European Journal of Sustainable Development (2026), **15**, 2, 63-78 ISSN: 2239-5938
Doi: 10.14207/ejsd.2026.v15n2p63

Innovative Approaches to Digital Logistics and Green Marketing: Key Growth Strategies in the International Economy

By Iryna Murenets[1], Viktoriia Karp[2], Iryna Kadyrus[3], Oleksander Yurchenko[4], Alina Kram[5]

ABSTRACT:
Digitalization has completely changed the approaches to the provision of logistics services in the global economy. The article discusses new strategic directions for the development of digital logistics as a concept of creating value in the provision of logistics services using technologies ("big data", digital platforms, cloud and blockchain technologies). The advantages of digital logistics are to ensure openness and transparency of the actions of logistics ecosystem participants, automatic coordination of logistics processes between participants, solving problems of delays and optimizing delivery routes. At the same time, obstacles to the use of blockchain in digital platforms as the basis of digital logistics are identified, which cause financial losses for developing companies and do not ensure the achievement of strategic goals. The main barriers to the development of digital logistics are associated with problems of communication, information support, legislative regulation of technologies, insufficient integration of local and global markets, problems of information quality control and compatibility of various management systems of logistics ecosystem participants. The strategic directions for the development of digital logistics include: digitalization of logistics processes in the global supply chain, taking into account existing barriers to technology integration (cloud and blockchain technologies in combination with digital platforms); development of on-demand digital logistics to create value and create new narrowly specialized services using digital technologies to collect big data; integration of green marketing innovations into digital logistics to create eco-efficient logistics services.

Keywords: logistics process, innovation marketing, green technologies, digital technologies, digital marketing, logistics

1. Introduction

Third-party logistics operators introduced in the 1990s (Schrauf, 2017).

The traditional approach to logistics as a commodity service views logistics processes as creating little value in the company's value chain. This is due to both the outsourcing of logistics services and the creation of established logistics networks and connections within trade routes between countries (Shih et al., 2021).

[1]PhD in Economics, Associate Professor, Department of International Economic Relations and Business Security, Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine. ORCID: https://orcid.org/0000-0001-9474-4374
[2]PhD in Economics, Associate Professor of the Department of International Business, Educational and Scientific Institute of International Relations, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine. ORCID: https://orcid.org/0000-0002-2231
[3]PhD in Economics, Associate Professor of the Department of Marketing, Dnipro States Agrarian and Economic University, Dnipro, Ukraine. ORCID: https://orcid.org/0000-0002-5024-6549
[4]PhD (Economics), Associate Professor of the Department of International Economy, Borys Grinchenko Kyiv Metropolitan University, Kyiv, Ukraine. ORCID: https://orcid.org/0000-0002-8447-6510
[5]MSc. (Management), Platform Engineer, Strategic Imperatives Limited, Staines-Upon-Thames, England. ORCID: https://orcid.org/0009-0007-0032-5058

To meet customer needs, logistics companies need to use an ecosystem approach to doing business. With the growth of digitalization, business models based on digital platforms will unite new players in the logistics market into a single integrated ecosystem and lead to the exit of old players from the market. As Woerner et al. (2022) point out, creating value from the ecosystem allows for income from all its participants in the transition to digital business models and the use of digital marketing in the transition to create completely new value propositions. Such trends lead to the emergence of new strategic directions for the development of logistics in the global economic system.

Despite the growing scientific interest in digital logistics, this concept is still in its infancy (Parhi et al., 2022). Digital logistics as a new development concept creates new challenges for activity. Traditionally, logistics companies coordinated the supply, transportation, and storage of assets of senders and recipients. In contrast, today digitalization has allowed the creation of logistics centers to coordinate the activities of several stakeholders ("multi-party" logistics). In this regard, the relevance of researching strategic directions for the development of digital logistics and green marketing of innovations in the global economy is increasing.

The purpose of the article is to outline the strategic directions for the development of digital logistics in the global economy, taking into account the practical application of the concept of green marketing of innovations to create eco-efficient services. The article reframes logistics as value creation through digital platforms, blockchain and cloud technologies.

2. Literature review

2.1. Digitalization as a factor in ensuring sustainable economic development

Digitalization has been driving changes in economic structure for decades, and new digital technologies have transformed the way work is organized and its content (Sturgeon, 2021). At the same time, the role of new digital technologies in economic development remains a central topic of academic research (Butollo et al., 2022).

The issues of digital transformation of economic processes and its impact on sustainable development are considered in the works (Desyatnyuk et al., 2024a), which examine the role of digitalization in ensuring international financial stability in the context of sustainable development. In turn, in the work (Desyatnyuk et al., 2024b), digital technologies are defined as the basis for increasing financial inclusion and accessibility of services, which is of direct importance for the development of digital logistics based on platforms.

Krysovatyy et al. (2024) substantiate the concept of an inclusive economy, in which digital and social innovations are combined with the principles of sustainable development. Desyatnyuk and Ptashchenko (2025) emphasize that digital technologies catalyze the development of a "green" economy and open up new opportunities for global business stability.

The digitalization of the economy is causing fundamental changes in all functional areas of global logistics (Parfenov et al., 2021), requiring a more detailed study of the latest trends in the development of digital logistics as a factor of economic growth (Zhang et al., 2023).

