

Digitization of the transport industry in Russia: problems and prospects

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Abstract — A modern market is hard to imagine without the use of digital technologies: the ability to obtain relevant and necessary information quickly has become an indispensable condition for the successful activity of organizations in various fields of business. At the same time, digitalization of individual sectors of the Russian economy is currently characterized by a low level and needs to be developed: transportation is one of such industries. The untapped potential of the transport industry does not allow to increase its efficiency, which in the context of the widespread introduction of information technology reduces the level of competitiveness of the country on the world stage. This article analyzes the current state of digitalization of the transport industry in Russia, identifies the main problems of introducing modern information technologies into the activities of transport companies, and also presents directions for the development of digital technologies in transport, paying attention to the specifics of the country's economy.

Keywords — *transportation, transportation infrastructure, digital economy*

I. INTRODUCTION

The current policy of digitization of various industries and activity fields is a logical continuation of the information technologies developing process. Computer software, data sharing, Internet and mobile applications have become an integral part of people professional activities. The term Industry 4.0, proposed in 2011, represents a kind of production equivalent to the consumer-oriented Internet of Things [1], which allows us to speak about the process of introducing information technologies into the sphere of not only consumption but also production.

The introduction of solutions and processes characteristic of Industry 4.0 into the transport industry is being actively carried out in developed countries [2]. The issue of modernization of the transport industry in accordance with the requirements of the digital economy is strategically important for Russia, which is reflected in the Digital Economy Program of the Russian Federation, developed to implement the Strategy for the Development of the Information Society for 2017-2030 [3].

However, not all market participants are ready to actively implement modern technologies in their activities. A study by the consulting company Simon-Kucher on the Russian logistics market showed that more than half of the respondents (52%) were extremely negative about the statements about the quick implementation of digital technologies. Despite the fact that some companies realized the need for digitalization of activities, another part of the market is not yet ready for digital changes and extremely negatively relates to technological

innovations, taking into account the threat of invasion of outside processes and individuals into their own business [4].

Currently, the main task of digitization of the transport industry in Russia is to provide coverage of all federal highways with communication networks with the possibility of wireless data transmission necessary for the development of modern intelligent logistics and transport technologies. It can be noted that this task is limited to one area of application and does not open the full potential of the application of information technologies in the field of transport. It is necessary to identify the main areas of digital technologies application in the transport industry of Russia and the problems that may be encountered in their implementation.

II. RESEARCH METHODOLOGY

The emergence of digital technologies has allowed the creation of new ways of providing the network services related to mobility, for example, vehicle sharing [5], [6], collective services [7], autonomous and platform services [8]. The view was also developed that buyers are not only consumers of goods, but also participants creating value added [9] and a center of attraction for the services being developed [10].

An important role in the development of digitalization is played by logistics, as a complex type of activity that combines the processes of transportation, warehousing, information and service provision. Kupriyanovskiy V. P. et al. raises the question of uniting the joint and the digital economy through logistics, since it objectively links together almost the entire real economy [11]. The widespread use of logistics information systems contributes to the improvement of port logistics [12], network solutions allow enterprises to develop after-sales service, which accounts for a large part of corporate profits [13].

Some studies point to the importance of digital technologies for the transport industry development. First of all, the role of transport infrastructure is associated with the development of the characteristics of a "smart city", which makes it more livable and also valuable in terms of reducing the travel time of passengers [14], [15].

The impact of digital technologies on the transport industry is due to the growing number of data sources whose information needs to be processed during the transportation of goods and passengers.

Stations, ports, railway stations, and logistics centers are increasingly using various sensors that collect, process, and provide information on load and unload times, transit times, transit times and delays, public transport timetable information, and backlog. etc.

As noted by E. B. Lenchuk and Vlaskin A. G. [16] "The digitalization of the economy is primarily focused on improving its efficiency and competitiveness." In the World Digital Competitiveness Ranking for 2018 Russia ranked 40th, up 2 points compared with the previous year. The digitalization process is held in by a low level of technological development and an undeveloped digital infrastructure, which is explained by the inefficiency of using factors of production, insufficiently qualified human resources, low level of competitiveness, productivity and efficiency.

It can be supposed that the success of state economic activity depends on the level of transport industry digitization of a particular country or region, since the possibility of obtaining remote access to the necessary information determines the attractiveness of markets.

III. RESULTS OF THE RESEARCH

The object of the study is the transport industry of the Russian Federation. Despite the fact that Russia occupies the first place in the world in terms of the territory, the transport communication is not sufficiently developed. Thus, the operational length of railways in Russia is 86 thousand km. According to this indicator, the country is in third place after the USA (226.2 thousand km) And China (111.8 thousand km) among the ten countries in the world with the largest area.

