

The impact of artificial intelligence on the transformation of enterprise business processes

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■ **Abstract.** The rapid advancement of artificial intelligence (AI) fundamentally transformed the business environment by optimising management processes, enhancing operational efficiency, and generating new challenges for enterprises. This necessitated a comprehensive analysis of its impact on the transformation of business processes. The objective of the study was to examine the influence of AI on the transformation of business processes in enterprises of various sizes, identify primary directions of its application, and assess development prospects. The study was grounded in the use of systemic analysis, comparative analysis, case study method, and statistical data analysis. Scientific publications, corporate reports, analytical materials, and practical implementation cases were processed. The findings revealed that the adoption of AI significantly increased the efficiency of business processes in large enterprises through operational automation, customer interaction personalisation, and enhanced market forecasting. In the financial sector, machine learning algorithms reduced fraud rates and expedited document processing, consistent with global practices in banks such as JPMorgan Chase, Mizuho, and SMFG. In retail, improvements in recommendation system accuracy were observed, as reported by global companies like Amazon and Netflix, where personalisation contributed to increased conversion rates. Manufacturing enterprises reported optimised logistics and reduced operational costs due to AI implementation. Furthermore, enterprises actively explored the potential of generative AI in marketing, product development, and employee productivity, yielding results aligned with international experience, including the deployment of GitHub Copilot, which improved the speed and quality of software development. The practical value of the study lay in the applicability of its results for executives, analysts, and consultants to enhance digital transformation strategies and improve enterprise competitiveness.

■ **Keywords:** digital transformation; machine learning; business analytics; process automation; corporate management; customer experience; ethical challenges

■ Introduction

The dynamic growth of digital technologies and globalisation processes at the beginning of the 21st century profoundly altered the business environment, particularly through the integration of AI. AI transformed business processes by means of automation, big data analysis, personalisation, and innovative approaches to management.

These developments enhanced operational efficiency, accelerated enterprise adaptation to market changes, and created competitive advantages. However, alongside new opportunities, AI introduced challenges linked to data quality, ethical concerns, financial costs, and the shortage of skilled personnel. Investigating the influence of AI on

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business processes proved essential for understanding its role in ensuring long-term sustainability of enterprises in the digital era.

The impact of AI on the transformation of business processes received considerable attention from scholars and analytical firms. Scientific literature examined the implementation of AI in managerial, operational, and strategic functions, while identifying potential integration challenges. O.O. Chernysheva *et al.* (2024) studied the use of AI for business process automation and its influence on enterprise efficiency. It was emphasised that machine learning algorithms enabled substantial optimisation of operations, reduced time expenditure on routine tasks, and improved market trend forecasting. The authors concluded that AI integration in enterprise management systems led to a 25-30% decrease in administrative expenses.

D. Oriekhov (2024) investigated the influence of AI on modern enterprise management, focusing on key AI components such as machine learning, deep learning, natural language processing (NLP), computer vision, robotics, expert and recommendation systems, autonomous systems, and intelligent agents. These technologies were examined in relation to production management, financial planning, marketing strategies, and human resource management. The study demonstrated that AI adoption contributed to enhanced operational efficiency and enterprise competitiveness. A. Beheshti *et al.* (2023) analysed the application of generative AI in business process management (BPM) and proposed the concept of ProcessGPT, a solution based on the generative pre-trained transformer (GPT) architecture. This technology facilitated automation, augmentation, and enhancement of business processes through large-scale data analysis and decision-making support. It was noted that traditional BPM systems targeted rigid processes, whereas ProcessGPT adapted to dynamic, complex environments such as finance, healthcare, and education. The study demonstrated this technology's capacity to reduce costs and increase enterprise efficiency through machine learning and NLP integration. A case from the banking sector illustrated how ProcessGPT enabled data management automation and decision support in complex informational ecosystems. The research confirmed that generative AI could significantly transform business processes by reducing human involvement in routine operations and improving enterprise analytical capabilities.

The automation of software project management through artificial intelligence opened new opportunities for optimising business processes and enhancing organisational efficiency. As noted by K. Bhavsar *et al.* (2019), the application of business process reengineering (BPR) in combination with machine learning (ML), deep learning (DL), natural language processing, and speech recognition (SR) technologies had not only eliminated routine operations but also improved risk forecasting, resource allocation, and decision-making accuracy. This approach facilitated the transformation of software engineering management (SEM), resulting in cost reduction, improved

product quality, and increased corporate competitiveness. The integration of AI into project management allowed organisations to adapt more swiftly to changes in the business environment by employing advanced algorithms for data analysis and strategic planning.

The use of AI and machine learning in predictive business process management unveiled further potential for improving process control. M. Abbasi *et al.* (2024) conducted a systematic literature review on the integration of AI and machine learning in business process modelling, with a focus on process enhancement. The authors highlighted that predictive business process management involved the utilisation of analytical methods to anticipate changes in workflows based on historical data, thereby enabling organisations to not only optimise existing processes but also adapt them to dynamic market conditions. Two core stages were emphasised: data analysis and refinement of process models, followed by radical process adjustments based on derived analytical insights. Furthermore, the role of process mining in identifying bottlenecks and enhancing operational execution was underlined, as well as the potential of deep learning algorithms to improve forecasting precision. Thus, the studies illustrated the substantial potential of AI in business process modelling, while also stressing the need for further exploration into the integration of predictive process management into corporate governance strategies. Accordingly, the objective of the article was to investigate the influence of AI development on the transformation of business processes across enterprises of varying scales – from small businesses to global corporations.

■ Materials and Methods

The study on the impact of artificial intelligence on the transformation of enterprise business processes was based on the comprehensive application of a range of scientific methods and the analysis of a wide spectrum of information sources. Both theoretical and empirical research approaches were employed to examine the specifics of AI integration into corporate governance, production processes, marketing strategies, and customer interaction.

