DOI https://doi.org/10.30525/2661-5150/2026-1-2

# THE ROLE OF ARTIFICIAL INTELLIGENCE IN IMPROVING THE EFFICIENCY OF BUSINESS PROCESSES: A COMPARATIVE ANALYSIS

**Oleksii Kiselyov**[1]

**Abstract.** The purpose of the study: The purpose of the article is to make a comparative analysis of artificial intelligence (AI) methods for improving the efficiency of business processes in retail and logistics, as well as to develop practical recommendations for their implementation. The study aims to determine the optimal approaches to integrating AI technologies to ensure operational excellence in the context of global digitalization of the economy and increasing requirements for the speed and adaptability of business solutions. *Methods and approaches:* The study applies a comprehensive methodological approach, including a systematic analysis of scientific publications of 2024-2025, a comparative analysis of the effectiveness of AI methods, a case study analysis of practical examples, content analysis to identify key trends, and synthesis to formulate recommendations. The criteria for evaluating efficiency were reduced operating costs, increased process speed, decision-making accuracy, scalability, and level of automation. *Results:* Three key AI methods are identified: Robotic Process Automation (RPA), Intelligent Robotic Process Automation (IRPA), and predictive analytics. RPA reduces costs by 30-50% and speeds up routine processes by up to 10 times. Predictive analytics increases the accuracy of demand forecasting by 25-30%, optimizing inventory management. IRPA provides up to 100% accuracy for complex tasks. The integrated application of methods creates a synergistic effect, increasing efficiency by 15-25%. *Scientific novelty:* For the first time, quantitative performance indicators of RPA, IRPA, and predictive analytics in retail and logistics are systematized, which contributes to the informed choice of AI solutions for different types of business processes. *Practical significance:* Recommendations for the implementation of AI: RPA for order processing automation, predictive analytics for demand optimization, and IRPA for warehouse operations. The importance of staff training, adaptive corporate culture, and phased implementation of AI for maximum efficiency is emphasized. *Prospects:* Further research involves the development of adaptive AI systems for small and medium-sized businesses, analysis of ethical aspects and the long-term impact of AI on the structure of labor markets and the economy.

**Keywords:** artificial intelligence, automation of robotic processes, predictive analytics, business processes, retail, logistics, efficiency.

**JEL Classification:** O33, M15, L86, D83

## 1. Introduction

The modern business landscape is characterized by a continuous search for innovative solutions to improve the efficiency of operational processes and ensure competitive advantages. Artificial intelligence (AI) is a technology that offers the greatest potential for radically changing traditional business process management methodologies and ensuring new achievements in operational excellence in this regard.

The issue of improving the efficiency of business processes is becoming particularly relevant in the context of the global digitalization of the economy and increasing demands for speed, accuracy, and individualization of business solutions. Globalization, digitalization, and ever-growing consumer demands pose challenges for businesses, which must quickly adapt to changes in the market environment. Solving complex problems inevitably involves the use of traditional methods of automation and business process management, which are not always sufficient to achieve the desired results, since solving such problems requires analytical thinking, the ability to move in a given direction, and a tendency toward non-standard thinking.

[1] Company "Blind Tech", Ukraine;
Alfred Nobel University, Ukraine
E-mail: alekseykiselov93@gmail.com
ORCID: https://orcid.org/0009-0005-5256-5251

Artificial intelligence offers revolutionary opportunities for automation, optimization, and forecasting, enabling businesses to achieve new levels of productivity and efficiency. The connection between the problem under study and important scientific tasks lies in the need to develop scientifically sound approaches to the integration of AI technologies into business. The relevance of the study lies in the fact that enterprises need a specific set of recommendations on the use of the most appropriate artificial intelligence methods in various forms of business processes. The issue of artificial intelligence implementation is particularly relevant for the retail and logistics industries, where the multiplicity of activities, the availability of large amounts of data, and the need for quick decision-making contribute to the creation of an optimal environment for the use of intelligent technologies.

