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THE ROLE OF DIGITAL TECHNOLOGIES IN DEVELOPMENT OF THE LOGISTICS SYSTEM OF THE TRADE ENTERPRISE

The article highlights the main approaches to interpreting the essence of the concept of "digital technologies", namely: instrumental, innovative and information-technological, which allowed giving the author's definition of this term. Factors were revealed that show relevance of logistics at the current stage of development of market relations. The essence of the logistics system of the trading enterprise was studied, the goal, objectives, main functions and principles of its functioning were determined. Information technologies that can be used in managing the logistics process of the trade enterprise were highlighted, namely: ERP, MRPII, CSRP, TMS, WMS, CRM, SRM, SCM and E- commerce systems, and their characteristics and automation objects are given. Digital technologies are described that allow trading enterprises to more effectively manage the logistics system, including artificial intelligence (AI), big data (Big Data) and analytical systems, Internet of Things (IoT), CRM and ERP systems, and blockchain technology.

Keywords: *digital technologies, artificial intelligence, Big Data, IoT, CRM, ERP, blockchain, e-commerce, logistics system, trade company, digitalization, logistics, digitalization.*
Fig.: 3. Table: 1. References: 22.

Problem statement. The current stage of business development is characterized by constantly growing competition, globalization of markets and supplies, introduction of new management systems, changing economic situation and challenges such as the COVID-19 pandemic and full-scale military operations on the territory of Ukraine. These factors require all business entities, including commercial enterprises, to flexibly and effectively organize logistics processes, make timely decisions, and actively use digital technologies.

In dynamic external environment, trade enterprises need to develop innovative approaches to management, implement concepts and methodologies of integrated management, and apply digital technologies to accelerate and improve logistics, since success of the enterprise depends on the quality and validity of management decisions made. Logistics solutions are an example of the systemic approach to solving business problems for a trade enterprise. They cover all elements of the logistics system aimed at meeting customer needs and achieving a high level of satisfaction of all stakeholders, as well as at implementing strategic goals of the enterprise.

Modern business requires trade enterprises to constantly develop and adapt to changing conditions. To achieve success, it is necessary to improve the quality of goods, services and management systems, taking into account customer needs. In this context, logistics, as a service industry, is a key element that allows you to optimize business processes, improve the level of service and strengthen competitiveness. However, for effective operation of the logistics system, certain digital and information technologies are needed that will allow you to more quickly collect, process and analyze data about the internal and external environment, possible partners and contractors, service quality, etc. Thus, introduction of digital technologies into activities of trade enterprises will allow you to optimize most logistics operations, creating safe environment for business processes. Therefore, digital research in the field of logistics is a key priority for modern business.

Analysis of recent research and publications. Scientific works of both domestic and foreign scientists, such as Yu.A. Aaron, B.O. Anikina, L.L. Afanasiev, O.A. Bilovodskaya, L.M. Volynets, N.V. Voloshin, I.M. Goberman, T.V. Dudar, V.L. Dykan, S.M. Ilyashenko, A.G. Kalchenko, E.V. Krykavsky, P.R. Levkovets, K.V. Melnikova, O.V. Popelo, N.I. Chukhrai, J. Stock, D. Lambert, and other scientists and practitioners in the field of logistics are devoted to theoretical provisions and practical aspects of studying the issue of logistics service management. Scientists including G.V. Baranets, V.O. Shyshkin, V.I. Perebiynis, I.O. Kuznetsova, G.M. Tarasyuk and others studied the logistics system of enterprises and its interaction with strategic planning and development of enterprise development strategies.

As for scientific works devoted to application of digital technologies in development of the logistics system of enterprises, as well as their role in logistics management of companies, it is worth highlighting the following scientists: V.Ya. Gavran, N.G. Georgiadi, D.A. Glukhova, N.M. Gurzhiy, A. Dligach, O.S. Drugova, V.G. Margasova, N.S. Medzhibovska, A.Yu. Pakholkova, G. Platukha, V.I. Sergeeva, V. Skitska, M.V. Kharchenko, O.A. Tsymbalistova, E.V. Yudenko, C. Rauh, G. Kovacs, S. Kot. These scientists emphasize that for the effective functioning of the logistics system, it is necessary to actively use digital technologies. This will ensure the unhindered flow of goods, capital, information, services, etc.