During the research, a combination of theoretical and empirical analysis methods was used. Systemic analysis was applied to assess general trends in the use of AI in business and its influence on the economic performance of enterprises. For this purpose, scientific publications and reports by international analytical firms such as McKinsey, Gartner, and Deloitte were summarised to identify key development trajectories of AI technologies and major challenges faced during integration (The state of AI..., 2023; Bittman *et al.*, 2024; Deloitte, 2024). Practical cases of AI implementation by international companies were examined, including Amazon (personalised recommendation systems and supply chain management), Netflix (user preference analysis and content personalisation), Tesla (autonomous control and production optimisation), and IBM (process automation and cognitive analytics), as well as Ukrainian enterprises such as Monobank (chatbots and financial scoring

algorithms) and Rozetka (intelligent recommendation systems and logistics optimisation). This analysis required the examination of corporate reports, public corporate materials, and statistical data on the efficiency of AI deployment (Verbivska, 2023; Artificial intelligence in..., 2024; Yurasov, 2024). Structural-functional analysis was used to evaluate the role of AI in various enterprise activities, including business process automation, service personalisation, marketing strategy formation, human resource management, and production optimisation (Bhavsar *et al.*, 2019; Jain & Jain, 2023; Chernysheva *et al.*, 2024). Furthermore, content analysis was conducted on scientific articles, international conference reports, and corporate documentation, enabling a comprehensive assessment of the global level of AI technology implementation (Beheshti *et al.*, 2023; Zavrachnyi, 2023; Abbasi *et al.*, 2024).

Among empirical methods, particular emphasis was placed on statistical data analysis, which enabled the quantitative assessment of AI technology's effect on business process efficiency. Public statistical reports by IBM and Deloitte were processed, providing concrete data on the economic effects of implementing machine learning and predictive algorithms (How much does a business..., 2021; The state of AI..., 2023; Deloitte, 2024). The case study method was used for in-depth analysis of AI technology application in leading international companies. Cases examined included JPMorgan Chase, which utilised AI for legal process automation; Mizuho Financial Group, which optimised financial operations; and companies such as Amazon and Nike, which actively integrated generative AI to create personalised products and improve supply chains (Peng *et al.*, 2023; Beheshti *et al.*, 2023; Oriekhov, 2024). Additionally, expert surveys were conducted, including the analysis of publications by leading analysts in the field of digital transformation and the evaluation of feedback from executives implementing AI. Expert opinions from Forrester Research and Boston Consulting Group were reviewed regarding the prospects and risks of AI integration into the business environment (Sizing the prize..., n.d.; Bittman *et al.*, 2024; Otsokolich, 2024).

To identify potential trends in AI's future development and its long-term influence on the entrepreneurial environment, forecasting methods were applied. Findings from McKinsey Global Institute concerning the future use of generative AI in marketing, product development, and business process automation were taken into account (The state of AI..., 2023; Deloitte, 2024; Chakraborty *et al.*, 2024). Additional reports from analytical firms such as Gartner, Deloitte, McKinsey, and Forrester Research were used to evaluate the predicted business impact of AI technologies (The state of AI..., 2023; Bittman *et al.*, 2024; Deloitte, 2024). Corporate reports by Tesla, IBM, and Netflix illustrated real-world applications of AI in business cases (Verbivska, 2023; Yurasov, 2024; Artificial intelligence in..., 2024). Official publications from research centres, governmental institutions, and open data platforms were also reviewed, offering insight into the scope and

peculiarities of AI applications (Regulation (EU) 2016/679 of the European Parliament and of the Council, 2016; We created a catalogue..., 2020; The AI ecosystem..., 2024). Through the integrated application of these methods, a coherent vision was formed regarding the impact of AI on the transformation of business processes, as well as the prospects for further technological development in the corporate sector.

■ Results and Discussion

Artificial intelligence had already become an indispensable component of modern entrepreneurship, having transformed key aspects of business processes such as automation, analytics, innovation, and personalisation. This evolution had occurred gradually, having reshaped approaches to management, product development, and customer engagement. According to Deloitte (2024), the use of generative AI had been rising sharply, promoting innovation and strengthening competitiveness. In its report, Gartner emphasised the role of composite AI and edge computing in reshaping business processes (Bittman *et al.*, 2024). These trends illustrated the significance of AI integration in business. The historical application of AI began with the automation of routine tasks. During the 1980s and 1990s, AI-based software enabled cost reductions and enhanced the efficiency of business operations. Since the early 2000s, powerful analytical tools had emerged, allowing market trend forecasting and customer behaviour prediction. As reported, generative AI had been widely used in creative activities, including design and content creation. For instance, Nike applied generative AI in developing personalised sports footwear designs, while The New York Times implemented AI algorithms to automate the generation of visual content and headlines based on reader preference analysis.

The impact of AI had been especially prominent in the optimisation of business processes, where its deployment contributed to increased efficiency and automation of routine tasks. Robotic Process Automation (RPA) enabled the execution of repetitive operations such as document processing, supply chain management, and financial auditing with minimal human involvement. According to the analysis by O.O. Chernysheva *et al.* (2024), Amazon utilised AI to enhance logistics and customer behaviour analysis, supporting demand forecasting and inventory optimisation. Beyond Amazon, significant applications of AI in business process optimisation had been demonstrated by Tesla and IBM. Tesla applied AI for automated quality control in manufacturing and for enhancing autopilot functionality, which improved safety and transport efficiency. IBM Watson assisted businesses in optimising data analytics and decision-making in the financial and healthcare sectors, simplifying the processing of large volumes of information. Among Ukrainian enterprises, Rozetka and Monobank stood out for their active integration of AI into business processes. Rozetka employed AI algorithms to personalise product recommendations, thereby boosting

sales and customer satisfaction. Monobank, Ukraine's first mobile-only bank, actively implemented AI to automate transaction processing, credit scoring, and customer interaction through chatbots and voice request analysis systems (Verbivska, 2023).

The role of AI in financial services and healthcare had been considerable. As stated by L. Verbivska (2023), banks utilised algorithms to detect fraud and personalise financial products. Monobank employed AI to analyse transactions and identify suspicious activities, reducing fraud levels and improving financial security. AI supported credit scoring, fraud detection, and personalised financial offerings. According to Deloitte (2024), over 60% of banks used AI algorithms to analyse large datasets and enhance decision-making accuracy. Notable adopters included JP-Morgan Chase, which automated legal document analysis with AI, reducing processing time and costs; and Japanese institutions such as Mizuho Financial Group and Sumitomo Mitsui Financial Group, which actively integrated computerised systems to replace manual labour and improve operational efficiency (Artificial intelligence in..., 2024). In the Ukrainian context, Sense Bank applied AI in information security, employing biometric identification to verify clients and prevent fraud related to social engineering techniques (Yurasov, 2024). In healthcare, AI facilitated the analysis of medical imagery and treatment prediction, significantly enhancing service quality. Notably, Google Health developed a deep learning-based algorithm capable of diagnosing breast cancer with higher accuracy than traditional mammogram analysis, supporting earlier detection and more effective treatment. Furthermore, AI enabled the creation of advanced diagnostic tools capable of forecasting disease progression, thereby supporting timely patient care and reducing the burden on medical staff (Sizing the prize..., n.d.).

