

# *The contribution of transport logistics to the competitiveness of domestic products in the context of digitalization*

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**Abstract** — Improving competitiveness is quite relevant for Russia. In our opinion, this problem can only be solved by the joint efforts of all interested parties: state, specific enterprise, suppliers, partners, consumers and society. The development of the country's economy is ensured by the competitiveness of individual industries, enterprises and the competitiveness of domestic products. Moreover, the country's leadership has taken a course towards import substitution. The scientific novelty of the study lies in the use of theoretical and methodological approaches to transport logistics and quality management to solve this problem. The aim of the study is the implementation of the principle of relationship management to increase the competitiveness of domestic products. The paper analyzes the transport infrastructure and information of Russian Railways on railway freight traffic using statistical data for 17 years, as well as the tariff policy. The analysis of the cost of renting wagons for the transportation of products by railroad of the enterprise LLC Industrial Enterprise Polevskoy DOZ for 2015-2018 was carried out. The main problems in the transport and logistics system related to management are identified and corrective actions are proposed to increase the competitiveness of domestic products.

**Keywords** — *logistics, transport, transport logistics, product competitiveness, partnership interaction.*

## I. INTRODUCTION

The aim of the work is the development of measures to improve the interaction between partners by minimizing transport costs, to increase the competitiveness of domestic products by implementing the principle of managing relationships with partners. The following tasks are defined: assessment of the contribution of transport costs to the competitiveness of products, analysis of the results of reforming the infrastructure of the railway industry, statistics on freight traffic, the structure of freight transportation and the cost of renting wagons for transporting products by the enterprise, as well as problems in the transport and logistics system, reasons and corrective actions based on the principle partner relationship management. The relevance of the work lies in the significant contribution of transport logistics to the development of the country's economy and the competitiveness of domestic products.

## II. MATERIALS AND METHODS

Statistical materials on rail freight for 2018 [4,20]. Information materials from the websites of Russian Railways

[19], JSC Federal Freight Company [12]. data on the enterprise "Polevskoy DOZ" LLC, theoretical and methodological approaches of transport logistics [1, 2, 17] and quality management [18].

## III. RESULTS

Rail transport is the basis of the country's transport system, 40% of the freight turnover is carried out by railways. During the reform of the Russian economy, transformations were also carried out in the system of transport logistics. They were aimed at creating a competitive environment, while maintaining organizational unity and centralizing dispatch control, in accordance with the regulatory framework of state regulation in rail transport. The goal was to balance the interests of the state, carriers and consumers of transport services. In the new regulatory documents, three entities of the transport services market were identified: carrier, owner of public railway infrastructure, and consumer of railway services. The authors [1] believe that the participants in the transport and logistics system are: shipper, consignee, carrier, state and population, an important role of the state in economic and social regulation is emphasized. In our case, the state acts only as the owner of the infrastructure, which is the company Russian Railways, and this is clearly not enough. The responsibility of the state for the economic integrity and integration of the country requires increased coordination of actions for the rapid development of the transport industry [2].

As you know, a strategic development program for Russian Railways was developed, it was planned to create about 60 subsidiaries, an increase by 2010 of freight traffic 1.5 times, transit freight traffic 60%, container traffic 2 times [11]. It should be noted that not all activities of the program have been completed. Regarding the competitive environment: Independent companies appeared on the railway transportation market, having over 26% of the freight car fleet and carrying out 22% of the most profitable freight turnover (oil and oil products, chemicals, cars) [11], and Russian Railways is still a "coal transportation company", no doubt, the large volumes of these transportations compensate for their low economic efficiency. In addition, annually an active coal delivery in September-October removes the transport system from a stable state.

