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ARTIFICIAL INTELLIGENCE AS A TECHNOLOGICAL BASIS FOR MODERN BUSINESS MODELS IN ENTREPRENEURSHIP AND TRADE IN THE CONTEXT OF ECONOMIC DIGITALIZATION AND BUSINESS COMPETITIVENESS FOR RISK ASSESSMENT AND DECISION-MAKING

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Sytnyk I. P., Bosenko O. S., Shved T. V. Artificial Intelligence as a Technological Basis for Modern Business Models in Entrepreneurship and Trade in the Context of Economic Digitalization and Business Competitiveness for Risk Assessment and Decision-Making

The article explores artificial intelligence as a technological foundation for modern business models in entrepreneurship and trade amid the digitalization of the economy and increasing competitive pressure on business entities. It is substantiated that in today's digital environment, traditional approaches to analysis, business planning, risk assessment, and decision support no longer provide the necessary speed, adaptability, and accuracy required for efficient business operations. It is shown that artificial intelligence is gradually transforming from a standalone automation tool into a system-forming factor in the development of entrepreneurship and trade, influencing the way business models are built, value is created, risk is managed, and competitive advantages are formed. The work summarizes modern scientific approaches to understanding the role of artificial intelligence in the digital economy and identifies its place in the architecture of contemporary commercial solutions. It is further shown that integrating machine learning tools, predictive analytics, intelligent data analysis, and digital platforms creates the conditions for moving from reactive to proactive management, focused on forecasting changes, early risk detection, and building adaptive business development scenarios. It is found that using artificial intelligence significantly expands the capabilities of information systems and technologies in business and trade, particularly in e-commerce, supply chain management, dynamic pricing, customer interaction personalization, operational process automation, fraud detection, cybersecurity, and strategic planning. Special attention is given to the risk-oriented potential of artificial intelligence. It has been displayed that using intelligent algorithms allows for improving the accuracy of assessing financial, market, operational, and behavioral risks, reducing the time needed for management decisions, optimizing resource allocation, and increasing business resilience in conditions of uncertainty. Summarizing the results shows that implementing AI positively affects operational efficiency, responsiveness to market changes, customer service quality, and risk reduction efficiency. At the same time, it is emphasized that the success of AI integration depends on data quality, the level of technological readiness of companies, the availability of relevant competencies, alignment with existing IT infrastructure, and compliance with ethical and regulatory requirements. It has been concluded that in today's conditions, artificial intelligence should be seen as a fundamental factor in transforming business models, developing e-commerce, improving business planning, and ensuring long-term business competitiveness in the digital economy.

Keywords: artificial intelligence; digital economy; information systems and technologies in entrepreneurship and trade; business model; e-commerce; business planning; risk; business competitiveness.

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Ситник І. П., Босенко О. С., Швед Т. В. Штучний інтелект як технологічна основа сучасних бізнес-моделей у підприємстві та торгівлі в умовах цифровізації економіки та конкурентоспроможності бізнесу для оцінювання ризиків і прийняття рішень

У статті досліджено штучний інтелект як технологічну основу сучасних бізнес-моделей у підприємстві та торгівлі в умовах цифровізації економіки та посилення конкурентного тиску на суб'єктів господарювання. Обґрунтовано, що в сучасному цифровому середовищі традиційні підходи до аналізу, бізнес-планування, оцінювання ризиків і підтримки прийняття рішень уже не забезпечують належної швидкості, адаптивності та точності, необхідних для ефективного функціонування бізнесу. Показано, що штучний інтелект поступово трансформується з окремого інструмента автоматизації в системоутворювальний чинник розвитку підприємництва та торгівлі, впливаючи на логіку побудови бізнес-моделей, способи створення цінності, підходи до управління ризиками та формування конкурентних переваг. У роботі узагальнено сучасні наукові підходи до розуміння ролі штучного інтелекту в цифровій економіці та визначено його місце в архітектурі сучасних комерційних рішень. Доведено, що інте-

