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CONTAINER AND MULTIMODAL RAILWAY TRANSPORTATIONS IN RUSSIA

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Abstract		
<p>Railway container transportation is one of the fastest-growing areas of the transport industry in Russia. Even though Russia is not a leading country in terms of the share of container transport by rail today, it gives them very important strategic importance. With its vast geographical area, Russia has very good opportunities for becoming a transport giant.</p>		
<p>Container and multimodal rail transportation in Russia and the prospects for their further development were studied in this thesis including current situation of rail container transportation in Russia, positions of the transport system of Russia in the world, current trends of the Russian transport market, role of the state in modernizing railway infrastructure and the technologies that are used in railway container transportation. In addition, the Kouvola-Xi'an route was analyzed in detail.</p>		
<p>In the study, both qualitative and quantitative methods of analysis were used. Quantitative methods were used to formalize statistics for a clear understanding of the topic and qualitative methods were employed in the form of interviews found on the Internet and annual reports of companies.</p>		
<p>The paper showed that Russia has great potential for increasing freight traffic, especially in transit. The continuous work to modernize the infrastructure will most likely lead to an increase in freight traffic. Innovation is an important component for development.</p>		
Keywords		
railway, container, Russia, perspectives		

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1 INTRODUCTION

Transport infrastructure is one of the fast-growing business areas. Millions of projects and investments are conducted annually in order to advance transportation networks between countries and cities. Development in the transportation area reveals new horizons for many companies all around the world allowing them to enter new markets and finally increase their sales. Nowadays, there are numerous kinds of transportation modes such as air, railway, road, marine and pipeline transports. Every type of transport has its own advantages and disadvantages.

Railway container transportation is one of the promising directions of transport development in many countries of the world. Undoubtedly, in order to improve this area, it is necessary to pay attention to many items, such as geographical location, trade volumes, both internal and external, infrastructure development. Railway container transportation in Russia does not yet have a high level of use and the share of container traffic is only 5% of the total freight by rail. In developed countries, the share of container traffic reaches 15-20%.

The research questions of the work are:

1. What is the current state of railway transport in Russia?
2. How efficient is the Kouvola-Xi'an railway route?
3. How rich is Russia's potential in container rail transportation?

The objectives of this thesis are to analyze container and multimodal rail transportation in Russia, the prospects for their further development and examine in detail the current situation of Kouvola-Xi'an railway route. It is worth considering that in Russia, container transportation began to become more popular only in the last 10-15 years. Therefore, the current container growth trends also apply to Russia. With its geographical potential Russia can significantly increase transit container railway transport. The main problem is the underdeveloped infrastructure.

In this study, railway transport is considered and discussed with a detailed overview of the Russian railway network and its external connections with other countries. Railway transport plays a crucial role in intermodal transportation. Due to the development in unit loads (containers), there is no need for any extra handling work when changing modes. Railway transport is very accessible and relatively cheap mode of transport. It is possible to deliver different kinds of commodities, especially bulk freight, over long distances.

Geographically, Russia is located in a strategically important and beneficial area. Because of its size, Russia cannot remain outside of many world projects particularly related to transport infrastructure. One of the great benefits is that Russia unites Europe and Asia. These are both economically advantageous regions for cooperation. The Trans-Siberian railway has been one of the renowned breakthroughs in the world that unites Asia and Europe. It is the longest railway in the whole world.

Another example of similar breakthroughs is the route from Kouvola (Finland) to Xi'an (China). This route was opened in 2017 and allows a delivery of goods within 12-14 days. The Russian Federation is one of the transit countries lying along the route. Furthermore, this railroad also creates certain advantages and high efficiency in terms of time contraction comparing with Trans-Siberian railway. It is expected that the Kouvola terminal is going to be expanded in a few years' time. In this thesis, the Kouvola- Xi'an rail route will be considered in detail.

Lastly, it is quite important to say that innovations play a crucial role in logistics. They are the vital component that matters when it comes to logistics. Companies often think about the logistics issues of their businesses trying to decrease the lead time of customer order and delivery. When delivering goods, it is also necessary to consider customer service which is a very important part of companies' businesses. A great amount of innovations are being constantly created, and the efficiency of some of them were proven many years ago. Some logistics innovations in the railway industry will be discussed later in this study.

In the thesis, both qualitative and quantitative methods of analysis were used. Quantitative methods were used to formalize statistics for a clear understanding of the topic such as official state statistics and customs statistics. Qualitative methods were obtained from public sources in the forms of interviews, news, blogs, articles found on the Internet and annual reports of companies. The materials of the thesis were received by processing information and sequentially reproducing new information.

2 THE CURRENT STATE OF RAILWAY TRANSPORT IN RUSSIA

2.1 Position of the transport system of Russia in the world

Russian railway infrastructure is considered one of the best transport systems in the whole world. In terms of the length of railways, it takes the third place following the United States of America and China. (Freight in Russia: an overview of the current Statistics 2019)

Railway transport has been a key link in the Russian transport system and economy for over 180 years. Railways produce more than 46% of the total cargo turnover (87.4% without accounting for pipeline transport) and more than 24% of the total passenger turnover. Stable work and infrastructure development of all transportation companies provide continued growth for all sectors of economy. Railway transport ensures the preservation of socio-economic stability and stimulates economic growth in country (Russian Rail Transport: Challenges Until 2025 2019).

The transport and logistics network plays a crucial role in Russian economy. In 2018, the sector provided 7.0% of gross value added, which is more than double the US indicator (3.2%), but comparable to Russia's BRICS partners (6.8% in India and 8.7% in South Africa) (Freight in Russia: an overview of the current Statistics 2019).

A well-established transport infrastructure is a key condition for successful trade both domestically and abroad. For domestic and foreign trade, transport is an analogue of the human circulatory system: the balanced and timely development of transport infrastructure is the foundation for increasing trade volumes. Cargo turnover in Russian transport has been showing steady growth over the past few years. In 2018, the freight turnover of Russian transport in the Russian Federation increased by 2.8%, and the volume of transported goods by 2.4%. Russia has a high average rail distance as the main shippers are located in the center of the country, and a significant share of freight flows is directed to exports. In India and China, this figure is approximately three times lower. The

length of public railway lines in Russia is 86,000 kilometers. (Overview of the freight industry in Russia 2019)

The World Bank Group has an indicator that calculates the logistics performance of countries all around the world considering many factors such as customs, infrastructure, tracking and tracing, ease of international shipments, logistics service quality and timelines. Logistics performance index (LPI) scores countries on how efficiently they move goods across and within borders. Russia has been showing significant growth since 2016 as shown in Figure 1.

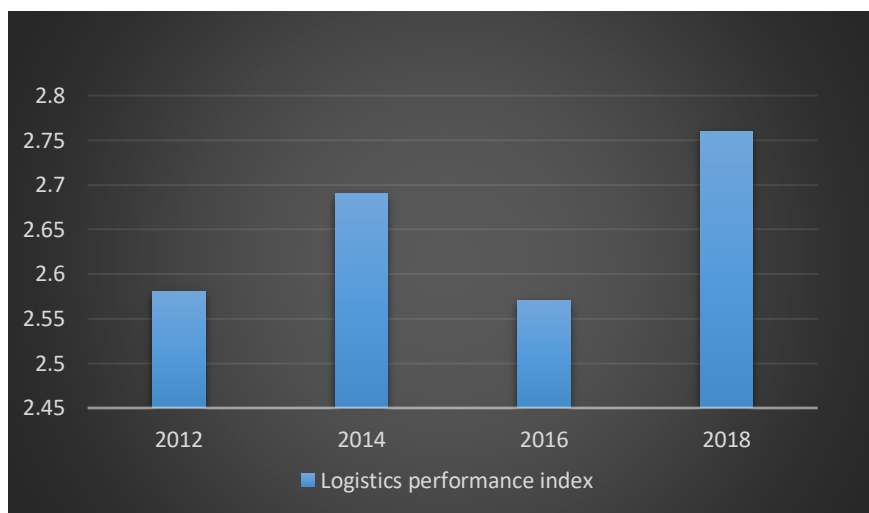


Figure 1. Logistics performance index in Russia (Global Rankings 2018)

In 2018, Russia reached 2.76. At the same time, Russia rose from 99th to 75th place in the ranking. It shows that Russia has invested significantly in logistics and the transport sector (Global Rankings 2018).

2.2 Russia's role in world trade

The growth of world trade is one of the key drivers for the development of transport systems. In 2018, it was below expectations. At the end of the year, it amounted to 3% (previously growth of 3.9% was forecasted) compared to 4.6% in 2017 mainly because of the fourth quarter when world trade declined by 0.3% (Figure 2). The reason for that decline was instability in financial markets and tightening monetary policy in developed countries.

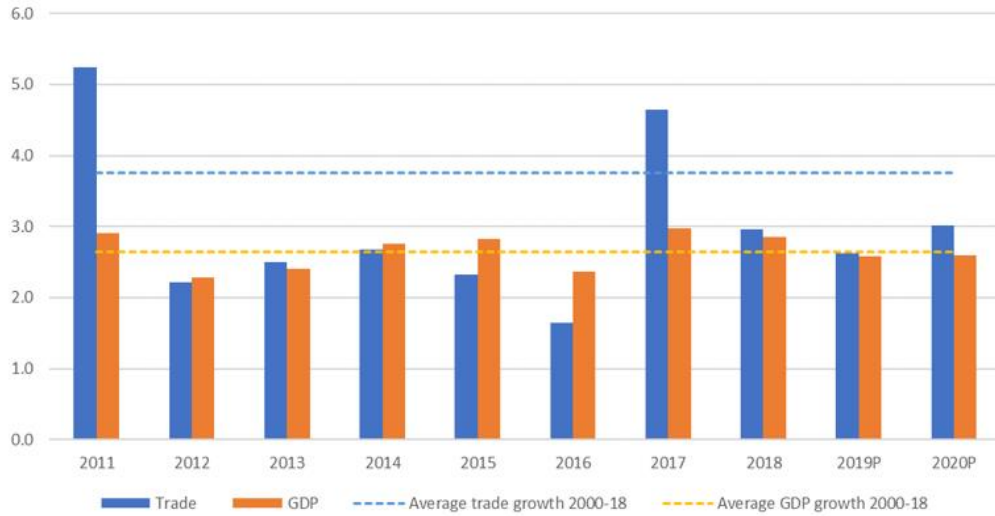


Figure 2. World merchandise trade volume and real GDP growth 2011-2020, % (World Trade Organization 2019)

The growth of real GDP of Russia in 2018 was the highest since 2012 and amounted to 2.3%. The high rate is due to an increase in oil production and subsequent export.

The turnover of Russian foreign trade, which largely determines the work of the Russian transport sector, slightly decreased by 3% in 2019 (Figure 3).

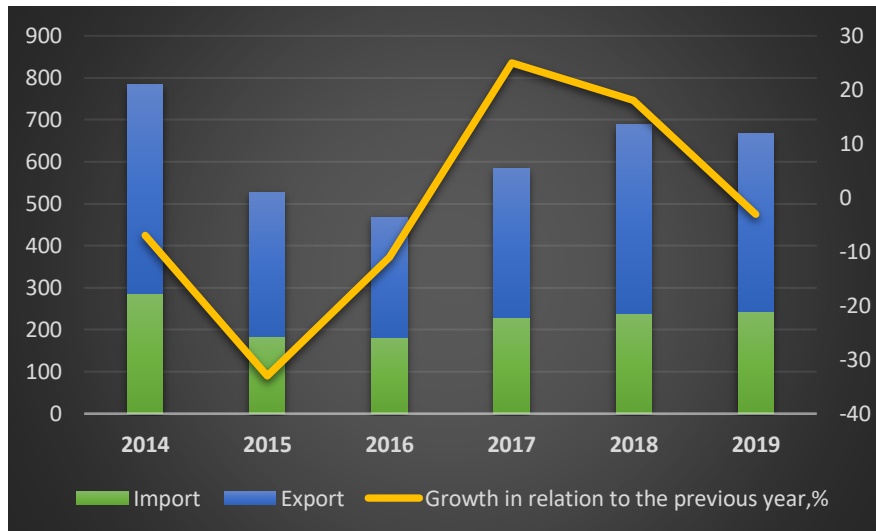


Figure 3. The dynamics of foreign trade turnover of Russia, billion US dollars (Federal Customs Service of Russia 2019)

Nevertheless, Russian foreign trade is on the way of recovery after a dramatic decline in 2014-2016 due to political issues followed by sanctions against Russia (Federal Customs Service of Russia 2019).

Over the past 11 years, the geographical structure of Russia's foreign trade has changed: the share of APEC countries has grown more than one and a half times, from 20% in 2008 to 32% in 2019 (Figure 4).

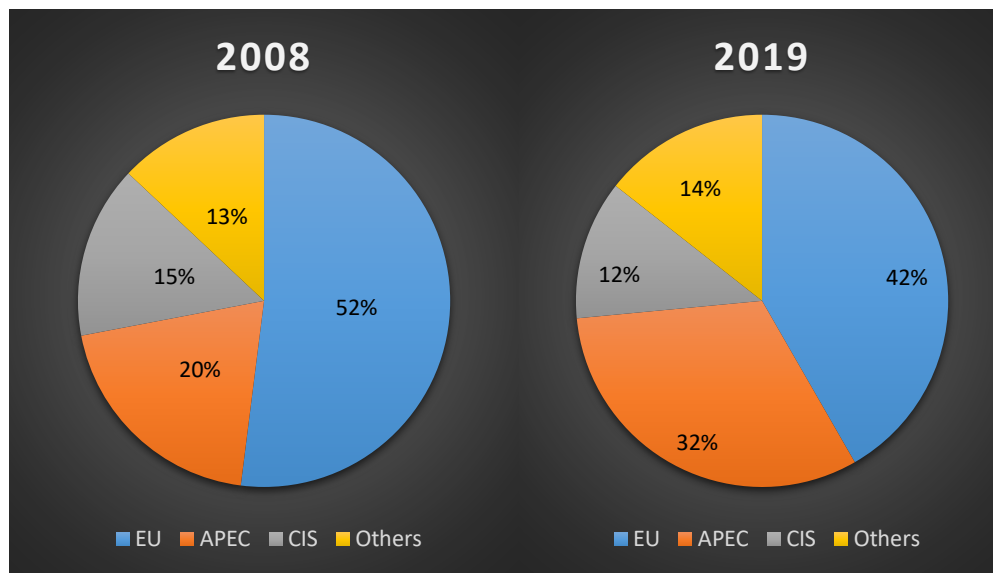


Figure 4. Geographical structure of Russian foreign trade in 2008 and 2019, % (Overview of the freight industry in Russia 2019)

At the same time, foreign trade with the EU fell by 10% over the same time. Trade turnover with EU began to decline starting in 2014 and gradually decreased from year to year, not counting 2018, when trade turnover grew by 0.6%.