AI had substantially transformed key dimensions of entrepreneurship by reshaping approaches to management, production, customer service, and new product development. It enabled automation of processes that had previously required significant human time input, including data processing, supply chain monitoring, and inventory management. According to Gartner, companies employing RPA achieved operational cost reductions of 20-30% within the first year of implementation (Bittman *et al.*, 2024). The insurance firm Encova Insurance actively adopted RPA to improve efficiency and enhance customer service. As reported by UiPath (Encova Insurance..., n.d.), the company automated its customer retention process, saving up to 25 working hours weekly by collecting data from customer files and sending agents recommendations regarding policyholders at risk of cancellation. Global Bilgi (n.d.), a leading business process outsourcing company, implemented RPA to optimise invoice processing. This facilitated faster workflows, reduced errors, and lowered operational costs. Through automation of repetitive tasks by software robots, the company improved both efficiency and accuracy in its operations.

The study by H. Makhova & V. Vostriakova (2022) comprehensively addressed the significance of artificial intelligence (AI) as a key instrument of digital transformation in entrepreneurship, highlighting that its implementation had become a necessity for contemporary enterprises across various industries. Two principal directions of AI's influence on business were identified: the first concerned cost optimisation through the automation of routine and repetitive processes, which enabled reductions in operational expenses and the mitigation of human factor risks; the second related to revenue growth, achieved by means of offer personalisation and enhanced customer experience. The study placed emphasis on changes driven by the COVID-19 pandemic, which had significantly accelerated the adoption of AI technologies, assisting enterprises in adapting to crisis conditions by improving supply chains, optimising inventory management, and enhancing the efficiency of customer engagement. The application of AI in key sectors of the economy was analysed, including automotive manufacturing, financial services, retail, and telecommunications. The authors underscored that the potential and specificity of AI deployment varied considerably across industries. An important conclusion of the study was a warning regarding the necessity of a strategic approach to AI adoption, with mandatory risk assessment – particularly with regard to the balance between automation and the human factor. Excessive automation could result in service quality degradation, erosion of customer trust, and the loss of competitive advantages. Overall, the study's findings and conclusions reflected the positive prospects of AI integration, substantiated by practical examples and empirical research from international companies. In contrast, the current research found no clear confirmation that the COVID-19 pandemic had significantly accelerated the development of AI technologies. Unlike H. Makhova & V. Vostriakova (2022), the present authors were inclined to consider the rapid advancement of AI as a consequence of evolutionary changes in related domains of digital technology development – including big data analytics, refinement of machine learning models, and adjacent innovations.

Another significant area of AI application involved customer interaction personalisation. Machine learning algorithms enabled companies to analyse consumer behaviour in real time, generating customised offers and recommendations. This substantially increased customer satisfaction and fostered loyalty. Research showed that following the deployment of AI-driven customer analytics systems, the accuracy of recommendations improved markedly. For instance, Amazon reported a 35% increase in purchases resulting from its use of deep learning algorithms in recommendation engines. Similarly, Netflix claimed that AI-based personalised suggestions helped retain 80% of its users by delivering individualised content monthly. In order for AI to accurately predict customer preferences, large and diverse datasets needed to be leveraged. Key data sources included purchase and viewing history, indicating which items or content the user had previously explored or

acquired. Activity time analysis – such as identifying when purchases or viewing typically occurred – also proved beneficial. Additional indicators encompassed click maps revealing which pages the user had visited and interacted with most, as well as device type and location, whether smartphone, laptop, tablet, or another medium. Another critical data source comprised user ratings and reviews of viewed products or services. To further refine predictive accuracy, it was considered effective to factor in the social networks and preferences of users with similar interests by analysing comparable profiles. These inputs enabled machine learning algorithms to construct predictive models capable of recommending products with a high likelihood of appealing to specific customers. This not only enhanced the customer experience but also significantly increased revenue for companies implementing such systems (Bittman *et al.*, 2024).

Another essential domain of AI application was the creation of innovative products and services. Generative AI models such as ChatGPT, Claude, and others had been actively used to automate content development, design, and even programming. These technologies allowed companies to reduce production costs and substantially improve product quality. Research by McKinsey Global Institute (*The state of AI...*, 2023) demonstrated that generative AI could dramatically improve the efficiency of marketing content by lowering production costs and increasing personalisation and effectiveness at scale. A separate marketing executive survey indicated that AI implementation resulted in a 7% reduction in overhead marketing expenses while simultaneously boosting customer satisfaction by 7%, indirectly suggesting an improvement in perceived product and content quality. These findings confirmed that AI-powered content generation enabled companies to produce higher-quality materials at lower cost, thereby improving business outcomes.

In the fields of design and manufacturing, substantial benefits of AI had also been recorded. H.A. Habeeb *et al.* (2023) proposed an AI-based design optimisation method that combined generative design with additive manufacturing. The findings indicated that such automation reduced production costs, improved productivity, and delivered significant enhancements in both quality and output. Accordingly, the implementation of AI in design and engineering processes led to resource savings and better final product quality through more optimal solutions. In software development processes, the use of AI-powered programming assistants also confirmed reductions in labour intensity and improvements in code quality. For example, a large-scale randomised study involving over 4,000 developers demonstrated that the AI-driven tool GitHub Copilot increased developer productivity by approximately 26%. Code written with the assistance of Copilot exhibited better functionality, improved readability, and a higher rate of test pass success, as well as receiving more approval during code reviews (Peng *et al.*, 2023).

