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Department of Sociology, Economic
Theory and International Processes
38.04.01 Economics
International Economics and Business

GRADUATION THESIS

on

Development of international logistics between China and Russia

Master's degree student

Feng
Cheng

signature, date

Academic adviser

Salnikova O. V.

signature, date

Compliance supervisor

Vlazneva S. A.

signature, date

Reviewer

Barbashova S. A.

signature, date

Head of the Department
of Economics and Finance of Penza Branch of
Federal State Educational Budgetary
Institution of Higher Education
Financial University under the Government of
the Russian Federation

The thesis was approved for defence (record of the department meeting dated _____ no.____)

Head of the Department

Rozhkova L.V.

signature, date

The thesis was defended and marked _____ (record of the State Examination Board dated
_____ no.____)

Secretary of the SEB

Rasskazova N. V.

signature, date

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FSBEI HE Penza State University
Institute of Economics and Administration
Department of Sociology, Economic Theory and International Processes
Field of study 38.04.01 Economics,
Master's degree programme International Economics and Business

APPROVED BY:
Head of the Department
Doctor of Social Sciences,
Professor
Rozhkova L.V.

«_____» _____ 20__

ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Feng Cheng, group 2309BAM1, full-time mode of study

1 The topic of the graduation thesis: "Development of international logistics between China and Russia"

was approved by the university order
dated «___» _____ 20__ no. _____

1 The deadline for the Master's degree student to complete the graduation thesis is 11.06.2025.

2 The input data for the graduation thesis is the regulatory and legal framework, scientific literature and reference books, and Internet data.

3 The list of issues to be studied includes importance of China-Russia trade relations and logistics cooperation; current development status of China-Russian international logistics; prospects and problems of international logistics development between China and Russia.

4 The list of visuals contains tables and figures.

5 The date of setting the assignment is 7.09.2023.

Academic adviser _____ / Salnikova O. V./
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Feng Cheng/
(signature) (full name)

Schedule for completing the graduation thesis

№ п/п	Content of the thesis	Deadline for completion	Due date, signature of the academic adviser
First year of study			
1	Substantiating of the research topic and methodology, subject and object of research	1.09.2023 – 31.10.2023	
2	Framing the scientific concept of research	1.11.2023 – 18.12.2023	
3	Collection of scientific literature for the thesis	19.12.2023 – 15.01.2024	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2024 – 19.02.2024	
5	Framing of a detailed plan and layout of the research	20.02.2024 – 12.03.2024	
6	Studying new literature sources within the topic of the thesis	13.03.2024 – 26.03.2024	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2024 – 30.04.2024	
8	Preparing the first chapter of the thesis	1.05.2024 – 30.06.2024	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2024 – 22.10.2024	
10	Preparing the second chapter of the thesis	23.10.2024 – 24.12.2024	
11	Conducting analytical research within the third chapter of the thesis	25.12.2024 – 25.02.2025	
12	Preparing the third chapter of the thesis	26.02.2025 – 21.04.2025	
13	Preparing the introduction and conclusion	22.04.2025 – 12.05.2025	
14	Completing the graduation thesis	13.05.2025 – 26.05.2025	
15	Handing in the thesis for compliance control and antiplagiat	27.05.2025 – 9.06.2025	
16	Getting acquainted with the feedback and review	10.06.2025	
17	Presenting the written thesis	11.06.2025	

Academic adviser _____ / Salnikova O. V. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Feng Cheng /
(signature) (full name)

Summary

The graduation thesis comprises 72 pages, 3 chapters, 19 figures, 3 tables, 72 sources.

CHINA-RUSSIA TRADE, INTERNATIONAL LOGISTICS, LOGISTICS COOPERATION, LOGISTICS ROUTES, TECHNOLOGICAL INNOVATION, GREEN LOGISTICS.

The target of research is: to analyze development of international logistics between China and Russia, including its current status, prospects, and challenges.

The goal of work is to study the importance of China-Russia trade relations and logistics cooperation, the current development status of China-Russian international logistics, the prospects and problems of its development, and to propose suggestions for strengthening China-Russia logistics cooperation.

The methodological framework of the paper is formed by the complex of theoretical and practical methods such as: Literature review, data analysis (e.g., using statistics on trade volume and logistics performance), case studies (e.g., of key logistics routes and hubs), and comparative analysis (e.g., of logistics performance between China and Russia).

The results of research include: China-Russia trade relations are of great economic, political, and strategic significance, with energy trade and manufacturing products being important components; logistics plays a crucial role in facilitating bilateral trade, but current development faces challenges such as infrastructure deficiencies and policy differences; key logistics routes (e.g., Siberian Land Bridge, China-Europe Railway Express) and hubs (e.g., Manzhouli, Moscow) form a comprehensive network; technological innovation and green logistics are important trends, with innovations like automated sorting systems and multimodal transportation enhancing efficiency.

The recommendations on disseminating and applying the results are as follows: establish a joint logistics information platform to enhance information sharing; build smart logistics parks with advanced technology and sustainable features; cooperate in developing logistics professional talent through educational exchanges and training programs.

The theoretical relevance of the thesis is established by Highlighting the significance of China-Russia trade and logistics in the context of global economic

development, regional cooperation (e.g., Belt and Road Initiative), and the need for theoretical guidance in addressing practical logistics challenges.

The target of research can be further explored through continuing to study the impact of technological advancements on logistics efficiency, exploring more sustainable green logistics solutions, and addressing policy and regulatory challenges to further optimize China-Russia logistics cooperation.

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Introduction

In the intricate tapestry of the contemporary global economic landscape, the trade relations between China and Russia have emerged as a linchpin, exerting a profound influence on regional and international economic development. This research undertakes an in - depth exploration of the development of international logistics between the two countries, delving into its multifaceted dimensions, current status, prospects, and challenges. China and Russia, both giants in the global economic arena, are characterized by a remarkable economic complementarity. Russia, endowed with abundant energy resources and robust scientific and technological capabilities, stands in contrast to China's vast market with its high - volume consumer demand and extensive manufacturing base. This complementarity forms the bedrock of their trade relations, which are not only of paramount importance for the economic growth of both nations but also have far - reaching implications for regional and global economic stability. From an economic perspective, the trade cooperation between China and Russia acts as a powerful engine, driving the growth of their respective economies. Russia's oil and gas exports to China meet the latter's growing energy needs, ensuring the stable operation of China's industries and energy security.

In return, China's diverse range of manufactured goods, from consumer electronics to machinery, flood the Russian market, satisfying the consumption demands of Russian consumers and providing essential equipment for Russia's infrastructure construction and industrial development. This mutually beneficial trade relationship promotes economic growth, job creation, and technological innovation in both countries. Beyond the economic realm, these trade relations play a crucial role in strengthening political mutual trust. Regular trade exchanges foster closer interactions between the two countries' governments, businesses, and people.

Through trade – related activities, cultural exchanges are also promoted. Chinese cultural products, such as traditional handicrafts and contemporary films, gain popularity in Russia, while Russian art forms and literature find admirers in China. These cultural exchanges enhance mutual understanding and friendship between the two peoples, further strengthening the political foundation of their relationship. Moreover, as permanent

members of the United Nations Security Council, China and Russia's cooperation in trade helps to maintain global and regional peace and security. By jointly addressing economic and trade issues, they can better coordinate their positions on international affairs, contributing to a more stable and just international order. China-Russia trade is also an integral part of regional cooperation and the Belt and Road construction. The Belt and Road Initiative, with its far – reaching vision of enhancing connectivity and economic cooperation across Eurasia, provides a vast platform for China and Russia to deepen their trade relations. Through infrastructure building, such as the construction of railways, ports, and energy pipelines, the two countries can strengthen their economic ties and promote the flow of goods, services, and capital within the region. This not only benefits China and Russia but also other countries along the route, facilitating regional economic integration and prosperity. Logistics serves as the lifeblood of China-Russia trade, facilitating the seamless flow of goods between the two countries. Given the large - scale bilateral trade and the complex geographical environments separating them, an efficient logistics system is essential [47]. China and Russia span across two vast continents, with long - distance transportation routes and diverse terrains. The efficient operation of logistics is the key to ensuring that goods can be transported from production sites to consumption destinations in a timely and cost - effective manner. It not only guarantees the timely delivery of goods, which is crucial for meeting market demands and maintaining supply - chain stability, but also enhances trade efficiency.

By reducing transportation times and costs, logistics can improve the competitiveness of enterprises in both countries. For example, faster delivery of Chinese - made consumer goods to the Russian market can help Chinese enterprises gain a larger share in the Russian market, while efficient logistics can also enable Russian energy products to reach China more quickly, ensuring a stable energy supply. In addition, logistics has the power to expand the scope of trade. With the continuous improvement of logistics services, new trade opportunities can be explored. For instance, the development of cold - chain logistics has enabled the trade of fresh agricultural products between China and Russia. Chinese fruits and vegetables can now be transported to Russia in a fresh state, while Russian high - quality seafood can reach Chinese consumers' tables. This not only enriches the choices of

consumers in both countries but also promotes the development of related industries. Moreover, logistics promotes regional connectivity. The construction of logistics routes and hubs, such as the China - Europe Railway Express and various border ports, not only connects China and Russia but also links them with other countries in Eurasia, facilitating the integration of regional economies. With the continuous growth of trade volume, especially the booming development of cross-border e-commerce, the logistics demands between China and Russia are escalating. Cross-border e-commerce has witnessed explosive growth in recent years, with more and more Chinese and Russian consumers turning to online platforms to purchase products from the other country. This new form of trade has imposed higher requirements on logistics infrastructure, service levels, and cooperation models. Consumers expect faster delivery times, lower logistics costs, and more reliable services [57].

To meet these demands, both countries need to invest in modernizing their logistics infrastructure, improving the efficiency of logistics operations, and strengthening cooperation in the logistics field. Despite the importance of China-Russia trade and logistics cooperation, the current international logistics development between the two countries faces a series of challenges. In terms of trade structure, there is still room for optimization. China's exports to Russia are mainly concentrated in manufactured industrial products, while Russia's exports to China are dominated by primary products such as mineral energy fuels. This trade structure may lead to certain imbalances and risks in the long - term trade relationship. Cross-border e-commerce, although a vibrant area of trade, encounters a series of issues. In the customs clearance process, complex procedures and differences in regulations between the two countries often cause delays. Logistics distribution also faces problems, such as long delivery times and high costs, especially in remote areas. Payment security is another concern, with the risk of fraud and the lack of unified payment platforms. Additionally, consumer rights protection in cross-border e-commerce is still in its infancy, with insufficient mechanisms to handle disputes. In the logistics field, border trade logistics suffers from infrastructure deficiencies. Some border ports lack modern facilities for cargo handling, storage, and transportation, which leads to inefficiencies and high costs. The capacity of third - party logistics is also weak, with many logistics enterprises being small -

scale and lacking the necessary resources and expertise to provide comprehensive and high - quality services.

The research object of this paper is international logistics. The subject is current state and development of international logistics between China and Russia.

The goal of the research is to analyze current state and development of international logistics between China and Russia.

Novelty of this study is in order to locate the present situation and development trend of international logistics more accurately, this paper synthesizes the development environment, logistics system, system problems and future development trend of international logistics, and makes a qualitative analysis of them.

Moreover, differences in policies and regulations between the two countries in customs clearance, tax, and transportation safety standards pose significant obstacles to the development of international logistics. These differences can create confusion for logistics operators, increase compliance costs, and lead to delays in the transportation of goods. However, the future of China-Russia international logistics is filled with promise. Technological innovation is revolutionizing the logistics industry. The application of the Internet of Things (IoT) allows for real - time monitoring of goods during transportation, ensuring their safety and quality. For example, IoT sensors can be installed in containers to monitor temperature, humidity, and location, enabling timely adjustments if any abnormal conditions are detected. Big data analytics can be used to optimize logistics routes, predict demand, and manage inventory more effectively [52] By analyzing historical data on transportation times, shipment volumes, and customer preferences, logistics companies can make more informed decisions, reducing costs and improving service quality. Artificial intelligence (AI) is also being used in various aspects of logistics, such as in automated sorting systems and intelligent customer service chatbots.

Chapter 1 Importance of China-Russia trade relations and logistics cooperation

1.1 Concept and system of international logistics

International logistics, in short, is the planning, implementation, control and management process of cross-border material flow and storage. It covers all logistics links from suppliers to final consumers, including transportation, warehousing, loading and unloading, packaging, distribution and information processing [31]. With the deepening of globalization and frequent international trade, international logistics came into being and gradually developed into an important part of modern logistics industry. International logistics can be divided into maritime logistics, air logistics, land logistics and multimodal transport. Maritime logistics is characterized by low cost and large volume, which is suitable for the transportation of bulk commodities; Air logistics is fast, but the cost is high, which is suitable for high-value and urgently needed goods; Land transportation logistics includes roads and railways, with moderate cost and suitable for short-distance transportation; Multimodal transportation combines the above modes of transportation, realizing the optimization of transportation efficiency and cost. Figure 1 is international traffic flow chart, as shown below:

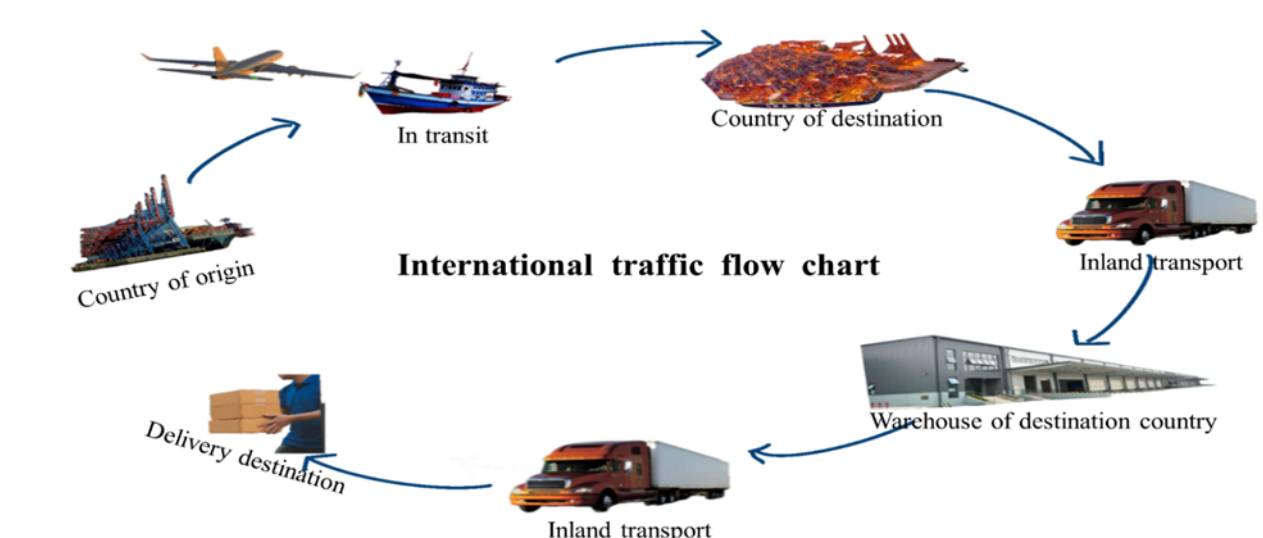


Figure 1 – International traffic flow chart [10]

With the continuous progress of science and technology and the in-depth development of globalization, international logistics will usher in a broader development space and challenges. On the one hand, the application of advanced technologies such as Internet of Things, big data and artificial intelligence will further promote the intelligent, automated and green development of international logistics; On the other hand, the deep integration of global supply chain and the change of trade pattern will also put forward higher requirements and challenges for international logistics. International logistics plays a vital role in modern economy. It can not only effectively connect the production, consumption and markets of various countries, promote the smooth progress of international trade, but also create greater value for enterprises by optimizing resource allocation and reducing transaction costs. In addition, international logistics has promoted cultural exchanges, scientific and technological progress and global economic development [1].

