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MODERN APPROACHES TO WAREHOUSE LOGISTICS MANAGEMENT

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Abstract. The article **aims** to systematize the main approaches to the definition of warehouse concept. It analyses modern approaches to warehouse logistics management and identifies the main advantages and disadvantages of their use in the enterprise logistics system. In the article the theoretical aspects of warehouse logistics are revealed and the existing approaches to warehouse logistics management of modern enterprises are analysed. The mechanism of warehouse logistics management was explored as well as the ways to improve its efficiency were suggested. **Methodology:** general scientific theoretical and empirical methods of research as analysis and generalization, methods of observation and comparison, analytical, grouping of data were used. The urgency and expediency of warehouse modification at Ukrainian enterprises is substantiated. The **relevance** of the article is the need to adopt domestic enterprises to a qualitatively new system of economic relations and mechanisms of competitive relations of the modern market as well as the urgent necessity to adapt business entities to uncertainty in order to improve their management organization strategies, including warehouse logistics. The **practical value** of the research results is that the proposals and recommendations for improving the warehouse logistics management process identified in the paper can be used by enterprises in order to use modern innovative approaches to improving the quality of logistics processes. In addition, the implementation of the proposed provisions will significantly reduce the logistical costs of the enterprise and optimize the activities of any production company.

Keywords: warehouse, preservation of quality of goods, warehousing logistics, inventory, cost minimization, optimization of logistics processes, modern logistics approaches.

JEL Classification: D24, L23.

INTRODUCTION

In the face of fierce competition, the issue of efficient allocation of production resources and ensuring their optimum level with minimal costs is solved through the use of cutting-edge logistics tools that increase the competitiveness of the enterprise, integrating the entity into a single logistics chain. In turn, the functioning of the logistics chain will not be effective without its full integration into market requirements, and warehouse is the main link between the manufacturer and the consumer. Economic activity cannot be aimed at wasting potential, which is why it is important to

qualitatively transform the actors of the market. To increase the level of economic activity, the company should minimize costs, including warehouse. In order to optimize such costs, there is warehouse logistics that helps in finding modern solutions for warehouse organization and process management in it.

LITERATURE REVIEW

International practice of business management indicates that the common way of increasing the competitiveness of enterprises in times of crisis is the logistic concept of management as businesses must organize their operations in such a way as to minimize the costs associated with moving and storing inventory from the primary source to the final consumer. One of the most important elements of the logistics management concept implemented at the enterprise is undoubtedly the optimization of its warehouse economy and ensuring the efficiency of warehouse logistics in general.

Theoretical issues of warehouse logistics management are covered in the works of Yu. K. Bazhenov et al. (1997), A. M. Hajinsky (2007), E. V. Krykavskyy (2004), R. Jindal (2012), I. A. Lenshin and Yu. I. Smolyakov (1996), H. Min (2006), Yu. M. Nerush and A. Yu. Nerush (2017), O. V. Tserkovna (2019), M. A. Oklander (2004), Y. V. Ponomariova (2003), B. Shah and V. Khanzode (2017), I. G. Smirnov (2004), T. Wild (2017) and others.

Nevertheless, the issues of qualitative organization and management of warehouse logistics at modern enterprises need more detailed study, given their significant actualization and role in forming the competitive advantages of the national economy.

PAPER OBJECTIVE

The purpose of the article is to systematize the main approaches to the definition of warehouse concept, to give examples of the basic systems of classification of warehouse space, to analyse the problems of existing approaches to warehouse logistics management of the enterprise and to reveal the advantages and disadvantages of the main modern areas of warehouse management in the domestic enterprise.

METHODOLOGY

Developing the research, general scientific theoretical and empirical methods were used, such as: analysis and generalization, methods of observation and comparison, analytical, grouping of data. The study also benefited from the Official State Statistics Committee of Ukraine's statistic data when researching the structure of the Ukrainian logistics services market.

