

**DIGITAL PLATFORMS FOR DEVELOPMENT
OF INNOVATIVE TRANSPORT LOGISTIC SYSTEMS****L.O. Serdyukova, R.R.k. Bashirzade, A.V. Pakhomova**Yuri Gagarin State Technical University or Saratov
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The article is devoted to the analysis and solution of a problem of innovative transport and logistics system on a digital platform. The research topic is relevant due to the urgent need for a new, innovative approach to creating a transport and logistics system based on modern digital technologies. The authors formulate the provisions of a conceptual approach to the creation of a common digital platform characterized by the use of the integrated logistics paradigm as the basic concept of managing the interaction of market entities in the supply chain “supplier-transport company-consumer”. It serves as the basis for the introduction of telematics principles in the operational management of the transport and logistics system. We consider recommendations on the creation of joint digital platform for participants of the transport and logistics system in the context of focus on solving the problems of operational impact on the flow of goods, increasing the speed and quality of customer service. We consider the concept of “innovative transport and logistics system” and define the role of digitalization in the process of creating a transport and logistics system. To increase the efficiency of the management process of the transport and logistics system of an innovative nature on the basis of the process approach the stages of its formation have been developed. For each of the stages the authors propose to apply information technologies determined by the nature of its results. The experience of the development and implementation of innovative products in transport logistics is analyzed, the existing shortcomings are revealed, in particular, related to satellite tracking systems, the influence of the human factor on the results of operations, poor attention to the development of innovations in the transport and logistics system for the integration of warehouse and transport facilities. We conclude that while many technologies, systems and programs that allow you to track and determine the location of both the vehicle and the cargo separately are in operation, the formation of innovative transport and logistics system on a digital platform remains relevant and unresolved. When developing and implementing the stages of forming an innovative transport and logistics system, certain prerequisites should be taken into account, including organizational ones (analysis of processes and functions performed by subjects of transport and logistic interaction, creation of a regulatory legal field, development and approval of technological standards and information exchange protocols); technological (ensuring efficient online interaction during logistics operations, implementation of support for users of the CDP in the remote access mode with transaction partners; implementation of technological interfaces to systems containing transport and logistics information).

Keywords: innovative transport and logistics system, digital platform, information technology, analysis**Citation:** L.O. Serdyukova, R.R.k. Bashirzade, A.V. Pakhomova, Digital platforms for development of innovative transport logistic systems, St. Petersburg State Polytechnical University Journal. Economics, 13 (2) (2020) 64–78. DOI: 1018721/JE.13206This is an open access article under the CC BY-NC 4.0 license (<https://creativecommons.org/licenses/by-nc/4.0/>)**ФОРМИРОВАНИЕ ИННОВАЦИОННОЙ
ТРАНСПОРТНО-ЛОГИСТИЧЕСКОЙ СИСТЕМЫ
НА ЦИФРОВОЙ ПЛАТФОРМЕ****Сердюкова Л.О., Баширзаде Р.Р. кызы, Пахомова А.В.**Саратовский государственный технический университет имени Гагарина Ю.А.
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Статья посвящена анализу и решению проблемы формирования инновационной транспортно-логистической системы на цифровой платформе. Актуальность темы исследования определяется настоятельной необходимостью нового, инновационного подхода к проектированию и созданию транспортно-логистической системы, базирующейся на современных цифровых технологиях. Сформированы положения концептуального подхода к созданию общей цифровой платформы, отличающейся применением интегральной парадигмы логистики как базового понятия управления взаимодействием субъектов рынка в цепочке поставок «поставщик-транспортная компания-потребитель», что служит основой для внедрения принципов телематики в оперативном управлении транспортно-логистической системой. Рекомендации по созданию совместной цифровой платформы участников транспортно-логистической системы рассмотрены в контексте направленности на решение задач оперативного воздействия на товаропоток, повышение скорости и качества обслуживания клиентов. Рассмотрено понятие «инновационная транспортно-логистическая система», определена роль цифровизации в процессе создания транспортно-логистической системы. Для повышения эффективности процесса управления транспортно-логистической системой инновационного характера на основе процессного подхода разработаны этапы ее формирования. Для каждого из этапов предложены определенные характером его результатов информационные технологии. Проанализирован опыт разработки и внедрения инновационных продуктов в транспортной логистике, выявлены существующие недостатки, в частности, относящиеся к системам спутникового слежения, влиянию человеческого фактора на результаты деятельности, слабому вниманию при разработке инноваций в транспортно-логистической системе интеграции складского и транспортного хозяйства. Сделан вывод о том, что при действующих на практике множестве технологий, систем, программ, позволяющих отслеживать и определять место нахождения как транспортного средства, так и груза в отдельности, остается актуальным и нерешенным вопрос формирования инновационной транспортно-логистической системы на цифровой основе. При разработке и реализации этапов формирования инновационной транспортно-логистической системы следует учитывать определенные предпосылки, в том числе организационные (анализ процессов и функций, исполняемых субъектами транспортно-логистического взаимодействия, создание нормативного правового поля, разработка и утверждение технологических стандартов и протоколов обмена информацией); технологические (обеспечение эффективного, оперативного онлайн взаимодействия в процессе выполнения логистических операций, реализация поддержки работы пользователей ОЦП в режиме удаленного доступа с партнерами по сделкам; реализация технологических интерфейсов к системам, содержащим транспортно-логистическую информацию).

