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THE ROLE OF ARTIFICIAL INTELLIGENCE AND BIG DATA IN SUSTAINABLE DEVELOPMENT OF DOMESTIC BUSINESS: IT, INDUSTRY, TRADE, MANAGEMENT

РОЛЬ ШТУЧНОГО ІНТЕЛЕКТУ ТА ВЕЛИКИХ ДАНИХ У СТАЛОМУ РОЗВИТКУ ВІТЧИЗНЯНОГО БІЗНЕСУ: ІТ, ПРОМИСЛОВІСТЬ, ТОРГІВЛЯ, УПРАВЛІННЯ

In the context of multitasking in commercial activities, innovative technologies, particularly artificial intelligence (AI) and Big Data, become key factors in the viability of business. The purpose of this article is to examine the role of artificial intelligence and Big Data processing technologies in ensuring the sustainable development of domestic business, with a focus on key sectors of economic activity. As part of the research, domestic cases of successful implementation of the mentioned technologies, such as Oll.tv, Promodj, Wind Parks Ukraine, Rozetka, Prom.ua, and Dragon Capital, have been analyzed. The study also outlines the potential challenges faced by these business entities in their journey towards digital transformation. The research results indicate that artificial intelligence and Big Data are powerful tools for the sustainable development of domestic businesses, enabling them to address a wide range of tasks, especially in areas such as IT, industry, trade, and management.

Keywords: commercial activity, key sectors of economic activity, digital transformation; business; information technology.

В умовах багатозадачності комерційної діяльності ключовими чинниками життєздатності бізнесу стають інноваційні технології, зокрема штучний інтелект (ШІ) та Великі Дані. Відтак метою статті є вивчення ролі штучного інтелекту та технологій обробки великих даних у забезпеченні сталого розвитку вітчизняного бізнесу, з акцентом на ключові сфери економічної діяльності. У межах дослідження також аналізуються вітчизняні кейси успішного застосування зазначених технологій на прикладі таких компаній, як Oll.tv, Promodj, Wind Parks Ukraine, Rozetka, Prom.ua, Dragon Capital, а також окреслюються потенційні виклики,

що постають перед цими суб'єктами господарювання на шляху цифрової трансформації. За результатами дослідження констатовано, що ШІ та Великі Дані є потужними інструментами для сталого розвитку вітчизняного бізнесу, який дозволяє вирішувати широкий спектр завдань особливо в таких сферах економічної діяльності, як ІТ, промисловість, торгівля, управління. Доведено, що підсистеми ШІ, такі як машинне навчання, нейронні мережі, обробка природної мови та автоматизоване прийняття рішень, забезпечують значний прогрес у роботі підприємств, дозволяючи автоматизувати основні процеси, передбачати ризики, аналізувати великі масиви даних і формувати персоналізовані продукти та послуги для клієнтів. Доведено, що великі дані, зокрема, їх основні характеристики – обсяг, швидкість і різноманітність, мають важливе значення для сталого розвитку бізнесу. Великі Дані дозволяють ефективно збирати, обробляти та аналізувати величезні обсяги інформації з різних джерел, що є необхідними для стратегічного планування, управління запасами, покращення логістики та передбачення змін у попиті. Констатовано, що інтеграція ШІ та великих даних дозволяє підприємствам ключових сфер економічної діяльності не лише забезпечити керованість витрат і бізнес-процесів, але й гарантує належну адаптивність до змін у зовнішньому середовищі (що є важливим фактором для успішного функціонування в умовах конкурентного ринку). Перспективи подальших досліджень полягають у визначенні форматів нових інноваційних рішень, що підвищують ефективність операцій підприємств ключових секторів економічної діяльності.

Ключові слова: комерційна діяльність; ключові сфери економічної діяльності; цифрова трансформація; бізнес; інформаційні технології.