RESULTS AND DISCUSSION

Warehousing logistics is a logistics industry that develops methods of organizing procurement, receiving, placement, accounting for material resources, warehousing and inventory management. The purpose of warehouse logistics is to reduce financial and time costs for warehousing and processing goods. Thus, warehouse logistics can be described as an open, stochastic, dynamic, sophisticated, and responsive feedback system that performs specific functions. The warehouse logistics system consists of several subsystems and functions to deliver goods to the full satisfaction of the buyer's needs with a minimum set cost level.

Enterprise storage system includes the following components:

Table 1

Warehouse components

Warehouse component	Elements of warehouse component
Warehouse	Warehouse and warehouse territories
Loading and unloading systems	Loading and unloading equipment, car and rail ramps
Internal transport systems	Conveyors, forklifts, trolleys
Goods processing systems	Bar coding, sorting, packaging and packaging lines, ordering
Goods storage systems	Shelves, pallets, containers, special equipment for maintaining the quality of goods
Systems of warehouse accounting of goods	Manual, automated and computerized goods accounting systems

Source: own study

Warehouse is an integral part of the activities of industrial enterprises, as its purpose is to reduce the time gap between production and consumption, which ensures the continuity of production and supply. Warehouse is a special building, construction and various equipment intended for receiving, placing and storing cargoes, preparing them for delivery to the consumer and consumption (Hadzhinsky, 2007).

When analyzing warehouse operations, it should be noted that they have certain features (mostly negative), such as:

1. Warehouses do not create additional consumer value, which means that warehouse operations are not a profitable activity.
2. The quality of cargo stored in a warehouse deteriorates over time and the risk of loss of goods as a result of theft increases.
3. Maintaining an appropriate warehouse and managing a warehouse requires considerable financial and time costs.
4. The long-term preservation of a large volume of stocks slows down the circulation of working capital (Ponomareva, 2003).

Logistics allows a complete and comprehensive analysis of any system of behavior in all its complexity and diversity, because the analysis of the operation of large systems requires a systematic approach. It can be concluded that a logistical approach is a systematic approach to the study of socio-economic systems. The peculiarity of the logistic approach is that each state of warehouse, as well as their totality is considered in relation, development and continuity and in the improvement to a qualitatively new state. Complex systems are thus regarded as a hierarchically interdependent set of open subsystems, and therefore, when making any management decision, their influence on related elements cannot be ignored (Grigor'ev and Uvarov, 2014).

The introduction of an efficient and technically equipped warehouse management at the enterprise on the basis of logistic approach allows achieving important production goals (Figure 1):