Ключевые слова: инновационная транспортно-логистическая система, цифровая платформа, информационная технология, анализ

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Introduction

In modern world there is a need to provide quality transport and logistics services in conditions of intense competition, the integration of market entities in the international economic space. In the furtherance of this goal, digitally enabled innovations are a key to success, since innovative activities foster a generation of new ideas introduced into management processes and industries, and creation of new technologies. Experience has shown that introducing innovations into transportation logistics companies can result in the cost, time and energy efficiency, and therefore, satisfy the consumer needs. Application of innovative and digital technologies gives a company distinct competitive advantages, and take the lead in a particular field for years to come. According to estimates by the UNESCO Institute for Statistics (data for December 2018), \$ 1.7 trillion was spent on innovation in the world in 2017 according to purchasing power parity, 47% of expenses on innovation in the world are in the USA and China, 80% in the top ten countries.

Logistics is one of the most digitalized industries, both in the world and in Russia [27], which is reflected in foreign sources studying logistics [1–6]. Most of the new trends in the logistics industry are impossible without innovations in the development of digital technologies in logistics. At the same time the use of modern digital technologies in logistics is a target factor in increasing the country's economic competitiveness [13].

The calculations of experts from the Higher School of Economics Institute for Statistical Studies and Economics of Knowledge showed the following: the highest share of innovative goods in the service sector is 14.5%, the share of costs in this sector invested in innovation amounts to 2.3% of the total volume of products sold; in the industry this indicator is 6.7% (costs per unit at 1.7%). Investments in R&D and innovation make up from 2 to 7% (in total costs, according to *Vedomosti&* surveys for large companies).

Digitization strategy of the logistics system is claimed to be a trending topic in the Decree of the President of the Russian Federation “On National Goals and Strategic Tasks of the Development of the Russian Federation for the Period until 2024”. At the digital forum in Almaty in February 2020, the prime ministers of the EAEU (Eurasian Economic Union) countries focused on how digitalization helps to develop the economy and social sphere. The discussion at the forum focused on such topics as artificial intelligence, electronic document management and cloud technologies¹. The proportion of organizations which make technological investments is presented in Fig. 1.

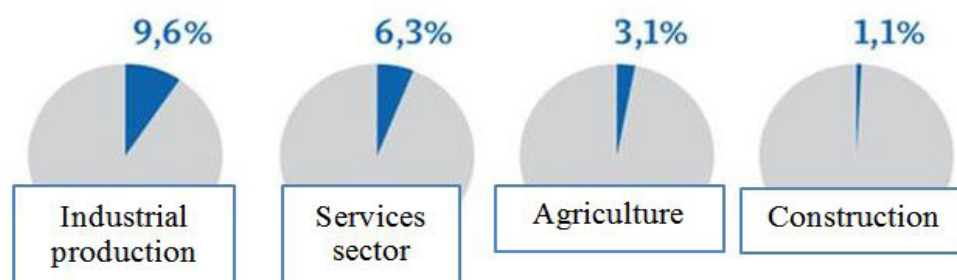


Figure 1. Proportion of technological investment organizations

(Source: HSE Institute for Statistical Studies) [16]

The digitalization of Moscow transport is evidence of the effectiveness of the topic under discussion. It is based on the use of big data analysis, machine learning and the introduction of the most advanced technologies. The territory of the city is covered by the Intelligent Transport System, supplemented by the Situational Centre for Road Traffic Organization².

