Цифровая трансформация логистических центров: спрос и предложение

Армашова-Тельник Г.С., к.э.н., доцент,
Санкт-Петербургский государственный университет аэрокосмического приборостроения, Санкт-Петербург, Россия
Зубкова А.Н., ст. преподаватель,
Санкт-Петербургский государственный университет аэрокосмического приборостроения, Санкт-Петербург, Россия
Соколова О.Л., к.э.н., доцент
Санкт-Петербургский государственный университет аэрокосмического приборостроения, Санкт-Петербург, Россия
Соколова П.Н., ассистент кафедры
Санкт-Петербургский государственный университет аэрокосмического приборостроения, Санкт-Петербург, Россия

Аннотация. Развитие цифровой экономики является одним из основных направлений деятельности России в среднесрочной перспективе. Это отмечено в программе «Цифровая экономика РФ» до 2024 года, согласно указанию президента страны. К тому же вопросы цифровизации экономики и развития систем блокчейна крайне актуальны. При этом современный рынок ориентируется на развитие несырьевого экспорта, увеличение объемов движения отечественных товаров, и, как следствие, увеличении доходов производителей в том числе за счет процесса цифровизации экономики и логистики. Вопросы цифровизации логистической отрасли относятся к конкурентоспособности компаний, работающих на этом рынке. Поэтому поддержка развития технологий всеми заинтересованными сторонами на этом рынке принесет пользу всем компаниям, задействованных в данной отрасли. Многие крупные логистические компании создают ИТ-системы. Новые предприятия и проекты серьезно относятся к фундаментальным изменениям в логистической отрасли, а

большинство инвесторов оказывают поддержку крупными финансовыми вложениями.

Данное исследование подготовлено с учетом открытых источников информации транспортных данных и тенденций рынка логистических услуг, данных DHL Radar, Росстата, исследований консалтинговых компаний, а также данных Центра стратегических разработок (ЦСР).

Ключевые слова: логистика, управление, логистические центры, цифровизация экономики, перевозки, цифровизациия в условиях пандемии

Digital transformation of logistics centers: demand and supply

Armashova-Telnik G.S., Ph.D., Associate Professor, Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia
Zubkova A.N., senior lecturer, Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia
Sokolova O.L., Ph. D., Associate Professor Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia
Sokolova P.N., assistant of the department, Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia

Annotation. The development of the digital economy is one of the main activities of Russia in the medium term. This is noted in the program «Digital Economy of the Russian Federation» until 2024, according to the instructions of the President of the country. In addition, questions the digitalization of the economy and the development of blockchain systems are extremely relevant. At the same time, the modern market is focused on the development of non-resource exports, an increase in the volume of movement of domestic goods, and, as a result, an increase in the income of producers, including through the process of digitalization of the economy and logistics. The issues of digitalization of the logistics industry relate to the competitiveness of companies operating in this market. Therefore, the support of

technology development by all stakeholders in this market will benefit all companies involved in this industry. Many large logistics companies create IT systems. New businesses and projects take fundamental changes in the logistics industry seriously, and most investors support them with large financial investments.

This study was prepared in the light of open sources of transport data and market trends in logistics services, DHL Radar, Rosstat data, research by consulting companies, as well as data from the Center for Strategic Research (CSR).

Keywords: logistics, management, logistics centers, digitalization of economy, transportation, digitalization in pandemic conditions

1. Introduction

The development of the Russian economy in the times of crisis and instability, the renewal of foreign economic and transit relations, and the processes of contradictions in the world market pose the task of organizational and economic restructuring to transport. At the same time, the main benchmark of the transport industry remains the tasks developed by the Transport Strategy of Russia until 2030:

- ensuring the unity of the country's economic space;
- improvement of the process of goods and material flow on the principles of logistics;
- reduction of unit transportation expenses;
- completion of the formation of a unified transport system (ETC) in the process of freight transportation and goods movement;
- Integrated interaction between different modes of transport (multimodal transport);
- formation of transport and logistics centers.

The implementation of the strategy for the development of the transport complex is closely connected with logistics.

Transport logistics as a direction of enterprise functioning management is focused on the implementation of organizational and production processes, planning

and monitoring the movement of various flows (material, transport and information). [1]

Transport and logistics centers (TLCs) are economic entities that coordinate the effective provision of various production sectors with commodity and material resources (warehouse and transport), including information support and monitoring of the degree and quality of implementation of the logistics services provided.

