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MODERN CONDITION AND DIRECT DEVELOPMENT OF WAREHOUSE LOGISTICS

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ABSTRACT

Warehouse logistics plays an increasingly important role in the activities of enterprises and modern society in general. Warehouses are used both by manufacturing enterprises to store raw materials, materials and products ready for shipment, and by trading companies that store finished products there. The optimality of the work of industrial enterprises, the speed of turnover in trading companies, as well as the level of customer satisfaction depend on the efficiency of warehouse management. To organize an effective business, you need to be able to properly manage resources, flows and means. The main element of warehouse logistics is a warehouse, the purpose of which in modern conditions is no longer the storage of goods, it is transformed into a transshipment point for the provision of modern services of cross-docking, assembly, consolidation, sorting, labeling of goods in order to minimize the costs of transportation and storage of goods and reducing delivery time. This article analyzes modern warehouse logistics management mechanisms and examines its main types. It was determined that the growth of the consumer society and the rapid development of electronic commerce require innovative solutions to ensure higher warehousing efficiency. The world and Ukrainian market of warehouse services and its growth rates were also analyzed. The impact of digital transformation on requirements for warehouse logistics management is determined. On the basis of the research carried out, directions for the development of warehouse logistics in the modern world were identified.

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Introduction.

The management of the warehouse state is also highly valued by enterprises as a key link in third-party logistics. With the rapid development of the modern science of logistics management, the role of warehouse management has also changed both qualitatively and quantitatively, although its regulation of the volume of production and the initial demand function has not changed due to the high development of information technology and the wide application of computer knowledge in business,

the industry of warehouse management is becoming more informational and automated. The inventory management system is an indispensable part of business. The content is important for people who make decisions, and business managers, that is why the warehouse inventory management system is responsible for its mother's ability to give enough information and security methods to employees.

Analysis of recent research and publications.

In recent years, the issue of logistics and warehouse logistics, in particular, has been in the center of attention of domestic and foreign scientists, such as M.A. Aucklander, D.D. Bowersox, L.M. Chornenka, D.A. Ivanov, L.V. Husak, E.V. Krykavskyi, M.O. Kunytska, A.S. Zahorodnia et al. Their works describe the importance of organizing warehouse logistics. However, the issue of building effective warehouse operations requires further research.

Research purpose.

The main purpose of the research is the study of modern warehouse logistics, the types of warehouses and automation systems used at this stage, the analysis of the world and Ukrainian markets of warehouse services and new innovative opportunities for warehouse logistics.

Research materials and methods.

In this article uses general scientific methods of analysis and synthesis of action induction and deduction, the transition from abstract to concrete, as well as special methods of analysis: grouping, comparison, systematic and others.

Results.

Modern warehousing is a hub and control center in the logistics and supply chain system. WMS (Warehouse Management System) is a specific form of informatization of warehouse management. WMS is divided into three types: the first type is a logistics distribution center business system, such as a distribution center in a china supermarket and a spare parts distribution center in supply logistics and manufacturing. The second type is an integrated information storage system that coordinates and integrates the information system of various automated equipment. For example, various specialized equipment of enterprises has its own information system. The third category is an application system that focuses on management solutions for the warehouse industry. Such as general logistics companies that use a WMS system for enterprises that provide warehousing services [1]. The acceleration of technology has affected all aspects of modern business, including how third-party logistics (3PL) warehouses operate and provide services. Advanced warehouse technology solutions and automation offer greater efficiency, lower costs and increased profitability.

Warehouse automation is the practice of automating the movement of goods in and out of a warehouse with minimal human intervention to eliminate repetitive and time-consuming tasks. When we think of warehouse automation, we might imagine robots wandering around warehouses, but in many cases it can involve replacing manual tasks with software solutions. Warehouse automation can have significant upfront costs, but there are also many benefits such as speed, efficiency and reduced human error.

With online sales in the retail sector expected to reach more than $6.3 trillion by 2024, and the coronavirus pandemic fueling the need for online shopping, the demand for warehouse automation solutions has never been greater. Automation is becoming an increasingly attractive option, but also more affordable for companies operating in logistics, distribution and parcel delivery. As logistics costs rise, more and more countries are investing in warehouse automation solutions.

In 2020, the United Kingdom was the leader in warehouse automation with an average spend of $451,000 per warehouse. The United States ranked second with an average of $377,000 [2]. In 2020, there were approximately 151,000 warehouses worldwide. 25,500 of them were located in North America. Due to the boom in e-commerce, the number of warehouses worldwide is expected to reach just under 180,000 by 2025.