The Transport Strategy of the Russian Federation for the Period until 2030 was amended and restated, and adopted by the RF Government in June 2014. The strategy set out to design motivation mechanisms taking advantage of innovative logistics technologies to be utilized to upgrade the freight rolling stock. Modern information and telecommunication technologies, telematics, and the global navigation system GLONASS are the instruments for introducing into practice and intellectualizing transport and logistics systems and integrating all participants in the supply chains of goods. The target of the Industry 4.0 concept is the accelerated integration of cyber-physical systems into factory processes as a result of which a significant part of the production will take place without human participation. Industry 4.0 is associated with concepts such as Industrial Internet of Things, Digital Enterprise of a new technological structure based on large-scale innovations. The ability to innovate is becoming a new factor in the development of transport and logistics infrastructure and an effective way to overcome crisis trends in the context of global competition [12].

¹ CIS: the space of integration. URL: <https://e-cis.info/news/567/85456/> (accessed March 5, 2020).

² SCRTO official site. URL: <https://roads.mos.ru/> (accessed March 6, 2020).

Germany is the leader in the development of Industry 4.0, where Intelligent Technical Systems OstWestfalenLippe is the answer to the Silicon Valley. Similar programs have been launched in the Netherlands, France, Great Britain, Italy, Belgium, etc. In the United States since 2012, there is a non-profit “Coalition of Leaders of Smart Manufacturing” combining business, universities and government agencies, which confirms the leadership of the country in terms of expenditures connected with innovations (Fig. 2).

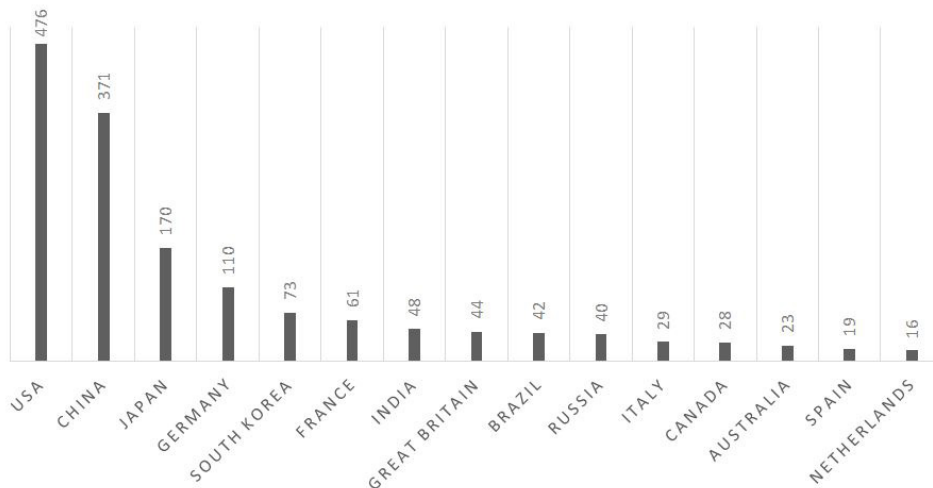


Figure 2. Costs of innovation by country, \$ billion
(Source: UNESCO Institute of Statistics) [32]

Digital economy is a future stage in the development of the global economy due to the transformation of all spheres of human activity under the influence of information and telecommunication technologies [10]. In relation to the problem under consideration, it is important to focus on the following definition: “Digital economy in transport can be interpreted as an IT platform for the tasks of innovative, balanced development and efficient use of a single transport infrastructure” [7]. A digital economy is a display of all data in digital form. The navigation in the indicators and records that are compiled in organizations is fast, and the search for a certain piece of information, statistical indicators, etc., in digital form is simple [8]. In a narrow sense, a digital economy is understood as a combination of online platforms, as well as the types of activity possible thanks to such platforms. In a broad sense, the digital economy refers to all types of activity based on the use of digital data³.

In the framework of the study, the definition of the International Monetary Fund is more relevant, since it reflects the role and importance of digital platforms in the formation of innovative transport and logistics systems in relation to the current situation. This serves as the basis for supporting real-time goods distribution processes and allows to make decisions in real-time in case of failures within the transport and logistics system.

Information logistic systems become important to ensure well-coordinated logistic work, since the functioning of the entire logistic system as a whole depends on their work [22].

