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Russian Logistics and Supply Chain Management: Challenges and Relevant Solutions

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ABSTRACT

Relevance of the research. The article considers a forced paradigm shift and systemic restructuring of Russian logistics due to the introduction of sanctions barriers and partial trade blockade, which, in addition to restricting Russian exports and imports, threatens digital technological transformations in supply chain management and occurs against the backdrop of tightening international environmental requirements for business activities, including logistics.

The purpose of the research is to review changes taking place in Russian logistics and to analyze corresponding solutions for supply chain management.

Design, methods, information base. The methodological framework of the research consists of fundamentals of logistics and supply chain management, elements of economic systems digital development concept and basic principles of ecological economics. The main research methods are collecting information from secondary sources, practicing experts in-depth interviewing, specialists surveying, computer content and PESTEL analysis. The methodological basis is formed by the basics of logistics and supply chain management, elements of the concept of digital development of economic systems and basic principles of ecological economy. The information base of the research consisted of interview transcripts, survey results, bibliographic documents, and Internet text files.

Findings. As a result of the work, external challenges and influencing factors are identified, internal processes, drivers and trends characteristic of Russian logistics and supply chain management today are identified and described. Relevant decisions made by Russian logisticians in the current period are systematized and evaluated. The flexibility and sustainability of supply chains was confirmed, as well as the high adaptability of Russian logistics to radical transformation of business environment and operating conditions.

Originality/value of the research. The study showed that despite the deglobalization of Russian logistics, it remains possible to manage any cargo delivery to Russia from anywhere in the world. The material may be useful both to Russian logistics practitioners and to persons studying or teaching the discipline "Logistics".

Keywords: supply chain management; logistics; international trade; domestic market; digitalization; ecology

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INTRODUCTION

Problem statement and relevance. Recovery from the COVID-19 pandemic was underway when the Russian economy faced new challenges due to the imposition of sanctions restrictions that deeply affected national imports and exports [1]. In this regard, Russian logisticians had to quickly adapt to the changed conditions: completely revise partner networks, establish other transport routes, master new customs regulations, and confront emerging risks and threats [2]. As a result, the transition to other route schemes and transport routes was carried out, domestic logistics operators were fundamentally restructured, new strategic solutions in the field of supply chain management (SCM) were worked out.

Such sudden and profound shifts have provoked an increased interest of the business community in the changes affecting Russian logistics and SCM. The aim of the study, which is to analyse solutions relevant to Russian logistics and supply chain management, can be achieved by implementing the following three tasks:

- identifying and analysing processes, drivers and trends important for the industry;
- identifying and analysing factors determining changes in Russian logistics and SCM;
- selecting and evaluating relevant solutions and adequate measures to adapt to new realities.

The object of the study is the supply chain management process carried out by Russian logistics operators. The subject of the study is the problem of the impact of sanctions restrictions, progress in digital technologies and environmental requirements on Russian logistics and SCM.

CURRENT INDICATORS AND TRENDS IN RUSSIAN LOGISTICS

The supply chain crisis triggered by the COVID-19 pandemic has been exacerbated by the geopolitical events of 2022–2023. Under the influence of sanctions, the volume and range of goods imported to Russia have decreased, while their cost in conditions of supply shortages is gradually increasing, and the purchasing power of Russian economic agents (households and companies) tends to decrease. As a consequence, sales are falling, which cannot but affect the scale of logistics activities, and as a result, the Russian market for this type of services is gradually shrinking in both B 2B and B 2C sectors.

The negative dynamics of the Russian currency exchange rate, the increase in the length of logistics routes, downtime at border crossings, and the reduction in the number of vehicles used in most directions have quite expectedly led to an increase in the cost of freight transport (*Fig. 1*).

1. ***An important trend is the reduction in rail, air, and pipeline freight traffic.*** Importers have mainly switched to road transport and containerised delivery by rail.

Cargo and freight turnover of railway transport. The growth of railway freight traffic in Russia in 2022 and 2023 did not fully compensate for its reduction due to the decrease in exports caused by sanctions restrictions. In 2022, compared to 2021, the decrease in its volume in our country amounted to 3.7%, and in 2023 this indicator remained virtually unchanged. However, since the length of routes has increased significantly due to the reorientation of cargo flows to the eastern direction, railway freight turnover in 2022–2023 remained essentially at the level of 2021 (*Fig. 2*).

In 2022 and 2023, the share of rail transport in Russian freight traffic decreased by 15.5%. Cargo traffic was redirected to the Far East, as well as along the North-South transport corridor to the ports of the Azov and Black Seas. The low capacity of railway lines in the Far East region hinders the return to the 2021 level.

This type of freight transport is more in demand than ever for the delivery of goods to Russia from China, which leads to in-