There are significant differences in the logistics environment of international logistics. As an important support of global economic integration and trade liberalization, international logistics involves cross-border cargo transportation, warehousing, loading and unloading, packaging, distribution and information management. With the continuous development of global trade, the importance of international logistics in modern economy is increasingly prominent. However, there are significant differences in political and economic systems, market size, technical level and cultural background between most countries and regions. Under the joint action of these factors, the logistics systems of various countries have formed their own unique logistics environment. At the same time, these differences bring challenges and opportunities for enterprises to carry out international logistics activities. The differences in the international logistics environment are mainly manifested in the following three aspects.

Differences in logistics systems: the logistics systems of different countries and regions have their own characteristics, which are mainly reflected in logistics network layout, transportation mode selection, storage facilities and information level. For example, European countries have developed logistics networks and perfect railway and highway transportation systems, while Southeast Asian countries have obvious advantages in water transportation [7].

International logistics serves international traders and multinational companies. International trade and international production system are two closely related and extremely complex large-scale systems, which are an open economic system with coordinated operation composed of many subsystems and subsystems. The international logistics system serving trade activities consists of subsystems such as packaging, storage, transportation, inspection, distribution processing and its arrangement, repackaging and international distribution. Among them, warehousing, transportation and distribution are the basic functions of international logistics, and a large number of warehousing outlets are often set up in international logistics centers to provide warehousing, transportation and distribution services for international logistics.

On the other hand, the international production system includes many links such as international procurement, internal storage and transportation of raw materials, international production and processing, storage and transportation of finished products, international marketing, research and development, international enterprise infrastructure and globalization strategy, which all constitute the content of international logistics activities under global production conditions. Compared with pure international trade logistics, international logistics activities generated by international production are often more complex and strategic. International logistics uses international logistics networks, logistics facilities and logistics technologies to realize the international flow and exchange of goods, so as to promote the development of regional economy and the optimal allocation of world resources, and promote the process management of global integrated supply chain. It can be seen that international logistics is a highly integrated concept with obvious system integration characteristics.

Figure 2 and 3 are the operation mode of the international logistics system and the framework of the international logistics function system respectively, as shown in the following figure. International logistics transportation subsystem is an important part of international logistics system. Specifically, it involves the transportation of goods, including road, railway, air, sea and other modes of transportation.

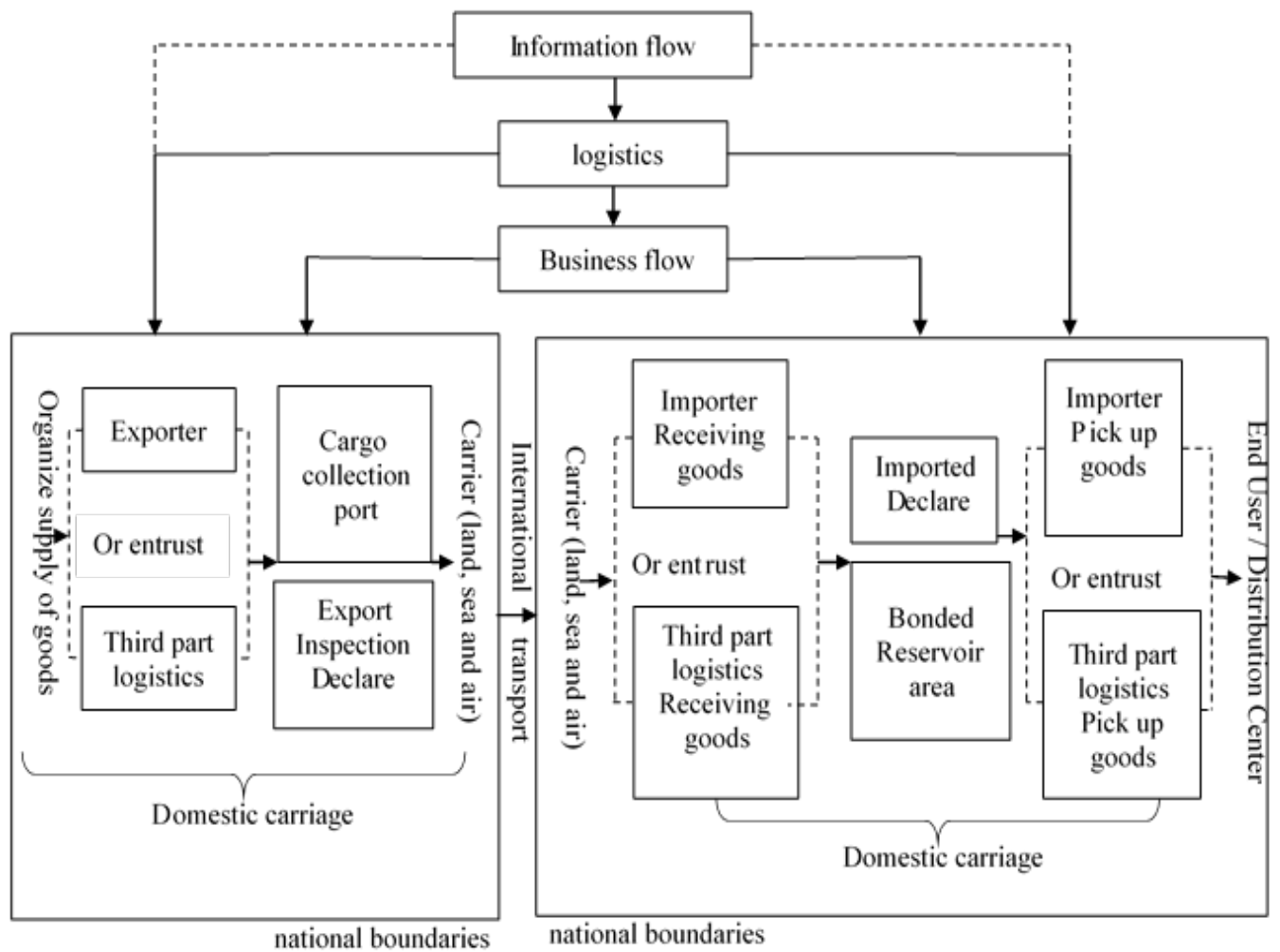


Figure 2 – Operation mode of international logistics system [12]

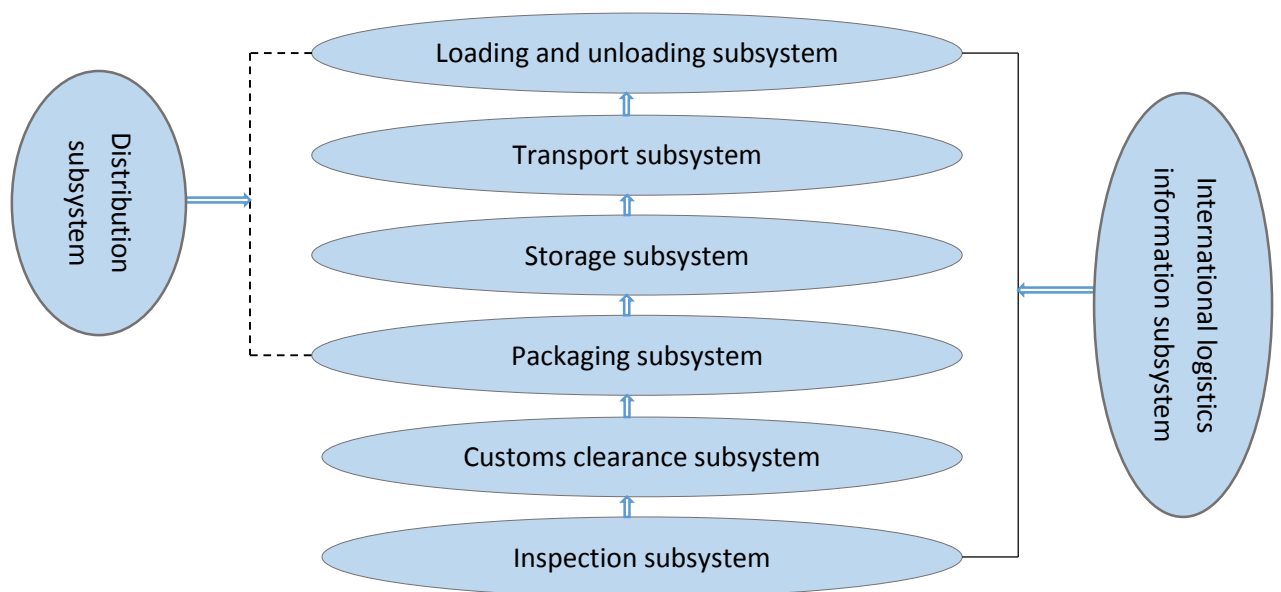


Figure 3 – Framework of International Logistics Function System [12]

The main function of this subsystem is to transport goods safely and quickly from the place of departure to the destination through various means of transportation and equipment. In international logistics, the transportation subsystem closely cooperates with other subsystems such as warehousing, loading and unloading, customs declaration, etc., and together constitutes a complete logistics chain. The efficient operation of transportation subsystem is very important to the overall efficiency and benefit of international logistics. At the same time, with the continuous development and innovation of logistics technology, the international logistics transportation subsystem is also constantly optimized and improved. For example, by applying advanced logistics information technology and intelligent equipment, we can improve the efficiency and accuracy of transportation, reduce transportation costs and improve customer satisfaction.

The international logistics warehouse subsystem is an important part of the international logistics system, which is responsible for the storage, management and distribution of goods. The storage and custody of the warehouse subsystem makes the goods in a relatively stagnant state in its circulation process, which is absolutely necessary. Because commodity circulation is a continuous circulation process from decentralization to centralization and then from centralization to decentralization. Specifically, the warehouse subsystem needs to classify and store different types of goods to ensure the safety and integrity of goods during storage, which includes reasonable warehouse layout, goods classification, marking and stacking.

The warehouse subsystem needs to comprehensively manage goods, including goods warehousing, warehousing, inventory inquiry, inventory counting and other operations, which requires the establishment of a perfect warehouse management system to realize information and digital management of goods. The warehouse subsystem needs to pick, package and distribute goods according to the order information and the demand of goods distribution, which requires close cooperation with the transportation subsystem to ensure that the goods arrive at the destination on time and accurately. The warehouse subsystem needs to control the inventory according to the demand and supply of goods to avoid the occurrence of inventory backlog or shortage. This requires inventory forecasting, inventory planning, inventory scheduling and other operations.

The international logistics commodity inspection subsystem is an important link to ensure that the quality and quantity of goods in international trade meet the contract requirements. This subsystem involves the inspection, appraisal, supervision and management of import and export commodities to ensure that the quality, quantity and packaging of commodities meet the international trade standards and contract requirements. Specifically, the main responsibilities and functions of the international logistics commodity inspection subsystem include: sampling, inspection, testing and appraisal of import and export commodities to ensure that the quality and quantity of commodities meet the contract provisions and international trade standards, which involves appearance inspection, size inspection, weight inspection, performance testing and many other aspects.

Check the packaging of the goods to ensure that the packaging conforms to the contract provisions and international trade standards, and can protect the safety and integrity of the goods during transportation. This involves packaging materials, packaging methods, packaging identification and many other aspects. Supervise and manage the production, processing, storage and transportation of import and export commodities to ensure the stability and reliability of commodity quality and quantity. This includes establishing a quality management system, conducting quality evaluation and monitoring, and handling quality problems and complaints.

The commodity packaging subsystem of international logistics is an indispensable part of international logistics, which is mainly responsible for the design and implementation of commodity packaging to ensure the safety, integrity and convenience of commodities during transportation and storage. The main responsibilities and functions of the subsystem include: designing packaging materials and methods according to the characteristics of goods, transportation requirements and market demand, and packaging design needs to consider many factors such as commodity protection, convenient transportation and cost reduction; According to the requirements of packaging design, we should pay attention to the selection of packaging materials, the correctness of packaging methods and the clarity of packaging marks during the packaging process.

Check the packaged goods to ensure that the packaging conforms to the contract provisions and international trade standards, and can protect the safety and integrity of the

goods during transportation. In international logistics, commodity packaging subsystem closely cooperates with other subsystems such as transportation, warehousing and customs declaration to form a complete logistics chain. Reasonable packaging design and implementation can reduce the damage and loss of goods, improve transportation efficiency, reduce logistics costs, and also help to enhance the market competitiveness and image of goods.

International logistics information subsystem is an important part of international logistics system, which is mainly responsible for collecting, processing and transmitting international logistics information. With the help of advanced information technology, the subsystem realizes real-time monitoring, analysis and prediction of logistics information, and provides strong support for international logistics decision-making. The main functions of the international logistics information subsystem include: collecting all kinds of information in the logistics process in real time through various sensors, scanning equipment, RFID and other technical means, such as the position and state of goods, the operation of transportation tools, etc.

Cleaning, integrating, analyzing and mining the collected information to extract valuable information and provide support for logistics decision-making. The processed information will be transmitted to relevant personnel and departments in real time through technical means such as network and database, so that they can know the logistics situation in time and make corresponding decisions. The characteristics of international logistics information system are large amount of information and frequent exchange. Large transmission capacity and strong timeliness; Many links, many points and long lines. Therefore, it is necessary to establish an international logistics information system with advanced technology. The development of EDI in international trade is an important trend. Countries should strengthen the application of EDI in international logistics and build expressways for international trade and transnational operation.

The above-mentioned main systems should be organically linked with distribution system, loading and unloading system and distribution processing system, and make overall consideration and overall planning to establish an international logistics system that meets the requirements of international competition. One end of the international logistics system

is connected with production, and the other end is connected with consumption, which is international, so it is a veritable complex open system operation. International logistics system is an organic whole with specific functions, which carries out logistics activities in a certain time and space (including domestic, inter-country, inter-regional and inter-continent) and consists of logistics personnel, logistics facilities, materials to be transported and logistics information. A series of processes such as system synthesis, system analysis and system management of international logistics system is the operation of international logistics system. The operation of international logistics system is the inevitable trend of the development of container transport and international multimodal transport, and it is the "second revolution of international transport industry" after container transport. The operation of international logistics system has become the main force in the world transportation industry in the 21st century with its modern management means, high-quality service level, good cooperative relationship with shippers and high-tech communication. Efficiency and optimization are the two major goals of international logistics system operation. The so-called efficiency means to construct, organize and manage the above functions of logistics as a system. The common goal of each subsystem of logistics is the efficiency of logistics, and it is this common goal that produces the necessity of closely linking all logistics functions. The so-called optimization, that is, applying the efficiency and cost analysis of the logistics system to optimize the structure, organization and management of the system operation, so as to achieve a certain logistics service with the lowest operating cost of the overall logistics system. Therefore, the international logistics system must operate in a suitable area, make use of perfect soft and hard environment, and achieve the required logistics service level with the least logistics cost.

