

**II International Scientific Conference GCPMED 2019**  
**"Global Challenges and Prospects of the Modern Economic Development"****DIGITIZATION AS A TOOL FOR THE LOGISTICS**  
**FRAMEWORK DEVELOPMENT**

O. D. Pokrovskaya (a), R.V. Fedorenko (b)\*

\*Corresponding author

(a) Emperor Alexander I St. Petersburg State Transport University (PGUPS), 190031, Moscow Ave., 9, St. Petersburg, Russia, [insight1986@inbox.ru](mailto:insight1986@inbox.ru)(b) Samara State University of Economics, 443122, Soviet Army Str., 141, Samara, Russia, [fedorenko083@yandex.ru](mailto:fedorenko083@yandex.ru)***Abstract***

The article is devoted to the formation of the logistic framework of integration processes in the Russian and world economy. Logistics infrastructure is one of the main factors of effective integration. The aim of the study was to discover some opportunities of digitization that may be used to perform a sustainable logistics framework. Digital transformation of transport companies all over the world is ongoing process. It allows transport companies to increase their competitiveness and attract new customers. It also gives clients new opportunities to reduce transportation costs and increase their profit. At macro level digitization create favorable conditions for regions and countries to become a part of world trade market. Authors tried to describe interactive digital platform that will decrease time and money losses or all participants of transportation process. The results of the development of proposals for automation, identification, marking and design of railway logistics facilities for unification and simplification of technical, operational and economic decisions are presented. Their implementation will allow to manage the objects of terminal and warehouse infrastructure and expand the customer base of JSC "Russian Railways" by increasing the availability, simplicity and customer-oriented information about logistics facilities. The proposed digital platform will increase the volume of interregional and international trade by reducing the logistics costs of shippers.

2357-1330 © 2020 Published by European Publisher.

**Keywords:** Logistic framework, integration process, customer focus, digitization, logistic entity.

## 1. Introduction

The formation of the logistics framework of integration processes in the modern world occurs through the transport companies and logistics holdings transformation. The logistics segment becomes an important resource for improving the efficiency of their activities. A successful example of transport and logistics activities organization is the experience of railway holding companies - "Deutsche Bahn "(DB), JSC "Russian Railways". The terminal business of these major carriers is growing annually and already occupies at least 25-30% of their total services portfolio.

Modern globalization, growth and competitiveness of the national economy, geopolitical and geo-economic factors determine the level of intellectualization of the main factors of production (Polidi, Goukasyan, Maslova, & Fedorenko, 2019). In the framework of a Fourth Industrial Revolution, the industry leaders will be the companies that shift their focus to the fields of digital design and modeling (Tolstykh, Shkarupeta, Purgaeva, & Fedorenko, 2019). Informatization and digitization of the economy and transport requires dynamic development of logistic activities (Wei, Alias, & Noche, 2019). As a result of digitization, logistics forms the basis for the implementation of new modern technologies (Romanova, Richnak, Porubanova, & Bolek, 2019). Logistics companies are constantly looking for new ways to improve operations, technologies, processes and procedures to achieve significant improvements (Gviliya, Parfyonov, & Shulzhenko, 2019). The purpose of this study is to create a fundamental structure of the digital platform for interaction of all participants in the transportation process.

## 2. Problem Statement

Today, business managers are increasingly paying attention to modern methods and ways of doing business, based on the principles of logistics and digitalization (Toymentseva, Karpova, & Evtodieva, 2020). Most enterprises are undergoing a digitization process with the fourth industrial revolution, named industry 4.0 (Kayikci, 2018). Most railway companies are transforming from purely transport and infrastructure companies into transport and logistics companies. Therefore, the issues of improving the efficiency and customer-oriented terminal and warehouse activities are of particular relevance for science and practice. Business in railway transport objectively feels the need for new formats of interaction with customers (Pokrovskaya, & Fedorenko, 2020).

Railway business today often loses potential customers who "leave" to private logistics facilities. In many ways, this situation of "outflow" of high-yield goods from public areas is due to the low customer-oriented information about the logistics facilities of the Railways and their functionality. This does not allow customers to have complete information for decision-making and significantly reduces the availability of information about logistics facilities and services.

