Transformation of Eurasian railway logistics in the context of growing supplies towards East Asian markets

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Abstract. Objective: to analyze trends in the cargo turnover of the ports of the Baltic basin with an emphasis on restoring the volume of port cargo transshipment, starting from the end of 2022. Methods: supply chain modeling, geo-economic analysis and parameterization of the main technical and operational indicators in transport and logistics systems. As a result of the conducted research: the analysis of changes in cargo transshipment at the ports of the Baltic Sea basin of Russia in comparison with the shipment of cargo through the ports of the Azov-Black Sea, the Far-East basin and other directions, the changes of participants from among the world and national sea container operators in the directions through the Russian ports of the Baltic basin, new container lines are given the dynamics of cargo turnover at Russian ports in the context of various types of cargo is also shown.

1 Introduction

In 2022, the total cargo turnover of Russian ports for all types of cargo increased by 0.8% compared to 2021, amounting to 841.5 million tons. At the same time, the dynamics was not unidirectional for various basins of seaports (the main geographical poles of Russian macro-statistics). If shipments grew in the Far Eastern ports, transshipment in the Baltic region decreased sharply. The dynamics was also observed in different directions for different types of cargo. Thus, the main contribution to the increase in port transshipment was made by such cargoes as oil (an increase of 8% compared to 2021), fertilizers (+25%), coal (an increase of 2%), grain (by 7%). At the same time, the decrease was marked by cargo: container shipments (-26%), petroleum products (-5%), metals (-18%) (Table 1).

Table 1. Changes in the cargo turnover of Russian ports in the context of the main commodity groups in 2021-2022

<table>
<thead>
<tr>
<th>Type of cargo</th>
<th>Cargo turnover, million tons per year</th>
<th>Change 2022 to 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>coal</td>
<td>202.7</td>
<td>206.5</td>
</tr>
<tr>
<td>oil</td>
<td>238.1</td>
<td>256</td>
</tr>
</tbody>
</table>

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grain & 42.4 & 45.3 & 2.9 & 7% \\
liquefied natural gas & 32.3 & 35.2 & 2.8 & 9% \\
fertilizers & 19.3 & 24.2 & 4.9 & 25% \\
metal ore & 11.9 & 12.7 & 0.7 & 6% \\
others & 45.2 & 48.7 & 3.5 & 8% \\
petroleum products & 146.7 & 138.7 & -8 & -5% \\
containerized cargo & 61.2 & 45.3 & -15.9 & -26% \\
metals & 35.3 & 29 & -6.4 & -18% \\

Source: [10]

For the ports of the Baltic Basin, cargo turnover as a whole in 2022 decreased by 2.9% compared to the previous year. The main decrease was due to a drop in transshipment of petroleum products (-1%), coal (-9%), containers (-65%), metals (-35%), and other bulk cargo (-35%).

The purpose of this article is to analyze the main trends in the dynamics of cargo shipments through the ports of the Baltic basin.

2 Materials and methods

The research is based on statistical indicators on the Russian transport market published by the analytical company Infraone, the consulting division of GlobalPorts, the Russian Agency for Sea and River Transport and other authoritative publications [10].

The theoretical and methodological main article is the theory of transport and logistics systems, the theory of economic integration, in particular, the provisions on the development and effectiveness of complex multi-agent multimodal transport and logistics systems.

Some of the studies that contributed to the formation of the results of the conducted research are presented in the works of L. Chechenova [1], M. Drozdova, O. Pokrovskaya, A. Safronova [2], M. Gorbunova, A. Novichikhin [3], L. Kazanskaya, S. Rizakulov [4], T. Klieštik, E. Salamakhina, N. Zhuravleva, P. Zhitinev, Y. Anufrieva [5, 9], M. Lyakina, M. Sheehy, I. Podhorska [6], A. Maznev, Y. Boronenko, A. Vorobiev, A. Kiselev [7], E. Volkova [8] and others.