2.2. Trends in digital logistics development

The driving forces of digital logistics are determined by a number of factors. Global structural shifts in communication systems, as a result of the transition from competition between distribution channels to economic competition between digital trading platforms, are recognized as the driver of digitalization in logistics (Parfenov et al., 2021). In addition, the loss of the status of the most influential participants by traditional owners of distribution channels in terms of understanding the needs of end consumers and tracking the dynamics of changes in their preferences, in fact, leads to the unviability of traditional structures of distribution channels in logistics (Dent, 2011).

The decline in the effectiveness of traditional approaches to logistics organization and the trend towards the use of digital technologies have influenced the development of new approaches to conducting logistics business on a global scale. Research Shih et al. (2021) highlights in detail the features of traditional approaches to logistics organization, built on the basis of outsourcing of logistics functions that do not provide value creation, suggesting the use of digital logistics to solve this problem.

An additional factor in the development of digital logistics is the development of a digital trade ecosystem between countries and the growth of cross-border e-commerce platforms (Yang et al., 2023).

The level of technological development and innovation activity in different countries affects the efficiency of the logistics sector. According to recent empirical studies, a country's technological readiness and innovation are positively correlated with logistics efficiency, in particular indicators of the quality of logistics services, the efficiency of customs clearance processes, the ability to track cargo, and other efficiency indicators (Moldabekova et al., 2021).

Theoretical and practical studies (Choudary et al., 2019; Schrauf, 2017) highlight the latest trends in digital logistics, built on the integrated use of digital technologies. Research Prokopenko et al. (2021) is devoted to the optimization of business processes through the logistics concept, which forms the basis of digital supply chain management strategies. Bobro et al. (2025) analyze the effects of digital transformation to optimize costs and ensure the sustainability of enterprise operations.

Recent digitalization trends in logistics include improvements in tracking systems, digitization of information flows, artificial intelligence, and automation, which have positively impacted the globalization of trade (Kuteyi & Winkler, 2022). Modern supply chain or logistics strives to implement large-scale intelligent infrastructure based on data, information, physical objects, products for business development (Zhang et al., 2023).

New approaches to the digitalization of logistics define a strategic, collaborative approach to implementing digital technologies to promote operational efficiency and sustainable development of the sector (Attah et al., 2024).

The latest trends in the development of digital logistics in the global economy include: the emergence of new business models as a result of the digitalization of the sector; the development of a new concept of "digital logistics". These vectors may become the main areas of logistics growth in the future.

The convergence of logistics "big data" flows, new platforms, cloud and blockchain technologies, data analytics, and market drivers are leading to the emergence

of new business models in logistics, trade, freight and maritime transport (Choudary et al., 2019; Schrauf, 2017). At the same time, the adaptation of existing business models of logistics and transport companies to the new conditions of the digital economy remains a problematic issue (Palkina, 2022). Given the significant risks of transitioning to new business models based on digital platforms, large and small market players are leveling these trends. As noted by Kern (2021), there is a large gap between the level of digitalization of digital leaders (giants) and other players in the logistics industry who refuse to implement new technologies. Such trends are associated with large initial investments in digitalization, a lack of standards, and unclear regulatory rules.

Future trends are determined by the increasing role of artificial intelligence, automation and cross-industry partnerships in managing digital ecosystems in logistics to ensure sustainability (Attah et al., 2024). As noted by Hong and Xiao (2024), the use of the potential of artificial intelligence and blockchain technologies in supply chains can contribute to transparency, accountability and improved traceability of logistics operations, increasing logistics efficiency, and thus influencing the sustainable development of the economy. The use of digital twins in the logistics sector is also recognized as an upward trend (Moshood et al., 2021).

Despite the existence of significant theoretical and practical research on the development of logistics in the global economy, comprehensive research on the strategic vectors of digital logistics development and the importance of green marketing innovations in the global economy remains limited.

3. Methodology

The methodology is based on methods of statistical analysis, synthesis and hierarchical cluster analysis of quantitative indicators of logistics and supply chain efficiency for 85 countries of the world. Logistics efficiency indicators were selected based on the criteria of accessibility and objectivity of data for 85 countries. As a result, the sample includes all countries with complete data without missing values for the second quarter of 2022. Complete statistical data made it possible to avoid the impact of imputation.

To analyze the main trends and directions of development of digital logistics in the global economy, World Bank data for the 2nd quarter of 2022 for container and air logistics was used (LPI, 2023). The construction of a dendrogram of hierarchical clustering made it possible to identify the optimal number of clusters relevant for further clustering and analysis. To verify the reliability of the hierarchical clustering results, two methods were used: clustering by intergroup distances based on Euclidean metrics and Ward's method, which uses the square of Euclidean distances. Both approaches demonstrated identical clustering results.

Hierarchical cluster analysis using the k-means iterative clustering method was applied to group countries by logistics efficiency indicators: number of available transportation services and number of container logistics alliances (units); number of container logistics maritime partner countries (units); number of aviation logistics partner countries (units) (LPI, 2023). Data collected using digital platforms, including TradeLens, for Q2 2022, which are hosted in the World Bank database (LPI, 2023).

To verify the reliability of the hierarchical clustering results, two methods were used: clustering by intergroup distances based on Euclidean metrics and Ward's method, which uses the square of Euclidean distances. Both approaches demonstrated identical clustering results.

