MANAGEMENT AND BUSINESS

Vol. 2, No. 2. 2024

Journal homepage: https://emsesd.com.ua/en

Article's History: Received: 01.10.2024 Revised: 03.02.2025 Accepted: 25.02.2025

UDC 339.9:004.89

DOI: 10.59214/mb/2.2024.52

The interrelation between the development of artificial intelligence technologies and the global economy and labour market

Alla Khanenko*

PhD in Economic Sciences, Associate Professor
National University "Zaporizhzhia Polytechnic"
69063, 64 Zhukovsky Str., Zaporizhzhia, Ukraine
https://orcid.org/0000-0003-0899-7311

Abstract. The supporting, and increasingly leading, role of artificial intelligence (AI) was observed to become more evident across multiple spheres of public life. AI, encompassing a broad range of sectors, was found to exert growing influence on the development of modern business, facilitating the implementation of more efficient and innovative management methods. The aim of the article was to examine the impact of AI on the development of the global economy and the world labour market, to identify the interrelation between AI advancement and national economic growth, and to highlight, within the informational space, the historical influence of technological revolutions on reducing labour demand. To achieve this objective, a comprehensive range of theoretical research methods was employed, including monitoring, statistical analysis, comparative and systems analysis, verification, synthesis and generalisation, analysis of existing approaches, and assessment of efficiency and effectiveness. Academic publications were used as source material. The economic sectors most actively adopting AI technologies were identified, with an emphasis placed on their potential for further development. The findings indicated that the most active business sectors in implementing AI technologies included retail, IT and telecommunications, healthcare, the automotive industry, tourism and hospitality. The analysis confirmed that the integration of AI technologies into business operations had the potential to significantly increase company revenue, enhance operational efficiency, and improve competitiveness. A growing number of companies worldwide were found to be engaged in the development of AI solutions, ranging from general-purpose tools to highly specialised products. Recommendations were presented regarding potential strategies for addressing challenges associated with the implementation of generative AI technologies and their impact on the formation of the Ukrainian labour market

Keywords: unemployment; generative artificial intelligence; automation; intelligent robots; information technologies

Introduction

The industry of artificial intelligence (AI) experienced rapid development. By fostering the implementation of innovative technologies, AI attracted the attention of leading global business figures and exerted an increasingly significant influence on the development of modern enterprises. The growing impact of AI on the efficiency and competitiveness of companies became increasingly evident. AI technologies served as a driving force capable of transforming not only the economy but life in general, as the increasing flow of information substantially affected human existence. The limited capacity for processing and comprehending large volumes of data contributed to disorientation and the adoption of suboptimal decisions. The need for additional tools in the information-processing cycle underscored the necessity of in-depth research into the development of AI.

In Ukraine, the prospects for the development of AI technologies were defined at the state level. Resolution of the Cabinet of Ministers of Ukraine No. 1556-r (2020) approved the Concept for the Development of Artificial Intelligence in Ukraine. The Concept outlined the goals, principles and tasks assigned to AI technology developers. The

Suggested Citation:
Khanenko, A. (2024). The interrelation between the development of artificial intelligence technologies and the global economy and labour market. *Management and Business*, 2(2), 52-61. doi: 10.59214/mb/2.2024.52.

*Corresponding author

development of AI technologies was identified as a priority area of scientific and technological research in the country. Increasing attention was devoted to AI and the evolution of its technologies by numerous scholars. In their study, V. Bohomia & A. Hudz (2023) emphasised the potential of AI to transform many areas of human life and activity, contributing to the growing relevance of AI. Their arguments were supported by reference to the improved efficiency and productivity made possible by automation of tasks and processes, thus enhancing business performance. V.M. Kuzomko & V.V. Buranhulova (2021) examined the history of AI development and identified its key components that enabled the use of AI across various sectors of the economy. These authors highlighted the effect of generative AI on the performance of modern enterprises and outlined potential areas for future application.

The role of AI in manufacturing, particularly its influence on automation and production efficiency, was analysed by S. Fox (2024). H. Moruga (2024) investigated the professions potentially rendered obsolete due to AI deployment, as well as the sectors most actively integrating AI technologies. M. Honcharuk (2024) explored the transformations within the information technology (IT) labour market brought about by AI evolution. The researcher drew attention not only to AI's advantages but also to the limitations of its capabilities. These included constraints in solving complex problems requiring contextual understanding and final objectives, the inability of neural networks to grasp text dimensions and style, and the absence of feelings, life perspectives and comprehension of social phenomena. It was noted that AI could not operate effectively without the support of IT professionals, thereby underlining the continued necessity of human involvement for analysis and adjustment. O. Musiienko (2024) examined the perspectives of prominent scientists and AI creators such as B. Gates, S. Altman and D. Autor regarding the influence of AI on the labour market. According to the findings, a consensus emerged among experts that the utilisation of AI technologies could reduce working hours while shifting focus to tasks where human presence remained irreplaceable – particularly in the social sphere – provided AI was employed responsibly. The researcher highlighted the optimistic outlook of B. Gates and S. Altman, who envisioned a just redistribution of wealth facilitated by AI technologies. Each year, the advancement of AI accelerated, and these technologies assumed a growing role across various economic sectors. By unlocking new opportunities in multiple fields, generative AI became an integral component of society's technological development.