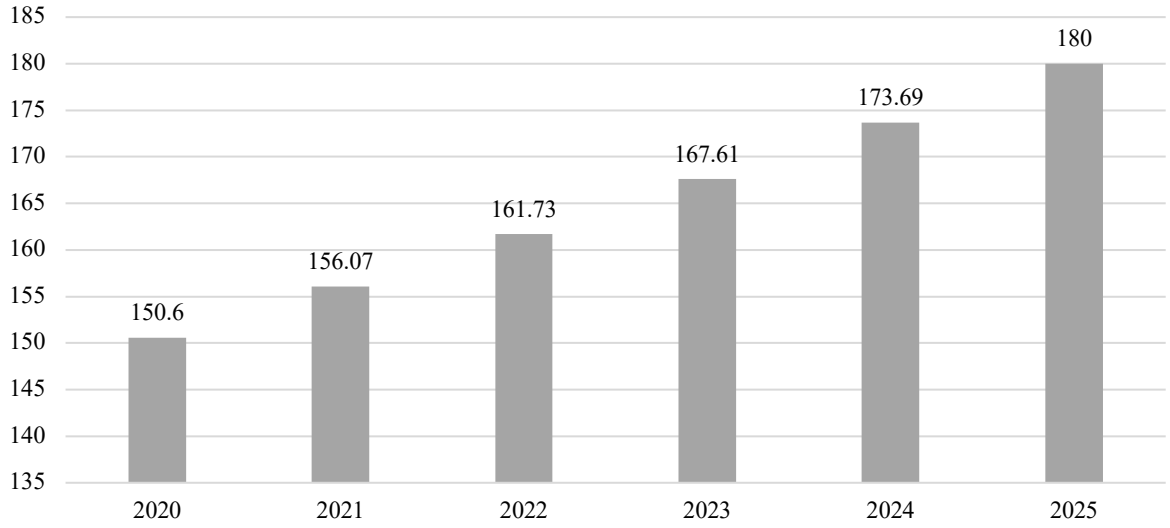

Fig. 1. Estimated number of warehouses in the world from 2020 to 2025 [3].

Technologies used in warehouse automation can range from simple replacement tasks, such as the use of conveyor belts or carousels, to complex technologies such as machine learning, robotics, and artificial intelligence (AI). However, the implementation of such technologies requires significant financial investments in hardware and software, as well as time and costs associated with the implementation of new systems and training of employees.

In 2020, about 384,000 units of industrial robots were shipped worldwide. Asia and Australia was the region with the highest number of units installed; approximately 266,000 units were installed in 2020 alone. It is predicted that by 2024 the number of industrial robots in these regions will reach 370,000 units.

Digital transformation is driving increased use of industrial robots. The global market for industrial robots, which was around US$45 billion in 2020, could reach an estimated US$102 billion by 2027 as more companies undergo digital transformation by incorporating technological equipment into the manufacturing process. Since then, the software market has grown and is expected to grow to just under US$40 billion by 2024.

This process of digitization can also be seen in the combination of the functions of industrial and service robots into a new type of robot: collaborative robots (collaborative robots). Designed to work in close proximity to humans, these co-bots are expected to become a large market that will reach a size of nearly US$1.5 billion by 2026. Collaboration robots are used for activities such as material handling as well as assembly.

The main demand for warehouse space is formed by distributors, retailers, and companies that are directly engaged in production. In 2018, in the structure of demand for warehouse real estate, retailers were in the lead – 63%, followed by representatives of medicine and pharmaceuticals and 3PL operators. Together, they occupied 95% of warehouse space, the remaining 5% were occupied by other segments. Among representatives of the industrial sector, producers of food, beverages, tobacco products, textiles and clothing have the greatest demand for warehouse space [4].