Identification of previously unresolved parts of the general problem. Despite numerous scientific works devoted to studying logistics systems of enterprises, at the current stage of development it is necessary to take into account the changes taking place in economic processes, apply new approaches to the analysis of the importance of logistics solutions in the activities of commercial enterprises, and introduce digital technologies, which requires additional scientific research.

Purpose of the article. The purpose of the article is to study the role of digital technologies in development of the logistics system of retail enterprises to analyze the impact of these technologies on the logistics efficiency.

Presentation of the main material. Modern development of digital technologies makes their implementation necessary to improve the quality of economic, financial and logistical activities. Logistics management requires the comprehensive approach, which includes creation and analysis of effective management methods, as well as ensuring the coordinated work of all logistics units. Enterprises use digital infrastructure to expand capabilities and accelerate logistics operations. Smart logistics, based on automation and modern digital technologies, is becoming especially relevant. Given complexity of logistics processes, the need to establish economic ties, quality control and security, as well as taking into account geopolitical challenges and changes in the strategies of large companies, digital technologies in logistics are gaining importance.

Digital technologies can be considered from several perspectives, namely:

– digital technologies that can be used in strategic planning and in the analysis of large amounts of information: Big Data, data analytics and artificial intelligence;

– digital technologies that allow you to automate certain business processes: enterprise management systems (ERP), customer relationship systems (CRM), etc.;

– digital technologies that allow changing the ways of communicating with customers: using social networks, mobile applications and online platforms provides companies with effective tools for constant communication with customers, collecting feedback and promptly responding to their needs, which contributes to increasing the level of satisfaction and loyalty;

– digital technologies aimed at introducing innovations into the work of the enterprise and increasing its competitiveness. These digital technologies include the Internet of Things (IoT), blockchain and cloud computing, the above technologies allow you to create unique services and products, gaining competitive advantages. It is application of innovative solutions based on digital technologies that help to adapt more quickly to changes in the market environment.

Therefore, digital technologies are a certain set of tools and instruments based on the use of digital (discrete) rather than analog signals for collecting, storing, processing and transmitting information. These technologies include computers, mobile devices, software, the Internet, social networks; cloud computing, artificial intelligence, the Internet of Things, blockchain, Big Data. These technologies are changing the way we interact and process information, increasing business efficiency, improving data management, creating new business models, and optimizing production, which contributes to the development of various sectors of the economy.

At the legislative level, definition of the concept of digital technology is given in the Law of Ukraine “On the National Informatization Program”, where:

“digital technology - a set of systematized legal, scientific, technical, organizational solutions aimed at the use of computers and other electronic computing equipment, software and other means to reduce the participation of the user of information and communication systems and informatization tools during the collection, reception, processing, transmission of information or the complexity of the operations performed” [4].

Regarding scientific approaches to defining the definition of "digital technologies", they can be groupped into three groups, namely: digital technologies as tools; digital technologies as innovations; digital technologies as a way to achieve the specific goal based on using information technologies. The main approaches to defining the concept of "digital technologies" are shown in Fig. 1.