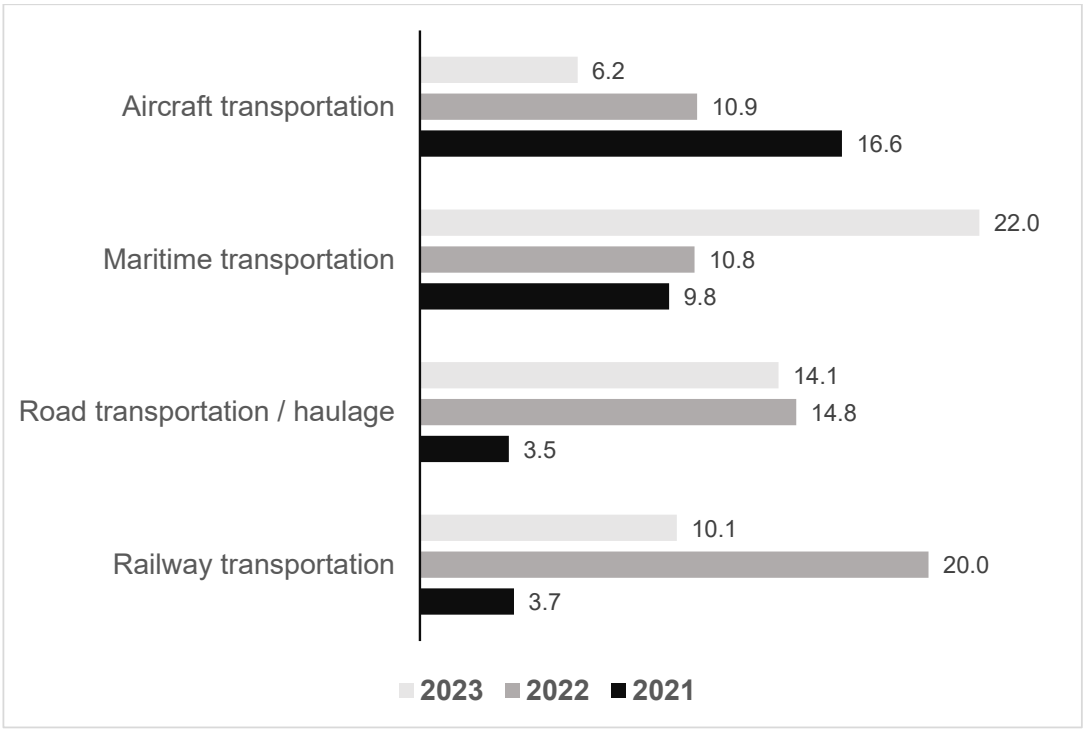

Fig. 1. **Growth of tariff indices for cargo transportation in Russian Federation in 2021–2023, % compared to the end of the previous year**

Source: developed by the author according to Rosstat data. URL: https://rosstat.gov.ru/statistics/price

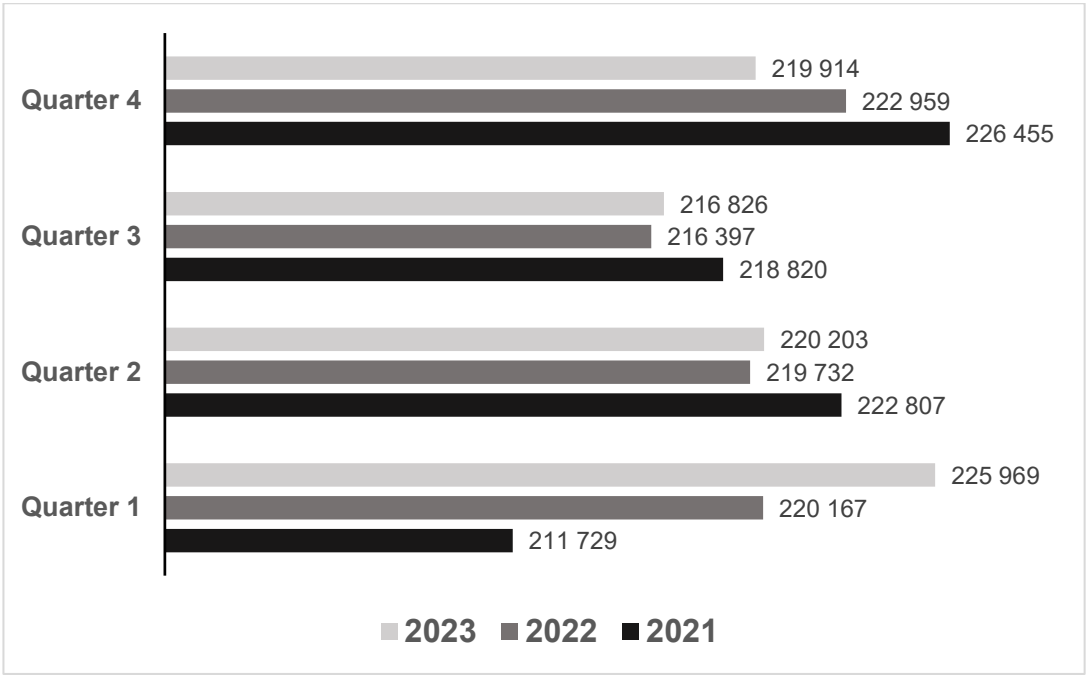

Fig. 2. **Dynamics of railway transport cargo turnover in Russian Federation in 2021–2023, million ton-km**

Source: developed by the author according to Rosstat data. URL: https://rosstat.gov.ru/statistics/transport

creased demand for rolling stock and empty equipment, as well as a shortage of space in goods trains travelling from China. Transit of cargo from China to Europe via Russia continues [3].

Cargo turnover of road transportation. Due to less infrastructure connectivity in our country, road transport dominates among other modes of freight transport — thus, in 2022 its share in freight transport in Russia will increase from 68.5% to 78.7%, and in 2023 it will decrease to 72.0%. Despite the reduction in imports due to sanctions, the volume of road freight transport grew by 11.3% the year before the previous one, and by another 0.6% last year (*Fig. 3*).

The entry of Russian freight vehicles into the EU territory is restricted, while European carriers are still allowed to import goods into Russia. As a result, trade links with Europe (via Poland, the Baltic States and Finland) are maintained, but the former intensity of cargo traffic in the north-west direction is out of the question. Delivery times from Europe have increased, freight and hire of rolling stock has become more complicated, logistical risks have increased, and their manageability has deteriorated [4].

Russian motor transport can freely enter the territory of China, but it is not possible to compete with container rail transport in terms of speed — the time of delivery from China to Moscow is 3–4 weeks, while a consolidated cargo takes even longer — up to 40 days. Another week can be spent waiting in queues for loading/reloading and for entry into China.