Changes in the geographical structure of foreign trade transform changes in transport flows. There is, at present time, large-scale development of transport infrastructure in the sphere of port operations and border crossings in the Far East (Investment in infrastructure. Far East 2019).

The export of crude oil rose in terms of volume from 2018 to 2019, but due to decrease in oil prices for the same period, Russian yields dropped in terms of values (Figure 5).

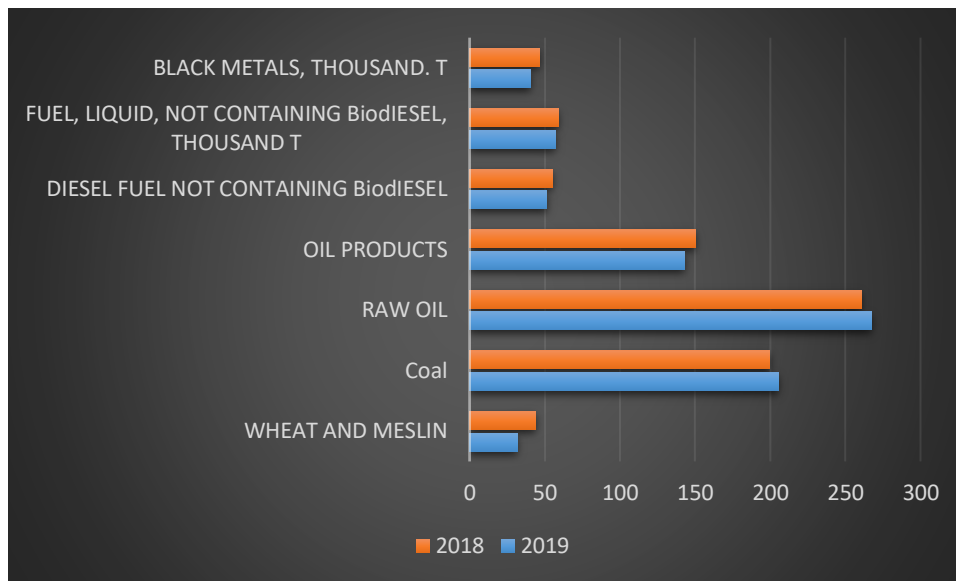


Figure 5. Export of basic goods in physical terms, mln tons (Federal Customs Service of Russia 2019)

Russian export was reduced by 6% comparing to 2018. Russian import increased by 2.7% for the same period. Net exports fell by almost 20% (Federal Customs Service of Russia 2019).

2.3 The main trends of the Russian freight transportation market

Against the backdrop of the recovery of the Russian economy, freight turnover in Russia in 2018 increased by 2.8%. The structure of cargo turnover by means of transport remained almost unchanged from 2014 to 2018 (Figure 6).

More than 90% of cargo turnover was accounted for by rail and pipeline transport, but only one third of all cargo is transported by these means. Road transport accounts for less than 5% of the cargo turnover structure, and it accounts for two thirds of the volume of traffic. For the last 4 years, cargo turnover has increased by 11%: from 5,080 to 5,644 billion tons per kilometer.

The share of railway transport in the structure of cargo turnover continues to increase despite the growing competition from the developing system of oil

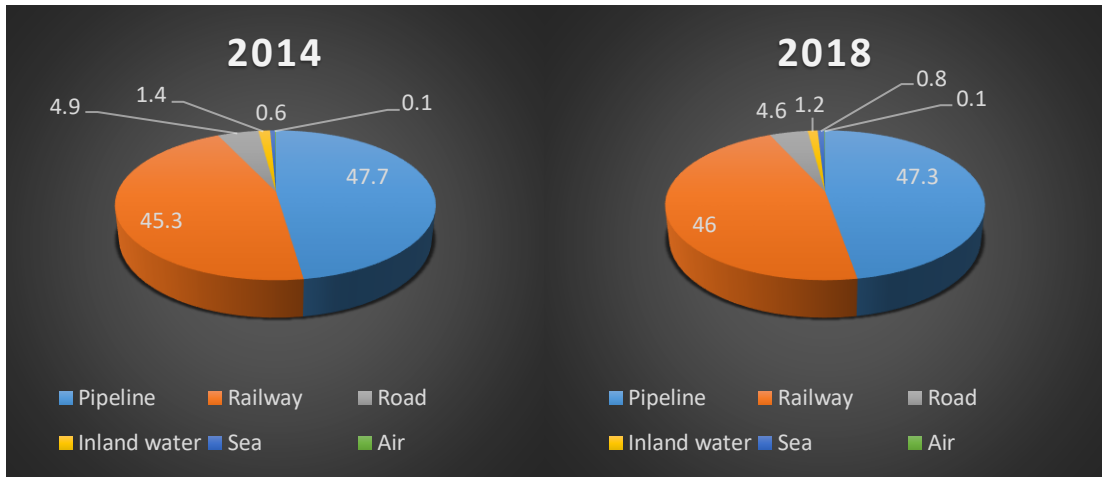


Figure 6. Cargo turnover structure by means of transport in 2014 and 2018, % (Freight in Russia: an overview of the current Statistics 2019)

product pipelines and inland water transport. As a respond to all those challenges, the range of rail transportation was increased.

The freight transport in Russia is based on three key modes of transport: pipeline, rail and road. In 2018, the volume of cargo transportation in Russia amounted to 8,3 billion tons. The largest share is traditionally in road transport (67.1% in 2018). The share of rail and pipeline transport amounted to 17.1% and 14.1%, respectively (Figure 7).

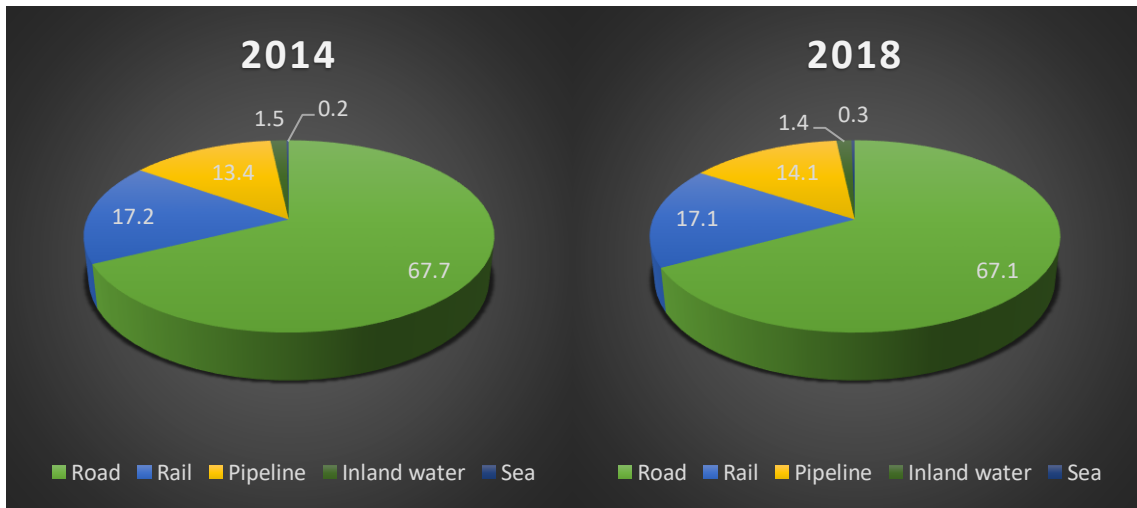


Figure 7. The structure of the volume of transportation of goods by mode of transport in 2014 and 2018, % (Freight in Russia: an overview of the current Statistics 2019)

Over the past few years, the cargo transportation structure has not undergone significant changes, but since 1990, the share of rail and pipeline transport has

grown. Between 1990 and 2018, the share of goods transported by road decreased by 12.6 percentage points, while the share of rail and pipeline transport increased by 6.0 and 8.4 percentage points, respectively. Such dynamics can be explained by the active development of these modes of transport and more favorable tariffs for transportation over long distances. Road transport, despite its enormous tonnage and heterogeneous structure, remains mainly a short-range transport with a low cargo turnover (Freight in Russia: an overview of the current Statistics 2019)

2.4 Railway transport

Rail transport is economically more profitable than road transport with large volumes of shipments and a route length of more than one thousand kilometers. Nevertheless, when analyzing the competition between different types of transport, it is necessary to consider the physical characteristics of the transported goods and the development of communication lines. Therefore, for example, if there is a developed infrastructure, building materials can be transported by rail over relatively short distances. Other materials, such as concrete that require mixing during transportation, or asphalt and bitumen, that require compliance with the temperature regime, can only be transported by special vehicles (Gorborukova, L. 2017).

In 1990, rail and pipeline transport accounted for approximately equal shares in the structure of cargo turnover. In 1990-1998, there was a general decline and underfunding of the railway industry, which led to a sharp decrease in its share and resulting in the predominance of pipeline transport in the structure of freight turnover. In 1998, the share of pipeline transport in the total volume of cargo turnover was 57.8%, and that of railway transport 31.2%. Later, rail freight turnover began to increase and in 2018 almost reached the performance of pipeline transport (Figure 6, p. 10). The remaining modes of transport essentially play the role of specific and auxiliary: inland water transport, sea transport and air transport (Freight in Russia: an overview of the current Statistics 2019).

Cargo turnover in Russia has been growing for the fifth year in a row, and in 2018 it increased by 2.8%, as already noted. The highest growth rates of freight turnover were recorded on the railway transport (+ 4.2%), primarily due to the supply of coal, the main export product of Russia, transported by rail (Figure 5, p. 10) (Freight in Russia: an overview of the current Statistics 2019).

In 2018, the absolute leader in the average range of transportation was the air mode of transport with an average range of 6,200 km for one ton of cargo, while over the past five years this indicator has increased by 51.9%. Air transport is followed by pipeline (2,300 km), marine (2,000 km) and railway (1,800 km) modes of transport (Freight in Russia: an overview of the current Statistics 2019).

In general, for all types of transport over the past five years, the average range of transportation for one ton of cargo in Russia has grown by 7.6% - from 634.5 km to 682.8 km. The range of movement of goods by rail over the same period increased by 10.1% (Freight in Russia: an overview of the current Statistics 2019).

In Russia, railways have traditionally carried the main transport load, especially regarding cargo. The gradual development of pipeline and road freight transport has created significant competition in conditions where the cost of maintaining railway infrastructure remains high. Structural shifts and interspecific competition lead to an increase in the dependence of Russian Railways (OJSC «Rossiyskie zheleznnye dorogi») on several major types of cargo with export orientation. In 2018, railway transport in Russia accounted for more than 87.4% of the cargo turnover (excluding pipeline transportation), i.e., railways are the most competitive on long-distance routes (Freight in Russia: an overview of the current Statistics 2019).

In 2018, 63.4% of the revenue of «Russian Railways» accumulated from freight transportation. The volume of carriage by rail amounted to 1291.5 million tons, of which 47.3% were accounted for by coal, oil and oil products (RZD 2018).

Regarding oil cargo in Russia, a kind of «division of labor» has developed between railway and pipeline modes of transport. Oil and petroleum product deliveries by rail in 2018 totaled 236.6 million tons, and 501.4 million tons through «Transneft's» pipelines, of which 462.3 million tons were accounted for by oil (Freight in Russia: an overview of the current Statistics 2019).

In 2018, the growth rate of the cargo volume and amount of loaded freight turnover of rail transport was more modest compared to 2017: the cargo volume increased by 2.2%, cargo turnover by 4.2% (Figure 8).

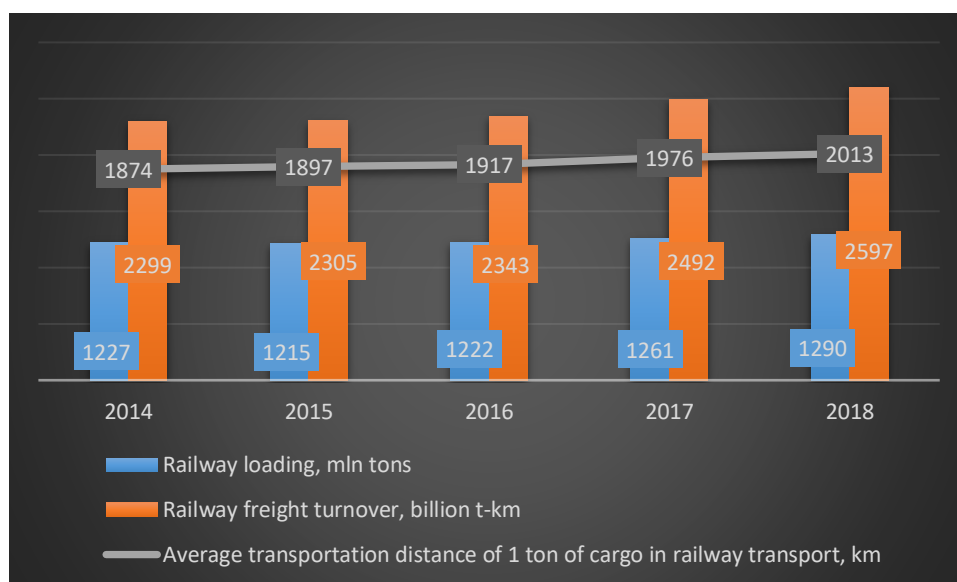


Figure 8. Amount of loaded cargo and cargo turnover of railway transport on the network of JSC «Russian Railways» in 2014–2018 (Overview of the freight industry in Russia 2019)

In 2018, according to «Russian Railways», the volume of loading in domestic traffic amounted to 797.6 million tons (+ 0.8%), and exports - 482.3 million tons (+ 4.8%). In the structure of cargo in domestic traffic, the main volume was coal (21.1% of the total volume of loading), oil and oil products (17.3%), construction cargo (15.3%) and iron and manganese ore (12.4 %). In the structure of export cargo loading, the main share was coal (42.8%), oil and oil products (20.3%), followed by chemical and mineral fertilizers (7.4%) and ferrous metals (7.2%). Due to the rapid growth in export deliveries, the share of loaded rail cargo in domestic traffic in 2018 fell to 61.8% (–1.0 percentage points to the level of 2017), and the share of exports increased to 37.4% (+0.9 percentage points). A

significant part of the energy production cargo transported by rail is sent for export. In 2018, coal accounted for 55.1% of all exported volume, and 41.5% was occupied by oil and petroleum products (Overview of the freight industry in Russia 2019).