1.2 Importance of logistics in facilitating bilateral trade

First, the trade relationship between China and Russia is of great significance to the economic development of the two countries. As the two largest developing countries in the world, China and Russia have strong economic complementarity. Trade cooperation between China and Russia can not only promote the mutual benefit and win-win results of

the two economies, but also help promote the development of regional and global economies. Russia has rich energy resources and scientific and technological strength, while China has the world's largest market size and manufacturing base. We can better complement each other's advantages and achieve mutually beneficial cooperation [1].

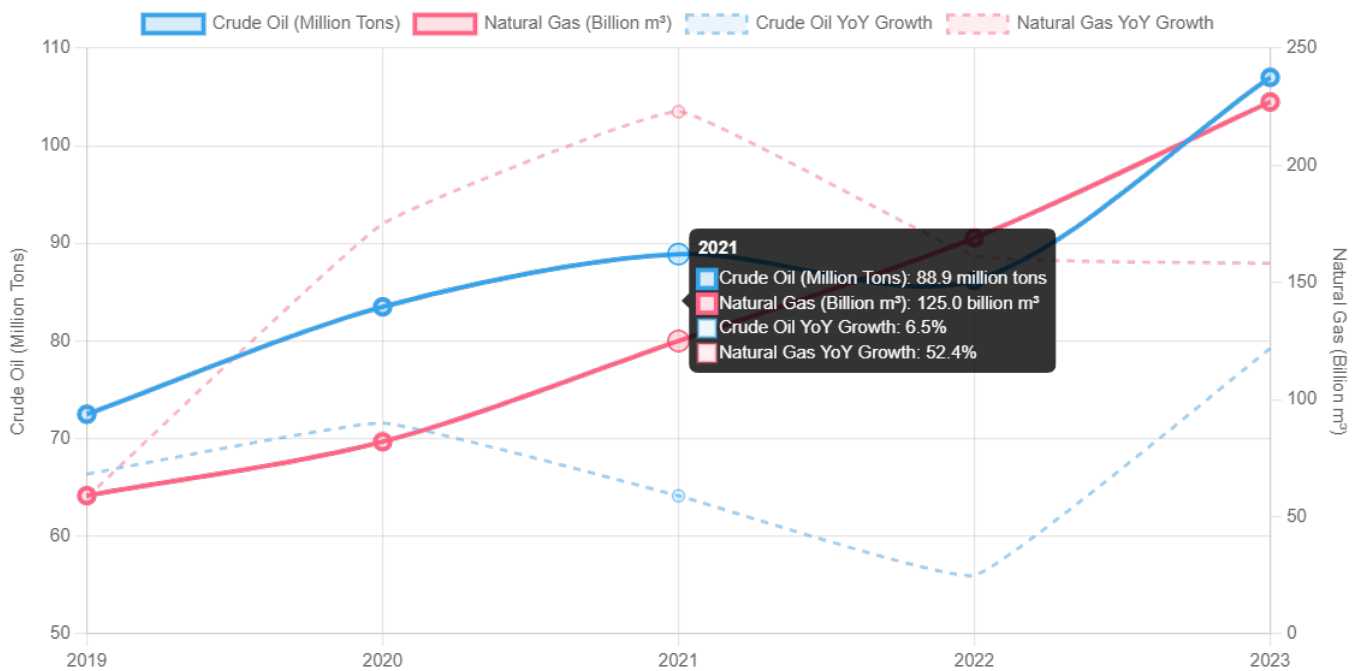


Figure 4 – Annual growth trend chart of China-Russia energy trade 2019–2023 [1]

In China-Russia trade relations, energy trade occupies a critically important position, highlighting the deep complementarity of the two countries' economic structures. Data from the General Administration of Customs of China clearly shows that in 2023, China's crude oil imports from Russia reached a new high, exceeding 107 million tons, an increase of 24% compared to the previous year, accounting for approximately 19% of China's total crude oil imports that year. With this supply volume, Russia regained its position as China's largest crude oil importer after a four-year gap. In terms of crude oil transportation channels, the China-Russia crude oil pipeline played a pivotal role, delivering approximately 40 million tons of crude oil to China in 2023, accounting for about 37% of Russia's total crude oil exports to China.

Natural gas trade has also achieved remarkable results. In 2023, China imported 8.05 million tons of liquefied natural gas (LNG) from Russia, a year-on-year increase of 23%. In

terms of pipeline natural gas trade, the volume of natural gas transported to China through the China-Russia natural gas pipeline reached 22.7 billion cubic meters, 700 million cubic meters more than the contracted export volume. That year, China's total pipeline natural gas imports amounted to approximately 48.5 million tons (equivalent to about 67 billion cubic meters), with Russian pipeline natural gas accounting for about 34%. Russia's abundant oil and gas resources continuously supply energy for China's booming industrial production and residential daily life, strengthening the solid defense line of China's energy security, and have become the core support for the stable development of China-Russia trade relations.

As a key component of China's exports to Russia, manufacturing products have seen continuous optimization and upgrading of their export structure in recent years, with high-value-added products gradually taking the lead. Looking back to 2013, low-value-added products such as textiles and household items accounted for more than 60% of China's export categories to Russia. As shown in figure 5.

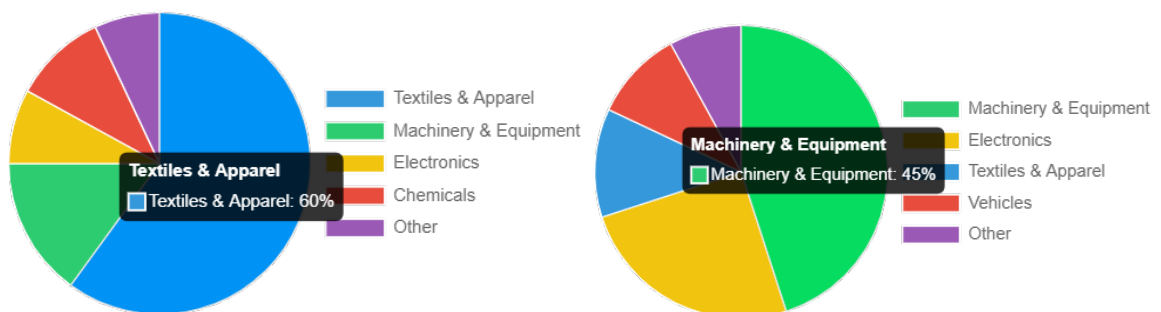


Figure 5 – Evolution of China's export commodity structure to Russia 2013 vs 2023
[34]

By 2023, however, the situation had significantly changed: high-tech products such as electronic products, mechanical equipment, and automotive components emerged prominently, with their export value share rising to over 45%. The automotive sector has shown particularly striking performance.

In 2023, China's automobile exports to Russia experienced explosive growth, surging fivefold to reach 800,000 vehicles. Chinese brand automobiles have rapidly filled local market gaps and continuously expanded their market share by virtue of their cost-performance advantages and technical adaptability to meet the needs of the Russian market. At the same time, high-tech products such as new energy equipment and smartphones have also become highly popular among Russian consumers, serving as a powerful engine driving the growth of China's exports to Russia. Take smartphones as an example: domestic Chinese smartphone brands such as Huawei and Xiaomi have achieved remarkable results in the Russian market.

Since March 2023, Huawei's sales in Russia have surged by 300%, while OPPO and vivo have also doubled their sales. Electromechanical products dominate China's exports to Russia, accounting for as high as 40%. This not only demonstrates the strong strength of China's manufacturing industry but also reflects the huge demand for electromechanical products in the Russian market. China's complete industrial system and continuous technological innovation capabilities have enabled manufacturing products to gain a firm foothold in the Russian market, continuously expand market space, further deepen China-Russia cooperation and exchanges in the manufacturing sector, and inject a steady stream of vitality into bilateral trade [50].

Secondly, the trade relationship between China and Russia is important to the stability and development of the political relations between the two countries. As a permanent member of the UN Security Council and an important member, China and Russia have important global and regional influence. Trade cooperation between the two countries can not only enhance the friendship between the two peoples, promote cultural exchanges and people-to-people exchanges, but also help to strengthen the political mutual trust and strategic cooperation between the two countries. Deepening economic cooperation between China and Russia will help to enhance political mutual trust and promote global and regional peace and stability.

Thirdly, Sino-Russian trade relations are of great significance to regional cooperation and Belt and Road construction. In recent years, the Belt and Road initiative has been supported and recognized by more and more countries, and the trade cooperation between

China and Russia has great potential and space for development. The two sides can jointly promote Belt and Road construction and promote regional cooperation and economic prosperity by strengthening infrastructure construction, expanding trade channels and deepening industrial cooperation. China-Russia trade relations will provide important impetus and support for regional and global cooperation.

In addition, Sino-Russia trade relations have an important impact on maintaining global and regional peace and security. As permanent members of the UN Security Council, China and Russia have greater international influence and responsibilities. Closer cooperation between the two countries can not only strengthen global governance and the international order, but also help to maintain regional peace and security. Trade cooperation between China and Russia can promote economic development and job creation, ease social conflicts and reduce poverty, and provide strong support for the regional and global stable development.

Finally, china-Russia trade relations are of great significance to deepening international cooperation and globalization. In recent years, the international community has faced many challenges and difficulties, such as climate change, epidemic prevention and control, and trade protectionism. China and Russia can strengthen cooperation to jointly meet these challenges and difficulties, and promote the building of an open world economy and a community with a shared future for mankind. China-Russia trade cooperation will provide a new development model and cooperation paradigm for the international community and promote common prosperity and development both globally and locally [2].

To sum up, china-Russia trade relations are of important political, economic and geostrategic significance, and to the peace, security, development and prosperity of the two countries, the regions and the worlds. The two sides should continue to strengthen cooperation, deepen economic and trade relations, promote mutual benefit and win-win results, jointly promote the building of a community with a shared future for mankind, and realize world peace and development.

1.3 Significance of China-Russia trade relations

As two important global economies, the economic cooperation between China and Russia has always been at a high level of development. In order to promote the prosperity of bilateral trade between China and Russia, logistics, as a key link in trade exchanges, closely relates to market demand, production supply, transportation channels, and many other aspects [3]. This article will discuss in detail the importance of logistics in promoting the development of bilateral trade between China and Russia.

Firstly, the scale of bilateral trade between China and Russia is huge, posing higher requirements for logistics. China and Russia are located at the junction of the two largest continents in the world, with vast territories and diverse geographical environments between their lands. Connecting these two vast markets and ensuring the smooth transportation of trade goods require logistics to act as a key coordinator. The logistics system includes supply chain management, transportation, warehousing, packaging, information technology, and more, with the ultimate goal of meeting the flow requirements of goods from production sites to consumption sites. Only through an efficient logistics network can bilateral trade between China and Russia proceed smoothly and the delivery, transportation, and transactions of goods be successfully completed.

Secondly, logistics can enhance the efficiency and competitiveness of bilateral trade. China and Russia are respectively the most populous and geographically largest countries in the world, complementing each other in resources, technology, and markets. Through logistics cooperation, goods can be delivered to destinations more quickly, logistics costs can be reduced, and trade efficiency can be improved. This helps the enterprises of both countries to enhance their competitiveness in the market, strengthen their cooperation, and most importantly, logistics, as a bridge connecting the economies of the two countries, can promote further deepening of trade cooperation between China and Russia, explore more cooperation opportunities, and drive the common development of the two economies, As shown in figure 6 [4].



Figure 6 – Comparison of logistics performance index (LPI) dimensions between China and Russia 2023 [35]

Thirdly, logistics can also expand the scope and fields of bilateral trade between China and Russia. With the deepening of economic development and mutual understanding between the two countries, bilateral trade between China and Russia is no longer limited to traditional resource trade, but also involves technology, services, agriculture, high-tech, and other fields. The expansion of these fields requires more convenient logistics support. The improvement and modernization of logistics networks can bring greater market potential, promote trade diversification between China and Russia, drive the development of high value-added goods, and provide greater possibilities for the structural adjustment and upgrading of the two countries' economies.

Finally, logistics plays a vital role in promoting regional cooperation and connectivity between China and Russia in bilateral trade. In recent years, China and Russia have made

significant progress in regional development cooperation areas, such as the Belt and Road Initiative and the Eurasian Economic Union, which mutually promote cooperation mechanisms [45]. As the core link running through various transportation and logistics networks, logistics is the cornerstone for the smooth operation of these cooperation mechanisms. Through the synergistic effect of logistics, the two countries can strengthen cooperation in cross-border transportation, shipping, railways, roads, and other areas, enhance the overall efficiency of bilateral cooperation, promote the deep integration of bilateral trade and economic development with regional cooperation, and achieve connectivity [5].

In conclusion, logistics plays an important role in promoting bilateral trade between China and Russia and is a key factor in the economic cooperation between the two countries. Only by further optimizing logistics networks and building efficient, safe, and intelligent logistics systems can we continue to promote the growth of bilateral trade between China and Russia, and promote the deepening development of economic cooperation between the two sides. It is believed that with the joint efforts of both sides, bilateral trade between China and Russia will embrace a more prosperous and brighter future.

China-Russia trade relies on a multi-dimensional logistics network, with efficiency differences in core corridors directly impacting trade cost structures: China-Europe Railway Express: As a premium logistics representative, the "Chongqing-Moscow" Yu-Xin-Ou train took approximately 12-14 days in 2023, with a comprehensive freight cost of around \$5,800 for a 20-foot container (including domestic, transit, and overseas segments). The cargo damage rate was below 3%, mainly carrying high-value goods such as electronics and auto parts. Its advantages lie in "door-to-door" temperature-controlled shipping and scheduled departures, but costs are 40% higher than sea transport.

Siberian Land Bridge (Rail+Sea): The route from Shanghai via Vladivostok Port to Moscow via the Trans-Siberian Railway takes 22-25 days, with a 20-foot container cost of about \$3,200, suitable for bulk cargo (e.g., building materials, machinery). However, it requires two transfers (sea to rail), with a cargo damage rate of 8%. The incompatibility between Russia's broad gauge (1520mm) and China's standard gauge (1435mm) causes each transfer at the Manzhouli Port to take approximately 5 hours, increasing implicit costs.

Data Comparison: For electromechanical products of the same value, the China-Europe Railway Express is 40% faster than the Siberian Land Bridge but 81% more expensive, reflecting the "efficiency-cost scissors gap" in China-Russia logistics corridors.

Analysis Based on the World Bank Logistics Performance Index (LPI) According to the World Bank's 2023 Logistics Performance Report: China's LPI Score: 3.68 (23rd globally), with strengths in "Logistics Service Competitiveness" (3.82 points, e-commerce logistics enterprise density of 5.2 companies/km²) and "Tracking and Tracing Capability" (3.91 points, Beidou positioning coverage >98%). [59]The shortfall is "Customs Efficiency" (3.21 points, cross-border e-commerce customs clearance averaging 28 hours) [55].

Russia's LPI Score: 2.89 (96th globally), with core weaknesses in "Customs Efficiency" (2.35 points, Moscow Customs' manual inspection rate as high as 35%, leading to average clearance time of 120 hours) and "Logistics Service Competitiveness" (2.51 points, digitalization rate of local 3PLs at only 18%).

Impact: Russia's low customs efficiency imposes an additional 12-15% compliance cost on China-Russia trade enterprises, while lagging logistics services slow supply chain response by 50% compared to China, restricting high-timeliness goods (e.g., fresh produce, new electronics) trade.