Cargo turnover of maritime transport. Russian maritime transport accounts for a small share of cargo delivered: in 2021, only 24.4 million tonnes, with the total volume of 8.1 billion tonnes. In 2022, maritime cargo turnover grew by 12.7%, and in 2023 — by 21.1%, which was due to an increase in freight traffic in coastal shipping/navigation. The main basins are the Baltic, Azov-Black Sea and Far East basins. One of the alternatives for sending Russian hydrocarbons to international markets could be the Northern Sea Route (from Sakhalin to Murmansk) [5]. The dynamics of cargo turnover of maritime

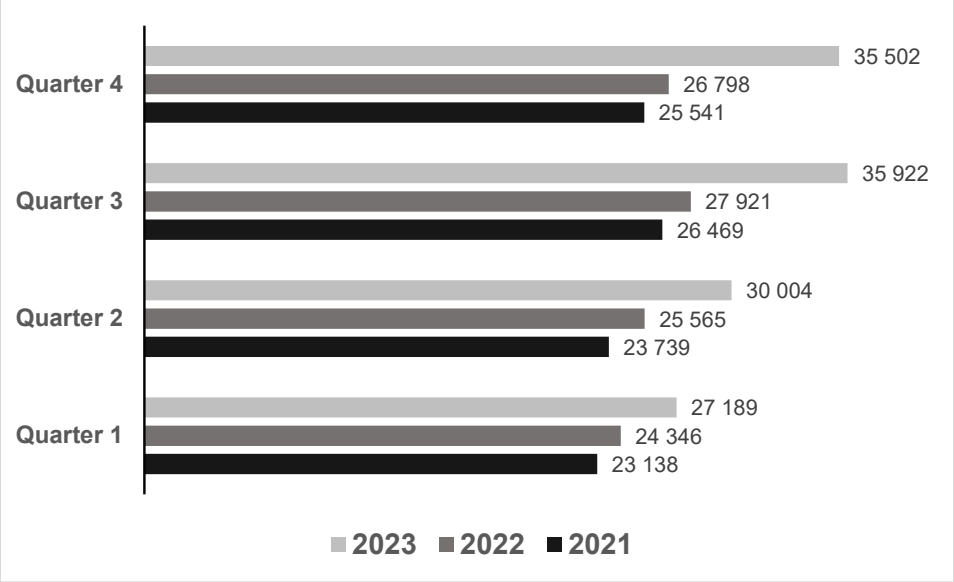

Fig. 3. **Dynamics of road transport cargo turnover in Russian Federation in 2021–2023, million ton-km**

Source: pdeveloped by the author according to Rosstat data. URL: https://rosstat.gov.ru/statistics/transport

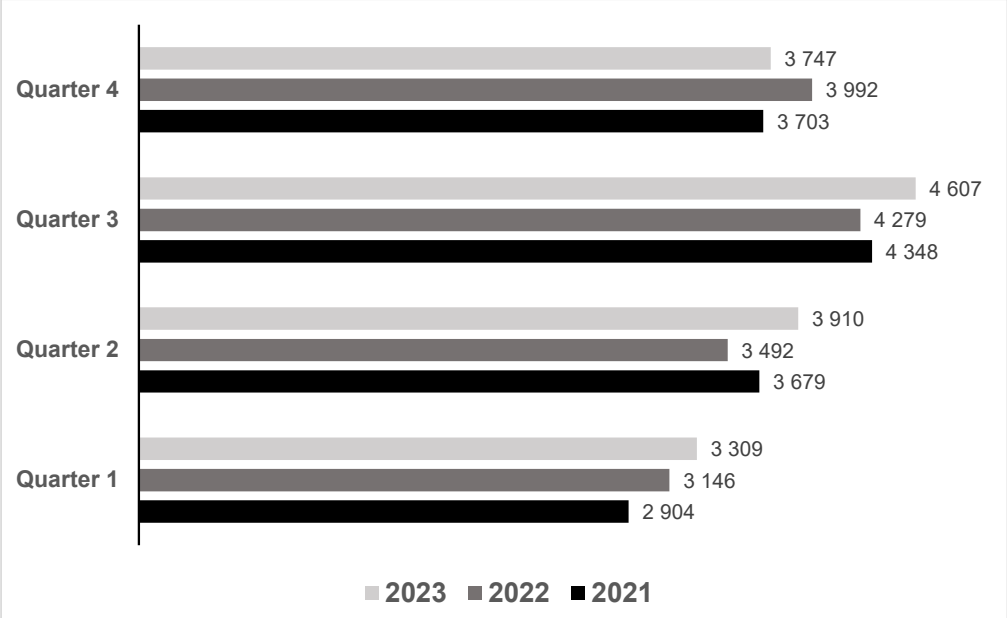

Fig. 4. **Dynamics of maritime transport cargo turnover in Russian Federation in 2021–2023, million ton-km**

Source: developed by the author according to Rosstat data. URL: https://rosstat.gov.ru/statistics/transport

transport in Russia in 2021–2023 is shown in *Fig. 4*.

Maritime transport provided about two-thirds of the transport of domestic imports and exports, so the boycott by foreign shipowners became very sensitive. Almost all giant shipping corporations refused Russian cargoes: A.P. Moller-Maersk Group (Maersk, Denmark), Mediterranean Shipping Company, MSC (MSC, Switzerland-Italy), Hapag-Lloyd (Hapag-Lloyd, Germany), CMA CGM Group (CMA CGM, France), Ocean Network Express (Ocean Network Express, Singapore-Japan), Yang Ming — YML (Yang Ming, Taiwan), which together account for about 80% of international container shipping [6]. Russian ships are banned from entering European ports.

However, there are still opportunities to transport cargo by sea — for example, cooperation with the Chinese company China COSCO Shipping (China Cosco Shipping), which carries out 13% of global container shipping, and the South Korean company Sinokor Merchant Marine (Sinokor Merchant Marine) with a wide geography of operations in South-East Asia, continues. In addition, more than 30 companies, including SITC Container Lines (Hong Kong), Hua Xin Container Lines (China) and others, carry out sea deliveries from Chinese ports to Vladivostok.

As for the leading domestic container sea carriers, their capacity is limited, but the development of foreign trade sea routes is still taking place. Ports on the Black Sea, the Pacific Ocean, the Sea of Okhotsk, and the Sea of Japan are functioning, and routes through Iranian ports and the Caspian Sea are being developed. Russian maritime transport infrastructure, including the harbours of Novorossiysk, the Leningrad Region, and the Big Port of St. Petersburg, has fallen under EU sanctions. Despite this, the sea gates are operating, accepting shipments from Turkey, Asia-Pacific, Middle East, Africa, Latin America, and others.