By the length of the road, Russia ranks 5th among the 10 countries with the largest area - 1,481 km. The density is 86.5 km / 1000 km². This indicator loses significantly for such countries as India (940 km / 1000 km²), USA (682.5 km / 1000 km²), China (465 km / 1000 km²), Brazil (202.1 km / 1000 km²).

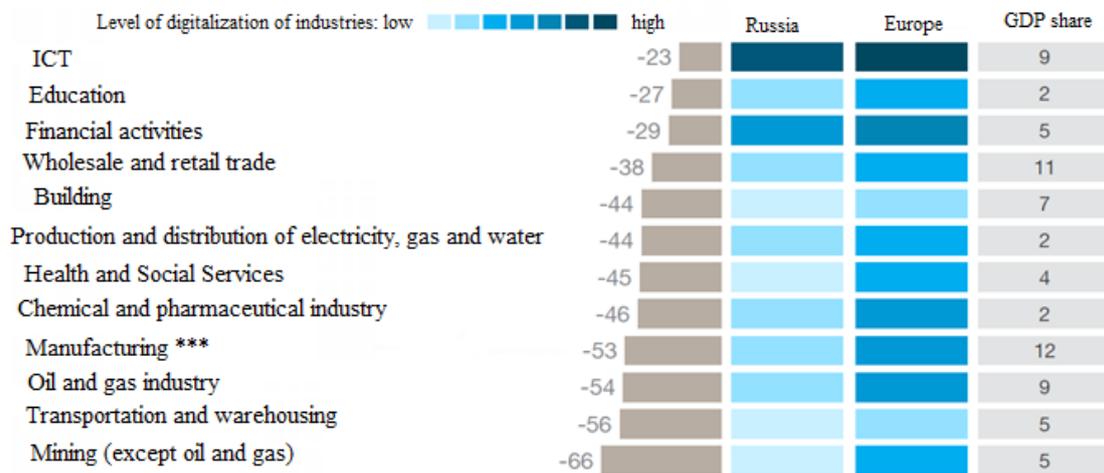
The length of trunk pipelines and oil products in Russia is 74.1 thousand km, which, apart from the United States (321 thousand km), is one of the highest in the world. At the same time, the turnover of oil and oil products in Russia in 2014 was 1220 billion ton-kilometers, in the USA - 881 billion ton-kilometers (as of 2012), in Kazakhstan - 66.3 billion ton-kilometers.

The data presented indicate a significant lag in the transport industry of the Russian Federation compared to other countries of the world, but it is worth noting that the low density of communication lines and their length are not negative signs of the development of transport infrastructure.

In addition to the main indicators of the transport industry state, Russia also has a low level application of digital technologies in transport. In terms of digitalization, individual sectors of the Russian economy are close to the world level (for example, ICT, education, finance), but in many key industries (mining, manufacturing, industry and transport) there is a serious lag behind the leading European countries (Fig. 1) [17].

Despite the implementation of the national program "The Digital Economy of the Russian Federation", calculated until 2030, at present only a few large Russian companies are planning full-scale implementation of information technologies in their activities: A consortium of Russian companies Plato, Russian Railways and GLONASS plan to start cooperation on the development of digital transport in Russia in 2019 [18].

The main indicators of the transport infrastructure digitization in Russia are shown in table 1.



Europe: United Kingdom, Germany, Italy, France, Sweden

***With the exception of chemical and mold industry, petroleum products, television equipment and office equipment

Fig. 1 The difference in the level of digitalization between Russia and Europe, data for 2016

TABLE I. INDICATORS OF THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE TRANSPORT INDUSTRY OF RUSSIA,%

Indicator	2010	2014	2015	2016	2017
Use of information and communication technology	63.5	79.0	77.0	76.3	93,4*
Use of electronic data interchange between own and external information systems	33.1	49.5	54.2	54.2	67,8*

The use of information and communication technologies in the organizations of the transport industry in Russia is

currently not high enough, but there is a positive upward trend. Note that in 2017, these figures increased significantly, due to

the change in statistical tools and the combination of two activities: transportation and storage.

