The Strategy of End-to-End Partnership as a Basis for the Development of Transport and Logistics Business of Railway Transport Enterprises

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Abstract

The article examines the processes of building end-to-end partnerships in the transport and logistics sector, including the railway industry. The key conditions for successful cooperation of the subjects of the transport and logistics sector have been determined. A strategy of end-to-end partnership of railway transport has been developed, which takes into account the impact of global transformations in the transport and logistics sphere and defines directions, tasks and tools for building sustainable partnerships between railway transport enterprises and other participants in the transport and logistics market with the aim of comprehensive service and generation of environmentally friendly and digital transport solutions It was noted that the implementation of this strategy will contribute to the development of the transport and logistics business in railway transport based on the transition from exclusively technological transformation to the integration of business processes and technological solutions, the greening of the transport and logistics process and the improvement of traditional service components.
KEY WORDS: *railway transport, transport and logistics sector, sustainable development, management, end-to-end partnership, digitalization, environmental initiatives*

1. Introduction

Over the last decade, the landscape of manufacturing and supply chains has become increasingly complex, resulting from the impact of geopolitical conflicts and the need to restructure established transport routes, port congestion and, as a result, the emergence of freight problems and significant disruptions. In addition, companies across industries face increasing pressure to cut costs, improve service levels, optimize working capital, and even realign supply chains on the fly. These factors force railway transport companies to constantly search for innovative solutions to increase the flexibility of their activities, focus on the client and his satisfaction, stability, speed of market entry. Taking into account the significant pressure of these factors, the processes of integration of transport and logistics market entities and the formation of their stable partnership relations for the realization of strategic growth goals are becoming widespread.

2. Research Results

The important role of the transport and logistics sector in ensuring the sustainable development of the economy and the concentration of the governments of countries on stimulating its growth processes is evidenced by the increase in the amount of investments aimed at building the transport and logistics infrastructure and improving service. For example, significant attention to solving these issues is focused in the countries of the Middle East, led by the Kingdom of Saudi Arabia and the United Arab Emirates, which are expanding logistics capabilities to offer an integrated system that covers sea, air and inland land transportation, and as well as warehouse and digital systems, with the aim of building an international integrated logistics center for international trade. Already today, Saudi Arabia has made progress in the direction of the development of the logistics sector, having invested more than 106.6 billion dollars, which allowed to increase the capacity of land, air and sea routes, as well as to develop export-import operations and eliminate restrictions related to logistics operations. In 2023, the Saudi Arabian Port Authority (SPA) invested about $4.5 billion. in the maritime transport and port sector. Investments will be aimed at creating new logistics parks equipped with the latest technologies that will work on clean energy, supporting global environmental initiatives [1].

As for the United Arab Emirates, as of 2024, the freight transportation and logistics market is estimated at $20.03 billion. It is forecast to reach $27.51 billion by 2029, growing at a CAGR of 6.55% during the forecast period. Such growth rates are planned to be ensured through the creation of opportunities for foreign investment, the development of free trade zones and the application of competitive incentives [1].

The British logistics sector is gradually gaining momentum, and by the end of 2023, it received 1.3 trillion pounds of revenue, which is 25.8% more compared to the previous year. The Logistics UK Association emphasizes that today the critical role of the logistics sector in the UK economy is gradually increasing, as its contribution is 185 billion

pounds, which is about 12% of the total volume of the "non-financial" economy. The improvement of the situation in the field of trade with EU countries, regarding the hiring of qualified personnel, the growth of warehouse capacity (increased by 4.3%), which indicates the stability of investments, the constant expansion of the logistics sector and its readiness for future growth, is also noted [2].

Along with this, a change in investment priorities in the logistics sector was recorded. In particular, a general decrease in intentions regarding the expansion of physical infrastructure was recorded, in particular regarding the purchase of additional warehouse and distribution premises, as well as the lease of additional facilities. In contrast, the intentions of logistics companies to diversify and consolidate business in 2024 have increased [2].