In this regard, TLC are distributed depending on the functions performed, as well as territorial location. Guided by the principle of territorial and sectorial formation of TLC, they can be classified into the following categories:

- International Logistics Center of Distribution – ILCD.
- Regional Transport and Logistics Distribution Centres (RTLCD).
- Local Logistics Distribution Centers (LLCDs).
- Trade Logistics Center of Distribution – TLCD.
- Center of Logistics Service – CLS.

The dynamism of economic processes in the context of real practical application ensures an increase in the indicators of trade turnover, which determines the growth of domestic and international transport flows, including transit ones. However, the effectiveness of the logistics and transport sector in Russia currently requires the development of innovative solutions for the development of the infrastructure component of the transport industry.

According to Rosstat (Fig. 1), the dynamics of transport and logistics services for the types of transport of all sectors of the Russian economy (except pipeline) in 2019 decreased by 4.7%, freight turnover increased by only 0.4% [11].

It should be noted that TPS, which accumulate the movement of commodity flows, combine such functional areas as transport, production, trade, financial, information, as well as analysis is implemented for groups of goods with increased cost. Collaborations between transport entities are being combined into centers - international transport corridors. Here, the implemented functional complex provides an opportunity to position international transport corridors as logistics «hubs» that contribute to the expansion of regional and international contacts. The key specific

element of the TLC is their multidimensional organization, structurally uniting the target consumer groups and groups of industrial partners (enterprises of trade, transport, banking, insurance, customs sectors) directly with the manufacturer. In addition, the versatile orientation of the TLC implements tasks of various directions (production, warehouse, distribution, information, financial, analytical, and forecast nature), within the framework of achieving a high level of consumer satisfaction (both on a regional and country scale).

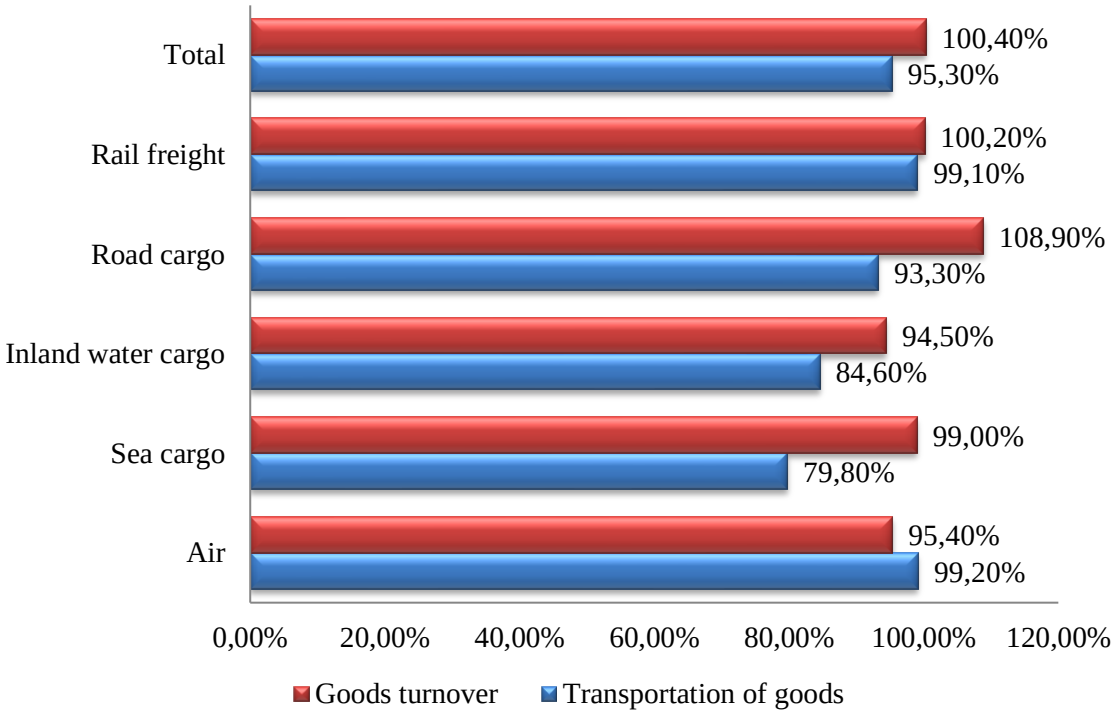

Figure 1 – Dynamics of transport and logistics services by types of transport of all sectors of the Russian economy, 2019, % by 2018

That is, making decisions regarding the modernization of the situational position of the transport and logistics services market is a key tool in the context of the strategic development of both the industry sector and the country's economy. It should be noted that the low efficiency of the process of organizing transport and logistics services, the insufficiently developed industry infrastructure (long distances, low level of development of automobile directions) complex, the inability to fully monitor the process of moving and delivering goods (due to the inconvenient territorial location of a number of industrial groups of manufacturers) – all this causes inflated costs for the provision of transport and logistics services.