грація інструментів машинного навчання, предиктивної аналітики, інтелектуального аналізу даних і цифрових платформ створює передумови для переходу від реактивного до проактивного управління, орієнтованого на прогнозування змін, раннє виявлення ризиків і побудову адаптивних сценаріїв розвитку бізнесу. Встановлено, що використання штучного інтелекту суттєво розширює можливості інформаційних систем і технологій у підприємстві та торгівлі, зокрема у сфері електронної комерції, управління ланцюгами постачання, динамічного ціноутворення, персоналізації клієнтської взаємодії, автоматизації операційних процесів, виявлення шахрайства, кібербезпеки та стратегічного планування. Особливу увагу приділено ризик-орієнтованому потенціалу штучного інтелекту. Показано, що застосування інтелектуальних алгоритмів дає змогу підвищити точність оцінювання фінансових, ринкових, операційних і поведінкових ризиків, скоротити час ухвалення управлінських рішень, оптимізувати розподіл ресурсів і підвищити стійкість бізнесу в умовах невизначеності. Узагальнення результатів засвідчує, що впровадження ШІ позитивно впливає на операційну ефективність, швидкість реагування на зміни ринку, якість обслуговування клієнтів та ефективність зниження ризиків. Водночас акцентовано, що результативність інтеграції ШІ залежить від якості даних, рівня технологічної готовності підприємств, наявності відповідних компетентностей, узгодженості з наявною ІТ-інфраструктурою та дотримання етичних і регуляторних вимог. Зроблено висновок, що штучний інтелект у сучасних умовах слід розглядати як фундаментальний чинник трансформації бізнес-моделей, розвитку електронної комерції, удосконалення бізнес-планування та забезпечення довгострокової конкурентоспроможності бізнесу в цифровій економіці.

Ключові слова: штучний інтелект; цифрова економіка; інформаційні системи і технології в підприємстві та торгівлі; бізнес-модель; електронна комерція; бізнес-планування; ризик; конкурентоспроможність бізнесу.

Табл.: 2. Бібл.: 25.

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Under current conditions, traditional methods of risk analysis and management are proving to be insufficiently efficient. They do not provide the necessary flexibility and speed of response, which is critically important for digital markets, particularly in the field of e-commerce, where changes in business parameters occur in real time. This necessitates the implementation of intelligent technologies capable of supporting decision-making under conditions of multi-criteria analysis and uncertainty [1].

In this context, artificial intelligence (AI) is viewed as one of the key technological foundations of modern business models in entrepreneurship and trade, used for risk assessment and to support managerial decision-making. Its application enables a shift from reactive management to proactive and adaptive strategies based on processing large datasets, identifying hidden patterns, and modeling probable development scenarios. Machine learning algorithms, neural networks, and intelligent data analysis methods significantly expand the capabilities of business planning, making it more dynamic and risk-oriented.

The application of AI is particularly relevant in the digital economy, where data, digital platforms, and intelligent services are becoming key resources. E-commerce, marketplaces, and digital ecosystems create new sources of competitive advantage, but at the same

time amplify systemic risks. Under these conditions, artificial intelligence serves not only as a tool for automating analytical processes but also as a key factor in transforming approaches to business management [2].

Within the framework of the modern risk management paradigm, AI should be viewed as a fundamental driver of the development of commercial architectures. Its integration contributes to the formation of flexible business models in entrepreneurship and trade, focused on reducing losses, the rational allocation of resources, and the creation of long-term value for stakeholders. This is why analyzing the potential and feasibility of implementing intelligent systems in risk assessment and decision-making processes is an important scientific and practical task in the digital age.

Analysis of recent studies and publications.

An analysis of international and Ukrainian sources indicates that artificial intelligence is no longer viewed merely as a localized IT innovation but has attained the status of a systemic factor that is transforming the very nature of entrepreneurship and trade. In their seminal works, Iansiti M. [3] and Marr B. [4] note that the business world has reached a stage where ignoring algorithmic decisions can significantly weaken a company's competitive position. In a retrospective review, Haenlein M. [5] cautions the scientific community and practitioners against "technological determinism,"

emphasizing that the history of AI has seen periods of both triumphs and disappointments.

The central theme of contemporary theoretical discourse is the evolution of business models. Di Vaio A. [6] and co-authors convincingly argue that the integration of AI resolves the age-old dilemma between profitability and sustainable development by optimizing resources at a level unattainable by human intellect. This creates the conditions for the development of digital entrepreneurship, the conceptual foundations of which are outlined by Kraus S. [7]. The latter argues that digitalization is not merely the automation of routine tasks, but the creation of new market niches.

Deep integration of AI is also observed in operational management and risk management. Baryannis G. [8] and Bag S. [9] view supply chains as complex adaptive systems, demonstrating that AI enables the modeling of “what-if” scenarios in real time. At the level of production processes, Chatterjee Sc., Rana N. P., Dwivedi Yo. K., Baabdullah A. M. [10] uses the TOE model to explain the factors driving AI adoption, while Alaskari [11] demonstrates how automation and ERP systems improve process efficiency.

