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MANAGING THE LOGISTIC ACTIVITIES OF AGRICULTURAL ENTERPRISES UNDER CONDITIONS OF DIGITAL ECONOMY

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Abstract. At the current stage of transformations, it is of urgent importance to solve the problems of logistics management in the system of agricultural enterprise management. The issues are particularly relevant under conditions of the rapid development of digital economy. Therefore, the purpose of this research is to develop further theoretical and methodological fundamentals, scientific and methodological approaches and practical recommendations to enhance the efficiency of managing the logistic activities of business entities in the agro-industrial complex allowing for the specific features of business processes digitalization. The article specifies the essence of the concept "management of the logistic activities of an agricultural enterprise" in digital economy. Problems, specific features and directions of transforming the logistics management in the agrarian sphere are identified. The work carries out a comparative analysis of the indicators reflecting trends in the global development of agriculture by applying digital instruments and technologies. The authors analyze the range of using information and communication technologies while organizing the logistic activities at Ukrainian processing enterprises. The authors reveal the key barriers hindering the digital transformation of the logistic activities of agricultural enterprises, which can be conventionally classified into 7 groups, namely institutional, market, transport, marketing, informational, organizational, financial and economic. It is confirmed that to eliminate those barriers, it is necessary to transform radically the existing system of managing the logistic activities of agricultural enterprises, which should be based on fundamentally new principles of operation under conditions of digitalization.

Keywords*: agricultural enterprise, logistics management, customer-oriented approach, information and communication technologies, digital economy, transformation*

JEL Classification: L86; M31; O13; Q12; Q13

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1. Introduction

Nowadays, it is necessary to improve logistics management at the enterprises in the agrarian sphere. A logistic component has become a strategically important factor, which is revealed in financial results of business entities' performance (Abazov, 1997; Abazov, 2010). Logistic activities are the center of costs optimization and, consequently, can be a lever to increase profitability, because supply chains consume a significant share of agricultural enterprises' costs.

According to the data supplied by Armstrong & Associates, Inc. (2021), in 2020 the share of costs for organizing the logistic activities accounted for 15.9% in the GDP of Ukraine (the world average index – 10.8%, in the USA – 8%, Canada – 9%, Japan – 8.5%, Great Britain – 8.5%, Poland – 10.1%, and generally in Europe – 8.6%). In that period, the share of income of the 3PL sector in Ukraine accounted for 8.2% of the volume of logistics costs (the world average index being 10.6%, in the USA – 13.8%, Canada – 10.6%, Japan – 10.9%, Great Britain – 9.8%, Poland – 10.2%, and generally in Europe – 10.5%). In 2020, the share of GDP of Ukraine accounted for 0.18% of the global GDP, costs for logistic activities amounted to 0.27% of its total amount in the world, income of the 3PL sector made 0.21% of the total amount in the world (to compare: the values of those indices in Great Britain were 3.2; 2.5; 2.3 respectively). Therefore, to improve their competitiveness, business entities of different industries, including agriculture, should organize their logistic activities with the purpose to minimize risks, losses and costs of production, to make reserves, to service customers, transportation and sales of products, as well as to maximize profitability from operational activities and sales. Hence, agricultural enterprises should switch to innovative technologies and to introduce information systems, which will secure a high level of customer service and improve logistic service.

A survey of 528 managers and specialists in strategic management of digital transformation, which was conducted by an advisory company Altimeter-Prophet, demonstrates that the main efforts are focused on improving the system of contacts with customers (54% experts) (Solis & Szymanski, 2019). Price water house Coopers, the second-largest professional services network (2012) proves that investing in the digital transformation first contributes to a better quality of customer servicing. Studies of Campaign Monitor (2021) show that 64.1% of small enterprises use digital marketing to attract customers. According to Gartner's estimates, in 2019, 25% of interactions with customers were automated with involvement of artificial intelligence and machine learning. Moreover, 91% of companies have planned to develop artificial intelligence by 2023 for managing customer relationship. According to forecasts, until 2030, chat bots will automatically collect above 1 billion of requests on customer service (Costello, 2019). A survey conducted by EY-Parthenon confirms that companies continue to make a lot of investments into digital transformation. Most managers and top-managers consider it is the main business imperative that is crucially important for survival in the competitive business environment (Wang et al., 2022). Therefore, for business to develop, they should introduce new technologies and digital channels, being incorporated into the customer experience (Bogachov et al., 2020; Borodin et al., 2021). Experts of Digital Marketing

Institute (2022) make forecast that by 2025, costs for strategic digital transformation in the world will have reached USD 2.8 trillion, which almost twice exceeds the amount of 2020. Those investments will assist international companies to implement the integral digital strategy for organizing logistic processes, technologies, data and management, as well as to interact with customers, to raise work efficiency, to reduce time for bringing new products and services to the global and national markets, and to stimulate innovative development (Moskalenko et al., 2022; Chygryn et al., 2020; Drozdz et al., 2020b; Kwilinski et al., 2020a).

According to the Statista data (2022a, 2022b, 2022c), in 2021 the share of digital advertising revenue made 65.2% of the total amount of worldwide revenue of advertising. It was expected that the share will increase to 67% in 2022, and will exceed 70% in 2025. According to estimates, in 2020 the worldwide spending for digital advertising accounted for USD 378 billion, USD 521 billion in 2021, and will reach USD 646 billion in 2024, and USD 876 billion in 2026. Expert estimations prove that spending for advertising in mobile Internet will increase in 2020-2024 by 79.3% or from USD 276 billion to USD 495 billion. The global revenue of the Internet advertising accounted for USD 365.9 billion in 2021, whilst by 2025, the amount will have reached USD 488 billion, which is by 33.4% more as compared to 2021. The global market of solutions for end users of the Internet of things (IoT) will grow every year and reach USD 1.6 trillion in 2025.