AI also exerted a notable impact on human resource management. AI algorithms facilitated the automation of recruitment processes by analysing candidate CVs and

selecting those best suited to vacant roles. In addition, AI was employed for employee training and development. Tools based on AI enabled the creation of personalised training programmes that accounted for individual needs and weaknesses. The application of AI significantly transformed approaches to human resource management by influencing recruitment, learning, and development procedures. Its use automated routine tasks, such as CV sorting, interview scheduling, and employee data management. This substantially reduced information processing time and allowed HR professionals to focus on strategic initiatives. AI algorithms supported more effective recruitment by analysing large volumes of data and identifying candidates that most closely matched job requirements, thereby increasing overall recruitment efficiency (Top 10 modern methods..., 2024). Beyond hiring, AI played a crucial role in personalised employee training and development. Machine learning-based tools enabled the design of individual training programmes that addressed each employee's needs and shortcomings, improving both productivity and job satisfaction. However, alongside these advantages, certain risks persisted. For instance, AI algorithms could inherit biases if trained on unrepresentative or subjective datasets, potentially resulting in discrimination against particular candidate groups (Holei & Drik, 2023).

AI had also been utilised for automated résumé screening. Among notable international firms adopting such solutions was Unilever, where the AI-based HireVue platform facilitated video interviews and candidate evaluations, enabling the processing of up to 13,000 applications annually and significantly reducing recruitment time. Similar technologies had been applied by Hilton, achieving a 90% reduction in hiring duration (*Recruitment of the future...*, 2024). In Ukraine, applicant tracking systems (ATS) and other AI technologies for recruitment had only begun to gain traction. Some companies had already started employing automated systems for résumé analysis and candidate-job matching (Top 10 modern methods..., 2024), although large-scale adoption remained in its early stages.

AI had considerably transformed production processes by integrating into the Industry 4.0 framework. Through AI algorithms, enterprises could predict equipment malfunctions, optimise supply chains, and lower production expenses. Specifically, sensor data analysis enabled the early identification of potential issues, helping to prevent costly downtime. This was confirmed by research from Danfoss, which reported that predictive maintenance supported by condition monitoring served as a powerful tool for optimising equipment performance and reducing maintenance costs (*Predictive maintenance...*, n.d.). Furthermore, Festo highlighted that AI-based solutions – such as predictive maintenance – could detect faults before they caused significant failures, thereby avoiding unplanned downtimes, lowering servicing costs, and enhancing company productivity (Blume, 2024). Ethical considerations surrounding AI implementation also represented a vital element of its business integration. Ensuring algorithm transparen-

cy, avoiding bias, and maintaining data privacy standards were key factors affecting customer and partner trust. Organisations were advised to develop responsible AI usage

policies that took into account potential social and economic consequences. Table 1 summarised the key aspects of AI's impact on entrepreneurship:

Table 1. Summary of AI's impact on key aspects of entrepreneurship

Area of impact	Description	Example of application
Business process automation	Cost reduction and efficiency increase through automation of routine tasks	Use of RPA (robotic process automation) for document processing
Personalisation	Individual customer approach through behavioural analysis	Recommendation systems of Amazon, Netflix
Analytics and forecasting	Prediction of market trends and customer behaviour	Banking algorithms for fraud detection
Product development	Creation of innovations using generative AI models	Use of ChatGPT, Claude, Gemini for automated text generation
Healthcare	Improved diagnostics and patient condition forecasting	AI-based analysis of medical imagery
Human resource management	Optimisation of recruitment and training processes	AI résumé analysis algorithms, personalised training
Marketing	Creation of targeted advertising campaigns	User data analysis for targeting
Manufacturing	Process optimisation and fault prediction	Industry 4.0 tools

Source: Compiled by the authors based on K. Zavrzhnyi (2023), O.O. Chernysheva *et al.* (2024), D. Oriekhov (2024), V. Petrenko (2024)

The implementation of AI in entrepreneurial processes offered significant prospects but simultaneously introduced a series of challenges affecting the efficiency and ethical integration of such technologies. Key obstacles encountered during AI adoption and potential approaches for overcoming them warranted further examination. One of the most critical challenges concerned data quality. Data formed the foundation for AI performance, and any inaccuracies, duplications, or inconsistencies could substantially affect outcomes. According to an IBM report, the average cost of a data breach for companies amounted to \$4.24 million, underscoring the importance of robust data governance for avoiding financial losses (How much does a business..., 2021). Research by Deloitte revealed that over 40% of companies experienced difficulties handling large volumes of data during AI integration (Deloitte, 2024). Barriers such as restricted data access, fragmented information, or processing delays hindered the creation of reliable AI models. These issues could be mitigated through the implementation of data standardisation, cleansing, and governance systems to ensure data suitability for AI use.

Ethical considerations presented another major challenge. The use of personal data raised concerns regarding privacy and protection. AI algorithms were susceptible to bias, potentially resulting in unfair or discriminatory outcomes. For instance, in recruitment, AI systems could unfairly assess candidates due to historical training data containing discriminatory patterns (Bittman *et al.*, 2024). To address such issues, companies were advised to establish ethical standards for the development and deployment of AI, ensure algorithmic transparency, and conduct regular audits to detect and correct bias. Financial costs represented a substantial barrier, particularly for small and medium-sized enterprises (SMEs). AI implementation required significant investment in technological infrastructure, including server upgrades, expansion of data storage,

enhancement of computing power, and integration of new software solutions into existing business systems. Large corporations likewise faced financial constraints, as full-scale AI integration often demanded modernisation of data centres, acquisition of high-performance GPUs for deep learning, and the deployment of specialised platforms for big data analytics (Business strategies using..., 2024).

To alleviate financial burdens, companies could utilise cloud-based AI services that provided access to advanced tools without requiring investment in expensive hardware or software licences. Platforms such as Google Cloud AI, Microsoft Azure AI, and Amazon Web Services (AWS) AI enabled organisations to process vast data volumes, leverage cutting-edge machine learning models, and automate business processes on a pay-as-you-go basis. This reduced initial infrastructure costs and allowed flexibility in scaling according to operational needs. For example, Netflix used AWS AI to analyse user data and improve its recommendation system without building proprietary infrastructure to handle massive datasets (Otsokolich, 2024). In addition to cloud services, enterprises could reduce expenses by using open-source machine learning libraries and frameworks, such as TensorFlow, PyTorch, and Scikit-learn (Technologies to optimise..., 2024). These tools allowed AI implementation without incurring development costs for custom algorithms. Another increasingly popular strategy involved outsourcing AI solutions by engaging external providers specialising in AI development and integration. This helped reduce the costs of maintaining in-house expert teams. For instance, Revolut collaborated with outsourcing companies to deploy AI algorithms for financial monitoring and fraud detection (Technologies to optimise..., 2024). Thus, although AI implementation might incur high costs, businesses could mitigate expenses through cloud computing, open-source platforms, and outsourced solutions, making advanced technologies more accessible – even to SMEs.

