

METELENKO Natalya Heorhiyivna,

Doctor of Economics, Professor

Academician of the Academy of Economic Sciences of Ukraine,

Y. M. Potebnya Engineering Education and Scientific Institute of

Zaporizhzhia National University, Zaporizhzhia

ORCID ID: 0000-0002-6757-3124

VORONKOVA Valentyna Hryhorivna,

Doctor of Philosophy, Professor,

Academician of the Academy of Sciences of Higher Education of Ukraine,

Y. M. Potebnya Engineering Education and Scientific Institute of

Zaporizhzhia National University, Zaporizhzhia

ORCID ID: 0000-0002-0719-1546

SILINA Iryna Vadymivna,

Candidate of Economic Sciences, Associate Professor

Y. M. Potebnya Engineering Education and Scientific Institute of

Zaporizhzhia National University, Zaporizhzhia

ORCID ID: 0000-0002-1205-0019

OHLOBLINA Viktoriya Oleksandrivna,

Candidate of Economic Sciences, Associate Professor

Y. M. Potebnya Engineering Education and Scientific Institute of

Zaporizhzhia National University, Zaporizhzhia

ORCID ID: 0000-0001-6627-0255

Ukraine

EVOLUTION FROM TRADITIONAL TO INTELLIGENT LOGISTICS MODELS IN DIGITALIZATION CONDITIONS (USING INTERNATIONAL EXPERIENCE)

Logistics management in industry in conditions of digitization is becoming an increasingly relevant topic, an important direction of scientific research, as digital technologies provide enterprises with new opportunities to optimize processes, increase productivity and reduce costs¹.

Key aspects of logistics management in conditions of digitization include:

- 1) Big data and analytics: Increasing the volume of available data and the possibility of their analysis allow enterprises to improve their logistics processes. Big data analysis helps predict demand, optimize inventory, solve supply problems and identify trends in the consumer market.

¹ Digital transformation of industrial management: theory and practice: monograph / edited by Doctor of Philosophy, Prof. Voronkova V. H., Doctor of Economics, Prof. Metelenko N.G. Lviv-Torun: Liha-Pres, 2023. 816 p.

- 2) Internet of Things (IoT): The use of sensors and communication between objects allows monitoring the movement of goods, the condition of equipment, storage conditions and many other parameters in real time. This helps reduce risks and increase efficiency.
- 3) Artificial Intelligence (AI) and Machine Learning: AI systems can help with route planning, optimizing warehouse management, automating problem solving and determining the best strategies.
- 4) Blockchain: Blockchain technology can improve the tracking of logistics operations and ensure the security of internal data exchange between participants in the logistics chain.
- 5) E-commerce and e-documentation: Digital commerce and e-documentation streamline ordering, shipping and payment processes, reducing the time and risks associated with manual operations.
- 6) Supplier networks and joint logistics: Digital technologies enable the creation of supplier networks and joint logistics platforms to share resources, share information and jointly optimize processes.
- 7) Effective risk management: Digital tools help monitor risks and quickly respond to them, reducing the impact of negative events on logistics activities.
- 8) Logistics management in conditions of digitalization involves the constant introduction of new technologies and the improvement of the digital competence of personnel.

Only in this way enterprises will be able to achieve high efficiency, increase competitiveness and meet the requirements of the modern market.

In the field of logistics management in conditions of digitalization, there are many concepts and authors who developed and improved approaches to the optimization of logistics processes.

Let's highlight the most important ones:

- 1) The concept of Supply Chain Management was developed and proposed by Hari L. Visser and Jacob Harberman, who emphasized the importance of integrating all stages of the supply chain to achieve optimal productivity and efficiency.
- 2) The concept of Lean Logistics (Fast Logistics) is based on the ideas of «Lean Manufacturing», was developed by authors such as Shigeo Shingo and Ohno Taiichi (authors of the Just-In-Time system), which is aimed at minimizing costs and optimizing logistics processes.

- 3) The concept of Digital Supply Chain, to which such authors as Hagop G. Bedoyan and Jason Boor should be attributed, are actively developing the concept of a digital supply chain, which is based on the use of digital technologies, big data, analytics and the Internet of Things to optimize logistics processes.
- 4) The concept of Industry 4.0 (Fourth Industrial Revolution), whose authors are Klaus Schwab and Jan Gennadius, who discuss the impact of digital transformation on industry and logistics, emphasize the importance of automation, the Internet of Things and artificial intelligence².
- 5) The concept of Smart Logistics, which is actively developing and being researched by many authors and experts in the field of logistics. It includes the use of modern technologies to create intelligent logistics management systems that can independently analyze and optimize processes³.

