

Digitalization of the transport and logistics industry of the region as an element of ensuring economic security

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Abstract. The article reveals the nature and mechanisms of the influence of the digital economy on the development of the transport and logistics industry of the region. The relevance of the study is undeniable, since recent years demonstrate the urgent need for technological innovative transformations in all areas of the region's economy, and the issue of ensuring the region's socio-economic security in the context of Industry 4.0 is also acute. The main purpose of this article is to indicate and argue the hypothesis of the direct impact of digitalization of the transport and logistics industry of the region on the state of indicators of its economic security. During the work, the tasks of identifying the most relevant and demanded digital technologies in the transport infrastructure for increasing the socio-economic development of the region, as well as their relationship with the main indicators of economic security of the region, were set. As the main conclusions on the work, one can note the justification of the objective need of the transport industry for new innovative developments. The economic effect that the introduction of digital technologies in the transport sector brings is obvious and tangible. Savings are realized by reducing unearmarked costs, increasing control and manageability of the system. Keywords: Digital economy; digitalization; digital transformation of the transport and logistics industry; digital technologies; economic security.

1 Introduction

The process of digital transformation has covered all spheres of life of society, including economic. Among the priority tasks facing the state, a full transition to the digital economy is highlighted. Moreover, the efficiency and security of sectoral structures of the economy is assessed by the level of their digitalization and the success of integration into the global digital transformation process. Such trends also covered the transport and logistics industry, the successful development of which directly affects the socio-economic development of the region.

The problems of entering regions into digital transformation are described in the works of many research authors. The results of the analysis of the components of the digitalization index of the Volga Federal District showed that the regional digitalization rating is influenced by the balance between demand and supply on digital technologies and services, the

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reflection of the main areas of digitalization in regional strategic documents, as well as the degree of introduction of smart city technologies by regional capitals (Arbuzov and Arbuzova 2019). At the same time, the technology of the "smart city" itself includes the digitalization of the city transport network.

The Ministry of Transport of Russia in the passport of the Strategy for the digital transformation of the transport industry of the Russian Federation notes that at present the transport industry is actively involved in the digitalization process, elements of the digital transport infrastructure, represented by intelligent transport systems, digital solutions for passenger and freight terminals, etc. are already manifested at the state level, including digital transport services. Also technically, the vehicles themselves are equipped with the benefits of the digital industry, from GPS navigators to unmanned technologies. However, as the Ministry of Transport notes, such innovations are implemented by individual advanced companies in the transport industry or in certain regions, while at the federal level, the integration of digital technologies in the transport industry is still low.

As researchers at the Higher School of Economics note in their report *Digital Transformation of Industries: Starting Conditions and Priorities* (Abdrakhmanova et al. 2021), in Russia, as well as abroad, the rate of penetration of digital technologies into the activities of various modes of transport varies greatly. The most advanced in terms of penetration of the latest technologies, of course, is the segment of air transportation. Moreover, the introduction of new technologies affected both aircraft and airports, which are actively introducing technologies based on artificial intelligence. Maritime transport and rail transport are also quite competitive at the global level in the process of digitalization. At the moment, special attention should be paid to the development of the digital transformation of the transport and logistics chain of road cargo and passenger transportation.

Optimized transport models help transform approaches to solving global territorial and intersectoral conflicts and contradictions in the production and distribution spheres (Arkhipov and Ryapisov 2020). Such a transformation, in turn, reduces the level of threats and risks to economic security at the state level.

At the same time, in most scientific studies, economic security is understood as the state of protection of the interests of economic agents at various levels of management from internal and external threats. If we consider the economic security of the region from the point of view of the positive dynamics of socio-economic indicators, we can give this definition: economic security is a stable development of the socio-economic sphere of the region, which contributes to improving the indicators of the regional economy and ensuring the protection of the socio-economic infrastructure from external and internal threats.

The study by K. Alam and co-authors notes that at the present stage of development of society, it is the methods and tools of the digital economy that allow business entities to most quickly and effectively respond to emerging internal and external threats (Alam et al. 2018).

In this regard, there is a need to highlight the main directions of digitalization of the transport and logistics industry of the region and assess the impact of the digital transformation of the industry on the size and dynamics of the main socio-economic indicators, including reflecting the state of economic security.

2 Materials and methods

The digital industry is growing rapidly, offering stakeholders a wide range of diverse technological solutions. Therefore, the ability to navigate technological solutions, and most importantly, the economic impact of their implementation, is essential. Choosing priority areas of digitalization of the transport and logistics industry should be based on the interest of end consumers and the possibility of increasing the financial results of the industry and reducing costs.

So, the introduction of BPM - systems in the framework of business process management of enterprises in the transport industry will allow you to effectively manage the personnel component, reduce the costs of automating business processes and ultimately increase labor productivity (Karanina and Kotandzhyan 2021).