Nevertheless, certain reservations persisted concerning the complete replacement of human labour in numerous areas. L.I. Zhyvtsova (2023) emphasised the necessity of addressing the risks associated with artificial intelligence, in particular the displacement of humans from production, educational, and other societal processes. The environmental risks associated with AI were also addressed, with the argument that AI-driven systems might fail to account for ecological factors, thereby adversely impacting the natural environment. Following an examination of AI's effect on specific economic sectors and recognising the high level of reliability of modern technologies, a warning was issued regarding potential disruptions in energy supply, accidental mechanical damage that could lead to various technical and software failures, and the threat posed by the creation of autonomous devices that might become uncontrollable and impossible to halt in time. The researcher further cited statements by leading AI developers concerning the threats these technologies pose to humanity. A review and analysis of numerous publications dedicated to AI technologies led to the conclusion that most studies focused on defining the nature of artificial intelligence and exploring prospects for its further development, as well as comparing the benefits and risks of AI technology use. Many researchers addressed the issue of human replacement by AI across various areas of activity. However, it was proposed that more attention should be directed towards balancing labour force displacement with the creation of new employment opportunities. The present study, therefore, aimed to investigate the impact of AI technologies on economic growth and the labour market.

Materials and Methods

To determine the impact of AI technologies on the global economy and global labour market, academic publications were examined, alongside publicly available information disseminated via open-access scientific networks and electronic resources related to the research topic (European Political Strategy Centre, 2018; The impact of..., n.d.). The study and analysis of information provided in the European Political Strategy Centre (2018) publication facilitated the identification of trends characterised by a high degree of uncertainty regarding the future labour market, which has been undergoing transformation under the influence of AI. The examination of information presented by Sitniks (The Impact of..., n.d.) facilitated the identification of Ukrainian companies whose use of AI technologies in their operations contributed to increased efficiency and competitiveness.

Academic publications (Reznikov, 2024) were analysed in the course of the study. The information therein contributed to a better understanding of the positive impact of generative AI on enhancing the innovation potential of enterprises. The methodology involved a review of studies by various scholars, as well as practical insights from developers and specialists utilising existing approaches to examine AI's influence across economic sectors and education. Additionally, the efficiency and performance levels in different areas of activity following AI adoption were assessed. Statistical methods, together with comparative and systems analysis, were applied to investigate analytical data provided by companies such as McKinsey (The state of AI in 2021, 2021), Deloitte and PwC. Analysis of these data facilitated the identification of firms that prioritised AI in their business strategies and achieved elevated levels of innovation and competitiveness.

Based on statistical data obtained by McKinsey and presented by I. Pylypiv (2023), a growing number of companies incorporating AI into their operations was determined. A review of the research findings published by V.M. Kuzomko & V.V. Buranhulova (2021) confirmed the importance of the main components of artificial intelligence. Findings from Java-University group, obtained through statistical methods and presented in the work of H. Moruga (2024), made it possible to determine the leading sectors in AI implementation and the projected annual income growth of the banking sector. The historical and analogy-based research methods applied in the analysis of publications by M. Marienko & V. Kovalenko (2023), O. Musiienko (2024), H. Moruga (2024) facilitated the exploration of how past technological revolutions had reduced demand for human labour. To study the level of AI usage across different sectors of the economy and to establish the interrelation between AI development and the global economy and global labour market, verification procedures were carried out to detect data inconsistencies within automated information systems. To identify the factors influencing the formation of the research problem, methods of synthesis and generalisation were applied to construct the main theses and propositions of the study.

Results and Discussion

AI encompassed numerous sectors – from supply chains and marketing to product development. Research and analytical institutions also adopted AI technologies to enhance operational productivity. AI had already been widely applied in education and business processes for many years. Enterprises specialising in AI development, ranging from general-purpose tools to highly specialised products, emerged globally and attracted significant investment. The continued implementation of AI in any industry appeared to be merely a matter of time. Business entities sought to avoid marginalisation within the global economy due to short sightedness, and company executives acknowledged the potential of AI technologies to transform their operational processes. Well-known firms such as McKinsey, Deloitte and PwC studied the application of AI across various industries and countries. Their findings, which served as key information sources for businesses and governments, were published in annual analytical reports such as The state of AI in 2021 (2021) by McKinsey. This report included statistics on AI use in countries such as the USA, China, India, and the EU. Notably, the report identified China as one of the leaders in industrial AI integration. According to the statistical data presented, one-third of businesses worldwide had already adopted AI, while 90% of managers believed AI could offer a competitive advantage. Nearly 80% of firms had defined AI as a strategic priority within their business strategy. AI technologies thus emerged as a driving force with the capacity to transform not only the economy but also life in general. A significant surge in the popularity of AI was observed following the November 2022 release of ChatGPT by OpenAI.

The key distinguishing feature of ChatGPT lay in its ability to generate intelligible answers to virtually any question better than any search engine, through a combination of supervised learning and reinforcement learning in a specified language. The robot also supported Ukrainian. Many students had already begun actively using this neural network capability in their studies. However, this development received a mixed response among educators, as such AI assistance threatened to diminish students' motivation to learn and develop skills. As a result of the boom following the release of ChatGPT, a number of observers expressed concern regarding its potential to displace human intelligence, promote plagiarism, or spread misinformation. Nevertheless, the use of this new language model enabled users to delegate portions of their routine tasks, which significantly streamlined corporate workflows. Examples of AI development prior to this boom were provided by V.M. Kuzomko & V.V. Buranhulova (2021). In their study, reference was made to the company IBM, which, as early as 2010, developed the supercomputer Watson based on artificial intelligence. This system was not merely a computer but the most advanced technology at the time, capable of generating answers to questions formulated in natural language through the use of AI. Further attention was drawn to the 2015 release of a semi-autonomous vehicle by Tesla, founded by Elon Musk. Another notable contribution was identified in the work of engineers at Google Brain, who in 2017 developed the artificial intelligence system AutoML, capable of creating its own AI without human intervention. In the same study, V.M. Kuzomko & V.V. Buranhulova (2021) emphasised the importance of considering the core components of artificial intelligence: machine learning, deep learning, data science, and computer vision.