Logistics activity is an important part of economic activity, which means the part in which products move from the place of production to the place of sale after production. This includes various activities such as packaging of products, transportation of products, processing, storage and processing during transportation and even services related to sales. Logistics capabilities are divided into logistics capabilities in a broad sense and logistical capabilities in a narrow sense. Logistics capabilities in the narrow sense refer to the assessment of the level of logistics taking into account fixed technical and organizational conditions. When evaluating the internal logistics capabilities of the enterprise, it is necessary to take into account the technical and organizational conditions, as well as the time and capital required for logistics activities, which mainly refers to the logistics equipment used in logistics activities and the amount of work required for logistics activities. Generally speaking, when managing enterprises, logistics is often determined by a judgment about capabilities in a narrow sense⁴.

In 2012, the concept of the Industrial Internet was proposed in the USA, corresponding to the German «Industry 4.0». It was proposed based on forecasting, research and innovation of future new industrial needs and directions of industrial development. It is also the development of the transformation of traditional industries.

2 Industrial potential of complex socio-economic systems of the digital society: macro-, meso- and micro-level; collective monograph / edited by Doctor of Philosophy, Prof. Voronkova V.G., Doctor of Economics, Prof. Metelenko N.G. Lviv-Torun : Liha-Pres, 2022. 480 p.

3 Natalya Metelenko, Valentyna Voronkova. The concept of global risks and their impact on the world economy and politics. Managerial, social and technological innovations – the basis of the public good = Vadybinės, socialinės ir technologinės inovacijos – visuomenės gerovės pagrindas : tarptautinės mokslinės – praktinės konferencijos tezių rinkinys. Lithuania Marijampolė, Marijampolės kolegija, 2023. pp. 54–56.

4 Managing the sustainable development of an industrial enterprise: theory and practice: a collective monograph / edited by Doctor of Philosophy, Prof. Voronkova V. H., Doctor of Economics, Prof. Metelenko N.G.; Ministry of Education and Science of Ukraine, ZNU INNI. Zaporizhzhia: "Helvetica Publishing House", 2021. 586 p.

The main method of transition to the intelligent production model mainly emphasizes the adoption of the enterprise as the core, promoting enterprises to actively develop new models of connections between service processes, such as R&D, production and services, the implementation of Internet integration, online consumption model and intelligent production model, information integration. Thus, the flexible characteristics of the Internet are brought to the manufacturing industry in combination with its rigid characteristics, the Internet is used as a driving force to strengthen the deep integration of consumers and manufacturing enterprises, thereby ensuring the long-term and reliable development of the manufacturing industry⁵. Industrial Internet technology is the software and hardware integration of several technologies, including big data, artificial intelligence, Internet of Things, embedded technology, etc. It uses various sensors to collect data on site, analyzes and calculates data with controllers and uses wireless network technology to process and transmit data. It also uses advanced data processing techniques such as edge computing to analyze and process data and finally integrates results into industrial production to promote the development of intelligent manufacturing. The Industrial Internet consists of a four-layer architecture, namely the sensing and identification layer, the network connection layer, the remote management platform layer, and the data analysis layer⁶.

Let's consider the principles of building a logistics system of an enterprise.

The first principle is the principle of appropriate scale. The development and advantages of logistics enterprises are closely related to the size of the enterprise. If the scale of the enterprise is too large, it will increase logistics costs and reduce the efficiency of the enterprise; if the scale of the enterprise is too small, it will be difficult to satisfy the market demand, which will harm the development of logistics enterprises. Faced with this situation, in the process of promoting innovation in the field of logistics management, the scale of logistics should be appropriately evaluated based on market demand, and based on the forecasts of future development trends, innovation in the field of logistics management should be based on meeting market demand and ensuring corporate benefits. Accordingly, we will promote sustainable and healthy development of logistics enterprises⁷.

5 Mar'yenko V. Yu., Voronkova V. H. Digitization of the economy as a condition for achieving success in the most dynamic region of the world. Collection of scientific works of students, postgraduates, doctoral students and young scientists «Young Science-2022» : in 5 v. / Zaporizhia National University. Zaporizhzhia: ZNU, 202. V.5. 262 Zaporizhzhia: ZNU, 2022. pp. 64–65.