A separate area of research focuses on the regional characteristics of AI implementation in Eastern Europe and Ukraine. Kwilinski A. [12] develops the foundations of the information economy, arguing for the need to modernize industry through the use of AI. In subsequent works, Kwilinski A. [12] details the mechanisms of this modernization, while Tkachenko V. [13] demonstrates this using the construction industry as an example. Ukrainian scholars Pizhuk O. [14] and Tardaskina T. [15] view digital transformation as a matter of national security and the adaptation of business models. Ilchenko T. [16] analyzes the institutional environment for digital entrepreneurship. Meanwhile, Adam N. [18] provides empirical data on how small and medium-sized businesses use digital tools to survive in crisis conditions.

Research in the field of payment infrastructure is also important. In particular, I. Sytnyk [17] analyzes in his works the peculiarities of the functioning of Ukraine’s payment system, its institutional foundations, and its role in ensuring the efficiency of financial flows. Particular attention is paid to the digitization of payment processes, enhancing their security, and developing innovative financial instruments that form the basis for further digital transformation of business.

Thus, an analysis of current research provides grounds for asserting that artificial intelligence technologies are becoming increasingly integrated into business models of entrepreneurship and trade, influencing risk assessment, decision-making, and the assurance of business competitiveness.

Problem Statement. Traditional approaches to risk management and decision support, based primarily on static models, retrospective analysis, and expert assessments, no longer fully meet the requirements of the digital economy. They do not provide the necessary speed, adaptability, and analytical accuracy required for efficient business planning and timely response to changes in the external and internal environment. As a result, there is a gap between the growing complexity of modern business systems and the capabilities of classical management tools.

At the same time, artificial intelligence has significant potential to overcome these limitations through the use of machine learning, intelligent data analysis, and predictive analytics. The application of such technologies makes it possible to improve the quality of risk assessment, enhance information support for managerial decisions, and ensure a more flexible business response to dynamic changes in the market environment. This is particularly relevant in the fields of entrepreneurship and trade, where digitalization, the development of e-commerce, and platform models amplify both new opportunities and new risks.

Despite the active spread of artificial intelligence technologies in the business environment, scientific research and management practice lack sufficiently systematized approaches to its use specifically as the technological foundation of modern business models in entrepreneurship and trade. Questions regarding its role in risk assessment, business planning, supporting managerial decision-making, as well as in ensuring business sustainability and competitiveness in the digital economy remain subject to debate.

Thus, the scientific problem lies in the need for a theoretical substantiation and practical understanding of the application of artificial intelligence as an important tool for risk assessment and decision-making, capable of ensuring the formation of adaptive, sustainable, and competitive business models in entrepreneurship and trade in the context of the digitalization of the economy.

Aim of the article. The aim of this article is to examine artificial intelligence as the technological foundation of modern business models in entrepreneurship and trade in the context of economic digitalization and business competitiveness for risk assessment and decision-making.

Description of the research methodology. The methodological basis of the study consists of a set of general scientific and specialized methods that made it possible to reveal the role of artificial intelligence as the technological foundation of modern business models in entrepreneurship and trade in the context of the digital economy. The study employs an interdis-

ciplinary approach that combines principles of economic theory, digital business, risk management, and modern information systems and technologies.

The following research methods were used in this study: analysis and synthesis to summarize scientific approaches to defining the nature of artificial intelligence, its functions, and its potential applications in business and commerce; a system approach to consider artificial intelligence as a component of modern business models related to business planning, risk assessment, and managerial decision-making; comparative analysis to compare traditional approaches to risk assessment and decision support with approaches based on the use of artificial intelligence; the generalization method to systematize the results of modern scientific research on the impact of AI on operational efficiency, business adaptability, the development of e-commerce, and ensuring competitiveness; tabular method to visualize and structure the generalized analytical results regarding the levels of AI implementation and the system of indicators for its application in specific areas of the digital economy.

The research information base consists of scientific works by Ukrainian and foreign authors devoted to the digital economy, digital entrepreneurship, artificial intelligence, e-commerce, risk management, and business model transformation, as well as analytical materials reflecting current trends in the implementation of AI in the business environment. The application of these methods made it possible to substantiate the significance of artificial intelligence as a key factor in enhancing the efficiency of business processes, improving risk assessment, and strengthening the competitive positions of business entities in the context of the digitalization of the economy.

Presentation of the main research material.