Aircraft transportation cargo turnover. The share of air transport in our country is very small — in 2021, it accounted for about 0.02% of the total volume of Russian freight traffic. And it is the aviation industry that has been hit

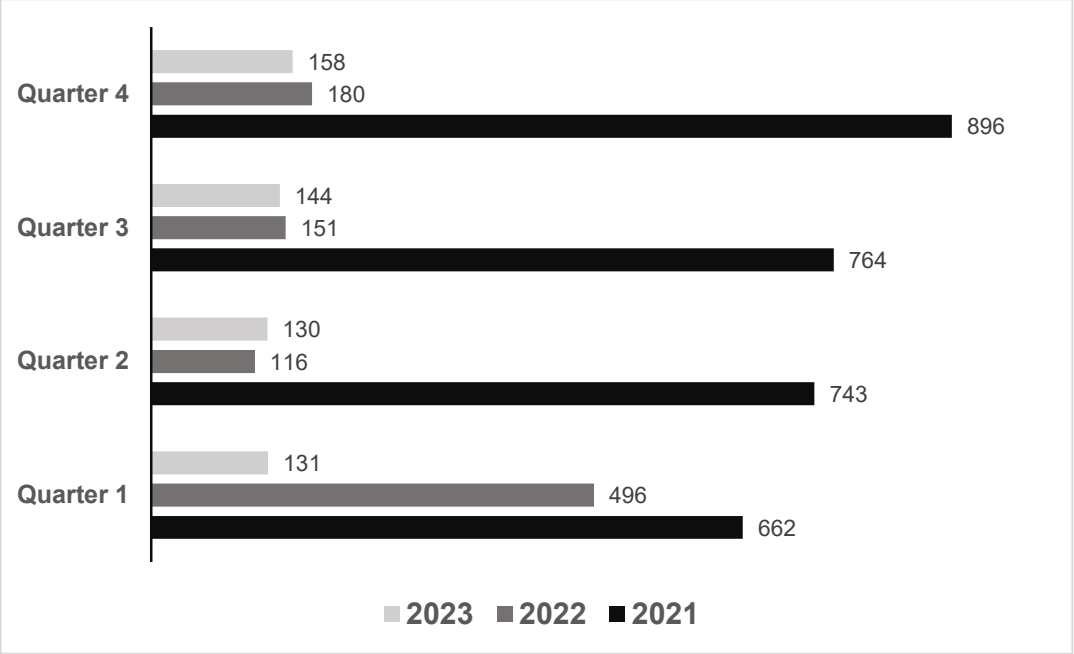

Fig. 5. **Dynamics of air transport cargo turnover in Russian Federation in 2021–2023, million ton-km**

Source: developed by the author according to Rosstat data. URL: https://rosstat.gov.ru/statistics/transport

hardest by the sanctions. European air routes were completely closed to Russia, as a result of which domestic air cargo traffic decreased by 62% in 2022 (from 1.48 to 0.56 million tonnes) and by another 17% in 2023 (to 0.47 million tonnes).

Logistics companies have reoriented to new air routes — for example, via Turkey, UAE, and China, or via Hong Kong and Korea; cargo is also sent by flights via Tajikistan, Armenia and Uzbekistan.

The dynamics of air cargo turnover in Russia in 2021–2023 is presented in *Fig. 5*.

2. *Exacerbation of infrastructural challenges,* including disruption of locomotive traction, shortage of wagons and containers, limited port and transhipment capacity, delays in loading and unloading, shortage of transport to move cargo out of ports, low capacity of border road crossings, as well as lack of transport capacity to ensure uninterrupted deliveries from East Asia, unpreparedness of Caspian and Far East infrastructure to divert and redirect logistics flows, inability of logistics staff to work in non-standard situations.

3. *Dominance in the Russian market of complex 3PL services* (storage, picking/kitting, delivery) as a consequence of:

- reorientation of the vector of domestic foreign trade from the western to the eastern direction, where multimodal logistics schemes mainly operate;
- two-way transport (i.e., with transhipment or transloading at the border), which implies complex services and involvement of several contractors;
- 3PL operators have more opportunities to circumvent international payment restrictions.

4. *Other trends* manifest themselves in several ways:

- *spread of e-commerce*, development of the Russian market for Internet order delivery, reorientation of Russian logisticians towards the domestic market due to the replacement of imported goods — that have disappeared or significantly increased in price — with domestic goods;

• *reduction of direct interaction* between manufacturers and customers in the course of logistics operations related to the movement of complex products subject to sanctions;

• *emergence of new players in the logistics services market* — in times of uncertainty, the chances of smaller companies finding their niche are increasing, as large corporations are not always ready for rapid restructuring and business paradigm changes, while newcomers are mobile and enthusiastic;

• *"containerisation" of shipments* — exports from Russia of non-ferrous metals, ore, grain and other products are now mostly containerised and routed through the Far East;

• *increased demand for consolidated cargo* due to the shift to smaller and more frequent orders due to the emergence of new small suppliers and lower customer demand;

• *high demand for door-to-door delivery*, difficulties in managing the movement of orders, growth in the number of distributors;

• *increase in the number of "fullfilment" operators* (offering a range of services at the "last mile"), i.e., expansion of related operations (customer interaction, assembly, packaging and dispatch of parcels, delivery control, etc.), the performance of which is increasingly outsourced;

• *deterioration of the ability to strategically plan* foreign trade logistics operations and manage international supply chains.

DESIGN, METHODS, INFORMATION BASE OF THE STUDY

The sequence and content of the research stages are presented in *Fig. 6*.