In 2018, the leader of the railway loading operators changed when «Freight One» JSC took the first place, replacing «FGK» JSC (JSC «Federal Freight Company»). One of the reasons was the return of 27,200 cars owned by LLC «Modum-Trans» from the lease of «FGK» JSC in November 2017 (Federal Freight Company 2017). Also, transportation of «SUEK» JSC (by 27%) and «Vostok1520» JSC (by 32%) was significantly increased (Figure 9).

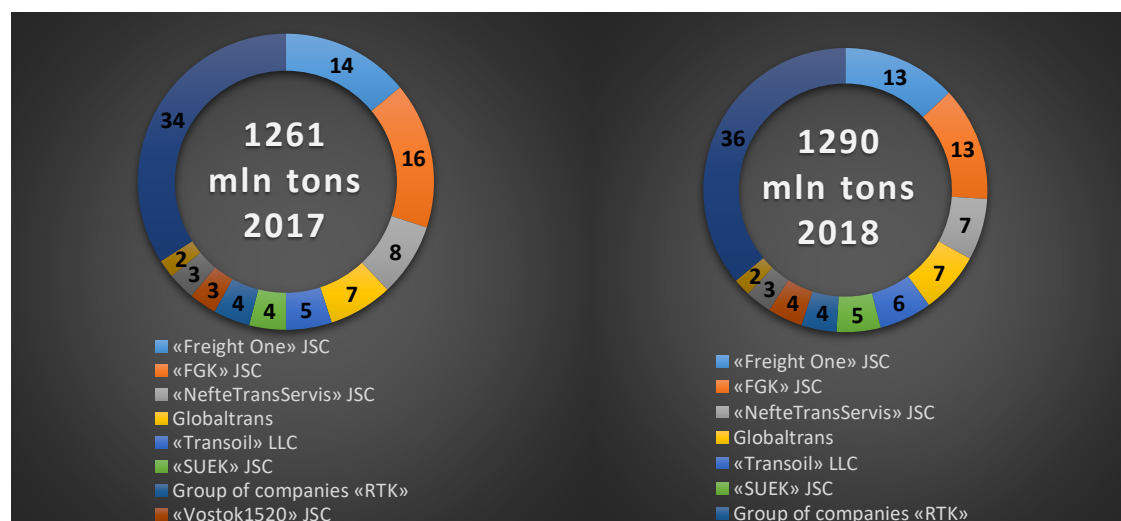


Figure 9. Largest railway operators of the Russian Federation in 2017 and 2018, % of the total volume of cargo transportation in the network of JSC «Russian Railways» (Freight in Russia: an overview of the current Statistics 2019).

2.5 Domestic and strategically important international railways of Russia

In 2018, 10 regions accounted for 29.1% of the operational length of Russian public railways. The longest railway networks are in Sverdlovsk (4.1% of the total length of railways), Amur (3.4%), Leningrad (2.9%), Irkutsk (2.9%) and Tyumen (2.8%) areas. The least developed railway network is in the Republics of Mari El, North Ossetia-Alania, Kabardino-Balkaria, Karachay-Cherkessia and Ingushetia (Table 1).

Table 1. Operating length of public railways, thousand km, 2018 (Freight in Russia: an overview of the current Statistics 2019).

The longest railway tracks		The smallest length of railway tracks	
Region	2018	Region	2018
Sverdlovsk region	3521,9	Mari El	152,2
Amur region	2919,9	North Ossetia-Alania	143,8
Leningrad region	2549,8	Kabardino Balkaria	133,3
Irkutsk region	2494,4	Karachay-Cherkessia	50,6
Tyumen region	2442,3	Ingushetia	38,8

The presence of long railways creates the conditions for the development of internal, external and transit freight. This is typical for regions with developed industry and allows users to combine different types of transport. Thus, cargo can be delivered to seaports by rail, and then sent for export by sea. In 2018, the Sverdlovsk Region (a region with developed industry) was the leader in terms of the volume of cargo dispatched by rail, and the Leningrad Region with its developed ports was ranked first in terms of volume of arrival (Freight in Russia: an overview of the current Statistics 2019).

It is notable that the western part of Russia is better equipped than the eastern part, which may be due to the fact that most of the population lives in the west. Since Russia has very large territory, it also has borders with many countries such as China, Kazakhstan in the east and Finland and Belarus in the west. Thus, Russia has many trade partners that are also interested in modernizing infrastructure areas. Russia plays a crucial role in providing effective transport interaction between Europe and Asia, sometimes acting as a transit territory for third parties. There are several internationally important railway roads that go through Russia.

One of the renowned railway roads that goes through Russia is Trans-Siberian railway. The Trans-Siberian Railway is a powerful double-track electrified railway line with a length of about 10,000 kilometers, equipped with modern means of information and communication. It is the longest railway in the world, a natural

continuation of the Pan-European Corridor 2. The highway passes through the territory of 20 constituent entities of the Russian Federation and five federal districts. These resource-rich regions have significant export and import potential (RZD No date).

In the regions served by the highway, more than 65% of the coal produced in Russia is mined, almost 20% of the country's refined oil is pumped and 25% of the industrial wood is harvested. Here is where more than 80% of the country's industrial potential and basic natural resources are concentrated, including oil, gas, coal, timber, ores of ferrous and non-ferrous metals. In total, 87 cities are located on the Trans-Siberian Railway, of which 14 are centers of the constituent entities of the Russian Federation. More than 50% of foreign trade and transit cargo is transported along the Trans-Siberian Railway (RZD No date).

This road also gives a lot of benefits such as reduced delivery times. The transit time for a container train traveling from China to Finland through the Trans-Siberian Railway is less than 10 days, while in comparison the sea transit time is 28 days. Currently, a significant part of cargo flows in the East - West direction is carried by sea. The dominant or almost monopolistic position of sea carriers in this direction does not allow shippers to count on a reduction in transportation costs. In this regard, rail transport is a reasonable economic alternative to maritime transport (RZD No date).

On September 14, 2017, the second export railway route to China was opened using the Vorsino-Chengdu-Vorsino circular route scheme (Figure 10). The project was implemented under the auspices of JSC «Russian Export Center» in partnership with: JSC «RZD Logistics», «TransContainer» PJSC and «Freight Village RU» Group of Companies.

The main destinations in China are the port of Dalian (with further delivery by feeder vessels to any port or by road to the Recipient) and Chengdu station (Sichuan province), and it is also possible to deliver goods from China to the Russian Federation.



Figure 10. Railway route Vorsino - Chengdu – Vorsino (RZD no date)

The «North-South» international transport corridor is also one of the most important international projects initiated by the Russian Ministry of Transport (Figure 11).



Figure 11. The «North-South» international transport corridor (RZD no date)

This corridor makes a significant contribution to the development of relations between Russia and the countries of the Caspian region, the Persian Gulf and South Asia, and supports the development of transit Eurasian transport via domestic transport communications. The «North-South» International Transport Corridor Agreement was signed between Russia, Iran and India on September 12, 2000 (RZD No date).

In May 2002, the Ministers of Transport of the participating countries signed a protocol on the official opening of the corridor. Currently, Azerbaijan, Armenia, Belarus, Kazakhstan, Oman, Syria have joined the Agreement (RZD No date).

The North-South international transport corridor is one of the largest transport and logistics projects currently being implemented in the Caspian region, designed to transport goods from India and the Persian Gulf states to Western and Northern Europe through the territories of the Caspian countries (RZD No date).

Another international transport corridor that goes through Russia is Pan-European Corridor 2. The main direction of Pan-European Corridor 2 is Berlin - Warsaw - Minsk - Krasnoye - Moscow - Nizhny Novgorod. In the future, the volume of traffic in the corridor will be largely determined by the implementation of strategic programs and projects of Russian Railways aimed at attracting mutual trade goods from Europe and Asia (primarily China) to the network of Russian Railways (RZD No date).

The main railway route of the Pan-European Corridor 9 is Helsinki - Buslovskaya - St. Petersburg - Moscow - Suzemka - Kiev - Lyubashevka - Chisinau - Bucharest - Sofia – Alexandroupolis (Figure 12). In the territory of the Russian Federation, in addition to the main direction of the corridor, traffic is also directed between the destinations of St. Petersburg - Zaverzhe - Zhlobin; Nizhyn - Zhlobin - Minsk - Vilnius - Kaliningrad / Klaipeda. The Russian sections of the corridor have a length of circa 1,900 km and are electrified along their entire length and almost completely equipped with a double track. In addition, based on

the need to increase promising traffic volumes, the General Scheme for the Development of the Railways Network of JSC «Russian Railways» for the Period until 2020 and for the Prospect until 2025 provides for a number of measures to expand the capacity of the infrastructure (RZD no date).



Figure 12. Pan-European Corridor 9 (RZD no date)

Therefore, it is highly important to develop transport infrastructure in order to simplify and streamline all transportation flows. As an example, Russia has developed a strategy for developing rail transport up to 2030. This will be further discussed in Chapter 4.

2.6 The role of the state in the development of railway infrastructure

The stable operation of transport requires significant financial investments to maintain its current state and respond to the needs of the economy, which is why states support their transport complexes with financial and non-financial measures. In 2018, 221.7 billion rubles (2.9 billion euro) of Russian budget funds

were allocated only for the construction and reconstruction of the transport infrastructure of Russia. The total amount of direct financial measures of state support for transport in 2018 amounted to 305.782 billion rubles (4.125 billion euro). The main recipient of public funds is road transport (Figure 13) (Russian Rail Transport: Challenges Until 2025. 2019).

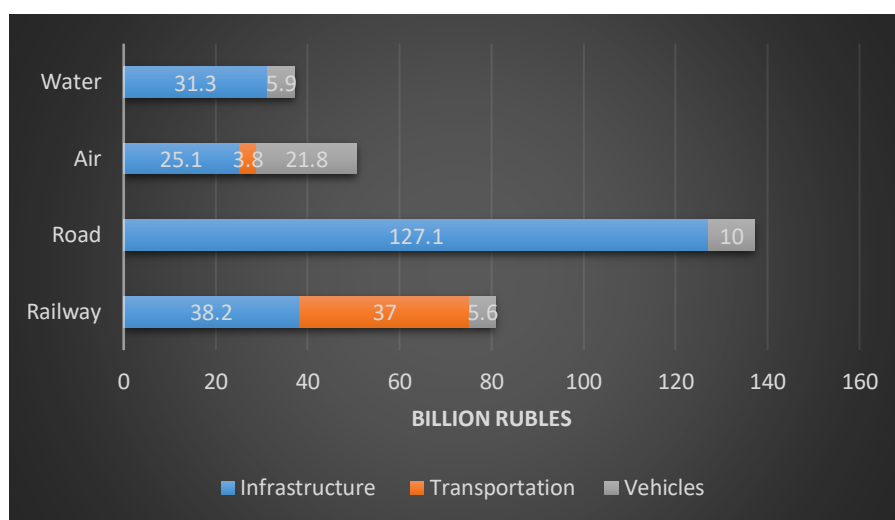


Figure 13. The structure of direct financial state support for transport in 2018 (Russian Rail Transport: Challenges Until 2025 2019)

A total of 3.6 billion rubles (0.04 billion euro) were allocated for the purchase of railway passenger rolling stock. In total, 2 billion rubles (0.027 billion euro) were allocated for the purchase of freight cars. The amount of subsidies for the implementation of road infrastructure projects (127.135 billion rubles- 1.715 billion euro) is three times higher than the subsidies for rail transport for the development of infrastructure. In total, 221.7 billion rubles (2.9 billion euro) were allocated for state support for the development of transport infrastructure in 2018, the largest share (58%) was aimed for the road infrastructure (Figure 14). The share of railway transport in the total amount of financial support for the development of transport infrastructure is 17% (Russian Rail Transport: Challenges Until 2025 2019).

In 2018, 43.3 billion rubles (0.584 billion euro) were allocated for state support for the purchase of vehicles (Figure 15). Air transport received more than half of the support, only 13% was rail which is less than any other mode of transport (Russian Rail Transport: Challenges Until 2025 2019).

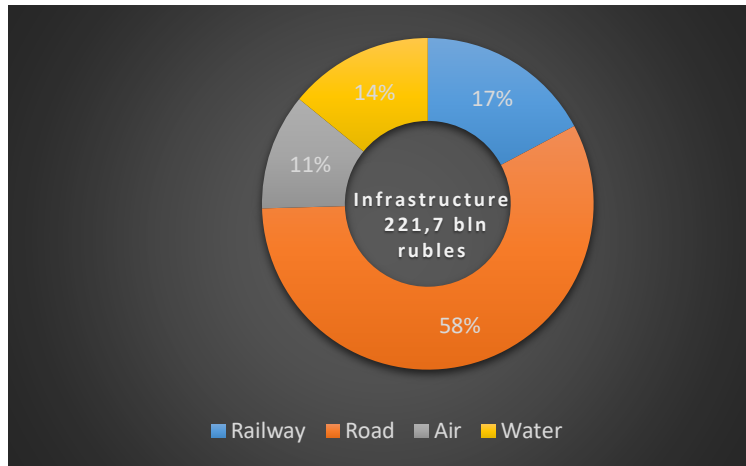


Figure 14. Structure of direct state support for infrastructure in 2018 (Russian Rail Transport: Challenges Until 2025 2019)

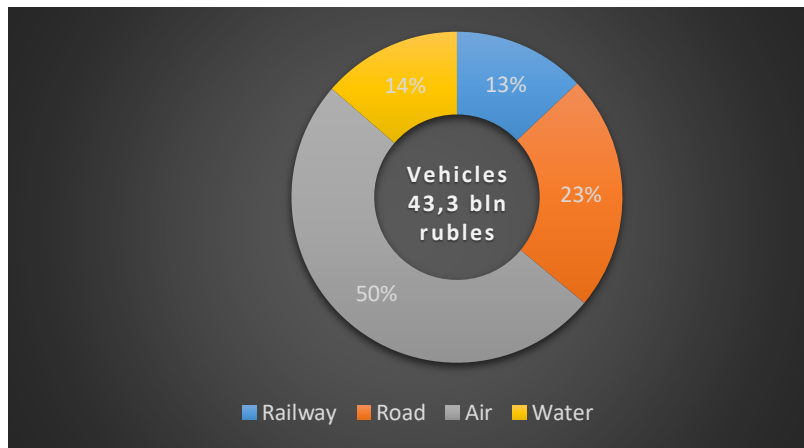


Figure 15. Structure of direct state support for vehicles in 2018 (Russian Rail Transport: Challenges Until 2025 2019)

At the same time, state support for rail transport includes other measures such as zeroing VAT on the transportation of passengers' baggage in domestic traffic and providing discounts to carriers on infrastructure services for transporting passengers in suburban traffic. In addition, in 2014-2015, the state adopted several regulatory measures in the field of safety of freight rolling stock, the result of which was the massive decommissioning of freight cars and the subsequent sharp increase in demand for new rolling stock (Russian Rail Transport: Challenges Until 2025 2019).