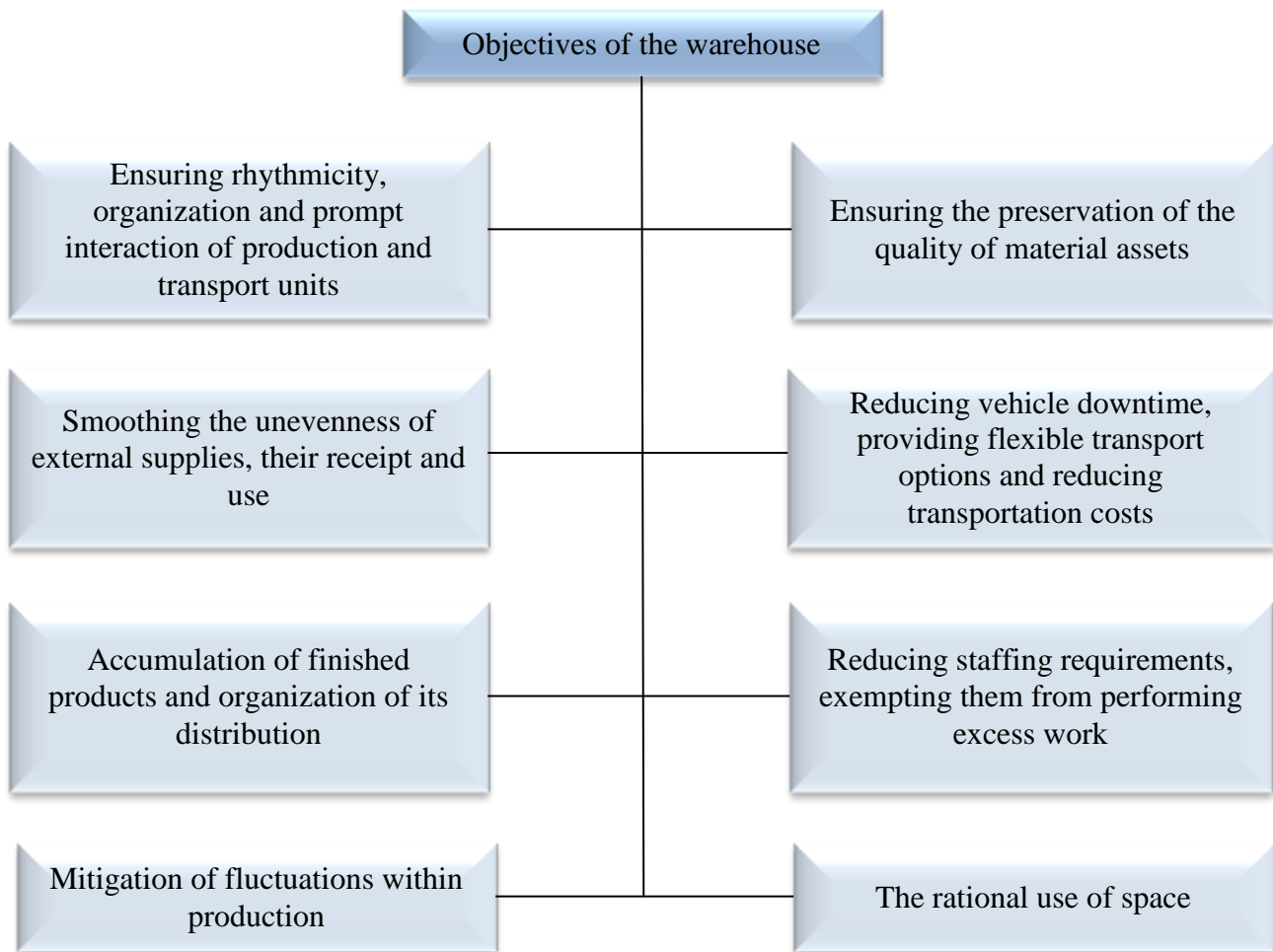


Figure 1. The main goals of creating a warehouse

Source: own compilation

So, analysing the goals of the warehouse management, the main tasks of warehouse logistics are the following:

- 1) placement of the warehouse network at the landfill;
- 2) effective inventory management;
- 3) storage and preparation of goods for delivery;
- 4) organization of deliveries and unloading and loading works.

The main purpose of warehousing in the enterprise logistics system is not to store goods, but rather to transform the parameters of material flows in order to use them as efficiently as possible. Such parameters are the volumes and quantitative composition of the consignments of goods, the method and type of packing, the number of nomenclature in the consignments, the time of departure and arrival of the consignments, etc.

It is at the level of the logistics chain that the main functions and technical requirements for the warehouse economy of the enterprise are formed. Therefore, in order to achieve a high level of warehouse operations and increase the level of profitability of the business, it is necessary to consider warehouses as an integrated component of the logistics chain. The profitability of the warehouse system of an enterprise is achieved only by an individual approach to its creation, taking into account all factors of influence. To accomplish these tasks, it is necessary to specifically define the functional tasks of the storage system.

Therefore, most scientists focus on the four basic functions of warehousing:

- transformation of production process into consumer according to demand;
- storage;
- transportation and unification of cargo;
- information support of warehouses and control over the process of order fulfillment;
- operations to maintain a high level of customer service.