Considerable attention is paid to the development of transport infrastructure and development of the logistics sector in Singapore. In terms of capacity, the PSA International container terminal in Singapore is among the world's leading operators of sea terminals, second only to the Port of Shanghai according to 2023 data, the capacity of which is more than 49 million TEU (Fig. 1). The capacity of Singapore's container terminal was 39.01 million TEU. It is interesting that according to the results of 2023, eight of the ten busiest container ports were located in Asia [3].

At the same time, a significant expansion and renewal of terminals in Singapore is planned, in particular, the development of the Tuas Terminal megaport is planned, after which the capacity of the container infrastructure will reach 65 million TEU, becoming the largest integrated facility in the world. Tuas Port currently has eight berths and plans to add three more this year. The weekly volume of transshipment of PSA containers during the first months of 2024 increased from 770,000 to 820,000 TEU [5, 7]. Despite the introduction of additional capacities, the problem of long queues and longer waiting times for ships at the container berth still persists. In the coming years, along with the increase in the number and capacity of infrastructure facilities, it is planned to ensure their compliance with the most modern requirements of automation and digitalization through the use of unmanned automated guided vehicles, intelligent sensors for detecting failures or other problems related to delivery, data analytics for predicting traffic jams.

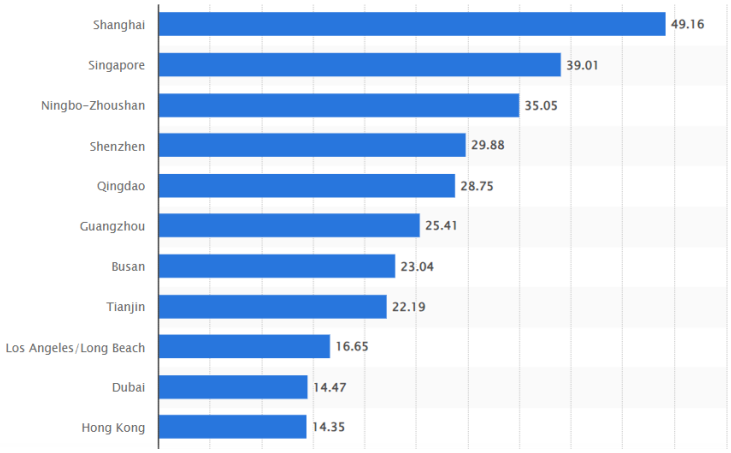

Fig. 1 The largest container ports in the world in 2023 by the level of throughput, million TEU [3]

Despite the close attention of the governments of countries and the management of companies to the development of the transport and logistics sector, a number of problems remain that create barriers to its effective functioning. First of all, the key challenge is geopolitical instability. Even countries that are stable in terms of business development feel the pressure of geopolitical factors associated with instability in neighboring countries and in the ocean. Interstate conflicts and sanctions caused by relevant changes, embargoes, political upheavals, piracy cause serious disruptions in the supply chain and have a significant impact on the restructuring of transport and logistics connections. In particular, the schemes of trade in goods have adapted to the sanctions against Russia, which is most noticeable in the trade of energy carriers to Europe and the implementation of indirect trade flows. This leads to a change in routes, a decrease in the volume and efficiency of trade, an increase in the cost of transportation by sea, which favors tanker shipping. Overcoming these challenges requires careful planning, strategic partnerships and innovative solutions to build trust and protect supply chain operations across geographies.

Secondly, along with the positive effects, certain limitations regarding the implementation of technological changes should be noted. Since the acceleration of the development of economic sectors, first of all, e-commerce, requires transport and logistics companies to quickly integrate advanced technologies, in particular blockchain, robotics and automation, the Internet of Things, into their operations in order to maintain their own competitiveness. However, high cost, limited awareness, and data protection and privacy concerns may hinder widespread adoption of these technologies.