1. An information base was formed based on the results of the desk research, which was based on a combination of such approaches as

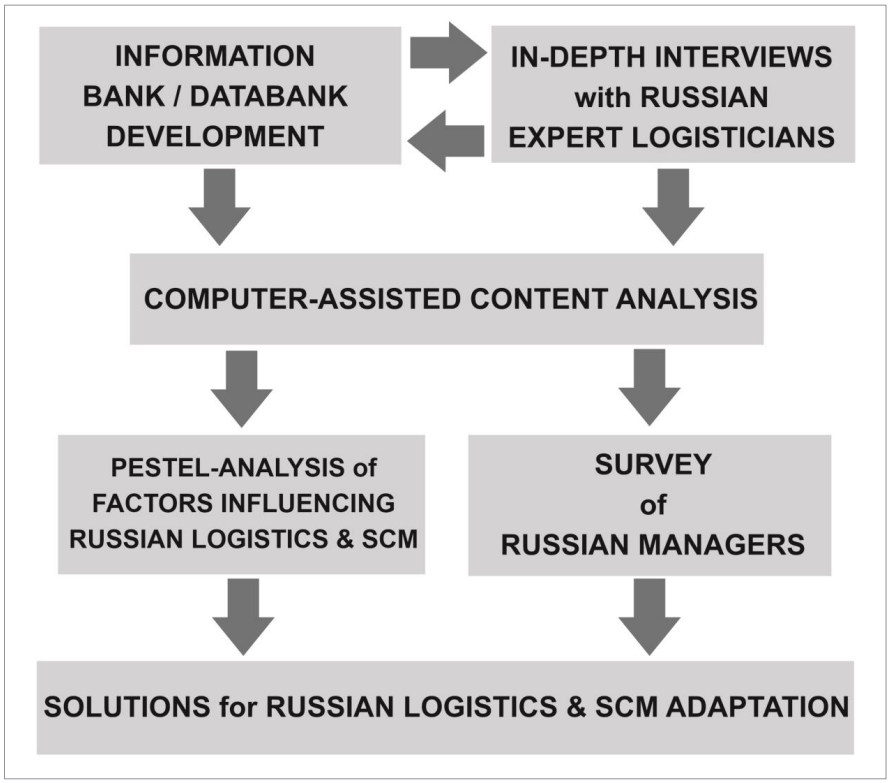

Fig. 6. **Research design**

Source: developed by the author.

computer content analysis, classification and description, induction, deduction, generalisation, analogy, observation, and comparison. It included scientific articles and proceedings of scientific and practical conferences, online publications containing opinions of experts and posts of practicing professionals in social networks, as well as Internet media files, materials of expert sessions and consulting reports in the following thematic areas:

- analytics — on trends and prospects of Russian foreign economic and logistics practices;
- national logistics industry under the influence of anti-Russian sanctions, attempts of logistic blockade and isolation of Russia;
- status quo of Russian logistics and SCM, measures to maintain Russia's foreign economic relations (restructuring of logistics networks, search for partners, development of new freight routes and transport schemes);
- innovative contexts of Russian logistics and SCM, digital development of domestic logistics operators, digitalisation of supply chain management in Russia;
- the concept of "ecologistics" or environmental logistics, minimising the environmental impact of logistics activities.

The selection criteria for the above materials are keyword compliance, relevance (publication in 2022 and 2023), credibility and reliability (significant experience in logistics and SCM, and good expert reputation of their authors).

2. Based on the findings obtained:

- a script of in-depth interviews with experts was developed and a guide or a roadmap for the upcoming conversation was prepared, which outlines the general framework, main logical blocks and key issues to be discussed;
- in 2023, a series of interviews with practitioners, including SCM directors and heads of logistics departments and projects with more than 10 years of professional experience was organised (*Table*).

3. With the help of MAXQDA[1] software, which does not require a user licence in the short term,[2] computer structuring and content analysis of interview notes, selected bibliographic documents and Internet text files was carried out, which provided material for PESTEL analysis of the factors determining the Russian logistics and allowed to form a set of actual solutions for SCM.

4. A PESTEL analysis was performed, with political, economic, technological, and social aspects at its centre, complemented by environmental and legal components, which allowed us to consider external influences on Russian logistics and SCM.

5. In January 2024, a survey of executives and managers of Russian companies involved in the organisation of production procurement and supply was conducted. In particular, the respondents were asked to assess the relevance of SCM solutions selected at the previous stages of the survey on a 10-point scale. All 120 respondents are students or graduates of further education and MBA programmes.[3]

FACTORS INFLUENCING RUSSIAN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

The operating conditions of Russian logistics and SCM are conditioned by six groups of factors, which are assessed below in the PESTEL analysis.

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[1] Kuckartz U., Rädiker S. Analyzing qualitative data with MAXQDA. Cham: Springer International Publishing. 2019;290. URL: https://link.springer.com/content/pdf/10.1007/978–3–030–15671–8.pdf

[2] MAXQDA — Software for qualitative data analysis. Official site. URL: https://www.maxqda.com/ru

[3] The margin of error was estimated as $\sqrt{Z^2 P (1-P) / n}$ 100%, where n — is the sample size (n = 120); Z — is the normalised deviation (at 95% confidence level Z = 1,96); P — is the variation for the sample. In the worst-case scenario (when P = 50%) the margin of error will be less than 9%, which is quite acceptable for this study.

Table

Profiles of interviewed experts

No.	Position in the organization	Area of activity	Topic of conversation
1	Head of the import and certification group at Schneider Group consulting company	Services for building the entire logistics chain along the flow of goods: from finding partners and suppliers to solving delivery and customs clearance issues	Integrated international logistics
2	Project manager in the field of foreign trade logistics	Projects for the supply of food raw materials, high-tech equipment, automation, and organisation of warehouse operations in China	International Supply Chain Management
3	Director for Business Process Optimisation, Head of the Project Office of "Russian Cheese" Group of Companies	Management of the company's logistics division, including automation of logistics processes. Development of technical tasks for IT-specialists, support of implementation	Procurement, warehousing, transport logistics
4	Director for SCM of "Specta" Group of Companies	SCM in retail, pulp and paper, metallurgy, and metal processing companies	Transport logistics
5	Chief Operating Officer of "Grene Kramp" Company	Management of foreign procurement and sales in Russia	All logistics in one process
6	Chief Operating Officer of "Makita" Company (Russia / CIS)	Transport logistics (rail, sea, road, air), warehouse logistics, planning, foreign trade, digital transformation of the organisation	Supply chain sustainability

Source: developed by the author.