It is a well-known fact that shipping and logistics would largely benefit from Big Data as well as the emerging digital technologies (Fruth & Teuteberg, 2017). Maximum updating and visualization of information about logistics facilities is a prerequisite for development. In modern conditions of the transport and logistics market it becomes necessary to transition "to a common language" with customers.

### **3. Research Questions**

In the context of the "outflow" of the customer base and high-yield cargo to alternative modes of transport and to small suppliers of terminal and warehouse services, the railway business faces such questions as: "How to increase the efficiency and flexibility of commercial offers?", "How to realize the potential profit of terminal activities?", "How to provide a simple and convenient interaction with customers?", "What format of providing information to choose to meet the requirements of completeness, accessibility, simplicity?», "What application tools should be used in solving the problems of advertising and marketing of integrated logistics services?».

### **4. Purpose of the Study**

The functioning of a sustainable logistics framework involves:

- informing customers about the significant parameters of the logistics facility in the most concentrated and capacious way;
- development of "digital platform" and creation of conditions for transformation of the transport company into the status of level 4 logistics provider;
- increasing the length and depth of logistics chains controlled by Russian Railways (not only "from station to station", but "from client to client");
- full automation design and methodological procedures;
- growth of total controllability of terminal and warehouse infrastructure facilities, the possibility of assessing their activities, inventory and tracking current parameters in real time;
- simplicity and ease of use in modern conditions of transport and logistics business.

The result of the successful implementation of the proposed digital platform should be:

- quality total control over logistics facilities, and, as a consequence, for all logistics chains;
- expanding the customer base through informative and simple information about the logistic entities;
- digital transformation of the company's terminal and logistics activities by "creating a single information environment" (Pokrovskaya, Fedorenko, & Khramtsova, 2019a) for the interaction of railway transport with customers and maintaining a single database of logistics facilities, simplifying control procedures, accounting and evaluation of railway activities;
- improving the competitiveness of terminal and logistics services provided by Russian Railways;
- creation of conditions for successful integration of regional business into the system of world economic relations.

### **5. Research Methods**

The authors used general scientific methods, tools of statistical, system, economic analysis, computer modelling. While developing this approach, we performed a thorough analysis of scientific literature in the field of transport, logistics and economics. It showed that today's scientific trends show mutual distribution, or integration of scientific research, that is to say that the research has an interdisciplinary nature.

## 6. Findings

### 6.1 Logistics class of freight station

It is proposed to assign to each railway station a logistics class and an individual identification number. This designation system will give customers key information about the logistics service provided by each logistics facility – warehouse, terminal and warehouse complex and other structures available at the station.

The logistics class of a railway logistics facility is an Arabic numeral from 1 to 9, determined by a point method by expert means for all logistics functions and operations performed at the station, taking into account their complexity. Logistics class of station should be assigned by experts (commercial audit service, independent experts, and clients) on a scoring methodology and must be placed in the public domain.

"Logistics class", in contrast to the generally accepted system of class and coding of stations objects (Pokrovskaya, Fedorenko, & Khramtsova, 2019b), reflects the functional and technological features of the terminal and warehouse infrastructure located at the station, as well as the range of transport, warehouse and integrated logistics services. In other words, the logistics class is directly related to the parameters that are most important for the client when making a decision to use the services of a logistics facility (Pokrovskaya, Fedorenko, & Khramtsova, 2019b).

The identification number of the railway facility will include, in addition to specifying the logistics class of the station, the station code for the railway network, the type of warehouse according to the international classification of Knight Frank, as well as an index of the nomenclature of processed goods and the capacity of storage facilities at this cargo station.

### 6.2 The basic structure of the digital platform of the railway company

According to the results of the study, the authors propose a basic structure of the digital platform of the railway company with the use of identification numbering and logistics class of objects of terminal and warehouse infrastructure (Fig. 01).

Let's consider what is included in the basic structure of the proposed digital platform "railway carrier – client – participants in the delivery process". As can be seen from the Figure 01, the digital platform is interactive. It forms a single information field for interaction between participants in the transportation process. Thus, in the system integration on this digital platform, service providers will have the opportunity to "reveal" part of their business by providing price lists and relevant information about the logistics infrastructure in an interactive online mode. In other words, the implementation of blockchain contracts in the electronic format of logistics will be ensured, which will allow talking about maximum transparency of business and availability of services for customers.