Despite the fact that there is no dynamic development of the Russian sector of transport and logistics services, there is a fairly high potential reserve of business entities in this industry.

2. Problem statement

2.1 Development problems of transport

A breakthrough in technological development is necessary to meet the goals and objectives of the transport system. Digitalization provides the least capital-intensive infrastructure improvements and improves transport services and offloads existing bottlenecks. Experts expect that by 2030 the main technological forks should be completed, and by this time, with the strategic development of the entire transport sector of the country, Russia must come up with its own achievements in order to be ready to switch to a new technological structure along with the leading countries of the world.

Railway freight transport in Russia has a fairly large cargo turnover among all types of transport. The share of railway transport accounts for approximately 85% of the total freight turnover of the country. According to this indicator, Russia is significantly ahead of the world's leading countries. Such popularity of railway transport is associated with its low-cost cost in comparison with motor transport. But water transport, also has a low price, in the conditions of the atmospheric climate of Russia, is able to operate only six to seven months a year. The average price of cargo transportation by rail in Russia is 18 USD per 1000 t. km, in the USA this coefficient is 22USD (Fig.2).

The gradual transformation to progressive technologies in transport in the country has limitations on the development of infrastructure. Russia ranks 64th out of 144 countries participating in the World Economic Forum's rating system in terms of the quality of transport infrastructure, while Russia does not take the leading positions in terms of the quality of roads.

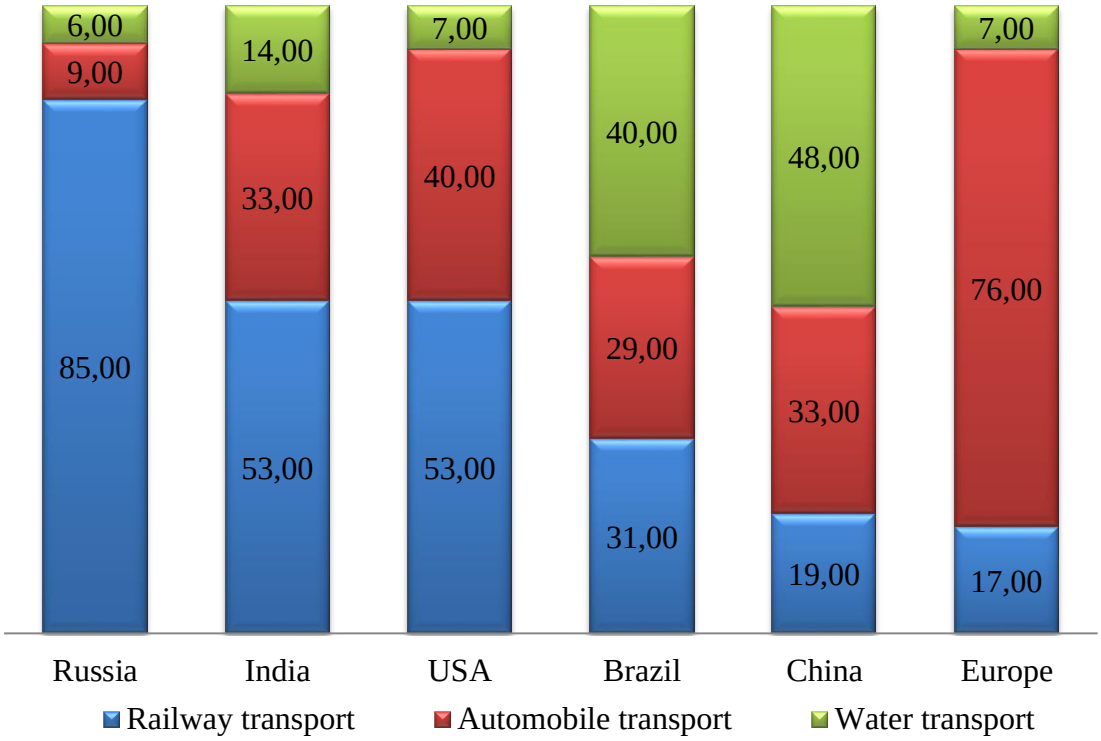

Figure 2 – Ratio of transport modes in the world by cargo turnover for 2019 (in USD)