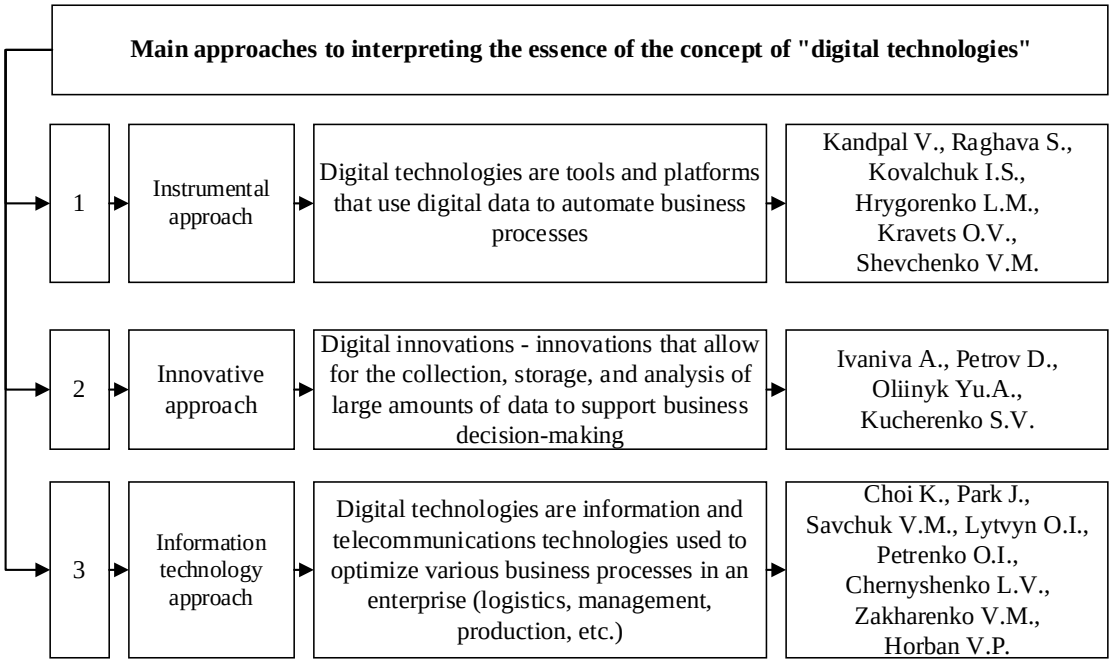

Fig. 1. Main approaches to interpreting the essence of the concept of "digital technologies"

Source: systematized by the authors based on [3, 5, 7, 9, 12, 13, 15, 20-22].

Therefore, in the existing scientific research there is no single approach to interpreting the essence of the concept of "digital technologies". This is explained by the multifacetedness and complexity of the processes that are included in this concept. That is why, in this study, we will understand digital technologies as a set of electronic tools and software products that use digital data to automate business processes in an enterprise.

Considering the concept of "logistics", it is appropriate to note that it comes from the Greek "art of calculation, reasoning" and has long been used in scientific and technical fields. In the field of economics and business, logistics as a practical activity has become especially relevant since the 70s of the 20th century. In a broad sense, logistics covers planning, control and management of flows. Therefore, the main criterion for success of logistics operations is to ensure maximum level of services with minimal costs of all types of resources.

Logistics of the trading enterprise is a holistic system that combines purchasing and selling goods. The effectively organized logistics system takes into account all stages and business processes related to goods from their purchase to sale to the end consumer, which helps reduce costs and increase efficiency of the enterprise. Logistics of the trading enterprise is defined as unification of the trading business into a single system. Its main task is to organize the movement and

interaction of resources and goods. The ultimate goal of implementing logistics is to increase efficiency and profitability through maximum integration of material, technical and information flows.

Relevance of logistics at the current stage of development of market relations is due to several key factors:

– increased competition between retail enterprises, especially in cities with high level of market saturation with large stores and shopping centers;

– emergence of new wholesale and retail formats, including attempts to create innovative structures that combine the strengths of different formats.

Thus, logistics, as the science of effective flow management, plays a key role in modern business, especially in trade. It is aimed at optimizing all processes, from procurement to sales, to minimize costs and maximize efficiency. Relevance of logistics is growing due to increased competition and emergence of new, more complex trade formats, which requires the implementation of integrated management systems. That is why the problem of improving existing mechanisms for managing logistics processes, which can be based on using digital technologies, is currently acute.

Under the influence of globalization taking place on the world market, intensive development of scientific and technological progress and stable trends of deepening of the international division of labor, there is constant transformation of market entities and complication of mechanisms of their functioning. Effective enterprise management in the market is largely determined by the implementation level of innovative logistics approaches and expediency of forming logistics systems.

Thus, N.B. Ilchenko gives the following definition of the concept of "logistics system": - "this is a complex organizationally complete (structured) economic system that covers the areas of production and circulation of material resources, management of material and related flows and is aimed at optimizing logistics functions and operations that arise in the supply chain of goods" [6]. According to the approach of G.V. Barants, the logistics system of the enterprise is a system that unites and coordinates movement of material resources along the entire path - from the producer to the consumer. The study of the relationship between financial and material components allows achieving interaction between financial and production goals of the enterprise, which ultimately contributes to increasing its organizational and economic sustainability [1]. According to I.V. Sirenko, logistics should be based on application of the systems approach for synchronous operation of all components of the logistics chain. In turn, the author emphasizes that logistics involves the integrated and systematic analysis of the movement of material resources throughout the entire production cycle. In this regard, transition to development of the integrated logistics system requires development of the methodology for managing material flows, and implementation of the management system based on accurate ratio of costs and processes is the most promising way to reorganize the enterprise's activities [16].

