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THE IMPACT OF ARTIFICIAL INTELLIGENCE APPLICATION ON THE OPTIMIZATION OF LOGISTICS AND WAREHOUSE MANAGEMENT

The article explores the role of artificial intelligence (AI) in logistics, focusing on its transformative impact on warehouse optimization, supply chain management, and strategic decision-making. AI technologies are shown to automate routine processes, forecast demand, optimize transport routes, and implement dynamic pricing, which collectively improve efficiency, reduce costs, and enhance competitiveness. The study highlights that AI enables better demand forecasting by processing large datasets, analyzing seasonal fluctuations, and predicting consumer behavior, thereby reducing risks of shortages or overstocking. Machine learning algorithms and predictive analytics enhance inventory control, while computer vision improves warehouse automation by identifying damaged products and ensuring quality control. Furthermore, AI applications in transport management, including autonomous vehicles and GPS-based routing, contribute to reducing delivery times and fuel consumption, thus improving customer satisfaction. Dynamic pricing supported by real-time analytics increases adaptability to market conditions. The paper also addresses key challenges in AI adoption, such as high implementation costs, the need for skilled personnel, cybersecurity, and data privacy concerns. Integration of AI into supply chain networks requires both internal optimization and external partnerships, ensuring resilience in volatile markets. The practical significance of this research lies in providing companies with tools to develop AI-driven strategies for logistics transformation, enabling flexible resource management, omnichannel procurement, and effective risk mitigation. Forecasts indicate significant growth in AI applications across logistics and marketing, with the global AI in logistics market expected to reach 36 billion USD by 2030. The findings underline AI's innovative potential in achieving sustainable development, improving customer service, and reinforcing competitive positions in a globalized economy.

Keywords: *artificial intelligence; logistics optimization; supply chain management; demand forecasting; machine learning; inventory management; dynamic pricing; autonomous transport; cybersecurity; business resilience.*

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ВПЛИВ ЗАСТОСУВАННЯ ШТУЧНОГО ІНТЕЛЕКТУ НА ОПТИМІЗАЦІЮ ЛОГІСТИКИ ТА УПРАВЛІННЯ СКЛАДАМИ

У статті досліджується роль штучного інтелекту (ШІ) у сфері логістики, зокрема його трансформаційний вплив на оптимізацію складських процесів, управління ланцюгами постачання та стратегічне ухвалення рішень. Показано, що технології ШІ забезпечують автоматизацію рутинних процесів, прогнозування попиту, оптимізацію транспортних маршрутів та впровадження динамічного ціноутворення, що в комплексі підвищує ефективність, знижує витрати та зміцнює конкурентоспроможність. Доведено, що ШІ дозволяє здійснювати точніше прогнозування попиту завдяки обробці великих масивів даних, урахуванню сезонних коливань та прогнозуванню поведінки споживачів, що знижує ризики дефіциту чи надлишку товарів. Алгоритми машинного навчання та предиктивна аналітика підвищують рівень контролю запасів, а технології комп'ютерного зору удосконалюють автоматизацію складів шляхом виявлення пошкоджених продуктів і забезпечення контролю якості. Також показано застосування ШІ в управлінні транспортом, зокрема використання

автономних транспортних засобів та GPS-маршрутизації, що сприяє скороченню часу доставки, зменшенню споживання пального та підвищенню рівня задоволеності клієнтів. Динамічне ціноутворення на основі аналізу в режимі реального часу забезпечує швидку адаптацію до ринкових умов. У статті також розглянуто ключові виклики впровадження ШІ, зокрема високі витрати, потребу у кваліфікованому персоналі, питання кібербезпеки та захисту даних. Інтеграція ШІ в логістичні мережі передбачає як внутрішню оптимізацію, так і розвиток зовнішніх партнерств, що забезпечує стійкість у мінливих ринкових умовах. Практична значимість дослідження полягає в наданні компаніям інструментів для розробки стратегій цифрової трансформації логістики на основі ШІ, що сприятиме гнучкому управлінню ресурсами, розвитку омніканальних закупівель та ефективному зниженню ризиків. Прогнози вказують на значне зростання використання ШІ у логістиці та маркетингу, причому очікується, що до 2030 року глобальний ринок ШІ у логістиці сягне 36 млрд дол. США. Результати підкреслюють інноваційний потенціал ШІ у забезпеченні сталого розвитку, покращенні обслуговування клієнтів та зміцненні конкурентних позицій у глобалізованій економіці.