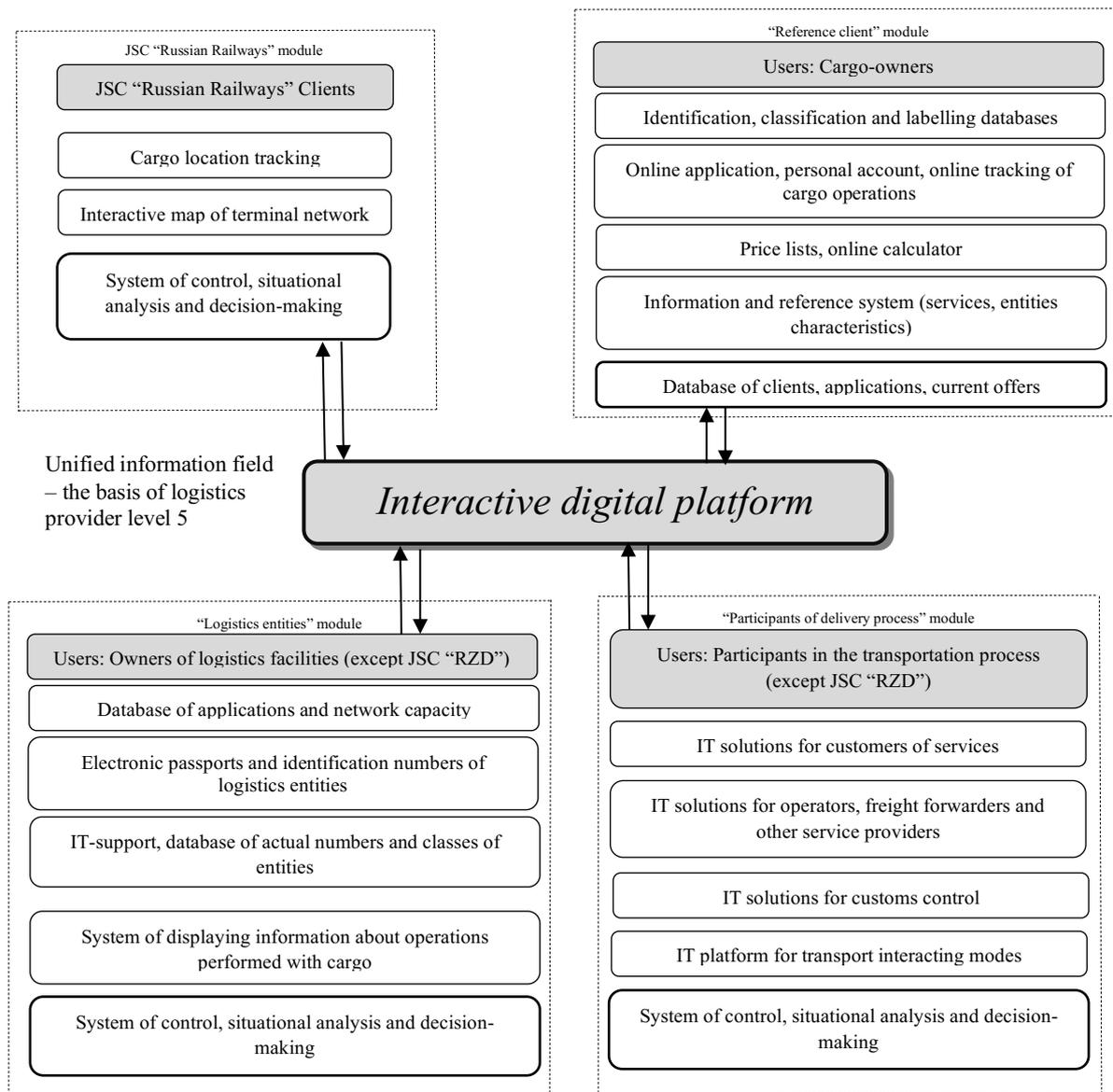
In the figure 01, 4 key modules are highlighted: customers-cargo owners, customers-other participants in the transportation process, owners of logistics facilities and users of the structures of the railway company (for example, JSC "Russian Railways").