Statement of the problem. In a multitasking commercial environment, innovative technologies—particularly artificial intelligence (AI) and Big Data—are key to ensuring business viability. Their active implementation contributes to the optimization of operational processes, enhances the effectiveness of managerial decisions, enables the forecasting of market trends, and supports the development of new environmentally and socially oriented approaches to interacting with clients and partners across various economic activities. It is worth noting that these technologies are gradually transforming the very foundations of enterprise operations, particularly in sectors such as information technology, industry, commerce, and public administration. For instance, in the industrial sector, the integration of AI enables the automation of equipment maintenance processes through predictive analytics systems that analyze large volumes of data from sensors and signals on production lines. In other key industries, the utility of AI and Big Data is also considerable, as they help reduce downtime, lower maintenance costs, and enhance overall operational efficiency.

It should be noted that the degree of efficiency improvement resulting from the implementation of AI and Big Data can vary significantly depending on the specific industry, the scale of the enterprise, and the quality of technology adoption. However, general estimates based on research and case studies suggest the following [2–3; 5]: reduction in equipment downtime – by 30–50%, thanks to the ability to predict failures before they become critical; decrease repair and maintenance costs – by 10–40% through optimized maintenance scheduling; increase overall productivity – by 10–25% due to more efficient resource utilization and reduced unplanned stoppages.

Analysis of recent research and publications. The study of the specifics of applying artificial intelligence and big data technologies to support business development has been the focus of numerous domestic and international scholars, including Duan Y., Edwards J.S., Dwivedi Y.K. [1], Mashika H., Zelic V., Kiziun A., Maslyhan R. [5], Haenlein M., Kaplan A., Tan C. W., Zhang P. [2], and others. Their research covers a wide range of topics – from the analysis of technological innovations that contribute to reducing environmental impact to practices for efficient resource management, optimization of logistics processes, implementation of predictive analytics in the industry, and personalization of services in the IT and retail sectors.

Significant attention is also given by Jain T.K. and Kansal M. [3] to AI integration into strategic planning, risk management systems, and the digital transformation of companies, which, as noted, opens up new opportunities for enhancing business competitiveness in the digital economy.

At the same time, the role of AI and Big Data technologies specifically in the context of ensuring the sustainable development of domestic businesses – with a focus on key industries – has not yet received sufficient attention in the scientific literature.

Formulation of the research task. The purpose of this article is to study the role of AI and Big Data technologies in ensuring the sustainable development of domestic businesses, with a focus on key industries – IT, industry, trade, and management.

The research also analyzes domestic case studies of successful implementation of these technologies, such as Oll.tv, Promodj, Wind Parks Ukraine, Rozetka, Prom.ua, and Dragon Capital, and outlines the potential challenges faced by these business entities in the process of digital transformation.

Summary of the main research material. Artificial intelligence (AI) and Big Data are fundamental digital technologies that are currently playing an increasingly important role in ensuring sustainable development, particularly by supporting stable economic growth.

So, AI is a set of subsystems, including their algorithms, methods, and technologies, capable of accelerating sustainable business development by modeling human intellectual functions such as learning, analysis, forecasting, and decision-making (see Fig. 1).

Big Data refers to subsystems that encompass large volumes of information, with high speed of incoming data and diversity, combined with specialized tools for processing, interpreting, and utilizing the data. Typically, big data in the sustainable development of domestic business is characterized by three main subsystems, known as the "three Vs" (see Fig. 2).

The significance of the outlined technologies in the context of sustainable development is due to their ability to simultaneously address a wide range of tasks, as evident from the data in Table 1.