Having analyzed the experience in the development and implementation of innovative products in transport logistics, note that in the existing systems considered there are a number of drawbacks, summarizing which we come to the following conclusion:

- satellite tracking systems have the so-called “blind spots” in which observation is impossible;
- the human factor, both the user of the product and the driver of the vehicle affect the results of the activity;

³ International Monetary Fund. URL: <https://www.imf.org/external/russian/index.htm> (accessed March 10, 2020).

– insufficient attention is paid to the development of innovations in the transport and logistics system for the integration of warehouse and transport facilities;

– insufficient account of the customs clearance and other operations, necessary when transporting goods.

The elimination of these shortcomings in transport and logistics is inextricably linked with information technologies, which affects all spheres of society. Their use in practice allows the most efficient processing of existing data, use of existing knowledge for timely adoption and implementation of management decisions [9].

Thus, today the management of the efficiency of performing other functions that facilitate the process of delivery of goods to the customer did not provide an active area for the introduction of innovative technologies. Although there are many technologies, systems, programs that allow you to track and determine the location of both the vehicle and the cargo separately. The fact that freight transportation has not been integrated into a supply chain using a single digital platform is one of the challenges of transportation logistics. The creation of a single platform makes it possible to save money and optimize the delivery of goods from China, as one of the priority areas of the transport industry in Russia.

The company's programmers develop and modify their systems annually. The lack of a single digital platform for the transport industry of the Russian Federation holds back the rapidly developing transport and logistics area at the moment. It is a favorable area for implementing an innovative approach to the process of forming a model of a transport and logistics system for servicing a certain circle of customers on a common digital platform.

The purpose of this article is to develop the stages of the formation of an innovative transport and logistics system on a digital platform, focused on stimulating the effective use of the components of an innovative transport and logistics system to implement the tools of the digital economy.

The objective of the article is to submit the suggestions relating the concept of a digital platform in the transport and logistics system, determine the role of innovation in the digitalization process, study the prerequisites, goals, tasks of creating a common digital platform of the transport and logistics system for customer service, develop the relationship of information technologies and recommendations for the formation of innovative transport and logistics systems to improve the quality of customer service with transport and logistics services.

The research methodology includes analysis and systematization of domestic and foreign developments on the organization of the process of formation of an innovative transport and logistics system on a digital platform that ensures the interaction of participants in the supply chain in order to improve the quality of customer service and goods flows.

The main purpose of the process of forming a model of an innovative transport and logistics system is to obtain an efficiently functioning supply chain that guarantees a stable supply of enterprises with material and technical resources, consistent demand for finished products and its positive work as a whole, implemented using this model. For the interaction of any enterprise with the external environment in modern market conditions, optimization of the movement of material flows of great importance [26].

However, the improvement of technological processes, including innovative activities as one of the most relevant methods for the development of transport logistics, in Russia is much slower than in Western Europe and the United States. The reason is focusing on optimizing warehouse logistics. At the same time, the demand for transport services based on modern information technologies and telecommunication systems, which allows optimizing the sequence of operations in the entire supply chain. A prerequisite for this is a flexible functioning of the transport and logistics system, capable of perceiving innovative achievements on the basis of a single digital space. Being a direct factor of production, the information requires ensuring security as a condition of economic security, data preservation, reliability, relevance, value, completeness, reliability and secrecy [24].

Creating a single logistics space based on digitalization can facilitate delivery processes anywhere in the country. Such space is a set of integrated systems, including platforms for transport planning using

various modes of transport and infrastructure. The general level of digitalization of market participants in the Russian Federation does not allow creating a single digital space.

Nevertheless, a variety of modern digital technologies used in various fields of human activity, proves their necessity in solving a number of applied problems, in particular, in logistics and supply chain management [11]. The Ministry of Transport is engaged in the preparation of a digital platform for the entire transport complex of the country. The company A + C Transproject, involved in the development of a mathematical model of the country's transport flows, engages transport planning based on a three-level system: city, region and country. It is assumed that the region uses data from cities, and the country uses data from regions. All the data will be included into a unified system. As a result, modern services do not allow the integration of participants in the complete supply chain. The position cannot be realized according to which in modern conditions the competitiveness and effectiveness of the organization, industry, the country is largely determined by the logistics component [16].