These modules can be divided into client and specialized modules.

As part of the first module for cargo owners, there are relevant databases on logistics facilities, price lists, directories and other information in the form of satellite programs and directories.

The second module for professional participants of transportation (forwarders, operators, carriers, etc.) includes a set of digital integrated solutions for customs clearance of transportation, interaction of modes of transport for situational management of supply chains. The result of the formation of these modules is the creation of a single customs and logistics framework of transportation processes.

The third module contains current passports of logistics facilities in the form of proposed identification numbers, markings and classifications. The fourth module is represented by digital solutions for the railway carrier. It includes as a key element an interactive map with the location of logistics facilities operating on the railway network, with an indication of their current status for operational control and effective operation of their production facilities.



**Figure 01.** Basic structure of the digital platform

Source: authors.

Automated system for management of terminal and warehouse infrastructure and terminal network allow to analyze the work of logistics facility and across a network, to conduct a visual inspection of the operational situation at the loading terminal facilities, process requests for logistic services. This system is a necessary stage in the development of currently operated terminal and warehouse infrastructure and increasing requirements for quality and customer-oriented transport and logistics services.

The introduction of a digital platform in the operational activities of Railways will increase the efficiency of management and control of terminal and logistics activities and the adoption of adequate decisions.

The digital platform should have the following features: have a network character, unity of management with a vertically integrated structure, be able to view and edit the database in real time. Its use should be customer oriented to work "in one window", as well as employment application for operational purposes to the railway company to analyze the situation and adjust information about objects.

For the client, the digital platform will allow to choose the appropriate parameters and services of the terminal and warehouse facility and the station where it is located. For a railway company, such a digital platform will allow assessing the level of logistics services in the territory and planning the development of its own network on the basis of automated calculation of logistics indicators.

We should note that Russian conditions are characterized by the fact that major players create their own, unique digital products. For example, JSC "RZD" in 2013 developed unique drone technology, including management of trains and the locomotive without a driver. It equips "smart" containers and wagons with sensors that measure the parameters of the environment and cargo. The company implements blockchain in managing the life cycle of rolling stock, in which there are many participants. Also JSC "RZD" creates own platform solutions for customer interaction and "big data" management.

We can state that the Russian digital transport and logistics market is still in the stage of turbulence and there is no single solution, which is logical, given the huge amounts of data and the growth of international trade.

Digital logistics creates application tools for business "with the speed of a click" and transition to "ideal logistics". Modern, intelligent transportation, as an innovative product of digital logistics, allows to create complex transport services, taking into account the dynamic wishes of the client. In place of Supply Chain Management today comes Supply Chain 2.0, using the "Internet of things" (Kaiser, 2017). The criterion of "minimum costs" loses its relevance to "maximum economic effect and value". The digital logistics targets a new approach: "managed supply chain 2.0 is a direct path to profit."

We can assume that the project of the proposed digital platform will also contribute to the digitization of the transport industry and will create a single logistics framework for the transport process. As a result, both the customer and the service provider will find the necessary and sufficient tools to conduct business in cooperation in complex supply chains.

## **7. Conclusion**

The result of these proposals is to determine conditions for the development of the logistics framework of integration processes at the national and international level. The proposed digital platform

will increase the volume of interregional and international trade by reducing the logistics costs of shippers.

The results are aimed at preparing a digital platform and automating decision-making on end-to-end, integrated management of terminal network facilities. In turn, this will expand the customer base and improve the efficiency of the logistics unit of railway companies. This is achieved by simplifying interaction with customers, providing information about logistics facilities and services in a concentrated and adapted to the interests of the client format.

## Acknowledgments

The reported study was funded by RFBR and FRLC according to the research project № 19-510-23001.