The political environment — foreign policy crisis, exchange of sanctions between unfriendly states and Russia, threat of taking measures against countries — potential partners and "bridges" that allow Russia to circumvent sanctions restrictions, became the main source of negative impact on the domestic economy, shrinking the market of Russian logistics services, complicating supply chains, increasing the length, timing and cost of freight traffic [7, 8].

Economic conditions. Restrictions on the work of domestic companies in foreign markets, denial of foreign lending and investments in Russian projects, partial freezing of Russian assets abroad, destruction of international economic alliances and partnerships, slowdown of interbank transactions and foreign economic activity — all this undermines the national economy, reduces demand for logistics services and makes it difficult to do business in this area [9, 10].

Social circumstances are unfavourable, which complicates the implementation of logistics activities in Russia, namely:

- almost complete technological dependence on the participation of the human factor and manual labour in most logistics operations and works, such as loading/unloading, warehousing, storage, picking, delivery;
- inexpediency of launching digital projects (robotisation, replacing people with automatons, etc.) that reduce the employment of workers in logistics and SCM, in anticipation of the expected reduction of the labour market in Russia [11];
- use of sophisticated fraudulent schemes and methods of dishonest enrichment (including theft of goods during transport and storage in warehouses), instigated by falling incomes of the population.

Technological constraints and opportunities. The limit of the Russians' access to Western know-how, the ban on the supply of equipment, components, spare parts, consumables to Russia, the import substitution of which will take years — all this has a negative impact on economic activity in the country, including its logistics sector [12]. In addition, due to the embargo on the supply of equipment and technologies to Russia, the course of digital development of logistics companies is jeopardised, as all the necessary element base (GPS-trackers, RFID-sensors and many others) is imported [13].

The environmental situation is characterised by a high dependence of Russian logistics on fossil fuels and energy-intensive technologies against the background of the adoption of the European programme of decarbonisation of the economy and the tightening of international environmental safety requirements for production and other activities, including logistics activities [14].

The legal aspect covers a wide range of issues.

1. State aid to the Russian logistics industry regulated by resolutions of the Russian Government:
   - additional capitalisation of Russian Railways, for which RUB 485 billion has been allocated from Russia's National Wealth Fund[4];
   - compensation to Russian international carriers and road transport companies that have had their rolling stock and/or cargo confiscated in the territory of the sanctioned countries in the amount of RUB 1.6 billion[5];
   - financing of the federal project "Development of Sea Ports", for which RUR 2.8 billion has been budgeted in 2024[6];
   - support for air transportation.[7]
2. Increased complexity of contractual relations with foreign element — due to sanctions regimes of unfriendly countries and increased attention from foreign regulatory authorities, counterparties have difficulties in fulfilling foreign trade obligations [15].
3. Unwillingness of litigation between parties (especially from different jurisdictions) in a sanctions environment (in particular due to the difficulty of engaging foreign counsel and the risks of refusal to recognise and enforce judgments in an unfriendly country) [16].
4. Fixing the definitions of electronic documents[8] (consignment note, accompanying list,

[4] Resolution of the Government of the Russian Federation No. 602 dated 06.04.2022 "On the Acquisition of Preferred Registered Shares of Open Joint Stock Company Russian Railways at the Expense of the National Welfare Fund". URL: http://government.ru/docs/all/140239/

[5] Order of the Government of the Russian Federation No. 2955-o dated 08.10.2022. URL: http://government.ru/news/46782/

[6] Maritime News of Russia. URL: https://morvesti.ru/analitika/1688/106558/

[7] Resolution of the Government of the Russian Federation No. 1015 dated 02.06.2022 "On the acquisition of bonds of Russian airlines at the expense of the National Welfare Fund". URL: http://publication.pravo.gov.ru/document/0001202206030005

[8] Resolution of the Government of the Russian Federation No. 2200 dated 21.12.2022 "On Approval of the Rules for Carriage of Goods by Road Transport and on Amendments to Clause 2.1.1 of the Road Traffic Rules of the Russian Federation". URL: http://publication.pravo.gov.ru/Document/View/0001202012230048

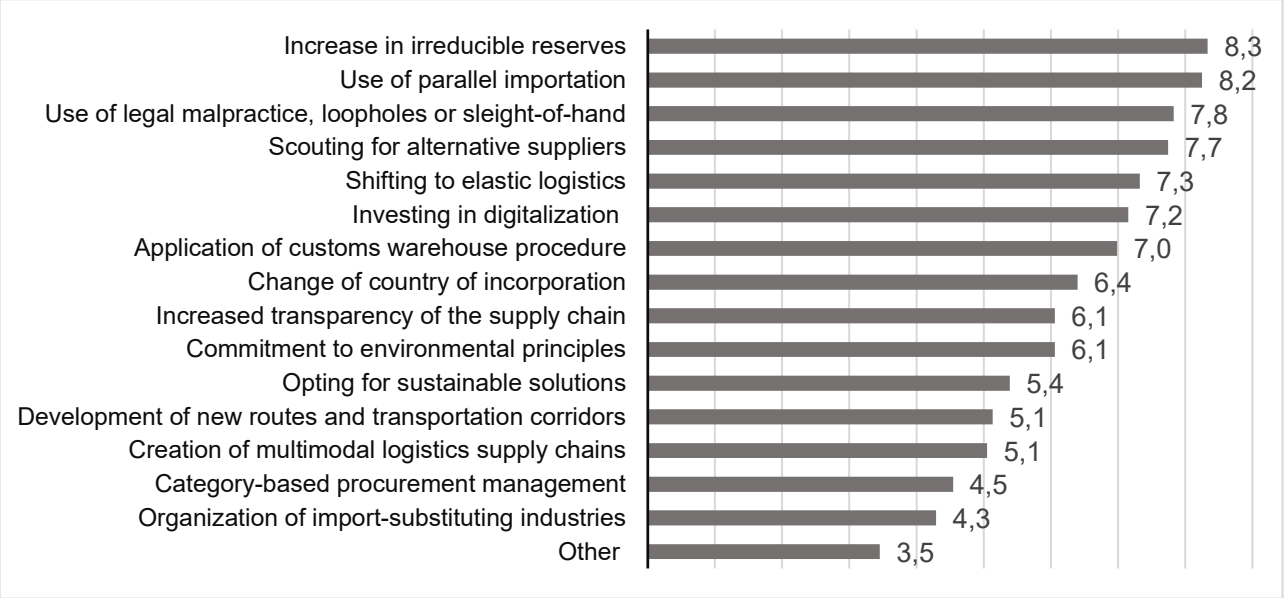

Fig. 7. **Ranking of current solutions in Russian logistics and supply chain management, weight %**

Source: developed by the author.

purchase order, etc.), which are important for the transition of Russian logistics to electronic document management (which is hampered by the lack of state standardisation and the absence of digital signatures in most domestic contractors).