The grouping of countries was carried out using the method of intergroup distances using the Euclidean distance measure. Table 1 presents descriptive statistics of logistics efficiency indicators.

Table 1: Descriptive statistics of logistics performance indicators for Q2 2022

Indicator	Number of countries	Minimum value	Maximum value	Average value	Standard deviation
Number of container transportation services, units	85	4.00	590.00	59.13	84.14
Number of alliances in container logistics, units	85	0.00	5.00	1.35	1.59
Number of maritime transport partner countries, units	85	1.00	102.00	34.61	24.73
Average number of partner countries for the country's aviation logistics, units	85	10.50	158.00	86.36	39.05

Source: calculated by the author based on data from The World Bank (LPI, 2023)

Correlation analysis allowed us to identify the main relationships between logistics and supply chain performance indicators. The Pearson correlation coefficient was chosen to identify the directions of the relationship between variables, the statistical significance of which was tested by p-value at a significance level of 0.01.

To identify the directions of development of digital logistics in the global economy, the average annual GDP growth rates of different countries of the world were analyzed (World Bank, n.d.) and the average share of trade of different countries of the world in 2016-2023 (The World Bank, 2024). The comparison method allowed for an analysis of countries with the highest indicators of logistics efficiency, taking into account the dynamics of GDP and trade openness. Data for the analysis of countries by annual GDP growth rates and the share of trade in GDP were selected according to the principles of data availability for different countries during 2016-2023. The sample of countries did not include those for which data on logistics efficiency indicators were missing. As a result, the sample covered 85 countries of the world.

The main limitations of the study are related to the limited World Bank data on logistics performance indicators, which were collected only for the 2nd quarter of 2022 (LPI, 2023). The limitation is related to the suspension of the data collection platform used by the World Bank to form a database with efficiency indicators for container and air logistics. Despite the limitations, the inclusion of 85 countries in the sample allowed for a detailed analysis of global trends in logistics development in the context of digitalization. Future research should include alternative data sets to reduce the bias of information

collected on the platform and take into account structural shocks in logistics in the medium and long term.

4. Results

The transition to platform-based digital logistics is driven by a combination of technological, market, and production factors: the development of technology and infrastructure, large flows of accurate logistics data, and the need for enterprises to reduce costs.

The demands of logistics customers for expanded functionality, which can be provided through the use of digital platforms, combined with cost reduction, allows logistics companies to use existing assets more efficiently, creating value. In this regard, logistics operators are implementing new ways of organizing activities based on an eco-system approach.

The allocation and shared use of available logistics capacities creates logistics value by reducing transaction costs. Business-models based on digital platform enable value creation across the entire supply chain without the need for direct asset ownership. In this context, capacity pooling and platform-based coordination reshape pricing mechanism, risk allocation, and the structure of interactions among market participants. Reducing transaction costs allows for higher profitability, while the use of platforms reduces the risk of financial losses through tracking mechanisms and shorter delivery times.

Despite the importance of digital platforms, logistics companies invest in tangible assets to ensure productivity, while investments in digitalization are significantly lower in terms of volume. For example, in EU countries, investment in tangible non-current assets of transport and warehousing services companies amounted to €149.02 million in 2022, increasing to €151.15 million in 2023 (Eurostat, 2022). Over the past ten years, data generated from sensors embedded in physical assets (delivery vehicles, containers, warehouses) has significantly increased the level of transparency of all operations and processes in the logistics value chain.

In addition to the benefits created by collecting big data on transactions, the emergence of blockchain and other distributed ledger technologies enables public recordkeeping and automated process coordination, allowing digital and physical actions to trigger each other. Data generated by sensors, ERP systems, inventory management systems, and delivery systems can automatically add records to the blockchain, triggering cascading actions in the value chain. The open architecture of blockchain allows many parties in the logistics industry to contribute to data sharing and collaborative data management from a single source.

This creates additional benefits: public records increase the transparency of transactions, as a result of which all participants adhere to high standards of service provision (Rivera et al., 2024). In addition, blockchain's ability to provide permission management, asset ownership, and accountability improves service quality. The level of trust between participants in the digital logistics ecosystem increases. Any individual gaps and operational shortcomings that companies previously encountered, which may have been hidden in complex data collection and storage systems, can now be eliminated. Digital logistics creates visibility into operations for all parties at every stage of logistics activities.

Financial institutions are driving the digital transformation of logistics by funding interoperability technologies in the industry and partnering with logistics firms to leverage blockchain. Greater transparency in logistics allows for more effective investment decisions across a wide range of transactions.

At the same time, the main obstacles to implementing blockchain in logistics for digital transformation, especially in developing countries, are identified as: lack of knowledge about blockchain technology in logistics; insufficient information support, communication and telecommunications problems, outdated financial infrastructure; lack of clear legislative regulation; local markets for creating blockchain technology are not sufficiently integrated into global markets for creating blockchain applications, despite the availability of human capital (Rivera et al., 2024).

The OECD study identified other challenges to blockchain implementation in supply chains (Figure 1): lack of control over information quality; access issues for vulnerable populations, communities, and informal participants in supply chains; lack of scalability and incentives for use; emergence of multiple databases for different supply chains; lack of interoperability across systems (OECD, 2019).