The work [3] provides comparative data on the volumes of transportation of various types of goods by rail in 1991 and

2013. The cargo transportation indicators for coal, oil and oil products, ore, and construction materials remain at about the same level, but there is a sharp decrease for other goods by 11 times, these include industrial and food products, materials, semi-finished products, technical equipment and others, it was observed a decrease of 32% for timber cargo [3]. At present, rail transport begins to lose competition to the automobile, mainly in terms of delivery, and in some cases also in cost. Figure 1 shows that the volume of cargo transportation by road (row 3) remains at the same level, despite the economic downturn.

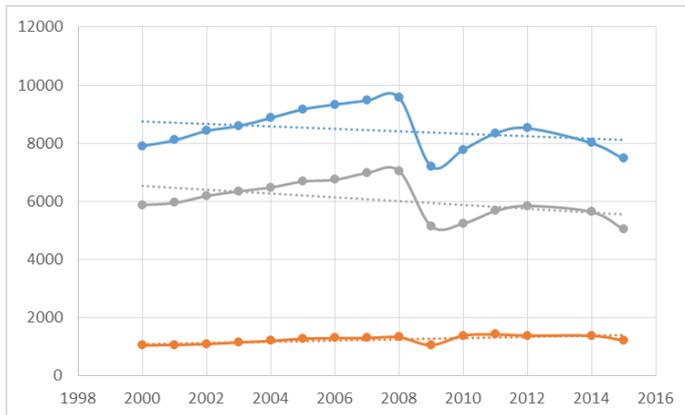


Fig. 1 Dynamics of cargo transportation (million tons) total (1), railway (2) and road transport (3), respectively [4, 20]

Figure 1 shows the data on cargo transportation: total (row 1) and railway transport (row 2) which show that in 2009 there was a significant reduction in total volumes, mainly due to goods transported by rail.

Table 1 shows the data on cargo transportation in 2018. [4], it can be seen that, as before, the raw material specialization of the country's economy is clearly traced: in the first place, coal — 30%, in the second — oil and oil products — 20%, a positive aspect is the exit to the third place — other cargoes (about 11%). In March-May 2018 there was an increase in railway transportation of building materials to 10%, apparently related to preparations for the construction season.

The main problems in this logistics system remain attracting investments and strengthening the material and technical base of railways, increasing the quality of services and expanding their range, increasing production and economic efficiency by reducing their own costs and financial stability. The authors of [6] also note the intensification of competition within the industry itself, since the Russian railway transport after the restructuring was divided into many operator companies, each of which achieves the greatest economic benefit for itself, and not for the company as a whole. Delivery terms are an important logistic indicator in the cargo transportation market, they are high in railway transport, the author [5] proposes to improve the organization of car flows in the logistics system of railway cargo transportation, and to increase transit by reducing the number of processing cars on the way.

The quantitative indicators of the activities of Russian Railways are freight traffic, cargo turnover, a qualitative indicator - the income rate is the income received from a unit of cargo movement (10 tkm), taking into account the structure of cargo turnover, transportation distance, tariffs, etc.

Russian Railways receives income from the transport of goods including: tariff and additional charges for the carriage of goods, rent for cars and rolling stock, charges for servicing access roads, local income of railways and branches, consisting of fees and fines exacted from shippers and consignees for violating the rules and conditions of carriage regulated by the Charter Railways of the Russian Federation [11]. In addition, incomes are grouped by type of cargo and type of tariff.

Since railways represent the infrastructural basis for the development of the country's economy, their contribution to the competitiveness of domestic products cannot be underestimated. The validity and durability of the tariff policy plays an important role.

A number of scientific publications discuss issues related to the objectivity of reflecting in railway tariffs the quality and efficiency of freight rail transport services [7, 8, 9].

In [10], it is noted that since rail transport as the most important branch of infrastructure is associated with all sectors of the economy, technical and economic capabilities and limitations, it is necessary to develop indicators for evaluating the effectiveness of decisions taken by the regulatory body on the level of tariffs for freight rail services in the economy. It is required to establish effective correspondence between the parameters and operating modes of freight railway transport. In this case, we are talking about evaluating work from two sides: from the side of service producers (carriers, owners of railway infrastructure) and from users of freight railway services [10].

