (2025). Digital transformation or digital divide? SMEs' use of AI and its implications for competitiveness. *Technological Forecasting and Social Change, 212*, 123456. DOI: https://doi.org/10.1016/j.techfore.2025.124184

Nahar, S. (2024). Modeling the effects of artificial intelligence (AI)-based innovation on sustainable development goals. *Technological Forecasting and Social Change, 198*, 123278. DOI: https://doi.org/10.1016/j.techfore.2023.123203

OECD. (2024). *Enhancing resilience by boosting digital business transformation in Ukraine* (pp. 1–52). OECD Publishing. DOI: https://doi.org/10.1787/4b13b0bb-en

Stewart, T. A. (1998). *Intellectual capital: The new wealth of organizations* (pp. 29–54). Currency Doubleday.