Today the society has realized that the constant and growing demand for mobility in the world cannot be met by the simple expansion of modern vehicles. Although transport is essential for modern civilization. Actually, transportation systems are a key source of traffic bottlenecks, roadway accidents, climate change, and resource depletion, public health problems due to air pollution and noise, and ecosystem degradation. The use of global navigation satellite systems and satellite communications can increasingly contribute to solving mobility problems through innovative services. Due to GNSS the ability to accurately determine and report your position at any time begins to have a significant impact on managing a fleet of trucks, monitoring road and rail traffic, mobilizing emergency services, and tracking goods transported by multimodal vehicles, transport and air traffic control.

Well-designed transportation and logistics systems are fundamental to individual mobility, trade, wealth, and economic growth. In connection with the constantly growing volumes of transportation and cargo, emerging transportation systems will face tough challenges related with how to balance the need for fast, efficient and sustainable transport with negative consequences. The answer is in a closer integration of telecommunications and information technology. Autonomous driving has already become a reality, vehicles are connected with each other and with the infrastructure in smart cities. It allows to collect all kinds of data for use in the decision-making process. Digital technologies confidently move from the category of auxiliary equipment to the main class. They allow to reduce the cost of management and communication in the organization and implementation of transportation, improve the quality of transport and logistics services, etc. [19].

The digital supply chain consists of the following key elements: integrated planning and execution, logistics transparency, intelligent warehousing, efficient spare parts management, autonomous logistics and B2C logistics, an analytical supply chain, and digital supply chain tools. Companies that can combine these parts into a single and completely transparent system can receive huge advantages in customer service, flexibility, efficiency and lower costs. Those that delay the changes will fall further and further behind. How these elements work to provide a digital supply chain is the subject of this study.

Behind the enormous potential of the digital supply chain (DSC) lies "Industry 4.0", the fourth industrial revolution. The transformation in production and automation was caused first by steam and water energy (Industry 1.0), then by electrification (2.0) and by a digital computer (3.0). Industry 4.0, digitalization, is a customer-oriented campaign through e-commerce, digital marketing, social networking and customer interaction. All aspects of the business will be transformed through the vertical integration of research and development, production, marketing and sales, and other internal operations and new business models. These models are based on these achievements. In fact, we are developing towards a complete digital ecosystem. Digital transformation dictates the need for fundamental changes in approaches to business, affecting absolutely all its aspects. The transformation is based on the idea of continuous business modernization and improvement [14].

The establishment of information support is one of the main tasks of any company which engaged in the transport of goods. In logistics, with the advent of GPS, GSM, WI-FI and other wireless methods of transmitting information, it becomes possible to solve a big problem: currently you can keep track of the condition and location of the cargo online, which allows to respond to difficulties more quickly and make decisions. In the future, innovations will affect the management system for the maintenance and the rolling stock. In particular, if a malfunction occurs, its code will be automatically transferred to the office to the mechanics. Those can send recommendations on how to fix it on the driver's smartphone. All diagnostic data can be obtained not upon car's arrival, but also while it's still in operation.

The information and technology revolution, leading to the formation of a new technological structure, sets a new direction for the development of the national economy and innovative technological solutions to improve quality of artificial intelligence systems, global information networks, robotics, unmanned vehicles, electronic commerce, big data processing technologies, and high-tech products. The development of the digital economy in the Russian Federation takes into account and complements the goals of the National Technology Initiative [28].

In order to implement the Industry 4.0 concept, most corporate processes must become digital. A critical element will be the evolution of traditional supply chains towards a connected, smart and highly efficient supply chain ecosystem. The supply chain today is a series of largely discrete, disparate steps through marketing, product development, production and distribution. Digitization destroys these walls, and the chain becomes a fully integrated ecosystem that is completely transparent to all players involved: from suppliers of raw materials, components and spare parts to carriers of these materials, and finished products to customers.

This network will depend on a number of key technologies: integrated planning and execution systems, logistics' transparency, autonomous logistics, smart procurement and warehousing, spare parts management and advanced analytics. The result will allow companies to respond to supply chain failures and even anticipate them by fully simulating the network, creating "what if" scenarios and adjusting the supply chain in real-time when conditions change.

Consider how the supply chain ecosystem works. An important point in the development of the digital economy is the strengthening of consumer confidence in it. This is facilitated by an increase in the availability, integrity, confidentiality, and authenticity of online transactions [15].