Another critical challenge concerned the shortage of qualified professionals in the field of artificial intelligence (AI). The development, deployment, and maintenance of such systems required advanced expertise in programming, data analysis, and technology management. Given the high demand for specialists in this domain, intense competition for skilled personnel had emerged. According to McKinsey, only 16% of companies reported that their workforce possessed the skills necessary to work with AI (The state of AI..., 2023). Many enterprises faced difficulties in retaining skilled staff or were compelled to engage expensive external consultants. To address this issue, it was essential to invest in employee training and reskilling, while also fostering cooperation with academic institutions to support the development of relevant expertise. Collaboration between industry and universities in AI education had become a widespread practice in many countries and had demonstrated positive outcomes. For example, Siemens partnered with the University of Lincoln (UK) and Transilvania University of Braşov (Romania) to develop educational programmes tailored to industry needs (Maksymchuk, 2023). This collaboration contributed to the preparation of specialists equipped with practical competencies, thereby enhancing their competitiveness in the labour market.

Similar initiatives had also been implemented in Ukraine. The Lviv IT Cluster, in collaboration with representatives of technology companies, modernised 19 undergraduate educational programmes across four universities in Lviv (Investing in knowledge..., 2024). From their first year, students worked in teams and developed independent projects, thereby cultivating entrepreneurial skills. At Taras Shevchenko National University of Kyiv, the establishment of a specialised school for AI training had been planned in partnership with American institutions (Ukraine will train..., 2024). Additionally, Ukraine's Ministry of Digital Transformation created a catalogue of educational programmes for prospective university students, offering information on training in AI-related fields such as data analysis, machine learning, and other specialisations (We created a catalogue..., 2020). The effectiveness of such programmes depended on the depth of business involvement in the educational process, the relevance of curricula, and the extent to which students could gain practical experience. Collaboration between universities and AI companies in workforce training had become a decisive factor in the development of AI education in Ukraine (The AI ecosystem..., 2024). These initiatives reflected a positive influence on the preparation of specialists capable of meeting the contemporary challenges of the AI industry.

Regulatory constraints also played a significant role in AI adoption. Governments worldwide had been developing laws and regulations to govern AI use and data protection. The *European Union's General Data Protection Regulation (GDPR)* imposed strict requirements for handling personal information. Organisations failing to comply with these regulations faced substantial penalties. The *GDPR* stipulated that personal data must be processed lawfully, fairly,

and transparently in relation to the individual. Data collection had to serve specific, legitimate purposes, and subsequent processing could not contradict those purposes. A key principle of data minimisation required companies to collect only the information strictly necessary for designated tasks. Data had to be accurate and, where necessary, regularly updated, and retained only for as long as needed to fulfil declared processing goals. Integrity and confidentiality also had to be safeguarded, ensuring protection from unauthorised or unlawful processing, accidental loss, destruction, or damage (Regulation (EU) 2016/679 of the European Parliament and of the Council, 2016).

To ensure compliance with regulatory frameworks, organisations were advised to establish specialised departments responsible for monitoring legal adherence or to engage external experts (Deloitte, 2024). Another significant concern related to the reliability and security of AI systems. Cyberattacks targeting AI algorithms had the potential to compromise data or disrupt system operations. In 2023, a substantial increase in cyberattacks aimed at AI-driven systems was recorded, generating additional risks for enterprises (Bittman *et al.*, 2024). To mitigate such threats, businesses needed to implement multi-layered security architectures that included data encryption, regular system audits, and the promotion of cyber hygiene practices among employees. Despite these challenges, organisations that succeeded in integrating AI technologies could derive considerable benefits. Automating routine operations enabled the reallocation of resources toward strategically important tasks, while AI's analytical capabilities supported precise forecasting and more informed decision-making. To achieve these outcomes, companies needed to revise their strategic approaches, invest in innovation, and apply best practices for AI adoption.

The implementation of artificial intelligence in entrepreneurship created substantial opportunities for enhancing business performance, optimising workflows, and generating innovation. However, to maximise results, companies were required to formulate clear AI integration strategies that accounted for both technological and organisational aspects. Key recommendations for AI adoption and utilisation included the following: investment in data quality, training and reskilling, change management strategies, and continuous monitoring and improvement (Yasinska, 2021).

Investment in data quality. Data quality constituted the foundation of any effective AI system. To ensure high algorithmic performance, companies needed to invest in data collection, cleansing, and standardisation infrastructure. The use of modern data management technologies – including big data platforms – helped prevent losses. Integrating data from diverse sources was critical to constructing a comprehensive view of business processes.

Training and reskilling. The effective use of AI required personnel to possess the necessary competencies. According to McKinsey, only 16% of enterprises reported their staff being adequately prepared for AI-related tasks. It was recommended to develop training programmes

covering machine learning fundamentals, data analysis, and technology governance. Collaboration with universities and training centres enabled the preparation of specialists capable of embedding AI into business processes. A culture of lifelong learning was essential to support employee adaptation to rapidly evolving technologies (The state of AI..., 2023).

Change management strategies. AI implementation frequently involved substantial modifications to business processes and organisational structure. A robust change management strategy was essential for successful integration, encompassing employee engagement, training, and adaptation to technological transformation. Active leadership played a crucial role by initiating change, articulating strategic vision, and providing continuous support throughout the innovation journey. Transparent communication – particularly regarding the objectives and benefits of AI deployment – reduced resistance and improved employee engagement. Training initiatives such as workshops, online courses, or specialised reskilling programmes were critical for workforce adaptation. A notable example was Amazon’s large-scale “Upskilling 2025” programme (Upskilling 2025 Annual Report, 2021). It was also advisable to begin with pilot projects to evaluate AI’s effectiveness and scalability before full-scale deployment. Furthermore, involving employees in the transformation process, fostering a culture of innovation, and designating “digital ambassadors” significantly increased the likelihood of successful AI integration (Sizing the prize..., n.d.).