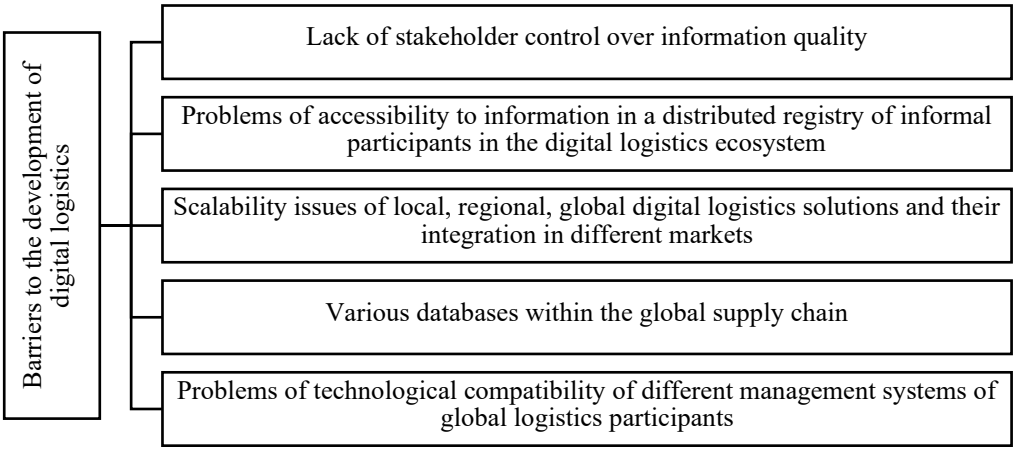

Figure 1. Main barriers to the development of digital logistics in the global economy
Source: systematized by the author based on OECD (2019)

The experience of the global shipping company Maersk (an integrated container logistics company providing flexible, eco-efficient logistics services) and the American software manufacturer IBM in joining forces to launch the blockchain-based platform TradeLens demonstrates the effective management of global transportation with the participation of many stakeholders (Moller, 2022). The set of logistical actions and processes throughout the transportation life cycle – creditworthiness check, contract signing, arrival at the port and payment – are automatically publicly recorded in a distributed ledger.

In the TradeLens platform, all actions, information and documentation are recorded on the blockchain as a single source of reliable information, accessible to all participants in the ecosystem. Contracts are automatically executed using distributed ledger technology: when a delivery is registered at the port, the contracts encoded in the

blockchain are automatically activated, eliminating human error, delays and document loss. In addition, customs documents required when goods are delivered to the port are automatically executed as smart contracts (Choudary et al., 2019).

It should be noted that the World Bank used the TradeLens platform to collect data on tracking delays in the import and export of goods at ports or multimodal transport infrastructure facilities to measure the efficiency of logistics and supply chains on a global scale (LPI, 2023).

At the same time, in 2022, Maersk management announced a decision to discontinue the digital platform due to failure to achieve the strategic goal of establishing open global cooperation, commercial failures, and the lack of financial benefits from the digital platform (Moller, 2022).

Given the above, one of the strategic directions for the development of digital logistics in the global economy is the digitalization of logistics processes in the global supply chain using blockchain technologies in combination with digital platforms.

World Bank data on container traffic, compiled based on vessel tracking data from Marine Traffic for Q2 2022, MDS Transmodal for Q2 2022, confirm the trend towards digitalization of logistics processes (LPI, 2023).

Digitalization of processes primarily allows to reduce the time for processing containerized cargo in ports and other multimodal transport infrastructure facilities in the context of the growth of the number of services and trade between countries. That is, digitalization in logistics is important from the point of view of international trade.

The development of on-demand digital logistics to create value and create new highly specialized services using digital technologies to collect big data can be considered an emerging trend in the global economy (LPI, 2023).

The results of hierarchical cluster analysis identified three distinct groups of countries characterized by high, medium and low levels of logistics efficiency. Countries belonging to the high logistics efficiency clusters include China, which demonstrates consistency strong values across key indicators, such as the number of container logistics services and the extent of maritime partnerships formed to support diverse sectoral operations. However, this group does not differ significantly from other clusters of countries in terms of the number of aviation logistics partnerships (Table 2).

Table 2: Results of grouping countries by logistics and supply chain efficiency indicators for the 2nd quarter of 2022

Indicator	**Cluster**		
	1	**2**	**3**
	Group of countries with high logistics efficiency indicators	**Group of countries with average logistics efficiency indicators**	**Group of countries with low logistics efficiency indicators**
Number of container transportation services, units	590	268	4

Number of alliances in container logistics, units	4	5	0
Number of maritime partner countries, units	92	78	7
Average number of partner countries for the country's aviation logistics, units	127	129	21

Source: calculated by the author based on data from The World Bank (LPI, 2023)

In comparison, countries with medium or low logistics efficiency indicators have corresponding indicators at medium or low levels (Table 3). The second group of countries includes Korea, Singapore, the USA, Malaysia, Japan, Hong Kong, Vietnam, Spain, the Netherlands, the UK, Germany, Indonesia, India, Belgium, Turkey, Italy, Thailand, the United Arab Emirates and France.