So, based on theoretical foundations of the system approach, it can be argued that the logistics system is a complex, organized economic system consisting of interconnected elements (subsystems, links) that perform logistics functions (operations) to manage material, information and financial flows, to ensure delivery of necessary goods to the right place, at the right time, in the right quantity, with the right quality and at minimal costs. When considering the logistics system of the trading enterprise, it is advisable to determine the purpose and objectives of its functioning, outline the main components and highlight the key principles of the functioning of this system (Fig. 2).

Thus, the purpose of the functioning of the logistics system of the trade enterprise is to ensure movement of material, information and financial flows from the source of raw materials to the end consumer, as well as to increase competitiveness of the trading enterprise by reducing costs, improving the quality of customer service and reducing time for the order fulfillment. Regarding tasks of the logistics system of the trade enterprise, the key ones are the following:

– inventory management;
– customer service;
– organization of transportation;
– warehousing and cargo handling;
– information flow management;
– demand forecasting and procurement planning.

The key principles of the functioning of the logistics system of the trade enterprise are as follows: the principle of systematicity, the principle of integration, the principle of optimization, the principle of flexibility, the principle of reliability and the principle of efficiency.

The principle of systematicity is that the logistics system of the trade enterprise should be considered as a single whole, consisting of interconnected elements that are subordinate to a single goal.

The principle of integration involves combining efforts of all participants in the logistics chain to achieve a common goal.

The principle of optimization is achieved by choosing the best solutions from the point of view of minimizing costs and maximizing the quality of service.

The principle of flexibility is manifested in the ability of the logistics system to quickly adapt to changes in the external environment.

The principle of reliability is to ensure uninterrupted movement of material flows.

The principle of efficiency means achieving maximum results at minimum cost.

The logistics system of the trade enterprise is a complex structure with a fairly large number of components that perform various tasks and functions, and to facilitate, simplify and speed up operation of this system in the digitalization era, it is advisable to use modern digital technologies and maximally implement them into the operation of this system.