3 Analysis of trends in shipments through Russian ports in 2022 and 2023

In 2022, the cargo turnover of Russian ports increased by 0.8% to 841.5 million tons compared to the previous year. The main contribution to the increase was made by the following cargoes: oil (+17.9 million tons), fertilizers (+4.9 million tons), coal (+3.8 million tons). In general, cargo flows of containers (-26%), metals (-18%), petroleum products (-5%) have significantly decreased in all ports (Fig. 1).
Grain turnover in 2023 increased by more than 2 times by 2022 and by 79% by 2021. The volumes of petroleum products and liquefied natural gas are relatively stable with slight fluctuations of +/- 2...9%.

The volume of fertilizers in 2023 increased by 66% by 2022 and by 74% by 2021. The shipment of goods in containers decreased by 17% (by 2021), metals - by 26% (by 2021) (Fig. 2).

Fig. 1. Cargo turnover of Russian ports for the period from 2011 to 2022, million tons of cargo
Source: [10].

Fig. 2. Dynamics of cargo transshipment in Russian ports for the period January-April 2021, 2022 and 2023, million tons of cargo
Source: [10].

4 Trends in the cargo turnover of container cargoes shipped through Russian ports
Changes in the Russian port logistics market in 2022 compared to 2021 are shown in Figure 3.

According to Figure 3, we see that the total volume of containers shipped through Russian ports in 20-foot equivalent (TEU) in 2022 decreased by 26%, from 5,405 thousand TEU up to 4112 thousand TEU. The largest reduction was due to a drop in transshipment through the ports of the Baltic Basin (the ports of St. Petersburg and Ust-Luga) (-1128 thousand TEU). Transshipment through the Novorossiysk port decreased by 72 thousand TEU. At the same time, the Far Eastern basin was distinguished by the growth of container shipments (more than 169 thousand TEU were sent through the ports of the Far East than in 2021).

![Fig. 3. Dynamics of sea container transshipment in Russia in 2021-2022, thousand TEU containers](image)

Source: [10]. Note: Other destinations include Kaliningrad, Arctic ports, ports of Kamchatka, Sakhalin, Magadan, southern ports, with the exception of Novorossiysk.

Figure 4 shows the main changes in container shipments through Russian ports based on the results of statistics for the first 5 months of 2023.

According to the results of the first 5 months of 2023, we see some course for market recovery. That is, the general downward trend has stopped. We are witnessing a further decrease in container transshipment through the ports of the Baltic Basin (by another 254 thousand TEU), while through the ports of the Far East and the Novorossiya port, container shipments increased by 192 and 84 thousand, respectively. TEU (fig. 4).
In the south and the Far East, the departure of operators of sea lines was somewhat smoothed out and not as noticeable as in the North-West, since the initial share of Russian, Turkish and Chinese lines in the eastern directions was significant. For this reason, the recovery in the eastern directions is going faster.

5 Trends in container transshipment in the ports of the Baltic Basin of Russia

After the growth in 2021, the cargo traffic of the Baltic Basin will decrease in 2022 (-2.9%). The main increase in cargo: oil (+13.5 million tons, 23%), fertilizers (+5.1 million tons and 41%) and other cargo (+3.8 million tons, 27%).

The main reduction is in containers (-18.4 million tons, 65%), metals (-3.8 million tons, 35%) and other bulk (-2.5 million tons, 35%) (Table 2).

<table>
<thead>
<tr>
<th>Type of cargo</th>
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<th>Change 2022 to 2021</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>oil</td>
<td>59.9</td>
<td>73.5</td>
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<tr>
<td>fertilizers</td>
<td>12.5</td>
<td>17.6</td>
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<tr>
<td>others</td>
<td>14.1</td>
<td>18.0</td>
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<tr>
<td>petroleum products</td>
<td>72.7</td>
<td>72.0</td>
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<tr>
<td>coal</td>
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<td>10.1</td>
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<tr>
<td>metals</td>
<td>10.9</td>
<td>7.1</td>
</tr>
<tr>
<td>other bulk cargo</td>
<td>6.9</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: [10].