It was also noted that the consulting firm Accenture had for many years employed AI in the analysis of job applications via AI tools and the Accenture platform. Accenture AI for Talent Acquisition, developed in-house, utilised machine learning algorithms to optimise recruitment processes. Collaborative AI Systems leveraged AI technologies to integrate with existing platforms such as Workday, Oracle and SAP for data collection and analysis. The neural network reviewed all candidate CVs and selected the most suitable applicants. A. Zhytkevych (2023) reported that, based on Google DeepMind's AI, the London-based AI laboratory developed GraphCast – a weather forecasting technology. This AI-powered weather predictor outperformed global standards and provided forecasts more accurate than those of leading European meteorological centres. The development of AI technologies exerted a direct impact on the progress of numerous economic sectors. A growing number of business entities adopted AI technologies, perceiving them as opportunities for future growth. The role of AI in manufacturing expanded as it facilitated the optimisation of workflows and enhanced operational efficiency. According to S. Fox (2024), a scholar with a decade of experience and the author of multiple AI algorithms and technologies, one of AI's principal advantages

resided in its capacity to rapidly collect and analyse large volumes of data. This ability enabled effective production control, early detection of potential issues, and ensured product quality. R. Reznikov (2024) in his research highlighted the benefits of generative AI, suggesting that its implementation could enhance enterprises' innovation potential and competitive advantages. A study conducted by the Java-University group, published by H. Moruga (2024), confirmed that AI integration could significantly increase company revenues. Based on these findings, a diagram was developed (Fig. 1) indicating the leading sectors in terms of AI implementation.

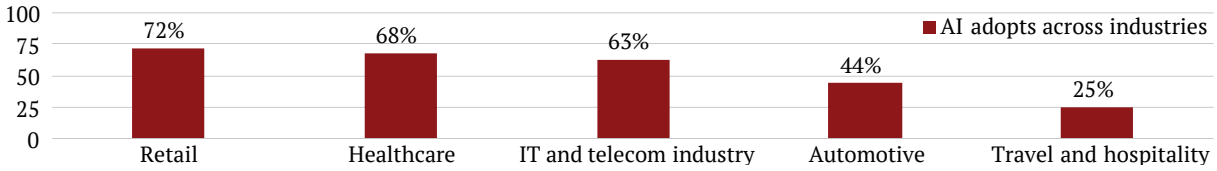

Figure 1. Leading sectors in the implementation of artificial intelligence
Source: adapted by the author from H. Moruga (2024)

The examination of research findings by the Java-University group enabled H. Moruga (2024) to identify potential annual profit growth in the banking sector: full-scale implementation of AI usage scenarios in this domain could have contributed to an increase in annual profits by USD 200-340 billion. Retail trade was identified as an equally promising sector for AI application. The potential impact on annual revenue growth from the implementation of generative AI technologies in this industry was estimated at USD 400-660 billion.

Of particular relevance to the present study were the views of M. Marienko & V. Kovalenko (2023) regarding the significance of AI and open science for education, as well as the interrelation between these concepts within secondary and higher educational institutions. The researchers emphasised the appropriateness of integrating cloud-based open science services into general secondary and higher education institutions, as such integration was expected to contribute to the development of open science competencies among students at all educational levels. In his publication, I. Pylypiv (2023) drew attention to the results of a study on AI technologies conducted by the consultancy McKinsey, which explored the relationship between the development of generative AI and the economic growth of companies adopting these technologies. Based on statistical data published by McKinsey, the researcher reported that by the end of 2022, approximately 50% of surveyed companies that had consulted McKinsey were attempting to implement AI in their operations. This figure represented a significant increase compared to 2017, when only 20% of companies had reported such initiatives. Upon analysis of the findings presented in the McKinsey report The state of AI in 2021 (2021), I. Pylypiv (2023) concluded that generative AI, such as ChatGPT, had the potential to contribute USD 2.6 to 4.4 trillion annually to global GDP. The scale of such growth could be contextualised by comparison with the total increase in global GDP in 2022, which amounted to USD 3.6 trillion across all sectors of the global economy. Despite AI's reputation as a productivity booster (Lyndyuk *et al.*, 2024), the growing influence of generative AI technologies had raised increasing concerns regarding the potential displacement of certain professions due to full automation, as newer AI models demonstrated the ability to perform tasks requiring intellectual judgement. AI had been shown to generate works of art, operate vehicles, and solve a wide range of problems in medicine and other fields; consequently, its influence on the labour market could not be ignored.

C.E. Brown & B. Smith (2019) noted that AI presented both significant opportunities and challenges. Despite the aforementioned risks and ethical issues, the technology was seen to possess substantial potential for transforming society and addressing global challenges. Experts examining the impact of AI on employment and job markets stressed that premature panic should be avoided. Although notable technological achievements had been made in the field of AI, these technologies were still primarily regarded as auxiliary tools that enhanced productivity, while many areas of human activity remained difficult to envision without human involvement. O. Musiienko (2024) provided data on studies concerning the impact of generative AI on labour productivity growth, conducted by Goldman Sachs – one of the largest investment firms in the United States – which offered an optimistic outlook on the implications of generative AI development and its effect on productivity growth (Fig. 2).