Ключові слова: *штучний інтелект; оптимізація логістики; управління складом; ланцюг постачання; прогнозування попиту; машинне навчання; автоматизація; динамічне ціноутворення; кібербезпека; конкурентоспроможність; стійкість бізнесу.*

Introduction. The relevance of using Artificial Intelligence (AI) in the field of logistics is driven by the increasing demands for speed and accuracy in process execution due to market dynamics. AI provides new tools for forecasting market trends, improving the accuracy of warehouse operations management, and optimizing delivery routes. This enables logistics companies to adapt quickly to changes, ensuring competitive advantages at the global level. However, the application of AI also raises a number of challenges, such as cybersecurity issues, data privacy, and the need for significant investments in technological infrastructure.

Methodology. The research is based on the analysis of literary sources, statistical data, and examples of AI applications in logistics. Methods of content analysis and comparison of the efficiency of various AI-based technological solutions for logistics process optimization are used, in particular, methods of demand forecasting, inventory management, route optimization, and the implementation of unmanned vehicles.

Main Sections

1. Demand Forecasting: AI is capable of processing large volumes of information to predict market needs, which reduces warehouse storage costs and improves the accuracy of supply planning.
2. Inventory Management: The use of machine learning algorithms for data analysis allows for more accurate determination of optimal inventory levels, automation of order processes, and reduction of the risk of shortages or overstocking.
3. Transport Route Optimization: AI provides dynamic management of routes and traffic flows, taking into account weather conditions, traffic jams, and other factors, positively influencing the timeliness of delivery.
4. Unmanned Transport: The introduction of autonomous vehicles reduces the human factor in logistics operations, increasing the safety and accuracy of deliveries.
5. Dynamic Pricing: AI algorithms allow companies to adapt product prices in real time, increasing their competitiveness.

Scientific novelty. The novelty of this research lies in a comprehensive approach to analyzing the impact of AI on the optimization of logistics processes. The article examines the

effect of AI on the efficiency of logistics and warehouse management, as well as highlights key innovative technologies that contribute to enhancing companies' competitiveness in the market.

Practical significance. The obtained results can be used by companies to develop strategies for implementing AI in logistics, which will help improve inventory management, optimize delivery routes, reduce costs, and increase customer satisfaction. The implementation of AI in warehousing processes will enhance the accuracy of demand forecasting, ensuring adaptation to changing market conditions and strengthening competitive positions.

Research results. The relevance of applying artificial intelligence in logistics systems is determined by the constantly changing market environment and the increasing complexity of tasks in this sector. One of the main challenges is the optimization of inventory management, transportation routes, and production planning under conditions of demand uncertainty and unpredictable market changes. Given the growing global competition, companies need to ensure the adaptability of logistics systems to respond quickly to changes in the production environment in order to remain competitive [7].

At the same time, the implementation of such technologies based on artificial intelligence requires overcoming a number of problems, including the complexity of deployment and the high costs of technological solutions. Data privacy protection and cybersecurity are also significant factors. Therefore, the main task is to balance the need for logistics optimization with the resolution of technical issues to ensure effective and sustainable functioning of logistics processes [5].

Logistics covers all stages of supply chain management: from the procurement of raw materials to the delivery of finished products to consumers. The integration of artificial intelligence into these processes can significantly reduce operational costs and increase productivity. To achieve these results, enterprises need digital transformation, automation of logistics and production processes in order to optimize efficiency [1].