Modern business models increasingly rely on artificial intelligence to improve value propositions and optimize operational processes, as AI enables large-scale personalization, transforming customer interactions into a predictable, adaptive experience that responds in real time to changes in preferences and behavior. In modern enterprises, AI is embedded not only in products but also in internal processes such as supply chain management, production planning, and resource allocation, while simultaneously supporting managerial decisions through predictive analytics, scenario modeling, and risk assessment. The integration of AI with digital platforms enables companies to develop new revenue streams, including subscription-based models, dynamic pricing strategies, and AI-as-a-Service offerings, demonstrating that AI is not merely a technological tool but a fundamental component of innovative, competitive, and scalable business models. Start-

ups implementing AI demonstrate accelerated market adaptation, more accurate forecasting, and improved scalability, indicating a significant advantage over traditional approaches and highlighting the role of AI as a strategic factor in entrepreneurship and commerce.

Market research and opportunity identification are significantly enhanced by AI's ability to analyze consumer sentiment, competitor behavior, and trends in emerging markets. Financial forecasting is enhanced through AI-powered predictive models, enabling startups and small businesses to manage cash flow, plan investments, and assess risks with greater accuracy than traditional methods allow. Operational efficiency is increasing thanks to robotic process automation, which reduces the burden of repetitive tasks, allowing human resources to focus on strategic and creative activities. In addition, AI fosters innovation by enabling rapid prototyping, virtual testing, and scenario modeling, thereby accelerating product development cycles and reducing time to market. Empirical data shows that startups using AI achieve faster time-to-market, demonstrate higher investor confidence, and have better opportunities for long-term growth and scalability, reflecting the tangible benefits of integrating AI into entrepreneurial ecosystems.

In the retail sector, AI makes a decisive contribution to managing complex supply chains, optimizing pricing strategies, reducing fraud, and improving customer service. Supply chain management benefits from AI through predictive demand modeling, inventory optimization, and reduced transportation costs. Dynamic pricing algorithms adjust product prices in real time based on market conditions and competitor behavior, optimizing revenue and market share [19]. Fraud detection and cybersecurity systems are enhanced by AI's ability to identify anomalous patterns in transactions, protecting the organization's assets and reputation. Customer engagement is also improved through AI-powered chatbots and recommendation systems, which boost conversion rates and overall satisfaction. Case studies of many national retailers show that AI integration can lead to cost reductions of 10-20% and sales increases of up to 15%, confirming the practical impact of AI on operational efficiency and market competitiveness [20].

Risk management, a critical component of sustainable business management, is undergoing a significant transformation driven by AI. Traditional risk management methods often rely on historical data and expert judgment, which may be insufficient in volatile and rapidly changing markets. AI introduces predictive and adaptive risk management methods that improve the early detection and mitigation of financial, operational, and market risks. Machine learning algo-

rithms analyze both historical and real-time datasets to predict potential vulnerabilities, while AI-powered scenario simulations allow organizations to evaluate numerous “what-if” conditions, providing insight into areas requiring proactive intervention. In addition, artificial intelligence enhances fraud detection, cybersecurity, and investment risk assessment by offering predictive insights into borrower profiles, portfolio volatility, and market exposure. Empirical studies show that companies using artificial intelligence for risk assessment achieve 30-40% improvements in the early detection of operational and financial risks, leading to more resilient strategies, optimized resource allocation, and a stronger foundation for informed decision-making.

At the strategic level, AI helps organizations identify market entry opportunities, anticipate competitive risks, and evaluate mergers and acquisitions. At the tactical level, predictive analytics helps inform decisions regarding resource allocation, production planning, and inventory management, while operational decisions such as order fulfillment, customer service, and transactional processes increasingly rely on AI for automation and efficiency. By providing real-time analytics and data-driven recommendations, AI reduces cognitive biases, accelerates decision-making cycles, and improves accuracy. Organizations that integrate artificial intelligence into their decision-making processes report a 25–35% reduction in strategic planning time, a 15–25% increase in operational efficiency, and a 20–30% improvement in forecasting accuracy, highlighting the measurable impact of artificial intelligence on an organization’s competitiveness and flexibility in a rapidly changing market [21].

The full version of the authors’ categorical analysis of AI implementation levels in terms of current AI metrics is presented in the *Tbl. 1*.