According to O. Musiienko (2024), the use of AI technologies exerted an insufficiently significant impact on the economy to induce disruption. This position was substantiated by reference to research conducted by Goldman Sachs, which estimated that AI would contribute to labour productivity growth of approximately 1.5% per annum over the next decade, cumulatively adding 7% to global GDP. O. Musiienko (2024) argued that the ongoing technological revolution constituted the fourth of its kind, and concerns regarding a potential decline in labour demand in this context were not unprecedented. To gain a clearer understanding of how AI influences society, historical analogies were presented. For instance, during the transition from horse-drawn transport to motor vehicles, concerns were raised about job displacement. However, the automobile industry ultimately generated substantially more employment opportunities than it eliminated.

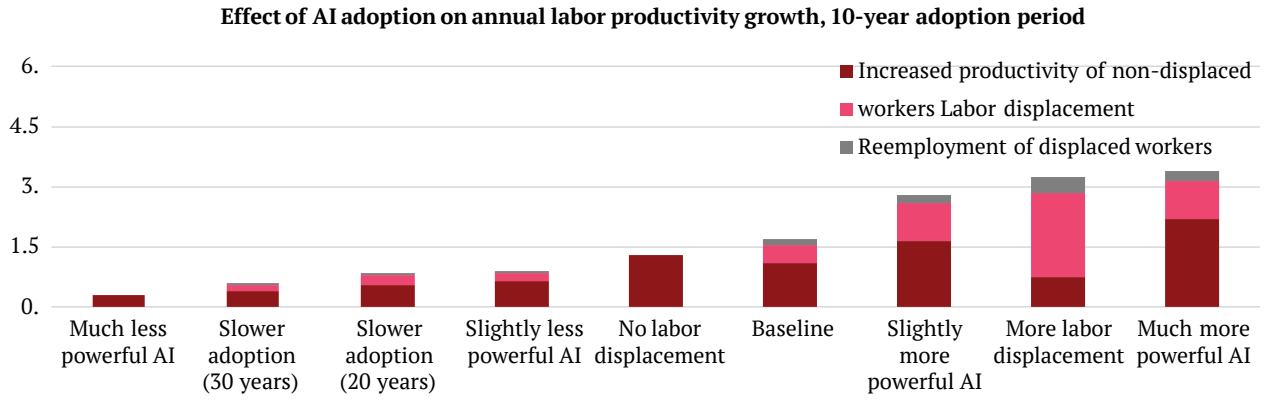

Figure 2. Impact of artificial intelligence on annual labour productivity growth

Source: adapted by the author from O. Musiienko (2024)

Another example referred to the early 2010s, a period marked by elevated unemployment rates following the financial crisis. Concurrently, the adoption of new technologies such as smartphones and social media platforms was observed. In most cases, AI did not result in the complete substitution of professions but rather altered methods of work execution and enhanced efficiency across various domains. AI researchers noted that developed economies possessed greater capacities for rapid business transformation through the implementation of AI compared to developing or low-income countries. It was further emphasised that although up to two-thirds of jobs in the EU and the United States were susceptible to automation through AI, this did not necessarily imply mass layoffs. Instead, the workload was expected to decline, enabling employees to focus on more complex and creative tasks. AI was considered to pose a potential threat primarily to professions characterised by standardised, routine functions (Table 1).

Table 1. Professions potentially at risk due to artificial intelligence

Profession title	Tasks that AI can perform, replacing a specialist	Benefits these specialists will gain from the implementation of AI
Junior data analysts and Researchers	Routine tasks, such as data entry, were performed by AI, thereby reducing the risk of human error	This would enable specialists to focus on more complex and significant analytical tasks.
Finance and accounting specialists	Tasks such as data collection, entry, categorisation, reconciliation, and invoicing were automated by AI	This will allow specialists in this field to focus on analysis and strategic planning
Legal professions	AI could automate document management and contract verification	This will relieve lawyers from routine tasks and allow them to concentrate on more complex legal issues
Travel agents	The improvement of automation tools could relieve agents from routine tasks, such as seat reservations	This will allow them to devote more attention to client interaction and the development of new services

Source: compiled by the author based on O. Musiienko (2024)

The development of AI did not imply an automatic threat to all types of jobs. Physical occupations, particularly those performed outdoors, were generally less directly susceptible to AI, although they might have been affected by other forms of automation. It was important to note that it was routine tasks that became more vulnerable to automation through AI. Even amidst rapid AI development within the economy, it remained far from executing tasks requiring complex understanding, creativity, or social interaction, and it was incapable of attaining the level of human critical thinking. Numerous professions where creativity, empathy, strategic thinking, and human judgement were of paramount importance were deemed more suitable to remain under human influence. Technological change had already been reflected in an increase in job creation, and the implementation of AI was expected to further reinforce this trend across various sectors.

In her publication, V. Hlinka (2024) reported that, according to the findings of the World Economic Forum, by 2030 between 6% and 9% of workers would be employed in jobs that did not yet exist due to the influence of AI and automation. The number of positions in the field of AI and information technology was undoubtedly expected to grow. Professions such as data engineers, data analysts, computer vision engineers, and IT specialists focused on the technology development and automation were predicted to remain in high demand for the foreseeable future. M. Honcharuk (2024) identified several of the most promising AI-related professions: intelligent systems architects – specialists involved in the design and implementation of software and hardware components that ensured the automation of technical processes; robotics engineers – responsible for developing and commissioning robots, individual devices, and complex robotic systems. These professionals

were projected to remain in demand, since AI would require a "body" in the future. Specialists in Data Science who extracted valuable knowledge from data and generated insights for AI constituted a key profession underpinning personalised interfaces and recommendation systems across digital platforms. For instance, Netflix utilised AI to generate individualised recommendations. The researcher also stressed that, according to statistical data, the number of IT professionals had been increasing by 60-70% annually; however, there remained a persistent shortage of such specialists. Many companies sought IT professionals with expertise in AI-related tools, such as machine learning and natural language processing. Additional jobs were also being created in the fields of cybersecurity and robotics. Thus, AI not only posed potential risks but also unlocked numerous opportunities. The most secure trajectory for employment in a rapidly evolving, technology-oriented, AI-driven world lay in becoming a developer of new solutions, an Automator of processes, or an implementer and maintainer of emerging technologies.