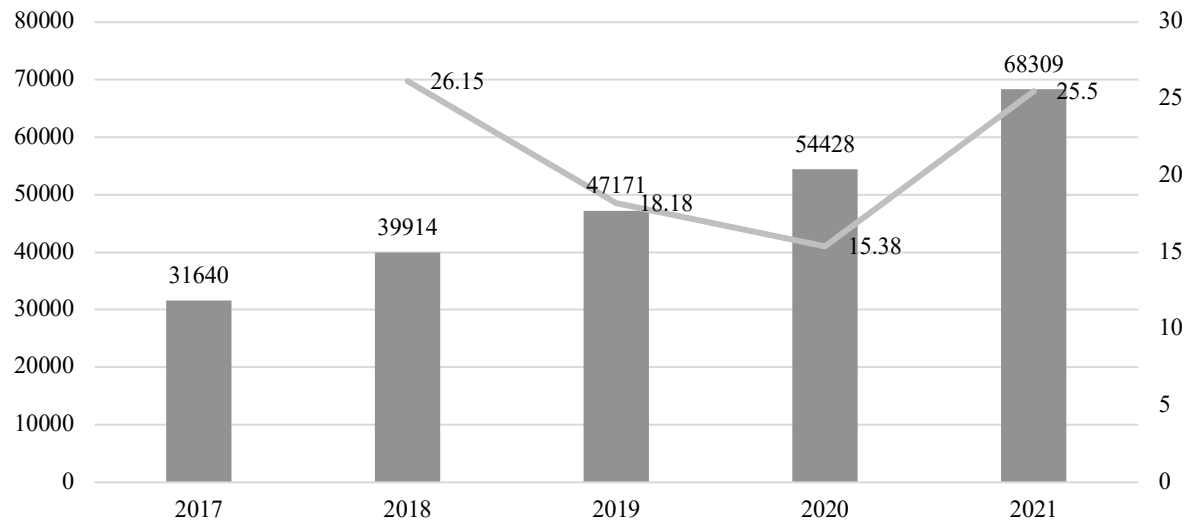

Fig. 2. Volume of warehouse services provided in Ukraine in 2017-2021, million UAH [5].

The volume of services provided by warehouse logistics in Ukraine, as well as in the world, is constantly growing. If in 2017 the volume of warehouse services amounted to UAH 31.6 billion, then in 2021 it increased to USD 68.3 billion, that is, more than twice. The rate of increase in the volume of warehouse services on the Ukrainian market was from 15.38% (2020) to 26.15% (2018). In the geographical structure of the warehouse logistics market of Ukraine in 2020, Odesa region was the leader with a share of 22.36%, Dnipropetrovsk region was in second place – 12.31%, Kyiv and Kyiv region occupied 12% and 7.36%, respectively.

Kuehne + Nagel, Zammler, Raben Ukraine, EKOL Logistics, FM Logistic form the five leaders in the field of warehouse processing and storage in terms of warehouse space. The warehouses of these companies are represented by class «A» and «B», «B» and «B +» warehouses. They are mainly located in Kyiv or the Kyiv region. There is also a trend of building new warehouses in Lviv and Dnipropetrovsk, which is connected with the growing demand in these cities. Lviv region is attractive due to its geographical location (it has a border with Poland).

In the near future, due to the large vacancy of warehouse spaces, it can be expected that new facilities will be absorbed by manufacturers, distributors and retailers immediately after putting them into operation. Responding to active demand, companies that provide warehouse services will begin to raise the rent (the rental rate can increase by more than 20%) [4].

Ukraine's warehouse logistics shows high rates of growth and introduction of automation and other innovative technologies. However, as already mentioned, the development of consumer society and e-commerce requires more active changes, which may include:

1. Optimization of 3PL. 79% of high-performing 3PL companies have revenue growth above the industry average. Optimizing and expanding your 3PL business with innovative technology leads to even greater heights for optimal profit growth. There is almost unlimited opportunity and potential for 3PLs that are serious about optimizing and scaling their business. The key to success lies in the centralized management of the flow of goods and services in the warehouse, which is under the control of supply chain management (SCM). Research shows that 3PL companies with optimal SCM have three times faster cash-to-cash cycles, while boasting a 15% reduction in supply chain costs [6].

2. The global warehouse automation market is over US$10 billion annually and is expected to continue to grow. Any 3PL company that wants to continue to grow needs automation, or it will suffer stunted growth due to inefficiencies. The rapidly growing market over the past few years has led to changes in operations, labor shortages and increased labor costs. In order to meet the demands of the evolving e-commerce market, warehouse logistics must step up their operations with modern automation to increase throughput and achieve significant levels of return on investment (ROI). Without turning to automation, a 3PL risks being left behind by the competition and facing a scaling dead end [7].

3. 50% of the time spent by the workforce in the warehouse or distribution center is spent on order picking activities. Selection time takes up too many valuable minutes and takes time in the execution process. Using a WMS in conjunction with barcode scanners and automated processes accelerates picking and processing. A WMS effectively integrates a large number of picking systems so that the picker can quickly fulfil orders on time. They can quickly find the shortest route, perform repetitive tasks, and check items in each order. There are many different types of collection technology (Fig.3) [8].