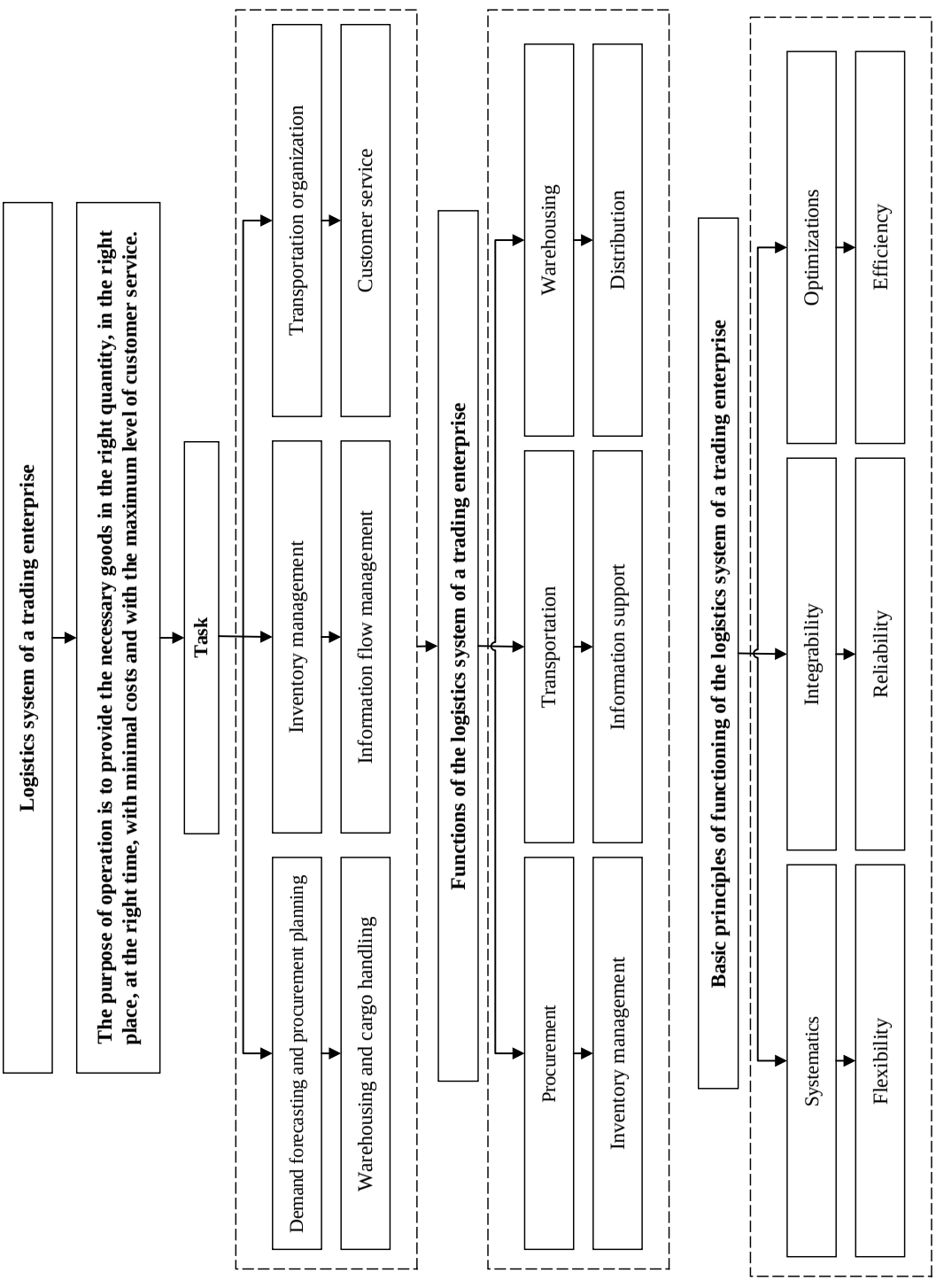

Fig. 2. Logistics system of the trade enterprise

Source: developed by the authors.

Introduction of digital technologies in logistics is a strategically important step for trade enterprises, which is due to the need to both meet requirements of modern industry development and meet growing needs of consumers. The main criterion for efficiency is ensuring fast delivery of goods and services with minimal operating costs. In conditions of increased demand for operational and high-quality logistics services, the use of digital technologies is key to maintaining competitiveness and ensuring high level of customer satisfaction.

In Table 1, information technologies that can be used to manage logistics of the trading enterprise are studied.

The use of information technologies to manage logistics of the trade enterprise contributes to increasing efficiency, completeness and reliability of information, which is critically important for effective management of logistics services in dynamic environment.

Table 1

Characteristics of modern information technologies for managing logistics of the trading enterprise

Name of digital technology	Characteristic	Automation object
The ERP system (Enterprise resource planning)	Enterprise resource planning systems. Main functions of demand forecasting, project, cost, and human resource management.	All business processes at the enterprise
MRPII systems (Manufactory Resource Planning)	Production resource planning systems. They forecast, plan, and control production.	Inventory management, supply, sales
CSRP systems (Customer Synchronized Resource Planning).	Systems of enterprise resource planning synchronized with consumers. Production planning is based on information about the buyer of the product (his needs, consumer requirements, capabilities, etc.).	All business processes at the enterprise
TMS systems (Transportation Management System)	Administration of business processes related to transportation and supporting services (calculation of transportation costs of different modes of transport, customs costs, data on loading and unloading operations, delivery times)	Transport business processes at the enterprise
WMS systems (Warehouse Management System)	Warehouse topology management, product nomenclature parameters, warehouse operations planning, cargo storage and handling methods	Warehouse logistics
CRM system (Customer Relationship Management)	Integrated methodology for managing relationships with customers	Logistics business processes
SRM system (Supplier Relationship Management)	Corporate information system (or its module) designed to automate the company's SRM strategy	Interaction and management with suppliers
Supply Chain Management) system Chain Management)	Methodology of the integrated supply chain management	Enterprise network
E-commerce (E -commerce)	Electronic marketplace systems for online ordering on the seller's website	Interaction with buyers

Source: compiled by the authors based on [17].