The dynamics of the Internet usage indicator for communication with suppliers and consumers of goods (works,

services) by the transport industry organizations in 2017 is presented in Fig. 2

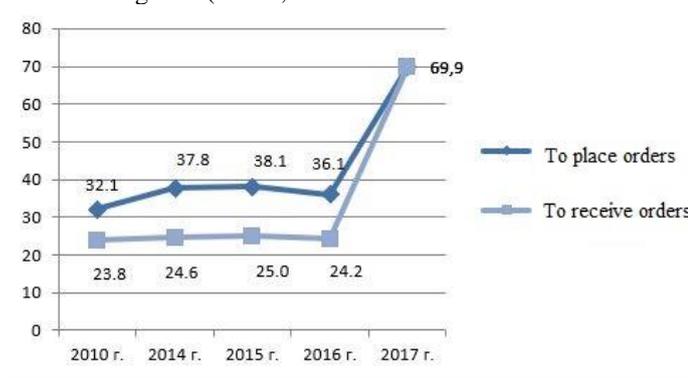


Fig. 2. The use of the Internet by transport industry organizations in Russia to place and receive orders in 2017, as a percentage of the total number of organizations surveyed

It should be concluded that the organizations of the transport industry do not sufficiently use the capabilities of the Internet to implement the process of communication with suppliers and customers. In 2017, only 69.9% of organizations involved in transportation and storage interacted with partners using Internet tools.

This indicator lags behind other types of economic activity, slightly exceeding only those for which Internet

communication should be the main direction of development (cultural activities, public administration, administrative activities). Thus, we can conclude about the insufficient use of modern Internet technologies by transport organizations.

The costs of organizations for information and communication technologies by type of economic activity “Transportation and Storage” in 2017 are shown in Table. 2 [19].

TABLE II. THE COST OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE TRANSPORT INDUSTRY OF RUSSIA IN 2017, BILLION RUBLES

Costs for information and communication technologies - total	of which costs			
	for computer facilities and business equipment purchasing	for telecommunication equipment purchasing	for software purchasing	for communication services paying
127.4	22.9	5.2	16.0	35.2

The largest share of costs (27.6%) is associated with payment for communication services. Purchasing of computers and office equipment, that is, technical means of mechanization and automation of labor, is 17.9%. At the same time, costs for the purchase of telecommunications equipment amounted to 4.08%.

This also confirms the conclusion that, despite a sufficient level of information support for organizations, there is no single “digital” space in the transport industry, the platform on which strong relationships between producers and consumers of transport services should be built. It can be said that, in addition to the main problems of the development of the transport industry [20], it is necessary to separately consider those one related to the digitization of this sphere.

IV. DISCUSSION OF RESULTS

Undoubtedly, the Russian market is an extensive field for the application of modern digital technologies, while their introduction into the transport industry is now driven by the need rather than the direction of development. In the face of growing competition in almost all sectors of the economy, optimization of the transport using should be the driving force for closer cooperation between partners within Industry 4.0.

The use of digital technologies in the transport industry should be associated with the implementation of the following areas:

- a) improving the safety of cargo and passenger traffic by exchanging real-time data on the current traffic situation;
- b) creation of a united digital space for interaction between carriers, shippers and passengers;
- c) software optimization for rational routes calculating;
- d) use of blockchain technologies to increase the transparency level of the activities of all participants in the transportation process;
- e) development of software for data collection and analysis of information on the location of cargo, road conditions;
- e) improvement of the regulatory framework in the field of digitalization of the transport industry, etc.

The introduction of new technologies involves the use of a significant amount of resources, including financial ones. Therefore, the state should assume the main functions of transport industry digitization by implementing state programs in the framework of digital economy development and financing the most prospective scientific developments. Monitoring the current global trends in the industry will enable the introduction of advanced technologies, taking into account

local peculiarities, in the activities of Russian transport companies, which should be more open to the application of innovations.

It is also necessary to take into account that innovations cannot be implemented at the same time and everywhere; this is a sufficiently long time process that requires constant improvement and adaptation.

V. CONCLUSIONS (INFERENCE)

The digitization of various sectors of the economy is currently a process that is only increasing its speed every year, and the lag in this area can lead to unacceptable financial consequences. The use of advanced technologies is undoubtedly quite expensive, but the promising benefit of their use over time pays for these costs.

One of the branches of the Russian economy that needs an active increase in digital power is transport. Transport infrastructure is an integral part of any production activity and social sphere. The importance of transport in a person's life is hard to overestimate. Without transport, it is impossible to imagine the life of a modern person - the intensification of all spheres of life dictates the conditions for the acceleration of the transport communication - from the time spent moving to work and ending with the speed of product delivery to sales markets.

That is why the introduction of advanced digital technologies in the transport industry should be the main focus of its strategic development. In the rapidly changing conditions of the world market, the adaptability and up-to-dateness of transport services plays a significant role, both for an individual enterprise and for a state.

The level of digitalization of this industry in Russia is currently extremely low, in addition, the process of applying modern technologies faces a number of difficulties. However, it seems necessary to implement digital technologies in the transport industry for the progressive development of transport, reaching a higher level within Industry 4.0 in the state and gaining competitive advantages on the world stage for the state.

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