Thirdly, the shortage of qualified labor has become quite acute. Currently, there is a high shortage of highly qualified personnel in the logistics sector, in particular in the field of supply chain management, transportation planning and warehouse operations. Such a shortage leads to higher costs for finding, attracting and retaining qualified personnel. In this sense, it is important to pay more attention to the training of specialists in the management of supply chains, logistics processes and the application of relevant technologies by deepening cooperation between the private and public sectors to ensure the necessary training.

So, for example, in many countries there is a significant shortage of drivers, which is currently a global problem and has a devastating effect on the transport industry. So, for example, there is a significant shortage of drivers in Japan. From April 2024, truck drivers in Japan will have an annual limit of 960 working hours as part of government reforms. The impact of this rule on the logistics sector has been called the "problem of 2024" as it is expected to lead to disruptions in delivery services due to the inability to attract young workers to the industry. The same driver shortage problem can be seen in Australia. There, the average age of a truck driver is 47 years, and there are more than 21,000 job vacancies. Australia's logistics industry is turning to robotics and unmanned aerial vehicles to ease the pressure caused by the mismatch between driver supply and demand [4].

A similar problem is typical for the railway industry. Yes, there is a significant shortage of machinists in Great Britain. It is proposed to solve this problem, in particular, by lowering the minimum age of drivers from 20 to 18 years. The number of drivers due to retire in the next five years will lead to an even greater shortage. Their average age at the moment is 48 years. By increasing the age diversity of the sector and recruiting more drivers, it will be possible to provide reliable services while creating employment opportunities for young people [5].

Given the key role of such factors as delivery speed and product safety, logistics companies must provide multimodal solutions that integrate all components of the supply chain: from freight transportation by rail, air, sea or road to warehousing operations, customs control, “last mile” delivery”. This creates the need for the application of integrated logistics and the cooperation of actors, since the fragmentation of the transport and logistics process and the use of several operators can leave gaps in the supply chain, which will lead to possible disruptions, delays, damage and losses [6, 7].

The insufficient development of the infrastructure of individual regions remains a problem, which makes it impossible to support effective regional logistics operations and does not allow the formation of a single effective system.

The pressure on logistics companies is also increasing from the point of view of compliance with modern high environmental requirements, in particular regarding the reduction of carbon emissions and minimization of the impact on the environment. Such a problem is connected, first of all, with the need to achieve the goals of sustainable development and simultaneously ensure and preserve the economic efficiency of companies' activities.

At the same time, supply chain uncertainty remains high and in connection with the increase in the number and scale of extreme weather events associated with climate change, which also creates a high risk of disruptions. So, for example, the water level in the Panama Canal, which connects the Pacific and Atlantic oceans and is an important transport route in trade on the east coast of Asia and the USA, is historically low and threatening. The Panama Canal Authority was forced to impose restrictions on the number and weight of ships that would pass through the canal, which in turn made traditional routes difficult for large ships. In response to such changes, the global shipping giant Maersk announced in early 2024 its intention to change the Oceania-America route. It is planned to overcome the gap in the route by using railway transport, creating a “land bridge” [8].

“Onshoring” and “nearshoring” processes, which are transforming the world transport map, are also becoming widespread: there is an increased interest in moving production closer to the end consumer in order to reduce the risk of disruptions and the inflationary effect on the cost of goods. Transportation executives expect that by 2025, 20% of cargo originating in Asia will move to nearby markets, and that number will double to 40% by 2030. Similar are the expectations of manufacturers: 62% of surveyed companies have already started changes. Supply chains in the field of agriculture, clothing, and consumer electronics will experience the greatest transformations [9]. For example, the US intends to increase regional production to reduce dependence on China, which has increased due to digitalization and the transition to green technologies such as electric cars. Of course, this is a long-term process and currently there is not mass deglobalization, but rather individual initial processes of diversification.

As the majority of experts note, overcoming the listed difficulties is possible only through effective partnership and joint efforts between government institutions, logistics companies and other interested parties to invest in infrastructure, simplify the rules for carrying out transport and logistics activities, develop the workforce, implement technologies, mitigate geopolitical risks and promotion of sustainable development practices.

