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**INTELLECTUALIZATION OF LOGISTICS  
AND SUPPLY CHAIN MANAGEMENT**

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*AUTOMATION AS THE FUTURE OF LOGISTICS*

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## AUTOMATION AS THE FUTURE OF LOGISTICS

**Danylo Grabovsky. Dmytro Bugayko. "Automation as the Future of Logistics".** *In the fast-paced, interconnected world of commerce and trade, automation has emerged as a transformative force within the logistics industry. Automation technologies are revolutionizing the way businesses manage their supply chains, offering unparalleled opportunities for efficiency, accuracy, and cost-effectiveness. As the global marketplace becomes increasingly complex and competitive, logistics plays a pivotal role in ensuring that products reach their intended destinations swiftly and seamlessly. The integration of automation, encompassing a spectrum of cutting-edge technologies, is ushering in a new era for logistics, redefining every aspect of the supply chain, from warehouse management to last-mile delivery. In this article we will delve into the profound impact of automation in logistics, exploring the benefits, challenges, and the evolving landscape of this transformative paradigm shift.*

**Keywords:** automation, logistics, paradigm shift, supply chains

**Данило Грабовський. Дмитро Бугайко. «Автоматизація як майбутнє логістики».** У швидкоплинному, взаємопов'язаному світі комерції та торгівлі автоматизація стала трансформаційною силою в галузі логістики. Технології автоматизації революціонізують спосіб управління своїми ланцюжками поставок, пропонуючи неперевершені можливості для ефективності, точності та рентабельності. Оскільки глобальний ринок стає дедалі складнішим і конкурентоспроможнішим, логістика відіграє ключову роль у забезпеченні того, щоб продукти швидко й безперешкодно досягали призначених місць. Інтеграція автоматизації, що охоплює спектр передових технологій, відкриває нову еру для логістики, переосмислюючи кожен аспект ланцюга постачання, від управління складом до доставки на останню милю. У цій статті ми заглибимося в

*глибокий вплив автоматизації на логістику, досліджуємо переваги, проблеми та зміну ландшафту цієї трансформаційної зміни парадигми.*

**Ключові слова:** автоматизація, логістика, зміна парадигми, ланцюги постачання

**Introduction.** In the fast-paced, interconnected world of commerce and trade, automation has emerged as a transformative force within the logistics industry. Automation technologies are revolutionizing the way businesses manage their supply chains, offering unparalleled opportunities for efficiency, accuracy, and cost-effectiveness. As the global marketplace becomes increasingly complex and competitive, logistics plays a pivotal role in ensuring that products reach their intended destinations swiftly and seamlessly. The integration of automation, encompassing a spectrum of cutting-edge technologies, is ushering in a new era for logistics, redefining every aspect of the supply chain, from warehouse management to last-mile delivery. In this article we will delve into the profound impact of automation in logistics, exploring

the benefits, challenges, and the evolving landscape of this transformative paradigm shift.

**The purpose of the article:** to analyze the impact of automation processes on the development of logistics and global supply chains, identify the main challenges and obstacles to this process and outline the paths for further development.

**Presentation of the main research material.** Warehouses, traditionally the epicenters of logistics operations, are among the first to experience the groundbreaking influence of automation. Automated storage and retrieval systems (AS/RS) have become the backbone of modern warehouses, employing robotics to efficiently manage inventory.