Therefore, in 2018, the trend of rising prices and rental rates of rolling stock, primarily gondola cars, continued as a result of a shortage of rolling stock caused by the massive write-off of cars in 2014-2016. Another factor was the increase in

coal transportation in 2017–2018 amid high prices on international markets (Overview of the freight industry in Russia 2019).

The dynamics of the supply and disposal of freight cars in the network of Russian Railways has multidirectional trends. From 2010 to 2014, the volume of deliveries of wagons to the network was quite high, due to the active development of the operating market and the large volume of private investments in the wagon fleet. At the same time, relatively few cars were written off during these years, not more than 2-4% of the total fleet of cars. As a result, at the end of 2014, the total fleet of freight cars in Russia amounted to 1,232,400 units, which is 20% higher than the 2010 level (Figure 16).



Figure 16. Deliveries, decommissioning and the general fleet of freight cars on the network of JSC Russian Railways, thousand units (Russian Rail Transport: Challenges Until 2025 2019)

However, such an increase in the rolling stock fleet led to a market oversaturation (surplus), worsening of the main indicators of the railway transport, a significant decrease in the profitability of freight cars (for example, the rental rate of a gondola car decreased by about 3 times from 2012 to 2015) and the decline in demand for a new rolling stock, which caused a difficult situation in carriage industry (Russian Rail Transport: Challenges Until 2025 2019).

In 2015, the write-off volume amounted to 104,000 cars, in 2016 – 109,000. The massive write-off was followed by a significant reduction in the total fleet of freight

cars (from 1,232,400 in 2014 to 1,072,800 in 2016) and the emergence of a local deficit, with reference to gondola cars. This was reflected in rental rates and the provision of rolling stock, as previously noted (for example, the rental rate of a gondola car from 2015 to 2018 increased more than 3.5 times) and an increase in demand for new rolling stock. In 2018, over 71,000 wagons were delivered to the network, and the total fleet grew to 1,112,800 units (Russian Rail Transport: Challenges Until 2025 2019).

In recent years, freight cars with increased axial load, the so-called «innovative cars», have been actively supplied to the network. If in 2017 approximately 97,000 such cars were operated in the Russian Railways network, then in 2018 the fleet exceeded 120,000, of which gondola cars accounted for 84.3% or more than 101,000 (Figure 17) (Russian Rail Transport: Challenges Until 2025 2019).

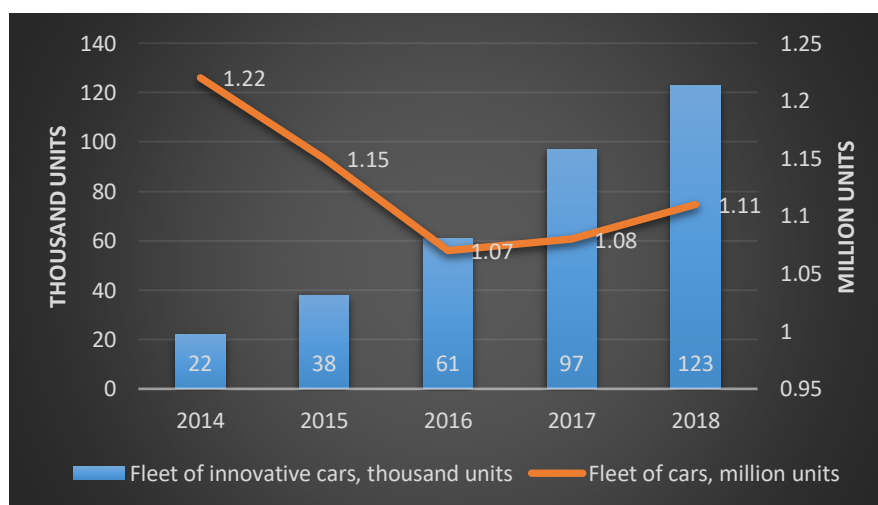


Figure 17. The fleet of cars and the fleet of innovative cars in Russia in 2014–2018 (Russian Rail Transport: Challenges Until 2025 2019)

The procurement and tariff policies of state-owned companies (in particular, Russian Railways and its subsidiaries) are also instruments of state influence on the industry. For example, the application by «Russian Railways» of a separate tariff scheme for empty mileage of freight cars with increased axle load (discounts on empty mileage of innovative open wagons) stimulates demand for such cars. In 2019, JSC «Federal Passenger Company» entered a long-term contract with JSC «Tver Carriage Works» for the supply of 3,731 passenger cars in 2019-2025 (an average of 533 cars per year). Such an order will ensure the loading of

approximately half of the plant's production capacity until 2025 (in 2018, more than 960 passenger cars were produced at the facilities of JSC «Tver Carriage Works») (Russian Rail Transport: Challenges Until 2025 2019).

An increase in the coefficient for tariffs for export transportation of goods and for tariffs for empty run of gondola cars had the greatest impact on coal shippers due to the peculiarities of their logistics schemes (half of all coal mined in Russia is exported) and the absence of this surcharge in previous years (surcharge as part of the tariff corridor for them was offset by a reduction factor). Thus, the actual increase in export tariffs for coal mining companies in 2019 amounted to 11.8%, and the increase in empty mileage tariffs was 9.8%. One of the reasons for the adoption of new allowances is the search for additional sources of financing for the long-term development program of «Russian Railways» until 2025, approved in March 2019 (Overview of the freight industry in Russia 2019).

The combination of railway and other modes of transport is one of the most promising areas in the development of digital technologies. With the digital docking of sea lines, ports, railways and regulatory authorities, a completely new logistics system is created that allows companies to quickly and safely deliver goods with minimal cost. Container transportation is the most optimal way to transport goods due to the versatility of containers and has great potential for the development of digital technologies that contribute to improving the process and reducing transportation time Freight in Russia (Freight in Russia: an overview of the current Statistics 2019).

2.7 Container rail transportation

Russian container rail transportation showed significant growth in 2019 increasing by 13.6% compared to 2018 and 50% over the last three years reaching 47,6 million tons (Figure 18).

When viewing the growth dynamics for the last four years, it is obvious that container deliveries are gathering momentum and thereby becoming popular mostly because of the container versatility. When it comes to number of TEU,

then again container rail transportation in 2019 increased by 12.6% compared with the results of 2018 and reached 5 million TEU (Figure 19).

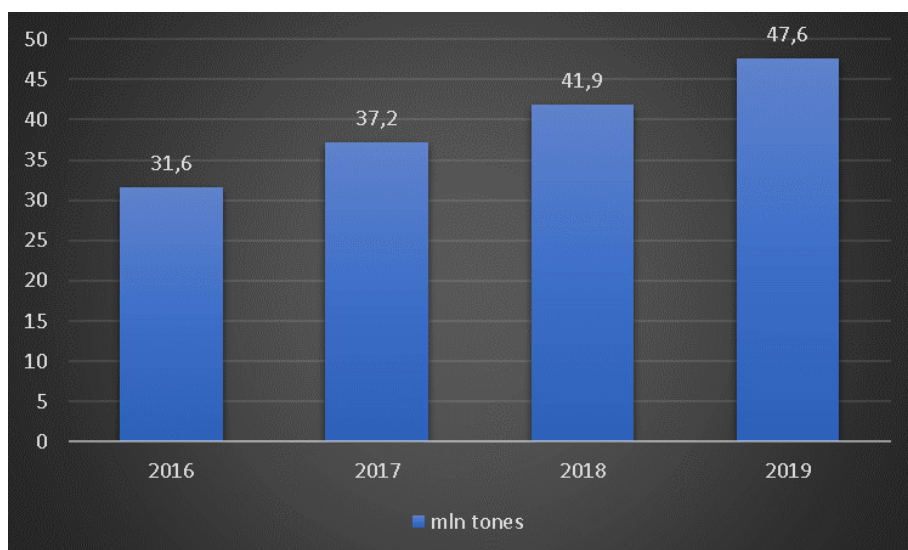


Figure 18. Container transportation, mln tons (Russian Railways 2020)

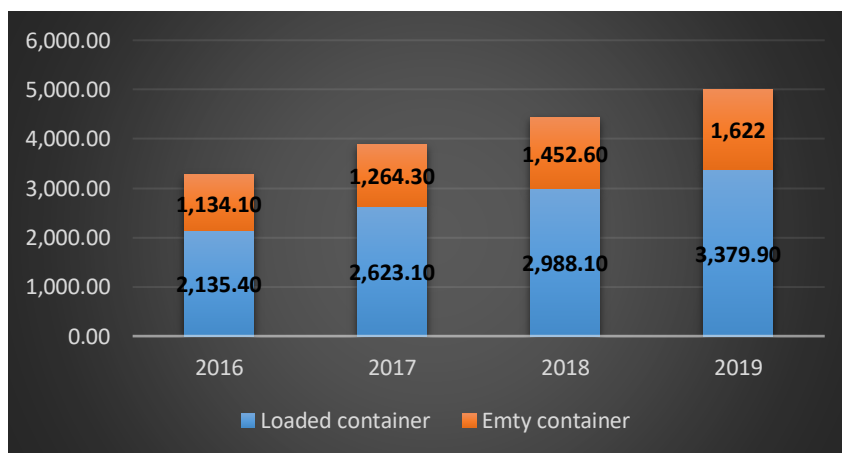


Figure 19. Container transportation on the railway network of JSC «Russian Railways» in 2016–2019, thousand TEU (Russian Railways 2020)

The main driver of market growth is international transport. Export transportation of all containers increased by 13.3%, to 1,28 million TEU, while in domestic traffic the numbers went up by 9.3%, to 2,08 million TEU, import rose by 24.1%, to 1,06 million TEU, transit increased by 35.1%, to 582,000 TEU. The numbers of loaded and empty containers have remained the same for the last three years with a ratio of 68 to 32% (Russian Railways 2020).

As noted earlier, multimodal transport is very important for the potential of transport development. A great amount of freight that have an export destination are sent to the seaports of Russia for further shipment. 308,8 million tons of freight designed for export went through Russian seaports in 2019 (Figure 20). Moreover, the largest share of freight was received by the ports of the North-West (42.4%) for further export of goods through the Baltic Sea, the White Sea and the Barents Sea (Russian Railways 2020).

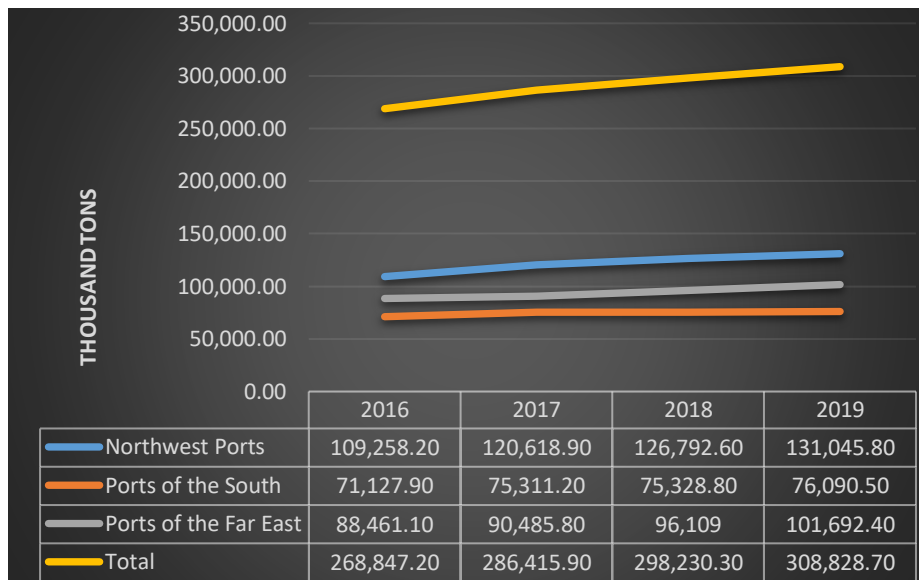


Figure 20. Loading of export cargoes to the seaports in 2016-2019, thousand tons (Russian Railways 2020)

The largest container rail operator in Russia is PJSC «TransContainer» (Figure 21). In 2018, the volume of container transportation was carried out by the company's rolling stock and container fleet increased by 6.1% and amounted to 1,9 million TEU mainly due to an increase in international traffic by 14.3% (+125,000 TEU compared to 2017). By 2024, a four-fold increase in the volume of rail transit container transportation is planned, as well as a reduction in the time of transportation of container transportation by rail, in particular from the Far East to the western border of Russia, from 13-20 to 7 days (Overview of Current Statistics 2019).

«TransContainer», being the largest player in the market of railway container transportation in Russia, has 38 own terminals in Russia. Also, it has 19 terminals

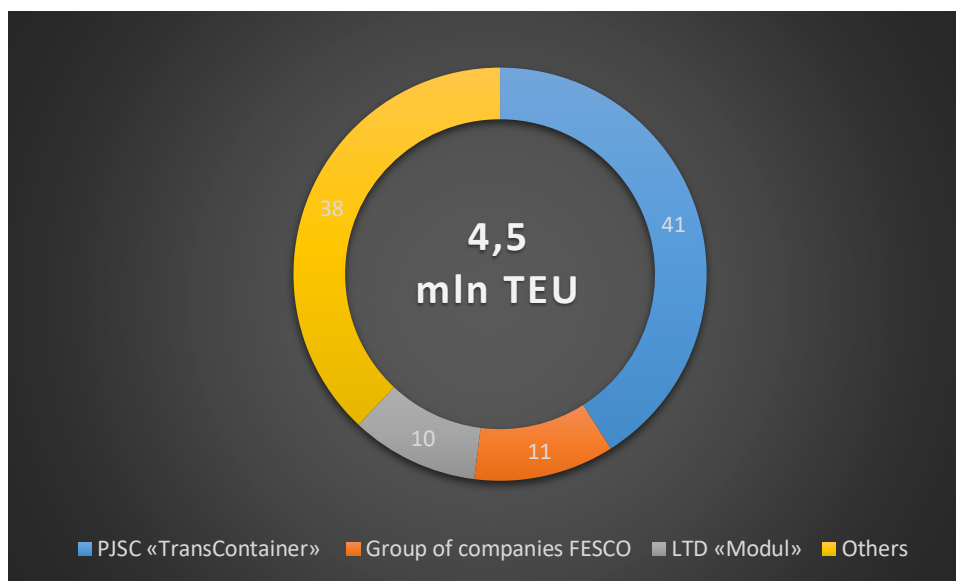


Figure 21. The largest railway container shipping operators in 2018, % (Overview of Current Statistics 2019).

in Kazakhstan and one in Slovakia. The assets of the company include 83,684 large-capacity containers and 30,676 fitting platforms. As the main result that should be achieved until 2022, «TransContainer» PJSC considers the consolidation of its position as the undisputed leader in the segment of railway container transportation (PJSC TransContainer 2019).