Monitoring and continuous improvement. AI implementation did not conclude at the deployment stage. Long-term success required continuous performance assessment, system adjustments, and adaptation to changing business environments. This included regular monitoring of key performance indicators (KPIs) and user feedback collection. Amazon utilised AI to analyse purchasing behaviour and forecast market trends, thereby improving inventory management and reducing stockouts. By employing machine learning algorithms, the company minimised supply chain disruptions and stock imbalances. The adoption of new technologies in logistics and fulfilment aimed to enhance customer interaction, reduce order-processing costs, and optimise freight flow. AI was increasingly applied in conveyor-based technologies across numerous industries, including logistics. Real-time analytics enabled optimal resource allocation, shorter delivery times, and reduced fuel consumption. A prominent example was DHL, which implemented AI solutions for demand forecasting, route optimisation, and logistics process monitoring. These applications significantly improved operational efficiency.

According to the research presented by N. Falovych & O. Dubchak (2023), the automation of routine logistics processes through AI enabled cost reduction, improved cargo tracking, and enhanced customer satisfaction. Additionally, the study conducted within the framework of digital transformation in logistics companies highlighted that the growth of trade volumes and the need for faster

delivery stimulated the adoption of advanced technologies, including AI, for supply chain optimisation and cost reduction (Dyma *et al.*, 2023). The use of machine learning algorithms allowed companies to anticipate delays and adjust routes based on weather and road conditions, contributing to resource savings and improved logistics service quality.

Technological development facilitated the active adoption of new management systems, particularly AI and the Internet of Things (IoT), which supported process automation, operational efficiency, and real-time data processing. AI in business encompassed operations optimisation, data-driven decision-making, logistics automation, and customer interaction personalisation. Meanwhile, IoT technology enabled interaction among smart devices, increasing productivity and automating control over production systems. These technologies delivered notable advantages: AI enabled faster large-scale data analysis, risk forecasting, and decision-making enhancement, while IoT enabled remote equipment control, automatic system monitoring, and energy consumption optimisation. In manufacturing, IoT sensors helped monitor equipment condition, prevent malfunctions, and minimise operational costs. However, alongside numerous benefits, the integration of these technologies introduced new cybersecurity challenges. Remote access and the proliferation of connected devices increased vulnerability to cyberattacks, potentially leading to data breaches, compromised operations, and financial losses. Key threats included supply chain attacks, unauthorised access to IoT devices, and the use of AI to automate cyberattacks. Balancing innovation adoption with security had become a critical concern amid digital transformation. To mitigate risks, companies were encouraged to implement cybersecurity strategies incorporating multi-factor authentication, regular system updates, data access control, and the use of AI algorithms for real-time threat detection.

Under globalisation and international integration, adapting to new standards had become vital for organisations. One of the most prominent regulatory frameworks was Regulation (EU) 2016/679 of the European Parliament and of the Council (2016), adopted in European countries. These data protection provisions required companies to review and improve their internal data handling policies. The use of AI-based technologies could complicate data processing and storage compliance. Large corporations such as General Electric and Siemens emphasised strengthening digital system security to reduce AI-related risks.

AI exerted substantial influence on production processes, particularly in their optimisation. Its implementation contributed to higher labour productivity, improved product quality, and cost reduction. Technologies such as AI-driven automation modified production cycles through predictive analytics and decentralised blockchain-based structures, boosting profitability and reducing employee workload. Such algorithmic tools enhanced management, logistics, marketing strategies, and financial processes. An example of AI-driven automation in manufacturing was

the use of predictive maintenance, where AI algorithms analysed equipment data to forecast potential failures. This approach enabled enterprises to schedule maintenance as needed, preventing unplanned downtime and extending equipment lifespan (The impact of artificial intelligence..., n.d.). Festo, for instance, used AI to analyse machine and system data in real time, facilitating fault detection and production process optimisation (Blume, 2024). Another example included personalised marketing in retail, where AI systems analysed customer data to deliver tailored recommendations and campaigns, improving engagement and increasing sales (The impact of artificial intelligence..., n.d.). Despite progress in AI, several challenges persisted. High implementation costs, the demand for skilled professionals, and data security concerns continued to hinder adoption. Widespread AI and automation altered work environments, prompting ethical and social considerations. Besides potential job displacement across sectors, AI-driven business transformation introduced additional negative effects. Chief among them was the widening digital divide, where AI-empowered enterprises gained competitive advantages while under-resourced firms struggled to keep pace. This disparity risked market concentration among large corporations and the marginalisation of SMEs.

Automation also raised serious concerns about workforce reskilling. New skill requirements related to AI operations, big data, and cybersecurity created obstacles for employees in traditional roles. Career changes proved difficult, and those who remained often experienced increased psychological pressure due to higher responsibility, rapid adaptation demands, and job security fears. While automation improved efficiency, it did not always replicate human sensitivity or flexibility. Consequently, sectors such as healthcare, education, and customer service risked losing the personal touch essential to service quality. Another critical risk involved ethical bias embedded in AI algorithms. Such bias could influence decision-making in recruitment, financial services, or law enforcement. Lack of transparency in AI-driven decisions posed risks of discrimination and human rights violations. Successful AI integration in business required balancing productivity gains with social responsibility. Companies were advised to implement reskilling programmes, establish ethical AI guidelines, and create employee support mechanisms during organisational change. Over the next 10-20 years, AI adoption in manufacturing was expected to increase global productivity significantly. To harness the full potential of innovation, organisations were urged to develop sustainable digital transformation strategies addressing both internal process optimisation and external social impact.