In view of this, integration processes in the transport and logistics sector are gaining scale and wide spread. Improved collaboration through transportation and service management platforms, real-time cargo visibility to protect against fraud, and digital tools to accelerate and optimize processes will help the transportation industry overcome the obstacles it currently faces. At the same time, cooperation becomes even more effective in the aspect of companies entering the international market. Because the new market is unique, with its own linguistic and cultural differences, technical requirements, regulatory and legal features, creating new opportunities and challenges for companies.

Such cooperation through integrated supply chain management can extend to all processes: from reservations and customs clearance to warehousing and insurance. A logistics partner operating in a new target market can offer a business access to an extensive network of suppliers. This can save businesses time and resources by eliminating the need to build partnerships from scratch. Instead, the business can rely on the existing experience and knowledge of logistics partners. Thanks to such end-to-end logistics, enterprises can quickly change routes and modes of transport, distribute product loading and vary storage options. As a result, companies are more flexible, resilient and able to respond quickly and successfully to any disruption, which is extremely important for businesses entering a new market.

Naturally, the cooperation of actors in supply chains has always existed through communication and information exchange of companies with suppliers, 3PL partners, distributors, etc. Typically, interactions between manufacturers and their suppliers involved transactions such as issuing purchase orders, exchanging information about production

capabilities, and product demand. However, this exchange of information was often isolated, not real-time, and sometimes inaccurate. Similar models of transactional and “disconnected” information sharing are implemented with logistics partners, contract manufacturers and other players. But this way of working often leads to significant system inefficiency and mistrust on both sides.

In particular, to overcome the problem of reactive communication of subjects, it is advisable to use a simple digital platform or several applications to manage delivery in order to ensure the coordination of the parties. They provide real-time updates by providing senders with periodic information via emails or tracking links. Among them are Real-Time Transportation Visibility Platforms (RTTVP) - the so-called “real-time transportation visibility platforms”, the main functional purpose of which is to ensure transparency and visibility of each stage of the logistics process, optimize previously inefficient routes and the ability to manage customer expectations, providing them with almost in real time information about the location of their cargo at any moment of time [10].

Among this kind of innovation, digital solutions for automating the work process based on artificial intelligence should be highlighted, which are focused on simplifying complex logistics planning and optimizing routes. Some also provide a digital co-pilot for customer service representatives who can, for example, send alerts, answer questions and adjust routes ahead of time when problems arise.

And the most revolutionary innovation in this direction is generative contextual communication controlled by artificial intelligence. Their usefulness is due to the fact that they solve delivery problems by building a contextual understanding of delivery and involving all parties through simultaneous real-time communication. This helps to improve communication and eliminate misunderstandings between shippers, carriers and recipients, provides increased efficiency and personalized customer service, and reduces manual intervention of drivers and dispatchers.

Usually, companies combine such solutions to obtain a better result, since each solution has its own value and their integrated use allows to expand opportunities and advantages. However, it should be taken into account that the use of technological solutions alone is not enough to achieve maximum value. To realize the potential of technical innovations, change management practices regarding their implementation are necessary. This may require companies to develop and use a roadmap for implementing planned transformations that includes change management practices to manage technology transformations. Ensuring a phased implementation and alignment of changes with the existing operating model can ensure the successful implementation of technology transformations.

Significant attention of companies is focused on cooperation to achieve the goals of sustainable development of the transport and logistics sector. In particular, one of the key trends today is the tracking of Scope 3 emissions. While many companies have traditionally preferred to collect data on Scope 1 (direct emissions) and Scope 2 (indirect emissions from electricity consumed) emissions, currently the key focus is on the so-called Scope 3 emissions, i.e. emissions generated throughout the value chain. Although the collection and reporting of Scope 3 emissions is currently voluntary, it is becoming a legal requirement in many countries.