Heilongjiang's vegetable exports to Russia: empirical evidence of reduced loss rates and expanded trade. As a major agricultural export region to Russia, Heilongjiang exported 320,000 tons of vegetables via the Suifenhe Port in 2022, accounting for 65% of China's fresh vegetable exports to Russia. Before cold chain upgrades (2019), ordinary road transport resulted in a loss rate of up to 30% (mainly due to bumpy roads and lack of temperature control in Russia's Far East), with a landed cost of ~\$1,200/ton. [48]

Upgrades: In 2021, the "Harbin-Suifenhe-Vladivostok" cold chain route was established, equipped with EU-standard refrigerated trucks (temperature control accuracy ± 0.5 °C), and a 4000-ton cold storage warehouse. [48]

By 2023, the loss rate dropped to 15%, cost per ton fell to \$850, and export volume grew 42%, with high-value varieties like fresh corn and broccoli increasing from 18% to 35% of total exports. [49]

Technical hurdles in cold chain standard alignment for cross-border e-commerce key differences in China-Russia cold chain standards focus on three areas: Temperature Zoning: China's *Food Cold Chain Logistics Hygiene Code* classifies refrigeration as 0-4 °C (fresh keeping) and -18 °C (frozen), while Russia's GOST 30608-2019 classifies into -6 °C (cool), -18 °C (frozen), and -60 °C (deep frozen). Chinese e-commerce platforms (e.g., Ozon's fresh channel) to set up separate temperature zones for Chinese goods, increasing operational costs by 20%.

Monitoring Technology Compatibility: China primarily uses GPS+Bluetooth temperature sensors (real-time data uploaded to the cloud), while Russia requires GLONASS positioning and M1 protocol sensors. Incompatible data interfaces necessitate additional development of transfer systems (e.g., SF Express' China-Russia dual-mode monitoring platform in Moscow, with R&D costs exceeding \$5 million). Packaging Material Standards: China allows biobased degradable materials (e.g., PLA polylactic acid), while Russia requires packaging carbon footprints below 0.8kgCO₂/kg. Some Chinese materials cannot enter the market promptly due to long certification cycles (12 months).

Radiation effects of regional logistics hubs [64]: Manzhouli Port: model of multimodal transport and cross-border e-commerce synergy. As China's largest land port, Manzhouli implemented an innovative "rail+road+cross-border e-commerce pilot zone" model in 2023: Rail Trunk Lines: 18 China-Europe Railway Express trains departed daily, with the "Manzhouli" special train carrying auto parts and e-commerce parcels. The "broad-gauge to standard-gauge intelligent transfer system" reduced transfer time from 5 to 2.5 hours, with freight volume growing 25% YoY to 32 million tons.

Road Network: The "Manzhouli-Chita" cross-border e-commerce route introduced driverless delivery vehicles (500kg capacity, 200km range), enabling 48-hour delivery to Russia's Buryat Republic. E-commerce parcels exceeded 5 million in 2023, up 180% YoY.

Pilot Zone Functions: A 100,000m² bonded warehouse implemented a "front-store-rear-warehouse" model (online orders cleared and delivered from the bonded warehouse within 48 hours), attracting Cainiao and JD Logistics and driving 15% job growth in surrounding industries (packaging, finance). Functional Positioning Differences Between Suifenhe and Hunchun PortsAs shown in Table 1.

Table 1 – Functional positioning differences between Suifenhe and Hunchun Ports [62]

Port	Geographical Advantage	Core Cargo	Logistics Features	2023 Data
Suifenhe	Adjacent to Vladivostok, Russia's largest Far Eastern city	Light industrial products (apparel, home appliances, daily goods)	China-Russia "cross-border e-commerce+express" , customs clearance efficiency improved to 24 hours	Freight volume: 18 million tons, e-commerce share: 35%
Hunchun	Located at the China-Russia-North Korea border, 60km from Russia's Zarubino Port	Energy (crude oil, coal), ro-ro vehicle transport	Utilizes Zarubino Port for "sea access via borrowed port," operating the "Hunchun-Niigata" ro-ro vehicle route	Energy imports up 40%, vehicle exports: 28,000 units

Suifenhe, relying on densely populated areas, focuses on consumer logistics. In 2023, small home appliance exports to Russia increased 65%, benefiting from "door-to-door" express networks.

Hunchun, leveraging its energy corridor, handles Russia's crude oil pipeline (15 million tons/year capacity) and ro-ro vehicle transport (500 vehicles per voyage), becoming a Northeast Asia energy and equipment trade hub. However, it is constrained by Zarubino Port's infrastructure (12 million tons/year throughput), with untapped potential [56].

Current China-Russia logistics face "three highs and one low": high customs costs (7-10% of trade value), high transfer losses (5-8% on average), high technical barriers (20% higher adaptation costs due to standard differences), but low digital penetration (Russia's logistics IT investment is 1/3 of China's). Future breakthroughs include: - Technical Synergy: Promote integration of Beidou and GLONASS positioning, and mutual recognition of China-Russia cold chain standards (e.g., 2024 pilot of unified -18 °C freezing temperature protocols).

Hub Upgrades: Build smart logistics hubs in Manzhouli and Yekaterinburg, introducing automated warehousing (sorting efficiency: 12,000 items/hour) and driverless container trucks.

Policy Innovation: Explore a "cross-border logistics white list" system, giving priority inspection to fresh produce and e-commerce parcels, with a target of reducing average customs clearance time to under 12 hours. [46]

Improving logistics efficiency is expected to unlock approximately \$15 billion/year in China-Russia trade potential, including 25% growth in agricultural trade and a doubling of cross-border e-commerce scale, truly realizing the strategic goal of "smooth logistics driving trade quality."

In the institutionalized construction of political mutual trust between China and Russia, the alignment of the Belt and Road Initiative (BRI) with the Eurasian Economic Union (EAEU), along with the high-level meeting mechanism, has become a critical engine for bilateral trade development. Through policy coordination in specific projects and top-level design of trade policies, the two countries have established an all-around, multi-layered cooperation framework, injecting strong momentum into economic and trade exchanges.

Chapter 2 Current development status of China-Russian international logistics

2.1 China-Russian trade relations

China and Russia are adjacent in geographical location. This geographical advantage has laid a solid foundation for bilateral trade exchanges, and their trade exchanges have a long history. In recent years, the trade relations between the two countries have been continuously deepening and expanding, presenting characteristics in multiple aspects [6].

In terms of political mutual trust, China and Russia have been closely cooperating and coordinating in international affairs, and their political mutual trust has been steadily enhanced. For example, during the discussion and voting on resolutions in the United Nations Security Council, the two sides often reach a consensus on major international issues and jointly safeguard multilateralism and the stability of the international order. This political mutual trust has built a stable external environment for bilateral trade, reduced trade uncertainties caused by political factors, and effectively promoted the smooth development of trade cooperation.

In terms of trade scale, the bilateral trade between China and Russia has generally witnessed rapid growth in the past few years. However, compared with the huge total foreign trade volume of the two countries, the proportion of the bilateral trade volume between China and Russia is relatively low, and the growth rate has been rather slow in some periods. For instance, in 2023, the trade volume between China and the United States reached hundreds of billions of US dollars, As shown in figure 7 and 8, while the trade volume between China and Russia had a significant gap compared with-it.

Nevertheless, with the continuous development of the domestic economies of the two countries and the expansion of cooperation fields, such as exploring new development and supply models in energy cooperation and increasing investment in R&D cooperation in the high-tech field, there is still huge room for the expansion of the bilateral trade scale [7].

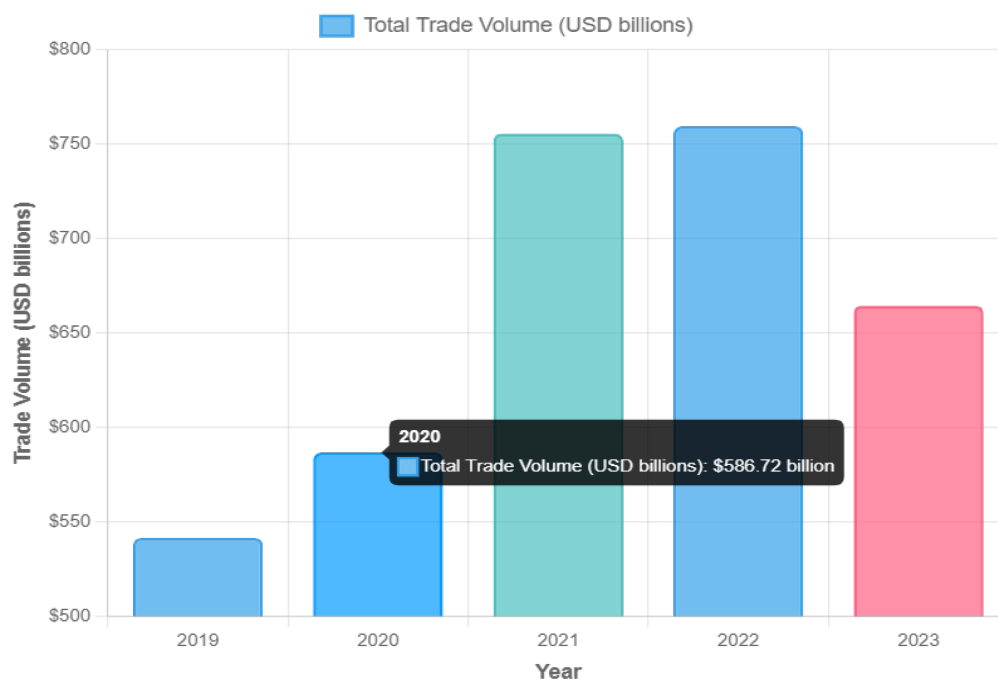


Figure 7 – Statistics on the total volume of trade between China and the United States [36]



Figure 8 – Changes in China-Russian trade volume [37]

While the trade volume between China and Russia had a significant gap compared with it. Nevertheless, with the continuous development of the domestic economies of the two countries and the expansion of cooperation fields, such as exploring new development and supply models in energy cooperation and increasing investment in R&D cooperation in the high-tech field, there is still huge room for the expansion of the bilateral trade scale [7].

Regarding the trade structure, China's exports to Russia are mainly concentrated on manufactured industrial products. Labor-intensive products once accounted for a large share, such as textiles, clothing, and footwear. As shown in figure 9 and 10.

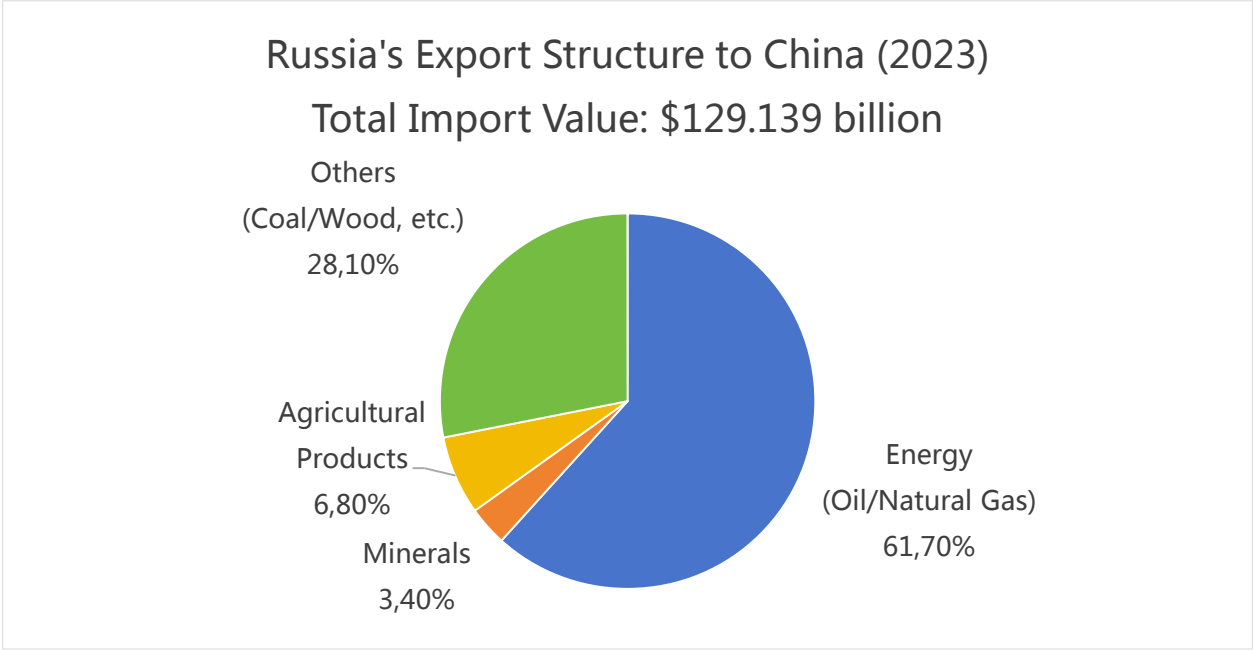


Figure 9 – Russia's export structure to China [39]

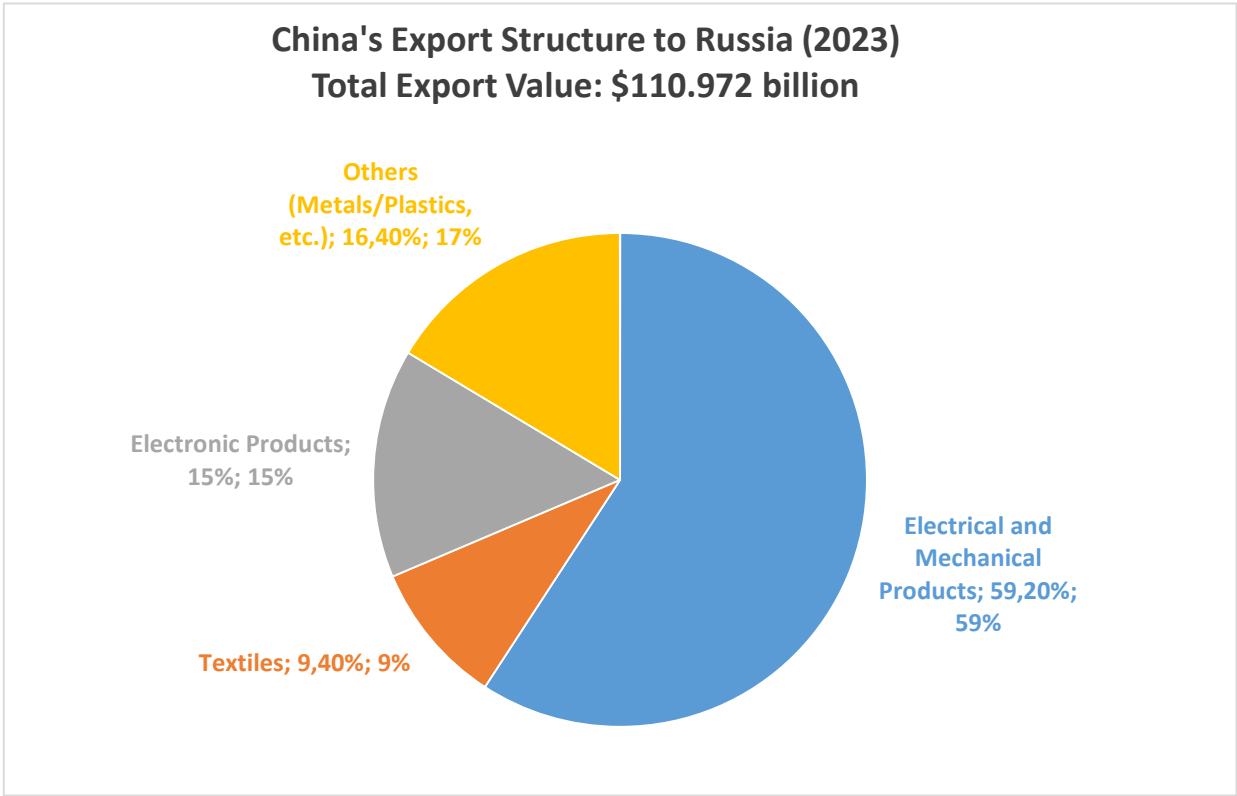


Figure 10 – China's export structure to Russia [38]

In recent years, with the transformation and upgrading of China's manufacturing industry, the export proportion of such products has gradually decreased, while the exports of products with higher technological content and added value, such as mechanical and electrical products, have increased. On the other hand, the commodities exported by Russia to China are mostly primary products such as mineral energy fuels. The exports of resources such as oil and natural gas play a significant role in bilateral trade. There is a certain imbalance in this trade structure. To achieve sustainable trade development, both sides need to further optimize the trade structure. For example, they should strengthen exchanges and cooperation in aerospace and information technology in the high-tech field; explore cooperation in the development of new energy and the efficient utilization of traditional energy in the energy field; and promote cooperation in deep processing technology of agricultural products and the exchange of experience in agricultural modernization planting in the agricultural field.