In modern theory and practice, there are a large number of classifications of warehouses, which may be presented, according to their specific features in table 2:

Table 2

The main types of warehouses

Classification mark	Type of warehouses
Functional purpose	Sorting-distributive, cumulative and transit-transshipment
Size of usable storage area (storage volume)	small – up to 5 thousand m ² , up to 1 thousand tons; average – from 5 to 10 thousand m ² , from 1 to 6 thousand tons; large – more than 10 thousand m ² , more than 6 thousand tons
The level of automation and mechanization of unloading and loading operations	Non-mechanized, mechanized, complex-mechanized, automated and automatic
Transportation conditions	Ritual, at marinas, port, non-run (inland)
Form of use	Individual use, sharing
Ownership	Public, collective, private, joint
Surface height of premises	Low-altitude (single-storey), mid-altitude, high-altitude
Temperature mode	Warm, heated, unheated, refrigerated warehouses
The technical structure that determines the mode of storage of goods	General merchandise, special
Attitude towards logistics intermediaries	Own warehouses, warehouses of logistics intermediaries
Relation to the basic areas of logistics	Supply warehouses, distribution warehouses, production warehouses
The kind of products stored in the warehouse	Warehouses of raw materials, components, materials, warehouses of work in progress, warehouses of containers, warehouses of return waste, warehouses of finished goods

Source: own compilation

Thus, sorting-distributive warehouses make a big share in the warehouse turnover. Such warehouses are built for logistical operations on acceptance of cargo from the supplier, sorting, picking of cargo according to the order of retail resellers. Usually, they focus on current inventory, which does not last long. Such a function as cargo storage for sorting warehouses is not typical.

Transit and transshipment warehouses are created for the purpose of transporting goods from the production areas to the points of consumption by different modes of transport. Such warehouses act as transshipment points, which provide unloading of the goods that arrived on one mode of transport, its reception and sorting according to the destination and loading on another mode of transport.

Cumulative warehouses are created at the enterprise for the purpose of seasonal and long-term storage of goods. Warehouses ensure the long-term storage of cargo, so an important role is played by a quality control of cargo storage function in that case. Cumulative warehouses are concentrated mainly in the wholesale trade. Together with the main function of accumulation and storage of cargo, such warehouses carry out auxiliary technological operations related to the acceptance and dispatch of goods to wholesale intermediaries.

To characterize the Ukrainian segment of warehouse real estate, it should be noted that it consists of objects of the following types:

- 1) warehouses located in the territory of existing enterprises or those that are idle;
- 2) warehouses belonging to transport and forwarding companies;
- 3) repurposed industrial objects;
- 4) unfinished construction works being already completed;
- 5) basement and basement floors of buildings.

Only 15% of the Ukrainian warehousing segment is professionally designed and equipped with warehouse terminals and logistic complexes built at the end of the twentieth century.

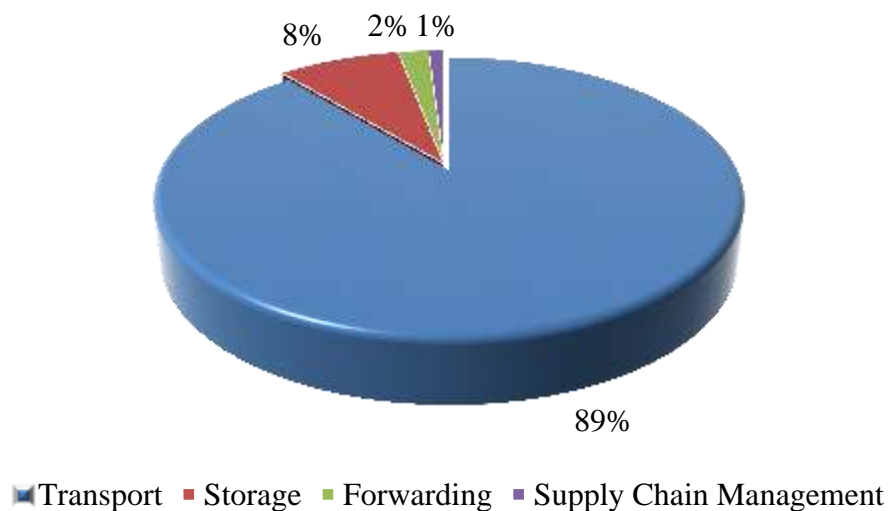


Figure 2. Structure of the Ukrainian logistics services market, 2018

Source: modified after (Official State Statistics Committee of Ukraine, 2020)