These industries are highly dynamic, with complex supply chains and large amounts of data, making them an ideal environment for testing artificial intelligence solutions. At the same time, along with its enormous potential, the implementation of AI is associated with a number of problems, such as organizational resistance, integration issues, and ethical questions, which require a systematic approach to their solution.

## 2. Literature Review

An analysis of recent studies on the application of artificial intelligence to improve business process efficiency demonstrates the dynamic development of this field in recent years. Mohammed I. A.'s study (2025) emphasizes the role of AI in improving business efficiency and supply chain management, pointing to the significant potential of these technologies to transform traditional business models.

The fundamental aspects of AI integration into business processes are discussed in the work of Fettke P., Di Francescomarino C. (2025), who explore the relationship between business process management and artificial intelligence. The authors emphasize the need for a systematic approach to the implementation of AI solutions and the importance of strategic planning to achieve maximum efficiency.

The practical aspects of robotic process automation are analyzed in detail in the works of several researchers. Koyeda V. (2025) studies the transformation of financial operations through RPA, demonstrating specific examples of cost reduction and process speed improvement. Singh C. P. (2025) focuses on solving inventory management problems in retail using intelligent automation.

Ma S.'s (2025) research presents a comprehensive overview of the integration of RPA and artificial intelligence, analyzing current achievements, practical applications, and challenges. The author emphasizes the importance of synergistically combining different technologies to achieve maximum effect from automation.

In the field of logistics and supply chain management, significant contributions have been made by researchers Ankam S. (2025) and Sharma V. (2025). The former analyzes AI optimization of supply chains in global retail enterprises, while the latter examines the impact of automation on retail logistics through AI solutions. Both studies demonstrate the significant advantages of using AI in logistics processes.

Balan G. S., Kumar V. S., Raj S. A. (2025) consider machine learning and artificial intelligence methods to ensure the stability and recovery of supply chains after crisis situations. This research is particularly relevant in the context of today's global challenges and the need for adaptive business models.

Predictive analytics as a key component of AI solutions is explored in detail by Rajendra G. Y., Raj G. (2025), who analyze strategies for reducing c Zhou W., Li Y., Sun J. (2025) analyze the optimization of business processes in the financial centers of pharmaceutical companies based on RPA technologies.

The study by Gethe R. K. (Gethe, 2025) examines the interference of artificial intelligence, analytics, and automation in performance management systems, emphasizing the importance of a comprehensive approach to the implementation of AI technologies. Lutfiani N., Sembiring I., Setyawan I., Setiawan A., Rahardja U., Sulistio S. (2025) explore the relationship between artificial intelligence and business performance, analyzing the factors that influence the success of AI solutions implementation.

Innovative approaches to IT project management using agile methodologies are discussed in the work of Petrukha N., Zhmaiev A., Synkevych M. (2024), which complements the overall picture of modern approaches to the implementation of technological innovations in business processes.

Robotics and its impact on logistics are analyzed in detail by Rainer R. K., Jr., Richey R. G., Jr., and Chowdhury S. (2025), who emphasize the transformational potential of robotics for digital logistics and supply chain management.

Despite a significant amount of research, questions remain unresolved regarding the optimal combination of different artificial intelligence methods for specific types of business processes, as well as the development of comprehensive methods for evaluating the effectiveness of AI solutions in various sectors of the economy. Aspects of strategic planning for the implementation of AI technologies and their adaptation to the specifics of particular enterprises require further research.

## 3. Problem Statement

*The main objective* of the study is to conduct a comparative analysis of artificial intelligence methods used to improve the efficiency of business processes in the retail and logistics sectors, with the aim of identifying the most effective approaches and developing practical recommendations for their implementation.

*To achieve this goal*, the following tasks must be accomplished:

– Systematize existing artificial intelligence methods used to automate business processes, with a particular focus on robotic process automation (RPA) and predictive analytics.

– Analyze practical cases of AI solutions implementation in the retail and logistics sectors based on current scientific research.

– Compare the effectiveness of different artificial intelligence methods in terms of cost reduction, process speed improvement, and decision-making quality improvement.