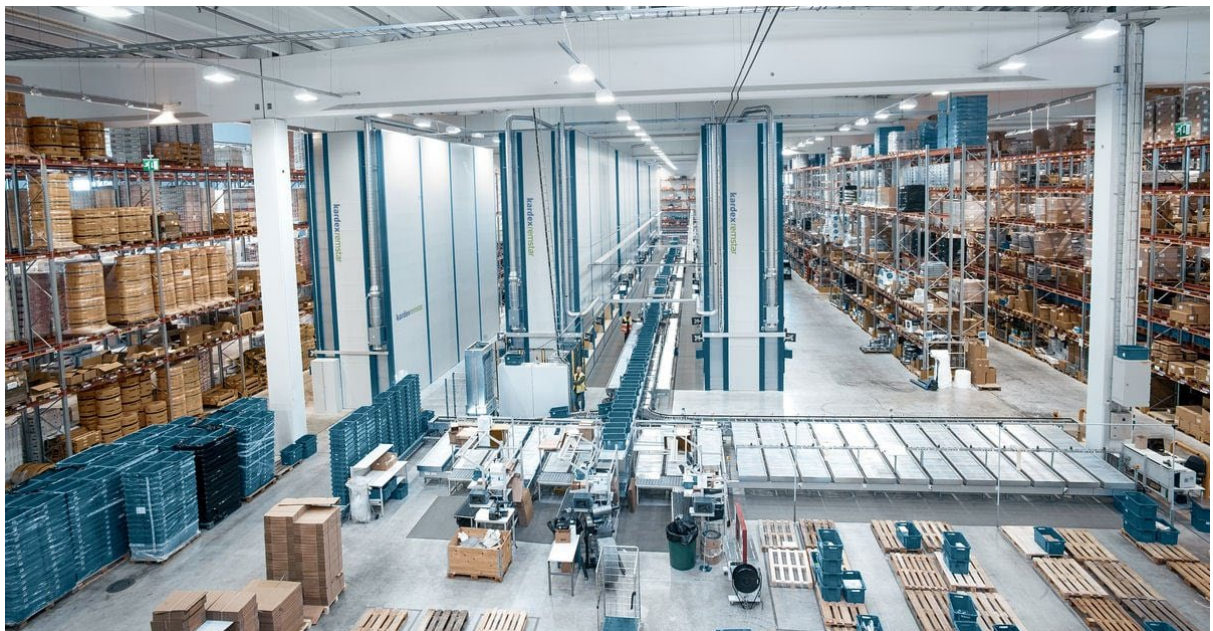


Fig.1. ASRS 101: Automated Storage and Retrieval Systems

Source: <https://us.blog.kardex-remstar.com/automated-storage-and-retrieval-systems-asrs> [1]

These systems boost storage capacity, cut labor costs, and dramatically improve inventory accuracy. The integration of automated guided vehicles (AGVs) and

drones within warehouse facilities facilitates seamless internal transportation, reducing reliance on manual labor and enabling round-the-clock operations. The result is accelerated

order fulfillment, enhanced accuracy, and ultimately, greater customer satisfaction.

Automation has fundamentally transformed the transportation of goods, introducing innovative solutions that

enhance efficiency and safety. Autonomous vehicles, including self-driving trucks and delivery drones, have significantly reduced the need for human intervention during transit.



Fig.2. Volvo and Aurora Launch Level 4 Self-Driving Trucks

Source: <https://www.carscoops.com/2024/05/the-future-is-here-volvo-and-aurora-launch-level-4-self-driving-trucks>[2].

Equipped with advanced sensors and AI algorithms, these vehicles optimize routes, reduce fuel consumption, and contribute to sustainability by minimizing emissions. Automation in transportation not only lowers operational costs but also enhances the reliability and predictability of deliveries.

Artificial intelligence (AI) and machine learning are pivotal components of logistics optimization. These technologies analyze vast datasets to forecast demand patterns, manage inventory levels, and determine optimal routing. AI enables just-in-time inventory management, resulting in reduced

carrying costs and mitigated risks of overstock or stockouts. Furthermore, AI has ushered in a new era of risk management, constantly monitoring for potential disruptions and offering alternative routes or solutions to maintain the flow of goods. Overall, the use of AI in ecommerce logistics is becoming increasingly essential in today's fast-paced business environment; however, research shows that not everyone in the logistics space is ready to adopt AI based strategies. Graph showing adoption of AI by logistics companies (see Fig.3) [3].