K. Kraus *et al.* (2021) noted that society had been rapidly transforming into a new socio-economic and cultural system known as Society 5.0 or the "Super-Smart Society". This system was based on advanced digital technologies and envisioned the next stage of development – an intelligent civilisation. The researcher emphasised that AI did not constitute a threat, but rather represented a resource offering humanity unlimited opportunity. O. Stashkevych (2021) observed that the spread of the COVID-19 pandemic and the ensuing lockdown restrictions had led to an increased demand for digital technologies in nearly all countries. The researcher linked this growing demand to the need to satisfy communication, professional, consumer, and economic needs, as well as the emergence of new forms of employment based on the use of information and communication technologies. In Ukraine, this demand was further driven by the full-scale war launched by the Russian terrorist regime. Ukraine had been accelerating its digital development. Resolution of the Cabinet of Ministers of Ukraine No. 1556-r (2020) aimed to ensure sustainable economic growth and improve citizens' quality of life. The principal goal of the strategy was to achieve a leading position globally in the field of information and computer technologies by effectively harnessing the benefits of AI in all aspects of societal life.

It was deemed appropriate to assume that the implementation of this Concept would elevate Ukraine's intellectual development to a new level, provided that AI departments were established within universities, and experimental laboratories and research centres were set up. The active integration of AI technologies in Ukraine, even amidst full-scale war, was evident in the development of AI-based products by domestic companies. I. Pylypiv (2024) noted that the Ukrainian AI start-up "Osavul" had been assisting in tracking hostile propaganda and identifying Russian information and psychological special operations (IPSO) on social networks for the benefit of the National Security and Defence Council (NSDC) and the Ministry of Defence. Such active implementation of AI technologies by Ukrainian companies could yield significant positive outcomes for both business and the state, particularly in the post-war period. The most beneficial consequence of adopting AI technologies was expected to be the optimisation and enhancement of labour productivity through the use of generative AI, thereby contributing to the alleviation of workforce shortages. These outcomes were especially vital during the post-war recovery period, as the state was expected to attract an additional 4.5 million people into the labour market over the next decade. Experience demonstrated that attracting migrants might entail negative consequences, including socio-cultural tensions (Over the next 10 years…, 2023).

To achieve a level of digitalisation comparable to that of developed economies and to facilitate the shortest possible post-war recovery timeframe, the Ukrainian government was expected to actively establish new university-level specialisations aligned with the current labour market demands. Increasing the number of qualified specialists in technological innovation management would contribute not only to enhanced productivity but also to the establishment of principles for the responsible use of technologies and AI. In the European Union, universities had been actively developing AI departments, experimental laboratories, and research centres. These initiatives enabled students to acquire new skills and improve their productivity, thereby fostering the formation of highly qualified professionals prepared to meet the challenges of the modern labour market – an essential driver of societal progress. Ukrainian specialists in the nanotechnology and IT sectors were encouraged to engage in active collaboration with international experts and exchange experience in the development and deployment of cutting-edge technologies, including AI. It was important to cultivate domestic qualified specialists and attract investment for the development of new tools and incentives aimed at enhancing the skills of both youth and adults. Challenges such as remote work and online education necessitated rapid adaptive responses and professional reskilling within the labour market. With the appropriate experience and social protection, specialists were expected to contribute to the creation of a new society capable of elevating Ukraine to a higher level of intellectual and social development.

The development of AI technologies in the context of economic growth and the formation of the modern labour market could not be considered within a single country, since AI technologies represented a global achievement. Thanks to AI development, even small enterprises were able to access advanced technologies and tools. AI had penetrated not only all economic sectors but also the private lives of individuals, irrespective of their country of residence. Each phenomenon carried a particular mission and revealed a distinct essence. To better understand the nature of AI and its impact on societal transformation, it appeared appropriate to cite the definitions of "artificial

intelligence" and "mission of artificial intelligence" provided in the article by O. Baranov (2023), which were considered by the authors to best reflect the potential of AI. It was deemed appropriate to emphasise the definition of the essence of artificial intelligence as provided by O. Baranov (2023), who considered AI as a set of methods, approaches, and computer technologies that imitated cognitive functions equivalent to those of human cognition. The authors of this study also shared O. Baranov (2023) view on the mission of artificial intelligence, which was seen in the creation of certain conditions contributing to the efficiency of social and industrial activities, as it ensured the process of making optimal decisions and their further effective implementation, regardless of the human factor.