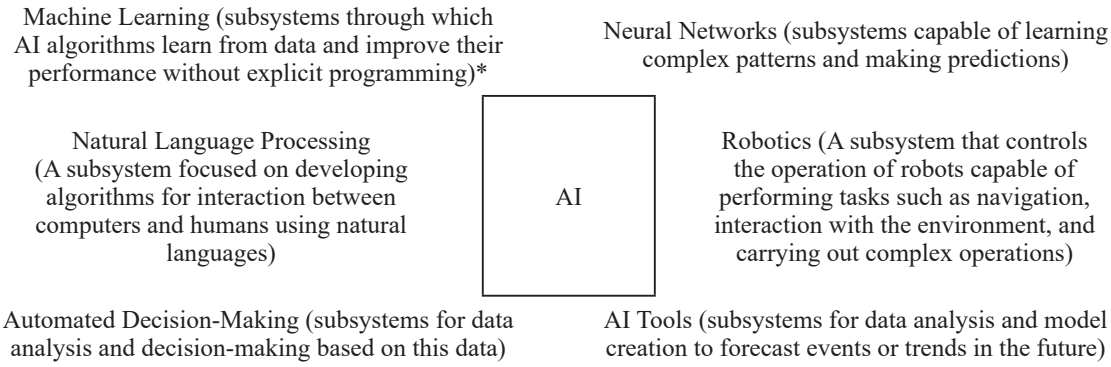

Figure 1. Components of AI used in the sustainable development of domestic business

Note

* They can be deep (deep learning), which allows working with large volumes of data and solving complex tasks, such as image and speech processing.

Source: compiled based on [1–2; 5]

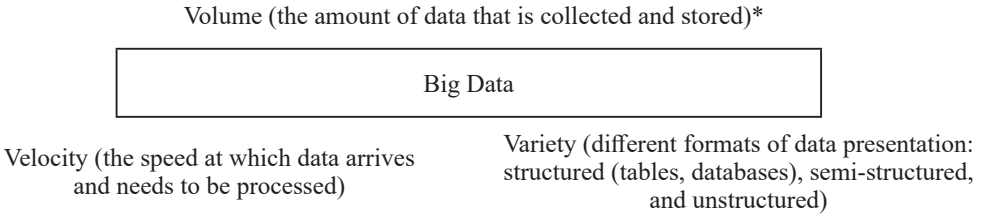

Figure 2. Components of Big Data used in the sustainable development of domestic business

Note

* These can be terabytes, petabytes, or even exabytes of data coming from various sources, such as social media, sensors, transactions, images, videos, etc.

Source: compiled based on [1–3]

Table 1

Detailed description of the roles of Artificial Intelligence and Big Data in the sustainable development of domestic business

Information Technology	Role in the sustainable development of domestic business
Artificial Intelligence (a system that models human intellectual functions)	Analysis of large volumes of data and creation of forecasts regarding future trends
	Automatic identification of patterns and trends, which is useful for businesses and governments when effective decisions need to be made based on numerous factors
	Automation of processes that typically require human intervention, such as processing applications, managing supply chains, or responding to changes in demand
	Reduction of costs and maximizing the efficient use of available resources in business processes
	Prediction of potential risks in financial, production, and other processes
	Creation of personalized products and services that meet the individual needs of customers
Big Data (a system that accumulates diverse sets of information)	Collection of vast amounts of information and its processing using specialized tools
	Formalization of important trends, patterns, and anomalies, which is useful for making well-founded strategic decisions
	Planning and managing inventory, reducing storage costs, and improving logistics
	Effective coordination of supply and production, minimizing delays, and enhancing operational efficiency
	Prediction of changes in demand for products or services, allowing businesses to better plan production and supply
	Creation of long-term forecasts for the strategic development of businesses, infrastructure, or even entire economic sectors
	Quick adaptation to changes in the external environment, such as fluctuations in market conditions or changes in consumer behavior

Source: compiled based on [1; 4; 6–7]

In particular, in the field of information technology, artificial intelligence and Big Data play a key role in ensuring sustainable development by creating innovative, flexible, and efficient digital solutions.

Thanks to Big Data technologies, deep analytics of user data is conducted, allowing the creation of personalized services based on individual requests and consumer behavior [6]. For example, Oll.tv (a Ukrainian service for watching movies, TV shows, and TV programs) and Promodj (a Ukrainian platform for listening to and downloading music, focusing on electronic music and DJ sets) use Big Data to provide recommendations tailored to users' tastes and preferences, thereby increasing customer satisfaction and loyalty.