After many years of stable growth, the turnover of dry cargo in the ports of the Baltic Basin in 2022 decreased by 18%, mainly due to the reduction of containers and coal (Fig. 5).
The volume of container transshipment in the port of Ust-Luga decreased very noticeably – 282 thousand TEU were handled in January-April 2023. The downward trend in cargo turnover persists in all ports of the North-West. The cargo turnover of the Large Port of St. Petersburg in January-April 2023 decreased by 59% compared to the same period in 2021. The cargo turnover of the port of Kaliningrad in January-April 2023 decreased by 72% compared to the analogous period of 2021 (Fig. 6, Fig. 7).

Fig. 5. Dry cargo turnover in the ports of the Baltic Basin of Russia in 2011-2022, million tons
Source: [10].

Fig. 6. Dynamics of container transshipment in the ports of the Baltic basin of Russia in the context of three ports, monthly, thousand TEU
Source: [10].
6 Analysis of the dynamics of cargo turnover in the ports of the Baltic basin by stevedores

The cargo turnover of all stevedores of the St. Petersburg port has significantly decreased since the beginning of 2022 (Fig. 8).

Fig. 7. Monthly dynamics of container transshipment volumes in the seaports of the Big Port of St. Petersburg and Ust-Luga in January 2022 - May 2023, thousand TEU
Source: [10].

Fig. 8. Dynamics of container transshipment in the Big Port of St. Petersburg, by stevedoring companies, thousand TEU
Source: [10].

The seaport of St. Petersburg by April 2023 actually reduced the transshipment of containers down to zero.

The decrease in transshipment volumes in April 2023 compared to April 2021 amounted to 75% for companies: Petrolepsort JSC, First Container Terminal JSC -89%, KTSP CJSC
managed to overcome the crisis and even increase 2% of cargo turnover in April 2023, due to the fact that in the term -vessels of the MSC container line enter the terminal.

7 Congestion of container terminals in the Gulf of Finland

Capacity utilization of container terminals of the Large Port of St. Petersburg in 2022 averaged only 18% (Fig. 9).

Moby Dick LLC resumed container transshipment in 2022, but in small quantities (430 thousand TEU).

![Fig. 9. Current capacity (in thousand TEU), cargo turnover and loading level of container terminals in the ports of the Baltic Basin, in % Source: [10].](image)

Trends in the recovery of the number of container lines

There was a sharp decline in the Baltic Basin in 2022 due to the withdrawal of most lines, but a gradual recovery began in 2023. The company that has survived on the market is the MSC container line. New Russian and Chinese lines are also appearing. The supply of container lines and their representation in 2023 (based on the results of 5 months) as a whole has been updated by 50% (Fig. 10).

![Fig. 10. The main sea lines in the Baltic Basin of Russia for 5 months of 2022 (left) and 5 months of 2023 (right) and the share in the volume of transshipment, % Source: [10].](image)
If in the first quarter of 2022 the number of container lines in the North-West was 19, then by the end of 2022 it decreased to 7, then in the second quarter of 2023 the number of container lines already totals 15 units.

8 Conclusion

The performed study allowed us to conclude the following.

The transshipment market through Russian seaports in 2022 and 2023 (based on the results of available data for the first half of the year) underwent a significant transformation.

In general, there was no decrease in all Russian ports in 2022, and statistics recorded an increase at a small level (+0.8%). The growth is ensured by increasing the transshipment of oil, fertilizers, coal, grain. But at the same time, the volumes of transshipment of containers, metals, and oil products have significantly decreased.

For container shipments, the total volume of their transshipment through Russian ports decreased by 26% in 2022, mainly due to a decrease in transshipment through the ports of the Baltic Basin (the ports of St. Petersburg and Ust-Luga). At the same time, the Far Eastern basin was distinguished by the growth of container shipments.

But from the second half of 2022, then throughout 2023, there is a slow recovery, an increase in the number of container lines, an increase in the loading of most ports in the Northwest.

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