6 Mar'yenko V. Yu. Information provision of management in organizations as complex systems in conditions of digitalization. Modern scientific strategies of development : collective monograph / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services, 2022. pp. 62–81.

7 Metelenko Natalya, Nikitenko Vitalina, Vasylychuk Hennadij, Kahanov Yuriy, Voronkova Valentyna. Digital transformation of education as a trend in the development of educational reforms and a process of social and cultural changes. Humanities studies: Collection of Scientific Papers / Ed.V. Voronkova. Zaporizhzhia : Publishinghouse "Helvetica", 2023. 16 (93). pp.122-134.

The second principle is the principle of cooperation. With the continuous development of the market economy, a large number of logistics distribution points appeared on the market. In the past, the situation where one point of sale distributed individual items of goods gradually decreased. In response to this situation, it is very important to optimize the distribution of logistics resources. Thus, in the innovation of logistics management, it should be clear that it is difficult for a single logistics company to meet diversified logistics needs. When establishing cooperative relations, each logistics company can also adhere to the principles of sharing risks and benefits to achieve win-win situations⁸.

The third principle is the principle of creating intelligent logistics links. At present, most logistics systems in China implement automatic and intelligent control of logistics links, such as receiving orders, sorting and distributing goods. At the same time, robots, flexible manufacturing and other related intelligent equipment are developing rapidly, but the intelligence of the equipment is different for each type of equipment. Interconnection and compatibility are still in the stage of partial application and have been able to achieve a unified cooperation. The purpose of creating an intelligent logistics factory is to realize the interconnection of intelligent equipment.

On the one hand, intelligent devices must have functions such as communication, detection, control, execution and storage, and include:

- 1) The communication module which not only communicates between machines, but also realizes intelligent communication between logistics goods, equipment and systems.
- 2) The detection module monitors the operating parameters of the equipment in real time with the help of sensors, detects the logistics goods and information about the distribution environment and transmits it back to the control system.
- 3) The control module performs intelligent information processing based on sorting and distribution rules and sensor feedback information and sends commands to the executive module; the executive module performs the appropriate processing according to the received commands.
- 4) The storage module stores information about the status of each module in real time⁹.

8 Voronkova Valentina, Nikitenko Vitalina, Metelenko Natalya. AGILE-economy as a factor in improving the digital society. *Baltic Journal of Economic Studies*, Riga, Latvia : "Baltija Publishing", 2022, Vol.8. No 2. pp.51-58.

9 Metelenko, Natalya, Vasylichuk, Gennadiy, Kaganov, Yuriy, Nikitenko, Vitalina, Voronkova, Valentyna. Digital cultural development under new threats and challenges. *Humanities studies: Collection of Scientific Papers* / Ed. V. Voronkova. Zaporizhzhia : Publishing house "Helvetica", 2023. 15 (92). pp.33-43.

On the other hand, intelligent devices are connected through the industrial Internet, and intelligent devices in key business connections in the logistics enterprise are connected together, so that intelligent devices of various types and functions are connected to form an intelligent logistics workshop¹⁰.

The Internet is creating a smart logistics factory. These intelligent equipment, intelligent production lines, intelligent workshops and intelligent logistics factories can be freely and dynamically combined to meet changing logistics needs, forming a very flexible approach to logistics integration, enabling very fast intelligent logistics. In the management of green logistics, it is necessary to actively apply Internet technologies to improve the modern logistics system from the point of view of protecting the green environment, connecting different types of transport and creating a comprehensive system of green logistics.

Currently, when the information system is launched to reflect the operational state, it is necessary to optimize the configuration of the vehicles, so that the vehicles have a higher utilization rate, and the logistics, transportation and distribution are more efficient.¹¹. Not only is energy consumption reduced, but operating costs are also reduced, thereby increasing economic benefits and achieving environmental benefits. To achieve significant results in the management of green logistics, the role of intelligent equipment should be played. The integration of various equipment used by logistics companies into intelligent technology allows to reduce the number of manual operations and reduce the labor intensity of personnel. The use of unmanned delivery vehicles and unmanned warehouses can reveal the benefits of green environmental protection and contribute to the better and faster development of logistics companies. In addition, during the operation of unmanned vending machines and unmanned warehouses, the error rate is relatively low and energy consumption is reduced, which allows logistics management to meet environmental requirements and ensure quality management.