All the factors discussed above are external to the domestic logistics industry. Their influence largely determines the current trends in Russian logistics practices.

RELEVANT RUSSIAN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

The assessment of the relevance of solutions for adapting Russian logistics and SCM to the current situation, based on the results of the survey of Russian companies' employees, is presented in *Fig. 7*.

Commentary on the content and specific application of each solution is provided below.

Revision of stock standards for key items of the assortment and materials, creation of insurance stocks for scarce components, refusal to use components that cannot be quickly replaced without affecting the properties and quality of products — all this contributes to ensuring uninterrupted operation of production enterprises.

The expansion of parallel imports[9] allowed domestic enterprises to establish new supply chains for goods that are not produced in the country. Now European and North American imports go to Russia through offshore (UAE, Hong Kong, etc.). The chain continues to improve, which helps to reduce the cost of delivery.

The use of defensive mechanisms and legal "tricks"/ loopholes in contracts and agreements, namely:

- to provide for the right to unilateral refusal to fulfill the contract in case of introduction of sanctions prohibitions concerning one of the parties;
- refer sanctions restrictions to force ma-

[9] Federal Law No. 213-FL of 28.06.2022 "On Amending Article 18 of the Federal Law "On Amending Certain Legislative Acts of the Russian Federation". 2022. URL: http://pravo.gov.ru/novye-postupleniya/federalnyy-zakon-ot-28–06–2022–213-fz-o-vnesenii-izmeneniya-v-statyu-18-federalnogo-zakona-o-vneseni/?sphrase_id=7994

jeure circumstances (contingency);

- limit the exchange rate difference when specifying the price in a foreign currency [designate a permissible currency corridor, peg to a "safe" currency (yuan) or the value of gold];
- avoid litigation, minimizing the risks and consequences of non-fulfillment of contractual obligations due to the problematic realization of the right to objective judicial protection in unfriendly countries.

Transition to elastic logistics and flexible supply chain management, which means the intention to make logistics processes more malleable and operations more sustainable in order to ultimately ensure route optimization, reduce overstocking, improve price control and increase the efficiency of logistics activities. The realization of this direction depends to a large extent on the level of digital development of companies in the industry.

Investing in the digitalization of logistics and SCM, implementing automated systems and mastering robotic technologies designed to improve the efficiency of warehousing, service, transportation and other logistics services are all measures of digital development of logistics operators and robotization of logistics procedures.

The digital development of logistics operators is determined by the mastering of a number of innovative technologies, namely:

- *the Internet of Things,* which facilitates optimal management of vehicle movements and warehouse inventories*;*
- *cloud computing* to centralize all logistics and SCM optimization analytics;
- *artificial intelligence and machine learning* to detect potential problems with logistics and SCM and suggest solutions;
- *barcoding,* an indispensable tool for tracking the movement of goods along the entire logistics chain;
- *blockchain,* which serves as a transaction ledger and safeguards sensitive data.

Implementation of all these technologies, which are in full demand in modern logistics, requires the use of appropriate electronic components, free access to which is currently limited due to the embargo on the import of microelectronics to Russia.

Robotic automation of logistics procedures today is limited to the participation of autonomous mobile vehicles in loading and unloading operations and the use of unmanned vehicles to move goods within warehouses.[10] More and more logistics operators are using computer analytics and machine vision algorithms to reduce order processing time and speed up delivery, as well as to reduce the need for human intervention and minimize the likelihood of errors.

Application of the customs warehouse procedure, the essence of which is that a carrier from Europe delivers cargo to the temporary storage warehouse closest to the border with Russia, and Russian transport picks it up and delivers it to the customer.

Change of "nationality". Since domestic vehicles are not allowed to enter the EU, some international logistics companies headquartered in Russia have re-registered, formally becoming foreign companies that are not prohibited from traveling to Europe.

Increased transparency of supply chains will make it possible to better track cargo on its way from supplier to customer.

Adherence to the principles of green logistics implies consistent implementation of a set of measures to reduce environmental pollution and carbon footprint. Modern business follows environmental rules primarily for image reasons — all customers today want the product to be environmentally friendly, and its production and delivery to be "green". Since logistics is concerned with optimizing freight traffic and

[10] The use of drones and quadrocopters, which could be considered last-mile delivery vehicles, is prohibited by Russian law.

increasing the efficiency of transportation systems (which also has an impact on reducing harmful emissions into the environment), its area of responsibility is largely identified with ensuring environmental safety in general. Hence the concept of "green logistics", which implies the guarantee of not only "clean" production and delivery of products, but also their return for disposal after consumption, as well as the realization of a closed cycle: production, distribution, consumption, disposal and recycling — due to environmental considerations.

Choosing sustainable solutions. Shifting priorities from least-cost business schemes and strategies to the most robust and flexible ones, focused on ensuring the supply chain's ability to continue to function reliably under the influence of unpredictable external influences, adapt easily and smoothly to changing conditions, and respond quickly and effectively to emerging risks.