Leading scholars and practitioners had been actively investigating how artificial intelligence transformed business processes within large enterprises. Their findings generally confirmed that AI contributed to the automation of routine operations, improved efficiency, and accelerated decision-making. D. Oriekhov (2024) emphasised that AI implementation had become an integral element of

modern enterprise management, offering sustainable competitive advantages as economies underwent digitalisation. Other researchers reached similar conclusions. Summarising findings across industries, D. Jain & A. Jain (2023) demonstrated the extensive application of AI for automation, analytics, and service personalisation, reshaping business models and enhancing competitiveness. Based on an entrepreneurial survey, V. Petrenko (2024) observed near-unanimous agreement on the positive impact of AI on productivity and innovation. These approaches positioned AI as a driver of digital transformation: from finance (fraud monitoring, algorithmic trading) to marketing and customer service (recommendation engines, chatbots), enterprises adopted intelligent algorithms to boost business process efficiency and agility. Researchers noted that the full realisation of AI's potential depended on resolving accompanying ethical, staffing, and regulatory issues.

The present study's findings aligned with previous global research while contributing new dimensions. It was established that AI implementation significantly enhanced business process efficiency at large enterprises by automating operations, personalising customer engagement, and improving market trend forecasting. These results corroborated international data. According to Deloitte (2024), over 60% of banks were already employing AI algorithms to analyse large datasets, improving decision accuracy in credit scoring and fraud detection. Financial sector case studies confirmed these outcomes: companies adopting machine learning observed fraud reduction and faster document processing, consistent with experiences at JPMorgan Chase and Japanese banks Mizuho and SMFG. In retail, improvements in recommendation accuracy – reflected in higher conversion rates – corresponded with Amazon's reports of a 30% increase in sales from recommended products due to deep learning algorithms. AI also positively influenced employee productivity. In an experimental scenario involving generative AI coding assistants, junior developers completed 25% more tasks. This closely matched findings from S. Peng *et al.* (2023), whose large-scale study showed that GitHub Copilot increased developer task completion rates by around 26% while also improving code quality. Such consistency validated the current study and highlighted the global nature of these trends.

Nonetheless, differences remained. Previous studies tended to focus on specific industries or metrics (e.g., finance or technical indicators), whereas this study covered enterprises of various sizes and sectors, employing an interdisciplinary methodology (systems analysis, case studies, statistics). This approach revealed both universal AI impacts and sector-specific effects. Notably, the study examined early generative AI use in marketing and product development – areas only recently addressed in the literature. While many sources presented conceptual overviews or isolated experiments, this analysis was based on real corporate initiatives from 2023-2024. Despite the outlined benefits, both literature and the study acknowledged critical challenges associated with widespread AI adoption.

Foremost were ethical and legal concerns. AI algorithms could inherit bias from training data, leading to discrimination against certain customer or employee groups. Documented cases showed biased hiring decisions made by AI-based systems due to skewed historical datasets. The current analysis confirmed this issue and emphasised the need for bias monitoring. Another ethical concern involved data privacy. As AI systems processed vast volumes of personal information, data breaches or misuse posed risks to user rights. These findings aligned with international expert warnings that algorithmic transparency and privacy protection must be foundational to AI deployment. Additional attention was drawn to unresolved intellectual property issues concerning AI-generated content, and to the risk of over-reliance on automated decision-making. V. Petrenko (2024) reported that entrepreneurs feared a decline in uniqueness and creativity due to AI-driven standardisation, which could strip businesses of their individuality. Staffing challenges were also significant. AI transformed job roles by automating functions, intensifying labour market pressures. Workers feared displacement, and companies faced the need to reskill their workforce. A gap remained in professionals capable of bridging management expertise with AI understanding – an issue also identified by D. Oriekhov (2024), who called for cross-functional teams combining business process and AI knowledge.

According to A. Chakraborty *et al.* (2024), 82% of companies in early AI adoption stages lacked talent development strategies and suitable generative AI training programmes, confirming the global relevance of this issue. D. Jain & A. Jain (2023) drew similar conclusions, stressing the need for human-AI collaboration cultures and workforce preparation. Regulatory and financial challenges formed another problem cluster. Regulatory frameworks often lagged behind AI's rapid evolution, generating legal uncertainty around accountability for AI-driven decisions and algorithm certification. Businesses faced a dilemma: how to harness AI innovatively while ensuring compliance with safety and ethics standards. Financial constraints included high initial investments and unclear short-term returns. While AI was expected to reduce costs and increase profits, empirical studies offered no definitive evidence of sustained financial impact. For instance, McKinsey (The state of AI..., 2023) reported that although 78% of companies used AI in at least one function, only 16% had fully modernised their processes based on AI, and only a small subset reported significant financial gains. Most remained in experimental phases, struggling with solution scalability due to unprepared data and infrastructure. Thus, critical analysis confirmed that for AI to become a true catalyst of business transformation, companies must overcome substantial ethical, staffing, regulatory, and economic barriers.

Based on the study's findings, several recommendations were formulated for large enterprises seeking to effectively integrate AI into their business processes. These included strategic implementation planning, workforce development, ethical risk mitigation, technological

infrastructure preparation, pilot project deployment, and executive support. Strategic AI implementation planning needed to align with the company's overarching business strategy. Within this strategy, it was important to identify priority areas for AI application – such as manufacturing, marketing, and finance – along with clearly defined expected outcomes. Case studies from successful firms indicated that without a systematic approach, AI initiatives remained fragmented and lacked synergy. Strategic planning also required consideration of rapid technological evolution and the need for flexibility in updating implementation roadmaps. Developing human capital was critical to AI adoption. This involved investing in staff training and reskilling programmes focused on data literacy and machine learning. Structured training initiatives for both managers and specialists addressed the knowledge gaps identified in the study. In addition, companies were encouraged to foster a culture of effective human-technology collaboration, in which employees understood both the capabilities and limitations of AI. To bridge the talent gap, the involvement of external experts and academic partnerships was recommended.

Ethical and transparent AI deployment represented another vital success factor. From the outset, companies were advised to establish ethical standards and governance mechanisms. This entailed internal policies for responsible data usage, privacy protection, algorithmic transparency, and bias mitigation. Findings indicated that companies with dedicated AI ethics committees faced less resistance from employees and customers. Regular algorithm audits for bias and accuracy, especially for generative AI, helped prevent major errors and reputational damage. According to McKinsey (The state of AI..., 2023), 27% of firms reported verifying all AI-generated content. Effective AI integration also required building appropriate technological infrastructure and ensuring data quality. This meant investing in high-quality datasets, computational resources, centralised data storage, regular data cleansing and updates, and standardised data governance. As noted by A. Chakraborty *et al.* (2024), developing a robust digital core and efficient data management were prerequisites for scalable AI projects. The present study confirmed that companies with advanced data infrastructure adopted new AI tools more rapidly and demonstrated superior financial performance.