JSC Federal Freight Company (JSC FFC), a network-wide operator of freight rolling stock, is a subsidiary of Russian Railways and one of the largest freight railway operators in Russia. There are 16 branches of transport services of JSC FFC at the Russian Railways training ground, as well as representative offices in Moscow and the Republic of Kazakhstan.

**TABLE I. DYNAMICS OF FREIGHT TRANSPORTATION BY RAIL IN 2018 [4]**

| Month   | January          | February         | March            | April            | May              | June             | July             | August           | September        |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Cargoes, t</b>                               | <b>103,866.8</b> | <b>100,121.7</b> | <b>112,820.9</b> | <b>109,348.9</b> | <b>110,734.3</b> | <b>107,560.0</b> | <b>107,590.3</b> | <b>108,930.9</b> | <b>105,085.3</b> |
| among them:                                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Coal  | 31,244.1         | 29,963.7         | 33,738.3         | 31,529.8         | 31,448.0         | 29,694.6         | 29,950.4         | 31,282.2         | 29,704.0         |
| Chark   | 903.4            | 879.9            | 960.6            | 886.0            | 882.3            | 894.2            | 926.7            | 942.8            | 962.5            |
| Oil and oil products                            | 20,740.9         | 18,806.6         | 20,675.4         | 19,403.6         | 19,255.7         | 19,130.8         | 19,529.3         | 19,316.1         | 19,247.1         |
| Iron and manganese ore                          | 9,207.0          | 8,468.0          | 9,566.0          | 9,710.7          | 9,888.6          | 10,213.8         | 10,078.1         | 10,176.3         | 9,187.4          |
| Non-ferrous metal ores and sulfur raw materials | 1,601.3          | 1,521.4          | 1,633.7          | 1,659.4          | 1,775.0          | 1,755.1          | 1,768.2          | 1,751.2          | 1,715.2          |
| Ferrous metals                                  | 6,565.2          | 6,070.9          | 7,115.9          | 6,708.1          | 6,576.6          | 6,497.5          | 6,533.0          | 6,409.1          | 6,319.8          |
| Ferrous scrap                                   | 659.4            | 797.6            | 1,042.0          | 1,339.6          | 1,502.0          | 1,574.7          | 1,527.6          | 1,597.4          | 1,576.2          |
| Chemical and mineral fertilizers                | 5,165.3          | 4,799.8          | 5,305.8          | 4,999.9          | 4,995.6          | 4,802.0          | 4,635.2          | 4,818.0          | 4,657.0          |
| Construction cargo                              | 8,754.7          | 9,488.7          | 10,522.2         | 11,278.8         | 11,970.9         | 11,197.3         | 11,397.1         | 10,817.2         | 10,548.8         |
| Cement  | 1,198.1          | 1,486.3          | 1,802.7          | 2,154.3          | 2,520.8          | 2,674.8          | 2,758.7          | 2,601.5          | 2,498.0          |
| Forest cargo                                    | 3,401.5          | 3,673.7          | 4,280.1          | 4,145.5          | 4,051.1          | 3,913.1          | 3,837.4          | 3,849.8          | 3,589.7          |
| Grain and grinding products                     | 2,358.6          | 2,519.7          | 2,883.4          | 2,867.8          | 2,722.0          | 2,260.3          | 1,709.2          | 2,165.8          | 2,347.9          |
| Compound feed                                   | 72.5             | 74.8             | 82.9             | 81.9             | 76.8             | 73.3             | 73.9             | 79.1             | 70.3             |
| Imported cargoes                                | 748.2            | 788.7            | 836.4            | 755.4            | 851.1            | 785.4            | 805.2            | 786.3            | 792.7            |
| Fish  | 32.5             | 25.8             | 33.2             | 17.3             | 13.9             | 19.8             | 14.9             | 14.3             | 24.9             |
| Others cargoes                                  | 11,214.1         | 10,759.4         | 12,342.3         | 11,810.8         | 12,203.9         | 12,073.3         | 12,045.4         | 12,323.8         | 11,843.8         |