The Engel coefficient (road network density adjusted for population density) is significantly lower than in other BRICS countries. In addition, there are no high-speed rail lines in Russia, including airports that are not sufficiently developed. There are a number of areas in the development of infrastructure in which Russia appears among the leaders, the presence of a unique icebreaker fleet, the original concept of companies for cargo transportation by rail, high punctuality of intercity communication, both by rail and by air. It is worth noting that in terms of the degree of development of information technologies, Russian market players are actively developing, which will help to increase the national degree of competitiveness

2.2. Automation in transport logistics

The Russian market situation in the transport logistics automation sector currently demonstrates a fairly active desire for development. This leads to the presence of a variety of developed and applied information technology solutions, focused on the implementation of logistics functions, among the industry business entities. Key industry players, as well as international companies, carry out their

activities based on the requirements of the international regulations of standards (for example, the use of cloud logistics services). In addition, among domestic cargo carriers, the use of digital platforms is growing in popularity as part of solving current production issues. At the same time, computer services allow for digital communication with industrial partners, customers, including the implementation of document management procedures. This makes it possible to organize a transport auction (in an online format), find the necessary carrier (according to the specified criteria), quickly distribute applications, monitor the movement of cargo, implement statistical analysis of completed works, operations, etc. [3]

We emphasize that the implementation of the processes of implementing digital technological solutions in the management structure of a transport and logistics enterprise is solved quite quickly, since unified, easily adaptable operations provide transparency of the interaction field, reduce costs (in particular for freight). In addition, the predominant aspect of the use of digital technological solutions in the transport and logistics services sector is the low degree of influence on the quality of products (services) of the human factor. This makes it possible to objectify many production processes.

Thus, the integration of digital technologies into production is economically feasible. Thus, digitalization of solutions for transport logistics «turnkey» of the developer company S2B Group-provides a reduction in transport costs by up to 30%. In addition, it is possible (in some cases) unlimited system testing at the expense of the company [3,4]. At the same time, automation of production solutions of transport logistics allows you to reduce personnel costs, since functional tasks are performed by software that takes into account the specific characteristics of the client.

A complex aspect in the process of cargo transportation is the question of timeliness (delivery) and monitoring the movement of cargo along the route.

Digital solutions provide a high degree of high-quality forecasting (time of logistics operations), minimize costs due to vehicle downtime and fines, and improve the efficiency of service delivery (customer service) – for example, as a TSM time window management system.

The concept for the implementation of digital technologies in transport logistics automatically creates new requirements for all participants in the supply chain. As a result, the developed software facilitates not only the process of searching and ordering transport, as well as the ability to control the execution of the order. [6].

Thus, it is possible to confidently predict the rapid transition of all participants in the transportation market to a digital format of work.

3. Research Questions

In course of the study the following questions were raised:

1. How is the digitalization process in logistics going?
2. What are the features of logistic systems digitalization?
3. How relevant is the problem of the development of digitalization of logistics systems in terms of demand and supply in the logistics market?
4. What advantages of development of the logistic centers are expressed during COVID-19 pandemic?

4. Purpose of the Study

The main goal of the study was to analyze the impact of the development of digitalization on logistics centers in general and in pandemic conditions.

5. Research methods

The global movement towards digitalization is also transforming the logistics industry. Digitalization changes the channels of goods movement, delivery formats and management processes. Companies investing in digital technologies are breaking into industry leaders. However, in general, the level of digitization of Russian logistics remains low.

Encouraging retailers and logistics operators to increase the efficiency of processes and introduce innovative technologies is the development of e-commerce and increasing conditions for delivery, which in turn includes multi-channel, timeliness, transparency, reliability. In this regard, it is necessary to study the current

channels and formats of delivery, as well as to investigate large data, automate processes, implement blockchain and robots.

There is a high-quality gap between the industry's favorites that invest in digitalization, and the formation of such firms is faster than that of other players. Logistics firms have mastered a number of technologies, such as the WMS warehouse management concept, TMS fleet management, online services for customers, but the opportunities for development are not exhausted.

For a clear example, here is one of the most popular logistics trends-the transformation from single solutions to platform solutions. An example of a platform solution is the service for the search and selection of cargo carriers and the organization of multimodal transport.

To increase the efficiency of the use of data arrays in order to create the latest services, including logistics optimization, investments in the development of platform services are used. This platform is able to solve several tasks, rather than separate programs and services.