According to the results of the research (Official State Statistics Committee of Ukraine, 2020), the Ukrainian market of logistics services has the following structure: transport – 89 %, storage – 8 %, freight forwarding – 2 %, management of logistics supply chains – 1 % (Figure 2). In addition, experts predict the stabilization of the Ukrainian logistics market with a further growth rate of 6 to 9 % over the next 3-5 years.

The modern state approach of solving the problem of Ukrainian logistics is not able to effectively control the market of logistics services. There is no specialist training base in Ukraine, as well as training centers for such specialists. The implementation of modern logistics management approaches is constantly hampered by the state's inability to assimilate and integrate new ideas. For example, due to the imperfection of the legal framework, Ukraine still cannot resolve the issue of introduction and use of electronic document flow. Adoption of the relevant laws would improve the quality of logistics services, accelerate cash flow, process documents and currency transactions, which will give more opportunities to domestic players in the logistics services market to compete in foreign markets.

In the process of economic activity, the industrial enterprise faces the question of modifying warehouse activity, assessing the feasibility of existing ways of providing the company with warehouse space and the optimal search for ways to provide themselves with storage facilities or increase the efficiency of use in the presence of their own.

Modern logistic approaches are characterized by the emergence of a new concept of efficient management of logistics processes and business in general, which aims at reducing the time and financial costs associated with freight in the logistics chain. Supply Chain Management is called logistics supply chain management, through the integration of all business processes that underlie logistics. The basis of these popular modern methods of production modification is warehousing logistics.

At the present stage of development of domestic logistics, several trends can be traced that determine the importance of logistics in the effective construction of business processes:

1. Expanding the opportunity to increase the level of profitability of the business by minimizing production costs and reducing turnover costs.
2. Development of IT technologies and modification of information flows.
3. Active search for the most effective forms of organization of interaction of all market participants.
4. The need to regulate the processes of goods movement not only at the enterprise scale, but also at the regional and national level.
5. Improvement of technology (the logistics system is developing due to modern technical achievements in the transport and storage economy) (Miahkov, 2016).

The development of the warehouse industry in Ukraine is accompanied by a number of obstacles, such as:

1. Lack of land for storage facilities.
2. The complexity of the process of land lease registration.
3. Underestimation of economic benefits by local authorities for the region's extensive warehouse facilities.
4. The unwillingness of domestic companies to invest in warehouse automation.

Today in the domestic market there is a fierce competition between suppliers of different types of products, and the ever-increasing demands on the level of logistic service, speed of supply and quality of products require the majority of enterprises to invest more forces and means for improving the efficiency of supply chain management. Most SMEs successfully minimize costs and strengthen their competitive position by using modern approaches to warehouse management. Consequently, at some stage the idea of cross-docking emerged.

Cross-docking is the process of receiving and sending goods directly through a warehouse, that is, without placing them in a long-term storage area. Such a modern logistical approach involves unloading goods from incoming vehicles and loading them directly into the leaving trucks, eliminating the storage function between these processes. Cross-docking can be used to change the type of transportation, sorting of cargo destined for different destinations, grouping groupage loads from different sources into one container or vehicle. Such a logistic approach is a set of logistics operations in the middle of the supply chain that allow you to ship out of stock and deliver goods with a minimum delivery time.

Cross-docking is divided into two directions:

- 1) one-stage, when the cargo passes through the warehouse as a single order;
- 2) two-stage, for which the shipped goods are re-consigned, with the goods in storage are grouped or vice versa.