The development of digital competences and logistics specialists is an integral need for the development of enterprises, and only professionals can effectively contribute to the development of enterprises. Cultivating digital competences and logistics specialists helps to increase the competitiveness of enterprises and contributes to the progress and development of enterprises; form professional

10 Cherep A.V., Voronkova V.H., Cherep O.H., Nikitenko V.O. Exponential technologies as an economic resource of the digital economy concept. "Innovative resources of modern science" ("Innovative resources of modern science"). collective monograph / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services, 2022. pp.48-58

11 Voronkova V.H., Nikitenko V.O. The concept of global management: characteristics and directions of development. Social and humanitarian dimensions of the rule of law: materials of the International Scientific and Practical Conference (Dnipro, April 14, 2023). Dnipro: Dnipropetrovsk State University of Internal Affairs, 2023. pp.113-118.

and unique teams of employees and improvement of strategic thinking of employees; promote the adaptation of enterprises to the development of society. The development of the enterprise is inseparable from the efficiency and level of its employees. Professionals can make smart plans and anticipatory judgments for future enterprise planning¹². The training of specialists in the field of logistics must keep up with the times, emphasize professionalism and practicality, meet the needs of the market and promote the development of entrepreneurship. Currently, the theoretical system of state-owned logistics enterprises is not mature enough, and the training of professionals can effectively contribute to the development of the theoretical system of logistics enterprises. At the same time, the government should encourage educational institutions to carry out logistics education and training projects, encourage exchanges and cooperation with research institutes and enterprises, and develop a pool of professional talents that will meet the needs of the time through a variety of channels and methods. Therefore, it is necessary to encourage enterprises to participate and train personnel in the workplace, as well as to provide support to enterprises in the renewal and development of original corporate specialists to ensure their effective development¹³.

Using the example of China, we will show that the informatization process of China contributed to the popularization of information infrastructure and technologies. Most businesses have established online marketing channels and operational platforms. As China's logistics market continues to develop and grow, traditional logistics management systems such as big data, cloud computing, artificial intelligence and the Internet of Things are no longer sufficient¹⁴. Industrial Internet technologies play an important role in this modernization, as various industries have begun to transform towards digitalization. The extensive logistics management methods of the past no longer correspond to the development trend of the logistics industry. Against this background, intelligent logistics as a completely new service model has gradually become an important starting point for the logistics industry, which can accelerate the adjustment of the industrial structure, improve the quality and efficiency of service, and transform the old and new driving forces. The development of smart logistics contributes to the

12 Kyvlyuk O.P., Voronkova V.H. The concept of post-information society: signs and characteristics. The communication space of the post-information society: problems and prospects: Materials of the All-Ukrainian Scientific and Practical Conference (Kyiv, May 30, 2023). Kyiv: Tvory LLC, 2023. pp. 9–12.

13 Voronkova V.H. Formation of the concept of cyber security strategy in the conditions of globalization: economic foundations. Scientific trends: modern challenges. Volume 1 : collective monograph / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services, 2021. pp. 46–60.

14 Voronkova Valentyna. Corporate social responsibility as the basis of sustainable management. Managerial, social and technological innovations – the basis of the public good = Vadybinės, socialinės ir technologinės inovacijos – visuomenės gerovės pagrindas : tarptautinės mokslinės – praktinės konferencijos tezių rinkinys. Lithuania Marijampolė, Marijampolės kolegija, 2023. pp. 84–85.

qualitative development of the logistics industry, and is also a favorable catalyst for a new development model in which the domestic cycle is the main one, and the domestic and international dual cycles contribute to each other, ensuring reliable logistics. In this process, although smart logistics has achieved some results and successfully contributed to the development of our country's economy, many problems have arisen during its development¹⁵.

The concept of intelligent logistics was first proposed by IBM in 2009. It involves the use of digital technologies, such as RFID-identification tools, the Internet of Things and big data, to achieve digital and improved management of the entire logistics process, improving logistics operations, increasing efficiency and reducing logistics costs, operating costs, providing a modern logistics model with intelligent analysis for logistics management. Due to the continuous improvement of information network infrastructure and the continuous development of Internet technologies, the process of digital transformation of various industries continues to advance, which is facilitated by the application of advanced technologies such as artificial intelligence, the Internet of Things, cloud technologies, computing, blockchain and big data. The entire logistics process gradually transformed logistics from labor-intensive to intelligent, intelligent and automated, which further reduced labor costs and increased logistics efficiency¹⁶.