These platforms provide an opportunity to combine the business processes of the chain participants, to unite manufacturers with buyers, to regulate inventory and to provide a whole range of other services. Digital transformation not only changes individual logistics firms, but also becomes the object of dialogue between government agencies, departments and businesses. In 2018, it was announced the creation of a single digital platform for the transport complex (DPTC) of Russia.

A single digital platform will enable the state to monitor compliance with legislation. The business will also receive benefits.

For carriers, the platform is a tool for optimizing routes and accelerating delivery. The platform is also needed for the technical implementation of barrier-free transit of goods throughout Russia. Its elements, in particular, are electronic document management, electronic seals, and more globally, the concept of the «physical Internet».

A pilot project using electronic seals was successfully implemented by RTITS (RT-Invest Transport Systems LLC, Plato state system operator) at the end of 2018,

and the first developments in the field of «physical Internet» in freight transportation by road appeared at the Business Lines logistics company in 2017.

For an offline retailer, when delivering goods from several different warehouses, both owned and leased, or directly from many suppliers, it is beneficial to consolidate all goods in one warehouse (or distribution center) with subsequent delivery to the stores of the network. Then, using modern technologies, you can track and replenish products in a timely manner.

Cross-docking allows you to speed up the delivery process – a set of operations to overload and distribute shipments from heavy vehicles to low-capacity ones for delivery to stores. The acceleration is due to the rapid picking of orders without storage in the warehouse.

When operating an online store, delivery is most often carried out from the warehouse to the customer's address, and the responsiveness of the order is a competitive advantage. In this case, the transfer of all logistics to one 3PL operator on the principle of fullfilment is relevant - from the receipt and processing of the order, to delivery to the customer. Such a solution reduces the time taken to complete individual transactions, as a result of which the buyer receives the goods much faster.

Internal processes can undergo certain reconfiguration. As part of inventory optimization, retailers need to consider inventory in transit, which will require the creation of a unified system for managing all supply sources in the chain, including warehouses, stores, vendor runoff, and so on. In general, integration, interaction and information exchange between IT systems will become necessary in supply chain management.

An example of integration in supply chain management was the project of the X5 Retail Group, which entered the market for transport and logistics services for e-commerce. The OMNI X5 division, which develops the infrastructure for delivering orders from online stores and marketplaces to distribution points and automated lockers (pochtomats) located in Pyaterochka wagons, Perekrestok supermarkets and Carousel hypermarkets, was created [5].

It is planned to open sorting centers for e-commerce parcels based on the logistics infrastructure of X5. Delivery of goods to post offices and order points is carried out using its own fleet, which provides regular retail deliveries [10].

According to the expert, self-pickup points on the market will be more and more automated in the future, since they have a tangible advantage for the buyer - speed and the absence of the need to plan the exact moment of receipt of the order, and for the retailer - a faster turnout.

The Internet of Things is considered a promising direction in supply chain management. The use of IoT is especially relevant for retailers developing their own distribution centers and logistics services. The technology can reduce freight costs and increase the transparency of logistics operations. Connecting vehicles to the Internet and remotely monitoring the fleet reduce operating costs by optimizing the repair and maintenance of equipment. Automatic dispatch systems control commodity and transport flows.

Robotization of intra-warehouse logistics is of increasing interest to market players.

Automation of internal warehouse processes is a solution that allows you to make a qualitative leap in improving performance, increasing the level of service and accuracy. The market has developed all the factors of warehouse robotization - understanding the need for automation, high business interest in technology, the moral readiness of companies to change and improve internal processes, a large number of ideas for a non-standard approach to automation. But the implementation process is hindered by high risks, an unstable economic situation, and the absence of 100% successful examples.

However, despite the growing trend of automation, the warehouses of even very large companies are still not automated.

The automated process prevails over manual labor in two main indicators: performance and accuracy [7,8].

With manual labor, the final productivity depends heavily on both the number of people employed in the process and their qualifications: more people, higher

qualifications - higher productivity. But the calculation here does not always work: people can be put three times more, and productivity can increase only one and a half times.

The second indicator is accuracy: the number of errors that people make by processing parcels with their hands and collecting orders manually is several times higher than with automated processing. The initiators of complete automation of warehouse processes should be large companies, since robotization allows you to get quick and noticeable benefits only on a large scale. With a small flow of processed goods, manual assembly will be cheaper and more efficient.