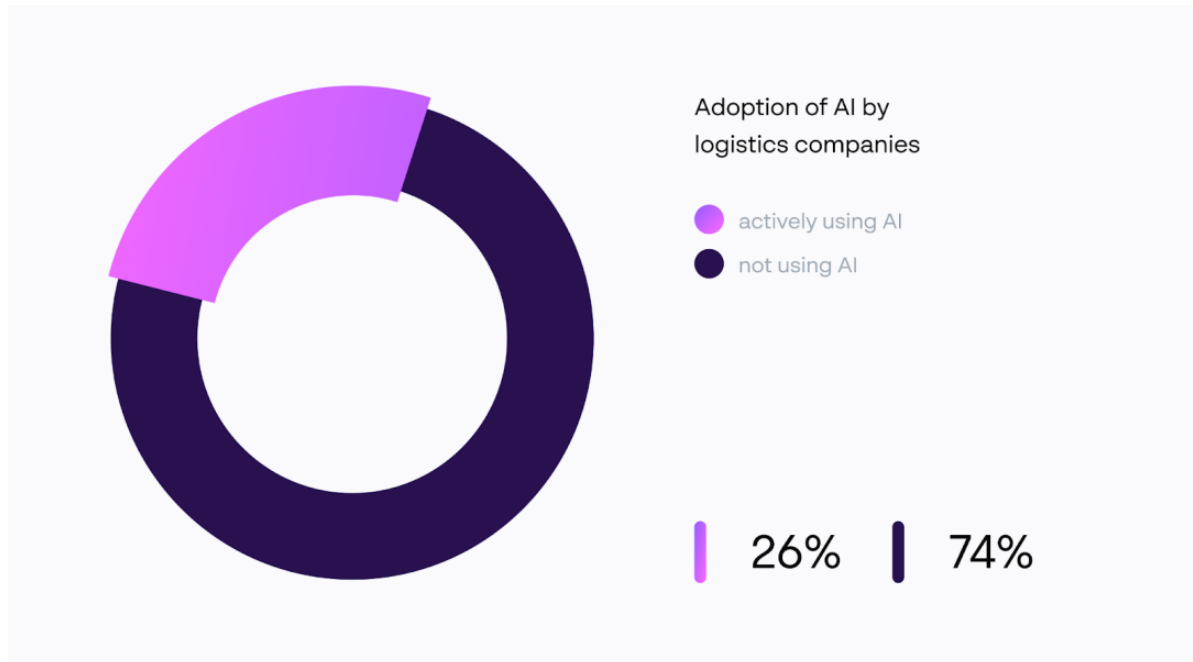


Fig.3. Challenges in AI adoption

Source: <https://en.codept.de/blog/5-ways-to-use-artificial-intelligence-in-logistics> [3].

The last mile of delivery, known for its complexity and high costs, is a prime beneficiary of automation. Drones and autonomous delivery vehicles have the potential to offer same-day or even same-hour delivery, reducing operational expenses

and significantly enhancing the customer experience. Innovative technologies, such as sidewalk-navigating delivery robots, have emerged to tackle the unique challenges of last-mile logistics, expanding delivery capabilities and efficiency.



Fig.4. Autonomous delivery vehicles

Source: [https://www.freepik.com/premium-ai-image/delivery-robots-navigating-sidewalks-streets-package-delivery\\_321403507.htm](https://www.freepik.com/premium-ai-image/delivery-robots-navigating-sidewalks-streets-package-delivery_321403507.htm) [4].

While the benefits of automation in logistics are clear, there are challenges to be addressed. The initial cost of implementing automation technologies can be substantial, necessitating careful financial planning and investment. Concerns about job displacement, as certain manual positions are replaced by automation, need to be addressed through workforce retraining and reskilling initiatives. Security and privacy issues related to the use of drones and AI require ongoing regulatory scrutiny to ensure ethical and safe practices.

The logistics industry is undergoing a profound transformation, driven by the increasing integration of automation technologies. Smaller businesses can now compete on a more level playing field with industry giants, leveraging automation solutions provided by third-party logistics providers. Logistics hubs and facilities are being reimaged to accommodate the needs of automation, and regulatory frameworks are evolving to address safety, ethical, and privacy concerns in this rapidly changing landscape.

**Conclusions.** Automation in logistics represents a seismic shift in the industry, offering the potential for enhanced efficiency, cost reduction, and superior customer satisfaction. To remain competitive in the global marketplace, businesses must embrace and invest in automation. The integration of automation in logistics is not just a trend; it is a necessity in today's fast-paced, interconnected world of commerce. It is reshaping the industry, setting new standards for efficiency and accuracy while challenging us to address ethical and regulatory considerations.

Automation will play a special role in the process of post-war restoration of the logistics sector of Ukraine, responding to the challenges of the reduction in the number of highly qualified personnel during the war period [5].

Logistics automation is not merely a transformation; it is a redefinition of how goods are moved, stored, and delivered, shaping the future of commerce and trade.

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