Specialists of Rocket Marketing Group (2020) declare that a raise of customers' loyalty contributes to increasing income. However, attracting new customers is five times more expensive than retaining available ones (Morgan, 2019). Investments into customers' loyalty are ones of the most profitable for developing business environment. Some researchers consider that a raise of customers' loyalty is more important than a reduction of operating costs. Increased customer loyalty by 2% influences profitability the same way as reduction of operating costs by 10% (Ozuysal, 2021). The research by Reicheld and Teal (2005) confirm that 5% growth of the number of loyal customers fuels an increase of the profit from 25% to 85% depending on the type of economic activities. However, according to Gamble et al. (2002), a raise of the level of loyalty reduces the customers' willingness to appreciate competitors' actions. The priority task of enterprises is to create an effective logistic information system, being flexible in response to the crisis phenomena in the global world, changes of institutional environment, instable economic situation, and the conjuncture fluctuations on the agricultural product market (Kwilinski et al., 2020b; Lyulyov et al., 2021a; Vaníčková & Szczepańska-Woszczyna, 2020; Yang et al., 2021; Hussain et al., 2021). Therefore, the issues of improving the logistic activities of agricultural enterprises with consideration of their operation and global digital transformation processes are still topical to study.

2. Literature review

Analysis of the past studies (Dementyev & Kwilinski, 2020; Dzwigol, 2021; Dźwigoł & Wolniak, 2018; Kwilinski et al., 2021; Miśkiewicz, 2019; 2021b) confirms a diversity of scientific approaches to defining the notion "management of the enterprise's logistic activities". Scholars apply various notions, particularly "logistic management", "strategic logistics

management", "logistics management of the enterprise", "logistics management in the company", "logistics management", "supply chain management", "marketing and logistics management", etc. There are numerous interpretations of those concepts, which are based on different scientific approaches and principles.

In general, logistics management is considered as an instrument, which can help to reduce costs for material and technical supply, management of reserves, transportation of products to customers; synthesis of the management functions (planning, organization, regulation, coordination and control) of flow processes; management of material and informational flows; management of integrated business processes (from material and technical supply to sales of final products to consumers); integration of the theory of management and logistics. Some authors use the notion "logistics management", which includes management of consumers' requests, proposals of market participants and establishment of relations among them; information flows; processes of purchase and delivery; production activities; reserves and storage; financial and sales activities; service maintenance; pricing; other components of production activities and relations with end consumers.

Thus, having consolidated the existing conceptual fundamentals and obtained results of personal research (Kwilinski, 2018a; 2018b; 2018c; Kwilinski et al., 2020; Dzwigol & Dźwigoł-Barosz, 2018; Dzwigol, 2019; 2020; Dzwigol et al., 2020a; Dzwigol et al., 2020b; Zaloznova & Trushkina, 2018; 2019; Trushkina, 2019a; 2019b; 2020; 2022; Koev et al., 2019), the authors of this study propose to consider management of the logistic activities of agricultural enterprises under conditions of digital economy as a continuous integrated process, fulfilled through exercising the functions of management (forecast, planning, organization, accounting, control, analysis and regulation); a complex approach to the processes of logistic activities (supply and purchase of material resources, contractual work with suppliers, production of agricultural products, their storage in the logistic centers, recycling of wastes with application of the tools of circular economy and reverse logistics, logistic servicing of customers, transportation and sales of agricultural products); application of digital technologies and information systems.

A great number of scientific works are devoted to the conceptual fundamentals, scientific and methodological approaches to increasing the efficiency of logistics management at various industrial enterprises. The analysis of scientific sources on logistics shows that the known foreign scientists pay much attention to justification and development of: a logistic model of distribution (Boom, 2007); concepts, models of optimization and strategies of supply chain management (Beresford et al. 2005; Huemer, 2006; Harrison and Hauck, 2007; Sander and Shechter, 2008; Barratt and Whitehead, 2008; Blaik, 2010; Murphy and Wood, 2017; Bowersox and Closs, 2017); methodological approaches to setting an optimal consignment (Schreibfeder, 2006); measures on increasing the level of consumer service and logistic service (Gunasekaran, 2005; Payne, 2005; Kotler, 2006; Lamben, 2007; Souitaris and Balabanis, 2007; Oke et al., 2007; Wallenburg, 2008); scientific and methodic fundamentals of enterprises' risk management and practical tools of logistic risk assessment in uncertainty conditions (Damodaran, 2008; Fuchs and Wohinz, 2009; Andersen and Schreder, 2010; Crouhy et al.,

2012; Saługa et al., 2021); methods of the warehouse operation accounting with application of automatic, information and communication technologies (Frazelle, 2013). The vast range of the scholars (Kuzior et al., 2021a; 2021b; Lyulyov et al., 2021b; Miskiewicz, 2020) outline the necessity of incorporation the green dimension within improving logistic management. It is justified by the reorientation of word development considering sustainable development principals (Abazov, 2021; Dźwigol et al., 2019; Kharazishvili et al., 2020). It requires the affordable investment (Miskiewicz, 2022; Melnychenko, 2021), knowledge, and innovation (Coban et al., 2022; Drożdż et al., 2020a; Ingber, 2017). At the same time, the logistic management should allow declining using of all recourses' types (Kharazishvili et al., 2021; Drożdż & Mróz-Malik, 2017) and reducing carbon dioxide emissions (Drożdż et al., 2021; Kotowicz et al., 2022).

In spite of the numerous scientific research on the chosen topic, the multi-aspect and debatable nature of some issues needs further development. Solution of the mentioned problem is getting more relevant at the current stage of transformational changes in the agrarian sector under conditions of digital economy. Therefore, the mentioned problem has shaped the purpose of this article, particularly to make scientific and methodological substantiation and to develop practical recommendations on improving the logistics management at agricultural enterprises in the context of digital transformation of business processes.

