

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE DEVELOPMENT OF THE DIGITAL BUSINESS ECOSYSTEM

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ABSTRACT

In the article, main aspects of the impact of artificial intelligence on functioning and development of the digital business ecosystem are considered. Urgency of using digital technologies, in particular artificial intelligence, for business development is substantiated. Experience of implementing artificial intelligence in functioning of business ecosystems and their main components in Ukraine is analyzed, and main challenges by using artificial intelligence technologies are identified. Based on the study of the essence of phenomenon of “digital business ecosystem” and effects of implementing artificial intelligence in functioning of digital ecosystems, the model of the digital business ecosystem is proposed, and positive features of the impact of artificial intelligence on development of the digital business ecosystem are highlighted. It is proven that existing problems in using artificial intelligence can be solved based on the strategic approach, which is the key one in development of effective modern policies in digitalization of the economy and management. It is substantiated that effectiveness strategic measures depend on coordination of the mechanism of the impact of artificial intelligence on the business ecosystem development. The model of the specified mechanism is proposed, and features of its action are determined.

Keywords: *Business, Business Ecosystem, Strategic Management, Digitalization, Digital Economy, Digital Technologies, Artificial Intelligence.*

1. INTRODUCTION

Formation of digital ecosystems has become possible due to the digital economy development, the key factor of which is production based on digital data, processing of large amounts of information, which has positive effect on efficient use of production resources, introduction of new production and sales technologies, establishment of logistics chains and development of business strategies. Most authors agree on conclusion that the digital economy determines social and economic

development of the country. Digital technologies, including artificial intelligence (AI) as their important component, are one of the leading factors influencing formation of innovative ecosystems and are considered as the basis for establishment of the digital economy and transformation of socio-economic processes. Development of the ecosystem and changes in its structure depend on the level of implementation of artificial intelligence, which subsequently creates conditions for development of

digital business in face of new challenges and threats to economic security.

At the same time, the level of integration of AI into business processes directly affects the structure and dynamics of the development of digital ecosystems, and therefore the competitiveness of digital economy entities.

Despite the rapid growth of interest in digital ecosystems, the mechanism of the impact of artificial intelligence on their development remains insufficiently studied: which elements of ecosystems undergo the greatest changes, how business processes are transformed, in which areas AI creates added value, and how these changes affect the overall sustainability and innovativeness of digital business. The lack of a comprehensive understanding of these relationships complicates strategic planning and management in the context of digital transformation.

2. LITERATURE REVIEW

Artificial intelligence is the key technology that is shaping current trends in digital business. Its implementation is significantly changing the way businesses do business, manage resources, market strategies, and communicate with consumers.

Development of digital ecosystems refers to one of the most relevant areas of scientific research in recent years. The issue of using artificial intelligence as effective tool to organise management is being considered by domestic and foreign scientists.

Gong S. [1], Kummer et al. [2], Sayyadi [3], Shkarlet et al. [4] discuss AI and business transformation, noting that AI allows for automation of many processes, including supply chain management, financial analysis, and operational processes. Machine learning allows companies to make decisions based on large data sets, which helps increase efficiency and reduce costs [5].

AI also plays important role in personalizing marketing strategies. According to studies [6], [7], [8], [9], data analysis algorithms allow predicting consumer behavior and offering personalized recommendations. This increases customer satisfaction and contributes to increased sales.

Using artificial intelligence is changing the labor market [10], creating new opportunities, but also leading to job losses in some industries [11]. However, studies show that along with disappearance of traditional professions, new ones that require digital skills are emerging [12].

At the same time, scientific search for solutions to problems of using artificial intelligence in the context of transformation of corporate governance,

digitalization of science and public administration is gaining relevance.

Active implementation of AI takes place in all spheres of society. Every year, interest of the scientific in studying the AI impact on digital business is growing. This is confirmed by the bibliometric analysis of scientific activity in one of the highest-rated bibliometric databases, Scopus (Fig. 1).

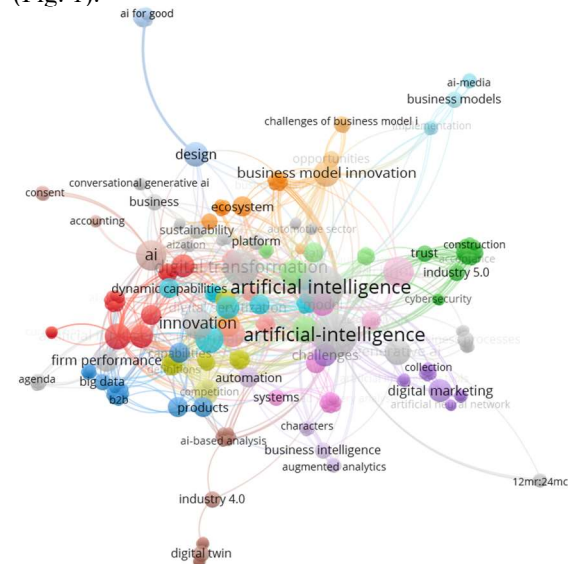


Figure 1: Map visualizing relationship between keywords in scientific publications on the topic of AI in digital business

The analysis of publications over the past ten years has shown growing number of studies in this area (number of publications has increased by 250%). The main areas of research have become as follows: business automation, ethical aspects of AI, digital transformation, demonstrating dynamic development of research in the AI sphere and digital business and confirming urgency of further scientific research in this area.

