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Digitalization of logistics hubs as a competitive advantage

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ABSTRACT

The article reveals the concept of a logistics unit, logistics and digital hubs. It is considering the possibility of combining the Northern Sea and New Silk Way sections into a single system on the territory of the Russian Federation. The authors investigated the ways of digitalization of the logistics block of the NSR – NSW with the subsequent creation of a virtual space for the control and redistribution of trade throughout the Russian Federation. The concept of a digitalized logistics block is considered from the point of view of a potentially beneficial project for Russia to collect statistical data and accelerate international transport by instantly redistributing routes.

KEYWORDS:

Northern Sea Route, New Silk Way, logistic system, logistic block, logistic hub, digital economy, IT systems, freight transportation, maritime logistics, railway routes.

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1. INTRODUCTION

The article considers the formation of a competitive advantage based on the digitalization of logistics hubs of the Northern Sea Route (NSR) and the New Silk Way (NSW), which are transport routes running through the territory under the jurisdiction of the Russian Federation and are part of the intercontinental transport system. The development of these routes has a positive vector for the formation of economic complexes in the southeastern and Arctic regions, and will also significantly increase the country's economic potential. The uniform development of the NSR and NSW in the regions of Russia with subsequent integration into a single logistic block can lead to a significant synergistic effect[1]. This project has also a huge social and cultural potential in the field of education as well as congress and exhibition activities.

Measures are already being taken to develop these priority routes, within the framework of which the reconstruction of old and the implementation of new roads and railways, the development of economic complexes of the Arctic region, are carried out. The creation of logistics hubs and centers in these transport corridors is also being actively discussed, the essence of which is to maintain the uninterrupted operation of routes and their integration into a single logistics block [Federal Service ..., 2019, pp. 371-372].

In order to formalize the design of cargo flows in the conditions of using the logistics block NSR — NSW, to ensure uninterrupted year-round cargo turnover in a competitive time frame with the possibility of an urgent response to force majeure circumstances, it is necessary to define the conceptual apparatus for the formation of logistics hubs both in physical and digital forms.

The implementation of logistics solutions for the New Silk Way and the Northern Sea Route, aimed at improving and optimizing the functioning of the transport system using digital technologies, is one of the priority areas of economic development in Russia until 2025.[2]

2. PURPOSE OF THE RESEARCH AND THE CONCEPTUAL MODEL

The aim of the study is to assess the competitive prospects for digitalization of the Russian logistics block of the Northern Sea and the New Silk Way as a set of international logistics and digital hubs, as well as exhibition complexes and educational sites.

[1] Statement for the media by the Minister of Foreign Affairs of Russia S.V. Lavrov following the negotiations of the President of the Russian Federation V.V. Putin with the Prime Minister of Israel B. Netanyahu. Sochi, September 12, 2019. URL: http://www.mid.ru/web/guest/meropriyatiya_s_uchastiem_ministra/-/asset_publisher/xK1BhB2bUjd3/content/id/3785296.

[2] Russian Railways statistics. URL: https://vawilon.ru/statistika-rzhd/.

The concept of a logistics hub is considered to be a set of logistics parks and multimodal complexes intended for processing, checking, controlling and redistributing cargo flows, united on a territorial basis[3].

A digital hub is considered as an IT link in a digitalized system of analysis and management of a logistics system tied to a specific cell (physical hub) in the virtual space.

The logistics block is understood as a part of the international logistics system, divided according to nationality, taking into account the territorial location (in this case, the Russian block is considered).

An international logistics system should be understood as a set of blocks that forms an integral system aimed at administering and controlling material interstate flows, starting with the transportation of products of the raw materials sector and ending with the delivery of various general cargos to the end consumer[4].

Currently, we are talking about the unification of the logistics sections of the Northern Sea Route and the New Silk Way into a single logistics system with its further registration in the digital space. The main purpose of this system is to combine all available resources of the Russian Federation in its block of the international logistics system to attract the biggest number of partners and customers.

This system has feedbacks that perform certain control and accounting functions, as well as operations in the field of logistics. In the context of the Northern Sea and New Silk Way the logistics system is a collection of sea routes and ports in the Arctic zone, railways and stations in the central abscissive and southern border zones of Russia, which are a transport corridor for Russia, Asia, Europe and the United States[5] (Fig. 1).