Currently, artificial intelligence is already actively applied in logistics planning, and its further integration into delivery and distribution is expected. The use of AI in logistics planning enables companies to forecast demand in real time, significantly reducing the probability of errors compared to traditional methods [7].

The most widespread AI-based planning tools include AI consulting, AI/ML solution development, data science, as well as machine learning and artificial intelligence platforms.

Supply chain optimization through AI enables real-time demand analysis, allowing for dynamic adjustments of supply planning parameters, thus optimizing the entire supply chain and minimizing costs through more efficient resource utilization [5].

In the field of warehouse management, innovative AI-based solutions increase the efficiency of supply chain management. Forecasts indicate growth in the warehouse robotics market in the future, driven by the ability of such technologies to improve the efficiency of logistics operations.

Artificial intelligence is also used to detect product damage, providing visual inspection and identification of damaged goods in warehouses. Computer vision technologies enable quality control, increasing the level of warehouse automation.

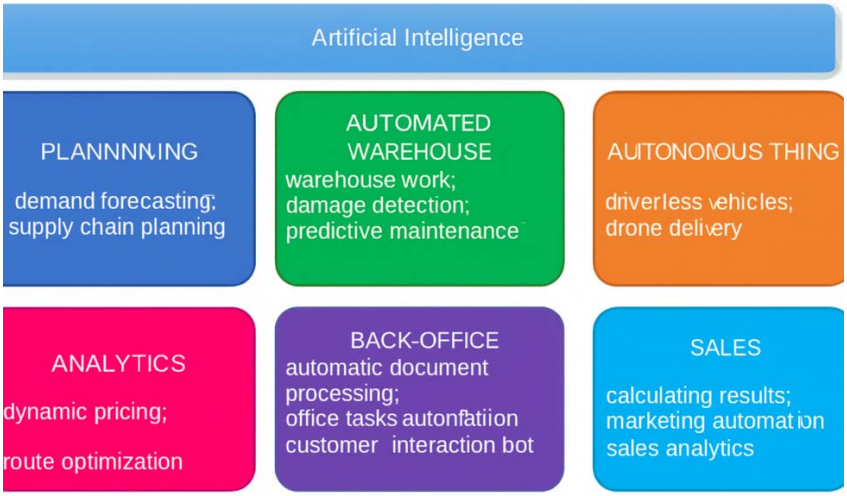
Predictive maintenance allows for forecasting potential equipment failures by analyzing real-time data. Using machine learning tools, it is possible to identify patterns in sensor data, which ensures timely responses and prevents downtime caused by technical failures.

Unmanned transport has the potential to significantly transform the logistics sector, as it reduces dependence on drivers and optimizes fuel consumption. With AI, autonomous vehicles can increase the efficiency and safety of transportation.

Dynamic pricing is a process in which prices are determined in real time, considering current demand and market conditions. Machine learning–based software analyzes consumer data and helps adapt prices according to market trends.

Route optimization and freight management involve the use of AI models to analyze existing routes and identify optimal ones. Algorithms such as the shortest path algorithm help determine the most efficient delivery routes, reducing costs and accelerating delivery. One example of such a system is the "Smart Roads" platform, which provides real-time information on road conditions for autonomous vehicles and users [1].

Thus, the potential of artificial intelligence in logistics systems encompasses a wide range of solutions that allow for improving supply chain management, inventory planning, and logistics processes overall.



Source: [18].