3. Methods

The theoretical and methodological basis of the research is made by the fundamentals of institutional theory, digital economy, concepts of strategic, logistic and marketing management, management of business development, and customer relationship management. Conducting the research, the authors used the following general scientific methods, namely analysis and synthesis to consolidate the existing theoretical approaches and principles, scientific works on the problem of logistics management, and to specify terminology; comparison and classification to systemize conceptual approaches to interpretation of the notion "management of the logistic activities of an agricultural enterprise"; a complex of barriers, hindering effective digital transformation of the logistic activities of agricultural enterprises; an expert opinion survey to define problems, specificity, tendencies and ways of the logistics management transformation in the agrarian sphere and management of customer experience; a statistical analysis to evaluate the current conditions of the information and communication technologies application at processing enterprises in Ukraine; structural and logical generalization to develop a structural and functional scheme of a principally new system of logistics management at agricultural enterprises; structural and logical scheme of transforming the system of logistics management; scientific and methodological substantiation of the expediency of the complex approach application to implement the digital strategy of logistics management at agricultural enterprises.

Information on the current problems of the formation and development prospects of the system of logistics management and customer relationship management is obtained by

making a comparative analysis and consolidating the methodologies of evaluating digital maturity and transformation of business processes, which are developed by the international consulting companies, analytical centers and scientific institutions, including the National Academy of Sciences and Engineering of Germany, PwC, Deloitte, KPMG, Cisco, Gartner, Arthur D. Little Agency, MIT Center for Digital Business, Global Center for Digital Business Transformation, Capgemini Consulting, and Ionology. The indices demonstrating the global development of agriculture with the use of digital technologies and instruments are taken from the official site of Statista.

Statistical data concerning Ukraine include the number of enterprises which have got access to the Internet; the number of enterprises grouped by the directions of using the Internet; the number of enterprises for determining the website opportunities while using the Internet; the number of enterprises using social media while organizing their logistic activities; the number of enterprises using big data analytics; the number of enterprises which have purchased cloud computing services; the number of enterprises employing IT specialists; the number of employees with the Internet access; e-commerce via the Internet; the number of enterprises running e-commerce; the amount of products (goods, services) sold online.

The data are taken from the chapters of "Information society" at the official website of the State Statistics Service of Ukraine and in the statistical bulletin called "The Use of Information and Communication Technologies at Enterprises" in 2017-2019; "The Use of Information and Communication Technologies at Enterprises: E-commerce, Big Data Analytics, ICT Specialists and ICT-related Skills, the Use of 3D Printing in 2018-2020"; "The Use of Information and Communication Technologies at Enterprises: the Use of the Internet, Cloud Computing, Robotics in 2018-2021".

According to the Statista data (2022d, 2022e, 2022f, 2022g), the amount of income at the global food market accounted for USD 8.3 trillion in 2021. Worldwide food production revenues continue to grow every year and can reach USD 11.1 trillion by 2027. In 2021, the value of the global market of agricultural technologies (Agtech) accounted for USD 10.5 billion. It is expected that the Agtech market will significantly grow by 2025. The Agtech market consists of such segments as platforms of agriculture management, solutions of chain supply management and stock management, GPS services, mapping of fields, agricultural monitoring and managerial decisions for micro-farms. According to the expected figures, the volume of the global market of "smart" agriculture will increase 2.8 times or from USD 12.4 billion to USD 34.1 billion in 2026 as compared to 2020. The global market of agricultural robots will grow and it expected to reach USD 20.6 billion in 2025.

According to Statista (2022h) data, the market price of a block chain at the global market of food and agricultural products was USD 32.2 million in 2017. It is expected that the value of the indicator will increase 16.7 times (USD 195.3 million) in 2023, and 44.8 times (USD 1442.9 million) by 2028. Considering Ukraine, it is worth noting that statistical bulletins of "The Use of Information and Communication Technologies at Enterprises" do not include data on the operation of enterprises of agro-industrial complex. Therefore, it is necessary to analyze

current conditions of the information supply for organizing the logistic activities of processing enterprises. It can be explained by the fact that, according to the CTEA-2010, that category includes enterprises of food production which are related with the economic activity of agricultural enterprises. Moreover, the authors of the research compared the use of information and communication technologies on the example of other types of business activities. Referring to the data of the State Statistics Service of Ukraine, the number of processing enterprises having access to the Internet increased by 14.2% during 2017-2021, whilst their share in the total number of enterprises of the corresponding type of economic activity increased by 8.1 per cent or from 82% to 90.1%. The share of processing enterprises stayed almost the same and accounted for 25.4% of the total number of enterprises in 2021 by all types of economic activities. The number of enterprises producing food products increased by 9.4%, in 2021 as compared to 2017, and their share in the total number of enterprises of the corresponding type of economic activity increased by 7.1 p.p. or from 82.2 to 89.3%. However, in that period, the share of enterprises engaged in food production reduced in the total number of processing enterprises by 0.8 % or from 19 to 18.2 % (Table 1).

Table 1. The number of enterprises having the Internet access

Indicators	Years			
	2017	**2018**	**2019**	**2021**
The number of enterprises by all types of economic activities	39582	43303	43785	44508
Including processing ones	9917	10878	11089	11323
in *%* to the total number of enterprises of the corresponding type of economic activity	82.0	90.0	89.5	90.1
A share in the total number of enterprises by all types of economic activities*, %*	25.1	25.1	25.3	25.4
Including enterprises of food production	1888	2071	2046	2065
in *%* to the total number of enterprises of the corresponding type of economic activity	82.2	90.2	90.3	89.3
A share in the total number of enterprises of processing industry*, %.*	19.0	19.0	18.5	18.2

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019; The State Statistics Service of Ukraine (2022). The Use of Information and Communication Technologies at Enterprises: The Use of the Internet Network, Cloud Computing, Robotics.