Despite its obvious advantages, the implementation of AI presents a number of challenges that require strategic attention. Data quality and availability are critical, as AI systems rely on large volumes of accurate,

structured data, and any shortcomings limit predictive and operational efficiency. Human capital is another constraint, as a shortage of personnel skilled in AI can hinder deployment, monitoring, and continuous improvement. The complexity of integrating AI with existing IT infrastructures requires careful planning and significant investment, while ethical and regulatory considerations including transparency, algorithmic bias, and legal compliance must be addressed to ensure the responsible use of AI. In addition, high initial and operational costs can create barriers, particularly for small and medium-sized enterprises, underscoring the need for a strategic framework that combines technology, human capital development, and governance mechanisms to facilitate sustainable adoption.

The authors have compiled a summary analysis of the system of indicators for AI implementation across sectors of the digital economy, presented in the *Tbl. 2*.

In the future, the impact of AI on business and trade will expand in several dimensions:

1. Hyper-personalization will enable the complete customization of customer journeys based on real-time behavioral data, while autonomous operations in supply chains, logistics, and financial processes will increasingly reduce reliance on human intervention for routine tasks.
2. AI-enhanced solution ecosystems will integrate predictive analytics, scenario modeling, and knowledge management into unified platforms, enabling faster, more informed, and evidence-based decisions. Collaborative initiatives in the field of artificial intelligence, including joint efforts between startups and established corporations, are expected to accelerate innovation cycles and reduce time-to-market for new products and services.

Sustainable approaches to AI that incorporate governance criteria into decision-making processes will become increasingly important, fostering respon-

Table 1

Categorical analysis of AI implementation levels

AI Metrics	High level of AI implementation	Medium level of AI adoption	Low level of AI adoption
Operational efficiency	+22%	+12%	+5%
Responsiveness to market changes	+28%	+15%	+7%
Customer satisfaction	+18%	+10%	+3%
Risk mitigation efficiency	+35%	+20%	+8%
Decision-making accuracy	+25%	+13%	+4%

Source: compiled by the authors based on [22; 23].

Table 2

System of AI Adoption Indicators for Digital Economy Sectors

Business Sector	Key Tools	Internal indicators	Global benchmarks
Retail and Sales	Dynamic pricing, personalization, chatbots	Sales growth: up to +15%. Cost reduction: 10–20%	Revenue growth: +10–20%. Conversion: 15–20% increase
Logistics supply chains	Demand forecasting, inventory optimization	General cost reduction and inventory optimization are mentioned	Inventory reduction: by 20–50%. Reduction in losses: by 10–40%
Risk management and security	Anomaly detection, cybersecurity, borrower assessment	Early risk detection: 30–40% improvement	Fraud detection: up to 50%. Reduction in false positives: by 60%
Strategic planning	Predictive analytics, reduction of cognitive biases	Reduced planning time: 25–35%. Forecast accuracy: +20–30%	Increase in analyst productivity: by 40%. Improved demand forecasting: by 20–50%
Operations	Robotic Process Automation (RPA), routine automation	Efficiency gains: 15–25%	Growth in labor productivity: by 14–40% by 2035

Source: compiled by the authors based on [24-25].

sible growth while maintaining a competitive edge. Taken together, these trends indicate that AI will remain a central technological driver, not only transforming operational and strategic processes but also shaping the competitive landscape of modern business in the digital economy.

CONCLUSIONS

The conducted research provides grounds to assert that, in the current context of economic digitalization, artificial intelligence is becoming a crucial technological foundation for the transformation of business models in entrepreneurship and trade. Unlike traditional approaches to analysis and management, artificial intelligence tools provide a higher level of adaptability, responsiveness, and analytical accuracy, which is particularly important in the context of a highly dynamic market environment, the development of e-commerce, and increasing competition.

A review of scientific approaches and current practices in AI application has shown that its integration into business processes contributes to increased operational efficiency, improved business planning, the development of personalized customer interactions, supply chain optimization, enhanced cybersecurity, and improved fraud detection mechanisms. At the same time, the use of artificial intelligence for risk assessment and supporting managerial decision-making is of particular importance, as it enables the timely identification of potential threats, the modeling of alternative development scenarios, and the enhancement of the soundness of managerial actions.

The study found that the application of AI is transforming the logic of modern business models, facilitating a shift from predominantly reactive management to a proactive, risk-oriented, and predictive approach. This creates the conditions for the formation of more flexible and resilient models of entrepreneurship and trade, capable of responding more quickly to changes in the external environment, using resources more efficiently, and maintaining competitive positions in the market. In this context, artificial intelligence should be viewed not merely as a tool for automating individual functions, but as a key driver of digital business transformation.