As of November 1, 2018, the total rolling stock of JSC FFC totals 136.4 thousand units of rolling stock. The structure of the fleet of JSC FFC is as follows: gondola cars — 104.2 thousand units, covered wagons — 10.8 thousand units, platforms — 9.4 thousand units, tanks — 12 thousand units. According to the results of production activities for 2017, the total volume of cargo transported by JSC FFC amounted to 197 million tons, which is 7% higher than in 2016 [12]. The total freight turnover of JSC FFC wagons reached 409.5 billion tonne-kilometers (+13% compared to 2016), the average daily loading amounted to 8.2 thousand units of rolling stock (+8%). Gondola car productivity increased by 7%. In 2017, the share of JSC FFC in the market for the transport of goods on the network of Russian railways increased by 0.6 percentage points compared to 2016, it amounted to 14%, the share of freight turnover reached 16.2% (+0.7 percentage points). The company's share in the Russian fleet of cars increased by 1.2 percentage points. in average annual terms (151.5 thousand units of rolling stock) [12].

However, there are less and less wagons, and the cost is higher. Thus, the cost of renting a gondola car for a day in

June – July has reached record levels since the beginning of 2017, as follows from an analytical review of the United Wagon Company (UWC). Demand for gondola-cars significantly exceeds supply: there is almost no accessible fleet, and rates for small parties of open wagons reach 1,500–1,700 rubles per day [13]. The reasons are: mass disposition of old rolling stock in 2016, growth in coal transportation (+9.6% January to July 2016), industrial raw materials (+11.6%) and timber cargo (+3.9%), as well as production limitation of gondola cars due to the irregular work of the Altayvagon enterprise [13].

Table 2 summarizes the problems in the logistics system of rail freight transportation, reveals the reasons for using the Ishikawa diagram (according to which the reasons may be equipment, personnel, technology, materials, the environment and management) and suggests corrective actions. E. Deming claimed that 96% of the problems are due to errors in the system, and only 4% are due to errors by the performers. Therefore, there is no need to look for who is to blame, but there is a need to look for what's wrong in the system and develop corrective actions.

**TABLE II. THE MAIN PROBLEMS IN THE TRANSPORT AND LOGISTICS SYSTEM (TLS) OF RAILWAY CARGO TRANSPORTATION ACCORDING TO THE AUTHORS [14, 15, 16]**

| Problems   | Reasons   | Correcting activities  |
|--|---|--|
| Lack of empty cars                               | Management — mass disposition of old rolling stock                              | Relationship management with railcar manufacturing enterprises   |
| High delivery time                               | Outdated material and technical base (equipment and materials) and technologies | Attracting investments through public-private partnerships and improving the organization of car flows |
| Increased competition within the industry itself | Management-imbalance of interests of TLS participants                           | Ensuring a balance of interests due to the implementation of the principle — relationship management   |
| Low quality of services                          | Ineffective profit-oriented management at all hazards                           | Implementation of the principle of consumer focus as a source of profit                                |
| High cost of services                            | Management: low production and economic efficiency                              | Implementation of the principle — relationship management  |

As we can see from Table 2, in most cases, the cause of problems in the TLS is management, therefore, we propose the implementation of the QMS principle - relationship management as corrective action.

Competitiveness is a system of economic relations to identify retention and development of competitive advantages. It is advisable to build these relationships taking into account the principle of a quality management system - relationship management. In the standard GOST R ISO 9000-2015. "Quality management systems. General Provisions and Dictionary". the formulation of the principle, advantages, and possible actions is given, in particular, "sustainable success is more likely to be achieved in a situation where the organization manages relationships with all interested organizations in order to optimize their impact on performance. Relationship management with its suppliers and partners is often of particular importance. The implementation of this principle of the participant in the logistics system allows you to get the following advantages: common understanding of goals and values by stakeholders; implementation of management in relation to risks associated with quality; well-managed supply chain to ensure a stable flow of products and services.