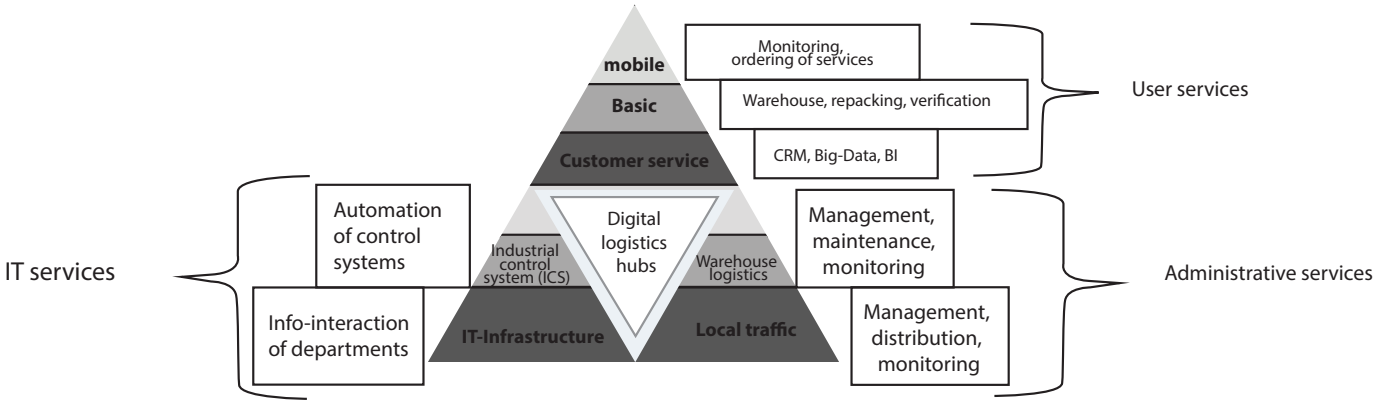
An increase in the intensity and mass of goods transport turnover within the Russian logistics block, as well as ensuring the RF-controlled communication of transport highways of Asia and Europe are the priority tasks for Russia, which can be solved by the development and optimization of the logistics system of the NSR — NSW.

The unification of the sections of the Northern Sea Route and the New Silk Way, which are under the jurisdiction of the Russian Federation, into a single logistic and informational block will lead to the possibility of redistributing trade flows between land and sea routes, depending on the needs. Such a system will make it possible to instantly respond to force majeure circumstances in

Figure: 1. Route map of the NSR — NSW on the territory of the Russian Federation

[3] Keys from the Arctic // Transport of Russia.URL: http://press.rzd.ru/smi/public/ru?STRUCTURE_ID=2&layer_id=5050&id=306946.
[4] V. V. Shcherbakov. The fundamentals of logistics: a textbook for universities. Saint Petersburg: Peter, 2009. P. 51.
[5] Russia climbed to 35th place in the Doing Business rating // TASS. 2017. 31 October. URL: http://tass.ru/ekonomika/4690859.

Figure: 2. Local architecture of the digital hub



the form of weather conditions, emergencies and the congestion of crossing points en route.

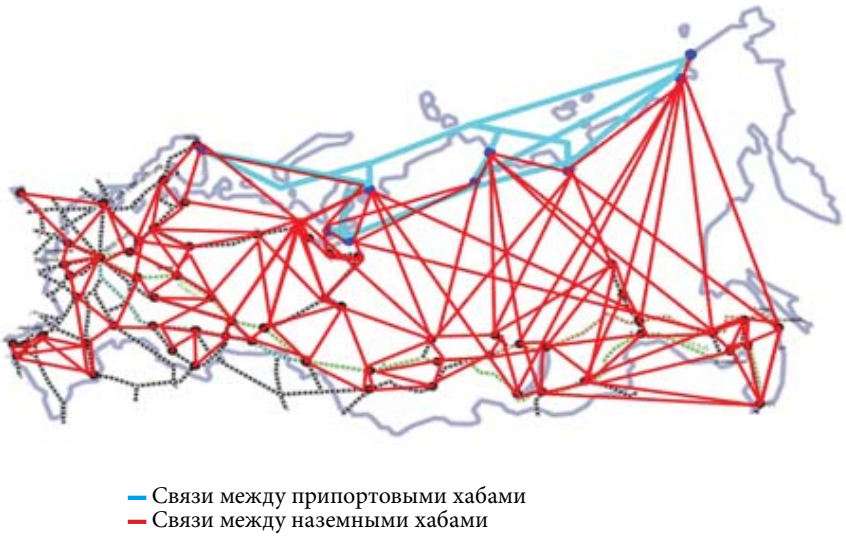
3. RESULTS

The first step to ensure uninterrupted operation and a timely responsive system is to create so-called digital hubs — digital spaces that fully reflect all the processes of activities of real physical hubs in this logistic block.