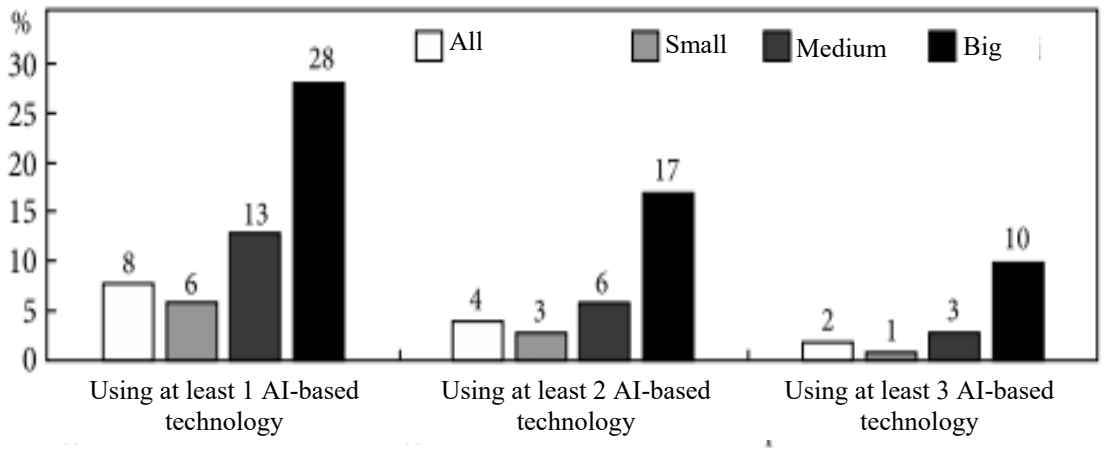
Figure 1. **The potential of artificial intelligence in logistics systems**

The functional role of artificial intelligence in modern logistics has significantly expanded: from monitoring contracts with carriers and negotiating tariffs to identifying and improving various links in the supply chain to increase company profitability. With the growing use of AI and machine learning methods in logistics and management processes, global supply chains will operate more efficiently. This growth in the implementation of artificial intelligence will contribute both to the efficiency of individual companies and to the overall development of the industry [2].

The transformation of the global economy under the influence of information technology innovations ensures the collection and analysis of environmental data through the global expansion of multinational companies. Artificial intelligence based on machine learning is becoming a key tool for solving tasks that are critical for success in today's market. Another important aspect is the automation of business processes within the framework of the Industry 4.0 concept, aimed at modifying mass production through product individualization and market hypersegmentation. In these conditions, the use of artificial intelligence in strategic management and business processes becomes an important factor in maintaining competitive positions even in crisis situations [7].

The growing importance of AI for optimizing internal company processes increases the need for investment in this area. In an unpredictable market, companies are forced to rethink their goals and business models, which stimulates the search for new approaches to optimizing limited resources and increasing flexibility to counter external challenges [4].

Research on the use of artificial intelligence in business practice indicates its potential for improving management efficiency, particularly through the analysis of the advantages and disadvantages of modern technologies. To determine the priority of these technologies, it is important to systematize the core competencies, updating them in accordance with current trends in the competitive market.



Source: [2].

Figure 2. **Proportion of companies using ai technologies, by enterprise size in eu countries, and by number of integrated technologies in 2021, %**

The innovative potential of artificial intelligence opens new opportunities for the development of internal processes, particularly in strategic management. AI enables more effective decision-making through market analysis, customer segmentation, risk management, and supply chain management, ensuring more accurate and faster real-time data analysis. This technology helps identify both advantages and risks that often remain unnoticed with traditional approaches such as SWOT analysis, Porter's Five Forces, or the McKinsey 7-S model [3].

At the same time, the use of artificial intelligence requires consideration of aspects such as data quality, confidentiality, and security. It is important to ensure that the data used for machine learning is accurate and reliable.

The use of artificial intelligence technologies among companies, according to Eurostat data for 2021, indicates a higher frequency of AI application in large companies compared to small and medium-sized enterprises. In 2021, 6% of small businesses, 13% of medium-sized businesses, and 28% of large businesses already used AI. This difference can be explained by the scale of AI implementation and the ability of large companies to gain greater benefits from such investments [5].

Marketing also benefits significantly from AI adoption, as the main goals of marketing – understanding customer needs, developing appropriate products, promotion, and competition – are greatly enhanced by AI tools. In 2021, the global AI in marketing market was valued at 15.84 billion USD, and forecasts suggest that this figure will reach 107.5 billion USD by 2028 [3].