In 2018-2021, the number of people employed at processing enterprises and having the Internet access increased by 2.2%. Their share in the total number of employees at the enterprises of the corresponding type of economic activity increased by 1.4 % or from 19.2% to 20.6%. In the studied period, there can be observed a 1.7% increase in the number of people employed at the enterprises of food production which had the Internet access, and their share in the total number of employees at the enterprises of the corresponding type of economic activity increased by 0.5% or from 19.2% to 19.7% (Table 2).

Table 2. The number of employees having access to the Internet

Indicators	Years		
	2018	2019	2021
The number of people employed at enterprises by all types of economic activities, *thousand people*	1064.7	1090.0	1133.1
Including people employed at processing enterprises, *thousand people*	255.7	257.6	261.2
in *%* to the total number of employees at enterprises of the corresponding type of economic activity	19.2	19.9	20.6
A share of employees in the total number of them at enterprises of all types of economic activities, *%*	24.0	23.6	23.1
Including the number of those employed at enterprises of food industry, *thousand people*	58.8	58.8	59.8
in *%* to the total number of people employed at enterprises of the corresponding type of economic activity	19.2	19.4	19.7
A share of employees in the total number of them at processing enterprises, *%*	23.0	22.8	22.9

Source: The State Statistics Service of Ukraine (2022). The Use of Information and Communication Technologies at Enterprises: The Use of the Internet Network, Cloud Computing, Robotics.

The statistical analysis shows that the number of processing enterprises which employed specialists in information and communication technologies increased by 2.7% in 2019 as compared to 2017. Their share in the total number of enterprises by all types of economic activities stayed almost the same in 2019 and accounted for 24.6%. However, the number of processing enterprises which organized training courses for ICT specialists reduced by 1.8% in that period, and those which employed such specialists – by 33.7% (Table 3).

Table 3. The number of processing enterprises which employed specialists of information and communication technologies

Indicators	Years		
	2017	2018	2019
The number of enterprises by all types of economic activities, which employed ICT specialists	10660	10973	10953
Including in processing industry	2627	2732	2699
A share in the total number of enterprises by all types of economic activities, *%*	24.6	24.9	24.6
The number of processing enterprises which organized training courses for ICT specialists	491	478	482
The number of processing enterprises which employed ICT specialists	1028	713	682

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

In 2017-2019, the number of processing enterprises which used the Internet to get information about goods and services increased by 12.9%; to send and receive e-mails – by

12.2%; for instant messaging and online advertising – by 14.6%; to make banking transactions – by 12.8%; to get access to other financial services – by 15.9% (Table 4).

Table 4. The Ways of the Internet Use by Processing Enterprises

Indicators	Years		
	2017	2018	2019
The number of processing enterprises having the Internet access	9917	10878	11089
Including: sending or receiving e-mails	9792	10769	10985
getting information about goods and services	9012	10004	10178
instant messaging and online advertising	4927	5510	5647
banking transactions	9604	10591	10832
access to other financial services	3952	4481	4580

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

During the analyzed period, the number of processing enterprises which used websites while organizing their logistic activities increased by 9.1%. It happened due to a growth of the number of enterprises which used their website to train staff – by 22.3%; to create personified information content of the website for regular customers – by 16%; to make online orders of goods – by 14.1%; to provide customer service – by 11.5%; to monitor and check the status of orders – by 10.1%; to supply products online – by 7.9% (Table 5).

Table 5. Website options while using the Internet by processing enterprises

Indicators	Years		
	2017	2018	2019
The number of processing enterprises having websites	4910	5288	5358
Including: customer service	2078	2275	2316
online product supply	636	688	686
making online orders of goods and services	1230	1372	1403
website personified information for regular customers	995	1176	1154
monitoring and check of the status of orders	1104	1221	1215
staff training	345	426	422

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

During 2017-2019, the number of processing enterprises which used social media for head-hunting increased by 30.9%; for the company presentation or promoting its goods/services – by 28.7%; for getting feedback from customers and replying to orders – by 28.5%; for involving customers into innovative activities – by 24.8%; for cooperation with different groups of stakeholders – by 21% (Table 6).

Table 6. Purposes of using social media by processing enterprises

Purposes	Years		
	2017	2018	2019
Presentation of the enterprise or promotion of its goods/services	2306	2795	2967
Feedback from customers and reply to orders	1571	1880	2018
Involvement of customers into development or innovation of goods and services	1005	1187	1254
Cooperation with business partners and other groups of stakeholders	1773	2028	2146
Hiring employees	1208	1452	1581

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

A statistical data analysis confirms that in that period, the number of enterprises in processing industry which used cloud computing increased by 33%, and their share in the total number of enterprises by all types of economic activities increased by 1.2% or from 22.5% to 23.7%. It was due to the growing number of processing enterprises which purchased services for the file storage – by 42.6%; office software – by 41.3%; programs for customer relationship management – by 37.7%; database hosting, financial or accounting applied programs – by 34.5% (Table 7).

Table 7. The use of cloud computing at processing enterprises

Indicators	Years		
	2017	2018	2019
The number of enterprises of all types of economic activities which purchased cloud computing services	4135	4831	5207
Including the number of processing enterprises	929	1124	1236
Among them, such kinds of cloud computing services were bought: office software	392	482	554
hosting the enterprise's database	330	375	444
file storage	338	420	482
financial or accounting applied programs	537	627	722
programs of customer relationship management	236	293	325

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

The number of processing enterprises which made big data analytics of the information obtained from geolocation data by portable devices increased by 16.5% in 2019 as compared to 2017. However, the number of processing enterprises which made big data analytics of the data obtained by smart-devices and sensors reduced by 6.7%; from social media – by 2%; other information sources and means – by 25.4% (Table 8).