At most companies, products are delivered to customers through a very standardized process. Marketing analyzes customer demand and tries to generate information to predict sales for the coming period. Related to this information are orders for the production of raw materials, components and parts for the expected capacities. The distribution takes into account upcoming changes in the number of products entering the supply chain. The customers are informed when to expect shipments. If everything is going well, the gap between supply and demand at each point in the system is small. This rarely happens because forecasting remains an inaccurate science. The data on which it depends can be conflicting and incomplete.

Too often, production operates independently of marketing, customers, suppliers and other partners. Lack of transparency means that none of the links in the supply chain understands what any other link does or needs. It seems inevitable that at some point the streamlined flow from marketing to the client is disturbed. To avoid this, the digital economy should require employees to constantly develop competencies to achieve their goals, the competent use of skills, knowledge and abilities in professional activities and be a worthy competitor in the labor market [23].

Based on the foregoing, we consider it expedient and necessary in the process of creating an innovative transport and logistics system to implement the integrity principle formulated by the authors in addition to the existing ones (principles of a systematic approach; taking into account the total logistics costs within complex logistics production, transport and transportation systems; coordination and integration; global optimization, etc.). Under the principle of integrity, the authors understand that the formation

of a transport and logistics system should be designed so that during its operation the changes made do not violate its integrity, and it continues to operate as a packaged, well-oiled system designed to realize a common task of adjusting to market conditions, a specific environment, while improving the quality of services and reducing all types of costs.

The results obtained and their discussion

When creating innovative transport and logistics systems, it is proposed to follow step-by-step recommendations on organizing the process of forming an innovative transport and logistics system based on a common digital platform (CGP). The stages are considered by the authors as the basis for creating an innovative transport and logistics system based on modern digital technologies.

When developing and implementing the stages of forming an innovative transport and logistics system, certain prerequisites should be taken into account.

Organizational tasks:

- analysis of processes and functions performed by subjects of transport and logistics interaction, as well as the creation of a regulatory legal field;
- development of a roadmap for amending the regulatory framework for transforming existing processes or introducing new ones;
- development and approval of technological standards and information exchange protocols that provided seamless integration of systems.

Technological tasks:

- creation of a single-entry point for digital platforms in the field of innovative transport and logistics interactions in the supply chain;
- ensuring efficient online technical interaction (including in the process of performing logistics operations) of supply chain participants by the goals and objectives of the transport and logistics cycle;
- implementation of support for the operation of users of CGPs in remote access mode, including with foreign partners in transactions;
- support for the effective exchange of transport and logistics information between participants in the supply chain;
- providing participants with the common standards required for joint innovative research in the field of transport and logistics with access to external distributed systems for storing and processing the necessary information;
- ensuring integration with external information systems, including foreign systems for identifying participants in supply chains and their interaction;
- ensuring the management of mutual settlements for transport and logistics operations, the joint use of infrastructure when researching the field of transport and logistics between the participants of the digital platform;
- implementation of technological interfaces to systems containing transport and logistics information;
- implementation of technological interfaces for interacting with digital platforms of participants in supply chains and leading logistics centers;
- implementation of technological interfaces for interaction with participants in the supply chain.

Recommendations on the organization of the process of forming an innovative transport and logistics system will be presented as a phased process characterized by certain activities (Fig. 3):

The first stage. Determining the grounds for the development of CGP, as such grounds are:

- Decree of the President of the Russian Federation No. 642 of December 1, 2016 “On the strategy of scientific and technological development of the Russian Federation”.
- The state program “Scientific and technological development of the Russian Federation”, approved by the decree of the Government of the Russian Federation of March 29, 2019. No. 377, main activity 4.4. “Development of digital platforms for participants in scientific and technological development”.

- Transport strategy of the Russian Federation for the period until 2030.
- Decree of the Government of the Russian Federation of March 29, 2019 No. 377 “On approval of the state program of the Russian Federation “Scientific and technological development of the Russian Federation”.
- The decree “On national goals and strategic objectives of the development of the Russian Federation for the period until 2024”.
- Order of December 29, 2017 No. 887 “On the Approval of Methodological Provisions on Transport Statistics”.

The second stage. Determining the goal and objectives.

The goal is to develop recommendations for a phased process of forming an innovative transport and logistics system for its implementation on a digital platform. Tasks:

- to develop the stages of the formation of an innovative transport and logistics system on a digital platform;
- to formulate a goal, tasks, principles of forming a common digital platform for the interaction of elements of an innovative transport and logistics system;
- determine the organizational and technological prerequisites for creating a common digital platform for an innovative transport and logistics system with information support through the use of GPS, GSM, WI-FI and other wireless methods of transmitting information.