However, despite a significant amount of research, the scientific literature still lacks a systematic understanding of the impact of AI on the formation and evolution of digital business ecosystems as holistic structures.

The purpose of the study is to analyze the impact of artificial intelligence on the development of digital ecosystems and identify the main directions of digital business transformation under the influence of AI. In this context, it is proposed to discuss the conceptual principles of the impact of artificial intelligence on digital business ecosystems, identify the key directions of transformations occurring under its influence, and also substantiate

the practical possibilities of using AI for the strategic development of digital business. The integration of artificial intelligence into the digital business ecosystem contributes to increasing management efficiency, creating new forms of digital interaction and strengthening the competitive positions of companies in the context of global digital transformation. The results of the study may be useful for entrepreneurs and company managers who implement digital technologies and seek to strengthen their position in the market; for politicians and government agencies that form the country's digital strategy; for scientists who study the processes of digital transformation; for investors who are looking for promising areas of capital investment in an AI-dominated market.

3. METHODOLOGY

To define the essence of the concept of "digital business ecosystem" and identify the effects of the implementation of artificial intelligence in the functioning of digital ecosystems, a set of scientific research methods was applied, in particular:

1. System analysis - to study the digital business ecosystem as a complex open socio-economic system with numerous relationships between participants, technologies, data and institutions. This method allowed us to determine the structure and functional elements of the ecosystem.

2. Factor analysis - to identify key factors that determine the effectiveness of the functioning of digital ecosystems in the context of the integration of artificial intelligence (in particular, the level of automation, data processing speed, service personalization, adaptability of business processes, etc.).

3. Modeling method - to build a visual model of the digital business ecosystem, which reflects the relationships between its main components and illustrates how the implementation of AI changes the functioning of the ecosystem.

4. Content analysis of scientific sources – to identify approaches to defining a digital business ecosystem, analyze theoretical concepts and empirical results of research on the impact of AI on the digital transformation of business.

The use of these methods in combination allowed us to form a substantiated model of a digital business ecosystem that takes into account current trends in the implementation of artificial intelligence and reflects transformational processes in the digital environment, as well as the mechanism of the impact of artificial intelligence on digital business ecosystems.

The study used a comparative analytical method that allows us to identify the characteristic features of the development of the artificial intelligence industry in Ukraine in comparison with similar processes in the countries of Central and Eastern Europe. This method allows us to compare not only absolute indicators (number of investments, company offices, funds), but also the dynamics of development in different political and economic environments, which is important for identifying success factors or deterrent barriers.

The selected countries of Central and Eastern Europe (including Poland, the Czech Republic, Romania, Hungary, Bulgaria, Estonia, and others) have a similar post-socialist past, comparable starting conditions for digital transformation, but demonstrate different levels of integration into global innovation ecosystems. This selection allows us to identify: unique features of AI development in Ukraine against the background of regional analogues; factors that facilitate or hinder the attraction of venture capital to the technology sector; the impact of external crises (including full-scale war) on the investment climate in the AI industry.

4. RESULTS

In generalizing main theoretical aspects of formation of ecosystems as modern trend of the economy, it is possible to define the digital ecosystem of business as a set of digital technologies, processes and services that form the basis for implementation by the company of the main areas of activity in the digital society. In the context of globalization economic processes, digital business systems coordinate various areas of the company's economic activity. Modern state programs that regulate implementation of principles of the digital economy distinguish following main digital technologies:

- big data (Big Data);
- artificial intelligence;
- systems;
- quantum technologies;
- Internet of Things;
- virtual reality technologies.

Development of global digital platforms has been driven by advances in artificial intelligence. Platforms act as infrastructure, eliminating unnecessary intermediary transactions and creating network effects, optimizing the real-time matching of supply and demand. The impact of platform models is diverse. Models of social interaction help improve purchasing goods and services with resource savings, creating possible implementation of projects in the circular economy. Work processes

are improved when platforms make it possible to work remotely. Using social networks promotes effective communication with stakeholders. A positive factor is contribution of artificial intelligence technologies to companies achieving sustainable development goals and implementation of corporate social responsibility policies to ensure gender equality, combat climate change, and preserve marine and terrestrial ecosystems.

Research results show that the largest AI market is in North America, with estimated value of \$87.18 billion to \$167.3 billion in the United States. In Canada, the North American the AI industry accounts for more than a third (36.84%) of the global AI market, which is worth \$43.7 billion. (Figure 2).