For example, if a user regularly watches thriller movies or documentaries about nature on Oll.tv, the system may recommend new releases in these genres to increase the number of views. Promodj, in turn, collects information about the electronic music that users listen to, their favorite songs, as well as the time and location of listening.

Using this data, Promodj offers personalized playlists that select songs or albums based on the user's musical preferences. Additionally, artificial intelligence in the IT sector enables intelligent processing of information to identify patterns, predict technical failures in information systems, adapt software functionality to environmental changes, and proactively respond to potential threats. At the same time, in the IT sector, among the potential challenges that businesses face in the digital transformation process is the integration of AI and Big Data technologies into existing information systems (due to the high cost of infrastructure updates, security and privacy issues, etc.).

In the manufacturing sector, the application of AI is fundamental in creating predictive maintenance systems, reducing energy consumption, minimizing waste, and improving product quality at every stage. For example, the company "Wind Parks Ukraine" uses AI to monitor the condition of its turbines (wind turbines used for generating electricity at power plants), determining when and what type of maintenance will be needed. This allows for predicting failures before they become critical, reducing unexpected repair costs, minimizing equipment downtime, and ultimately improving production efficiency. Additionally, through predictive maintenance, the company reduces energy costs (timely maintenance of the turbines helps maintain their optimal performance level).

The use of Big Data technologies in manufacturing allows for optimizing supply logistics, managing inventory, and forecasting demand, which contributes to more effective planning and cost reduction. In particular, "Wind Parks Ukraine" uses big data analysis to forecast the need for specific components, such as turbine blades or rotor systems. Overall, the implementation of Big Data and AI into the core activities of a manufacturing enterprise enhances the quality of products and services, which is a crucial aspect for success in global competition (see Table 2).

At the same time, among the potential challenges that arise are the need for constant technology updates. This, in turn, creates a continuous demand for investment in new developments, employee training, and infrastructure improvement.

Thanks to the use of machine learning algorithms, retail companies are currently improving sales strategies and customer service. This can be observed in the examples of Rozetka (one of the largest online stores in Ukraine) and Prom.ua (an e-commerce platform in Ukraine that allows users to buy and sell goods) (see Table 3).

Thus, Big Data and AI enhance operational efficiency and ensure a better customer experience, which in turn contributes to increased sales and user loyalty. However, some potential challenges include technical failures and unforeseen issues in systems, which can completely block sales processes and customer service operations.

In the field of holding companies, which primarily operate in sectors involving the ownership of securities or other equity stakes in other companies, AI and Big Data have a significant impact on decision-making processes, risk management, portfolio optimization, and development strategies.

Thanks to their ability to process and analyze large volumes of information, these technologies provide a significant advantage in the competitive landscape, enhancing the effectiveness of investment activities and reducing risks associated with financial and operational decisions [4].

Dragon Capital, a company that provides brokerage services, investment banking support, asset management, and direct investments for institutional, corporate, and private clients, actively utilizes Big Data and AI technologies to enhance its investment strategies and mitigate risks. These technologies allow the company to effectively analyze vast amounts of economic and financial information (see Table 4).

Table 2

Features of the use of AI and Big Data by "Wind Parks Ukraine"

Features of Use	Specifics of Use	Benefits Formed
Predictive maintenance of wind turbines	Monitoring the condition of turbines and determining the need for maintenance before failures occur	Reduction of unexpected repair costs, decrease in equipment downtime, and improvement in production efficiency
Reduction of energy costs	Determining the optimal operating mode of turbines to maintain their maximum efficiency	Improved supply planning, reduction of storage and transportation costs, and prevention of critical component shortages
Data analysis to improve turbine performance	Monitoring the quality of production and the performance of wind turbines	Enhanced turbine performance, increased productivity at each stage of maintenance
Detection of anomalies and potential threats	Detecting anomalies in turbine operations to improve their immediate maintenance	Prevention of emergency situations, reduction of equipment risks, and ensuring safety and stability of station operations