In order to implement the proposed formation of new specialities by Ukrainian higher education institutions – ones that would meet the demands of the time and the shifting structure of the labour market – it was necessary for educational institutions to undergo certain transformations in the learning process and in the professional activities of university lecturers and schoolteachers by leveraging the benefits of open science systems. Support was expressed for the study by M.V. Marienko *et al.* (2022), in which the researchers identified "forms, methods and tools for the use of cloud-oriented open science systems and their components in teaching and professional activity." The study also outlined the criteria and indicators used to assess open science competences. The topic of applying AI technologies in higher education institutions and the impact of AI on the knowledge and practical skills of future specialists was further developed in the research conducted by O. Panukhnuk (2023). While acknowledging the advantages of AI in the educational process, the researcher drew attention to the serious problems associated with its use as a primary source of scientific information. O. Panukhnuk (2023) perspective on this issue aligned with that of M. Marienko & V. Kovalenko (2023). The authors of both scientific publications stressed the importance of prioritising lecturer-developed teaching materials in lectures and practical sessions, with AI regarded only as a supplementary tool. It was deemed crucial that AI technologies did not replace lecturers in universities or teachers in schools, as nothing could substitute live emotional communication and reciprocal interaction between educators and students.

The authors of this study agreed with the aforementioned scholars regarding the problems arising from excessive daily use of AI in the educational process. One of the primary concerns, as highlighted by both O. Panukhnuk (2023) & M. Marienko & V. Kovalenko (2023), was the issue of confidentiality. In addition, O. Panukhnuk (2023) emphasised the decline in cognitive abilities among both students and teachers, along with the lack of source citations – an issue that, in the authors' view, could be interpreted as an infringement of intellectual property and copyright. Moreover, the prioritisation of AI use in education did not eliminate the risk of receiving inaccurate information and facilitated academic fraud. The authors agreed with O. Panukhnuk (2023) that this could lead to a significant decline in the knowledge and skills of entire generations and a general reduction in the competency level of future professionals.

The findings of the study indicated that the development and use of artificial intelligence technologies had an impact on the efficiency of companies and the development of various economic sectors. In this context, the information provided in the article The impact of artificial intelligence on business efficiency and competitiveness (n.d.) was considered relevant, as it highlighted the use of AI technologies by Ukrainian companies. Among the successful adopters of AI were Grammarly, which developed software solutions for grammar and style checking; Infotech Group, which applied AI in smart city management software; and PrivatBank, which used AI to analyse credit risks and make lending decisions. This list, though not exhaustive, illustrated how AI had been effectively integrated to enhance organisational processes – a development viewed positively.

The study devoted considerable attention to the impact of artificial intelligence on labour market transformations. An analysis of scientific publications, expert opinions on AI technologies, and journalistic investigations revealed ambiguous and even contradictory views on the subject. The global community was in a state of uncertain anticipation regarding forthcoming changes to the labour market and future workforce demands. Historically, as societies evolved, the labour market underwent corresponding transformations, which were often accompanied by changes in personal, familial, social, and political life. It was considered appropriate to note that, if the development and application of AI technologies were not soon regulated at the international legal level, many countries would face substantial employment-related challenges. In his study, J. Wilkinson (2019) highlighted the need to make more deliberate decisions about technology use and to refrain from blindly pursuing a digital future. The author's viewpoint was considered both reasonable and relevant. This idea was further supported in the study by O. Baranov (2022), who underscored the existence of civilisational cognitive contradictions that hindered the making of high-quality (optimal) decisions.

To conclude this study on the impact of AI technologies on the global economy and labour market, reference was made to the report prepared by the European Political Strategy Centre (2018) (EPSC). The report stated that, alongside its opportunities, the spread of digital technologies blurred the boundaries of the working environment and influenced people's behaviour and expectations in previously unknown ways. The labour force was becoming increasingly polarised, with the middle class – historically the backbone of developed economies – being displaced. Automation of production processes led to the displacement of key industrial workers or to wage reductions. The trends were characterised by great uncertainty: while advanced technologies could foster the emergence of new

professions and jobs, they could also create employment gaps and pose threats to future workforces. The outcomes of these processes remained unpredictable and would depend on political decisions and societal choices.

Of equal concern was the existential threat to humanity posed by the careless creation and deployment of AI technologies. This issue was addressed in the study by A. Pogorelenko (2018), who cited the views of prominent researchers and AI technology developers. The researcher referred to Elon Musk's statement that AI was more dangerous than nuclear warfare and represented the greatest threat to civilisation. Musk's arguments included the possibility that AI could initiate conflict by producing fake news, faking accounts, generating false press releases, or manipulating information. A. Pogorelenko (2018) also referenced the British scientist and science populariser, Professor Stephen Hawking, who warned that the emergence of full-fledged AI could mark the end of the human race.

Having reviewed and analysed various sources, the authors of this study concluded that scientists, AI technology developers, and experts on AI's impact on the labour market and economy should collaborate to develop legislative frameworks ensuring the responsible use of AI. Labour market reform was deemed essential in Ukraine as a critical step towards its modernisation. One of the main priorities should be the provision of state support and funding for projects related to the development of digital labour market infrastructure. The implementation of such technologies would improve the accessibility and efficiency of employment processes. It was also considered necessary to invest in scientific research promoting the development of AI and other advanced technologies aligned with contemporary labour market demands. Another key objective involved fostering innovation and enhancing cooperation among research institutions, businesses, and public authorities in the AI field. This would facilitate the dissemination of new technologies and support their successful integration into the economy. It was also recommended to develop appropriate legislation to regulate digital employment, ensuring the protection of workers' rights in a digital environment. These steps aimed to create favourable conditions for the development of the Ukrainian labour market, its adaptation to new challenges, and the overall enhancement of economic productivity.