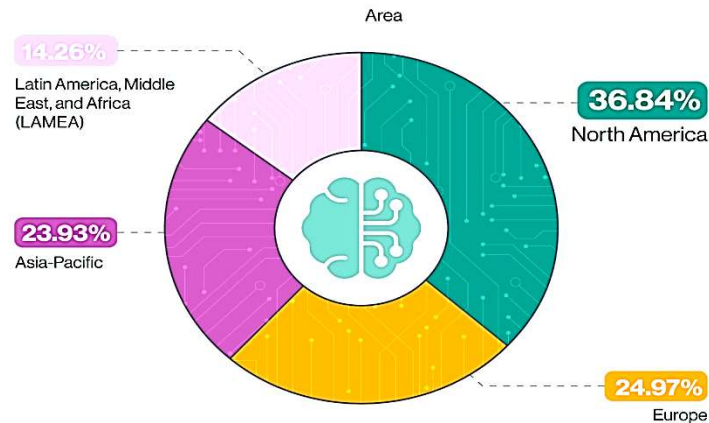


Figure 2: Use of AI in the global market, %

Source: [13]

The analysis of AI development statistics shows that 24.97% of the global AI market share is accounted for by European countries. It should be noted that the AI market in Germany is worth US\$25.7 billion, which is 146% less than that of the

US. The Asia-Pacific region accounts for 23.93% of the total AI market size. Forecast data on the AI technology development show that the global market size could exceed US\$2,500 billion by 2032 (Figure 3).

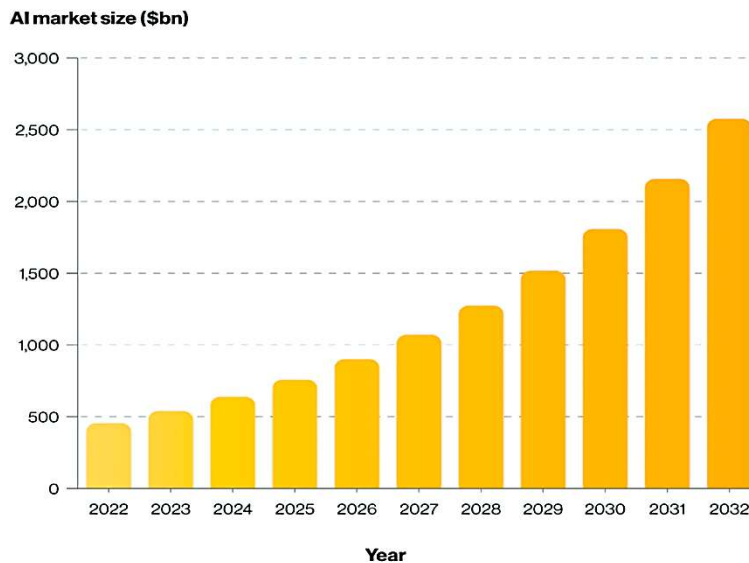


Figure 3: Global statistics and forecast of artificial intelligence use, 2022-2032

Source: [13]

Forbes survey show that 65% of CEOs surveyed plan to use ChatGPT for business purposes instead of search engines. Top managers are convinced (97%) that this will have positive impact on their business. 74% of business owners believe that ChatGPT will help them generate answers to

customers using chatbots. 70% of CEOs are convinced of significant speed of content creation, and 44% are sure that AI will help them create necessary content in different languages. (Figure 4).

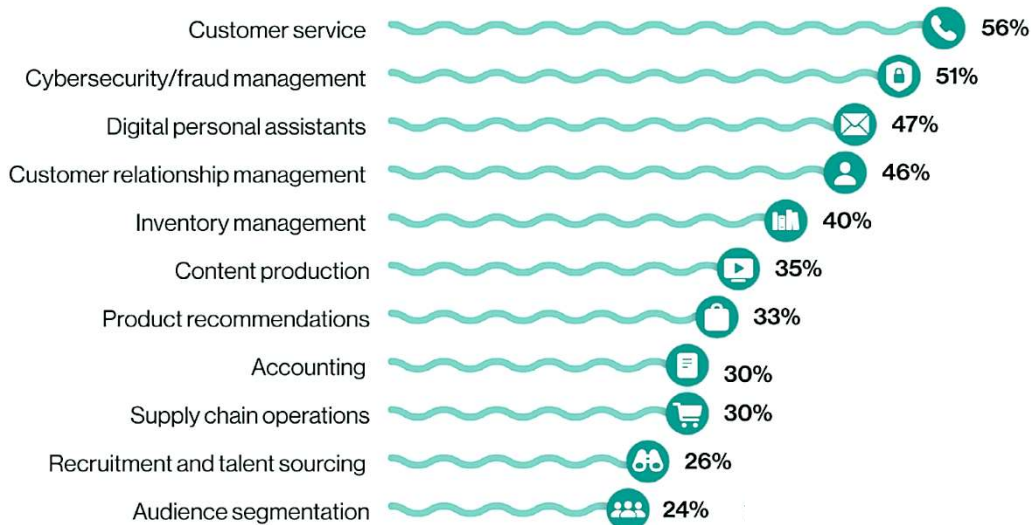


Figure 4: Percentage of business owners using AI technologies, %

Source: [13]

Studying the experience of implementing artificial intelligence in functioning of business ecosystems and their main components in Ukraine for the period 2022-2023 allows us to draw the following conclusions. In terms of the number of AI companies in 2023, Ukraine ranked 2nd among the countries of Central and Eastern Europe. Since 2014, number of companies using artificial intelligence technologies has increased from 97 to 243 by the end of 2023. The study of human resources of domestic

companies indicates a 5-fold increase in the number of specialists with AI competencies, which amounted to 5,200 people by the beginning of 2024. Despite riskiness of doing business and decline in business activity due to military operations, there are 44 venture funds in Ukraine that support startup projects in artificial intelligence technologies. The largest centers of AI development in Ukraine are Kyiv - 177 company offices and Lviv - 43 offices [14] (Figure 5).