FESCO is one of the largest private transport and logistics companies in Russia with assets in the port, railway and integrated logistics business. FESCO's diversified asset portfolio enables door-to-door cargo delivery and control of all stages of the intermodal transport chain. Most of the company's operations are concentrated in the Far East of Russia, which allows FESCO to receive additional benefits from participating in dynamically growing volumes of trade operations between Russia and Asian countries. FESCO also works with transport companies in the Middle East and Europe. FESCO operates more than 14,000 units of rolling stock, including 5,000 fitting platforms. The Group manages about 40,000 containers (FESCO no date).

LTD «Module» has five terminals in Russia, mostly concentrated in western part. LTD «Module» also has more than 2,500 units in the fleet of fitting platforms and carries out more than 200 container trains per month (LTD «Module» no date).

The throughput capacity of ports and railways of Russia and other transit countries is, of course, not infinite. Already now, when planning the growth of transit freight traffic, it is necessary to think about increasing the capacity of the infrastructure for the export of potential cargo volumes. Undoubtedly, the presence of a developed infrastructure system provides a tangible prerequisite for the intensification of container traffic. An important factor in attracting freight traffic to the Russian railway network is the development of transit traffic which is the least dependent on the domestic economic situation. By developing transit, benefits could be obtained by using only the infrastructural and geographical resources of Russia without spending effort on the production and sale of the goods themselves. This is especially true during the period of reduction in imports, exports and domestic transport in Russia. Transit here acts as a “safety cushion”, not allowing ports, terminals and rolling stock to stand idle without work (Container transit: reality and potential 2019).

It is worth noting that in 2018 the contribution of transit traffic increased significantly, amounting to 12.6% compared to 10.7% a year earlier. The main factor was a significant increase in transit through the territory of the Russian Federation in the China-Europe-China corridor within the framework of the Chinese Silk Road project, which involves a high level of containerization. The total volume of China-EU-China container transit amounted to 376,800 TEU, which is 35% higher than the level of 2017. At the same time, transportation in the direction of China-EU increased by 25%, from 179,200 to 223,500 TEU, while EU-China traffic increased by 54%, from 99,500 in 2017 to 153.4 thousand TEU in 2018. Thus, in container transit, there was a decrease in the imbalance in the east-west direction (Developing the benefits - Annual Report 2018).

Given the expected moderate dynamics of the cargo base for container transportation, a key driver of growth in the railway container segment is expected to increase growth in containerization of transportation. This implies maintaining a high level of competition both among the operators of railway rolling stock and between the railway and automobile segments of the Russian transport market (Developing the benefits - Annual Report 2018).

The factors that promote the railway container transportation segment in comparison with other segments of the transport market are the balanced tariff policy of Russian Railways in relation to container transportation, simplification of document management and procedures for access to railway infrastructure, development of container train movement technologies and other measures that increase the attractiveness of this type of transportation (Developing the benefits - Annual Report 2018).

In 2019, FESCO and several other companies launched a transit service from Korea and Japan to European countries. The routes of all services run along the Trans-Siberian Railway. However, some suggest a direct route by rail, switching to the European gauge in Poland, while others include the sea shoulder from St. Petersburg to Kaliningrad, from where railway or auto delivery can already be arranged. The main advantage of transit traffic in comparison with sea carriers on DeepSea is the reduction of time to 25 days. This direction has great potential: the export volume to Germany alone from Korea and Japan is 2.5 times higher than the export of these countries to Russia. However, while almost all cargo is transported by sea, the volume of transit traffic through Russia is insignificant at 320 TEU per year (Fesco 2019).

3 KOUVOLA-XI'AN RAILWAY ROUTE

3.1 Overview of the «Railgate Finland» project

The container business today is one of the most modern and technologically advanced segments of the freight transportation market. An increasing number of business-related people are becoming involved in container transportation. They suppose that it is more beneficial and much more reliable. Container deliveries are becoming more popular and common amongst the users. Nowadays, container transportation is gaining momentum and according to many experts' opinions, it is going to grow in the future. In order to do so, the container industry needs to change its attitude and be realistic about the current situation. With the advent of digitalization and the massive spread of e-commerce, customers' needs are also changing. They set different kinds of requirements and need more visibility and reliability. In this case, containers have several advantages. Innovations are going to be discussed in Chapter 4 of this thesis.

Kouvola-Xi'an railway route is one of the railway routes created over the past five years in cooperation with Kouvola Innovation Oy. It opened great opportunities for Finland and the rest of the Scandinavian countries, gaining efficiency and competitive advantage (Figure 22).



Figure 22. Kouvola-Xi'an railway route (Kouvola Innovation Oy 2017)

The road itself also has advantages in terms of delivery time having made possible to carry out transportation in a significantly short time - in 12-14 days which is a significant reduction when compared to the Trans-Siberian Railway which requires circa 18-21 days.

Another advantage of this route is that the tracks used in Finland, Russia and Kazakhstan have similar gauge dimensions, which speeds up the process of preparing the train. In this case, there is no need to deal with the rearrangement of the gauge. It is also worth noting that the European railway operators used to be overloaded with cargo scales and suffered from a lack of containers, which impeded the transportation process. Kouvola-Xi'an railway route reduced the distance to 2000 km, which has also helped redistribute cargo, thereby balancing traffic flows (Kouvola Innovation Oy 2017).

3.2 Trade between Finland and China

«Railgate Finland» brought a new level of efficiency to transportation and competitive edge to rail traffic. It opened new business opportunities and enabled growth in both export and import volumes. China is the second most important trade partner for the European Union after the United States, which makes connections between Europe and China critically important. From the point of view of the importance as a trading partner for Finland, China also has special significance in terms of import, ranking fourth after Germany, Russia and Sweden (Figure 23).

It is also worth noting that over the past year, imports from China have increased by 5%, amounting to 4,897 billion €. Import and export with China over the past five years have increased by 22 and 38%, respectively (Figure 24).

When increasing goods turnover, it is also necessary to pay attention to transport accessibility between countries. Appropriate conditions must be created so that the cargo can reach its destination without much effort. The «Railgate Finland»

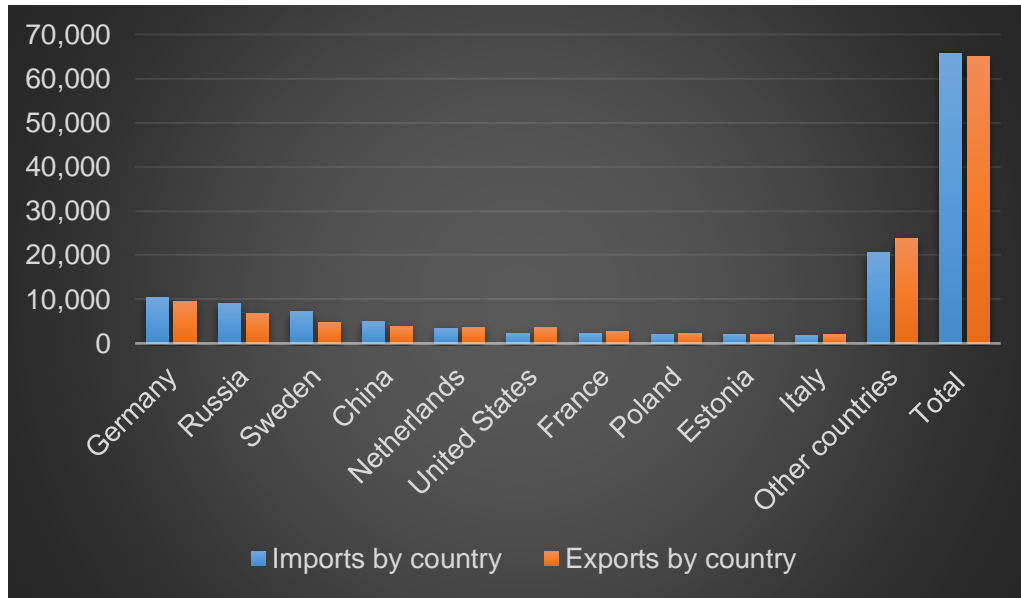


Figure 23. The largest import and export countries for Finland in 2019, € million (Statistics Finland 2020)

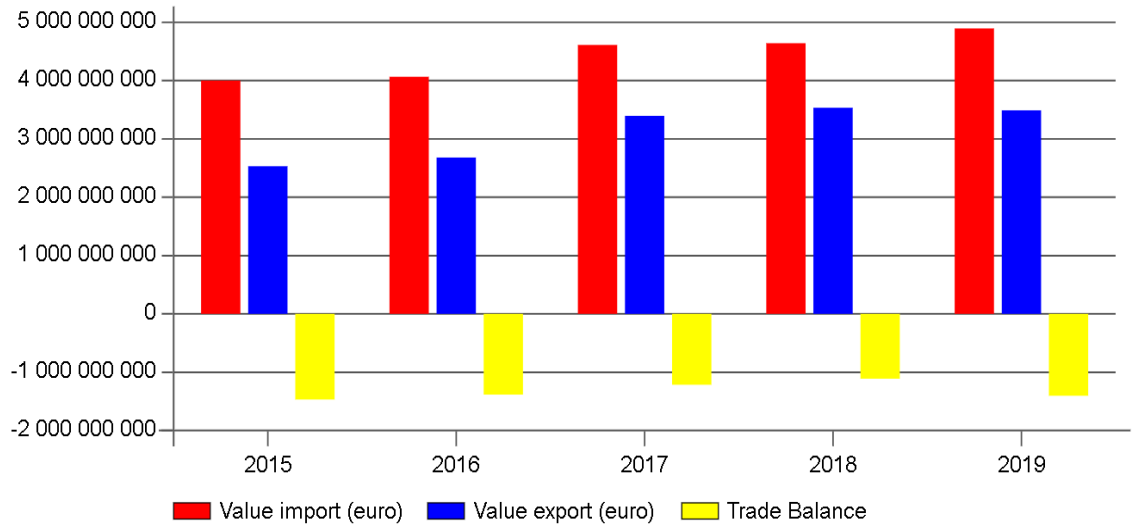


Figure 24. Trade with China over the past 5 years (International Trade Statistics 2019)

project is one of those projects that can rightfully be acknowledged for contributing to the development of transport links, namely between China and Finland. This project also created certain competitive advantages for railway transport over other modes of transport when air transportation is too expensive and sea transport is too slow.

3.3 Role of rail transport between Finland and China

Most of the cargo between Finland and China is transported by sea. Railway transport over the past five years has shown growth (Figure 25).

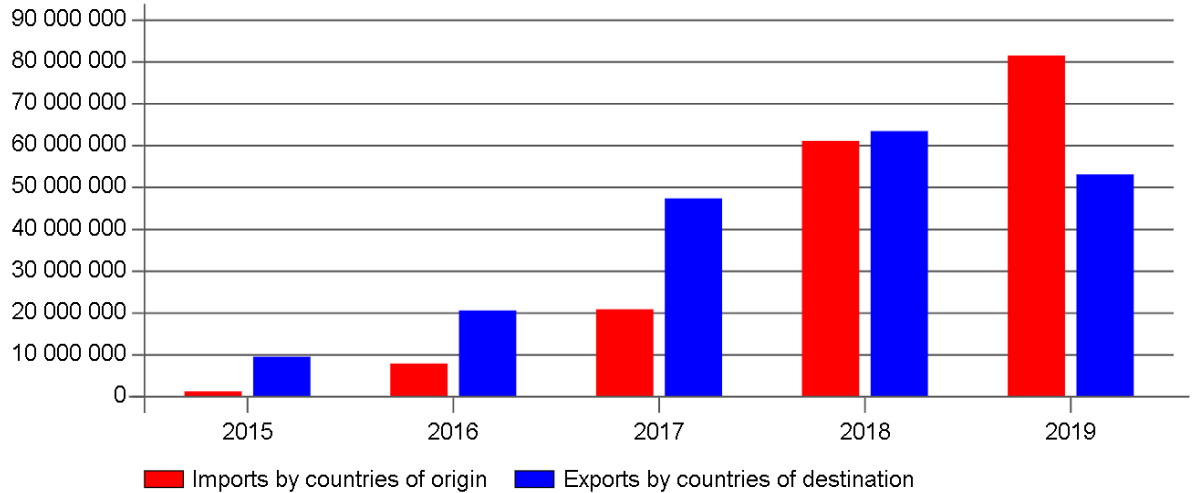


Figure 25. Import and export with China over the past 5 years delivered by rail, € (International Trade Statistics 2019)

In connection with that it can be said that during that time, imports of goods from China transported by railway transport have increased annually, reaching 81,567,800 €, which is 33% more compared to 2018. Exports showed the same growth dynamics until 2018, but in 2019 unexpectedly decreased by almost 47%. Moreover, this seems to be mainly due to a decrease in container traffic (Figure 26).

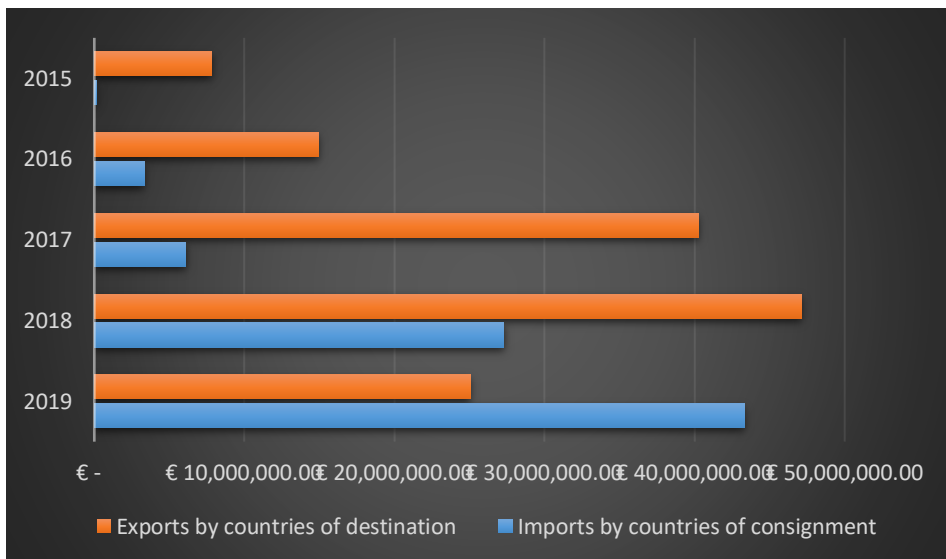


Figure 26. Container rail transportation between Finland and China, € (Logistics statistics 2019)

In 2018, the share of container rail transport in exports amounted to 74%. Most of the goods in both directions are carried in containers. ((International Trade Statistics 2019)

The main reason for the deterioration of export indicators was the decision of China to tighten its aid policy. A prerequisite for this was that the trains in the Chinese direction were not fully loaded. As a result of the tightening, cargo traffic to Kouvola began to pile up. The first full year of operation of the Kouvola-China route was still reasonable in terms of delivery consistency. In 2018, 24 trains passed between Kouvola and Xi'an. The first train from Kouvola to Xi'an was dispatched at the end of 2017 (Kirsi Skön 2019).