Transport logistics is a favorable area for the emergence of new innovative technologies. Transport logistics is multimodal and requires an approach based on an integrated transport policy [17]. Examples of digital technologies: Gonrand, Videotrans, STS, BRS, Espace Cat, ISCIS, etc.

The fourth stage. Formulation of the basic principles for the creation and operation of a common digital platform of the transport and logistics system (CGP).

The main principles include the following:

- centralization of information on the interaction of participants in the supply chain;
- the presence of well-established schemes for collecting information about customers and the structure of the material flow;
- completeness and availability of information on the interaction of counterparties on transactions;
- the active use of information technology and computers;
- a clear division of powers between decision-makers;
- the presence of partnerships of participants in the supply chain;
- the availability of a competent legal service.

The implementation of these principles on the basis of the introduction of digital technologies will increase the efficiency of interaction between participants in the transportation process, create organizational and technological conditions not only for concluding smart contracts for multimodal transportation, but also for automating the processes of controlling the movement of vehicles and cargo operations in transport hubs, paperwork and settlements with all participants in the supply chain [18].

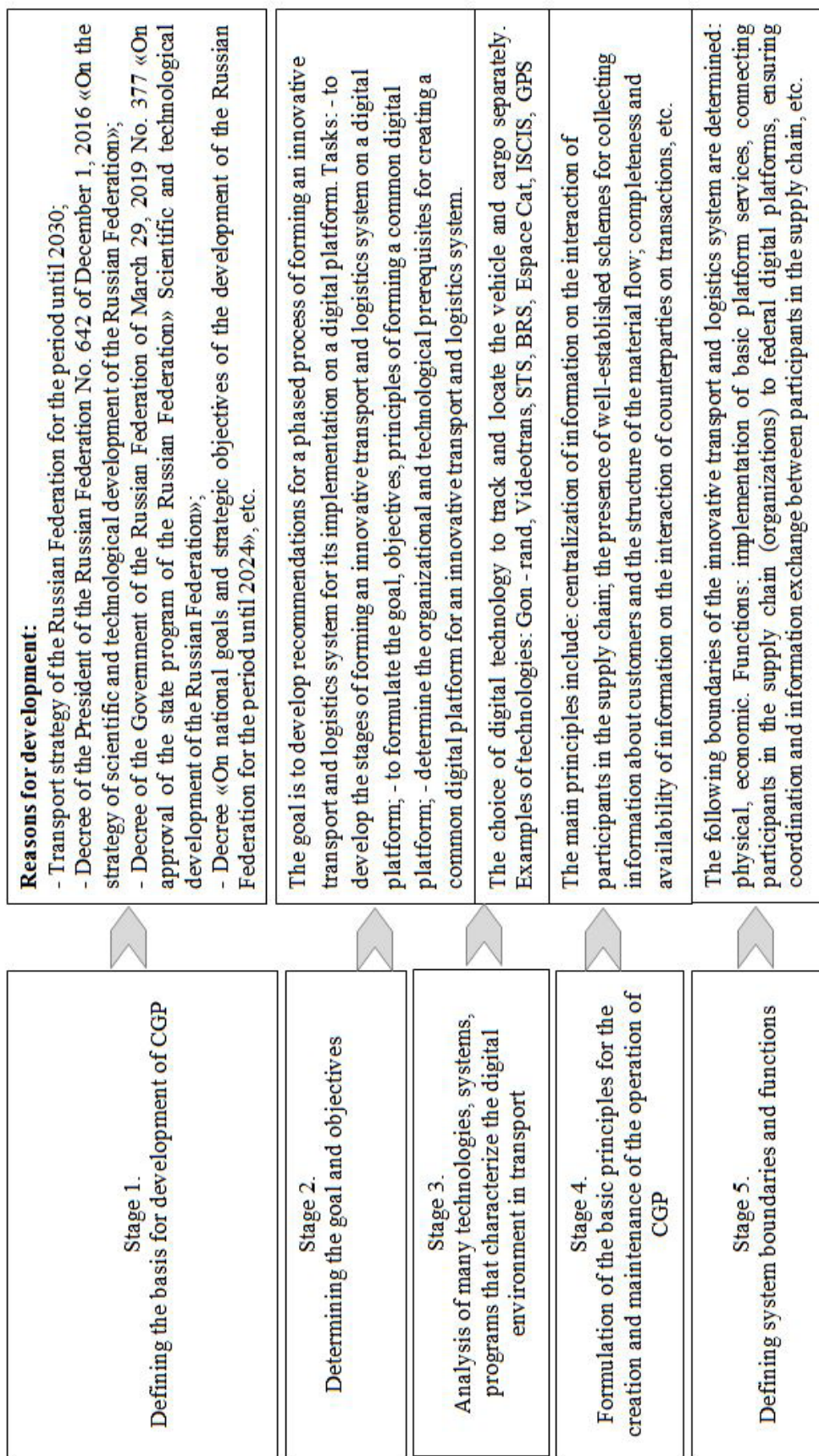
The fifth stage. Defining the boundaries and functions of the system.