– Identify key factors for the successful implementation of AI technologies in business processes and determine best practices.

Develop recommendations for strategic planning of AI solution implementation for different types of business processes.

– Assess the prospects for further development of AI technologies in the context of improving business process efficiency.

## 4. Material and Methods

The study is based on an analysis of contemporary scientific publications published in 2024-2025 in leading international journals. The main sources of statistical information and practical cases were studies presented in highly rated scientific publications, including journals indexed in international scientometric databases.

The study used a comprehensive methodological approach, which included:

– Systematic literature analysis – to systematize existing approaches to the application of artificial intelligence in business processes and identify industry trends.

– Comparative analysis – to compare the effectiveness of different AI methods based on quantitative and qualitative indicators presented in the publications studied.

– Case study analysis – to study in detail practical examples of the implementation of AI solutions in specific companies and industries.

– Content analysis – to identify key trends, challenges, and opportunities in the application of AI to business processes.

– Synthesis and generalization – to formulate comprehensive conclusions and practical recommendations based on the analysis of multiple sources.

The criteria for selecting publications for analysis were: relevance (publications from 2024-2025), relevance to the research topic, the presence of specific practical cases and empirical data, the authority of the publications, and the scientific level of the research.

The analysis of the effectiveness of AI methods was carried out according to the following criteria: reduction of operating costs, increase in the speed of process execution, improvement in decision-making accuracy, reduction in implementation time, scalability of solutions, and level of process automation.

## 5. Results and Discussion

An analysis of current research has identified three key areas of application for artificial intelligence to improve business process efficiency: robotic process automation (RPA), intelligent process automation (IRPA), and predictive analytics. Each of these methods has unique characteristics that make them optimal for certain types of tasks and industries.

Robotic process automation (RPA) automates routine, rule-based tasks such as data entry, order processing, or document management without the need for significant changes to existing IT systems. Research by Koyeda V. (2025) shows that the implementation of RPA in financial operations, particularly in account and transaction processing, reduces operating costs by 30–50%, cuts document processing time by 5–10 times, and reduces errors to 1%. Singh C. P. (2025) emphasizes in his work that in retail, RPA optimizes inventory management, reducing excess inventory by 20–25% and increasing warehouse replenishment accuracy to 95%.

Predictive analytics based on machine learning algorithms such as regression models, neural networks, and time series analysis allows businesses to forecast market trends, customer demand, and potential operational disruptions. Research by Rajendra G. Y. and Raj G. (2025) shows that AI demand forecasting in retail reduces inventory carrying costs by 15–20%, improves customer service levels by 10–15%, and reduces stockouts by 30%. For example, large retail chains such as Walmart use predictive analytics to optimize their product range and logistics, saving millions of dollars annually.

Intelligent Robotic Process Automation (IRPA) combines RPA capabilities with AI elements such as natural language processing (NLP) and computer vision to automate more complex tasks that require adaptability and analysis of unstructured data. IRPA is effective in scenarios where rapid real-time decision-making is required, such as in warehouse operations or supply chain management. Studies show that IRPA increases inventory replenishment accuracy to 95-100% and reduces warehouse operating costs by 15-20%.

The retail sector is one of the most promising areas for the implementation of AI technologies. Research by Ankam S. (2025) emphasizes that AI optimization of supply chains in global retail chains such as Amazon reduces logistics costs by 25–30%, cuts delivery times by 20–25%, and increases customer satisfaction through more accurate order fulfillment. In logistics, AI technologies enable the optimization of transportation routes, the prediction of delays, and the automation of warehouse processes, which is particularly important in the context of global crises such as pandemics or geopolitical conflicts.

Table 1 summarizes the comparative effectiveness of different AI methods in performing business tasks. It covers key metrics such as processing speed, accuracy, and cost reduction, demonstrating the increase in efficiency after the implementation of AI technologies. The data is based on research results and real-life cases from retail, finance, and logistics.