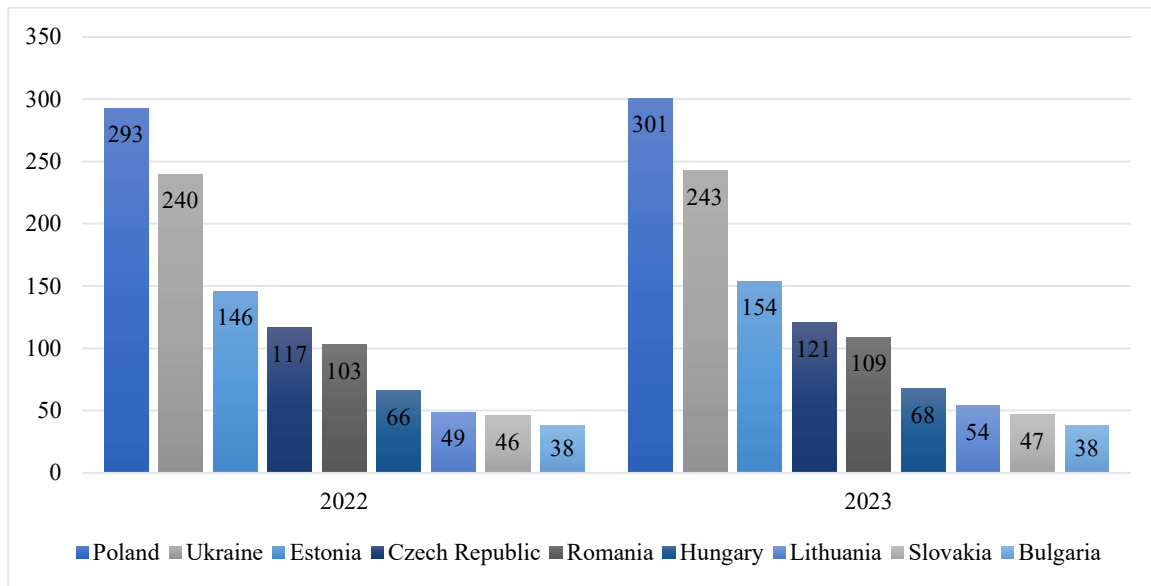


Figure 5: Number of AI companies in dynamics (2022 – 2023)

Source: [14]

In 2023, there was a 35% increase in funding for startups in artificial intelligence, which, despite military aggression of the Russian Federation and work in conditions of high risk, follows the global trend of increasing investments in the AI. However,

in terms of the number of venture investments, Ukraine ranks last among the countries of Central and Eastern Europe (10.8 million USD in 2023) (Figure 6).

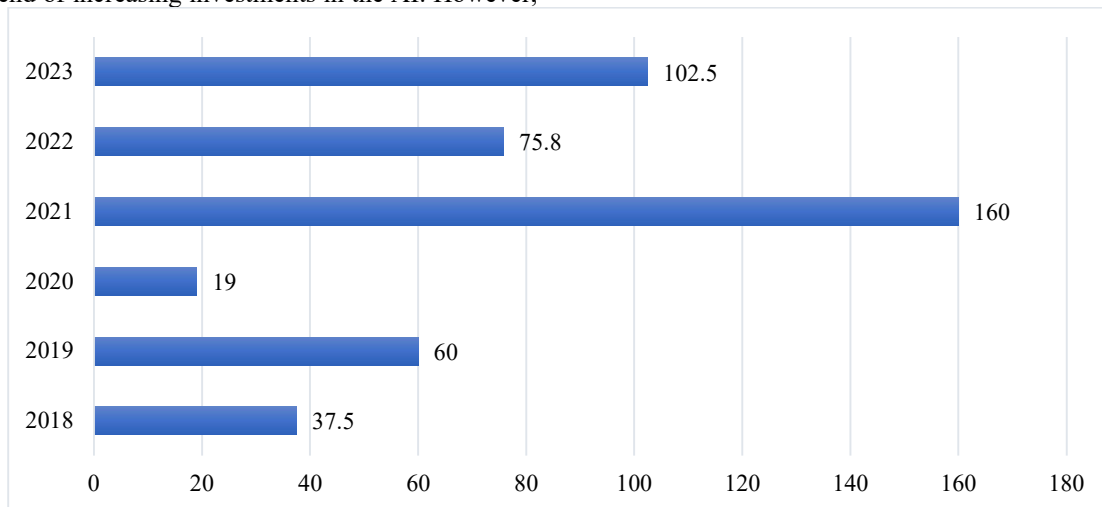


Figure 6: Financing startups specializing in AI technologies

Source: [14]

Universities are also involved in developing artificial intelligence technologies. Thus, out of 31 artificial intelligence laboratories operating in Ukraine, 6 operate at universities: Lviv National University named after Ivan Franko, Kyiv National University "KPI named after I. Sykorsky", Kharkiv National University of Radio Electronics, etc.