The boundaries of the innovative transport and logistics system are determined by:

- the deployment of suppliers, consumers, cargo, transport companies serving this supply chain (physical boundaries);
- served by this transport and logistics system with the required services of regional, interregional and other customer markets (economic borders).

Functions:

- implementation of basic platform services, as well as applied digital services for platform interaction within the framework of an innovative transport and logistics system, including services aimed at digital support of counterparties for transactions in the supply chain, growth in the volume of transport and logistics services;



Innovation: the formation of a transport and logistics system on a digital platform that allows you to integrate the links of the system for managing online resource flows

Figure 3. Stages of the innovative transport and logistics system formation on a digital platform

- connecting participants in the supply chain (organizations) to federal digital platforms (information systems and resources) between which information interaction is provided to carry out intra-regional and inter-regional transport and logistics activities under the concluded agreements;
- ensuring coordination and information exchange between participants in the supply chain, including through the conclusion of agreements on information interaction.

The creation of a single information system allows the formation, management and control of the supply, production, transport, storage facilities, distribution system for the successful functioning of the enterprise as a whole [21]. The process of introducing digital technologies into the activities of transport organizations not only helps to increase their competitiveness, but also leads to the digitalization of the country's economy as a whole [20].

Thus, the study reflects the following results. The authors:

1. Developed the stages of the formation of an innovative transport and logistics system on a digital platform, characterized by specific actions aimed at ensuring effective, efficient and technical interaction regarding the logistics operations of supply chain participants, which allows for a clear structuring of the process of creating such a system.
2. Formulated the goals, objectives, principles of the formation of a common digital platform for the interaction of elements of an innovative transport and logistics system, characterized by a focus on integration with external participants of the supply chain for this system based on a single operational management system for decision-making control in the online response to problems in goods distribution.
3. Identified the organizational and technological prerequisites that are necessary, on the one hand, for creating innovative transport and logistics systems supported by digital technologies, on the other hand, for organizational support for the effective exchange of transport and logistics information between participants in the supply chain, as in the process of forming the system, and its effective functioning.

Conclusion

The implementation of the proposed phased recommendations on the formation of an innovative transport and logistics system on a digital platform allows:

- to formulate general principles and general logic of constructing such a system within the framework of which it is possible to establish information support for operational monitoring and evaluation of the implementation of the goals and objectives of the entire supply chain using innovative wireless methods of transmitting information;
- to prove the innovativeness of the implementation of the main research idea: logistics is the impetus in the digital economy, which creates intellectual mobility as a new industry combining the movement with finances, physical objects and human flows, and thus, requiring serious changes for future supply chains [25];
- to provide, on the basis of common digital standards, the participants of joint innovative research in the field of transport and logistics with an access to external distributed systems for storing and processing the necessary information, as conditions for the practical use of the proposed step-by-step process of forming an innovative transport and logistics system.

Directions for further research

The presented research results and recommendations are to be further discussed, since the process of forming an innovative transport and logistics system can be varied both in terms of target settings, depending on the industry context, and the implementation of technological interfaces for interacting with digital platforms of participants supply chains and leading logistics centers. Further developments may be related to the study of the features of the implementation of technological interfaces for interaction with participants in the supply chain, as well as the analysis of processes and functions performed by subjects of transport and logistics interaction. In addition, a study of the issues of managing financial flows of mutual

settlements for transport and logistics operations is of interest, sharing infrastructure when conducting research in the field of transport and logistics between the participants of the digital platform.

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