Table 8. Big data analytics at processing enterprises

Indicators	Years		
	2017	2018	2019
The number of processing enterprises which made analytics of big data, obtained from: data of their enterprises by smart-devices or sensors	750	676	700
geolocation data from portable devices	345	353	402
data of social media	354	340	347
other information sources	921	695	687

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

During 2017-2019, the number of processing enterprises which made procurement online increased by 32.6%, whilst their share in the total number of enterprises by all types of economic activities increased by 1.5% or from 24.2% to 25.7%. However, the number of processing enterprises which got orders online reduced by 10.3%, whereas their share in the total number of enterprises by all types of economic activities – by 1.3% or from 28.4% to 27.1% (Table 9).

Table 9. E-commerce run by processing enterprises

Indicators	Years		
	2017	2018	2019
The number of enterprises by all types of economic activities which purchased good and services online	8168	9583	10169
Including in processing industry	1973	2440	2616
A share in the total number of enterprises by all kinds of economic activities*, %*	24.2	25.5	25.7
The number of enterprises by all types of economic activities which received orders for their products or services via the Internet	2596	2476	2440
Including in processing industry	737	673	661
A share in the total number of enterprises by all types of economic activities*, %*	28.4	27.2	27.1

Source: The State Statistics Service of Ukraine (2019). The Use of Information and Communication Technologies at Enterprises by the Type in 2017; The State Statistics Service of Ukraine (2020). The Use of Information and Communication Technologies at Enterprises by the Type in 2018-2019.

It is worth noting that the number of food processing enterprises running e-commerce reduced by 2.6% in 2020 comparing to 2018. Their share in the total number of enterprises by all types of economic activities reduced by 0.2% or from 6.8% to 6.6%, whilst in the total number of processing enterprises running e-commerce it reduced by 1% or from 23.2% to 22.2% (Table 10).

Table 10. The number of enterprises running e-commerce

Indicators	Years		
	2018	2019	2020
The number of enterprises by all types of economic activities	2476	2440	2494
Including in processing industry	673	661	684
A share in the total number of enterprises by all types of economic activities, *%*	27.2	27.1	27.4
in *%* to the total number of Ukrainian enterprises	5.6	5.3	5.4
The number of enterprises of food industry	156	146	152
A share in the total number of processing enterprises, *%*	23.2	22.1	22.2
in *%* to the total number of Ukrainian enterprises	6.8	6.4	6.6

Source: The State Statistics Service of Ukraine (2021). The Use of Information and Communication Technologies at Enterprises: E-commerce, Big Data Analytics, ICT Specialist and ICT-related Skills, the Use of 3D Printing.

Despite the positive trends in organizing the logistic activities of processing enterprises due to applied information and communication technologies there are some negative aspects. According to the data of the State Statistics Service of Ukraine, in 2018-2020 the share of processing industry products via the instruments of e-commerce reduced by 6.4% or from 23.1% to 16.7% of the total volume of sold products by all types of economic activities. The share of food products sold online fell by 4.2% or from 14.8 to 10.6% of the total volume of sold products by all types of economic activities (Table 11).

Table 11. The amount of products sold via e-commerce websites or applied programs

Indicators	Years		
	2018	2019	2020
By all types of economic activities, *billion UAH*	228.0	292.7	364.6
Including in processing industry, *billion UAH*	52.6	56.3	61.0
A share in the total amount of sold products by all types of economic activities, *%*	23.1	19.2	16.7
in *%* to the total amount of products sold by enterprises of the corresponding type of economic activity	2.7	3.1	3.1
Including food production, *billion UAH*	33.8	36.4	38.5
A share in the total amount of products sold by all types of economic activities, *%*	14.8	12.4	10.6
in *%* to the total amount of products sold by enterprises of the corresponding type of economic activity	5.2	5.7	5.2

Source: The State Statistics Service of Ukraine (2021). The Use of Information and Communication Technologies at Enterprises: E-commerce, Big Data Analytics, ICT Specialist and ICT-related Skills, the Use of 3D Printing.

Thus, the statistical data analysis confirms that enterprises of processing industry in Ukraine actively use modern digital technologies and information systems. In its turn, this contributes to effective organization of the processes of logistic activities in digital economy.

4. Results

The conducted research found out that effective digital transformation of the logistic activities of processing enterprises is hindered by some barriers, which are conventionally systemized into 7 groups:

- institutional (a negligible effect of the legislative and normative documents regulating the processes of procurement, commercial, sales, and transportation activities) (Kwilinski et al., 2022a; Abaas et al., 2018; Bilan et al., 2019);
- financial and economic (permanent fluctuations at currency markets; instable economic situation because of crisis phenomena; late payment for delivered products; poor investments and financial resources) (Miśkiewicz et al., 2022; Prokopenko & Miśkiewicz, 2020; Chygryn et al., 2018; Melnyk et al., 2018);
- market (regular fluctuations of the sales markets conjuncture; insufficient consumer's demand for agricultural products (Kalashnikova et al., 2019; Lypchuk et al., 2019; Prokopyshyn, 2019; Danko et al., 2020);
- marketing (under-consideration of the specific features of servicing different categories of consumers; weak contract activities of enterprises; an inefficient use of digital marketing tools; an inadequate use of the customer-oriented approach to logistic services (Sandiuk et al., 2019; Trushkina, 2019c; 2020; Hnatyshyn & Trushkina, 2021; Prokopyshyn & Trushkina, 2021; Petroye et al., 2020);
- transport (a delayed delivery of freight because of breakage or unexpected idle of transport means; freight not prepared in the proper time; a loss of freight because of transportation problems) (Lyulyov et al., 2015);
- information (insufficient knowledge and skills of digital economy and marketing; a limited use of digital technologies and electronic platforms for customer relationship management) (Miśkiewicz, 2018; Miśkiewicz ey al., 2021; Szczepańska-Woszczyna & Gatnar, 2022; Trzeciak et al., 2022);
- organizational (a lack of a clear strategy of digital transformation, comprehension of the company's digital future and drawbacks of management; unskillful management of organizational changes; no digital strategy of customer relationship management; a low level of employees' involvement; the insufficient number of qualified and competent employees who meet modern requirements of digital economy) (Miśkiewicz, 2021a).