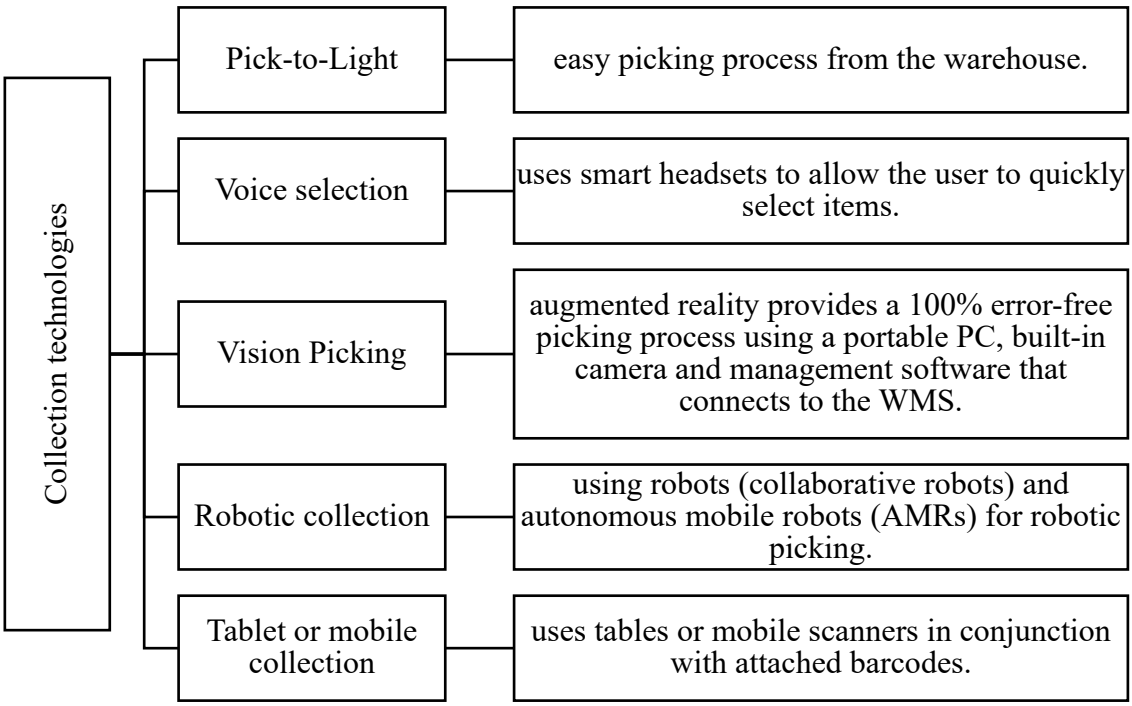

Fig. 3 Technologies of collecting orders in the warehouse [6].

4. 72% believe that warehouse management systems (WMS) are the best warehouse management software. WMS saves money, enables faster delivery and helps 3PLs stay competitive. A reliable WMS optimizes all warehouse operations, such as: warehouse management, accounting, receiving, packing, fulfilment, assembly, delivery, ownership of goods, inventory monitoring. WMS enables 3PLs to leverage multi-channel ordering and meet volume requirements [6].

5. More integrated forms of order processing with WMS result in more than 20% less space usage, 30% more efficient use of inventory and more than 25% productivity improvement. Using a WMS system for rapid integration of orders, picking and inventory management helps improve the efficiency of the entire supply chain. The goal of any WMS is always to improve the accuracy and efficiency of all processes. Accurate delivery and time management help avoid delays and control costs. WMS is becoming a critical component of any product management system, helping 3PLs manage speed and accuracy during spikes [6].

Conclusions.

As a result of the analysis of the current situation, it was established that the revitalization of the logistics market causes an increase in the demand for storage facilities and leads to an increase in consumer demands for the quality of services for the storage and processing of goods in warehouse complexes. The main goal of the work of 3 PL operators in serving cargo owners is to take into account their interests in ensuring full and high-quality processing of cargo with the rational use of existing resources (warehouses, transport, etc.). It is necessary to develop new approaches aimed at the effective organization of the warehouse complex due to the rational use of warehouse resources and optimization of functioning parameters.

Logistics information system process analysis and information system design can better manage warehouse relationships. In today's turbulent logistics environment, the warehouse link is particularly important in the logistics process. The analysis of the warehouse process is of great importance for the optimization of the warehouse link and the improvement of work efficiency.

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