Logistics management in the conditions of digitalization (on the example of international experience) includes the following areas of development.

1. Traceability. Compared with traditional logistics, intelligent logistics has obvious information tracking characteristics. Thanks to the use of Internet of Things technology, the logistics process is fully controlled and monitored in real time. This not only makes it easier for consumers and sellers to track logistics, but also greatly improves the safety of food and medicine during the logistics process.
2. Informatization. The development of intelligent logistics cannot be separated from the support of Internet technology, and the support of Internet technology has greatly improved the capabilities of interactive logistics information exchange, providing information support to enterprises and helping logistics enterprises to better manage material needs and transportation.

15 Voronkova V.H., Nikitenko V.O. Formation and development of the VUCA concept in conditions of global transformation of society. Scientific trends: modern challenges. Volume 1 : collective monograph / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services, 2021. pp. 44–48

16 Industrial management: theory and practice: collective monograph / edited by Doctor of Philosophy, Prof. Voronkova V. H., Doctor of Economics, Prof. Metelenko N.G. Zaporizhzhia: Zaporizhzhia National University. 2020. 338 p.

3. Use of automation and intelligent equipment. In intelligent logistics, the use of automation and intelligent equipment has replaced the large amount of manpower used in traditional logistics¹⁷. In the process of loading, unloading and transportation, machines are used, which significantly reduces labor costs and increases the efficiency of transportation. Machine sorting of goods also significantly reduces the number of errors in the logistics sorting process.
4. Cloud. In the development process of intelligent logistics in recent years, the application of new information technologies such as big data and cloud computing has led to the fact that intelligent logistics has become cloud-based. In the future development of intelligent logistics, cloud functions will also develop. In particular, the technological development of cloud computing and cloud storage will provide users with better data transmission services, while reducing the requirements for terminal equipment in intelligent logistics¹⁸.

At present, China's economy has moved from the initial stage of high-speed development to the stage of high-quality growth. In addition, enterprise managers have higher requirements for service functions and logistics service efficiency. Traditional logistics can no longer effectively meet the needs of economic development and need urgent improvement. Characterized by traceability, informatization, intelligence and cloud technology, smart logistics has the advantages of efficiency, convenience and accurate tracking in logistics processing, supporting the digital transformation of the logistics industry. In order to promote the further development of intelligent logistics, China has adopted a number of policies, regulations and planning documents. Against the backdrop of industrial digital transformation, most logistics companies have followed development trends and transformed and modernized from traditional logistics models to intelligent logistics models¹⁹.

However, since the development of intelligent logistics requires joint investment in automation equipment, network information equipment and

17 Natalya Metelenko, Valentyna Voronkova. The concept of global risks and their impact on the world economy and politics. Managerial, social and technological innovations – the basis of the public good = Vadybinės, socialinės ir technologinės inovacijos – visuomenės gerovės pagrindas : tarptautinės mokslinės – praktinės konferencijos tezių rinkinys. Lithuania Marijampolė, Marijampolės kolegija, 2023 pp. 54–56.

18 Metelenko V.H., Voronkova V.H., Nikitenko V.O. Silina I.V. Formation and development of the smart-economy and its modifications in the conditions of digital development. "Vectors of the development of science and education in the modern world" / Compiled by V. Shpak; Chairman of the Editorial Board S. Tabachnikov. Sherman Oaks, California : GS Publishing Services, 2023. pp. 79–95.

19 Azhazha Maryna. The concept of anti-crisis regional management as a factor in ensuring sustainable development. Managerial, social and technological innovations – the basis of the public good = Vadybinės, socialinės ir technologinės inovacijos – visuomenės gerovės pagrindas : tarptautinės mokslinės – praktinės konferencijos tezių rinkinys. Lithuania Marijampolė, Marijampolės kolegija, 2023. p. 9.

system development, the initial investment costs are relatively high. For example, companies such as JD Logistics use big data and cloud computing technologies to organize and analyze logistics data, which reduces the company's logistics costs, facilitates the logistics needs of consumers, and increases the company's efficiency in the logistics process. SF Express has introduced the concept of intelligent logistics management, combined with the construction of intelligent logistics warehouses and the development of unmanned distribution technology, which has enabled the company to move from traditional logistics to smart logistics, formulate logistics service standards and create a smart logistics brand, promote the modernization of the logistics industry. However, due to the high investment costs of intelligent logistics automation equipment, the distribution method based on manual distribution is still used in the terminal distribution stage of the logistics process²⁰.