Digitalization and informatization significantly change logistics activities, introducing new technologies and approaches that contribute to increasing efficiency, flexibility and transparency of logistics. The main digital technologies that can be used to manage the logistics system are as follows: the use of artificial intelligence (AI), big data (Big Data) and analytical systems, Internet of Things (IoT), machine learning, CRM and ERP systems and blockchain technology. The detailed description of the essence of these digital solutions is given in Fig. 3.

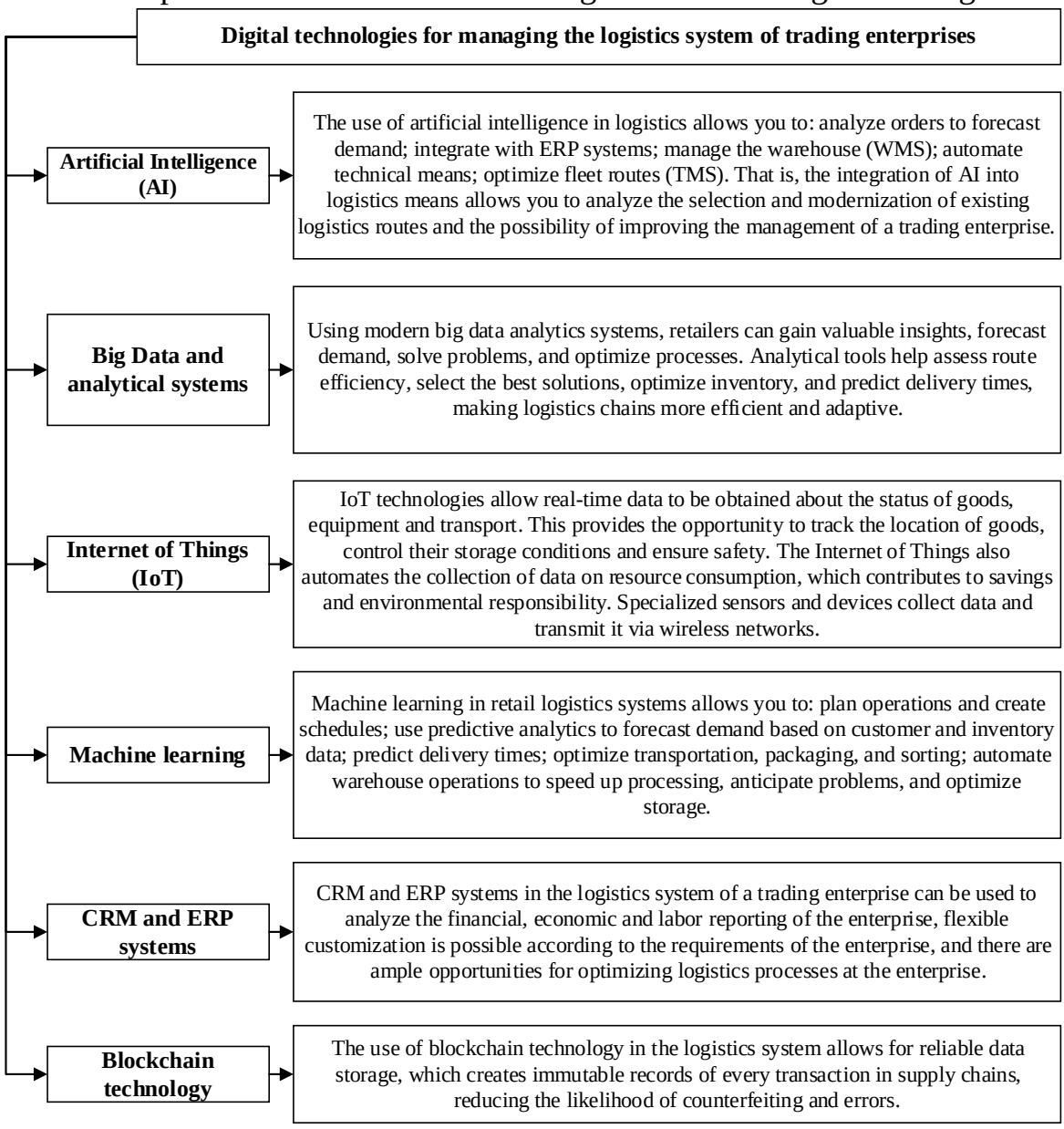

Fig. 3. Basic digital technologies for managing the logistics system of the trade enterprise

Source: compiled by the authors based on [2; 8; 10; 11; 14; 18; 19].