At the same time, the efficiency of AI implementation depends on a number of prerequisites, including the quality and availability of data, the level of technological readiness of enterprises, the availability of specialists with relevant digital competencies, as well as the ability of businesses to integrate intelligent technologies into existing information infrastructure while taking into account ethical and regulatory requirements. Thus, in the context of the digital economy, artificial intelligence serves as a key factor in enhancing business competitiveness, improving risk assessment, and developing modern business models in entrepreneurship and trade.

Prospects for further research and publications are linked to deepening the scientific analysis of artificial intelligence development in the context of the transformation of modern business models in entrepreneurship and trade. Of particular interest is the shift in contemporary professional discourse from

classical deep learning models to hybrid and neuro-symbolic architectures, which combine the ability of neural networks to process weakly structured data with the capabilities of formalized logic, interpretation, and explainability of results. This approach is particularly significant for business, as it enables greater transparency in algorithmic decisions, which is crucial for risk management, regulatory compliance, and building trust in digital systems.

Another promising area is research into the practical application of hybrid artificial intelligence in e-commerce, logistics, operational resilience management, and strategic business planning. Unlike traditional “black box” models, such systems allow not only for generating a forecast or recommendation but also for substantiating it by taking into account context, functional relationships, and specified constraints. This creates additional opportunities to improve personalized services, optimize supply chains, reduce operational risks, and support more informed managerial decisions.

Special attention should be given to the integration of prior knowledge, expert rules, and the “human-in-the-loop” approach into the architecture of modern intelligent systems. Such solutions make it possible to combine the computational capabilities of artificial intelligence with the practical experience of specialists, increasing the resilience of business processes in conditions of uncertainty and data scarcity. In this context, further research should focus on developing methodological approaches to the implementation of explainable, hybrid, and risk-oriented artificial intelligence in digital business systems, which will contribute to improving management efficiency, competitiveness, and adaptability of business entities in the digital economy. ■

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ІНТЕГРАЦІЯ ШІ-АГЕНТІВ У ЦИФРОВУ ТРАНСФОРМАЦІЮ БІЗНЕС-ПРОЦЕСІВ МАЛОГО ТА СЕРЕДНЬОГО ПІДПРИЄМНИЦТВА

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**Кучинський В. А., Кузьминський А. М. Інтеграція ШІ-агентів у цифрову трансформацію бізнес-процесів
малого та середнього підприємництва**

У статті досліджено теоретичні та прикладні засади діджиталізації малого та середнього підприємництва (МСП) в умовах промислової революції 4.0 (Industry 4.0) через впровадження ШІ-агентів як інструменту системної трансформації бізнес-процесів. На основі індексу DESI та даних ОЕСР обґрунтовано відставання вітчизняних МСП від середньоєвропейських індикаторів цифрової зрілості та необхідність переходу від реактивної автоматизації до проактивного управління на основі даних. Розкрито сутність ШІ-агента як автономної системи на базі великих мовних моделей (LLM), здатної до планування складних послідовностей дій (chain-of-thought reasoning) та інтеграції із зовнішніми API. На основі порівняльного аналізу традиційного та агентного ШІ доведено, що на відміну від вузькоспеціалізованих рішень агентні системи формують принципово нову економічну логіку автоматизації. Результати емпіричного дослідження 28 вітчизняних МСП засвідчують, що 55% підприємств уже застосовують ШІ у маркетингу, 48% – у клієнтській підтримці, однак складніші операційні завдання залишаються поза межами автоматизації, що підтверджує переважно тактичний характер поточного ШІ-впровадження в секторі. Систематизовано ключові напрямки застосування технології, зокрема: автоматизацію до 80% клієнтських запитів, предиктивний скоринг у маркетингу, фінансовий облік у хмарних середовищах (BAS, Xero) та оптимізацію ланцюгів постачання. Запропоновано концептуальну чотирьохетапну модель поетапного впровадження ШІ-агентів на МСП (від стратегічної діагностики та пілотування на базі low-code платформ до досягнення цифрової зрілості протягом 18+ місяців). Установлено, що інтеграція автономних систем дозволяє МСП досягти ефекту «масштабування без зростання витрат» і демократизує доступ до високорівневої аналітики. Попри існуючі ризики технологічної залежності (vendor lock-in) та «галюцинацій» моделей, ШІ-агенти стають стратегічним фактором підвищення конкурентоспроможності та інституційного навчання підприємств в умовах Industry 4.0.

Ключові слова: МСП; ШІ-агенти; діджиталізація; цифрова трансформація; бізнес-процеси; промислова революція 4.0.

Рис.: 1. **Табл.:** 3. **Бібл.:** 19.