The only container train from Finland to China runs from Helsinki to Hefei in eastern China. It is managed by the private logistics company «Nurminen Logistics» which also has employees in China occupied in the sphere of freight business. The company says that in order to increase sales, it is necessary to achieve a regular route (Kirsi Skön 2019).

3.4 Infrastructure covering the Kouvola-Xi'an route

Infrastructure must be properly planned before opening any routes. Undoubtedly, demand is one of the most important components for large transport projects. Despite the difficulties encountered in deliveries between China, trade is likely to grow between China and Finland considering the results of the last five years (International Trade Statistics 2019).

«Railgate Finland» can intensify and give impetus and new dynamics to the development of relations between countries. Currently, large-scale work is underway to modernize and expand the large intermodal logistics terminal located in Kouvola.

The terminal has been ranked as the best logistics center in Northern Europe. Geographically, the terminal is located in a profitable and convenient place that has easy access to the harbor in Kotka, railway road and highway. Therefore, in

terms of a location, Kouvola terminal has great potential for multimodal transport deliveries (Figure 27).



Figure 27. Transport connection of Kouvola terminal (Kouvola RRT Rail and Road Terminal 2020)

It is also worth noting that Kouvola terminal is considered as a part of the trans-European transport network (TEN-T). Therefore, its value to the world transport infrastructure is extremely important. Currently, 200 companies operate in that terminal with nearly 2,000 employees. The size of logistics area is 407 hectares (Kouvola RRT Rail and Road Terminal 2020).

As a part of development program, the terminal is being extended in the Tehola–Kullasvaara area in Kouvola (Figure 28). The terminal building project has received funding from the EU because of its strategic importance. The Kouvola terminal is expected to contribute to the growth of the economy and employment on a regional and national scale. It is predicted that the Kouvola terminal will be ready at the beginning of 2021 and that by 2025 the terminal capacity will be 250,000 TEU. It is worth noting that the construction of the terminal will contribute to the increasing traffic mainly from Russia, as well as from China and Kazakhstan. In terms of innovations, robotics and digitalization are expected to play a crucial role. It will enable to achieve time and cost savings. It will also be possible to handle trains longer than 1 km at the terminal. After the completion of construction, the Kouvola terminal will be fully updated, gaining efficiency and competitiveness in intermodal transportation being able to meet the growing

demands of national and international traffic (Kouvola RRT Rail and Road Terminal 2020).

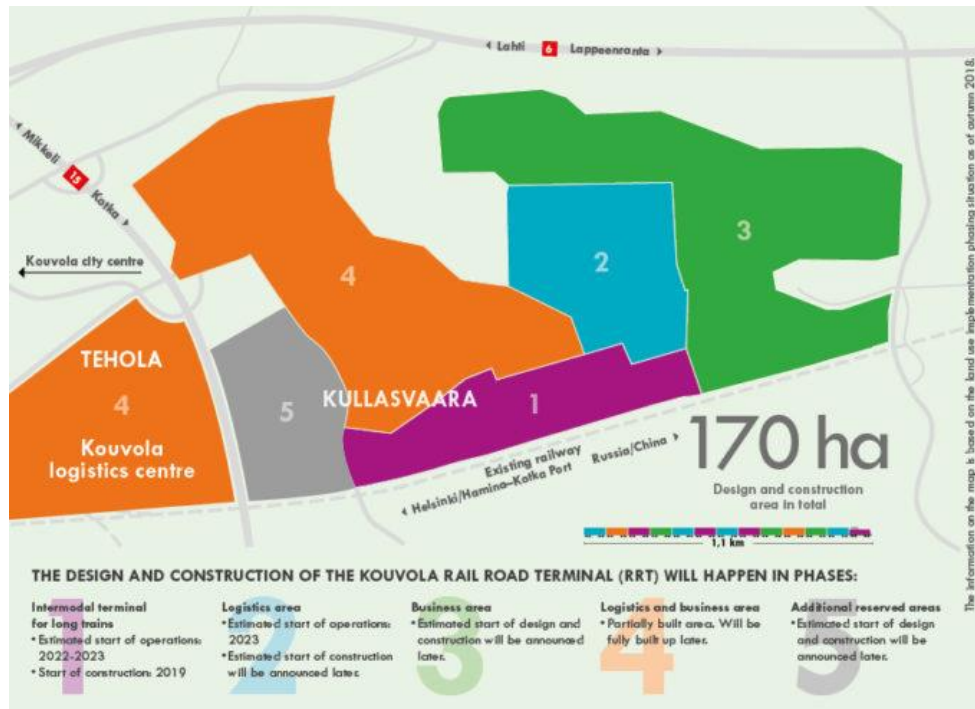


Figure 28. Kouvola Rail and Road Terminal (Kouvola RRT Rail and Road Terminal 2020)

Intermediate stops on the Kouvola-Xi'an route are arranged at St. Petersburg, Moscow and Khorgos. In recent years, Russia has been making great efforts to modernize its infrastructure, providing the most favorable conditions for transportation, both domestic and international. Today, one of the largest multimodal logistics centers in Russia is operating in the city of Kaluga. The «FREIGHT VILLAGE RU» group of companies unites the logistics, customs and development business lines. The company offers container and customs terminal services, industrial and warehouse real estate for rent and for sale. Since 2012, «FREIGHT VILLAGE RU» has been implementing a project to create one of the largest multimodal production and logistics centers in Russia in a unique "cargo village" format - Freight Village Vorsino and Freight Village Rosva (FREIGHT VILLAGE RU no date).

FREIGHT VILLAGE VORSINO (a cargo village of the federal format of 570 ha) is located on the border of New Moscow and the Kaluga region and is part of the Vorsino industrial park (Figure 29). The size of the container terminal is 26 ha.

The container terminal also has seven railway tracks. The usable area of each of them is more than 1 km. The capacity of the loaded container terminal is 350,000 TEU per year. Area for empty containers can accommodate 7,000 TEU. The terminal also uses the Solvo automatic control system, which allows customers to submit applications and track the status of containers on the terminal online. Kalmar reachstackers are used as reloading equipment («FREIGHT VILLAGE RU» no date).



Figure 29. FREIGHT VILLAGE VORSINO cargo village («FREIGHT VILLAGE RU» no date)

From Kaluga railway lines, export transportation is also possible. The project for sending goods by rail to China was implemented by FVK together with the Russian Export Center (REC) in partnership with Russian Railways Logistics and with the support of PJSC Transcontainer. A container train leaves from Vorsino Station to China. The main destinations are Dalian (with further delivery by feeder vessels to any port or by truck to the recipient), as well as the cities of Chengdu (Chengxiang) and Shilong, as the most developed logistics complexes in central and southern parts of China («FREIGHT VILLAGE RU» no date).

FREIGHT VILLAGE ROSVA (a cargo village of a regional format of 64 hectares) is located on the border of Kaluga and is part of the industrial park of Rosva. The capacity of this section is 150,000 TEU per year («FREIGHT VILLAGE RU» no date).

A multifunctional logistics complex is operating in St. Petersburg, providing a full range of container and general cargo handling services under the name of Logistics Terminal (Figure 30).



Figure 30. Multifunctional logistics complex - JSC «Logistics Terminal» (LOGISTICS TERMINAL no date)

This is the first "dry port" in the Russian Federation and it is located 17 km from the territory of the Seaport («Big Port of St. Petersburg») in the industrial zone of Shushary. It has an integrated IT system with the First Container Terminal (FCT) and provides cargo handling for customers of all marine terminals and any forwarding companies. The activities of Logistics Terminal are aimed at a substantial expansion of the range of services offered by sea terminals, including the storage of large quantities of goods and the formation of container trains. Logistics Terminal has significant storage space, a powerful and diverse fleet of transshipment equipment, a well-developed railway infrastructure and direct access to public road and railway networks, including the M-10 Moscow-St. Petersburg highway. The total area of the terminal is 92 ha. Container site capacity (loaded) is 12,500 TEU and container Depot Capacity (empty) is 4,500 TEU and throughput is 273,000 TEU per year (LOGISTICS TERMINAL no date).

The special economic zone “Khorgos - East Gate” is part of the territory of the Republic of Kazakhstan with precisely defined borders on which a special legal regime of the special economic zone operates (Figure 31). It is a strategically important facility connecting China, Central Asia and the Middle East. The Khorgos-East Gate special economic zone includes three key zones - the logistics and industrial, as well as the transport and logistics complex “dry port”.



Figure 31. KTZE-Khorgos Gateway dry port (KTZE-Khorgos Gateway 2019)

KTZE-Khorgos Gateway dry port is a multimodal logistics hub, the services of which are various cargo operations, such as carriage and container operations, transshipment, terminal cargo handling and additional logistics services. In the Dry Port, six railway lines were laid, three of which were along the narrow Chinese track. It complies with international dry port standards in terms of operating procedures, workstation software and terminals. The total area of the Dry Port is 129.8 ha, integrated with the logistics (224.9 ha) and industrial (224.6 ha) zones. This project provides an optimal solution for container handling and opens new opportunities for further industrial processing of imported goods. Khorgos Gateway is considered as a strategic object for creating a logistics hub that will cover the global market from China to Europe, passing through the countries of Central Asia, Turkey and the Gulf countries (KTZE-Khorgos Gateway 2019).

The effectively developed project infrastructure actively contributes to the development of trade and economic relations between East and West. Also, new logistics solutions significantly reduce costs in the 'supply chain' and speed up delivery time in the global market (KTZE-Khorgos Gateway 2019).

Thus, it can be stated that the infrastructure of those regions along which the Kouvola-Xi'an route extends is well equipped to meet the requirements of modern technologies and throughput. This gives railway transport good advantages over other modes of transport.

"One belt, one road" is China's development program to improve trade and economic ties with other countries. Part of this initiative is the modernization of infrastructure. The main objective of the program is the redistribution of cargo from sea to land in order to unload overloaded ports.

In order to be able to accept such a large number of containers, infrastructure development is necessary. «Railgate Finland» is exactly what might be called a good addition.

3.5 Finland's container rail transport with Kazakhstan and Russia

The opening of Kouvola-Xi'an route, of course, is a very important event for increasing trade volumes. Indeed, now the goods of the Scandinavian countries are not only sent to Russia but can also be sent to China and Kazakhstan. Moreover, the demand for sawn timber is quite large in China, especially for fast container trains. The first container train with saw timber went to China at the end of 2017. Xi'an is the final destination of the route because it is the most advantageous location of the city, which allows consignees to get maximum accessibility and convenience. Moreover, most buyers are concentrated in the central part of China (Kouvola-Xian rail route: Timetable for January-March 2018 announced 2017).

At the end of 2018, an agreement on the development of cooperation between Finland and Kazakhstan was signed in Helsinki with the participation of the President of Kazakhstan, where the importance of railway transport was emphasized. Kazakhstan railways, KTZ Express, Kouvola Innovation Oy and Unytrade Oy have formed a partnership that will facilitate railway transportation between Kazakhstan and the Nordic countries (Enhancing rail transport cooperation between Kazakhstan and Finland 2018).

Cooperation in the field of railway transport is also carried out with other Nordic countries such as Sweden and Norway. With relation to the town of Haparanda and the port of Narvik, both of which are included in the development of relations with China and Kazakhstan. The main purpose of all those agreements are increasing the volumes of rail transport with China and Kazakhstan (Enhancing rail transport cooperation between Kazakhstan and Finland 2018).

According to the official statistics of the Finnish customs authorities, container transport by rail looks rather ambiguous. Finland does not import anything from Kazakhstan by rail container transport (Figure 32). As for exports, they have shown slight growth over the past two years reaching 3,726,406 euros. Exports are based mainly on chemicals and related products (Transport Statistics 2019)

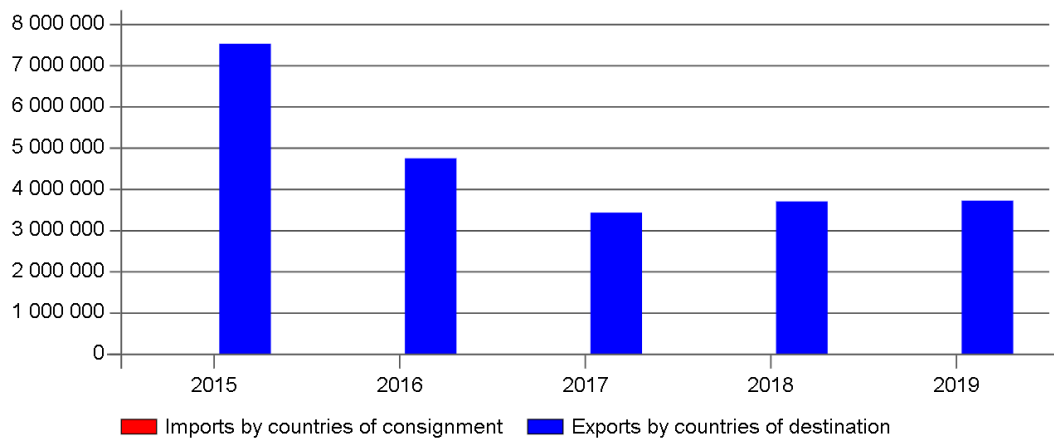


Figure 32. Container rail transportation between Finland and Kazakhstan, € (Transport Statistics 2019)

Considering in detail the railway container situation with Russia, at the moment Russia is the main importer of Finland in terms of railway container

transportation. Based on the growth dynamics of the last five years, imports from Russia reached 799,058,783 euros. The main cargo item of import is crude materials. Exports are stable, although show slight growth (Figure 33).