To overcome the above-mentioned barriers, it is reasonable to transform the current system of logistic activity management (SLAM) at agricultural enterprises which should be considered as an interrelated complex of objects and subjects of management through implementing the whole list of functions of the logistics process management in a single complex on the basis of using the mechanisms of information and organization supply (Figure 1). The transformation of the system of logistic activity management at agricultural enterprises should be based on fundamentally new principles of operation (Figure 2). Among them, there can be distinguished:

- an application of the system approach to organizing logistic activities as a single complex, which means implementation of the integrity of related, sequential processes (supply and purchase of material, contract work with suppliers, production of agricultural

products, their storage in logistic centers, recycling of wastes, customer servicing, transportation and sales of agricultural products) and different logistic services;

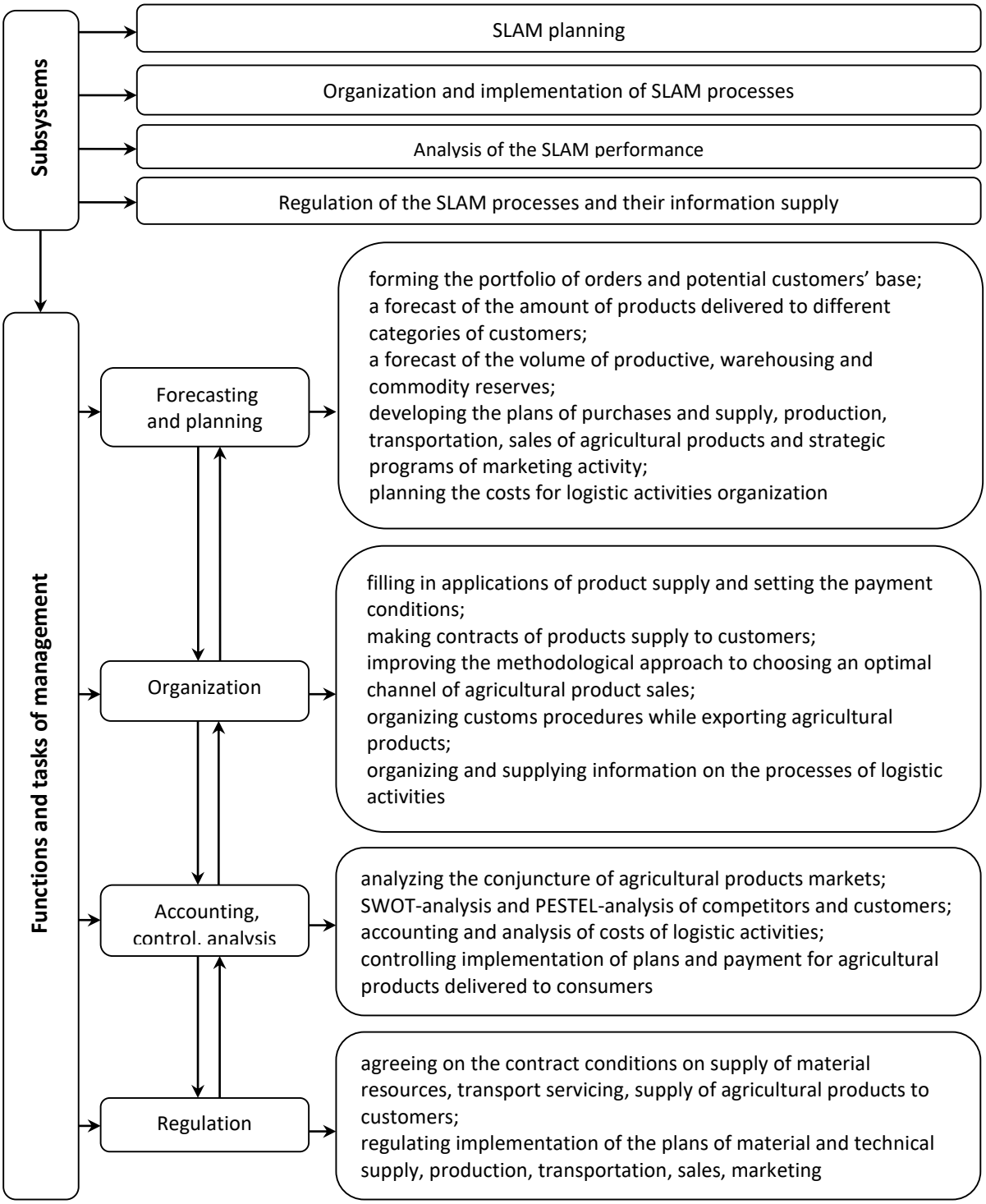

Figure 1. The Structural and Functional Scheme of the Fundamentally New System of Logistics Management of Agricultural Enterprises
Source: designed by the authors