Table 3: Characteristics of countries around the world by indicators of logistics and supply chain efficiency for the 2nd quarter of 2022 according to the TradeLens platform

Group of countries	Countries with high levels of logistics efficiency	Countries with average logistics efficiency	Countries with low logistics efficiency
Efficiency of container transportation	High number of available container logistics services (more than 100 types of services, units), developed alliances and the highest number of partner countries in maritime communication (units) to meet container logistics needs	Average number of available container logistics services (from 50 to 100 types of services, units), developed alliances and average number of maritime partner countries (units)	Critically low number of available container logistics services (less than 50 services, units), lack of established alliances and low number of maritime partner countries (units)
Efficiency of aviation logistics	High number of aviation logistics partner countries	High number of aviation logistics partner countries	Low number of aviation logistics partner countries

Source: calculated by the author based on data from The World Bank (LPI, 2023)

The third group of countries includes mainly European states (Northern Europe: Denmark, Finland, Norway, Sweden, Iceland, Estonia, Lithuania, Latvia; Western Europe: Ireland, Malta, Portugal; Southern Europe: Greece, Slovenia, Croatia, Cyprus, Bulgaria, Romania; Eastern Europe: Poland, Georgia).

The third group of countries also includes the following countries: Asia and the Pacific (Bangladesh, Sri Lanka, Cambodia, Philippines, Saudi Arabia, Israel, Iran, Iraq, Kuwait, Oman, Bahrain, Syria, Australia, New Zealand); Africa (Egypt, Sudan, Ghana, Benin, Togo, Guinea, Cameroon, Congo, Gabon, Djibouti, Madagascar, Angola, Algeria, South Africa); North America and the Caribbean (Canada, Mexico, Panama, Dominican Republic, Jamaica, Costa Rica, Guatemala, Honduras, Cuba, El Salvador, Bahamas); South America (Argentina, Brazil, Uruguay, Peru, Chile, Colombia).

Analysis of data on the number of container logistics services and the number of partners in different countries of the world of container, aviation logistics demonstrates high values of indicators in countries with a high level of economic development, despite the different level of openness of the national economy in terms of the share of trade in GDP. The trend is most pronounced in China, Singapore, Malaysia, Vietnam, Indonesia and India (Table 4). These countries belong to countries with a high or medium level of logistics efficiency. In general, it can be assumed that digital logistics is more developed in highly developed countries. In addition, the level of economic development affects the creation of alliances and partnerships, determining the strategic directions of logistics development in the global economy.

Table 4: Logistics and supply chain efficiency indicators and average annual GDP growth rates and the share of trade in GDP in the world's leading countries in terms of logistics services development

Economy	Number of container transportation services, Q2 2022	Number of alliances in container logistics, Q2 2022	Number of maritime partner countries, Q2 2022	Average number of countries-partners of aviation logistics of the country, 2022	Average number of international postal partners, 2019	Average annual GDP growth rate 2016-2023, %	Average share of trade in GDP 2016-2023, %
China	590	4	92	127	121.5	5.744	36.166
Korea	268	5	78	129	120.5	2.353	79.898
Singapore	240	5	81	124.5	116	3.107	323.734
USA	223	5	102	158	149.5	2.390	25.921
Malaysia	208	4	70	111	123	3.724	130.360
Japan	206	3	42	135	140	0.452	37.200
Hong Kong	183	4	59	135.5	134	0.823	371.271
Vietnam	180	3	34	98	103.5	5.935	166.706
Spain	144	4	90	136.5	142	1.846	67.440
Netherlands	137	3	87	145	148.5	2.157	162.531
Great Britain	133	3	90	152.5	139.5	1.390	62.914

Germany	119	3	70	149.5	150.5	0.974	79.616
Indonesia	118	1	17	104	117	4.036	39.682
India	117	2	58	133	140	5.761	42.825
Belgium	114	3	88	141	107.5	1.733	169.367

Source: calculated by the author

At the same time, the correlation analysis of the logistics efficiency indicators of all 85 countries demonstrates the presence of a high level of direct connection between the number of container transportation services, the number of alliances created between countries in container logistics, and the number of partner countries in maritime communication. Partnership in aviation logistics between countries is characterized by the presence of a direct high degree of connection with partnership in container logistics efficiency indicators (Table 5).

Table 5: Correlation analysis of logistics and supply chain efficiency indicators of 85 countries according to data from Q2 2022

		Number of container transportation services, units	**Number of alliances in container logistics, units**	**Number of maritime partner countries, units**	**Average number of partner countries for the country's aviation logistics, units**
Number of container transportation services, units	Pearson correlation coefficient	1	,688 **	,716 **	,525 **
	p-value		0.000	0.000	0.000
Number of alliances in container logistics, units	Pearson correlation coefficient	,688 **	1	,823 **	,629 **
	p-value	0.000		0.000	0.000
Number of maritime transport partner countries, units	Pearson correlation coefficient	,716 **	,823 **	1	,632 **
	p-value	0.000	0.000		0.000
Average number of partner countries for the country's aviation logistics, units	Pearson correlation coefficient	,525 **	,629 **	,632 **	1
	p-value	0.000	0.000	0.000	

Source: calculated by the author based on data from The World Bank (LPI, 2023)
Note: the correlation coefficient is significant at the 0.01 level.