Digital technologies presented in Fig. 3 that can be used to manage the logistics system of the trade enterprise demonstrate rapid digitalization of logistics and widespread use of various approaches to increase efficiency of transportation,

warehousing and packaging, taking into account production capabilities. Integration of these technologies is a key factor in success of managing logistics processes in modern conditions of trade enterprises.

Conclusions and suggestions. Within the framework of this study, a number of key issues were considered. The essence of the definition of "digital technologies" was determined, which can be viewed from different points of view, as technologies used in strategic planning, as technologies that allow automating certain business processes and technologies that can change methods of communication with customers. The essence of the concept of "logistics system" was revealed, the purpose, objectives, functions and principles of functioning of the logistics system of the trade enterprise were given. Modern information and digital technologies used to manage the logistics system of the trade enterprise at the current stage of development were considered. It was found that the main place in the system of making management decisions in logistics services belongs to information solutions. Thus, we can conclude that to improve and increase efficiency of the operation of the trade enterprise and its logistics system, it is advisable to use such digital technologies as follows: artificial intelligence, big data and analytical systems, the Internet of Things, CRM and ERP systems and blockchain technology.

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РОЛЬ ЦИФРОВИХ ТЕХНОЛОГІЙ У РОЗВИТКУ ЛОГІСТИЧНОЇ СИСТЕМИ ТОРГОВЕЛЬНОГО ПІДПРИЄМСТВА

У статті висвітлено основні підходи до трактування сутності поняття «цифрові технології», а саме: інструментальний – передбачає, що цифрові технології є інструментами та платформами, які використовують цифрові дані для автоматизації бізнес-процесів; інноваційні, згідно з яким цифрові технології – це інновації, які дозволяють збирати, зберігати та аналізувати великі дані для прийняття рішень; та інформаційно-технологічний, у межах якого цифрова технологія розглядається як інформаційно-комунікаційна технологія, що використовується для оптимізації бізнес-процесів на підприємстві. Зазначене дозволило сформувати авторське визначення цього терміну. Виявлено фактори, що свідчать про актуальність логістики на сучасному етапі розвитку ринкових відносин, а саме: посилення конкуренції з боку торговельних підприємств, особливо в містах із високим рівнем насиченості ринку великими магазинами та торговими центрами; поява нових форматів оптової та роздрібної торгівлі, у тому числі спроби створення інноваційних структур. Досліджено сутність логістичної системи торговельного підприємства, визначено мету, завдання, основні функції та принципи її функціонування. Визначено інформаційні технології, які можуть бути використані в управлінні логістичними процесами торговельного підприємства, а саме: системи ERP (система планування ресурсів підприємства), MRPII (система планування ресурсів виробництва), CSRP (система планування ресурсів підприємства, синхронізована споживачами), TMS (адміністрування бізнес-процесів, пов'язаних з транспортуванням і допоміжними послугами), WMS (управління топологією складу), CRM (управління відносинами з клієнтами), SRM (управління відносинами з постачальниками), SCM (інтегрована методологія управління ланцюгом поставок) та E-commerce (електронна комерція). Наведено їхні характеристики та об'єкти автоматизації. Описано цифрові технології, які дозволяють підприємствам роздрібної торгівлі ефективніше керувати системою логістики, включаючи такі технології, як: штучний інтелект, великі дані та аналітичні системи, Інтернет речей (IoT), системи CRM та ERP, а також технологія блокчейн.

Ключові слова: *цифрові технології, штучний інтелект, Big Data, IoT, CRM, ERP, блокчейн, е-комерція, логістична система, торговельне підприємство, цифровізація, логістика, диджиталізація.*

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