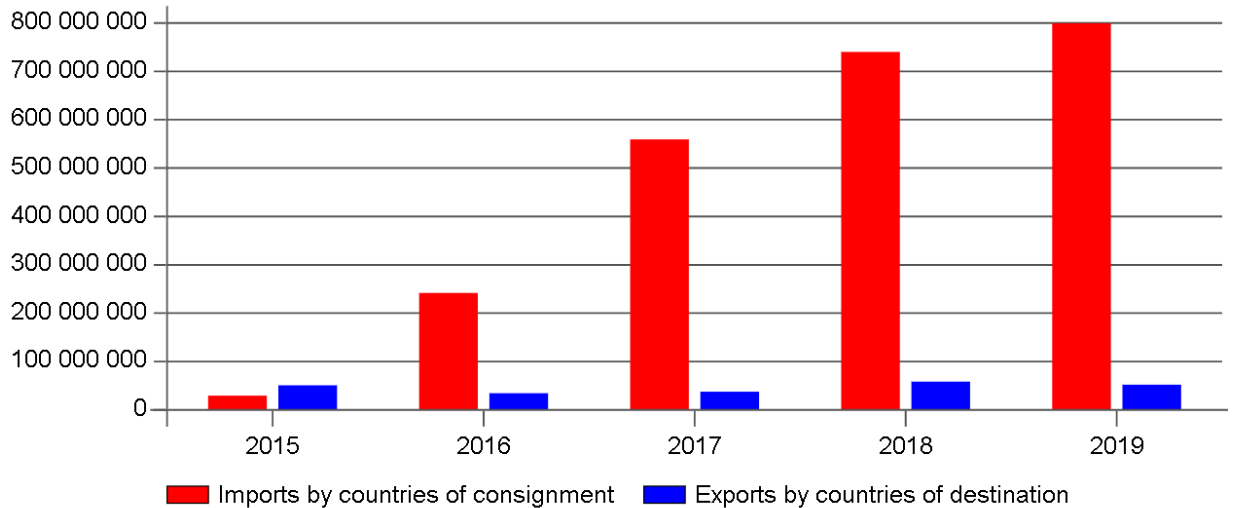


Figure 33. Container rail transportation between Finland and Russia, € (Transport Statistics 2019)

Undoubtedly, «Railgate Finland» can serve as a significant catalyst for increasing traffic volumes in promising directions. The changing infrastructure in other countries also encourages hopes that the situation will change for the better.

3.6 Operators of railway container routes China-Finland

Container train traffic between Kouvola and Xi'an has been operated by several parties including Kazakhstan railways, KTZ Express, Unytrade Oy, and Kouvola Cargo Handling Oy (Enhancing rail transport cooperation between Kazakhstan and Finland 2018). The trains and containers on the Kouvola-Xian route are owned by the Kazakh rail company KTZ (Kouvola-Xian rail route: Timetable for January-March 2018 announced 2017).

Kouvola Cargo Handling Oy offers its services only to large exporters who reserve the entire train capacity and determine the departure date themselves, i.e. so-called block trains. Kouvola Cargo Handling Oy has transported e.g. paper, carton board, pulp, timber and metal industry products in such container trains. The train moves as a whole train from start to end, and always along the

same route. The only stop during the passage is on the border of Kazakhstan and China, where containers are offloaded to other cars because the gauge of the railway in China is different from that in Finland and the CIS. Kouvola Cargo Handling Oy also controls the train online so that customers always know where the train and their goods (Kouvola Cargo Handling Oy 2020).

Considering, alternatively, another route from Finland to China, namely the Helsinki-Hefei route, that was opened circa one year after Kouvola- Xi'an route, certain parallels can be drawn. «Nurminen Logistics» is the operator that functions on this route. Transportation time takes up to 18 days. At the same time, unlike the Kouvola-Xi'an route, «Nurminen Logistics» carries out transportation on a regular basis, which indicates high reliability of this route (Nurminen Logistics 2020).

Direct block train service between China and Finland has been functioning for more than one year. The demand for this route has been increasing. Among other modes of transport, this railway route, of course, takes its niche in the market. As for recent events, in March 2020, a train from Hefei to Helsinki arrived in a record time of 11 days. The current situation related to the global pandemic has complicated the work of air and sea operators but has not hindered railway operators. «Nurminen Logistics» continues to operate in a stable mode and plans to continue sending block trains to China (Nurminen Logistics 2020).

4 PROSPECTS FOR THE FUTURE DEVELOPMENT OF CONTAINER AND MULTIMODAL RAIL TRANSPORTATION

4.1 The future of railway transport in Russia

Existing trends in the railway transportation market and relevant development plans for industry participants allow to predict an increase in cargo loading and cargo turnover (Figure 34).

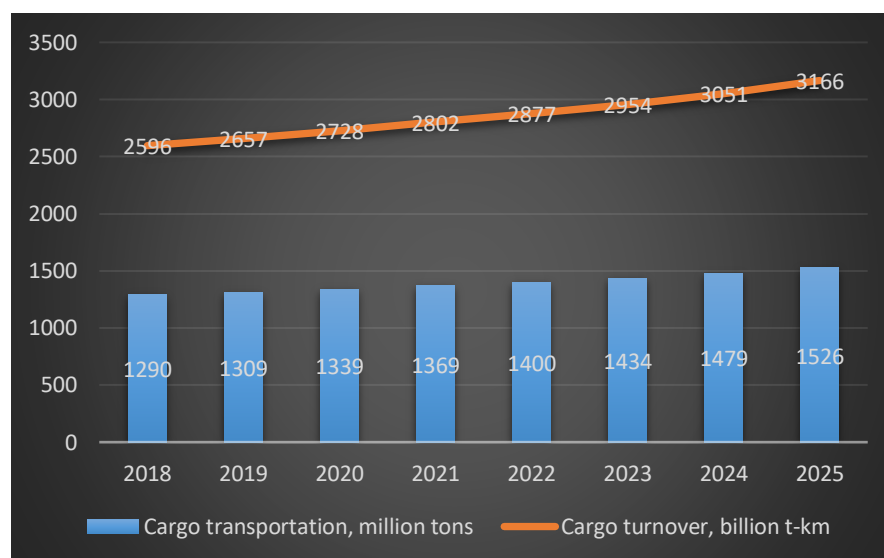


Figure 34. Forecast of transportation of goods and freight turnover of railway transport on the network of JSC Russian Railways (Overview of the freight industry in Russia 2019)

Therefore, in 2020, a moderate increase in the volume of loading on the Russian Railways network is expected, mainly due to an increase in export of coal, formed by favorable market conditions, and limited growth of the economy of the Russian Federation (Overview of the freight industry in Russia 2019).

In the medium term, a significant increase in rail freight is expected, mainly due to an increase in the loading of Russian coal in the eastern direction, including for export to the countries of the Asia-Pacific region, up to 195 million tons in 2025 (excluding isolated coal mining areas) (Figure 35, Figure 36).

Such growth will be facilitated by:

1. Implementation of the first and second stages of the development program of the Eastern landfill.
2. Development of transshipment port facilities.

3. Implementation of investment projects of coal industry companies aimed at increasing coal production and enrichment.

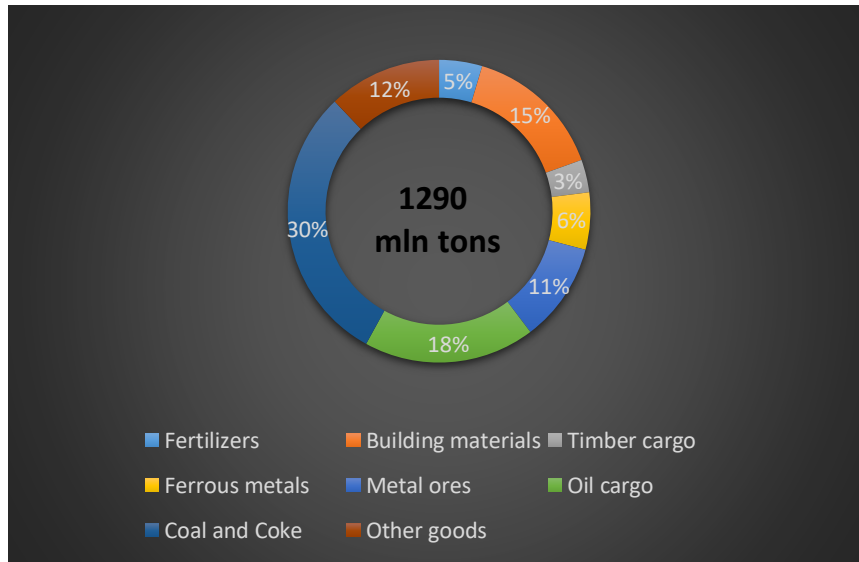


Figure 35. Cargo loading structure by type of cargo in 2018, % (Overview of the freight industry in Russia 2019)

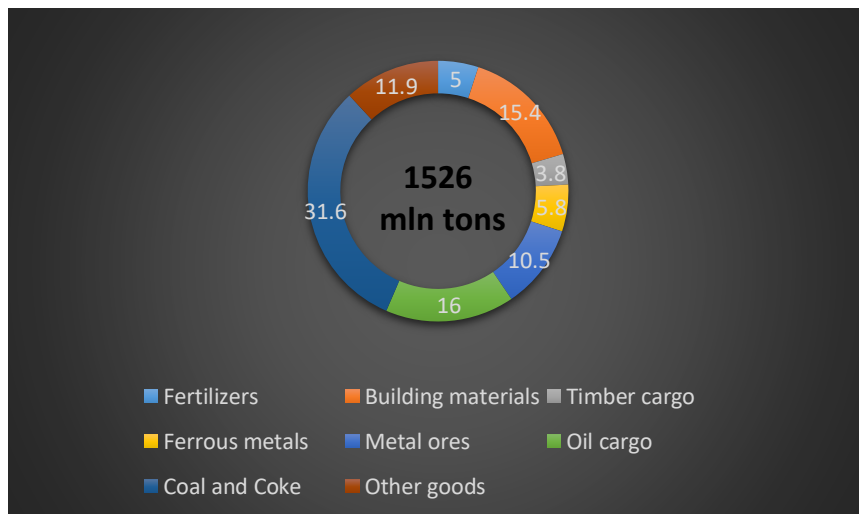


Figure 36. Cargo loading structure by type of cargo in 2025, % (Overview of the freight industry in Russia 2019)

At the same time, the growth potential of coal exports in the western direction is significantly limited by a decrease in coal consumption in the EU countries and related plans for the development of renewable energy sources (Overview of the freight industry in Russia 2019).

The volume of transportation of oil and oil products, which occupy a significant share in the structure of the cargo base of Russian Railways, will remain stable in the medium term with the potential to decrease due to competition from pipeline transport (Overview of the freight industry in Russia 2019).

The shares of the remaining categories of cargo in the structure of the cargo base in 2020–2025 will not change significantly. One of the tasks for the development of the industry, fixed in the long-term development program of JSC Russian Railways, is to increase container traffic. Under the baseline scenario, an increase in the volume of transit container traffic by 3.7 times is projected. At the same time, the development of container transportation in all directions may be limited due to the existing constraints (The long-term development program of the Russian Railways until 2025 № 466-p 2019).

Until 2019, it was assumed that the privatization of the container transportation segment, in particular the sale of PJSC «TransContainer», will contribute to the growth in traffic. And therefore, at the end of 2019, Russian Railways finally sold a controlling stake. Funds received from the sale of assets will be allocated to Russian Railways for infrastructure development (Interfax 2019).

The key factor contributing to a potentially significant increase in loading volumes will be the development of railway infrastructure. The conditions for increasing eastward coal supply will be created as part of the implementation of measures to increase the carrying capacity of the Baikal-Amur and Trans-Siberian railways (up to 180 million tons by 2024). Cargo will be transported in the direction of ports and border crossings of the Far East (Overview of the freight industry in Russia 2019).

At the same time, the development of railway infrastructure will make it possible to attract freight flows formed in new areas of coal mining in Eastern Siberia and the Far East. A promising cargo base, ensured by an increase in production at the main fields of the Eastern landfill, could reach up to 144,5 million tons by

2025 in addition to the level of 2012 (Overview of the freight industry in Russia 2019).

The investment program of Russian Railways until 2025 also includes the following projects aimed at increasing the volume of cargo loading:

1. Development and updating of railway infrastructure on the approaches to the ports of the Azov-Black Sea basin. The measures being implemented will ensure the transportation of goods by rail to the ports of the Azov-Black Sea basin in the amount of 125.1 million tons by 2020, as well as optimize the operation of the Krasnodar railway junction.
2. Development and updating of railway infrastructure on the approaches to the ports of the Northwest basin. The goal of the project is to master the projected growth in the volume of cargo transportation in the near and far approaches to the ports of the North-Western basin in the amount of up to 165.7 million tons (+35 million tons) by 2025.
3. Integrated development of the Mezhdurechensk-Tayshet section of the Krasnoyarsk Railway. The project will ensure the transportation of goods from the Kyzyl - Kuragino railway line under construction in 2020 in the amount of up to 15 million tons (Overview of the freight industry in Russia 2019).

It should be noted the development of the practice of applying concessions in the Russian railway infrastructure market. To date, several concession agreements have been signed:

1. Agreement on the construction of the Northern latitudinal railway (Figure 37). The implementation of the project will create the carrying capacity for the export of 23.9 million tons of cargo from fields in the northern regions of Western Siberia and will reduce the length of transport routes to the ports of the North-Western basin.
2. Agreement on the construction of the Kyzyl-Kuragino railway line. The project aims to ensure the export of coal from Elegest coal field (up to 15 million tons).
3. Agreement on the construction of railway infrastructure on the Taman Peninsula. Implementation of the project will make it possible to transport

goods in the direction of existing and prospective transshipment terminals of «OTEKO» Group of Companies («OTEKO» Group of Companies is a diversified holding company operating in the transport market of the Russian Federation) (OTEKO no date).



Figure 37. Northern Latitudinal Railway (The Moscow Times 2019)

4. Agreement on the construction of the Kyzyl-Kuragino railway line. The project aims to ensure the export of coal from Elegest coal field (up to 15 million tons).
5. Agreement on the construction of railway infrastructure on the Taman Peninsula. Implementation of the project will make it possible to transport goods in the direction of existing and prospective transshipment terminals of «OTEKO» Group of Companies («OTEKO» Group of Companies is a diversified holding company operating in the transport market of the Russian Federation) (OTEKO no date).

The implementation of the project for the construction of non-public railways, from the Elginsky coal mine to the Ulak station of the Far Eastern Railway, will also contribute to achieving the target indicators of cargo loading volumes. The project aims to ensure the export of coking coal from a deposit in South Yakutia in the amount of 15 million tons (Overview of the freight industry in Russia 2019).

In order to ensure the loading of additional capacity of the railway infrastructure, Russian Railways proposes to introduce the possibility of concluding long-term

contracts between shippers and carriers with fixing tariffs and volumes of transportation, including ship-or-pay and investment tariffs (Overview of the freight industry in Russia 2019).