In the aspect of cross-border e-commerce, the current cross-border e-commerce between China and Russia is in a period of rapid development and high activity. Its rise has promoted the optimal allocation of multilateral resources between the two countries and created more win-win opportunities for enterprises. Many Chinese e-commerce enterprises have promoted their characteristic commodities to the Russian market through the Internet platform, and Russian characteristic products have also entered the vision of Chinese consumers through e-commerce channels. The governments of both countries have issued a number of support policies to boost the development of cross-border e-commerce. The Chinese government has provided support in aspects such as tax preferences and logistics subsidies, while the Russian government has taken active measures in aspects such as customs clearance facilitation and the regulation of electronic payment supervision. At the enterprise level, both sides have also continuously strengthened exchanges and interactions in the field of cross-border e-commerce, and enhanced mutual understanding and cooperation by holding e-commerce forums and conducting enterprise visits.

However, the development of cross-border e-commerce also faces many challenges. For example, the identification of commodity categories in the customs supervision link and tax collection and management need to be improved; the timeliness and cost control of

cross-border logistics distribution in the transportation link need to be optimized; the security and convenience of cross-border payment in the payment link still need to be enhanced; and the relevant laws and regulations on consumer rights protection and dispute settlement mechanisms in the trade guarantee aspect are not yet sound. [8]All these require both sides to further strengthen cooperation to ensure the healthy and stable development of cross-border e-commerce.

The trend of trade diversification has become increasingly significant. On the basis of traditional trade, both China and Russia are actively exploring emerging trade fields. Besides traditional energy trade and the exchange of manufactured industrial products, continuous new progress has been made in cooperation in the high-tech field. For example, in the field of aerospace technology, China and Russia have carried out satellite launch cooperation projects, sharing technical resources and launch facilities and jointly improving the aerospace technology level and international competitiveness. The cooperation in the agricultural field is becoming increasingly close. Russia exports a large amount of agricultural products such as wheat and barley to China, while China exports advanced agricultural planting technologies and mechanical equipment to Russia to help its agricultural modernization development. In the aspect of service trade, exchanges in tourism services are frequent. More and more Chinese tourists travel to Russia for sightseeing, and Russian tourists are also very interested in famous historical and cultural cities in China. In the field of financial services, the exploration of cooperation between the two sides in cross-border financial investment and currency settlement is gradually deepening, promoting the capital flow in bilateral trade to be more smooth and efficient.[9]

With the rapid development of information technology, the digitalization process of China-Russian trade has been significantly accelerated. Emerging trade models such as cross-border e-commerce and digital trade have emerged continuously, injecting new vitality into bilateral trade cooperation. Taking cross-border e-commerce as an example, Chinese e-commerce platforms such as Alibaba.com and AliExpress are very popular in the Russian market, enabling Russian consumers to conveniently purchase various Chinese commodities. In the aspect of digital trade, businesses such as data services and software outsourcing have also emerged in bilateral trade. As shown in table 2 and figure 11.

Table 2 – Proportion of segmented fields in China-Russia digital trade (2024) [40]

Segmented Field	Proportion (%)	Scale (USD billion)	Core Driving Factors
Cross-Border E-Commerce (B2C+B2B)	65.30%	31.8	The Russian e-commerce market scale reached 9 trillion rubles (~\$100 billion), with China-Russia cross-border e-commerce accounting for 78% of Russia's total cross-border volume
Digital Payments (Local Currency Settlement)	20.10%	9.8	The digital RMB-ruble settlement pilot covers 15% of trade volume, with local currency settlement accounting for 95% to avoid SWIFT sanctions risks
Data Services (Platform+Technology)	10.20%	5	Electronic certificates of origin, blockchain customs clearance (customs clearance time reduced to 24 hours at pilot ports), AI product selection (e.g., "Russia Data Connect" predicts regional consumption preferences)
Software Outsourcing & Cloud Services	3.40%	1.7	Semiconductor design collaboration (90nm chip joint production), Beidou-Glonass navigation system data interaction, cloud services covering 23% of enterprises in Russia's Far East
Others (Digital Marketing, etc.)	1.00%	0.4	VKontakte precision advertising (ROI 1:4), live commerce (e.g., TikTok GMV in Russia increased 300% annually)

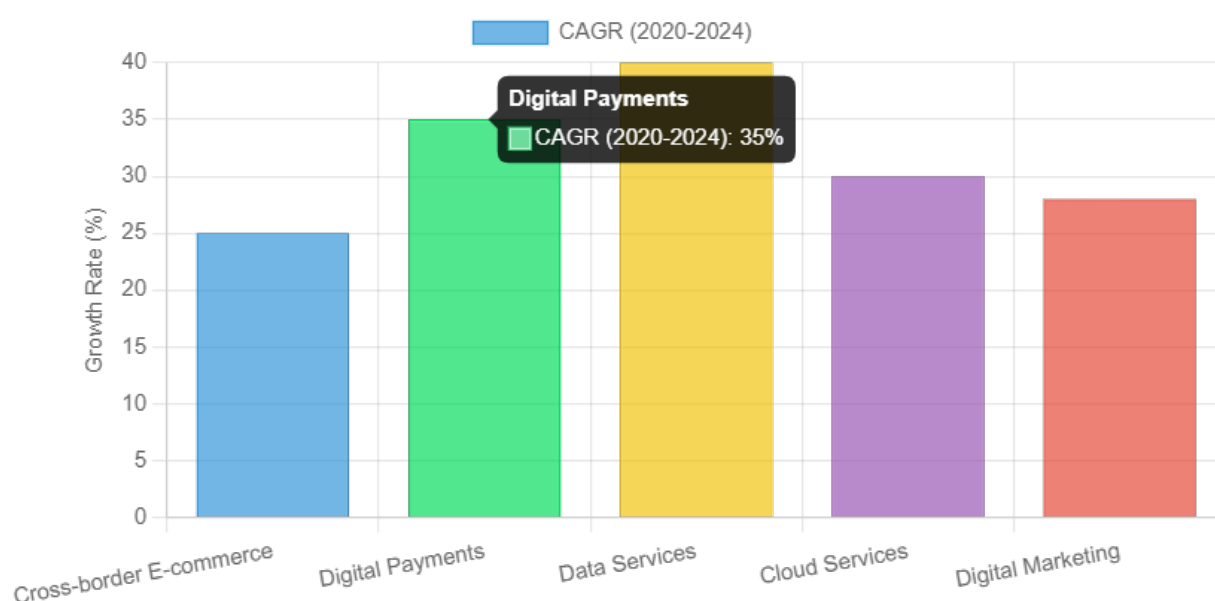


Figure 11 – Growth rates in subfields of China - Russia digital trade [41]

To further promote the digitalization process of trade, both sides need to increase investment and cooperation in the construction of digital infrastructure. For example, they should jointly build cross-border communication networks to improve the network transmission speed and stability; strengthen consultations in the formulation of digital trade

rules to clarify the norms for cross-border data flow, the standards for digital intellectual property protection and the digital trade tax policies, so as to lay a solid institutional foundation for the long-term development of trade digitalization [10].

Although the prospects for China-Russian trade are broad, it also faces a series of new challenges. The slowdown of global economic growth and the weakness of international market demand have squeezed the external market space for China-Russian trade products to some extent. The rise of trade protectionism, with some countries setting high tariff barriers and implementing trade quota restrictions and other measures, has had an indirect impact on China-Russian trade, increasing trade costs and difficulties. Geopolitical tensions have also brought uncertainties to China-Russian trade. For example, regional conflicts may lead to the obstruction of trade transportation routes and the increase in trade insurance costs. In addition, in the internal operation links of bilateral trade, the customs clearance process is cumbersome, with long goods inspection time and complicated procedures; in the transportation link, the connection of logistics transportation is not smooth, such as the low transfer efficiency between railways and highways and the high transportation cost; in the payment link, there are problems such as high risks of cross-border payment and limited payment channels; in the trade guarantee aspect, the trade dispute settlement mechanism is imperfect and the relevant laws and regulations are incomplete [11]. All these urgently require both sides to make joint efforts and take targeted and effective measures to deal with them to ensure the stable and continuous development of trade.

2.2 International logistics infrastructure

With the continuous advancement of globalization, the international logistics industry has developed rapidly and become an important link connecting the economies of various countries. As an important part of logistics industry, international logistics infrastructure plays a vital role in improving logistics efficiency, reducing costs and enhancing the stability and security of supply chain. However, the current international logistics infrastructure is generally imperfect, which seriously restricts the development of the international logistics industry.

In the field of international logistics, the imperfect infrastructure is mainly manifested in the following aspects: the level of construction and maintenance of transportation facilities, including ports, airports, railways and highways, is uneven, and some facilities have serious congestion, aging and insufficient maintenance; Some international logistics nodes have backward storage facilities and limited storage capacity, so it is difficult to meet the growing logistics demand. There are some problems in international logistics information transmission system, such as slow data transmission speed and low accuracy, which affect the real-time and accuracy of logistics information.

Perfect international logistics infrastructure means more advanced transportation network, more efficient information processing system and more convenient goods distribution center, which will greatly improve logistics efficiency, shorten logistics time and accelerate the transfer of goods from production to consumption. Efficient infrastructure will reduce unnecessary transit links, reduce transportation losses and increase loading rate, thus reducing logistics costs [35].

At the same time, the optimized logistics path and transportation mode can further reduce logistics costs and improve the economic benefits of logistics enterprises. Perfect international logistics infrastructure can help enterprises to respond to market demand more quickly and accurately, improve customer service level, which will help enterprises win more market share and improve their competitiveness in the international market.

The main reasons for the imperfection of international logistics infrastructure are as follows: there are great differences in the level of economic development in different countries and regions, which leads to differences in investment and construction of international logistics infrastructure. If we observe the infrastructure of different countries, we can see that the higher the level of economic development, the better the infrastructure construction, and the higher the density of roads and railways, while the relatively backward level of economic development, the infrastructure construction is insufficient, and the density of roads and railways is also low, as shown in figures 12 and 13.

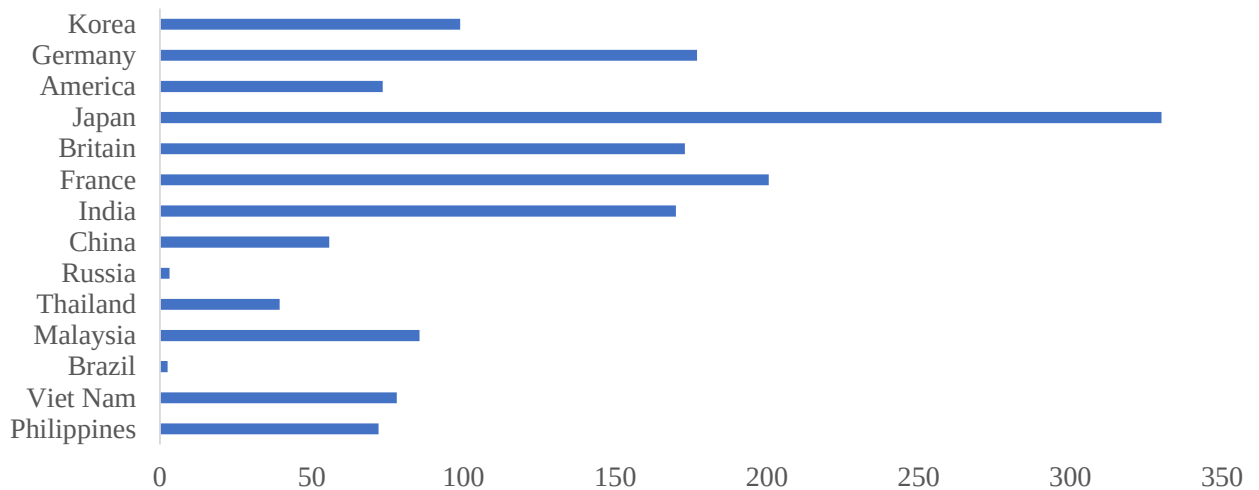


Figure 12 – Highway density in the world [6]

Because international logistics infrastructure construction needs a lot of capital investment, some countries and regions are facing the problem of capital shortage, which leads to the lag of infrastructure construction.

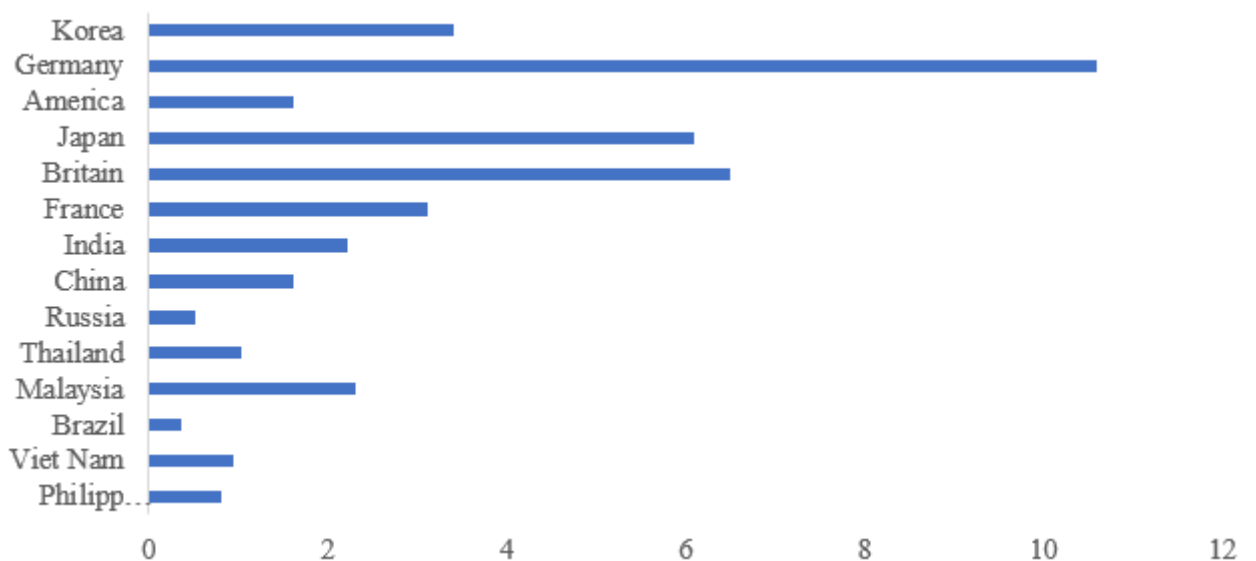


Figure 13 – Railway density in the world [60]

Backward technical level: some countries and regions are relatively backward in logistics technology and lack of advanced logistics facilities and technical support, which makes it difficult to improve the overall level of international logistics infrastructure, resulting in the inability to keep up with freight capacity. Some countries with higher infrastructure level will have relatively strong freight capacity, as shown in table 3.