Regarding the industry distribution of AI startups, the leader is investments in software development – 27.2%, healthcare – 12.54%, marketing – 9.78%,

FinTech technologies – 8.92%, development and implementation of automated systems – 6.19% [15].

The main challenges using artificial intelligence technologies, according to experts, are:

- lack or secrecy of information, as well as difficulties with data processing in certain sectors of the national economy (medical, military, agricultural), which does not always contribute to the spread of AI technologies;
- lack of clear established regulatory norms;

- need to train specialists who possess not only technical, but also communication and creative skills,

- reduction in available financial resources for investment in artificial intelligence.

Defining the essence of the phenomenon of “digital business ecosystem” and effects of introducing artificial intelligence into functioning of digital ecosystems allows us to form the following model of the digital business ecosystem (Figure 7).

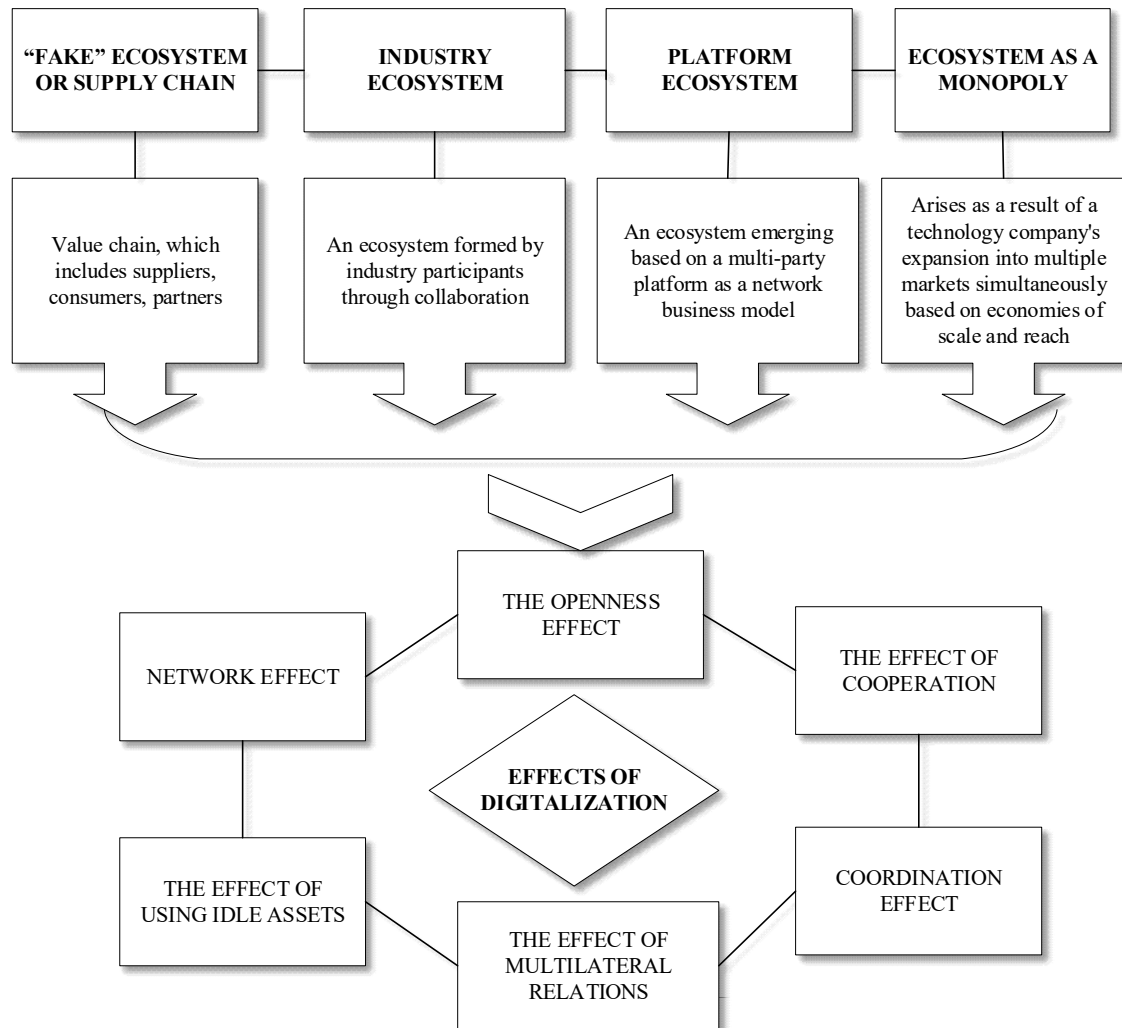


Figure 7: Digital business ecosystem model

Source: developed by the authors

Following positive features of the impact of artificial intelligence on development of the digital business ecosystem should be highlighted:

- high productivity of economic operations due to process automation;
- ability to accumulate and process large data sets;
- expanding opportunities for social integration;
- ensuring business transparency to the public;
- possible effective cost management;
- achieving competitive advantages in production and sales activities.