## References

- Fruth, M., & Teuteberg, F. (2017). Digitization in maritime logistics - What is there and what is missing? *Cogent Business & Management*, 4(1), 1411066. <https://doi.org/10.1080/23311975.2017.1411066>
- Gviliya, N. A., Parfyonov, A. V., & Shulzhenko, T. G. (2019). Managing integrated interorganizational logistic systems in the digital economy. *Upravlenets (The Manager)*, 10 (1), 40-51 <https://doi.org/10.29141/2218-5003-2019-10-1-4>
- Kaiser, M. (2017). Industry 4.0 meets IoT Logistics and Supply Chain in the digital Transformation. In *Proceedings of 26th German Material Flow Congress / Conference on Innovative Intralogistics for Trade. VDI Berichte, Proceedings Paper 2305* (pp.167-172). Dusseldorf: V D I-V D E - VERLAG GMBH.
- Kayikci, Y. (2018). Sustainability impact of digitization in logistics. *Procedia Manufacturing*, 21, 782-789. <https://doi.org/10.1016/j.promfg.2018.02.184>
- Pokrovskaya, O. D., & Fedorenko, R. V. (2020). Evolutionary-functional approach to transport hubs classification. In V. Murgul, M. Pasetti (Eds.), *Proceedings of International Scientific Conference Energy Management of Municipal Facilities and Sustainable Energy Technologies EMMFT 2018. Advances in Intelligent Systems and Computing*, 982 (pp. 356-365). Cham: Springer.
- Pokrovskaya, O. D., Fedorenko, R. V., & Khramtsova, E. R. (2019a). Formation of transport and storage systems. In V. Mantulenko (Ed.), *Proceedings of International Scientific Conference "Global Challenges and Prospects of the Modern Economic Development". European Proceedings of Social and Behavioural Sciences*, 57 (pp. 1213-1223). London: Future Academy. <https://doi.org/10.15405/epsbs.2019.03.123>
- Pokrovskaya, O. D., Fedorenko, R. V., & Khramtsova, E. R. (2019b). Study of the typology of logistic entities using functional and logistic approach. In V. Mantulenko (Ed.), *Proceedings of International Scientific Conference "Global Challenges and Prospects of the Modern Economic Development". European Proceedings of Social and Behavioural Sciences*, 57 (pp. 91-101). London: Future Academy. <https://doi.org/10.15405/epsbs.2019.03.10>
- Polidi, A. A., Goukasyan, Z. O., Maslova, I. A., & Fedorenko, R. V. (2019). Some aspects of the quality of corporate governance in digital economy. In V. Mantulenko (Ed.), *Proceedings of the 17th International Scientific Conference "Problems of Enterprise Development: Theory and Practice". SHS Web of Conferences*, 62, 04002. Les Ulis: EDP Sciences. <https://doi.org/10.1051/shsconf/20196204002>
- Romanova, A., Richnak, P., Porubanova, K., & Bolek, V. (2019). Application of modern information technology in innovation of business logistics processes. *Ad Alta-Journal of Interdisciplinary Research*, 9(1), 245-248.
- Tolstykh, T. O., Shkarupeta, E. V., Purgaeva, I. A., & Fedorenko, R. V. (2019). Transformation of positions, competences and skills in the digital economy industry. In V. Mantulenko (Ed.),

*Proceedings of International Scientific Conference "Global Challenges and Prospects of the Modern Economic Development". European Proceedings of Social and Behavioural Sciences, 57* (pp. 953-959). London: Future Academy. <https://doi.org/10.15405/epsbs.2019.03.94>

Toymentseva, I. A., Karpova, N. P., & Evtodieva, T. E. (2020). Strategic purchasing control of the industrial enterprise: digitalization and logistics approach. In S.I. Ashmarina, M. Vochozka, V.V. Mantulenko (Eds.), *Digital Age: Chances, Challenges and Future. Lecture Notes in Networks and Systems (book series), 84* (pp. 398-407). Cham: Springer. [https://doi.org/10.1007/978-3-030-27015-5\\_48](https://doi.org/10.1007/978-3-030-27015-5_48)

Wei, F., Alias, C., & Noche, B. (2019). Applications of digital technologies in sustainable logistics and supply chain management. In A. Melkonyan, K. Krumme (Eds.), *Innovative Logistics Services and Sustainable Lifestyles* (pp. 235-263). Cham: Springer. [https://doi.org/10.1007/978-3-319-98467-4\\_11](https://doi.org/10.1007/978-3-319-98467-4_11)