Most of the small and medium-sized logistics companies in China still use traditional logistics based on human labor, and their application of information technology is relatively crude. Some companies have not even developed and created their own management platform. As advanced technologies such as artificial intelligence, Internet of Speech, cloud computing, blockchain and big data continue to develop, and new infrastructure facilities such as 5G are further improved, goods and equipment in the logistics process will become fully automated and intelligent. The lower production chain carries favorable radiation, stimulates industrial development, deepens the division of labor and cooperation between enterprises, and maximizes the use of social resources. At the same time, intelligent logistics will be used to introduce advanced technologies such as artificial intelligence, cloud computing and big data to other industries to help them undergo digital transformation and modernization, creating a new development model with an inner loop²¹.

At present, although China has adopted some policies, regulations and guidelines to provide guidance and suggestions for the development of logistics with the participation of many administrative departments and many specific policies, it lacks a leadership management mechanism and the logistics management system is not sufficiently unified and effective. Each management department has mechanisms to stimulate the development of logistics, but there

20 Azhazha Maryna. The concept of anti-crisis regional management as a factor in ensuring sustainable development. Managerial, social and technological innovations – the basis of the public good = Vadybinės, socialinės ir technologinės inovacijos – visuomenės gerovės pagrindas : tarptautinės mokslinės – praktinės konferencijos tezių rinkinys. Lithuania Marijampolė, Marijampolės kolegija, 2023. p. 9.

21 Metelenko N.H., Voronkova V.H. Andryukajtene Rehina. A systematic approach to the analysis of steel consumption in Ukraine. System analysis in management: interdisciplinary research: materials of the 4th All-Ukrainian scientific and practical conference with international participation on May 26-27, 2022 / M. P. Drahomanov National Pedagogical University. Kyiv: Oreol-Service, 2022. pp. 71–73.

are overlapping and sometimes conflicting phenomena with other departments, which makes it difficult for logistics companies to find the right direction in the process of reasonable logistics reform. Therefore, it is very important to offer comprehensive management solutions and smart logistics management systems that will contribute to the healthy development of smart logistics reform²².

The development of «smart» logistics in China is still in its infancy. In the conditions of continuous development of our country's economy, the logistics industry and management departments related to logistics have understood the importance of developing logistics standards. However, due to various reasons, such as the long time-consuming process of creating a system of logistics standards and the low readiness of logistics enterprises to standardize production, the development of logistics standards lags behind²³. Compared to the wide application, it is difficult to create an intelligent logistics system. According to the «China Logistics Standards Catalog» jointly published by the China Federation of Logistics and Procurement Standardization Work Department and the Secretariat of the National Technical Committee for Logistics Standardization in 2021, there are currently 1,196 logistics standards.

Some large logistics companies, such as JD Logistics and SF Express, have implemented large-scale upgrades to intelligent logistics systems. However, most small and medium-sized logistics companies have insufficient investment in information automation and information equipment, insufficient construction of information platforms and insufficient cargo warehousing, management systems and cargo management systems.

The development of the information tracking system lags behind and it is difficult to connect to a single logistics information management platform. This has led to the fact that the existing logistics information management platform is mainly used by a small number of large logistics companies. It lacks a comprehensive information management platform with full coverage, which limits logistics companies' ability to allocate resources and holds back logistics transformation²⁴.

22 Metelenko Natalya, Vasyľchuk Gennadiy, Kaganov Yuriy, Nikitenko Vitalina, Voronkova Valentyna. Digital cultural development under new threats and challenges. Humanities studies: Collection of Scientific Papers / Ed. V. Voronkova. Zaporizhzhia : Publishing house "Helvetica", 2023. 15 (92). pp. 33–43.

23 Voronkova V.H. Digital management as a factor as a factor of effective management of modern organizations. Geostrategic transformations and the trajectory of national security in the context of reconstruction and sustainable development of Ukraine: materials of the International Scientific and Practical Conference (May 25–26, 2023, Zaporizhzhia) / scientific editor N. G. Metelenko ; Y. M. Potebnya Engineering Education and Scientific Institute of Zaporizhzhia National University. Odesa : Oldi+, 2023. pp. 266–270.