In addition to using blockchain to develop digital logistics, another solution – Singapore's Transport Integrated Platform TRIP, launched in 2017 (Williams, 2017) – brings together various logistics stakeholders on a platform to ensure seamless tracking of shipments, reduce delays and the number of unprofitable deliveries for both parties. The platform provides shared data and information about the logistics lifecycle to independent players – participants in the supply chain. TRIP includes fleet management tools (container warehouses, port authorities, freight forwarders, shippers, shipping lines). The successful experience of the integrated digital platform TRIP, in contrast to the solution of launching the blockchain-based platform TradeLens, is aimed at solving the problem of coordinating various participants in logistics processes at the local level when moving goods through manual processes and the incompatibility of management systems in place before the implementation of the platform.

Cloud technologies in the logistics sector also improve the coordination processes of industry participants at all levels of the supply chain. More and more logistics companies are transferring digital processes and workplaces to cloud services that facilitate the exchange of data between participants through application programming interfaces (APIs) – software for the interaction of software products. With the help of APIs, all activities in the supply chain can be aggregated on central platforms, which receive data from the distributed systems of the companies participating in the processes in real time (Choudary et al., 2019).

Logistics platforms like TRIP and TradeLens scale through a combination of network effects, learning effects, and coordination effects. As more fleets, ports, warehouses, and containers are equipped with digital tools, the value of the platforms increases through network effects as partners create value for each other.

Value increases in several ways. First, greater accessibility and coordination of fleets, warehouses and containers leads to increased transportation speeds and improved, optimized routes. Second, the combination of different types of fleets and warehouses within platforms provides an increase in the number of different usage scenarios that logistics platforms can handle. For example, for fruit and meat, there are requirements for warehouse temperature and humidity that are not present for automotive parts. For gasoline storage warehouses, there are requirements for preventing combustion that are not present for fruit and meat. Connecting more warehouses with different work specifics to the platform contributes to the growth of logistics value for more parties.

Third, platforms are mediating an increasing number of deliveries, thereby collecting information about the delivery lifecycle and the participants that create high levels of transport volatility. This data is used for training to hedge transport risks and buffer future operations. Learning from platform delivery data not only improves logistics productivity, but also reduces costs by tracking unreliable partners whose activities lead to increased transport volatility.

Fourth, the creation of a platform market in logistics allows the use of unused assets, such as transport and warehouse capacity, allowing them to be allocated over time and rented out over carefully coordinated time periods.

Large integrated logistics companies such as Maersk, which have been pioneers in the adoption of digital technologies in logistics, have enabled SMEs to apply their knowledge and experience in creating digital platforms to extract value from existing idle

assets. SMEs are transferring localized logistics processes to digital platforms using advanced technologies (blockchain). The expansion of cross-border trade operations of SMEs is leading to the growth of decentralized trade flows, which requires improved logistics tracking and coordination processes.

Ware2Go's data platforms for creating a network of on-demand fulfillment of orders for customers (Ware2Go, n.d.) and Project 44, a platform for developing innovative supply chains (Project44, n.d.) are designed to solve existing problems of logistics participants by uniting e-commerce and logistics companies to manage comprehensive product supply strategies. Ware2Go's data platforms allow e-commerce companies to launch new sales channels, enter new markets or change their own strategies according to changes in demand. The flexibility of the supply chain based on a digital platform allows enterprises in different product markets to test and launch marketing innovations without the risk of financial losses. With Ware2Go's platform, businesses can analyze the most accessible warehouses for their customers to reduce delivery times, assess seasonality of demand to manage inventory placement and reorders, and analyze order types, quantities, and customer locations to develop transportation strategies to maintain inventory levels (Ware2Go, n.d.). Project 44, a platform development project for creating innovative supply chains (Project44, n.d.), provides customers with analytics and allows 24/7 tracking of deliveries for 25,000 customer companies.

5. Discussion

The study of strategic directions for the development of digital logistics in the global economy allows us to confirm the scientific opinion regarding the high level of development of the sector in countries with high economic growth and stable GDP growth rates. It can be assumed that the high level of development of logistics in various areas is associated with the level of technological readiness of the country and innovative capabilities, which positively affect the efficiency of logistics (Moldabekova et al., 2021).

The development of digital logistics in the global economy towards the digitalization of logistics processes in the global supply chain is not only associated with the use of blockchain technologies and digital platforms. First of all, economically developed countries need the development of various services, their availability to optimize the supply chain. Technologies allow to track weaknesses in logistics, eliminate them to reduce the processing of orders during transportation and the time for transporting goods. These conclusions are confirmed by the analysis of data from the World Bank on the number of container logistics services (LPI, 2023). Digitalization of processes primarily allows to reduce the time for processing container cargo in multimodal transport infrastructure facilities in the context of an increase in the number of services and trade between countries. Digitization of work processes (tracking, electronic document management, planning, and analytics) reduces downtime in the provision of logistics services. At the same time, countries with highly developed infrastructure and investment opportunities (China, Japan, the US, Malaysia, Germany, and Spain) offer better logistics services. For example, in Japan, the average time for order fulfillment (processing) at the port is 0.5 days as of Q2 2022, in Spain – 1 day, and in China – 1.1 days.