However, spread of using artificial intelligence as effective tool of the digital economy is hampered by certain circumstances caused by crisis state of the domestic economy, military aggression of the Russian Federation, political and social instability. As a result, low innovation capacity, investment limitations do not allow most manufacturing enterprises to carry out technological upgrades, use new methods and tools to ensure effective logistics and sales systems. In addition, there is shortage of qualified personnel in informatization and digitalization, with developed digital competencies,

which is due, among other things, to significant population migration. Personnel with high level of knowledge in digital technologies in functioning of business ecosystems play the leading role, since the work of the performer is transformed into the work

of the manipulator and controller of high-tech equipment and digital management platforms. Fig. 5 presents data on probability and trust consumers to companies that use artificial intelligence in their own activities (Figure 8).

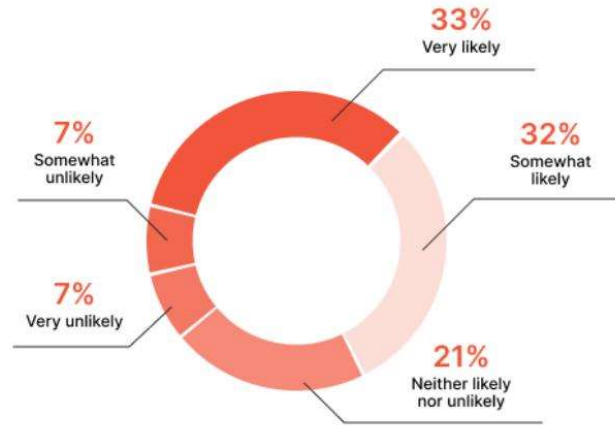


Figure 8: Likelihood of consumers trusting companies that use AI

Source: [16].

Strategic management of business ecosystem development is key direction of effective modern policy in the economy digitalization and management processes, which affects making management decisions at both the state and microeconomic levels and can be considered as effective tool for solving the above problems. Urgency of the strategic approach is significantly increasing in the context of technological transformations of business processes and transition to new technological order, which is based on principles of creating fundamentally new technical systems that use advantages of artificial intelligence. When forming principles of strategic management of implementing artificial intelligence technologies, it is necessary to take into account investment factor, including for conducting applied research and their further commercialization in the medium term. At the same time, the time factor is of great importance in ensuring strategic management of implementation

of artificial intelligence systems in activities of business ecosystems due to high level of competition in this area not only from the standpoint of civilian developments, but also from the point of view of ensuring national security and possible threats associated with adaptation of artificial intelligence to solving military tasks. Accordingly, strategic management of implementation and use of artificial intelligence systems should be considered as important direction of the socio-economic, scientific and technical policy of the state, as well as national security policy, which will further contribute to ensuring competitive advantages of the domestic economy at the international level. Figure 9 presents indicators of using artificial intelligence in various areas of enterprise activity, among which the most popular areas are: automation of IT processes (33%), security and threat detection (29%) and marketing and sales (28%).

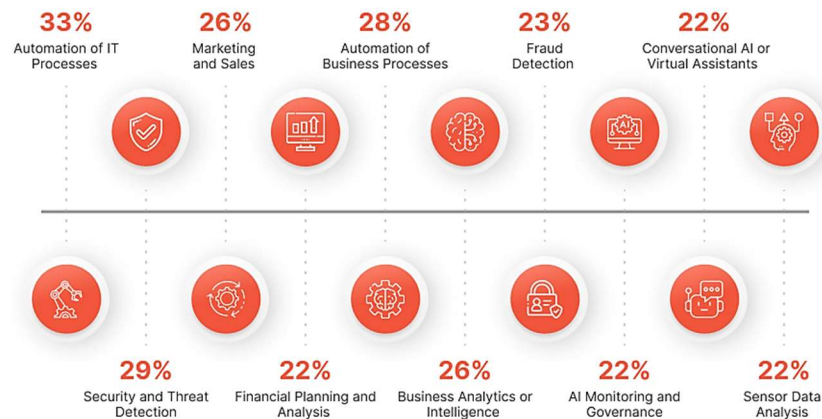


Figure 9: Using AI in various areas of business activity

Source: [16]

Existing trends in the world indicate available requirements for compliance of artificial intelligence technologies with ethical norms and direction of its use to solve the problems of humanity, however, at present there is no unified view on formation and regulation of relevant institutions, development of norms and rules for implementation of relevant projects. First of all, this concerns ethical component of using facial recognition systems and social scoring. Issues of personal data protection, access to them, especially during neural network training and development of intelligent systems also do not always have appropriate institutional support. From the point of view of legal protection, the priority area of regulatory policy is the issue of legal personality

of artificial intelligence and legal nature of results of its application. The economy digitalization creates prerequisites for competitive struggle in artificial intelligence, however, geopolitical tensions, spread of technological sovereignty do not contribute to formation of the single universal approach to development of regulatory policy, since priority is given to national models of regulatory frameworks.