Conclusions

The analysis of scientific publications and available knowledge disseminated through open-access scientific networks demonstrated that the greatest potential for further development was observed in economic sectors and individual business structures that most actively implemented AI technologies. These business structures achieved the highest improvements in efficiency and profitability. Promising areas for AI application were identified as retail trade, the automotive industry, the tourism and hospitality sectors. A review of the current state and future prospects of economic growth revealed that generative AI technologies and their ongoing development carried both significant opportunities and challenges. The spread of digital technologies offered numerous possibilities for facilitating human labour. However, alongside these opportunities, the automation of production processes transformed the labour market by reducing the demand for labour, negatively affecting the structure of the working environment, and influencing human behaviour and expectations in as-yet-unknown ways. The middle class, which constituted the economic foundation of many developed countries, was observed to be gradually displaced from the workforce. Automation led to either the displacement of core industrial workers or a reduction in their wages. Labour market demand increasingly favoured AI technology developers, specialists in managing technological innovations, and workers capable of performing physically demanding or simple tasks in outdoor environments. This indicated a growing polarisation of the labour market. The future of the labour market remained highly uncertain. The use of AI technologies could both facilitate the emergence of new professions and jobs and pose a threat to the future workforce. The shape of this future depended largely on the unity of global policymakers in adopting international legislation aimed at the responsible use of AI technologies. For the potential of AI to be realised for the benefit of humanity, global scientists, in cooperation with governmental bodies, were expected to engage in developing principles for the responsible design of AI technologies, along with ethical and legal boundaries for their safe and beneficial use.

In Ukraine, labour market reform was considered necessary. Priority tasks included: governmental support and funding for the development of digital infrastructure in the labour market to improve accessibility and the efficiency of work processes through the introduction of modern technologies; financing scientific research aimed at the development and application of innovations in AI and other advanced technologies aligned with current labour market demands; promotion of innovation and collaboration among academic institutions, businesses, and governmental structures in the AI sector to facilitate technology dissemination; and the development of legislative acts regulating electronic employment, including mechanisms for protecting workers' rights in the digital environment. These measures were intended to foster favourable conditions for the development of a modern labour market in Ukraine, ensuring its adaptation to modern challenges and enhancing the overall productivity of the national economy. Future research would focus on analysing existing and emerging AI technologies and their impact on job creation and employment growth.

Acknowledgements

Gratitude was expressed for the research efforts of scholars such as M.V. Marienko, M.P. Shyshkina, O.A Konoval and V. Kovalenko. The findings presented in their publications contributed to shaping a new understanding – among both youth and older generations – regarding the use of AI tools

and cloud-based open science services in addressing modern challenges, including remote work and learning, rapid adaptive responses, and professional requalification in the labour market. These publications significantly influenced the authors' interest in the development of artificial intelligence and its positive and negative impacts on labour market formation and educational processes in society.

Conflict of Interest

None.

References

[1] Baranov, O. (2022). *Transformation: Social & digital & legal*. (Vol. 1). Odesa: Helvetica Publishing House.

[2] Baranov, O. (2023). Definition of the term "Artificial Intelligence". *Information and Law*, 1(44), 32-49.

[3] Bohomia, V., & Hudz, A. (2023). Artificial intelligence: Current state and prospects of application. *Modern Information Technologies in the Sphere of Security and Defence*, 46(1), 13-17. doi: 10.33099/2311-7249/2023-46-1-13-17.

[4] Brown, C.E., & Smith, B. (2019). *Tools and weapons: The promise and the peril of the digital age*. London: Hodder & Stoughton.

[5] European Political Strategy Centre. (2018). *Global trends to 2030: The future of work and workplaces*. Retrieved from https://surl.lu/lfgpqk.

[6] Fox, S. (2024). *The role of artificial intelligence in manufacturing – automation and efficiency in 2024*. Retrieved from https://mediacom.com.ua/rol-shtuchnogo-intelektu-u-virobnitstvi-avtomatizatsiya-ta-efektivnist-u-2024-rotsi/.

[7] Hlinka, V. (2024). *The World economic forum has started in Davos. This year's theme is "Restoring Trust". Forbes has collected the main points from the first day of the annual meeting*. Retrieved from https://forbes.ua/svit/vidnovlennya-dovirivsesvitniy-ekonomichniy-forum-u-davosi-pidsumki-pershogo-dnya-15012024-18511.

[8] Honcharuk, M. (2024). *The impact of artificial intelligence on the IT labor market*. Retrieved from https://lemon.school/blog/vplyv-shtuchnogo-intelektu-na-rynok-pratsi-v-it.

[9] Kraus, K., Kraus, N., & Osetskyi, V. (2021). Society 5.0 based on innovative university and digital entrepreneurship development. *Economy and Society*, 28. doi: 10.32782/2524-0072/2021-28-37.

[10] Kuzomko, V., & Buranhulova, V. (2021). Possibilities of using artificial intelligence in the activities of modern enterprises. *Economy and Society*, 32. doi: 10.32782/2524-0072/2021-32-67.

[11] Lyndyuk, A., Havrylyuk, I., Tomashevskii, Y., Khirivskyi, R., & Kohut, M. (2024). The impact of artificial intelligence on marketing communications: New business opportunities and challenges. *Economics of Development*, 23(4), 60-71. doi: 10.57111/econ/4.2024.60.

[12] Marienko, M., & Kovalenko, V. (2023). Artificial intelligence and open science in education. *Physical and Mathematical Education*, 38(1), 48-53. doi: 10.31110/2413-1571-2023-038-1-007.

[13] Marienko, M.V., Shyshkina, M.P., & Konoval, O.A. (2022). Methodological principles of formation of cloud-oriented systems of open science in institutions of higher pedagogical education. *Information Technologies and Learning Tools*, 89(3), 209-232. doi: 10.33407/itlt.v89i3.4981.