Given the large number of available services in container logistics, another strategic direction for the development of digital logistics on demand for creating value for the sector has been identified. The offer of numerous narrowly specialized services in combination with the use of digital technologies to collect big data about transportation will ensure the transition from traditional to innovative approaches to the organization of logistics in the future. In particular, logistics operators will move from traditional approaches to providing services in logistics (Schrauf, 2017), which involved the involvement of one or two parties (Shih et al., 2021), to multi-party logistics. The ecosystem approach to logistics will become more important, especially on a global scale (Woerner et al., 2022), as it ensures the creation of value through the use of technology. An additional factor in the implementation of this approach in logistics will be the further development of the digital trade ecosystem between countries and the growth of cross-border e-commerce platforms (Yang et al., 2023).

The study also confirms the initial trend in the field of digital logistics towards improving tracking systems, digitizing information flows, and automation (Kuteyi & Winkler, 2022). The supply chain seeks to implement a large-scale intelligent infrastructure based on data, information, physical objects, and products for business development, ensuring higher logistics efficiency in the global economy (Zhang et al., 2023).

6. Conclusions

Integrated digital logistics based on digital platforms, cloud technologies and blockchain, logistics data flows allows for the provision of valuable logistics services on customer demand, combining high-quality logistics and taking into account the needs of client companies.

Digital logistics allows companies to improve their innovative marketing strategies based on analytics of demand data, order types, number of customers, and other indicators. In addition, integrated digital logistics changes traditional supply chains, allowing them to solve existing challenges of transparency of logistics processes, coordination of logistics with the participation of various stakeholders.

At the same time, the further development of digital logistics depends on combining the knowledge and experience of digitalization of ecosystem participants, solving communication challenges and infrastructure development, improving legislative regulation, strengthening control over the quality of information collected using technologies, and ensuring the compatibility of various digital solutions.

The strategic directions of development of digital logistics in the global economy are to solve existing obstacles and overcome problems of digitalization of logistics processes with involvement of various stakeholders in the global supply chain. Further development of digital logistics on demand will ensure creation of value and new narrowly specialized services using digital technologies to collect big data for marketing purposes of companies-clients of logistics firms. Integration of green marketing innovations into digital logistics to create eco-efficient logistics services is one of the initial trends, which is emerging as a result of the increase in the activity of using digital technologies. Furthermore, in the context of sustainable development, the implementation of digital technologies in logistics must take into account government requirements for compliance

with environmental standards for doing business, measured through a system of relevant indicators. Governments in different countries should encourage the implementation of "green" digital technologies in logistics, thereby encouraging businesses to transition to digital and sustainability.

References

Attah, R. U., Baalah, M., Iwuanyanwu, O., & Ifechukwu, G. O. (2024). Strategic frameworks for digital transformation across logistics and energy sectors: Bridging technology with business strategy. *Open Access Research Journal of Science and Technology* 12(2), 070–080. DOI: 10.53022/oarjst.2024.12.2.0142

Bobro, N., Lisova, R., Parfentieva, O., Dmytrovska, V., & Kyrylenko, S. (2025). Digital Transformation for Cost Optimization and Sustainable Business Operations. *European Journal of Sustainable Development* 14(2), 158. DOI: 10.14207/ejsd.2025.v14n2p158

Butollo, F., Gereffi, G., Yang, C., & Krzywdzinski, M. (2022). Digital transformation and value chains: An introduction. *Global Networks* 22(4), 585-594. DOI: 10.1111/glob.12388

Choudary, S. P., Alstyne, M. W. V., & Parker, G. G. (2019). Platforms and Blockchain Will Transform Logistics. *Harvard Business Review*. https://hbr.org/2019/06/platforms-and-blockchain-will-transform-logistics

Dent, J. (2011). *Distribution Channels: Understanding and Managing Channels to Market (2nd ed.)*. London: Kogan Page. https://books.google.com.ua/books?hl=uk&lr=&id=FdlRv1wqTT4C&oi=fnd&pg=PR2&ots=yoeLyE43R5&sig=Ijok1QlVkNJz81_H6bCb8rAmujQ&redir_esc=y#v=onepage&q&f=false.

Desyatnyuk, O., & Ptashchenko, O. (2025). Digital Technologies In Advancing The Green Economy Opportunities For Global Business And Financial Stability. *Baltic Journal of Economic Studies* 11(1). DOI: 10.30525/2256-0742/2025-11-1-78-85

Desyatnyuk, O., Krysovatyy, A., Ptashchenko, O., & Kyrylenko, O. (2024a). Enhancing financial inclusivity and accessibility of financial services through digital technologies. *AD ALTA: Journal of Interdisc Iplinary Research* 4(1), 65–70. DOI: 10.5281/zenodo.11870944

Desyatnyuk, O., Naumenko, M., Lytovchenko, I., & Beketov, O. (2024b). Impact of Digitalization on International Financial Security in Conditions of Sustainable Development. *Problemy Ekorozwoju* 19(1), 104–114. DOI: 10.35784/preko.5325

Eurostat (2022). Enterprises by detailed NACE Rev. 2 activity and special aggregates. Eurostat. DOI: 10.2908/SBS_OVW_ACT

Hong, Z., & Xiao, K. (2024). Digital economy structuring for sustainable development: The role of blockchain and artificial intelligence in improving supply chain and reducing negative environmental impacts. *Scientific Reports* 14(1), 3912. DOI: 10.1038/s41598-024-53760-3