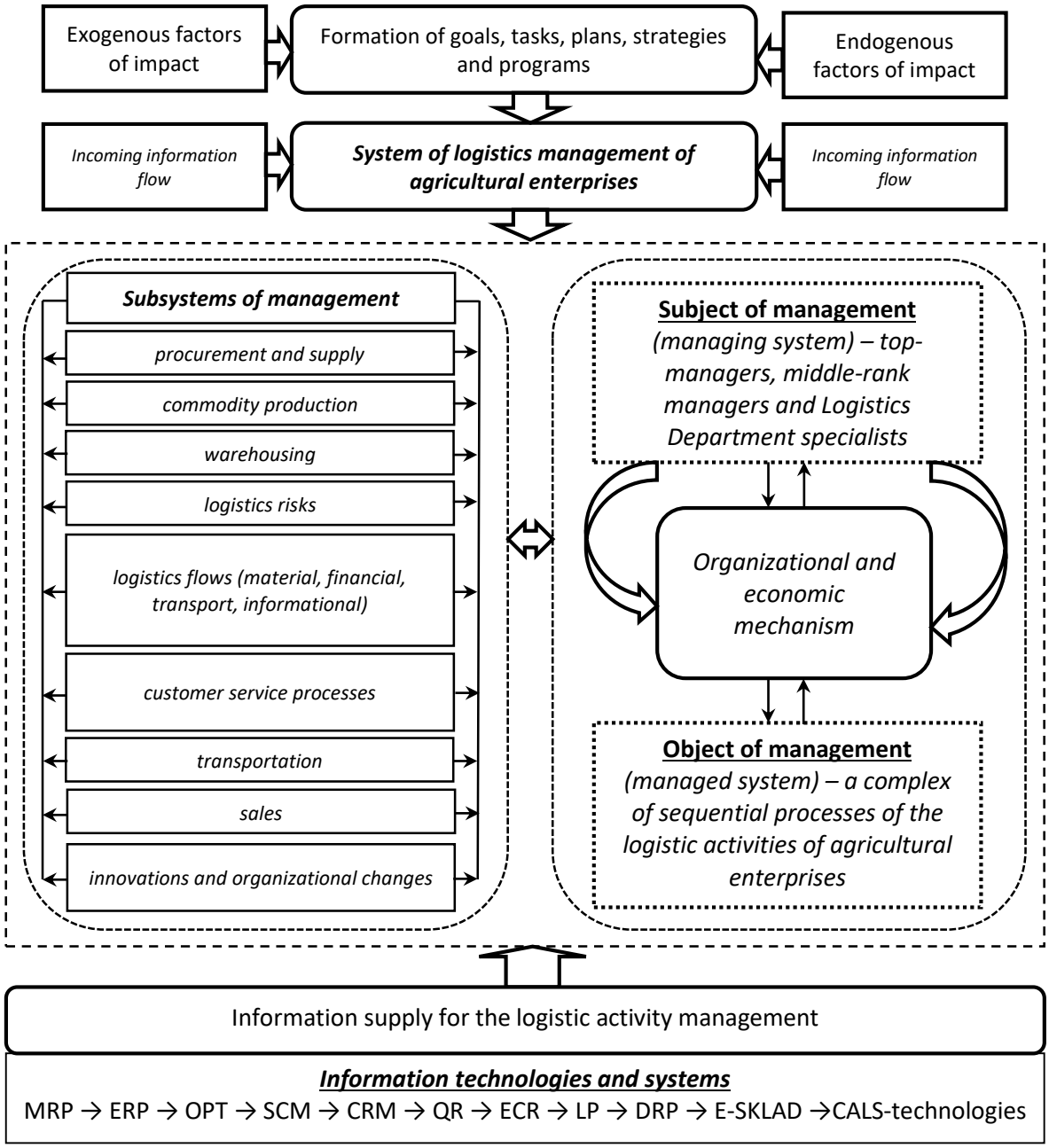

Figure 2. The Structural and Logical Scheme of Transforming the System of Management of the Logistic Activities of Agricultural Enterprises in Digitalization Conditions
Source: designed by the authors

- exercising the whole list of managerial functions (forecast, planning, organization, accounting, control, analysis and regulation) through a complex of sequential processes of logistic activities;
- differentiation of the product consumers into the large-scale, medium-scale, and small-scale and wholesale ones referring to the amount of their annual demand;
- partnership relationship among the members of sales networks should be implemented voluntarily on the principles of interaction and synergy due to integration of

efforts, goals and resources of stakeholders (Polcyn et al., 2022; Saługa et al., 2020) on the basis of interdependence of their responsibility, distribution of authorities and logistics risks;

- the processes of logistic activities should be organized basing on modern information and communication, as well as digital technologies with the use of specific software, automated systems of management, logistic concepts, economic and mathematical methods.

The conducted research provides for the conclusion that to transform the system of managing the logistic activities of agricultural enterprises in digital economy, it is reasonable to apply a complex approach (Fig. 3).