Analyzing dynamics of development of artificial intelligence and its use in business, it is advisable to pay attention to positive dynamics. In 2017, only 20% of companies used AI, in the period 2018-2023 - there were 47-58% of these enterprises, and in 2024 - 72%, which significantly exceeds indicators of previous years (Figure 10).

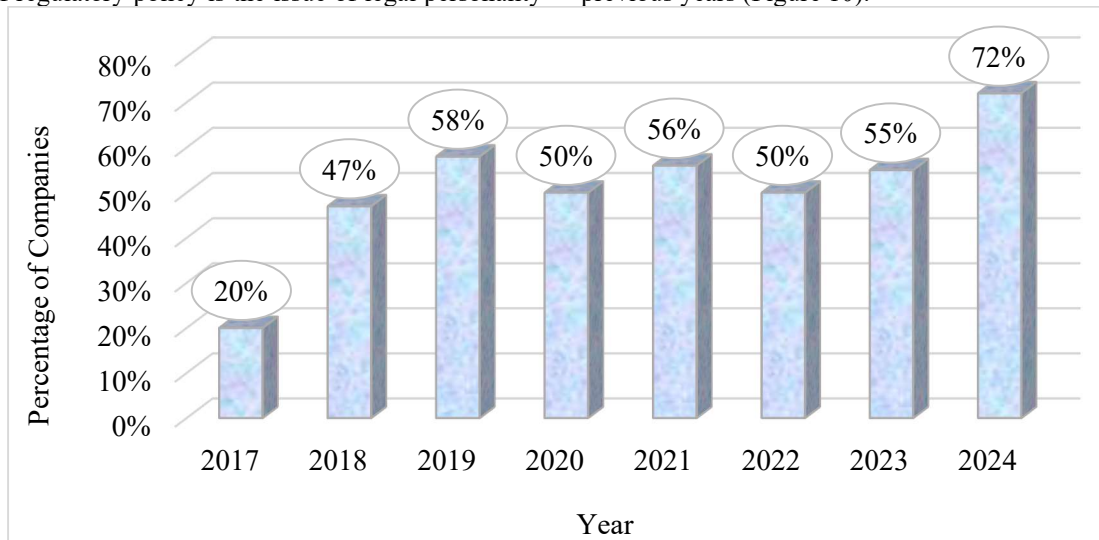


Figure 10: Companies using AI, %

Source: [17]

The strategic management system of development of artificial intelligence in the conditions of functioning of digital business ecosystems should be based on appropriate regulatory and legal support and measures of state regulation and support, including those of stimulating nature. Effectiveness of strategic measures largely depends on coordination of the mechanism of influence of artificial intelligence on development of the business ecosystem, formed in the conditions of effective interaction of market relations subjects and state policy measures and expansion of the practice of using digital innovations in implementation of entrepreneurial initiatives. Implementation of the mechanism involves state intervention in the context of measures of strategic management of development of artificial intelligence in the conditions of functioning of business ecosystems, as well as taking into account principles and objective prerequisites associated with organizational and economic features of artificial intelligence as an object of management in strategic perspective (Figure 11).

Effect of the mechanism of influence of artificial intelligence on functioning of business ecosystems is determined by its following features:

- functional features and potential capabilities of artificial intelligence depending on the level of its implementation. Thus, some researchers distinguish levels of artificial intelligence, depending on the ratio of resource potential of business entities. These can be both specialized programs used for data processing and formation of optimal models of behavior of the management entity, and automated systems that completely or partially replace the person and control management in various areas of the company's business;

- scale and level of use of artificial intelligence. Thus, prevalence of competencies in digital technologies and artificial intelligence among citizens and company employees is of great importance. At the same time, digital skills should be spread among different social strata of economically active part of the population as potential consumers of companies' products and services;

- stage of the life cycle of artificial intelligence technology and its ability to adapt to technological changes.