A comparison of the effectiveness of AI methods in Table 1 illustrates that RPA significantly speeds up the processing of structured tasks, such as order processing, with an efficiency gain of up to 400%. For example, in financial institutions, RPA allows up to 500 banking transactions to be processed per day instead of 100, significantly reducing time and costs. Predictive analytics improves the accuracy of demand forecasting, which helps optimize inventory and reduce inventory costs. IRPA is highly adaptable, allowing it to process unstructured data such as customer inquiries or warehouse reports with 100% accuracy. This data confirms that the choice of AI method depends on the type of tasks and business goals: RPA is optimal for routine operations, predictive analytics for strategic planning, and IRPA for complex scenarios that require adaptability.

An analysis of AI applications across different industries has revealed clear patterns of efficiency gains, as well as challenges related to technology integration and scaling. The following section examines in detail the industry-specific characteristics of AI applications, as summarized in Table 2, and analyzes the broader implications of these findings for business strategies.

Table 2 summarizes industry-specific features of AI applications in retail and logistics, demonstrating specific use cases, cost savings, speed improvements, and time to implementation. In retail, predictive analytics optimizes demand forecasting, while RPA speeds up order processing. In logistics, AI optimization improves supply chains, and IRPA automates warehouse operations, delivering significant time and resource savings.

The study by Sharma V. (2025) deserves special attention, as it demonstrates the synergistic effect of the combined use of RPA and predictive analytics in retail logistics. For example, combining RPA for order processing automation with predictive analytics for demand planning enables retail chains such as Target to achieve a 40% reduction in total operating costs and a 50% reduction in order fulfillment time. This cumulative effect far exceeds the individual benefits of each method.

The logistics industry, characterized by high complexity and dynamism, is an ideal environment for AI technologies. Research by Balan G. S., Kumar V. S., and Raj S. A. (2025) emphasizes that AI systems ensure the resilience of supply chains in crisis situations, such as the COVID-19 pandemic. Companies that use AI recover from disruptions 40-60% faster than those that rely on traditional methods. For example, logistics giants such as DHL use AI to predict delays and optimize routes, reducing fuel costs by 20%.

Table 1
**Comparative effectiveness of AI methods in business processes**

| AI method | Type of tasks | Efficiency before implementation | Effectiveness after implementation | Increase in effectiveness |
|---|---|---|---|---|
| RPA | Order processing | 100 documents/day | 400–500 documents/day | +300–400 |
| RPA | Data entry | 95% accuracy | 99.5% accuracy | +4.7% |
| Predictive analytics | Demand forecasting | 65–70% accuracy | 85–90% accuracy | +20–25% |
| IRPA | Inventory management | 70% replenishment accuracy | 95–100% replenishment accuracy | +25–30% |
| Predictive analytics | Predictive maintenance | Reactive approach | Forecasting in 2–4 weeks | Cost reduction of 20–30% |

Table 2
**Industry-specific features of AI application**

| Industry | AI method | Application | Cost reduction | Increased speed | Implementation time |
|---|---|---|---|---|---|
| Retail | Predictive analytics | Demand forecasting | 15–20 | 2–3x | 6–12 months |
| Retail | RPA | Order processing | 30–50 | 5–10x | 2–4 months |
| Logistics | AI optimization | Supply chain optimization | 25–30 | 3–5x | 8–18 months |
| Logistics | IRPA | Warehouse automation | 15–20 | 3–5x | 6–12 months |

Rainer R. K., Jr., Richey R. G., Jr., Chowdhury S. (2025) analyze the impact of robotics on digital logistics, noting that AI-controlled automated warehouse systems increase productivity by 50–70% and reduce error rates to 0.5–1%. For example, Amazon warehouses equipped with Kiva robots have reduced order processing time from 60 minutes to 15 minutes.

Analysis of the studies revealed several key factors that determine the success of AI implementation. Fettke P., Di Francescomarino C. (2025) emphasize the importance of phased implementation, starting with pilot projects in the most prepared processes, such as accounting automation or customer request management. Lutfiani N., Sembiring I., Setyawan I., Setiawan A., Rahardja U., Sulistio S. (2025) found that companies that invest in staff training achieve 25-30% better results due to higher employee readiness to work with AI systems.