Source: compiled by the author based on data from business entities

Table 3

Features of the use of AI and Big Data by Rozetka and Prom.ua

Feature	Rozetka	Prom.ua
Personalization of recommendations	Personalizes recommendations based on purchase history, views, and search queries	Recommends products based on purchase history, views, and search queries
Demand forecasting and inventory optimization	Predicts demand and ensures timely inventory replenishment, minimizing shortages and excess stock	Uses demand analytics to optimize sellers' inventory and forecast trends based on sales analysis
Customer behavior analysis	Analyzes customer data to create personalized advertising campaigns and improve customer engagement	Analyzes user behavior on the platform to improve marketing strategies
Supply chain optimization	Optimizes supply chains, ensuring timely delivery of products	Works with sellers to analyze product demand for rationalizing supply chains
Analysis of customer reviews and ratings	Studies product reviews and ratings to improve service quality and personalize recommendations	Collects and analyzes reviews to improve product visibility and recommendations on the platform
Price optimization	Creates effective marketing campaigns and offers that match customers' interests	Uses big data analytics for targeted advertising campaigns and improving customer engagement

Source: compiled by the author based on data from business entities

Table 4

Features of the use of AI and Big Data by Dragon Capital

Features of Use	Specifics of use	Advantages formed
Operational response to economic changes and adaptation of investment strategies	Analysis of large data flows, including financial reports, macroeconomic indicators, news, social media, as well as other public and private sources of information	Forecasting potential changes in financial markets, including exchange rates, asset prices, interest rates, and other economic indicators
Market risk assessment and management.	Processing and analysis of financial data, based on which risk assessments are conducted for different markets and assets	Reducing the likelihood of significant financial losses and ensuring effective risk management
Investment portfolio optimization.	Collection and processing of data regarding various investment assets, their risks, and potential profitability	Reducing investment risks through diversification and improving financial outcomes
Forecasting economic and financial changes.	Analysis of the dynamics of financial instruments and interpretation of macroeconomic indicators	Minimizing potential financial losses and enhancing the effectiveness of investment strategies
Automation of investment opportunity analysis.	Integration of automated analytical systems for selecting investment opportunities based on large data sets and risk forecasts	Reducing decision-making time, ensuring a quick response to new investment opportunities, and more efficient use of resources
Management of macroeconomic and political risks.	Analysis of data on political events, social trends, and changes in legislation that may impact financial markets and the economic situation	Minimizing the impact of macroeconomic and political changes on financial outcomes, enhancing the flexibility of asset management strategies

Source: compiled by the author based on Dragon Capital data

As a result, AI and Big Data optimize the processes of forecasting market changes, identifying potential threats, and investment opportunities. However, among the potential challenges that arise are issues related to data quality assurance, security concerns, and confidentiality, among others.

Conclusions. The research results indicate that AI and Big Data are powerful tools for the sustainable development of domestic business, enabling the resolution of a wide range of tasks, especially in areas such as IT, industry, trade, and management.

It has been proven that AI subsystems, such as machine learning, neural networks, natural language processing, and automated decision-making, provide significant progress in business operations, enabling the automation of processes, risk prediction, analysis of large data sets, and the creation of personalized products and services for clients.

It has been proven that Big Data, particularly its key characteristics – volume, velocity, and variety – play a crucial role in the sustainable development of business. Big Data enables the effective collection, processing, and analysis of vast amounts of information from various sources, which is essential for strategic planning, inventory management, improving logistics, and forecasting changes in demand.

It has been established that the integration of AI and Big Data allows enterprises in key sectors of economic activity not only to manage costs and business processes effectively but also to ensure proper adaptability to changes in the external environment, which is a critical factor for successful operation in a competitive market.

The prospects for further research lie in identifying the formats of new innovative solutions that enhance the operational efficiency of enterprises in key sectors of economic activity.

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