Digitalization in the transport industry: development perspective

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Abstract. Analyzing the current state of digitalization in the transport industry in Russia and abroad, it can be revealed that various digital technologies are currently being introduced to facilitate business transactions, as well as increase their efficiency. The topic of this article is becoming more relevant due to digital revolution which can stimulate economic growth and development. Therefore, the study of issues related to the digitalization, including the study and determination of trends in the transport business, became the purpose of this research. This goal was achieved using methods of analysis, inference, generalization, as well as statistical methods. As a result of the research the authors has observed several factors that affect the development of the transport and logistics system in Russia. In fact, trends in the transport industry were formulated and conclusions about the directions of decision-making in transport sphere were made. In this research the authors highlighted the problems and advantages associated with making such decisions, and provided examples of their successful implementation. Based on the research data the authors were made a proposal to pay special attention to the training of specialists who are able to implement new tasks. It will contribute to faster and more competent involvement of digital technologies, strengthening the company's position in the competitive environment.

1. Introduction

It requires a progressive change in the digitization process in various spheres of economic and social life which is manifesting itself in introduction of information technology, artificial intelligence, blockchain/distributed technologies, different software and new computer equipment, etc. It seems that the implementation of such technologies can increase national wealth, stakeholder’s benefits as well as the transparency of many processes. The interest in this topic is also explained by the fact that digital technologies are fundamental in the economic development for all countries from all over the world.

We live in times of change. The world is becoming more uneven and multipolar, and the emergence of new technologies is changing the expectations of consumers and all other stakeholders. The events of recent months related to the COVID-19 pandemic have changed social relations, working conditions and people's priorities. Some enterprises have moved to telework, some of them is trying to survive in the current conditions that changed the world overnight. All industries are undergoing dramatic changes, with risks on the one hand, and new opportunities and prospects on the other.

Many domestic researchers such as Berman N., Bogdanov A., Kupriyanovsky V., Larin O., Lipnitsky D., Semenova A. Malakhov A. and others as well as foreign scientists (Z. Baigireyeva, Sh. Niyazbekova and others) are engaged in research of issues of digitalization, end-to-end digital
technologies (STTS). Organizations from all over the world such as the World intellectual property organization (WIPO), the Federal Institute of industrial property (FIPS), the Ministry of communications of Russia, the American global network of PwC firms and many others are also studying emerging trends and changing conditions.

Transport companies, like many others, have entered a process of unprecedented change against the rapid development of digital technologies. Digitalization has made economy more mobile, it affects all segments of transport, which has already led to the greatly change of the transport market.

The purpose of this research is studying issues and expanding theoretical and practical knowledge related to the digitalization in the transport sector, and also determining corresponding trends.

2. Materials and methods
The materials of this research are based on data from the period from 2010 to 2020, including data of statistical research in the transport sector. When preparing the material authors used the following methods: analysis, comparison, conclusion, statistical methods.

3. Results
Various researchers offered different definitions of "digital economy". At the World Bank seminar on December 20, 2016 [1] "digital economy" was defined as a "system of economic, social and cultural relations based on digital information and communication technologies". On approval of the program "Digital economy" by Government of Russia’s dated 28.07.2017 noted that digital economy is divided into three levels that are interconnected: markets and industries, platforms and technologies, environment for the existence of platforms and technologies. However, it should be noted that "the digital economy" appeared at the last decade of the 20th century when internet technologies, internet commerce and e-mail were developed and even earlier.

The implementation of digital technologies is supported by the governments of different states that allocate funds for the development of "competencies in scientific research and technological reserves of domestic organizations on "end – to-end" digital technologies". So Ministry of Communications of the Russian Federation and the State University Higher School of Economics participated in the patent analysis of directions of technological development in Russia and abroad. This project based on data from the World intellectual property organization (WIPO) and Espacenet and PatStat databases. As a result of this project, lists of International patent classification codes and/or keywords were created by experts to conduct patent analysis for each group of wireless communication technologies; virtual and augmented reality technology; quantum technologies; neurotechnologies and artificial intelligence; new production technologies; distributed registry systems; robotics and sensor components. As a result of the patent analysis, it was revealed that the greatest activity for the period from 2010 to 2017 was observed in "New production technologies", "Neurotechnologies and artificial intelligence" and "Virtual and augmented reality Technologies". At the end of this period Russia was in the top 10 countries in terms of the number of patent applications for the "Components of robotics and sensors" (6th place), "Quantum technologies” (9th place), and "New production technologies" (10th place)" [2].

4. Discussion
The transport industry is the most important industry in practically all countries. The market size is large, and also competition in the market is rather strong. According to the American global network of PwC, which provides consulting services, in the fourth quarter of 2019, investments in the transport and logistics sector amounted to $140 billion, which is 19% more than in 2018. The volume of transactions carried out by financial investors increased by almost 40% in 2019, although the average transaction value decreased by almost 20% compared to the previous year [3]. In the Russian Federation the volume of investment in transport infrastructure increased by more than 14% in 2019 [4]. 2.4 trillion rubles were attracted for transport, 1.5 trillion of them were non-budgetary investments. It is planned to increase investment in transport and transport infrastructure in 2020. The
implementation of such plans and expectations requires using the latest technologies, digital models and artificial intelligence.

Many countries such as Denmark, Singapore, South Korea, Germany, the United States, China, Japan, the United Arab Emirates and Saudi Arabia are already widely using digital technologies. Digitalization relates to processing multiple volumes of data that should be organized and presented in a convenient form that is easy to use and understand. Modern transport systems are increasingly complex, so it’s necessary to monitor the market reaction to the received offers in order not to lose control over all this information, sales channels, demand and supply of products and services in their field. For a better interpretation of the situation researchers study the state of affairs in the industry both inside and outside the country making forecasts that help managers make decisions on business development.