24 Metelenko Natalya, Nikitenko Vitalina, Vasyľchuk Hennadij, Kahanov Yuriy, Voronkova Valentyna. Digital transformation of education as a trend in the development of educational reforms and a process of social and cultural changes. Humanities studies: Collection of Scientific Papers / Ed. V. Voronkova. Zaporizhzhia : Publishinghouse "Helvetica", 2023. 16 (93). pp. 122–134.

In recent years, in connection with the rapid development of China's logistics industry, the problem of information leakage is becoming more and more noticeable. This not only causes great inconvenience to consumers, but also seriously threatens people's legal rights and interests, as well as property security. A serious leak of information about express delivery always tests the management capabilities of logistics companies. If logistics companies cannot protect information, the consequences will be immeasurable. Currently, our country has adopted rules such as «Temporary Express Delivery Rules» to protect information security. However, due to the increase in the number of sources of logistics information in the logistics process, it is difficult to prevent information leakage in the logistics process²⁵.

Currently, there is an uneven contradiction between the development of the logistics industry and the education of specialists in the field of logistics. According to relevant research, logistics professionals were included in the list of 12 types of talent that are in short supply in my country, with a gap of more than 600,000 people. In addition, most universities and vocational schools in my country are not keeping up with the development of smart logistics, and are modernizing and innovating traditional logistics majors into «smart logistics».

The strategy of transformation of smart logistics against the background of digital transformation involves the following stages.

1) Strengthen the logistics management structure.

The transition from traditional logistics to intelligent logistics covers a wide range of areas and affects many departments and industries²⁶. In addition, local governments should also integrate local logistics enterprises with other local basic conditions to create «smart» logistics with local characteristics and local advantages, so as to enhance the role of promoting the development of «smart» logistics and promote the overall development of upstream and downstream industrial chains. It is necessary to study and publicize the policy related to the modernization of traditional logistics to intelligent logistics, as well as provide incentives for logistics companies to carry out the transformation of intelligent logistics from credits, benefits, etc. It is also necessary to support and reduce the resistance of traditional logistics enterprises to transformation into smart logistics enterprises²⁷.

25 Voronkova V.H. Digital industry clusters as a new driving force and key factor of development. Problems of managing the economic potential of regions: a collection of scientific works of the All-Ukrainian Scientific and Practical Conference: Zaporizhia National University. Zaporizhzhia: ZNU, 2023. pp. 10–12.

26 Ibid.

27 Nikitenko Vitalina, Voronkova Valentyna, Kozar Yurii, Oleksenko Roman, Yanchevskyi Oleksandr, Korobko Igor. Digital Healthcare in the Context of Challenges and Opportunities of Technological Progress in the Countries of the European Union. Revista de la universidad del ZULIA. 3a época. Año 14, N° 40, 2023. pp. 315–33.

2) Establish uniform logistics standards.

Unified and standardized logistics standards are the only way to promote the creation of intelligent logistics management platforms. Regarding logistics standards, on the one hand, uniformity and inclusiveness should be fully considered, and research on general standards and application standards of key technologies for logistics enterprises should be strengthened. Through government departments or logistics industry associations to unify information standards, we can create a close relationship between various logistics processes, promote the interaction between the data layer, application layer and exchange layer, and establish applicable and implement logistics standards from the point of view of docking, based on further openness and exchange of information. On the other hand, we should also use the Internet of Things as a link to actively promote the creation of intelligent logistics management system platforms, promote the use of barcodes, QR codes, PFID identification systems and other technologies in logistics warehousing and distribution. Logistics information application standards for key industries such as the textile industry and the textile industry provide technical support for the transformation of traditional logistics into intelligent logistics²⁸.

3) Make full use of the leading role of large enterprises.

Looking at the process of transformation of smart logistics in the world, developed countries pay special attention to the role of large enterprises in promoting the transformation from traditional logistics to smart logistics. For example, the Amberg electronics factory in Germany uses big data, cloud computing and other technologies to integrate the production management system with software and various equipment in the production process to achieve intelligent manufacturing and intelligent logistics. Despite the existence of industry reference enterprises with strong integrated capacity and leading role in the industry, there is still a large gap with large enterprises in developed countries in terms of developing functional logistics management platforms and promoting the development of intelligent logistics. It is recommended to make full use of the role of the market to help large enterprises take the lead in the research, development and improvement of advanced technologies such as big data and cloud computing, and build an intelligent logistics ecosystem. In particular, on the one hand, it is about creating an intelligent logistics and warehousing management center that will help large enterprises to implement digital methods and build intelligent logistics and warehousing management systems. On the other hand, it is about expanding the industry chain of intelligent

28 Nikitenko V.O. From digitization to the integration of digital intelligence and the construction of smart cities. Problems of managing the economic potential of regions: a collection of scientific works of the All-Ukrainian Scientific and Practical Conference: Zaporizhia National University. Zaporizhzhia: ZNU, 2023. pp. 44–46.

logistics and spreading the high-tech information technology used in intelligent logistics to transportation, industry, agriculture, retail and other industries to increase the scope of the system²⁹.