Cross-docking eliminates the costs of cargo storage, reduces the need for storage space and staff, and the receiving organization minimizes delivery time to the end consumer and the cost-effectiveness of deliveries, as well as extends customer base geography. According to the latest scientific research, the introduction of the cross-docking approach allows to minimize logistical costs for the delivery of goods from 5 to 15%. However, the use of cross-docking is impossible in the absence of counterparties, which is the basis of this method. Thus, potential partners may not have the necessary storage facilities or cargo fleet to operate the cross-docking system. It is critically important for a logistics company that uses cross-docking to have an appropriate IT system to monitor the execution of logistics operations and track the movement of goods. When transporting fragile loads, additional processing of the goods increases the risk of damage to the cargo (Table 3).

Table 3

Advantages and disadvantages of using cross-docking

Advantages	Disadvantages
Exclusion of costs related to storage of cargo	Subcontractors are required
Reducing the need for storage space	Cargo or transport fleet storage options are required
Minimize delivery time to the end consumer	Availability of IT system for controlling the execution of logistics operations
Expanding the geography of the client base	Risk of damage to fragile loads if they are further processed

Source: own compilation

One of the key principles of warehouse logistics is the analysis of existing management decisions to find ways to improve their efficiency. Based on this principle, there are modern approaches to optimizing logistics processes in warehouses:

- 1) “just in time” system, characterized by the fact that it clearly defines the exact time, amount of materials and the end result, which allows to optimize flows in such a way as to minimize production volumes;
- 2) ordering, which includes several systems of technological operations:
 - 2.1 automated system, managed by the operator and allows you to automatically submit goods;
 - 2.2 reducing the total time of order collection by eliminating downtime. This is due to the compilation of a route map detailing the way of movement of the collector, which in turn shortens the delivery time by almost half;
 - 2.3 logistic coordination between retailers and wholesalers to improve the promotion of finished goods;
- 3) a system for scheduling resource requirements that minimizes inventory and storage costs (Krykavskyy, 2004).

CONCLUSION

In the process of economic activity, the industrial enterprise faces the challenge of modifying warehouse activity, assessing the feasibility of existing ways of providing the enterprise with warehouse space and the optimal search for ways of securing itself with storage facilities or improving the efficiency of use in the presence of their own.

At the present stage of development of domestic logistics, several trends can be traced that determine the importance of logistics in the effective construction of business processes:

1. Expanding the opportunity to increase the level of profitability of the business by minimizing production costs and reducing turnover costs.
2. Development of IT technologies and modification of information flows.
3. Active search for the most effective forms of organization of interaction of all market participants (manufacturers, consumers, intermediaries, transport, warehouses).
4. The need to regulate the processes of goods movement not only at the enterprise scale, but also at the regional and national level.
5. Improvement of equipment (the logistics system is developing due to modern technical achievements in the transport and storage economy).

The development of the warehouse industry may be accompanied by a number of obstacles, such as:

1. Lack of land for storage facilities.
2. The complexity of the process of land lease registration.
3. Underestimation of economic benefits by local authorities for the region's extensive warehouse facilities.
4. The companies' unwillingness to invest in warehouse automation.
5. Absence of a base of specialists with appropriate professional training, as well as centers of training of such specialists.
6. Retarding the implementation of modern logistics management approaches due to the state's inability to assimilate and integrate new ideas.
7. The imperfection of the legislative framework, which is why some countries still cannot resolve the issue of introduction and use of electronic document circulation.

To solve the current problems of warehousing logistics, most large and medium-sized companies successfully minimize costs and strengthen their competitive position, using modern approaches to warehouse management, among which are the following:

- 1) introducing cross-docking methods, i.e. receiving and sending goods directly through the warehouse, i.e. without placing them in a long-term storage area;
- 2) application of the "just in time" system, which allows to optimize processes at warehouses;
- 3) warehouse management automation and use of modern IT technologies;
- 4) the use of a resource needs planning system that minimizes inventory and storage costs;
- 5) the application of the Supply Chain Management concept to manage logistics supply chains by integrating all business processes that underlie logistics;
- 6) ordering, which includes several systems.