Kern, J. (2021). The Digital Transformation of Logistics. In M. Sullivan & J. Kern (Eds.), *The Digital Transformation of Logistics* (pp. 361–403). Hoboken: John Wiley & Sons. DOI: 10.1002/9781119646495.ch25

Krysovatyy A., Ptashchenko O., Kurtsev O., & Arutyunyan O. (2024). The Concept of Inclusive Economy as a Component of Sustainable Development. *Problemy Ekorozwoju*, *19*(1), 164–172. DOI: 10.35784/preko.5755

Kuteyi, D., & Winkler, H. (2022). Logistics Challenges in Sub-Saharan Africa and Opportunities for Digitalization. *Sustainability* 14(4), 2399. DOI: 10.3390/su14042399

Logistics Performance Index (LPI) (2023). Supply chain tracking data. *The World Bank*. https://lpi.worldbank.org/postal

Moldabekova, A., Philipp, R., Satybaldin, A. A., & Prause, G. (2021). Technological Readiness and Innovation as Drivers for Logistics 4.0. The *Journal of Asian Finance, Economics and Business* 8(1), 145–156. DOI: 10.13106/JAFEB.2021.VOL8.NO1.145

Moller, A. P. (2022). Maersk and IBM today announced the decision to withdraw the TradeLens offerings and discontinue the platform. *Maersk*. https://www.maersk.com/news/articles/2022/11/29/maersk-and-ibm-to-discontinue-tradelens

Moshood, T. D., Nawanir, G., Sorooshian, S., & Okfalisa, O. (2021). Digital Twins Driven Supply Chain Visibility within Logistics: A New Paradigm for Future Logistics. *Applied System Innovation* 4(2), 29. DOI: 10.3390/asi4020029

OECD (2019). Is there a role for blockchain in responsible supply chains? *OECD Business and Finance Policy Papers, (78)*. DOI: 10.1787/bfa93287-en

Palkina, E. (2022). Transformation of business models of logistics and transportation companies in digital economy. *Transportation Research Procedia* 63, 2130–2137. DOI: 10.1016/j.trpro.2022.06.239

Parfenov, A., Shamina, L., Niu, J., & Yadykin, V. (2021). Transformation of Distribution Logistics Management in the Digitalization of the Economy. *Journal of Open Innovation: Technology, Market, and Complexity* 7(1), 58. DOI: 10.3390/joitmc7010058

Parhi, S., Joshi, K., Gunasekaran, A., & Sethuraman, K. (2022). Reflecting on an empirical study of the digitalization initiatives for sustainability on logistics: The concept of sustainable logistics 4.0. *Cleaner Logistics and Supply Chain* 4. DOI: 10.1016/j.clscn.2022.100058

Project44 (n.d.). Movement. The Decision Intelligence Platform for the modern supply chain. *Project44*. https://www.project44.com/

Prokopenko, O., Kichuk, Y., Ptashchenko, O., Yurko, I., & Cherkashyna, M. (2021). Logistics Concepts to Optimize Business Processes. *Studies of Applied Economics, 39*(3). DOI: 10.25115/eea.v39i3.4712

Rivera, L., Gauthier-Umaña, V., & Chauhan, C. (2024). Blockchain: An opportunity to improve supply chains in the wake of digitalization. *International Journal of Information Management Data Insights* 4(2). DOI: 10.1016/j.jjimei.2024.100290

Schrauf, S. (2017). Digitizing the Supply Chain. *Harvard Business Review*. https://hbr.org/webinar/2017/10/digitizing-the-supply-chain .

Shih, W. C., & Foucault, A. (2021). Time to rethink your global logistics. *Harvard Business Review*. https://hbr.org/2021/03/its-time-to-rethink-your-global-logistics

Sturgeon, T. J. (2021). Upgrading strategies for the digital economy. *Global Strategy Journal* 11(1), 34–57. DOI: 10.1002/gsj.1364

The World Bank (2024). Trade (% of GDP). *World Bank Group*. https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

Ware2Go (n.d.). On Demand Fulfillment and Warehousing. *Ware2Go, A Stord Company*. https://ware2go.co/

Williams, A. (2017). Logistics industry group launches tech platform for seamless tracking of goods. *The Straits Times*. https://www.straitstimes.com/business/economy/logistics-industry-group-launches-tech-platform-for-seamless-tracking-of-goods

Woerner, S. L., Weill, P., & Sebastian, I. M. (2022). Successful digital transformation is first and foremost about value. *Harvard Business Review*. https://hbr.org/2022/10/is-your-company-seizing-its-digital-value

World Bank (n.d.). GDP growth (annual %). *World Bank Open Data*. https://data.worldbank.org

Yang, Y., Chen, N., & Chen, H. (2023). The Digital Platform, Enterprise Digital Transformation, and Enterprise Performance of Cross-Border E-Commerce-From the Perspective of Digital Transformation and Data Elements. *Journal of Theoretical and Applied Electronic Commerce Research* 18(2), 777–794. DOI: 10.3390/jtaer18020040

Zhang, L., Gong, T., & Tong, Y. (2023). The impact of digital logistics under the big environment of economy. *PLOS ONE* 18(4). DOI: 10.1371/journal.pone.0283613