Innovative AI-based solutions allow organizations to obtain up-to-date information for informed decision-making in dynamic environments. For example, the use of frameworks such as Bayesian learning helps better predict customer responses to marketing campaigns.

In 2022, AI technologies were already used in 35% of companies, and 42% planned to implement them in the future. Among the industries most transformed by AI, the sales sector leads, where progressive companies actively apply AI solutions to maintain competitive advantages.

AI-based software effectively adapts marketing content and advertising to customer needs by analyzing their behavior and identifying patterns. For example, AI-based bots can automatically adjust content according to user interests, ensuring fast and personalized interaction at any time of day [3].

This approach contributes to sales optimization and customer relationship management through CRM systems such as PipeDrive, Zoho, and Salesforce. AI enables the integration of data

from different departments, promoting better management decision-making and strategy implementation [2].

Predictive analytics based on AI makes it possible to forecast future sales by analyzing large volumes of data and identifying patterns. This increases the accuracy of forecasts, allowing managers to better plan performance indicators for further development [4].

Artificial intelligence, combined with automation, can contribute to long-term profit growth. According to Hubspot, 61% of companies that achieved their sales goals use automation in their processes, which increases efficiency and frees human resources for more complex tasks [1].

However, the integration of AI into a business model may be accompanied by difficulties if important factors such as the correct choice of scenarios, data quality, proper staff training, and others are not taken into account.

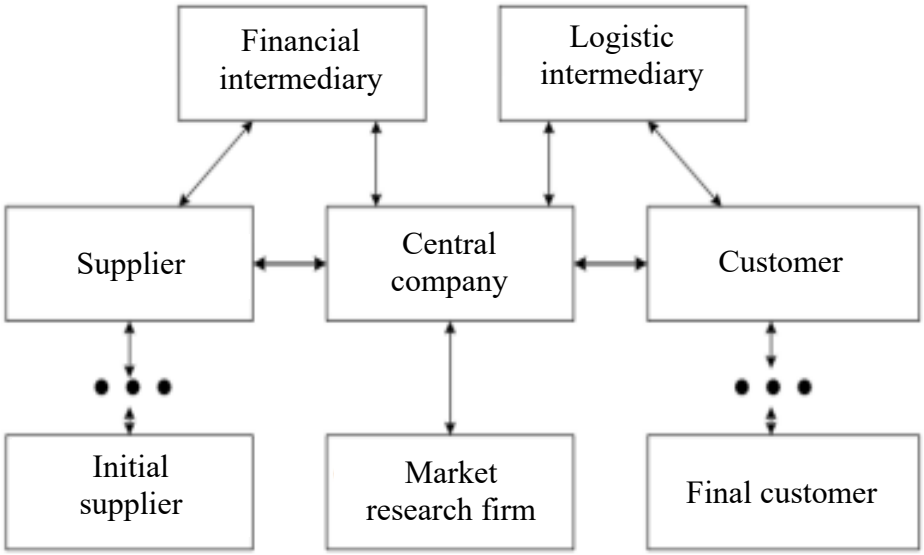
Different definitions of supply chains in modern literature have emerged from various motives, particularly in the context of goods and processes. To better understand this, it is important to consider the terms "object" and "process." An object is an element or process toward which activity is directed. A process is a sequence of actions leading to defined results and can be divided into stages. In light of these definitions, a supply chain can be represented as a set of organizations (e.g., manufacturing, warehousing, logistics) that collaborate to deliver goods from the source of raw materials to the end consumer.

A logistics system (LS) is a complex, dynamic system with subsystems that perform various logistics functions such as procurement, warehousing, and transportation. Logistic elements and links form the components of the LS, each carrying out specific tasks in the logistics process, creating an integrated structure for efficient management of goods and service flows. A logistics network is a structure containing supply chain details, with connections built on the basis of logistics flows, while a logistics channel includes intermediaries who transport goods from the manufacturer to the final consumer [1].