AI adoption was recommended to begin with pilot projects in the most problematic or promising business areas. These initial implementations enabled performance testing under real conditions while minimising risk. According to the study, firms that piloted limited AI use cases – such as chatbots within a single support team or demand forecasting for selected product categories – successfully scaled these solutions company-wide after achieving positive outcomes. During the scaling phase, it was essential to regularly assess AI's economic impact, including cost changes, process cycle duration, and customer satisfaction. A key success factor for AI-driven initiatives was shared responsibility and active support from senior leadership.

Executives were expected to engage directly in the digital transformation process and assume accountability for outcomes. Close collaboration between IT specialists and business users during AI deployment and development facilitated alignment. Creating cross-functional working groups to define algorithm requirements, assess business impact, and adapt organisational structures ensured a comprehensive approach to transformation. This allowed AI to evolve from an external tool into an integral component of the enterprise's management ecosystem.

Implementing these recommendations would enable large enterprises to fully harness AI's potential for business process transformation. Global practices confirmed this: companies that approached AI implementation holistically – combining technology with process reengineering, staff training, and ethical oversight – achieved greater revenue and productivity growth than competitors. In conclusion, integrating previous research insights with the study's empirical findings, it was evident that successful AI-driven digital transformation required simultaneous focus on technology, people, and processes. Only through this triad could AI innovation produce sustainable, positive organisational change.

■ Conclusions

The implementation of artificial intelligence emerged as a key factor in modern business transformation, offering enterprises competitive advantages, innovation-driven growth, and operational efficiency. The analysis of AI's impact on business processes demonstrated the potential of these technologies to optimise operations, automate routine tasks, enhance analytics, and support personalised customer interactions. The research objective – a comprehensive analysis of AI's influence on the transformation of business processes across enterprises of various scales – was successfully achieved. The findings confirmed that AI implementation contributed to improved operational efficiency, streamlined management processes, enhanced customer experience personalisation, and more accurate market trend forecasting. Moreover, process automation enabled cost reductions and accelerated decision-making, thereby strengthening firms' competitiveness. It was established that in the financial sector, machine learning

algorithms reduced fraud rates by enabling more precise transaction and risk analysis. In retail, AI improved logistics efficiency and facilitated the creation of personalised marketing strategies. In manufacturing, intelligent systems supported predictive maintenance, minimising equipment downtime and enhancing supply chain performance.

The study further confirmed the widespread adoption of generative AI in marketing, design, content management, and automated decision-making. Generative algorithms simplified the creation of text, images, and video content, reducing creative task costs and accelerating time-to-market for new products. Several implementation challenges were identified, including insufficient data quality, a shortage of qualified personnel, high integration costs, ethical concerns, and regulatory constraints. Addressing these challenges required a holistic approach involving investment in data quality, development of ethical standards, staff training, and the deployment of pilot projects to assess technological effectiveness. Enterprises were advised to adapt their business models with a focus on innovation, digitalisation, and AI integration across core functions. The execution of these recommendations was expected to enhance business performance, reduce costs, and ensure long-term success in a dynamic digital environment. AI functioned not only as an optimisation tool but also as a catalyst for strategic transformation, enabling enterprises to adapt to contemporary challenges and unlock new development opportunities. Future research avenues included the assessment of long-term socio-economic implications of widespread AI adoption, development of effective workforce training methodologies for interaction with intelligent systems, and evaluation of the impact of emerging regulatory frameworks on innovative business model evolution. Further attention was recommended for the integration of AI into corporate governance systems and the evaluation of its influence on strategic decision-making across enterprises of varying sizes.

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■ Conflict of Interest

None.

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Вплив штучного інтелекту на трансформацію бізнес-процесів підприємств

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■ **Анотація.** Швидкий розвиток штучного інтелекту кардинально трансформував бізнес-середовище, оптимізуючи процеси управління, підвищуючи ефективність та створюючи нові виклики для підприємств. Це обумовлює актуальність аналізу його впливу на трансформацію бізнес-процесів. Метою дослідження було проаналізувати вплив штучного інтелекту на трансформацію бізнес-процесів підприємств різного масштабу, визначити основні напрями його застосування та оцінити потенційні перспективи розвитку. Дослідження базувалося на використанні системного аналізу, порівняльного аналізу, кейс-методу та аналізу статистичних даних. Було опрацьовано наукові публікації, корпоративні звіти, матеріали аналітичних компаній та практичні приклади впровадження штучного інтелекту у провідних компаніях. Результати дослідження показали, що впровадження штучного інтелекту значно підвищило ефективність бізнес-процесів великих підприємств через автоматизацію операцій, персоналізацію взаємодії з клієнтами та поліпшене прогнозування ринкових тенденцій. У фінансовому секторі алгоритми машинного навчання дозволили знизити рівень шахрайства та суттєво прискорити процес обробки документів, що узгоджується з міжнародним досвідом провідних банків, таких як JPMorgan Chase, Mizuho і SMFG. У сфері роздрібної торгівлі було зафіксовано покращення точності рекомендаційних систем, аналогічно до результатів глобальних компаній, таких як Amazon і Netflix, де персоналізація забезпечила зростання конверсійних показників. Виробничі підприємства повідомили про оптимізацію управління логістикою та скорочення операційних витрат завдяки впровадженню ШІ. Крім того, підприємства активно досліджували можливості генеративного штучного інтелекту у маркетингу, розробці продуктів та підвищенні продуктивності працівників, отримавши результати, які узгоджуються з міжнародними практиками, такими як впровадження інструменту GitHub Copilot, що підвищив швидкість і якість роботи розробників програмного забезпечення. Практична цінність дослідження полягає у можливості використання його результатів керівниками компаній, аналітиками та бізнес-консультантами для вдосконалення стратегій цифрової трансформації та підвищення конкурентоспроможності підприємств

■ **Ключові слова:** цифрова трансформація; машинне навчання; бізнес-аналітика; автоматизація процесів; корпоративне управління; клієнтський досвід; етичні виклики