The application of modern approaches in the management of warehousing logistics will allow companies to reasonably and purposefully resolve the issue of optimization of logistics operations in the supply chain, to implement the transition to innovative methods and technologies that correspond to the period of formation of the market of logistics services.

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СУЧАСНІ ПІДХОДИ ДО УПРАВЛІННЯ СКЛАДСЬКОЮ ЛОГІСТИКОЮ

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Стаття спрямована на систематизацію основних підходів до визначення поняття складського господарства. Проаналізовано сучасні підходи до управління складською логістикою та визначено основні переваги та недоліки їх використання в логістичній системі підприємства. У статті розкрито теоретичні аспекти складської логістики та проаналізовані існуючі підходи до управління складською логістикою сучасних підприємств. Досліджено механізм управління логістикою складу та запропоновано шляхи підвищення його ефективності. Методологія: використовувалися загальнонаукові теоретичні та емпіричні методи дослідження, такі як: аналіз та узагальнення, методи спостереження та порівняння, аналітичні, групування даних. Обґрунтовано актуальність та доцільність модифікації складів на українських підприємствах. Актуальність статті полягає у необхідності залучення вітчизняних підприємств до якісно нової системи економічних відносин та механізмів конкурентних відносин сучасного ринку, а також у нагальній необхідності адаптації суб'єктів господарювання до невизначеності з метою вдосконалення стратегій організації управління, включаючи складську логістику. Практична цінність результатів досліджень полягає в тому, що пропозиції та рекомендації щодо вдосконалення процесу управління логістикою складів, визначені у статті, можуть бути використані підприємствами з метою впровадження сучасних інноваційних підходів до підвищення якості логістичних процесів. Крім того, реалізація запропонованих положень значно знизить матеріально-технічні витрати підприємства та оптимізує діяльність будь-якого виробничого підприємства.

Ключові слова: склад, збереження якості товару, логістика складування, матеріальні запаси, складське приміщення, мінімізація витрат, оптимізація логістичних процесів, сучасні логістичні підходи.

СОВРЕМЕННЫЕ ПОДХОДЫ К УПРАВЛЕНИЮ СКЛАДСКОЙ ЛОГИСТИКОЙ

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Статья направлена на систематизацию основных подходов к определению понятия складского хозяйства. Проанализированы современные подходы к управлению складской логистикой и определены основные преимущества и недостатки их использования в логистической системе предприятия. В статье раскрыты теоретические аспекты складской логистики и проанализированы существующие подходы к управлению складской логистикой

современных предприятий. Исследован механизм управления логистикой склада и предложены пути повышения его эффективности. Методология: использовались общенаучные теоретические и эмпирические методы исследования, такие как: анализ и обобщение, методы наблюдения и сравнения, аналитические, группировка данных. Обоснована актуальность и целесообразность модификации складов на украинских предприятиях. Актуальность статьи заключается в необходимости привлечения отечественных предприятий к качественно новой системе экономических отношений и механизмам конкурентных отношений современного рынка, а также в настоятельной необходимости адаптации субъектов хозяйствования к неопределенности в целях совершенствования стратегий организации управления, включая складскую логистику. Практическая ценность результатов исследований заключается в том, что предложения и рекомендации по совершенствованию процесса управления логистикой складов, определенные в статье, могут быть использованы предприятиями с целью внедрения современных инновационных подходов для повышения качества логистических процессов. Кроме того, реализация предложенных рекомендаций значительно снизит материально-технические затраты предприятий и оптимизирует деятельность любого производственного предприятия.

Ключевые слова: склад, сохранение качества товара, логистика складирования, материальные запасы, складское помещение, минимизация затрат, оптимизация логистических процессов, современные логистические подходы.