The digital base of hubs should display the workload of loading and unloading zones and warehouses, the average time spent on the processing of consignments, the capacities of customs posts, schedules of shipments and arrivals of vehicles. It is also necessary to create an electronic document management system between the sender, the recipient, the carrier and the customs authorities[6]. This system should allow a remote loading of waybills, invoices, contracts, transaction passports, specifications for goods, packing lists, certificates and other documents necessary for the legal transportation of different types of cargo (Fig. 2).

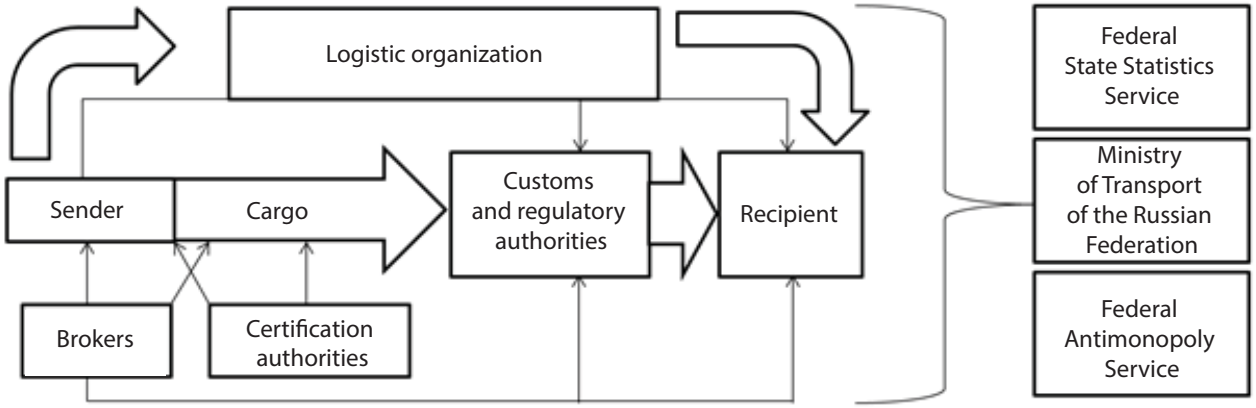
At the second stage, these local systems should be combined into a single network with the possibility of document flows and feedback between hubs throughout the logistics block and integration with the existing systems of the Ministry of Transport of the Russian Federation. In this case, it will be possible to remotely monitor the current and planned capacities of different hubs, the congestion of sea, rail and road transport

Figure: 3. Digital inter-hub network



[6] Digital economy: ways of implementation and development prospects // Ministry of Economic Development of the Russian Federation. 2017. 5 October. URL: http://old.economy.gov.ru/minec/about/structure/depgosgv/2017051001.

Fig: 4. Diagram of the relationship between the participants of the digital logistics platform



routes, which will make it possible to quickly adjust the previously planned route in case of congestion of one of the crossing points or load transfer points (Fig. 3).

At the third stage of digitalization of the logistics block it is necessary to carry out a number of measures to integrate and modernize the software of the already existing state procurement apparatus into the inter-hub network[7]. Therefore, added to this digital platform will be the ability to remotely conclude bilateral smart contracts for the transportations between the customer (sender or recipient) and the contractor (logistics company) controlled by the state.

After the inter-hub network connection is completed, it is possible to gradually introduce digital offices into the system — the authorities responsible for issuing certificates and certificates with the provision of access to sections of the digital storage in accordance with their competencies (Fig. 4). This measure will also speed up the document flow, which in turn will reduce the time of transit from the sender to the recipient [Loginov, Ionichev, 2017].

It is possible to trace the evolution of the form of organization of logistics in the field of circulation of goods and services according to the principle "from simple to complex": direct supply chains (supply chain 1.0) — advanced (advanced, supply chain 2.0) — maximum supply chains (supply chain 3.0) — supply chain networks [Scherbakov, Silkina, 2019]. This system has feedbacks that perform certain control and accounting functions and operations in the field of logistics.