Those companies that do not yet actively use digital technologies in logistics processes, of course, should carefully review management processes, otherwise they will not be able to gain a leading position in the modern rapidly changing world. In the era of digitization, the format of the industry exhibition, a single business platform, where not only novelties are presented, but also a freight owner and carrier, developer and user meet face to face, remains relevant.

6. Findings

In 2020, digital transformation became a given, and cloud solutions - its integral component. Digital solutions have now gone beyond ICT to help create new business models, transaction types and service formats that can become new sources of income.

To achieve greater flexibility and efficiency, companies from various industries are moving to a cloud-centric strategy, in which investments are directed to three models of cloud services: software as a service (SaaS), infrastructure as a service (IaaS), and platform as a service (PaaS). According to Gartner reports, by 2025, at least 50% of large enterprises are successfully implementing a comprehensive strategy in the SaaS cloud.

The Covid-19 pandemic exposed many problems in transport logistics and accelerated the process of transition to automation. This is confirmed by both consumers and world market leaders. For example, PwC identified 5 main factors that affect the development of the transport and logistics industry, where digitalization and

even greater penetration of IT systems in the digitization and automation of the entire logistics chain occupy the first place.

Recall that, according to a survey of heads of the largest companies in the world, 85% of CEOs of transport and logistics companies are confident in the revenue increase of the organization in the next 12 months.

This indicates that digital technologies in logistics are a new, mandatory and inevitable trend in the development and increase of the company's profitability for the next few years.

Technological changes will affect both the V2V and V2S segments. Somewhere it will be necessary to update the approach to management and strengthen the digital component, somewhere - simply automate the usual manual processes and supplement them with customer-friendly communication formats.

At the present stage, the digitalization of logistics systems is expressed in:

● Increase of the implementation of digital technologies.

This will also affect the new approach to management solutions, including cloud technologies, and the robotization of business processes, and the implementation of ITS (intelligent transport systems).

● Market restructuring and new ecosystems.

In 2020, a natural selection was held in the logistics services market among small and medium-sized players. Some lacked capacity, some did not possess enough time to adapt to new realities. One of the solutions is to join efforts: with the proper professionals, companies of complementary services and growth opportunities. So new unique offers for customers, new ecosystems will begin to be created to ensure competitiveness among others.

● Scaling of domestic freight traffic.

The sudden closure of borders and the restriction of cargo flows from Asian countries gave impetus to the development of import substitution. I would like to believe that this situation will positively affect the increase in domestic production as well as the development of internal logistics. Those who can technically prepare for

peak demand for services will secure a new level of output and gain greater market share.

● Automate deliveries.

The echoes of the pandemic will be with us for a long time, especially in terms of contactless services. This applies to both online shopping and contactless shipping. The forced measure turned into a benefit for the buyer: the level of service for him has grown many times. Convenience of delivery around the city, narrow time slots, communication with the driver, tracking the approaching order online. You will need to try not to disappoint buyers in the future, and at a minimum, keep the buyer's attention on a product. Therefore, those who have already debugged processes and automated what previously took hours and staff, will go through the crisis easier.

To ensure the maximum effective operation of logistics centers taking into account digitalization, it is necessary to:

• Enhance the digital component.

• Create a single platform for communication of all participants in the logistics process.

• Provide them with online access from anywhere in the country, allow them to control and manage in real time, reduce the burden on manual work to solve more complex tasks. This allows you to create more transparent and controlled business processes.

The positive side of the crisis was that it pointed to weaknesses that needed to be dealt with. With new business process automation technologies, the development of AI and robotization, the willingness and desires of other players to join efforts to create new competitive advantages is now even easier.

7.Conclusion

When forming a mechanism for the development and efficient functioning of transport and logistics concepts, including complexes based on digital transformation of logistics, it provides an opportunity to form a platform for partnership relations for the coordinated development of Euro-Asian transport links.

The effectiveness aimed at improving the key performance indicators of Russian companies engaged in material production, transportation, and sales is permissible only with a fundamental rethinking and radical change in business relations, redesigning transport and logistics concepts. In this context, the topic is not only about the formation of the latest delivery methods using a functioning transport infrastructure. Also including finding multimodal solutions that ensure the implementation of significant strategic directions of the movement of material flows with the use of innovative transportation technologies, including modern methods of management and economic processes. Namely, integrated logistics conclusions, which should be relied on when choosing modern methods of estimating transaction costs, as well as specific assets in logistics concepts, including non-technological processes of «smart projects». Thus, the use of innovative digital solutions sets the direction of the vector for the innovative development of transport systems, including complexes, and establishes the actual significance of the transformation of digital logistics.

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