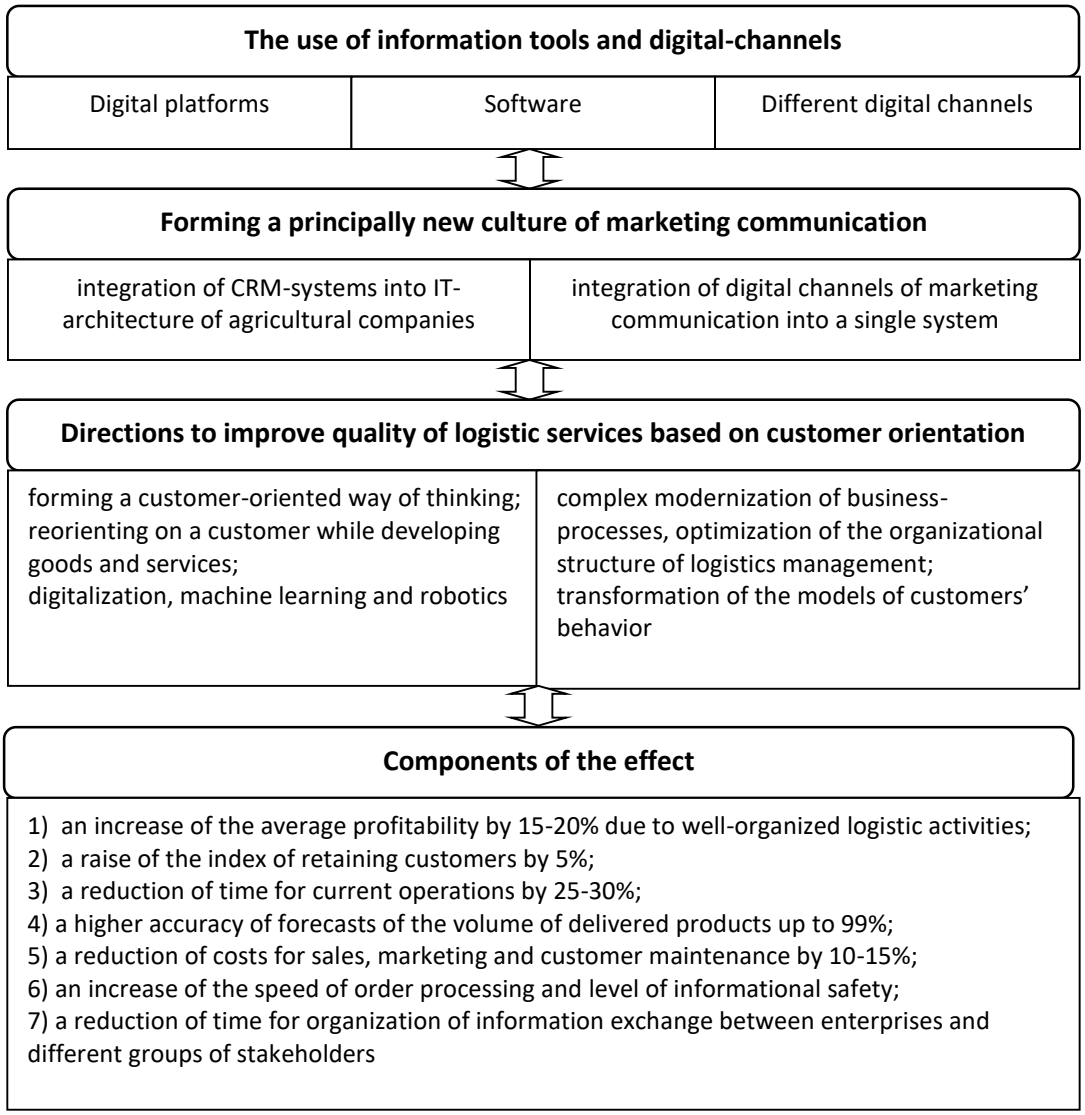

Figure 3. A Complex Approach to Managing the Logistic Activities of Agricultural Enterprises in Digital Economy
Source: designed by the authors

Thus, effective operation of agricultural enterprises in the instable institutional environment needs creating adequate conditions, which would provide for the business entities to get

maximum benefits from organization of the logistic activities with consideration of the specificity of the global and digital economy development.

5. Conclusions

Considering everything mentioned above, it is possible to make some conclusions. Transformation of logistics management of an enterprise in the agro-industrial complex is closely related with the development of digital economy. A total focus on consumers is achieved by accumulating, structuring and exchanging information, whereas high competitiveness of enterprises in the digital economy is impossible without the customer-oriented approach to logistic services. The mentioned approach means planning all business processes around customers' needs and is considered as a tool to create values for consumers and to use digital technologies in order to improve the customer experience. Therefore, the consumer relationship management is a priority direction in the system of logistics management under conditions of business digitalization.

In the current conditions, to increase efficiency of the logistics management of business entities in the agrarian sector of Ukraine, it is expedient to develop a complex of strategic measures on:

- managing material and technical supply (calculation of an optimal consignment of materials and sources; optimization of the purchasing strategy of enterprises; improvement of the purchasing process management by means of multi-criteria assessment of the choice of the best-possible supplier of materials);
- managing transportation process (introduction of information systems of freight management; application of automatic processing of documents while delivering freight; shaping proposals on optimization of transport loading; the use of Internet technologies for transportation process automation);
- managing the processes of customer servicing (analysis and forecast of the volume of delivered products with consideration of the seasonal factor; development of algorithms of servicing different categories of consumers and proposals on improvement of the level of logistic services);
- managing sales activities (the substantiated use of the network approach to organization of enterprises' sales activities; the development of a system of contract relations with consumers; improvement of the customer-oriented approach to servicing different categories of consumers in the context of the concept of marketing relations, mechanism of implementing public-private partnership in managing the enterprises' trading activities on the basis of agro-clusters, the methodological approach to choosing an optimal channel of agricultural products sales; identification of the priority directions of e-commerce development as an effective instrument to promote goods at the markets of agricultural products);
- information supply for organizing logistic activities by using modern digital technologies.

The research confirms numerous risks which should be considered while organizing logistic activities of agricultural enterprises. Therefore, it is reasonable to make permanent

monitoring, a system analysis of risks of the logistic activities of enterprises and thus, to manage them by applying a complex of methods, tools and information systems which can provide for a forecast of probable market risks and to take measures to minimize them.

Implementation of the proposed complex of strategic measures will provide a synergetic effect, comprising:

1) *an economic effect* because of an increase of the average profitability by 15-20% due to well-organized logistic activities; a raise of the index of retaining customers by 5%; reduction of time for current operations by 25-30%; a higher accuracy of forecasts of the volume of delivered products up to 99%; a reduction of costs for sales, marketing and customer maintenance by 10-15%;
2) *a social effect* due to optimization of the work of the logistics department staff at agricultural enterprises; faster processing of customers' orders and level of information safety; reduction of time for information exchange between the enterprise and economic counteragents;
3) *an ecological effect*: a reduction of the negative impact on the environment due to improved conditions of products transportation and storage, application of the concept of industrial waste management in the context of circular economy, implementation of "green" technologies in production and organization of logistics processes.

Prospects of the further scientific research suggest the development of an organization and economic mechanism to improve the system of consumer relationship management in the context of the marketing strategy of agricultural enterprises in digital economy, as well as scientific and methodological substantiation of the digital strategy of developing the logistics companies in Ukraine with consideration of the specificity of their performance and advanced international experience.

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