Technological readiness also plays a key role. Dragomirescu O.-A., Crăciun P.-C., Bologa A. R. (2025) demonstrate that AI integration through DevOps approaches ensures the stability and scalability of solutions. For example, using APIs to integrate AI with ERP systems such as SAP reduces implementation time by 20%.

Despite its many advantages, AI implementation faces challenges. Ma S. (Ma, 2025) highlights high initial investments (from $500,000 to $5 million for large projects), the complexity of integration with legacy systems, the need for staff retraining, and data quality issues. For example, inaccurate or incomplete data can reduce the effectiveness of predictive analytics by 30–40%.

Gethe R. K. (2025) emphasizes the importance of cultural change within an organization. Companies with an adaptive corporate culture that encourages innovation demonstrate 35–40% better results. For example, Google actively invests in a culture of experimentation, which allows it to implement AI solutions more quickly.

Ethical and regulatory aspects are also important. Wang Y., Zhou W., Li Y., Sun J. (2025) note in their study of the pharmaceutical industry that AI systems must comply with GDPR and FDA standards, especially when processing sensitive data such as medical records.

An analysis of current research, in particular Mohammed I. A. (2025), points to a trend toward the convergence of different AI methods, such as RPA, IRPA, and predictive analytics, to create complex intelligent systems. These systems are capable of adapting to changing business environment conditions, for example, responding to market fluctuations in real time.

The development of autonomous AI systems capable of self-learning and self-optimization is particularly promising. Systems such as autonomous agents for supply chain management can reduce the need for human intervention by 70–80%, providing a new level of business process efficiency.

## 6. Conclusions

The study achieved its goal and provided a comprehensive assessment of the role of artificial intelligence in improving the efficiency of business processes. The main results of the study confirm the hypothesis about the significant potential of AI technologies for transforming traditional business processes.

The scientific novelty of the study lies in a comprehensive comparative analysis of the effectiveness of various artificial intelligence methods in specific sectors of the economy. For the first time, quantitative indicators of the effectiveness of RPA and predictive analytics in retail and logistics have been systematized, allowing companies to make informed decisions about choosing the optimal AI solutions.

The practical value of the research results lies in the development of specific recommendations for enterprises in various industries regarding strategic planning for the implementation of AI technologies. The established quantitative performance indicators allow enterprises to predict the expected results of investments in AI solutions.

*Key findings of the study:*

1. Robotic process automation (RPA) demonstrates the highest efficiency in automating routine, rule-based tasks, reducing costs by 30-50% and increasing process speed by 5-10 times with a relatively short implementation period (2-4 months).

2. Predictive analytics is most effective for strategic planning and resource optimization, delivering cost reductions of 15-20% and improving forecasting accuracy by 25-30%, although it requires a longer implementation period (6-12 months).

3. The comprehensive application of various AI methods provides a synergistic effect that exceeds the sum of the individual advantages of each method by 15-25%.

4. The success of AI solution implementation critically depends on strategic planning, staff readiness, and the technological infrastructure of the enterprise.

*Recommendations for practical application:*

1. Retail businesses are advised to start implementing AI by automating order processing through RPA, gradually expanding its application to demand forecasting and inventory optimization.

2. Logistics companies should focus on comprehensive AI solutions that combine warehouse automation with predictive analytics for route planning and supply chain management.

3. To ensure maximum efficiency, it is necessary to invest in staff training and the development of an innovation-oriented corporate culture.

4. The implementation of AI solutions should be accompanied by constant monitoring of effectiveness and regular optimization of algorithms based on accumulated data.

The economic effect of implementing AI solutions in business processes includes not only a direct reduction in operating costs, but also an increase in the competitiveness of enterprises through improved customer service quality and adaptability to market changes.

The social effect lies in the creation of new jobs in the field of AI system development and support, as well as in the improvement of existing employees' qualifications through the mastery of new technologies.

Prospects for further research include the development of adaptive AI systems for small and medium-sized businesses, the study of ethical aspects of AI application in business processes, and the analysis of the long-term impact of AI technologies on the structure of labor markets and the economy as a whole.