The result of the study by Kuznetsov et al. (2018) made a proposal on the expediency of introducing, as a digital innovation, the so-called “electronic transportation passport” - a document generated by a consignor registered on the electronic platform being created or by a domestic party to an international contract of sale (delivery) and containing the essential terms of the contract of transportation or each of its stage in multimodal transportation: name of the cargo (original, price list and corresponding to the commodity nomenclature of foreign economic activity), type of transport, starting and ending points of transportation (stage), terms of transportation, cost, etc. The positive effect will be the possibility of restoring the entire history of transportation by the number of the electronic passport, objective control of the traffic density of individual transport directions and nodes, as well as analysis of the dynamics of transportation costs.

The transport complex is a kind of link between all sectors of the economy and has a direct impact on the magnitude of the socio-economic indicators of the region. First of all, the optimization of transport infrastructure will reduce transport costs, which tend to increase in the Russian Federation (Arkhipov and Ryapisov 2020).

As part of the digitalization of the transport and logistics industry, researchers propose to adhere to the following principles (Merenkov, 2018):

- creation of a regulatory framework;
- recruitment and training;
- scientific competencies and the availability of a technological base;
- information infrastructure and cybersecurity.

A study by Mashkina and Veliyev (2020) cites four main areas for the digital transformation of the transport industry:

- digitalization of transport infrastructure and supply chains (including warehousing and service centers);
- robotization of production processes;
- large-scale automation, including management processes;
- introduction of autopilot systems.

At the same time, the authors identify the transport industry as the most affected and the introduction of digital technologies, which in turn has both positive and negative consequences. Thus, the risks of active digital transformation of the industry are presented by the authors in the following aspects:

- one-time release of a large number of drivers who, in principle, will no longer be able to find a job in their profession;
- difficulties in determining the measure of responsibility in the event of an insured event;
- risk of software failure and loss of control over the controlled vehicle.

Of course, such risks are significant and can cause enormous losses, including the life and health of the population, therefore, competent study and response measures are required for possible negative development scenarios.

Among the undoubted advantages of digitalization of the transport industry, the researchers noted:

- improving the efficiency of the transport sector as such (reducing fuel costs, increasing road capacity, reducing accidents, reducing the number of people injured in transport accidents and the proportion of cargo damaged during transportation);

- reduction of labor costs for drivers and many employees whose jobs will be automated;
- reduction of downtime of the vehicle;
- eliminating the risk of human error.

In the context of the main goal of this work, the study by Yakovleva et al. is of particular interest. (2019), which included monitoring of the expectations of transport and logistics companies from the introduction of digitalization in the industry. The results showed that 54% of respondents see an increase in the company's revenue, 16% - an expected increase in profits, 11% - an improvement in the quality of customer service, 19% of respondents expect other improvements. That is, the first two indicators are directly relevant for determining the level of economic security of both transport companies and the region. The researchers also noted that, according to expert estimates, the use of a number of software products at enterprises in the transport and logistics industry can provide not only 15–35% savings in money, but also significant time savings.

The author of Sudina (2021) notes in his work that, speaking about digitalization at the state level, it is planned to allocate 4.5 billion rubles within the framework of the Federal project of the Russian Federation "Digital Region", which is being considered for implementation. on the digitalization of the transport sector. The author also notes the main priority areas of digitalization of the transport industry:

- introduction of the Unified travel ticket;
- equipping freight transport with on-board devices to optimize traffic flows;
- ensuring the operation of digital transport modeling and traffic flow management systems.

At the same time, the researcher points out the need to respond in a timely manner to possible risks of digitalization of the transport industry, such as the risks of cyber attacks. Thus, in the period from February to May 2020, cyber attacks in the maritime industry increased by 400%.

Blaginina and Mikhailovsky (2018), in their study of the impact of road transport infrastructure on the economic security of the region, presented a number of indicators linking the concepts of the transport industry and economic security on the example of the Sverdlovsk region. Among the group of indicators was the "Compliance with the requirements of the Industry 4.0 technological platform", which we were interested in, which included the following indicators:

- number of electric filling stations;
- availability of intelligent automarketing;
- availability of a system of intelligent traffic lights;
- number of registered electric cars;
- the number of people injured in road accidents.

Taxi market research reflects the digital transformation of passenger transportation as one of the drivers of GDP growth. Thus, the entry of new high-tech players into the market has fundamentally changed the face of passenger transportation in Russia, where the number of employees has grown in just a three-year period, the number of illegal carriers has decreased by 36 thousand, and by 134 billion rubles. increased direct contribution to GDP. There is also a trend to improve the quality and safety of the service, reduce the cost of the average trip ticket.

A rather interesting study by Chinoracky et al. (2021) confirms the macroeconomic impact of the digitalization of the transport industry on indicators such as:

- added value;
- general employment;
- labor productivity.

The above indicators of the transport industry in the study of the authors showed an increase over the period from 2000 to 2018.

3 Results

An analysis of statistical data, strategic development plans and government projects made it possible to identify priority and demanded areas of digitalization of the transport and logistics industry, which contribute to improving the indicators of socio-economic development of the regions. The selected directions are shown in Figure 1.