Table 3 – World Airport Freight Throughput TOP10 in 2023 [21]

№	Airport	Code	Country	Throughput (10,000 tons)
1	Hong Kong International Airport	HKG	China	433.2
2	Memphis International Airport	MEM	America	388.2
3	Ted Stevens Anchorage International Airport	ANC	America	360
4	Shanghai Pudong International Airport	PVG	China	344
5	Miami International Airport	MIA	America	278
6	Incheon International Airport	ICN	Korea	274.4
7	Louisville International Airport	SDF	America	272.8
8	Hamad International Airport	DOH	Qatar	234.1
9	Taiwan Taoyuan International Airport	TPE	China	211.3
10	Guangzhou Baiyun International Airport	CAN	China	203.1

The improvement of infrastructure level can improve the production and transaction efficiency of market players, reduce the cost of enterprises, and improve the total factor productivity and labor productivity. On the other hand, strengthen the flow of factors between different regions, promote the development of urban and rural areas, reduce the incidence of poverty, and at the same time promote the complementary advantages between regions and narrow the regional gap. The improvement of international logistics infrastructure is of great significance to improve logistics efficiency, reduce costs, enhance the stability and security of supply chain, enhance the facilitation of cross-border goods clearance, strengthen international interconnection and cooperation, promote diversified settlement and reduce exchange rate risks, and cope with the impact of environmental and climate change [9].

International logistics planning and layout is unreasonable. With the continuous development of global economy, international logistics planning plays an increasingly important role in multinational enterprises. Reasonable international logistics planning can greatly improve logistics efficiency, reduce operating costs and enhance the competitiveness of enterprises. However, in reality, many multinational enterprises have unreasonable layout in international logistics planning, which seriously affects the operational efficiency and economic benefits of enterprises, and there are many factors leading to unreasonable layout of international logistics planning.

When planning the layout of international logistics, there is often a lack of a global perspective on the entire logistics system. This makes it possible to ignore some important links or factors in the planning process, which may lead to the lack of coordination and cooperation among all links in the logistics process, and the links such as warehousing, transportation and distribution may not be smoothly connected, resulting in long transit time and delay of goods, making the logistics process complicated and inefficient, thus affecting the efficiency and benefit of the entire logistics system. Lack of overall view may lead to the dispersion of enterprises' investment in logistics, unable to form scale effect, thus increasing the logistics cost. In addition, due to the lack of coordination among all links in the logistics process, it may lead to unnecessary waste and loss, further increasing the cost [36].

Lack of global view may make enterprises unable to fully understand and master the changes and risks in the global logistics market. At the same time, enterprises lacking global vision may not be able to deal with these risks in time, thus having an impact on international logistics.

There are great differences in economic development level, infrastructure construction and policy support in different regions, which leads to great differences in the speed and scale of international logistics development in different regions. In some regions, there may be excess logistics resources and excessive concentration of logistics facilities, which will lead to fierce market competition, while in some regions, there may be shortage of resources and lagging logistics facilities, which will lead to transportation delay, backlog of goods and interruption of supply chain, which makes the layout of the whole logistics system unreasonable and cannot meet the growing logistics demand. Uneven development may require enterprises to increase additional transportation and storage costs to make up for the shortage of logistics facilities in some areas, which may include using more expensive transportation modes, increasing transit links or renting additional storage space. This unbalanced market competition may lead enterprises in some areas to be at a disadvantage in logistics costs.

The interconnection in the international logistics system is communicated through information, and the scheduling of resources is also realized through information query.

Therefore, there is always an international logistics information system that collects, processes, transmits, analyzes and applies international logistics information in the international logistics system. The basic functions of the international logistics information system are summarized as shown in figure 14.

However, there is information asymmetry in the current international logistics system, which is mainly reflected in the transmission and sharing of logistics information. Because of information asymmetry, it may lead to unreasonable allocation of logistics resources and ineffective coordination among all links in the logistics process [61]. For example, suppliers may not be able to accurately understand the real-time demand of demanders, resulting in overstocked inventory or insufficient supply. At the same time, logistics companies may not be able to obtain accurate goods information, which may lead to transportation delays or wrong distribution, thus affecting the efficiency and benefits of the entire logistics system.

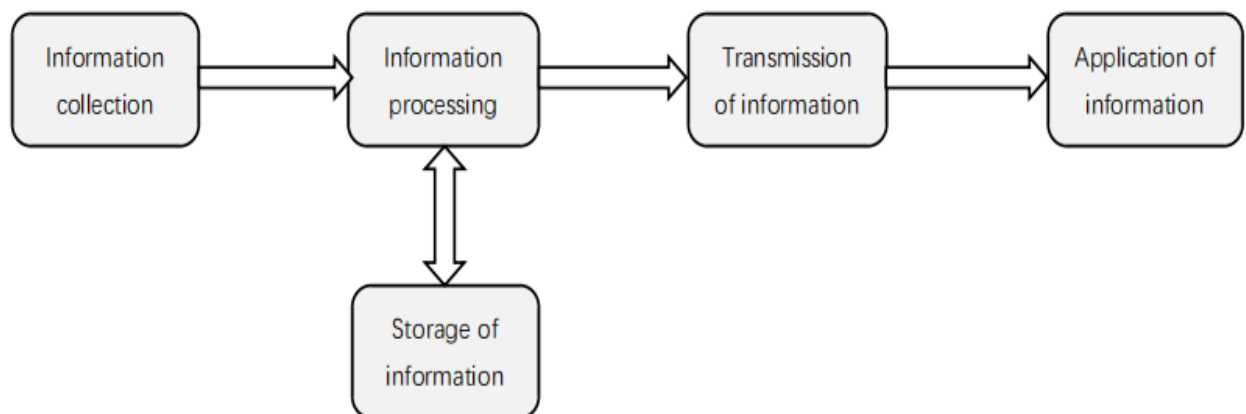


Figure 14 – Functional diagram of international logistics information system [27]

Due to information asymmetry, enterprises may need to invest more resources to obtain accurate information, including increasing manpower, material resources and financial resources. At the same time, information asymmetry may also make enterprises unable to understand market trends and competitors in time, which may lead enterprises to fail to formulate effective competitive strategies, reduce market competitiveness and miss business opportunities.

In addition, enterprises may face the risk of overstocking or shortage due to the inability to accurately predict market demand and supply, which will also increase additional costs. Information asymmetry may also lead to trust problems among all links in the supply

chain. For example, suppliers may hide product quality problems or delivery delays, and demanders may not be able to accurately evaluate suppliers' capabilities and reputation. These trust problems may increase the risk of supply chain interruption or cooperation breakdown [38].

In the field of international logistics, due to the lack of unified standards and norms, there are great differences between logistics systems in different countries and regions, which may lead to the waste and repeated construction of logistics resources, make the layout of the whole logistics system unreasonable, and without unified logistics standards and norms, the logistics systems in various countries and regions may be incompatible with each other, which may lead to transportation delays, goods damage, distribution errors and other problems, thus reducing the overall logistics efficiency. Due to the lack of uniform standards, logistics enterprises may need to invest more resources to meet the logistics requirements of different countries and regions, which may include purchasing different equipment, training employees, adjusting operating procedures, etc., thus increasing logistics costs. Inconsistent logistics standards and norms may also lead enterprises to face additional challenges when entering new markets.

For example, some countries may require enterprises to comply with specific logistics laws and standards, which may increase the cost and time for enterprises to comply with these laws and standards. Inconsistent standards and specifications may increase the uncertainty of the supply chain. For example, different packaging requirements may cause damage to the goods during transportation, and different customs clearance procedures may cause the goods to be detained. These risks may lead to the interruption or delay of the supply chain. Lack of unified logistics standards and norms may also lead to opaque logistics information, which makes it impossible for all parties in the supply chain to accurately understand the real-time status and location of goods, increases the risk of information asymmetry, and may lead to decision-making mistakes [16]. Lack of uniform logistics standards and norms may also have negative impacts on the environment and society. For example, different emission standards may lead to environmental pollution, and different labor safety standards may affect employees' rights and interests.

Perfecting and strictly implementing the international logistics planning that meets the development needs of enterprises is of great significance for improving the competitiveness of multinational enterprises [45].

It can not only help enterprises reduce costs, improve efficiency and reduce risks, but also enhance customer satisfaction, enhance competitiveness, promote sustainable development, optimize resource allocation and enhance market adaptability. Therefore, multinational enterprises should pay more attention to and invest in international logistics planning, and constantly optimize logistics layout and management mode to meet the needs of global economic development.

To sum up, the backward international logistics infrastructure and unreasonable layout are two main problems facing the global logistics field at present. First of all, the backwardness of international logistics infrastructure is one of the key factors restricting the improvement of logistics efficiency. In some areas, especially developing countries and regions, the construction of logistics infrastructure is still lagging behind, such as imperfect transportation facilities such as ports, airports, railways and highways, and lack of advanced logistics equipment and information systems, which leads to the inefficiency of transportation, warehousing and distribution in the logistics process and is difficult to meet the rapidly growing demand for international trade.

Secondly, the unreasonable layout of international logistics is also an urgent problem to be solved. At present, the layout of global logistics network is not balanced, some areas are too concentrated, while others are relatively weak. This unreasonable layout leads to uneven distribution of logistics resources, excessive logistics pressure in some areas and insufficient logistics demand in others, which not only increases logistics costs, but also affects the stability and reliability of logistics services. In a word, only by increasing investment, optimizing layout and strengthening international cooperation can we promote the healthy development of international logistics and provide strong support for the prosperity of global economy and trade.

2.3 Logistics Demands between China and Russia

With the continuous expansion of the trade scale between China and Russia, the logistics demands between the two countries are constantly increasing. Especially with the booming development of cross-border e-commerce business, higher requirements have been put forward for logistics services. Consumers of cross-border e-commerce have higher expectations for the timeliness of commodity distribution. They hope to receive the goods within one week after placing an order. They also pay great attention to the reliability of logistics and require the damage rate and loss rate of goods to be as low as possible. At the same time, they expect the logistics cost to be more reasonable to reduce the shopping cost. To meet these growing and diversified logistics demands, both China and Russia must further strengthen the construction of logistics infrastructure, increase investment in the construction and upgrading of logistics hub ports, railway stations and highway transportation networks; and improve the level of logistics services, including enhancing the operation and management capabilities of logistics enterprises and strengthening the professional quality training of logistics employees.

Currently, the logistics development of China-Russia border trade is facing some prominent problems. In terms of border logistics infrastructure construction, there are many imperfections. Some logistics facilities at border ports are old and obsolete. For example, the storage capacity of some port warehouses is limited and cannot meet the storage needs of goods; the loading and unloading equipment is backward and the loading and unloading efficiency is low, resulting in long detention time of goods. The operation ability of third-party logistics also has deficiencies. Many third-party logistics enterprises are small in scale and have a limited coverage of logistics networks, making it difficult to provide all-round and efficient logistics services. For example, in cross-border transportation, it is impossible to realize the whole-process tracking and precise scheduling of goods. To optimize the logistics development of China-Russia border trade, both sides need to increase capital investment in logistics infrastructure construction, build modern logistics warehouses, update loading and unloading equipment and improve transportation roads, so as to improve the overall level of border logistics infrastructure [12].

At the same time, through policy support and enterprise integration and other means, they should cultivate and strengthen third-party logistics enterprises, improve their operation and management capabilities and service levels, and enhance their competitiveness in the international logistics market.

The cooperation between China and Russia in the logistics field is constantly expanding and deepening. Besides the traditional freight transportation business, both sides have also carried out active cooperation in aspects such as logistics information sharing, supply chain management and logistics park construction. In the aspect of logistics information sharing, by establishing a unified logistics information platform, integrating freight transportation information, warehousing information and customs clearance information, etc., real-time sharing of logistics information is realized. For example, logistics enterprises can timely understand the position and status of goods in transit through the platform, and customs departments can obtain the goods declaration information in advance to improve the customs clearance efficiency [13].

In the aspect of supply chain management, enterprises on both sides strengthen cooperation and jointly optimize the supply chain process. From raw material procurement, manufacturing, product transportation to the sales terminal, the whole process is coordinated and managed to reduce waste and delay in intermediate links and reduce logistics costs. In the aspect of logistics park construction, China and Russia jointly plan and build logistics parks. The parks integrate multiple functions such as warehousing, transportation, processing and distribution, forming an industrial agglomeration effect, improving the utilization efficiency of logistics resources and promoting the large-scale and specialized development of the logistics industry [14].

Key logistics routes and hubs: Siberian Land Bridge. Its starting points are usually cities along China's eastern coast such as Shanghai and Qingdao. After the goods depart from these cities, they enter Russia through the Manzhouli Port. As an important land port in northern China, the Manzhouli Port has complete customs clearance facilities and an efficient customs clearance process. After the goods successfully complete the customs clearance procedures here, they enter the territory of Russia and cross the vast Siberian region.[15]In the Siberian region, railway transportation is the main mode of transportation.

The goods travel westward along the Trans-Siberian Railway and finally arrive in Moscow. As the political, economic and cultural center of Russia, Moscow is an important transit point or destination for many goods. After some goods are distributed in Moscow, they continue to be shipped to other European countries such as Germany and France, thus realizing trade exchanges between China, Russia and Europe. This logistics channel has played an irreplaceable important role in promoting regional trade exchanges and strengthening economic ties. It has been undertaking a large amount of freight transportation tasks for many years, involving a wide range of categories, including mechanical equipment, electronic products and textiles [16].

China-Europe Railway Express: Its departure stations cover multiple inland cities in China such as Chengdu, Chongqing and Xi'an. These cities rely on their own industrial advantages and geographical location advantages to actively organize freight sources and operate China-Europe Railway Express trains [61]. For example, as an important economic center in southwest China, Chengdu has a developed electronic information industry, and a large number of electronic products are shipped to Europe through the China-Europe Railway Express. After departing from these inland cities, the China-Europe Railway Express enters Kazakhstan through the Alashankou or Khorgos ports. The Alashankou Port is an important railway port for China to connect with Central Asia and Europe, with advanced railway transshipment equipment and an efficient customs clearance service system. After a short stay in Kazakhstan, the goods continue to enter the territory of Russia in the north and then head for Europe. The China-Europe Railway Express has remarkable characteristics such as fixed schedules, fixed points and fixed routes, which enables enterprises to plan logistics transportation plans in advance and provides enterprises with relatively stable and reliable logistics services. In recent years, with the continuous optimization of the operation and organization of the China-Europe Railway Express and the improvement of service quality, its transportation proportion in China-Russian trade has gradually increased, and the types of transported goods have become increasingly rich, including not only traditional manufactured industrial products but also some high-value-added high-tech products and fresh agricultural products.