Development of new international transportation corridors. The main logistical means of mitigating sanctions restrictions was the organization of cargo transport flows to Russia via third countries:

1) *Turkey*, which has now become the main hub for import supplies to our country. Russian airlines Aeroflot, Red Wings, Ikar, and S 7 fly to Istanbul on several flights a day. There are also two options for traveling to Russia from Turkey by road: via Georgia or Iran and Azerbaijan [17]. Since the Upper and Lower Lars crossing points are overloaded and not always accessible due to weather conditions, the main cargo traffic goes through the second route, which takes about 20 days. In addition, it is possible to deliver by ferry from Turkey to the ports of Krasnodar Region;

2) *from China* to ports in the Far East and then by rail to the European part of Russia (cargo delivery time to Moscow via Vladivostok averages 40–45 days). Cargo from China can also arrive at the ports of Novorossiysk and North-Western Sea harbors. Direct flights from China to Russia are operated by Aeroflot, Volga-Dnepr, Air China, Hainan Airlines, and Sichuan Airlines;

3) *to India, Iran, the Middle East, North Africa*, which are connected with Russia by the transport corridor "North-South", combining sea, rail and road routes with a total length of more than 7 thousand km and including three routes: through Azerbaijan, Kazakhstan and Turkmenistan, the Caspian Sea [18, 19]. In all three directions there is a steady growth of traffic, limited by infrastructural capacity, for the expansion of which it is necessary to modernize the port of Astrakhan, railway and port terminals in Iran, as well as border crossing points and highways in Azerbaijan, Dagestan and Kalmykia.

Reorientation of Russian exports to southern and eastern directions. For example, Russia's leading metallurgical companies (EVRAZ LLC, Mechel PJSC, Severstal PJSC, DiPOS Group of Companies), which previously exported to EU countries, are now supplying to Asia, the Middle East and North Africa. The Russian oil and gas industry has also reoriented itself and is developing logistics infrastructure in Eastern countries, which will significantly increase the latter's import potential.

The development of the Northern Sea Route as an alternative route for cargo delivery to Russia and oil and gas exports is limited by the short navigation period, the difficulty of ice navigation and the lack of regular voyages [20]. In addition, Russia currently has insufficient tanker capacity, and maritime transportation cannot develop due to the ban on insurance of Russian ships.

Transformation of logistics chains towards a multimodal structure implies a combination of sea, rail and road transportation. For example, indirect cargo delivery is practiced, based on a combination of road and air transport: by plane, as close as possible to the Russian border, followed by transloading onto a car. And vice versa. For example, from

China — by road to Khabarovsk or Vladivostok, and from there by airplane to Moscow. Such a connecting flight lasts 7–10 days, and the cost reduction compared to direct delivery from China is 15–20%

Category-based procurement management[11] is used as a way to improve supply efficiency and reduce costs for the company.

Organisation of domestic production and import substitution reduces supply chains.

Other solutions [21–25]:

- *digital transformation and automation of the supply chain process* to improve demand planning, increase supplier efficiency and reduce costs;
- *change of inventory management strategy* — creating Just in Case inventories instead of Just in Time replenishment;
- *uberisation* — joint use of resources of supply chain participants based on standardisation of nomenclature data and integration of system solutions;
- *attracting European carriers*, which is complicated by the fact that not all of them are ready to make flights to Russia, as cargo is often delayed at the border and there is a high probability that it will not be certified;
- *development of alternative sources of supply*, access to new vendors and distributors;
- *improving control over the movement of vehicles transporting cargo*;
- *introduction of a proactive approach to risk management*,— which is based on the forecasting by procurement managers and supply specialists of possible scenarios of market situation development;
- *renewal of vehicle fleets* with Russian and Chinese heavy-duty trucks (FAW, DongFeng) and gradual abandonment of Western-made trucks (Man, Mercedes, Scania), which have become difficult to maintain;
- *shipping containers in gondola (open railroad freight car) cars* (instead of fitting platforms), which was launched and is being developed by Russian Railways Holding Company;
- *development of "cold" logistics* — improvement of measures to ensure the necessary temperature and other conditions for preserving product conditions on the way from the producer to the consumer;
- *adherence to ESG principles* in designing transport and warehousing chains.

[11] Consolidation of the disparate needs of the company's business units into a single global contract.

CONCLUSIONS

Joint analysis of the information base, expert opinions, and the results of the survey of specialists allowed us to see the key transformations in Russian logistics and Supply Chain Management in 2022–2023, identify the main trends and select relevant solutions.

Three defining aspects were identified: changes in international trade and domestic market dynamics; digitalisation, process automation, new software, electronic systems, and equipment; and the environmental factor. The results of analysing the complex influence of these aspects constitute the scientific novelty of the study.

The theoretical contribution is the discovery that deglobalisation has become a new reality for Russian logistics practices. Nevertheless, it is still feasible to organise cargo delivery to our country today, from anywhere in the world, but using bypass routes, which, of course, affects timing, risks, and price.

The applied significance of the research lies in identifying the main drivers, trends, and vectors of restructuring of Russian logistics as of 2023. It is also practically important to assess the main trends, identify risks and opportunities, consider, and analyse strategic decisions in the field of domestic logistics and Supply Chain Management.

It is shown that current trends are transform-

ing this industry (or sector) towards greater flexibility and better adaptability to changing conditions.

It was confirmed that the creation and development of new logistics schemes, despite the high time and labour costs, turned out to be quite feasible — Russian specialists succeeded in reorienting supply chains and redirecting commodity flows. At the same time, many logistics systems and supply schemes are built from scratch and "finalised" as they are being used.

Limitations of applicability of the results. Any of the factors influencing Russian logistics and Supply Chain Management may change, and earlier conclusions may require revision. In addition, the estimates obtained may not be sufficiently universal, as they are based on the opinions of a narrow group of experts and a limited sample of respondents. In this regard, it is necessary continue to monitor the Russian logistics services market, work closely with experts in this area and Russian business practices to make timely changes in logistics solutions and adjust Supply Chain Management.

Continued research primarily involves tracking processes and events important to Russian logistics and Supply Chain Management, including:

- political and economic dynamics that have a direct impact on trends, work and decisions in the sphere of Russian logistics and Supply Chain Management;
- development of new transport corridors and logistics routes, development of the country's transport and logistics infrastructure;
- creation of specialised software products and services;
- new opportunities offered by digitalisation of business processes and artificial intelligence;
- stricter environmental principles and requirements.

In addition, it is important to study the impact of current events and challenges on international logistics and global supply chains.

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