Logistics, according to different levels of involvement (1PL–5PL), varies in the range of services: from basic transportation services (2PL) to comprehensive management of the entire supply chain using modern electronic tools (5PL). Higher-level logistics operators, such as 3PL, 4PL, and 5PL, act as integrators of logistics processes and usually serve multinational corporations, especially in high-tech manufacturing sectors. Supply chain participants are divided into primary, who directly form business processes, and auxiliary, who support them by providing the necessary resources and services, including banks and insurance companies. In some cases, a single company may perform both primary and auxiliary functions, increasing the flexibility of supply chain management.

The classification by types of logistics (1PL–5PL) covers all levels of logistics support, from basic transportation to comprehensive logistics management using modern electronic tools. Such companies, particularly at the 3PL, 4PL, and 5PL levels, ensure the integration of logistics processes, enabling centralized supply chain management and meeting the demands of large corporations. The main elements of effective management are a systematic approach to building partnerships, optimization of logistics processes, integration of information flows, and the development of cooperation strategies among different market participants.

The development of the supply chain management concept emphasizes the importance of creating alliances to minimize costs and provide maximum benefits to end consumers. With the shift toward long-term cooperation, the focus has moved from cost minimization to the development of relationships between partners, which has increased the efficiency of interaction within the supply chain. This enables companies, during periods of socio-economic crises, to optimally allocate resources and coordinate their actions to overcome negative consequences.



Source: [24].

Figure 3. **Main parts of the supply chain**

The application of integration in the supply chain involves combining actions and resources to create a unified system that ensures the continuity of logistics processes and flows. According to the European Logistics Association, supply chain management includes the development of strategy, organizational structures, decision-making, and resource management. It is important to distinguish between internal integration (aimed at optimizing processes within the company) and external integration, which involves the use of third-party services, the expansion of partnerships, and the integration of information technologies.

The introduction of artificial intelligence (AI) into supply chain management has significant potential for optimizing processes such as demand forecasting, inventory management, and transportation routing. Through AI, it is possible to reduce costs, increase the efficiency of production processes, and identify patterns and trends in large volumes of data. This allows companies to respond more effectively to changing market conditions and reduce risks. Nevertheless, such innovations are associated with challenges, including significant implementation costs, cybersecurity, and data protection, which are particularly important given the large volume of information [1].

The implementation of AI in supply chains is accompanied by high costs for equipment, software development, and staff training, which may be burdensome for companies with limited budgets. Moreover, the vast amount of collected data poses a potential security threat, as unauthorized access or cyberattacks may compromise confidentiality and lead to information leaks, negatively affecting customer trust [2].

The need for qualified personnel to implement artificial intelligence is one of the main challenges in the logistics sector, as this technology requires specialists with deep knowledge of its features. Even if a company is ready to invest in training, the development of relevant skills takes considerable time and effort. According to SymphonyAI Retail forecasts, AI will remain one of the main trends in logistics in 2023. It is expected that by 2030, the AI market in logistics will reach 36 billion USD, and the technology will be actively applied in solving key issues such as finding alternative sources of supply and optimizing inventory management. The use of AI will also contribute to the development of omnichannel procurement, enabling the rapid analysis of offers from various online resources and the adaptation of assortments to consumer needs [6].

Strategic planning plays an important role in the process of integrating artificial intelligence into the supply chain. Planning involves setting specific goals and strategies that the company seeks to achieve through the implementation of technology. In particular, AI can be used to improve the efficiency of the supply chain by automating routine processes, accurately forecasting demand, and optimizing inventory, which contributes to cost and risk reduction. Data analysis carried out through AI allows companies to obtain more substantiated insights for decision-making in areas such as ordering, pricing, and marketing strategy development. Another aspect of strategic planning is the optimization of resources and reduction of supply chain costs with the help of AI, which makes it possible to reduce energy, material, and labor use [3].