Thus, according to the results of PwC research conducted in 2018, the opinions of 1,239 heads of transport and logistics companies in 85 countries, the authors should expect breakthrough changes. Based on the results of these studies it can be concluded the following:

- 68% of managers expect that changes in core service technologies will have a breakthrough impact on their business in the next five years;
- 65% of managers predict changes in sales channels;
- 78% of managers of transport and logistics companies are concerned about "the availability of specialists with knowledge in the field of digital technologies both in the organization's staff and in the industry as a whole". [4]

Researchers have identified five factors [4,5] that influence the development of the transport and logistics system: 1) digitalization; 2) changes in the dynamics of domestic markets; 3) changes in processes due to the introduction of new equipment; 4) changes in international trade; 5) changes in processes due to the introduction of new software. At the same time, it is noted that digitalization in terms of its impact on the industry and of time to market are the first.

Based on the data from these studies the authors were formulated the trends of industry’s transformation. Thus "digitalization of operational and contractual processes has already begun, it is noted the following:

- changes in consumer behavior;
- lack of qualified specialists;
- availability of new technologies;
- changes in the data protection and labor legislation law". [4]

According to these researchers changes are also expected in the processes related to the introduction of new software, such as: artificial intelligence, the internet of things, big data analysis, blockchain / distributed computing technologies [5,6] due to the implementation of the data protection laws and a need to strive continuously for improved efficiency. The trend to increase the level of e-commerce maturity will lead to a change in the dynamics of domestic markets. The trend towards technology development in transport engineering will lead to changes in processes due to the introduction of new equipment. And the trend towards trade wars and the establishment of barriers will make changes in international trade.

These trends will lead to adapt to new technological and economic developments such as intelligent transport systems, robotics business processes, drones for monitoring the technical condition of vehicles, robotics systems, expansion of highways, development of e-commerce market and much more.

There are a lot of digital technologies, so it is important to choose those that will help integrate the developed digital strategy into the business strategy. It is important to pay attention to pilot projects of digitalization. They can offer effective solutions for customers, can use the latest technologies, improve their operations and select competent specialists. All of this is interlinked with the company’s external and internal environments, based on shared digital connections and practices. [7,8] It’s important in this context that 58% of the surveyed managers of transport and logistics companies [4] consider that it’s a big deal to attract specialists who possess new technologies. [9]
According to PwC another problem of transport and logistics companies is the lack of digital literacy and knowledge management. A survey of respondents helped to identify what hinders the development of digitalization:

1. Outstanding issues related to data security and privacy - 38%.
2. Important needs for investment – 38%.
3. Lack of the absence of a clear programme for digitalization and support from top management - 33%.
4. Staff shortages - 26%.
5. Slow diffusion of basic infrastructure technologies - 23%.
6. Business partners don’t have the opportunity to participate in the joint development of digital solutions - 22%.
7. Lack of clear understanding of the economic benefits of digitalization – 21%.
8. Lack of digital standards, norms and certification - 17%.
9. Concerns about the loss of control over the company's intellectual property – 15%. [4]

Despite the difficulties digital technologies accelerate and expand the possibilities of interaction with existing and potential customers. Internal processes and communications are also simplified, which saves companies time and money. In addition it can help improve the quality of service by personalizing offers and tracking orders.

Examples of the active use of digital knowledge when COVID-19 pandemic are free conferences for transport companies (for example for shippers) for "convergence of theory and practice of logistics and transport, discussion different digital technologies in logistics" (held by S2B GROUP specializing in the development of software for transport logistics). [10,11]

Another example is Silva' LLC, which is owner of the following fleet: "in Russia it has 200 transport units and 800 forest railway platforms. Almost 400 drivers deliver raw materials and products daily in the Central and Volga Federal districts." Due to the COVID-19 pandemic the company changed the working process of drivers who receive a daily task via messenger, in a waybill in a special cell without contact with a mechanic. Pre-flight medical check are performed using the Medpoint 24 telemedicine project. The Transics telemetry system installed in each cab has an interactive information panel with full access to the vehicle of the bus. The purchase of transport services is carried out through the Transporeon trading platform. The Ticontract module is responsible for automatic distribution of requests based on pre-set criteria and logic. As discussed by Larin and Kupriyanovskiy [12] administrative staff actively uses video chats, messengers and apps.

The authors could give many more examples such as JSC "Russian Railways", "Business lines", the Logistics company "PEK". However, they all share one thing: move with the times, apply new technologies and develop their own rules for doing business [13, 14].

The results of this research are consistent with current knowledge on digitalization in the transport sector and the economy as a whole. Theoretical prerequisites for studying these phenomena arose with the advent of technologies that change the profile of the transport business. This will contribute to faster and more competent involvement of digital technologies in the transport industry, strengthening the company's position in the competitive environment. Of course, the processes of implementing new technologies require further in-depth study of both the theoretical and practical foundations of current events.

5. Conclusions

Thus the authors can draw the following conclusions:

1. The process of digitalization of the transport industry both in Russia and in the world has been launched and intensively developing.
2. The importance of this process in the transport industry is recognized by companies.
3. To date there are clear trends in digitalization, which help to promote decisions to strengthen the competitive position of enterprises.
4. Decision-making related to the introduction of new technologies is aimed at using artificial intelligence, drones, robots, large databases and other.

5. There are difficulties in implementing digital technologies in the industry, which include the lack of a digital literacy, the difficulty of attracting staff.

6. There are also advantages of using digitalization, for example increasing revenue; simplifying internal processes and communications, improving the quality of customer service.

7. The authors propose pay more attention to training specialists with specific competencies in digital sphere.

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