In order to monitor progress and set ambitious emission reduction targets, tracking Scope 3 emissions is of course essential, but assessing such negative impacts at all stages of the supply chain is extremely challenging as the volume of transactions and data grows exponentially. To reduce carbon emissions, companies need primary sources of information from suppliers and are starting to use hybrid carbon accounting methodologies to more accurately estimate Scope 3 emissions. In this sense, these processes are simplified by digital platforms that provide suppliers with a centralized system to enter their emissions data, which can then be easily integrated into the company's sustainability reporting [11].

In terms of deepening the cooperation of transport and logistics entities, the Mobility-as-a-Service (MaaS) concept should be noted, which, according to experts' estimates, will become even more widespread in 2024. In general, MaaS defines that the transport and logistics process is not limited to a single mode of transport or a single means of getting from point A to B. The modern passenger appreciates flexibility and variety, looking for the most efficient, cost-effective and ecological way to travel. The scope of MaaS is expanding from car sharing to rental vehicles and shared bikes, offering passengers greater flexibility and efficiency without the need to own a vehicle. Not only are there more shared mobility options, but also new hybrid mobility services that will combine traditional transportation options with new technologies such as electric vehicles and autonomous cars.

Consequently, the corona crisis period and the subsequent negative fluctuations that caused disruptions, changes in supply dynamics and transformation of consumer expectations forced companies to move away from traditional cooperation to a mutually beneficial cooperation approach characterized by trust and commitment to building sustainable supply chains. The current complexity of supply networks also requires expanding the boundaries of collaboration beyond tier one suppliers to include other supply chain partners, making the transition to end-to-end supply chain collaboration. Such end-to-end (E2E) supply chain partnerships involve seamless coordination and collaboration between stakeholders, from suppliers to consumers. So, at the heart of this approach is end-to-end supply chain planning, which begins with procurement and distribution, transportation of finished products and delivery to the customer, and ends with reverse logistics. Given the strategic importance and scale of process coverage, companies use modern end-to-end logistics solutions for effective transport flow planning, so that the movement of products occurs without any problems or disruptions, while ensuring the environmental and economic sustainability of business entities. End-to-end solutions cover packaging, shipping, order fulfillment and warehousing, improving transportation operations and increasing end-to-end visibility and efficiency. Thus, it is a fully integrated supply chain process that involves the end-to-end movement of products. Depending on the industry, such a process may begin with product development or procurement and encompass all activities from distribution and transportation to delivery to the

consumer. After-sales service and return logistics can be included in end-to-end logistics operations.

In the aspect of forming end-to-end partnership relations, attention should be paid to the key conditions for successful cooperation of the subjects. First of all, such a condition as common goals and strategic alignment of the supply chain should be noted. Because under the condition of a common strategic vision and coordination of the stages of the supply chain, effective motives are formed for cooperation and the development and implementation of joint project initiatives, while eliminating misunderstandings in the process of interaction of the participants of the supply chain. Second, technology integration is important because for effective day-to-day collaboration, companies' supply chain technology stacks must be compatible, and data shared by one company must be seamlessly used by its partners without the need for emails, phone calls, or social media messages. An effective corporate platform that facilitates the integration of data between corporate and operational systems and allows you to eliminate discrepancies, improve the quality of decision-making in various channels, and at the same time contribute to the growth of ROI can be considered as the technological basis for transformation. Such platforms can be successfully implemented in production, supply chain organization, business operations.

However, it should be noted that this kind of transformation is usually carried out by the IT department, which, given the necessary knowledge and skills, is a faster and more efficient way to achieve results. However, this approach often fails to deliver lasting, sustainable change and meaningful stakeholder engagement across the business. Therefore, it is worth moving away from exclusively technological changes to the transformation of the entire business, which is based on modern equipment and technologies. Such a transformation involves not only the introduction of new technologies, but is a complex process that involves a comprehensive rethinking of the entire business model, including personnel, processes and technologies. This approach enables long-term growth and change because it considers the views of all stakeholders, works within budget constraints, and takes into account the expert opinions of technology teams. By applying such a comprehensive holistic approach, namely the end-to-end integration of business and technology, companies can improve supply chain resilience through better integration of advanced planning systems and increased ability to quickly respond to unexpected events.