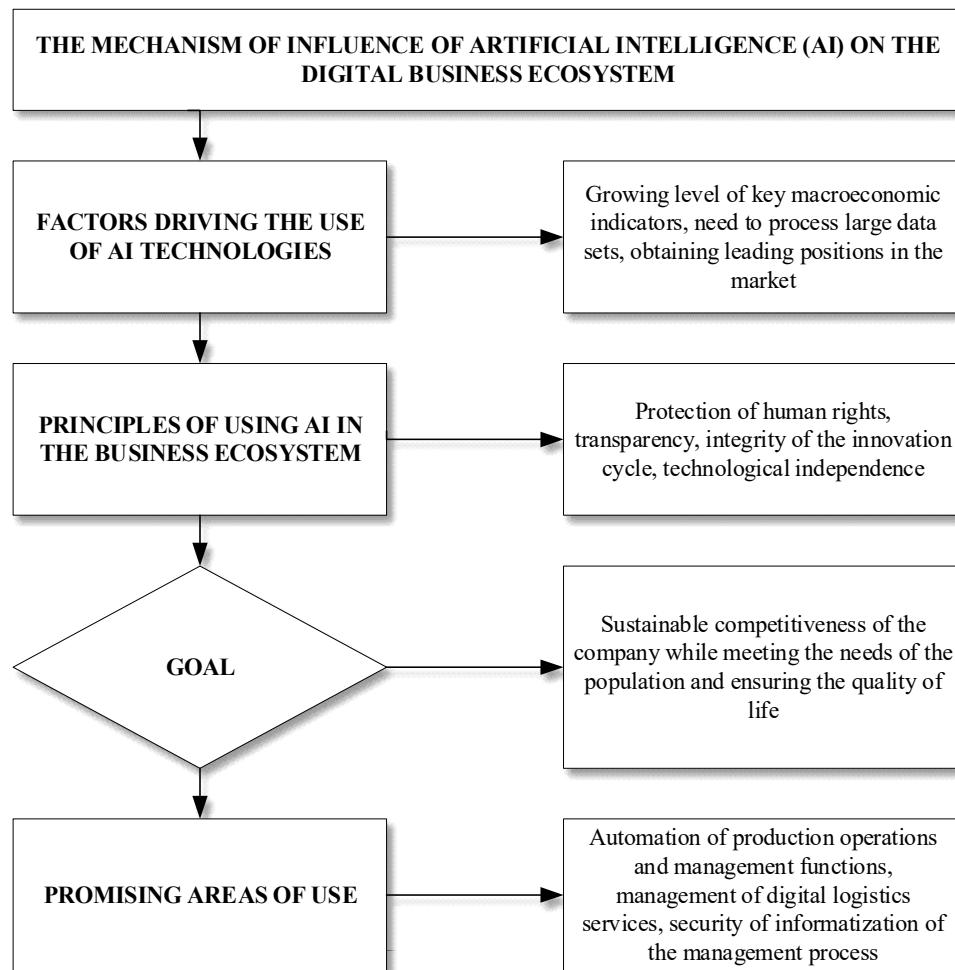


Figure 11: Mechanism of influence of artificial intelligence on development of the digital business ecosystem

Source: developed by the authors

When developing strategic management measures for companies, the following aspects of the mechanism should be taken into account, such as the ability to develop, design and implement artificial intelligence systems based on available administrative and financial support from government authorities, as well as ability to modernize and update artificial intelligence systems and ensure continuous investment process in the company's intellectual capital.

5. DISCUSSION

The issue of the impact of artificial intelligence on development of the digital business ecosystem remains debatable today. In the context of the research conducted, it can be seen that most authors devote their works to revealing the essence of business ecosystems, features of their development at the present stage, problems of formation of the digital society in Ukraine and the world,

management of financial transactions in the context of ecosystem development and formation of necessary competencies of company personnel in the context of digitalization.

We fully share the ideas of [18], [19], [20], [21] regarding use of artificial intelligence and the impact of digitalization on sustainable business development, which are based on how implementation of digital technologies, in particular artificial intelligence, contributes to creation of sustainable consumption and increased social responsibility of business.

In turn [22], [23] prove relevance of digital business transformation in the face of global challenges, such as the COVID-19 pandemic and military aggression.

Bist et al. [24], Solosich et al. (2024) [25] justify introducing artificial intelligence into business processes by identifying possibilities of introducing artificial intelligence into business processes for

automation, obtaining information through data analysis and interaction with customers and employees, and identifying potential challenges (for example, job losses and the need to adapt employees to new technologies). In addition to benefits, using artificial intelligence also has certain risks. These include ethical issues, in particular using personal data and algorithmic bias [26], [27]. Researchers emphasize the need to regulate AI at the legislative level to avoid negative consequences Leavy [28].

We fully support the ideas of [29], [30] regarding the study of the impact of intellectual capital and artificial intelligence on digital transformations by identifying the role of intellectual capital and artificial intelligence in modern economic environment and their interaction with digital initiatives. The key mechanisms through which these factors contribute to digital transformations are identified, and their relationship is clarified.

Artificial intelligence as one of the key drivers of digital transformation of the economy is studied by [31], [32] through consideration of the prospects for the use of AI in various economic and social spheres, as well as determining its role in creating sustainable economic growth and ensuring competitive advantages of organizations.

This study adds to the knowledge on understanding the impact of artificial intelligence on development of the digital business ecosystem.

6. CONCLUSIONS

For widespread use of artificial intelligence technologies and transformations of management, the company's management must have information about possible implementation leading digital technologies and directions of their impact on various areas of economic activity. Implementation of artificial intelligence, digital platforms and neural networks becomes appropriate: when conducting analysis, planning, forecasting and design, including processing large data sets; when implementing monitoring and control processes of production and sales activities; when making complex intelligent management decisions.

Considering the impact of artificial intelligence technologies on functioning of digital business ecosystems, it is advisable to pay attention to security aspect as one of the priorities. Thus, using artificial intelligence and machine learning technologies to protect data and prevent challenges and threats in the information environment is becoming popular direction in the future. However, due to rapid changes in the environment, dynamism of digital threats and emergence of new malicious

software, artificial intelligence systems require constant modernization, and degree of their automation should be constantly increased. Using artificial intelligence by companies should take place subject to development of appropriate regulatory and legal support, state support policies, formation of prerequisites for development of the digital economy infrastructure, and training of specialists in digital technologies.

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