Ensuring high data quality is a key element for the successful functioning of AI systems in global supply chains. The more accurate and up-to-date the data, the more effective AI forecasts and recommendations will be. This requires not only the use of high-quality information sources (such as inventory, order, and market trend data) but also the application of modern data processing methods—cleansing, transformation, and analysis. High-quality data helps model processes in line with market realities, which improves forecasting accuracy and facilitates strategic decision-making [4].

The availability of qualified specialists in machine learning, data analysis, and natural language processing is a determining factor for the successful integration of artificial intelligence into the supply chain. Competent experts must have a strong understanding of the technology and its capabilities, be able to work with large volumes of data, and implement machine learning algorithms. Such specialists may include data engineers, analysts, and programmers specializing in the development of AI systems and algorithms, which enhances company competitiveness [5].

Data security is an important component of the successful implementation of artificial intelligence in global supply chains. Companies use large volumes of data, which may contain confidential information about customers and internal processes. To protect this data, it is necessary to establish and adhere to security policies that include encryption, user authentication, the use of secure networks, and other measures. Regular security audits make it possible to identify potential vulnerabilities in a timely manner, ensuring reliable protection of information [5].

Partnership and cooperation are essential for the implementation of artificial intelligence in supply chains, as it requires interaction with partners, suppliers, and stakeholders. Such cooperation contributes to the optimization of the supply chain, allowing for the development of joint AI initiatives, data sharing, and mutual support in risk management [7].

The support of top management is critically important for the successful implementation of AI in the supply chain. Management provides a favorable environment for the introduction of technologies, allocates financial resources, and ensures the provision of necessary support for AI-related projects. Leadership involvement creates an atmosphere of change and engages teams in actively supporting automation initiatives [3].

Step-by-step implementation of AI is a practical approach that allows for gradual learning and adaptation to new technologies. By starting with small projects, companies can quickly assess the effectiveness of AI in specific processes and then expand project scope. This approach minimizes risks, enabling the gradual introduction of AI into broader areas of activity [3].

Monitoring and evaluation of results are important components of AI implementation, as they allow for the systematic study of the technology's impact on the efficiency and productivity of the supply chain. The analysis of achieved results helps organizations identify aspects of implementation that require improvement and adjust strategies in a timely manner. It is important to consider factors such as cost savings, product quality, and customer satisfaction to assess the extent to which AI contributes to achieving key objectives [3].

Procurement logistics is a fundamental component for companies of all sizes, including small and medium-sized enterprises. It covers processes of sourcing and supplying goods, inventory management, and communication with suppliers. The use of AI in procurement logistics helps simplify these processes, ensuring timely product supply and inventory optimization.

The use of information systems and software is an integral part of modern procurement logistics, enabling automation of purchasing processes, inventory management, and quality control. One popular platform is Shopify, which combines e-commerce functions with a point-of-sale (POS) system, synchronizing inventory levels in real time across all sales channels. Shopify provides convenient tools for sales tracking and analytics, helping companies monitor performance and adapt to customer needs through personalized marketing. In addition, the platform supports various payment methods and integrations for additional functions such as accounting and delivery, making it a universal solution for businesses of any size [5].

Demand forecasting is an important component of effective inventory management, reducing the risks of shortages or overstocking. Through methods such as regression analysis and machine learning, companies can plan purchases more accurately, taking into account product seasonality and market demand. This helps companies save warehouse resources and reduce costs associated with maintaining surplus goods.

Data analysis is another important tool that allows for identifying demand patterns and planning optimal inventory volumes. By using various data analysis software packages, companies can effectively minimize the risks of losses associated with shortages or surpluses of goods. Understanding trends and forecasts ensures timely procurement, maintaining a balance between available stock and product demand.

Optimization of transportation routes and warehouse locations is also a crucial aspect of ensuring an efficient logistics network. Selecting optimal delivery routes and warehouse sites, considering transport accessibility, logistics costs, and customer locations, contributes to cost reduction and improved service quality. The use of GPS routing, mathematical programming, and other tools allows companies to ensure fast and accurate delivery of goods, positively influencing reputation and customer loyalty.