At the same time, it is safe to say that the transport and logistics industry is currently undergoing continuous transformation, which will lead to the emergence of new challenges and opportunities. The dynamic interaction of currently dominant trends serves as a catalyst for innovative changes and transformation on the basis of innovation, sustainability and operational efficiency. As a result of regionalization of industry and niashoring of production processes, integration of subjects of industry and the transport and logistics sector in the direction of generating innovative solutions, digitalization of economic and social processes, active support by governments of countries of the global environmental order, greening of transport and logistics processes, tracking of emissions at all stages of the value chain, the emergence and spread of hybrid mobility services, there was a rethinking of the principles and transformation of approaches to building partnerships in the supply chain and the transition to the creation and spread of environmentally friendly digital supply chains. The latter requires accelerated adaptation to such changes by Ukrainian railway transport enterprises by implementing relevant transformations, namely by deepening their cooperation with other participants in the supply chain by forming and developing end-to-end sustainable partnerships (Fig. 2).

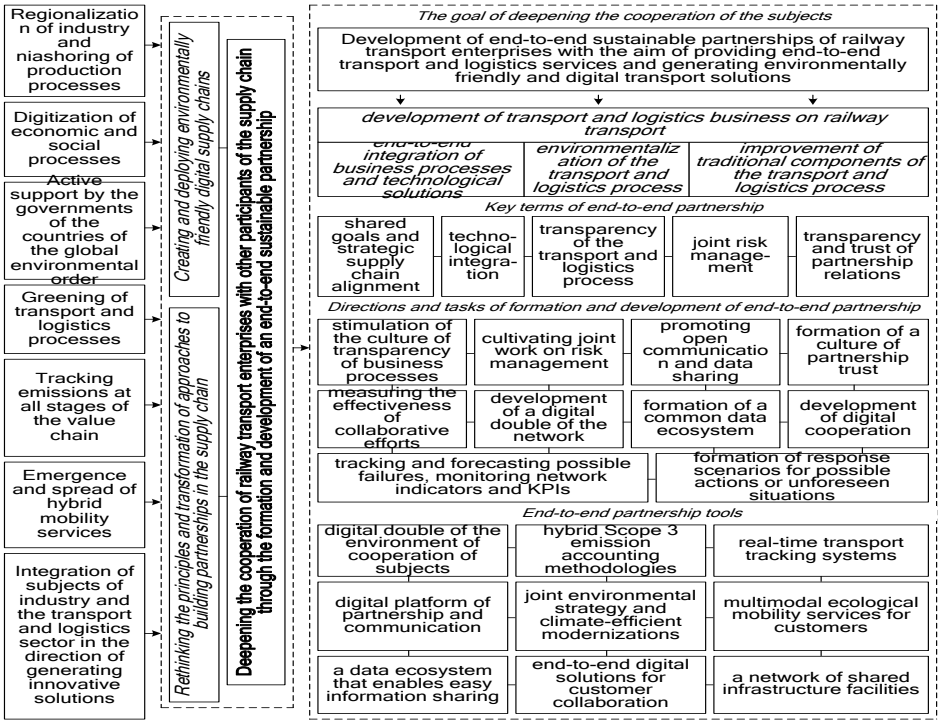

Fig. 2 End-to-end partnership strategy as a basis for the development of transport and logistics business of railway transport enterprises (*author's development*)

The purpose of deepening the cooperation of railway transport enterprises with other participants in the transport and logistics process should be to define the development of end-to-end sustainable partnerships with the aim of providing end-to-end transport and logistics services and generating environmentally friendly and digital transport solutions. Such a partnership will contribute to the development of the transport and logistics business in railway transport based on the transition from exclusively technological transformation of processes to end-to-end integration of business processes and technological solutions, greening of the transport and logistics process and improvement of traditional components of the transport and logistics process.