To implement this principle in practice, the following possible actions are proposed: identification of priority relationships with suppliers, partners, consumers, investors,

employees and society as a whole; collection and exchange of information, experience and resources with stakeholders; measuring performance to activate an improvement initiative.

The main factors of increasing competitiveness are quality and price, the contribution of logistics costs to the price is undeniable. Studying transport and logistics complexes in the country, the authors [15] note that the problem of high logistics costs is becoming a deterrent to the sustainable socio-economic development of Russia and emphasize the need to reduce the level of unit transport costs in the cost of domestic products [16]. With this aim, it is proposed to use the logistic approach in the management of freight transportation, in particular, transferring a number of logistic processes to outsourcing, the formation of transport and logistics clusters, and their tax incentives [14]. In addition, it was noted in [17] that it is necessary to build a flexible tariff system to ensure the technical and technological connectivity of the participants in the transport process, and coordination of their economic interests.

In accordance with the principle of relationship management, we suggest starting with a common understanding of goals and values by interested parties, as well as adding to the number of participants in the TLS. Table 3 summarizes the interests, goals, and performance indicators of participants in the logistics system.

**TABLE III. THE MAIN PROBLEMS IN THE TRANSPORT AND LOGISTICS SYSTEM (TLS) OF RAILWAY CARGO TRANSPORTATION ACCORDING TO THE AUTHORS [14, 15, 16]**

| Indicators     | State   | Infrastructure owner            | Carrier                                     | Shipper   | Consignee                         |
|----------------|---|---------------------------------|---|---|-----------------------------------|
| Interests      | Balanced development of the country's economy | Receiving a profit              | Reimbursement of operating costs and profit | The ability to cover transportation costs       | Reduced transportation costs      |
| Goals          | Import substitution, tax base growth          | Customer satisfaction           | Customer satisfaction                       | Improving the competitiveness of their products | Quality materials "just in time"  |
| Availability   | TLS stability                                 | maintaining demand for services | Continuity of freight traffic               | No wagon shortage                               | Insurance stocks of materials     |
| Functionality  | Improving the competitiveness of products     | Uninterruptioness               | High cargo turnover                         | High-quality TL services                        | Allowable level of rejected goods |
| Specialization | Investments in TLS                            | Interdependence awareness       | Responsibility                              | Timely exchange of information                  | Joint supply planning             |

Let us analyze how the principle of relationship management is implemented on a specific example of the relationship between the enterprise IE Polevskaya DOZ LLC and Russian Railways.

As it is known, the goal of transport logistics is that the right cargo must be delivered at the right time, place, in the right quantity and quality with minimal cost [17]. Let us consider the implementation of goals on a concrete example.

IE Polevskoy DOZ LLC supplies construction feldspar sand to Bashkiria to the enterprises producing ceramic tiles by rail using the services of Russian Railways, ordering gondola cars from Railtransline Limited Liability Company (RTL), Federal Freight Company JSC (FFC) and LLC Federal Transport Company (FTC). About ten to thirteen times a month, it orders the services of a railway station for the supply and cleaning of wagons. The distance to consumers is about 600 km, the delivery time is four days, the volume of shipped material is 670–870 tons per month.

In the course of its activities, the enterprise management solved various problems, including those described in Table 2 above. The first problem is the lack of empty wagons. It was decided to purchase their wagons, later they were faced with the fact that Russian Railways began to impose paid repair and maintenance services for private wagons, even because of the open hatch, they sent a new wagon for repair.

The second problem is the fines for car downtime at the station. It was decided to purchase a railway dead end and invest in the equipment of this dead end. The railway station began to impose additional paid services, delivering one wagon to a dead end.