4) Development of logistics specialists.

To implement the transformation of «smart» logistics, it is very important to train highly professional specialists in the field of «smart» logistics. This especially applies to talented specialists in the field of logistics, since domestic universities are still at the experimental stage of training specialists in the field of smart logistics, there is currently a serious shortage of talented specialists in the field of logistics with high-level logistics management capabilities³⁰. Therefore, it is recommended to use the following methods to develop smart logistics schemes: first, to implement the integration of industry and education, to cooperate with universities and enterprises to develop a training mechanism oriented towards specialists. In highly developed countries of the world, universities and enterprises are jointly developing a platform for modeling intelligent logistics. College students model the entire process of intellectual logistics during the courses, acquire relevant professional knowledge and form knowledge related to intellectual logistics at enterprises. Second, create an incentive mechanism for professionals through government subsidies to provide targeted incentives related to intelligent logistics and attract high-class specialists in the field of intelligent logistics³¹.

Conclusions

We can conclude that digitalization is the direction and driving force for all areas of life, as well as the cornerstone of the future development of the logistics industry. In the future development of intelligent logistics, companies need to do a good job on the design of logistics management at the highest level, establish unified logistics standards, give the lead to large enterprises, and develop intelligent logistics talents to ensure smooth operation. With the establishment of a new norm of high-quality economic development in the highly developed countries of the world, intelligent logistics will play an important role in economic development, as well as in the development of the national economy as a whole. Over the past few years, the entire logistics industry has undergone radical changes, the driving

29 Metelenko N.H. The concept of digital transformation as a factor in the development of regions. Problems of managing the economic potential of regions: a collection of scientific works of the All-Ukrainian Scientific and Practical Conference: Zaporizhia National University. Zaporizhzhia : ZNU, 2023. pp. 39–41.

30 Venher O. M., Development of a strategy for the sustainable development of an industrial enterprise. In the book: Management of the sustainable development of an industrial enterprise: theory and practice / Edited by V. G. Voronkova, N. G. Metelenko Zaporizhzhia: Helvetica. 2021 pp. 197–242.

31 Voronkova V.H., Nikitenko V.O. Philosophy of digital man and digital society: theory and practice: monograph. Lviv-Torun : Liha-Pres, 2022. 460 p.

force of which is digitalization. In the future, «digitalization» will move toward «digital intelligence,» and all digitalization will provide the necessary conditions for intelligence. Changes in business forms to some extent affect changes in logistics and forms of distribution. In the future, the development of new technologies, especially the Internet of Things, will surely create a new generation of logistics elements (future logistics vehicles may undergo new changes). Similar to the great success of the digitalization of commercial sales (various types of e-commerce), the great success of the digitalization of transport and logistics was also confirmed. Integration projects implemented for automated warehouses have long implemented the digitalization of the logistics system, which collects digital signals from various on-site switching sensors, digitizes the warehouse, facilitates digital alignment.

In fact, automation systems and information management systems of various branches of the manufacturing industry can be called the embodiment of digitization in the manufacturing industry. Logistics automation is no exception. The execution of tasks and information management of various logistics equipment at the facility is based on the passage of digital information through the computer control unit, which provides information display, control and other functions. Various existing logistics automation systems have increased the level of enterprise automation, increased the efficiency of production logistics, and reduced the cost of land and personnel.

However, from a macroeconomic point of view in our country, the level of use of various logistics automation applications in various industries is very low, especially in the manufacturing industry, where the share of application of automated logistics equipment and software is very low. In fact, most in-plant logistics in the manufacturing industry are manual and naturally have no digital genes. In terms of comprehensive digitalization in the future, there is still a lot of work to be done.

In retrospect, in companies that have implemented automated warehouse and logistics systems in the manufacturing industry, employees use WMS and WCS to understand and control the main logistics facilities on site to help the production of the main production line without being affected by the supply of materials.

DOI: 10.51587/9798-9866-95983-2023-015-64-78