Among the new areas of investment activity, the participation of Russian Railways in projects contributing to the integrated development of transport infrastructure in key foreign trade areas, including the construction project of coal terminal "Lavna" in the seaport of Murmansk, as well as a project to create a new specialized port on the Far East coast in Sukhodol Bay of the seaport of Vladivostok. The implementation of projects will allow by 2022 to create new coal transshipment capacities with a volume of 18 million tons and 12 million tons per year, respectively (Overview of the freight industry in Russia 2019).

As for the constraints to the development of railway transport, the railway infrastructure itself can be noted, which is not developing sufficiently. This is one of the main constraints to the rail freight industry. Limitations of carrying capacity on some railway routes impede the development of industries that use the railway as the main method of cargo delivery. Further growth in the transportation of a number of goods directly depends on the implementation of projects to remove infrastructure restrictions. The created multi-complex development plan until 2025 will undoubtedly improve the situation. In addition to infrastructure restrictions, a local shortage of vehicles during peak demand may also serve as a constraint. The deficit is caused by a significant write-off of gondola cars, a lack of spare parts for repairs (and as a result of rising prices for them), and an increase in loading on the network of Russian railways (Overview of the freight industry in Russia 2019).

4.2 Prospects for container rail transport

One of the most common ways to transport goods is containers. Containers brought the transport industry to a new level, adding great advantages. Containerization helped to standardize the cargo unit, which allowed the fastest way to handle and transport cargo.

At the moment, Russia is at the stage of transformation, improving infrastructure facilities and creating new access roads. Despite the fairly active development of this market in the past few years, the level of containerization in Russia still lags significantly behind European countries. Therefore, in 2017, only 5% of cargo was transported in containers by rail. In Europe, this indicator is 15%, while in India it is 17% and in the USA it is as much as 20% (What are the perspectives of container transportation 2018).

Based on the current dynamics of railway container transportation in Russia, it can be said that Russia has great potential to influence the future volumes of railway transport. According to the current trend of railway container traffic, it can be said that Russia is building up its potential.

According to the transport strategy for 2036, Russia intends to increase its transit potential. The transport strategy provides for a significant increase in container transit through the territory of the Russian Federation and it even indicates that after 2024, in the event of a possible decrease in demand for Russian coal, which is indicated as one of the current risks for the transport system, the released capacity of railways can be used to transit Asian cargo. The transit transportation of containers, based on the project estimate, should grow from 553,000 TEU in 2018 to 1.6–1.7 million TEU in 2025 and 2.53–2.74 million TEU in 2036. Also the share of container traffic in the total volume of railway cargo should grow from 5% to 14.7–16.3%. At the same time, the revenues of Russian enterprises from transit in the total revenue from international freight traffic will increase by 2036 by 60–85%. Already today, it is planned to use the released capacity of the Trans-Siberian Railway for containers with redirection of coal to the Baikal-Amur Railway. The Baikal-Amur Railway, even after modernization, will be fully loaded with Russian industry, and capacity, as practice has already shown, will be released in the north-west direction as the demand for thermal coal in Europe decreases (Kommersant 2020).

In May 2019, «RZD Logistics» launched a completely new multimodal transit service RZDL Trans-Siberian LandBridge for accelerated delivery of containers in

containers from Japan and Korea to Europe and back through the ports of the Far East and the Trans-Siberian Railway. The service can significantly reduce the time of transportation of goods in comparison with traditional sea routes or transit through China (RZD Logistics 2019).

The first transit container from Europe to Japan was successfully delivered at the end of 2019. A 40-foot test container, consisting of various groupage cargoes, departed from Hamburg (Germany) to the port of Yokohama (Japan). The transportation client was one of Japan's largest forwarding companies Nippon Express Co., Ltd. The container was equipped with temperature, humidity and vibration sensors so that the customer could be convinced of the safety and quality of transportation along the Trans-Siberian Railway. In addition, throughout the entire time the service was provided, the client was provided with detailed information on the location of the cargo on a daily basis (RZD-Partner 2019).

This multimodal route is not only more than twice as fast as shipping by sea, but also guarantees the safety of cargo throughout the entire transportation period. This promising route in the near future will bring an additional impetus to the intensification of transit traffic through Russia (RZD-Partner 2019).

Regarding container rail transport from China to Europe, the situation is complicated. Chinese authorities plan to abolish subsidies for 2020–2022. In 2019, empty container subsidies were abandoned. It should be noted that it was state subsidies for export railway container transportation that ensured an explosive growth in the flow of containers from China to Europe since 2011. A reduction or cancellation of these subsidies will lead to an increase in transportation tariffs and may reduce the growth rate of freight traffic. It should also be noted that although the volume of subsidies for loaded containers, according to estimates of the Group of companies «TELS», is reduced by about 10%, this does not lead to a proportional reduction in traffic (TELS 2020).

«TELS» experts also do not expect a significant reduction in the growth of the container rail transportation market from China, although the freight portfolio may

undergo some adjustment. The increase in tariffs will not be sensitive for a significant part of the cargo in this direction since it is a rather expensive product. According to Russian Railways, in January 2020, container traffic from China to Europe by rail grew by 22% compared to the same month last year, even despite the coronavirus epidemic in China (TELS 2020).

Against the background of the development of road freight transport links between China and the Russian Federation, a reduction in subsidies and an increase in railroad transportation tariffs may become an additional incentive for importers to use road transport more often (TELS 2020).

Despite the aggravated global pandemic, Russian railway operators have noticed a revival of traffic in the Chinese direction. For example, «Transcontainer» assesses the growth prospects of the container shipping market in 2020 «with cautious optimism» (Interfax 2020).

JSC UTLC ERA is also experiencing growth in the direction of China — Europe. From January 1 to February 29 of this year, Freight Village RU terminal in Vorsino received 92 container trains from China, which is ten more than a year earlier (Interfax 2020).

Since late February 2020, «FESCO» has observed weekly growth in imports from China. It is worth noting that the unstable world situation has led to a weakening of the national currency. This could negatively affect further imports from China. Interfax considers this recovery temporary and insufficient to compensate for the decrease in traffic from abroad. In addition, it is not known how the situation will change in the future (Interfax 2020).

The transit container traffic by rail across the Russian territory increased in the first quarter of 2020 by 3.4% compared with the figures for 2019. The organization of rail transportation provided the transit of 132,900 TEU. An increase in the volume of transit cargo is noted against the backdrop of global trends in production decline due to the spread of the coronavirus pandemic. In

addition, trucking, like sea transport, proved to be more exposed to “new” risks (LLC SlavTrans 2020).

For the year 2020, the management of Russian Railways set itself an ambitious task - to bring transit traffic by rail to 750 thousand TEU. The total volume that container transportation should demonstrate is 6 million TEU (LLC SlavTrans 2020).

Thus, the potential for growth in transit traffic is significantly large. A total modernization of infrastructure is required, which implies the creation of modern terminal and logistics centers, the construction of additional tracks, tunnels and junctions in order to increase the capacity of roads. By 2024 railways are expected to increase the throughput capacity of the Baikal-Amur and Trans-Siberian railways by one and a half times, up to 180 million tons. It is also planned to reduce the time for transporting containers from the Far East to the western border of the Russian Federation from 13-20 days up to 7 days (The main projects of Russian Railways 2020).

4.3 Innovations in railway container transportation

Today, it is safe to say that innovation is the impetus for progress in all industries. The transport industry is an area in which there are many changes. Indeed, now the issue of transportation of goods as quickly, cheaply and safely has become increasingly relevant. This should not be limited to the benefits of various modes of transport and properties of the cargo should also be considered, its destination. The focus will be on the role of innovation in modern container transportation, either by rail or by means of multimodal transportation.

It has already been noted earlier that containerization has transformed the transport industry into a completely new direction. Today, containers can be transported by absolutely any type of transport and the most important difference of containers is that they do not need unnecessary handling which would consume much time. The standardization of containers has so thoroughly

affected the entire transportation and handling process that the whole supply chain is accelerated.

First of all, it is worth noting that the innovations have ensured a most effective tracking system which allows all interested parties to receive information about the cargo in real time. For example, the iSales service used by «Transcontainer» allows the tracking of the status of order execution and real-time control of the location of the container (iSales online service 2019). This improves the transparency of the entire transportation process.

«Fesco» uses a tracking system called the «FESCO Tracking Service» which allows the customer to receive cargo information in real time (FESCO Tracking Service 2019). All this is due to the introduction of the Internet of things which allows companies to track vehicles and goods through cloud services. The container management powered by IoT also makes it easier to obtain important information about containers. That allows companies to be proactive rather than reactive. It means that they can take any kinds of preventive measures in order to avoid problems in operation

Another innovative trend used in logistics today is blockchain technology. Initially, this technology was used to create cryptocurrency. However, projects gradually began to appear using the principles of blockchain in other areas. Today, there are a number of pilot projects that offer blockchain solutions for logistics and retail businesses and customs procedures, supply chain management, warranty on goods and advertising. Blockchain technology is based on smart contracts which automatically monitor the fulfillment by the parties of their obligations, and whose conditions cannot be changed without the confirmation of all participants. This enables to carry out reliable transactions without intermediaries. Russian Railways was one of the first companies in Russia to use blockchain technology in its business processes. One such project was the blockchain platform, which will unite shippers, a port and railways. All data on cargo transportation will be entered into the platform. The technology of smart contracts will ensure the

reliability and the accuracy of the information entered (The most important trends in logistics and retail 2019).

In this context, it is also worth referring to the Smartlog project which was launched with the financial support of the EU. The main objective of this project was to improve transport flows in cross-border transportation more specifically the Baltic and Nordic countries such as Finland, Sweden, Estonia and Latvia. A prerequisite for the creation of this project was the inefficiency of information flows between all interested parties. It may easily happen that some companies invest a great amount of money in an IT system, but other companies are not interested or not able to provide an appropriate IT system. In this regard, many companies experience difficulties in establishing well-coordinated interaction. Therefore, it is no secret that the creation of a unified system would have simplified and optimized information flows. This in turn allows manual work to be minimized between systems. Therefore, the development of a platform based on Blockchain technology was started in 2016 and completed in August 2019 (SmartLog no date).

Big data has also come into use recently in the field of logistics. Today, large companies need to accumulate large amounts of information, process them and use them in the future. Most companies use information about transport applications such as performance, refusals, or counterparty loyalty in order to compile internal ratings of carriers. Undoubtedly, it is extremely important to conduct a comprehensive retrospective analysis of company's work history and adjust a further plan of action. That will allow company to use data in a more efficient way.

The proper creation of a chain of delivery of cargo is a strategic advantage. Most of the costs in this business are spent on transportation, so it is beneficial for logistics operators to build optimal routes to reduce costs. That is why big data analytics and forecasting are now coming to the forefront. It is possible to transport goods in various ways, and choosing the best route and delivery

method, as well as the speed and price that the client will receive as a result, will greatly affect competition (KORUS Consulting 2017).

In 2017, PJSC «TransContainer» presented a new information system called Intelligent Container Terminal in Novosibirsk. This system is focused on the optimization and automation of container processing. The Intelligent Container Terminal makes it possible to reduce the role of the human factor in technological operations and improve the reliability of information support, increase the level of efficiency and quality of managerial decision-making, as well as the rationality of using carriage and container fleets, terminal equipment and human resources, and accordingly optimize the costs of terminal activities (PJSC TransContainer 2017).

In conclusion, it can be said that the global transport industry is undergoing versatile changes largely due to technologies and innovations that are constantly involved in our lives. Russia cannot be called a leading country in the field of innovation, but it is on the path to the gradual transformation of the transport industry. In the coming decades, Russia can make an enormous leap forward, given its inherent potential.

5 CONCLUSION

Undoubtedly, the scale of container traffic will grow in the future. Many have already convinced themselves that containers are one of the best freight units in modern logistics. Today, containers can be stuffed with various types of cargo, from piece cargo to liquids and most of them transported by sea. However, railway transport undoubtedly has its advantages in this regard. Railway transport is faster than sea transport. Moreover, it also covers large areas of land, which allows him to deliver the goods as close as possible to the client. In order to organize highly efficient railway transportation, great investments in infrastructure are required.

Returning to the research questions, it can be said that the answers to them were successfully given in the main part of the work. The current situation of container rail transport in Russia was successfully examined by analyzing the positions of the Russian transport system in the world. Digital data were given on the current situation of the Russian transport market with a detailed analysis of railway transport. An assessment was also given of the role of the state in the development of railway infrastructure.

Considering the second research question on how efficient the Kouvola-Xi'an route is, it can be said that despite the recent difficulties in transportation, this route certainly has potential. This route does not exist for long, and therefore it cannot be said that the route is inefficient, based solely on the current situation. It is necessary to continue work on creating favorable conditions for attracting customers, as well as to improve the infrastructure to create additional benefits for all interested parties.

Turning to the last research question on how rich Russia's potential in container rail transportation, it can be said that Russia has a fairly tangible potential. It is one of the key results of the thesis. In Russia, the volume of containerized cargo transportation by rail is gradually growing. One of the strategic tasks of the Russian government is to increase the share of railway container cargo to 15% by 2036. Today, Russia is at the stage of transformation. Russian government

understands perfectly well that it is necessary to modernize the railway infrastructure, increase the capacity of logistics terminals and the capacity of international railway lines. Active work is also underway to create the necessary infrastructure to facilitate multimodal transport. Increasing transit cargo is one of the most important strategic tasks for Russia. Realizing its transit potential, Russia intends to increase transit traffic.

Today, deliveries between Europe and Asia are mainly carried out by sea. Given the amount of cargo transported between the two continents, Russia can certainly benefit from maximizing its geographical potential. In addition, transfer of part of the cargo flow from sea to railway transport will also help relieve the workload of ports. One of the currently existing routes is the Kouvola-Xi'an route which has been operating since 2017, although it has not yet reached the projected cargo volumes. This route certainly has potential to give a new impetus to further traffic flow. In this case, Russia will act as a transit country.

Innovation is the impetus for progress. The era of digitalization has already brought many innovations to the business world and container shipping is no exception. Innovations will continue to improve, optimize and update the work of all interested parties, starting with consumers, continuing with carriers, ending with suppliers.

When assessing the reliability of the work performed, most of the information was presented based on the reports of consulting companies, transport companies operating in the transport sector. Undoubtedly, information taken from open sources, such as news or articles, were double-checked in other sources in order to convey the most reliable information.

Considering the potential for further research on the studied topics, it is possible to conduct a detailed analysis of the work of other transport modes, focusing on multimodal container transportation. This will reveal the general image of the entire transport area and possibly find some bottlenecks for mutual cooperation.

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