For a successful partnership, it is important to foster a culture of transparency in business processes, in which information about changes and disruptions flows through the supply chain in a timely manner and decisions are made based on the latest and most relevant information. It is necessary to ensure and cultivate joint work on risk management, since timely identification of potential risks in the supply chain and cooperation with other partners of the partnership to mitigate them will help minimize the negative impact and increase resistance to various types of threats. At the same time, it is important to ensure that the participants of partnership interaction form joint scenarios for responding to possible actions or unforeseen situations.

In light of the above, the importance of promoting open communication and data sharing to improve supply chain efficiency is becoming increasingly important. Although companies are now constantly in the process of collecting and updating data, they hide their own information. However, effective collaboration requires open communication and a willingness to share personal data. Free access to information about stock levels, production schedules or sales plans allows for better coordination and collective response to challenges and opportunities. With this in mind, it is advisable to develop a culture of open communication, where each party is ready to share data and quickly adapt to changes or problems.

It is also extremely important to form and develop a culture of partnership trust, as it is the basis for successful cooperation between the subjects. Such trust begins with personal relationships built on honesty, reliability and mutual respect, especially in international cooperation, when it is necessary to be aware of cross-cultural norms and rules to avoid misunderstandings. In order to cultivate a sense of trust, the participants of cooperation should be considered as partners, and not just subjects of transactions. Personal trust is the basis for building organizational trust and developing communication and partnership.

In the conditions of digitalization, it is important to develop digital cooperation, develop a digital double of the network, form a common data ecosystem, etc. Along with this, it is necessary to monitor and predict possible failures, to monitor network indicators and KPIs, to measure the effectiveness of cooperation efforts, which can also be implemented more effectively by applying digital technological solutions. The use of ERP systems, Internet of Things devices and solutions based on artificial intelligence supports the automation of processes, reduces manual intervention and minimizes errors. Analysis and use of data will allow railway transport enterprises and other participants of cooperation to identify patterns, make forecasts and make informed decisions. Real-time tracking systems provide the ability to track the status of shipments at every stage of the supply chain, which improves visibility for both partner businesses and customers and helps build confidence in delivery reliability. Artificial intelligence technologies are used to optimize routes and supply chains by analyzing traffic patterns and predicting the fastest or most cost-effective routes. Blockchain technologies provide a secure and transparent way to track and document transactions in the supply chain. The integration of the technologies listed above has significant potential in terms of efficiency, security and transparency. Because these technologies make it possible to optimize existing processes and develop new business models that meet the changing and exponential demands of the global economy. By implementing these technological changes at an early stage, railways and other end-to-end partners will be able to secure a competitive advantage and be ready for the challenges of the future.

3. Conclusions

Consequently, the corona crisis period and subsequent negative geopolitical fluctuations, which caused significant changes in the supply chain and transformation of consumer expectations, forced companies to move away from traditional cooperation to a mutually beneficial cooperation approach characterized by trust and commitment to building sustainable supply chains. Taking into account the above, there was an expansion of the boundaries of cooperation of subjects within the supply chain and a transition from traditional communication relations to end-to-end cooperation in the supply chain. The processes of building end-to-end partnerships in the transport and logistics sector, including the railway industry, were studied. The key conditions for successful cooperation of the subjects of the transport and logistics sector have been determined. A strategy of end-to-end partnership of railway transport has been developed, which takes into account the impact of global transformations in the transport and logistics sphere and defines directions, tasks and tools for building sustainable partnerships between railway transport enterprises and other participants in the transport and logistics market with the aim of comprehensive service and generation of environmentally friendly and digital transport solutions It was noted that the implementation of this strategy will contribute to the development of the transport and logistics business in railway transport based on the transition from exclusively technological transformation to the integration of business processes and technological solutions, the greening of the transport and logistics process and the improvement of traditional service components.

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