Transportation management systems (TMS), decision support systems (DSS), and supply chain management systems (SCM) are automation technologies that help companies manage logistics flows and product distribution processes. The integration of these tools not only increases the efficiency of logistics operations but also ensures quality control and optimization of business processes in a rapidly changing market [7].

Procurement logistics is a key element of successful company operations, as it ensures the efficiency of purchasing and logistics processes, maintains product quality, and optimizes costs. The flexibility of procurement logistics allows companies to adapt to changes in demand and market conditions, which is important for maintaining competitive advantages and ensuring stable market development.

The advantages and risks of implementing new solutions are also an important aspect to be evaluated. The main advantages may include cost savings, increased productivity, improved service quality, and competitive advantages. However, the implementation of new technologies is also accompanied by risks such as high costs, technical difficulties, potential impacts on employees, and compatibility issues with existing systems. This underlines the importance of conducting detailed analysis before implementation to minimize potential risks and determine optimal ways of integrating new solutions into company business processes.

The configuration of the supply chain network covers the stages from production to final consumption, where each component plays a role in ensuring efficiency. Considering costs and

overall productivity of the network is crucial when forming the supply chain structure, as these factors determine the ability to achieve competitive advantages and reduce supply cycles.

The types of relationships among supply chain participants vary from fully controlled to uncontrolled, depending on the level of management and monitoring by the central enterprise. Central enterprises aim to establish relationships that allow for effective control of goods and service flows. However, full control is not always possible, making it important to build flexible partnerships that help maintain stability throughout the supply chain.

Uncontrolled relationships are those that the central company decides not to manage, acknowledging the limitations of its resources or relying on other participants. They provide flexibility and expand the autonomy of the supply chain, reducing the administrative burden on the central company. Relationships beyond the supply chain, such as cooperation with providers of financial or technical services, also affect efficiency, even if such actors are not direct participants.

Such differentiation in managing participants contributes to the adaptability of the supply chain, allowing the central company to optimally allocate resources, coordinate actions, and reduce risks. In modern conditions, supply chains are complex systems with numerous participants interacting through multiple channels. This increases the complexity of management, as it is necessary to balance cost minimization with a high level of service.

Uncertainty in the supply chain is inevitable; therefore, when designing it, it is important to provide opportunities to mitigate the influence of external factors such as demand fluctuations or changes in supply. Additionally, conflicts of interest among participants may arise when, for example, a manufacturer seeks to increase production volumes to reduce costs, while a distributor may prefer smaller batches to lower warehousing costs. Reconciling these interests helps avoid conflicts and supports effective supply chain functioning.

The integration of artificial intelligence into logistics processes contributes to solving many tasks such as demand forecasting and strategic planning. Thanks to AI, companies can adapt more quickly to market changes and achieve more reliable and resilient supply chains. The implementation of such approaches increases productivity and improves risk management, which is important for gaining competitive advantage in the global market.

Automation and information technologies play an important role in achieving these goals. For example, the use of electronic inventory management systems (EIMS), such as Shopify POS, allows for real-time stock control and synchronization of data across different sales channels, increasing accuracy and service speed. Demand forecasting based on machine learning methods also allows for more precise procurement planning and reduces the risk of product shortages.

Effective planning of transportation routes using mathematical algorithms and routing technologies such as GPS makes it possible to reduce logistics costs while ensuring fast delivery, which positively affects customer satisfaction. Optimal warehouse locations also contribute to improved logistics networks by reducing transportation costs and providing quicker access to customers.

Automated systems such as DSS and SCM (decision support and supply chain management systems) make it possible to automate planning and distribution processes, increasing company efficiency. The integration of artificial intelligence into supply chains helps optimize processes, making logistics more reliable and flexible.

Conclusion. The implementation of artificial intelligence and information technologies allows businesses to significantly optimize logistics processes, ensuring a more reliable and efficient supply chain. The integration of such technologies contributes to improved customer service quality and enables companies to make better use of their resources while remaining competitive in the market.

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