The final step in digitalization of the logistics block can be the connection of the access system to the blockchain technology. In contrast to the transfer of the entire data system to the blockchain, connecting only the access system requires less energy costs not losing in terms of security. With this use of blockchain technologies all data about the users of a single logistics portal and their relationships will be placed in a closed, separate cloud storage with one connection point, while access to it will be impossible without a proper authorization in the blockchain. The obvious and most important advantage is the maximum protection of information from falsification. After entering the data into the blockchain registries it is almost impossible to change the data, which makes it possible to use them as comprehensive legally significant documents [Klechikov et al., 2017].

4. EXPECTED RESULTS

The implementation of the described list of measures can lead to the following positive results.

Consignors will not have to request commercial offers from carriers, choosing the most profitable ones for themselves and adjusting to time corridors of certain logisticians. It will be sufficient to place an order for a certain number of cargo items with an indication of the

[7] Unified information system in the field of procurements. URL: www.zakupki.gov.ru.

desired point of entry, time frame and type of cargo.

After placing an order it becomes available to all registered carriers, who can offer their prices for the transportation of this cargo. Under these conditions, the ordering and processing of transportation services from logistics organizations is reduced to a system of discount auctions, where the customer acts as the holder of the contract, and the carriers act as players fighting for the customer. At the same time, a quick addition to container consignments for carriers is possible.

It also becomes possible to quickly respond to changes in traffic density with further redistribution of freight vehicles along adjacent routes with online coordination of adjustments with the authorities supervising these routes. In the future, these processes can be automated with appropriate software upgrades. These measures will speed up the customs clearance process due to the fact that all the necessary documentation is loaded into a single system even before the shipment of goods. In this case, it is possible to avoid a huge amount of paper work and to automate the system of exchange and verification of documents by customs authorities, which in turn offloads traffic on physical hubs.

Another positive effect can be the simplification of the mechanism for collecting statistical data for each of the senders and carriers according to the frequency and volume of traffic, types of cargo and the popularity of destinations for state agencies. On the basis of statistical analysis it is possible to predict traffic taking into account the seasonal congestion of routes and weather conditions for a competent distribution of cargo flows along these routes.

Based on the collected statistical data on carriers it is possible to single out the main market players and to control monopolization by subsidizing and allocating quotas for transportation. These measures will help maintain healthy competition on the market and promote national carriers.

Such system of data collection can also be useful for the Ministry of Defense of the Russian Federation. With advanced analytics of the congestion of transport routes and the speed of passing various routes by all modes of transport, it is possible to calculate the time spent on the transfer of military equipment, not theoretically, but in an applied format, which increases the country's defense capability, not to mention the monitoring of the number and movements of vehicles owned by non-resident companies.

5. SOCIAL IMPORTANCE

In addition to the undeniable economic effect, the system of interconnected hubs has also a social significance for the population.

Firstly, it is the collection of statistics and the ability to monitor practical solutions in the online format for students in the field of economics, management and logistics.

Secondly, the creation and development of physical hubs is an increase in jobs for specialists in both technical and humanitarian professions in completely different areas: from IT technologists to civil engineers.

Thirdly, hubs can serve as bases for internship and retraining.

Fourthly, the territory of the hubs can be used for cultural and exhibition complexes for holding events at the domestic and international levels, such as congresses, technological and cultural exhibitions, festivals of science and culture, and all kinds of forums.

Fifthly, it is possible to develop the infrastructure of residential settlements adjacent to the hubs: expanding the hotel and restaurant businesses, opening entertainment complexes, increasing the number of retail outlets, a general increase in the level of provided services.

6. CONCLUSION

In summary, we can say that this work investigates the methods of digitalization of logistics hubs, presents options for their unification into a single logistics IT network based on the existing state platforms using blockchain technologies. It also presents positive results from this project.

In conclusion, it should be noted that the project of combining the two most significant routes into a single logistics block with its further digitalization and systematic transfer to IT environment is extremely

beneficial for our country and has enormous potential. A significant reduction in the bureaucratic apparatus, the elimination of paper workflow, a significant reduction in transaction costs, full control over the activities of platform users allowing the timely disqualification of unscrupulous participants — all this provides a favorable business environment.

Therefore, this project can significantly speed up the processes of transporting goods both within the country and on the global logistics market, which will strengthen the position of the Russian Federation on the international arena and increase its attractiveness as a global transit zone between eastern and western countries in comparison with alternative routes. In addition, the project has a social significance allowing the implementation of the concept of infrastructure development in the central and Far Eastern parts of Russia. It is also worth noting the huge potential of the apparatus of digital hubs as a system for collecting data useful for both the economic and military spheres of the country's activities.

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