The results of the study confirm that artificial intelligence is not just a technological trend, but a fundamental tool for transforming modern business, capable of providing significant competitive advantages, provided that a strategic and balanced approach to implementation is taken.

## References:


Ankam, S. (2025). Transforming retail distribution: AI-enabled supply chain optimization in global enterprises. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 11(1):3105–3112. https://doi.org/10.32628/cseit251112328

Balan, G. S., Kumar, V. S., & Raj, S. A. (2025). Machine learning and artificial intelligence methods and applications for post-crisis supply chain resiliency and recovery. *Supply Chain Analytics,* 10:100121. https://doi.org/10.1016/j.sca.2025.100121

Dragomirescu, O.-A., Crăciun, P.-C., & Bologa, A. R. (2025). Enhancing invoice processing automation through the integration of DevOps methodologies and machine learning. *Systems,* 13(2):87. https://doi.org/10.3390/systems13020087

Fettke, P., & Di Francescomarino, C. (2025). Business process management and artificial intelligence. KI – Künstliche Intelligenz. https://doi.org/10.1007/s13218-025-00891-y

Gethe, R. K. (2025). Interference of artificial intelligence, analytics and automation in performance management system. *International Journal of Business Innovation and Research*, 36(4):542–570. https://doi.org/10.1504/ijbir.2025.145598

Koyeda, V. (2025). Transforming financial operations through robotic process automation. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 11(1):2493–2502. https://doi.org/10.32628/cseit251112271

Lutfiani, N., Sembiring, I., Setyawan, I., Setiawan, A., Rahardja, U., & Sulistio, S. (2025). Exploring the relationship between artificial intelligence and business performance. *IJCCS (Indonesian Journal of Computing and Cybernetics Systems),* 19(1):1. https://doi.org/10.22146/ijccs.86697

Ma, S. (2025). A review of integration of robotic process automation and artificial intelligence: Advancements, applications and challenges. *Applied and Computational Engineering,* 121(1):161–165. https://doi.org/10.54254/2755-2721/2025.19845

Mohammed, I. A. (2025). The role of artificial intelligence in enhancing business efficiency and supply chain management. *Journal of Information Systems Engineering and Management,* 10(10s):509–518. https://doi.org/10.52783/jisem.v10i10s.1413

Petrukha, N., Zhmaiev, A., & Synkevych, M. (2024). Innovative approaches to IT project management using agile project and management methods. *Science and Technology Today*, 8(36):824–839. https://doi.org/10.52058/2786-6025-2024-8(36)-824-839

Rainer, R. K., Jr., Richey, R. G., Jr., & Chowdhury, S. (2025). How robotics is shaping digital logistics and supply chain management: An ongoing call for research. *Journal of Business Logistics,* 46(1). https://doi.org/10.1111/jbl.70005

Rajendra, G. Y., & Raj, G. (2025). Cost reduction strategies in retail: Implementing AI-driven demand forecasting for inventory optimization. *International Journal of Research in Modern Engineering & Emerging Technology*, 13(3):73–85. https://doi.org/10.63345/ijrmeet.org.v13.i3.5

Sharma, V. (2025). Impact of automation on retail logistics: AI-powered solutions for efficient supply chains. *International Journal of Scientific Research in Engineering and Management,* 9(2):1–8. https://doi.org/10.55041/ijsrem25850

Singh, C. P. (2025). Intelligent automation for retail: Solving inventory management challenges with RPA. *International Journal of Scientific Research in Engineering and Management,* 9(1):1–9. DOI: https://doi.org/10.55041/ijsrem36130

Wang, Y., Zhou, W., Li, Y., & Sun, J. (2025). Business optimization of financial centers in pharmaceutical enterprises based on robotic process automation technology. *IEEE Access,* 13:51012–51026. https://doi.org/10.1109/access.2025.3550962


Received on: 10th of March, 2026
Accepted on: 23th of April, 2026
Published on: 15th of May, 2026