China-Russia highway transportation special lines: There are multiple land ports between China and Russia that have opened highway transportation special lines. Among them, the Manzhouli Port is not only an important channel for railway transportation, but its highway transportation is also very busy. A large number of light industrial products such as clothing and small hardware are shipped to Russia through the Manzhouli Highway Port. The Suifenhe Port mainly connects cities such as Vladivostok in the Russian Far East. Here, highway transportation and railway transportation cooperate with each other, which is suitable for the export of light industrial products. For example, Chinese household goods, toys and other products are shipped to the Russian Far East through the Suifenhe Port. The Heihe Port and Dongning Port are also important highway transportation ports. Dongning is a popular place for small-scale border trade between China and Russia. Many small-scale trade commodities such as characteristic agricultural products and handicrafts are traded through highway transportation here. Highway transportation has the significant advantage of high flexibility. It can adjust the transportation route and time according to customer needs at any time; it has a fast customs clearance speed. [17] Compared with railway transportation, the procedures for highway transportation at the port customs clearance link are relatively simple and take less time; it is convenient for small-batch and high-frequency transportation and has strong adaptability for the transportation of special goods such as cross-border e-commerce, fresh cold chain and high-value goods. For example, fresh cold chain products can achieve door-to-door fast delivery through highway transportation to ensure the freshness and quality of the products.

Sea-Land combined transportation: Taking the Hunchun Port as an example, Hunchun is located on the northeastern border of China, with a special geographical location. It is adjacent to Russia and close to the Sea of Japan. After the goods enter Russia by land from the Hunchun Port, they can be transshipped through Russian ports to realize sea transportation. For example, the goods can be shipped to the European part of Russia through ports such as the Vostochny Port and the Vladivostok Port. This sea-land combined transportation mode integrates the advantages of land transportation and sea transportation. Land transportation has the characteristics of low cost and flexible transportation in short-distance inland transportation, while sea transportation is suitable for long-distance and

large-batch freight transportation, which can effectively reduce transportation costs and improve transportation efficiency, providing more diversified transportation options for export enterprises, especially suitable for some goods that are sensitive to transportation costs and have less urgent requirements for transportation time, such as building materials and chemical products.

Air transportation: There are multiple direct flight routes from major Chinese cities such as Beijing, Shanghai and Guangzhou to cities in Russia such as Moscow and St. Petersburg. For example, as the political, economic, cultural center and international aviation hub of China, Beijing has a large number of flights shuttling between China and Russia every day. Air transportation is extremely fast and can deliver goods to the destination in a short time, which is suitable for transporting goods such as electronic products, precision instruments and pharmaceuticals. For example, high-end smartphones, precision parts for aerospace and various urgently needed pharmaceuticals produced in China can be quickly shipped to the Russian market through air transportation to meet customers' strict requirements for the timeliness of goods. At the same time, due to the high value of these goods, the security and efficiency of air transportation can also effectively guarantee the quality and value of goods transportation.[18]

In terms of key logistics hubs – Chinese part: Manzhouli. As the largest land passage between China and Russia, its importance is self-evident. It is not only a key starting point of the China-Europe Railway Express but also the largest land port between China and Russia. The transportation network in Manzhouli is very complete. In terms of railways, multiple railway trunk lines intersect here, enabling the rapid loading, unloading and transshipment of goods. Highway transportation is also extremely convenient, connecting with multiple domestic expressways. Relying on such transportation advantages, it is convenient for the export of bulk commodities such as mechanical equipment, timber and minerals. A large amount of timber imported from Russia is shipped to timber processing enterprises across China through the Manzhouli Port. Chinese-produced construction machinery and mining equipment are also shipped to Russia through here. Moreover, Manzhouli can use the Trans-Siberian Railway to further connect goods to other regions of

Russia and even Europe, playing a key hub role in the trade and logistics chains between China, Russia and Europe.

Suifenhe – Dongning Area: Suifenhe is a crucial gateway for China to connect with the Russian Far East. Its railway and highway transportation are closely integrated, forming an efficient transportation network. Through railway transportation, large quantities of goods can be transported. Highway transportation plays an important role in short-distance distribution, small-batch goods transportation and the connection with railway transportation. It mainly connects cities such as Vladivostok in the Russian Far East and is suitable for the export of light industrial products. For example, light industrial products from China, such as clothing, footwear and plastic products, are continuously shipped to the Russian Far East market through Suifenhe. Dongning is the preferred place for small-scale border trade between China and Russia. Its unique border trade market atmosphere and convenient trade environment attract a large number of Chinese and Russian merchants to conduct small-scale trade activities here. The main traded commodities include characteristic agricultural products, handicrafts and daily necessities. Together, they form an important onshore port-type national logistics hub. By continuously improving infrastructure construction and upgrading logistics service levels, they can effectively improve the regional logistics infrastructure level and logistics efficiency and promote the prosperity and development of China-Russia border trade.

Harbin: As the capital city of Heilongjiang Province and a transportation hub, Harbin has the function orientation of a land port-type and production service-type national logistics hub. The highways and railways here are well-developed. Multiple expressways, such as the Beijing-Harbin Expressway and the Harbin-Dalian Expressway, intersect here, and the railway trunk lines extend in all directions, connecting various parts of China and Russia. Meanwhile, Harbin has numerous central enterprises and state-owned enterprises and is the economic center of Heilongjiang with a solid industrial foundation. In China-Russian trade, Harbin can provide powerful logistics support and industrial matching for trade. For example, mechanical manufacturing enterprises in Harbin can provide various industrial equipment for Russia, and at the same time, they can also provide warehousing, processing, distribution and other logistics services for imported and exported goods, playing an important role in connecting

and supporting the industrial chain and logistics chain of China-Russian trade. Mudanjiang: It is a border city adjacent to Russia and an important node of the Longjiang Silk Road in the China-Mongolia-Russia Economic Corridor [58].

Its positioning as a commercial service-oriented national logistics hub enables it to play an important role in promoting the development of China-Russian trade. The transportation in Mudanjiang is very convenient, with national highways and railways intersecting here, facilitating the distribution and transportation of goods. Relying on its own border and transportation advantages, it actively develops the border trade logistics industry. For example, the agricultural product wholesale market in Mudanjiang can gather Chinese agricultural products and transport them to the Russian market through logistics, and at the same time, it can also introduce Russian characteristic products into China. In addition, Mudanjiang is also constantly innovating and developing in commercial service fields such as logistics information services and trade exhibitions, providing a more comprehensive and efficient service platform for China-Russian trade.

Chapter 3 Prospects and problems of international logistics development between China and Russia

3.1 Development and trend of technological innovation and green logistics in China-Russian trade

In the contemporary landscape of China-Russian international logistics, technological innovation has emerged as a linchpin for driving efficiency and competitiveness. The Internet of Things (IoT) has been making significant inroads. In transportation, IoT sensors are now commonly installed on trucks, trains, and ships engaged in China-Russian trade. These sensors can continuously transmit data on the vehicle's location, speed, fuel consumption, and even the condition of the cargo. For example, temperature - sensitive goods such as food products or pharmaceuticals being transported from China to Russia can be monitored in real - time. If the temperature within the cargo compartment deviates from the optimal range, an alert can be sent immediately to the logistics operator. This allows for timely intervention, such as adjusting the cooling system or rerouting the vehicle to a nearby maintenance facility, ensuring the quality and integrity of the goods [25].

Big data analytics is another powerful tool transforming the logistics sector. Logistics companies handling China-Russian trade routes can collect vast amounts of data from various sources, including past transportation schedules, shipment volumes, and customer preferences. By analyzing this data, they can predict demand more accurately. For instance, if historical data shows that there is a spike in demand for consumer electronics in Russia during certain months of the year, logistics providers can plan in advance by securing additional transportation capacity, optimizing warehouse space, and streamlining customs clearance procedures. This not only reduces costs associated with over - or under - capacity utilization but also improves customer satisfaction by ensuring timely delivery.

Artificial intelligence (AI) is also being harnessed in multiple ways. In the area of route optimization, AI algorithms can take into account various factors such as traffic conditions, weather forecasts, and border crossing wait times. For a trucking company operating between Chinese and Russian cities, an AI - powered system can calculate the

most efficient route in real - time. If there is a traffic jam on a usual route due to road construction in Russia, the system can quickly recommend an alternative route, taking into consideration the vehicle's fuel efficiency, the time it will take to reach the destination, and any potential detour - related costs. Additionally, AI - based chatbots are being used by logistics firms to handle customer inquiries. These chatbots can provide instant answers to common questions regarding shipment tracking, delivery schedules, and customs requirements, improving the overall customer experience [63].

With the global upsurge in environmental consciousness, green logistics has become an inevitable trend in China-Russian trade. Both China and Russia are taking steps to reduce the carbon footprint of their logistics operations. In the transportation segment, electric trucks are gradually making their presence felt. Chinese manufacturers have been at the forefront of developing electric heavy - duty trucks, and some of these are now being used in short - to - medium - distance China-Russian logistics routes. Electric trucks offer several advantages. They produce zero tailpipe emissions, which is a significant boon for reducing air pollution, especially in densely populated border regions [26].

Additionally, they tend to have lower operating costs in the long run as electricity is generally cheaper than diesel. However, there are challenges. The limited driving range of current electric trucks can be a constraint, especially for long - distance hauls between major cities in China and Russia. To address this, efforts are being made to expand the charging infrastructure along key logistics routes.

Railway transportation, a major mode of freight movement between the two countries, is also seeing a push towards greener technologies. More fuel - efficient railway locomotives are being introduced. These locomotives are designed to consume less diesel per unit of cargo transported, thereby reducing emissions. In addition, there are initiatives to electrify more railway lines in both China and Russia. Electrified railways are not only more energy - efficient but also produce significantly fewer emissions compared to diesel - powered trains. For example, in the construction of new railway lines as part of the China - Mongolia - Russia Economic Corridor, the option of electrification is being seriously considered to align with long - term environmental goals [27].

Another aspect of green logistics in China-Russian trade is the use of sustainable packaging materials. In an effort to reduce waste and environmental impact, both Chinese and Russian companies are exploring alternatives to traditional plastic and cardboard packaging. Biodegradable and recycled materials are increasingly being used. For instance, some Chinese exporters shipping consumer goods to Russia are using packaging made from recycled paper pulp or biodegradable polymers. These materials can break down naturally over time, reducing the amount of non - biodegradable waste in landfills in Russia. Furthermore, there is a growing emphasis on optimizing packaging design to minimize the amount of material used while still ensuring the safety of the goods during transportation. This not only reduces the environmental impact but also cuts down on packaging costs.

International logistics laws and regulations also pay attention to the sustainable development of logistics industry and environmental protection. The global environmental problem is becoming more and more serious, and the global carbon dioxide emissions from international shipping are increasing year by year, with an increase of nearly 100 million metric tons from 2012 to 2022, as shown in figure 14 below. In 2022, global distribution also accounts for a very large proportion of carbon dioxide emissions generated by the global transportation sector, reaching 10%, as shown in figure 15 below.

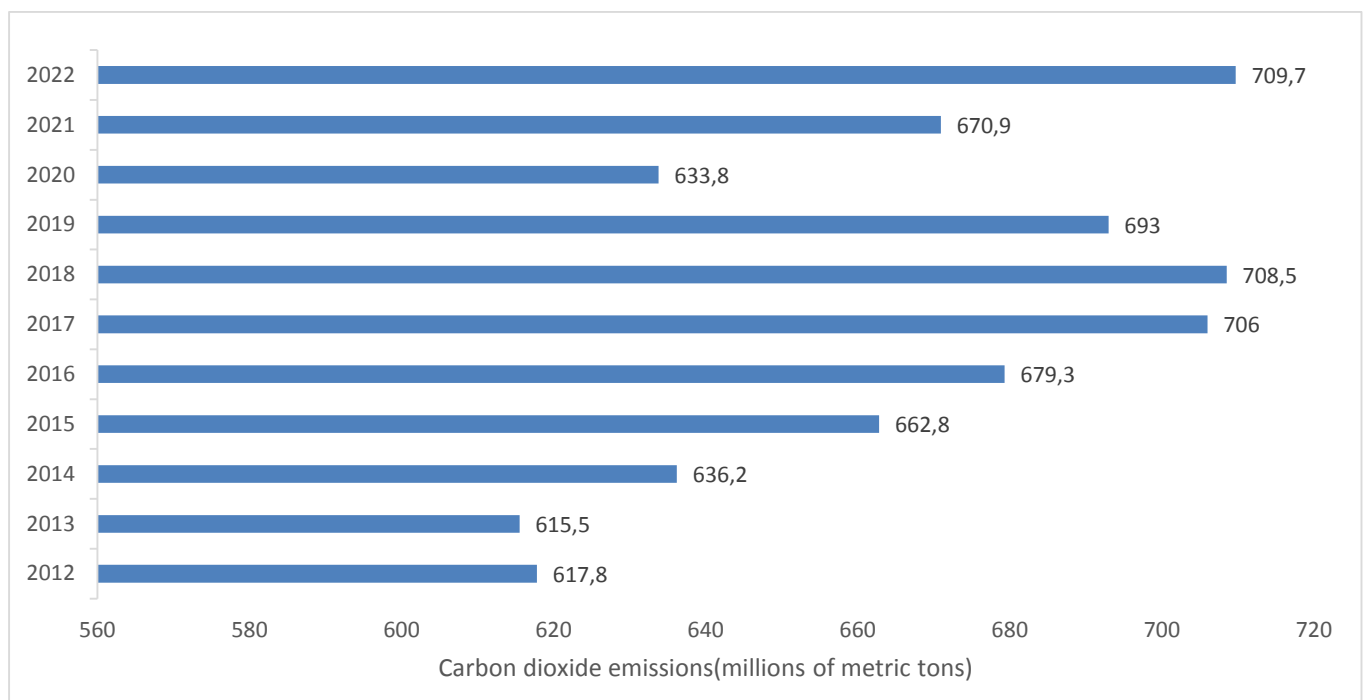


Figure 14 – Global CO2 Emissions from International Shipping in 2012–2022 [30]

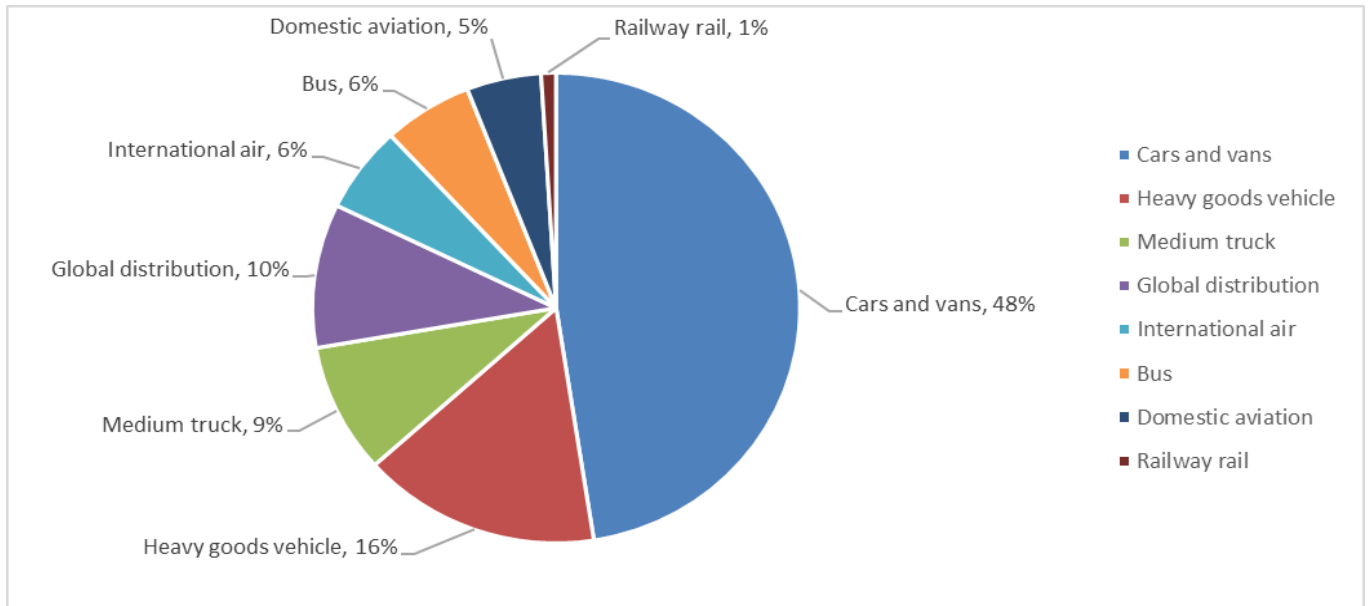


Figure 15 – Distribution of Carbon Dioxide Emissions Produced by Global Transportation Sectors in 2022 [61]

Therefore, as one of the main sources of energy consumption and emissions, the international logistics industry is also facing enormous environmental pressure. Therefore, international logistics laws and regulations should not only regulate logistics activities, but also emphasize environmental protection and sustainable development. These regulations should require logistics enterprises and employees to take environmental protection measures in logistics activities, reduce energy consumption and emissions, and promote the green and sustainable development of the logistics industry [60].