Each direction is a wide range of measures for implementation in the transport and logistics industry at the state level with the participation of all regions of the Russian Federation. At the same time, it is noted that a positive effect from the implementation of the noted areas is expected only with the creation of an integrated infrastructure that provides wide access and the possibility of using new technologies in transport.

The digital transformation of the transport and logistics industry will lead to an improvement in a number of indicators, both quantitative and qualitative. The positive effect in the form of improvement of certain indicators is shown in Table 1.

Table 1. Effects resulting from the digitalization of the transport and logistics industry.

Quantitative	Qualitative
Growth in sales volume, revenue, reduction of transport costs in the economic sector	Increasing the level of comfort, ease of travel
Growth of the region's economy (GRP)	Ease of route planning
Increase in the level of transport security (decrease in the number of accidents)	Reducing labor intensity (for employees of transport companies)
Growth in labor productivity	
Reducing travel time and route building time	

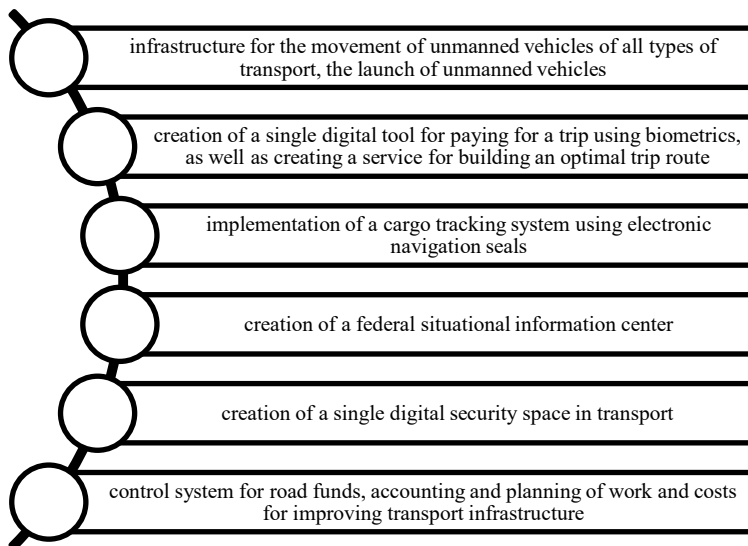


Fig. 1. Priority areas of digitalization of the transport and logistics industry.

The next stage of the study was the analysis of the main indicators of the transport industry of the Kirov region and the reflection of their relationship with the main socio-economic indicators. The indicators are presented in Table 2.

Table 2. Indicators of the development of the transport industry and the economic security of the region (Kirov region).

Indicator Period	2015	2016	2017	2018	2019	2020
Transport industry development indicators						
Length of roads (km)	24 671.1	24 151.8	24 610.7	24 758.7	24 838.1	24 914.5
Freight turnover of road transport	1729.6	1708.7	1795.2	2021.3	2231.3	2321.6
Passenger turnover of public bus transport	880.4	858.2	813.8	785.9	754.7	514
Mortality from traffic accidents	13.8	12.7	13	13.3	12.2	10.3
Macroeconomic indicators						
GRP physical volume index in the transport industry	93.7	101.8	101.9	102.8	102.9	-
Labor productivity index	100.3	100.5	100.7	103.2	103.8	-
Average annual number of employees of transport infrastructure organizations (thousand people)	-	-	21	22.1	22.3	21.3

It can be seen from the data in the table that with the growth of the development indicators of the transport industry, the macroeconomic indicators involved in assessing the level of economic security of the region also demonstrate growth. Thus, the length of roads in the period from 2015 to 2020 increased by almost 1%. It cannot be said that the change is significant at the state level, but in this case, the positive dynamics pleases. The turnover of road transport for the period under review increased by 34.2%, while the passenger turnover of bus transport, on the contrary, decreased by almost 42%, which can be associated with the development of taxi services and the availability of personal vehicles for the population. The favorable effect of the development of transport infrastructure was manifested in a decrease in the death rate from road accidents by 25%. Among the macroeconomic indicators for the period under review, we observe an increase in the GRP physical volume index in the transport industry by almost 10%, an increase in the labor productivity index by 3.5%.

In the Kirov region, the further development of the digital transport infrastructure is predicted, primarily associated with the creation of an intelligent transport system (ITS) in 2022. Among the main goals of this project are the improvement of road safety, the development of effective solutions to prevent accidents, and the optimization of traffic conditions. flows, automated traffic control.

4 Conclusions

Our analysis clearly demonstrates the direct impact of the process of digitalization of the transport and logistics industry in the region on the state of indicators of its socio-economic development and the state of economic security.

Of course, the market for technological solutions for launching the digitalization process of any industry is diverse and represented by numerous solutions. Therefore, as a recommendation, the subjects of the transport industry are invited to conduct a preliminary assessment of the feasibility and effectiveness of the introduction of a particular technology with an assessment of both quantitative and qualitative indicators.

It is also important to note that the socio-economic effect of the introduction of digital technologies in the transport and logistics industry will be achieved only with a comprehensive modernization of the entire infrastructure with a preliminary assessment of the needs of the region.

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