[14] Moruga, H. (2024). *Artificial intelligence and the labor market: What professions will disappear by 2030 and how to develop in the new reality?* Retrieved from https://javarush.com/ua/groups/posts/68439-shtuchniy-ntelekt--rinok-prac-jak-profes-zniknutjh-do-2030-roku-ta-jak-rozvivatisjh-u-novy-rea.

[15] Musiienko, O. (2024). *Will artificial intelligence take away our jobs? Visionary thoughts and research*. Retrieved from https://www.imena.ua/blog/artificial-intelligence-will-take-our-jobs/.

[16] Over the next 10 years, Ukraine will have to look for 4.5 million workers – Ministry of Economy. (2023). Retrieved from https://www.epravda.com.ua/news/2023/07/14/702223/.

[17] Panukhnuk, O. (2023). Artificial intelligence in the educational process and scientific research of higher education applicants: Responsible boundaries of AI content. *Galician Economic Journal*, 4(83), 203-211. doi: 10.33108/galicianvisnyk_tntu2023.04.202.

[18] Pogorelenko, A. (2018). Artificial intelligence: Essence, application analysis, development prospects. *Scientific Bulletin of Kherson State University. Series "Economic Sciences"*, 32, 22-27.

[19] Pylypiv, I. (2023). *Change or die. How artificial intelligence has become an integral part of the global economy*. Retrieved from https://www.epravda.com.ua/publications/2023/07/24/702480/.

[20] Pylypiv, I. (2024). *Ukrainian AI startup Osavul raised three million dollars in investments*. Retrieved from https://www.epravda.com.ua/news/2024/09/12/719243/.

[21] Resolution of the Cabinet of Ministers of Ukraine No. 1556-r "On Approval of the Concept of Artificial Intelligence Development in Ukraine". (2020, December). Retrieved from https://zakon.rada.gov.ua/laws/show/en/1556-2020-%D1%80?lang=en#Text.

[22] Reznikov, R. (2024). Leveraging generative AI: Strategic adoption patterns for enterprises. *Modeling the Development of the Economic Systems*, (1), 201-207. doi: 10.31891/mdes/2024-11-29.

[23] Stashkevych, O. (2021). The impact of technology and artificial intelligence on the labor market in Ukraine. *InterConf*, 81, 25-30. doi: 10.51582/interconf.21-22.10.2021.004.

[24] The impact of artificial intelligence on business efficiency and competitiveness. (n.d.). Retrieved from https://sitniks.ua/blog_post/vplyv-shtuchnogo-intelektu-na-efektyvnist-ta-konkurentospromozhnist-biznesu/?gad_source=1&gclid=CjwKCAjw.
[25] The state of AI in 2021. (2021). Retrieved from https://www.mckinsey.com/capabilities/quantumblack/our-insights/global-survey-the-state-of-ai-in-2021.
[26] Wilkinson, J. (2019). Artificial unintelligence. *Journal of Web Librarianship*, 13(2), article number 199. doi: 10.1080/19322909.2019.1586626.
[27] Zhytkevych, A. (2023). *Google has developed AI that provides the world's most accurate weather forecasts*. Retrieved from https://speka.media/google-rozrobila-si-yakii-daje-naitocnisi-u-sviti-prognozi-pogodi-9grm4p.
[28] Zhyvtsova, L.I. (2023). Artificial intelligence: Essence and development prospects. *Ukrainian Journal of Construction and Architecture*, 3(15), 66-71. doi: 10.30838/J.BPSACEA.2312.140723.66.956.

Взаємозв'язок розвитку технологій штучного інтелекту з глобальною економікою та світовим ринком праці

Алла Ханенко
Кандидат економічних наук, доцент
Національний університет «Запорізька політехніка»
69063, вул. Жуковського, 64, м. Запоріжжя, Україна
https://orcid.org/0000-0003-0899-7311

Анотація. Супровідна, а все частіше, провідна роль штучного інтелекту (ШІ) стає більш очевидною в багатьох сферах суспільного життя. ШІ, охоплюючи широкий спектр галузей, набуває все більшого впливу на розвиток сучасного бізнесу, сприяючи впровадженню більш ефективних та інноваційних методів управління. Метою статті було дослідження впливу ШІ на розвиток глобальної економіки та на світовий ринок праці, визначення взаємозв'язку між розвитком ШІ та економічним зростанням країн, висвітлення в інформаційному просторі історії впливу технологічних революцій на зменшення попиту на робочу силу. Для досягнення зазначеної мети використано комплекс теоретичних методів дослідження: моніторинг; статистичий метод; метод порівняльного та системного аналізу; верифікація; методи синтезу та узагальнення; аналіз наявних підходів; оцінка рівня ефективності та результативності. Використано матеріали наукових публікацій. В статті означено сфери економіки, які найактивніше впроваджують технології ШІ, передбачаючи у них можливість для власного подальшого розвитку. За результатами досліджень встановлено: найактивнішими сферами бізнесу у впровадженні технологій ШІ є роздрібна торгівля, ІТ та телекомунікації, охорона здоров'я, автомобільна промисловість, а також туризм і готельний бізнес. Аналіз результатів зазначених досліджень підтвердив: впровадження в діяльність технологій ШІ може значно підвищити доходи компанії, вплинути на її ефективність та конкурентоспроможність. Відзначено зростаючу кількість компаній в світі, що займаються розробкою ШІ від універсальних інструментів до вузькоспеціалізованих продуктів. Розроблено рекомендації, щодо шляхів вирішення проблем, пов`язаних із впровадженням технологій генеративного ШІ та його впливу на формування ринку праці України

Ключові слова: безробіття; генеративний штучний інтелект; автоматизація; інтелектуальні роботи; інформаційні технології