The third problem is the unreasonable increase in the cost of renting wagons (see Table 4) forced to assign transportation costs to the consignees of the products.

Theoretically, the size of the fee for the carriage of goods by rail depends on: type of dispatch, speed of transportation, distance, type of wagon, an accessory of the wagon, amount of cargo carried [16]. The common tariff set includes fees for the use of infrastructure and locomotives of Russian Railways, for infrastructure in an empty wagon, fees for the use of wagons in the common fleet.

We give a specific example of calculating the cost of renting a wagon of JSC FFC for this enterprise LLC PP Polevskoy DOZ.

Calculation of fees for the use of infrastructure and locomotives of Russian Railways in a loaded gondola car:

- 1) 7,862 – base rate
- 0.77 – correction coefficient for additional loads
- 0.75 – shipping for 1 quarter depending on the distance
- 0.909 – additional coefficient for cargo
- 3.94 – indexation coefficients
- 1.02 – base rate indexation

$$(7,862 + 486) * 0.77 * 0.75 * 0.909 * 3.94 * 1.02 = 17,611.43 \text{ RUB (for infrastructure use)}$$

Where 486 is base rate adjustment

- 2) Calculation of infrastructure charges in an empty wagon

$$(364 + 29.12) * 3.94 * 1.02 * 4 = 6,319.48 \text{ RUB}$$

Where (364 + 29.12) is base rate

- 3) Calculation of fees for the use of wagons of a common fleet

$$(2,130 * 3.94 * 1.02) - 382 = 8,178.04 \text{ RUB}$$

Where 2,103 is base rate

382 is base rate adjustment

$$\text{Total: } 17,611.43 + 6,319.48 + 8,178.04 = 32,108.95 \text{ RUB}$$

Calculation of fees for using own infrastructure

$$(7,862 + 486) * 0.77 * 0.75 * 0.909 * 3.682 * 1.02 = 16,458 \text{ RUB}$$

The final calculation of the cost of renting a gondola car:

$$(32,108.95 * 1.3) - 16,458 = 25,283.64 \text{ RUB}$$

The average calculation results for the years are shown in Table 4.

TABLE IV. DYNAMICS OF GROWTH IN THE COST OF RENTING A GONDOLA CAR WITH VAT

| year | The price of raw materials, rubles/tones | % increase | The average cost of renting a wagon, RUB | % increase | The proportion of the cost of renting a car in the cost of production, % |
|------|--|------------|--|------------|--|
| 2015 | 1,017.50                                 |            | 16,850.40                                |            | 25   |
| 2016 | 1,024.90                                 | 1          | 23,817.91                                | 141        | 36   |
| 2017 | 1,024.90                                 | 0          | 31,740.44                                | 133        | 46   |
| 2018 | 1,096.64                                 | 1          | 40,000.00                                | 126        | 54   |

Table 4 shows that in the period 2015–2018, the increase in the price of raw materials amounted to 1%, which is lower than the inflation rate of 4%, the cost of renting a gondola car grew annually by 141.133 and 126%, taking into account the average load of the gondola car (67 tons) calculated the contribution of this indicator to the cost of production, it is significant and there is a growth trend, respectively, of 25%, 36%, 46% and 54% in 2018.

#### IV. CONCLUSION

The course on import substitution involves ensuring the competitiveness of domestic products and domestic producers. Using the example of a manufacturer of feldspar raw materials for the ceramic industry, it is shown that due to the annual significant increase in transport and logistics costs (associated with renting gondola cars), domestic raw materials lose the competition with Turkish feldspar raw materials supplied by water, and import duties have not changed recently.

Thus, it was established that in order to reduce transport and logistics costs, the railway transport system needs to improve the quality of management by implementing the principle of the QMS of relationship management to coordinate the goals and values of TLS participants, to intensify the activities of the state as a regulator of economic interests.

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