In a word, the definition and importance of international logistics laws and regulations are of vital significance to the healthy development of the global logistics industry. These laws and regulations provide a solid legal guarantee for the healthy development of the global logistics industry by standardizing logistics activities, protecting the legitimate rights and interests of interested parties, promoting international cooperation and coordination, and paying attention to environmental protection. In the future, with the deepening of globalization and trade liberalization, the international logistics industry will face more opportunities and challenges. Therefore, governments and enterprises need to further strengthen the formulation and implementation of international logistics laws and

regulations, constantly improve and optimize the relevant laws and regulations system, improve the standardization and standardization level of the logistics industry, and promote the sustainable development and progress of the global logistics industry. At the same time, it is necessary to strengthen the training and education of logistics enterprises and employees, improve their legal awareness and compliance awareness, and ensure that they can strictly abide by relevant laws and regulations in international logistics activities. In addition, governments of all countries need to strengthen international cooperation and coordination to jointly cope with the challenges and problems faced by the international logistics industry and promote the healthy development of the global logistics industry [13].

The development of international logistics laws and regulations is a thick chapter in the history of the continuous evolution of global economy and trade. Tracing back to the beginning of the 20th century, with the increasingly frequent international exchanges, international logistics laws and regulations began to brew, and its core focus was mainly on the fields of maritime and air cargo transportation. During this period, the promulgation of landmark laws and regulations, such as The Hague Rules and Warsaw Convention, laid a preliminary legal foundation for international logistics activities and provided clear rules and guidelines. These laws and regulations not only provided legal guarantee for the smooth operation of international trade at that time, but also injected impetus into the initial development of international logistics.

With the passage of time, the process of global economic integration has been accelerating, and the scale and frequency of international trade have increased significantly. This change has prompted the international logistics laws and regulations to continuously expand the coverage, including railways, highways and other modes of transportation into its normative scope [70]. At this stage, the international logistics laws and regulations system is gradually improved, which not only provides legal guarantee for the coordinated operation of various modes of transportation, but also lays a solid foundation for the rapid development of the international logistics industry.

3.2 Innovations in logistics technology and practices

The application of information technology in international logistics status quo. The price of world trade keeps rising. If an enterprise wants to prosper, it must regard the whole world as its own stage. Product or process innovation is not just a state monopoly. Global companies can use excellent product and process innovation anywhere in the world. These companies have established R&D centers around the world to gain the benefits of local talents. For example, Ford took the lead in introducing escort models into the concept of "world cars". Every part of this model is produced in one place and then distributed to assembly lines around the world by using local expertise. In every market, cars can be assembled according to the tastes of local people. Organizing the integration of manufacturing and logistics in this way is helpful for enterprises to greatly shorten the cycle time of product launch, but success in this environment is inseparable from international logistics [3].

All the complexities we see in global logistics lead to the need for active coordination within the company and between different functional departments in order to succeed in the market. The traditional wisdom of concentration and export adopted by many multinational companies is gradually giving way to geographically dispersed activities, which are interrelated in a very important way. These contacts include coordinating R&D activities, engaging in transcontinental product design, establishing network factories around the world, purchasing raw materials, spare parts and finished products around the world, distributing finished products around the world, and most importantly, maintaining effective communication between employees of different cultures. Coordinating these interrelated and complex activities is an important part of global business success, and information systems can just solve these problems.

Information technology is the driving force of the new economic tide and the material and technical basis of enterprise informatization. With the rapid development of information technology, there are various ways to realize its innovation. In the formation and diffusion of new information technology, it can be generally divided into technical leaders, technical followers and technical latecomers. Logistics information technology is the application of

modern scientific and technological means in the process of logistics operation and forms a comprehensive application. It is also the symbol of modern logistics informatization and the key point that distinguishes it from traditional logistics. The application technology of information technology in logistics system mainly includes automatic identification and collection technology, information storage and processing technology, information exchange technology, logistics dynamic tracking technology, network service technology and so on [23].

Automated sorting systems have revolutionized warehouse operations in China-Russian logistics, as shown in figure 16.

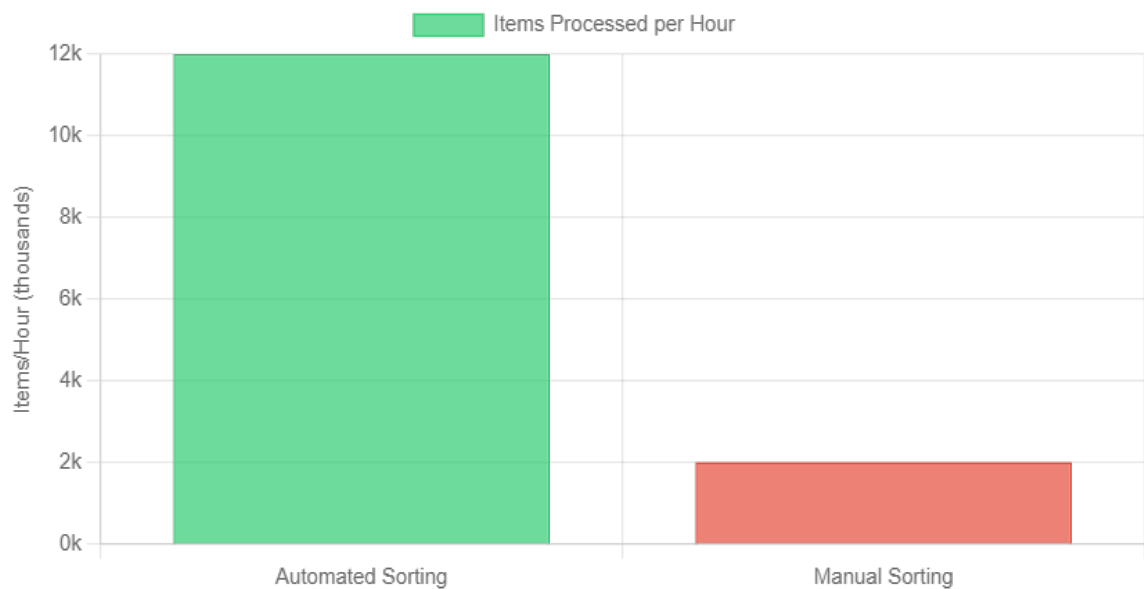


Figure 16 – comparison between automatic sorting system and manual efficiency [14]

In large-scale distribution centers in China that handle exports to Russia, these systems are now the norm. High-speed conveyor belts equipped with advanced sensors and robotic arms can quickly and accurately sort a vast array of products. For example, in a warehouse handling electronics goods, the automated sorting system can identify different types of smartphones, tablets, and accessories based on barcodes or RFID tags. The robotic arms then pick up the items and place them onto the appropriate conveyor belts for further processing, such as packing or loading onto transportation vehicles [28]. This process can handle thousands of items per hour, far surpassing the capabilities of manual sorting. As a

result, labor costs are significantly reduced, and the risk of human - error in sorting is minimized.

Blockchain technology, although still in the early stages of adoption in China-Russian logistics, holds great promise [51]. By creating a decentralized and immutable ledger, blockchain can enhance the security and transparency of logistics information. Consider a scenario where a Chinese manufacturer ships a consignment of industrial machinery to a Russian customer. With blockchain, every step of the logistics process, from the moment the goods leave the factory in China to their arrival at the customer's location in Russia, is recorded on the blockchain. The manufacturer, logistics provider, customs authorities in both countries, and the customer can all access this information in real - time. This ensures that the origin, movement, and condition of the goods are verifiable. For example, customs officials in Russia can check the authenticity of the goods' origin certificates and the details of the shipment without relying on potentially forged paper documents. Additionally, in case of any disputes regarding the delivery, such as damage to the goods or incorrect invoicing, the blockchain - based record can provide an unbiased source of truth.

Multimodal transportation has emerged as a key innovative practice in China-Russian logistics. This approach combines different modes of transportation, such as railway, road, and maritime, to create more efficient and cost-effective logistics solutions. For example, a common multimodal route for goods from China to Russia might involve transporting the goods by railway from an inland Chinese city to a port in northeastern China. From there, the goods are loaded onto a ship for the sea voyage to a Russian port [29]. Once in Russia, the goods are transferred to trucks for final delivery to the customer's location. This combination allows for the utilization of the strengths of each mode of transportation. Railways are efficient for long - distance overland transportation, ships are ideal for large - volume overseas shipments, and trucks provide the flexibility for last-mile delivery. Multimodal transportation also helps to reduce transit times. By avoiding the need for long - distance trucking across vast territories, which can be time-consuming and subject to various risks such as traffic congestion and border delays, goods can reach their destination more quickly, as shown in figure 17.

Another innovative practice is the development of cross-border e-commerce logistics centers. With the rapid growth of e-commerce between China and Russia, these centers have been established to streamline the logistics process for online retailers. These centers are equipped with state-of-the-art facilities for warehousing, sorting, and packaging.

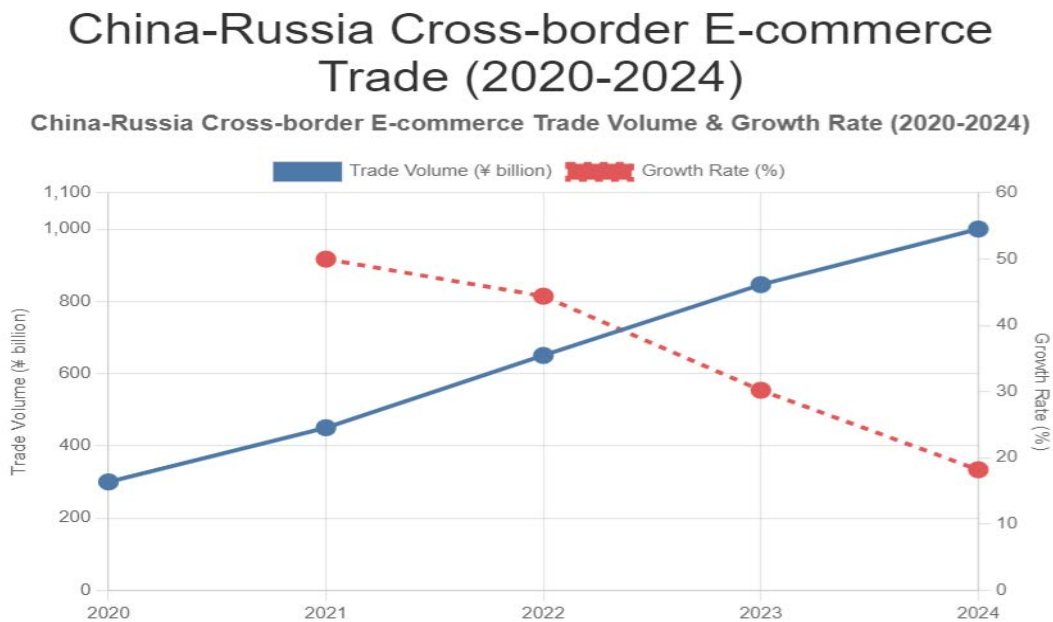


Figure 17 – Scale and growth rate of cross-border e-commerce transactions between China and Russia [42]

They also have dedicated teams to handle customs clearance for e-commerce shipments. For example, in an e-commerce logistics center in a Chinese border city, goods ordered by Russian customers from Chinese online platforms are received, sorted, and packaged for international shipment. The center has pre-established relationships with customs authorities in both countries, enabling faster and more efficient customs clearance. This ensures that the products are delivered to Russian customers in a timely manner, which is crucial for the success of cross-border e-commerce.

With the acceleration of globalization, the international logistics industry is facing unprecedented challenges, and the timeliness, accuracy and cost-effectiveness of cargo transportation have become the focus of the industry. Under this background, the introduction of global positioning system technology has brought new development opportunities to the international logistics industry. GPS is the abbreviation of Global

Positioning System. Its function is to use navigation satellites for timing, positioning and ranging [24]. The use strategy of GPS is charging strategy and system accuracy strategy. It is characterized by global and all-weather work; High positioning accuracy; Multifunctional and widely used. The global positioning system in international logistics is mainly used for automatic positioning, tracking and scheduling and land rescue; Used to determine the best voyage and safe route of inland river and ocean fleet, real-time dispatching, monitoring and water rescue route; Used for air traffic management, precise approach and landing, route navigation and surveillance; Used for railway transportation management; Used in military logistics.

The importance of the application of information technology in international logistics system. In order to provide the best logistics service, logistics enterprises must have a good information processing and transmission system, and the implementation of logistics system informatization can greatly accelerate the speed of logistics distribution. At present, the survival and benefit improvement of logistics enterprises largely depend on the level of information technology.

How to optimize the allocation of resources, how to manage and make decisions, and how to get the maximum benefit at the lowest cost is one of the important problems faced by logistics enterprises. In logistics management and decision-making, it is necessary to analyze all kinds of information in real time, give the best form in the shortest time, and need optimization or intelligent planning, such as delivery, packaging, transportation resources and transportation route selection. Through the implementation of contemporary information technology, the information generated in the logistics process is collected, classified, transmitted, summarized, identified, tracked and inquired, so as to realize systematization, networking and integration, effectively allocate resources and obtain maximum effect and profit at the lowest cost [65].

The operation of logistics enterprises depends on various processes, and each operation step and connection takes time to complete the standard tasks. Saving process time can bring more value to customers, help improve the market response ability of logistics enterprises and strengthen their core competitiveness. Use advanced information technology to integrate the business process of logistics system, and comprehensively handle the whole

warehouse in terms of warehouse management, order processing, loading and unloading and distribution. Through the transportation application and cost management of logistics information system, cost consumption can be reduced and the competitive advantage of logistics enterprises can be established.

Logistics information system provides intelligent decision-making function, which can comprehensively and objectively quantify the operating performance of logistics enterprises, divide the undertakings and elements of logistics enterprises, and cover all aspects of logistics enterprises. In-depth evaluation, formulate very detailed quantitative indicators, take the overall logistics enterprise as the analysis basis, and provide suggestions for future improvement. For example, when dealing with the market quickly, there must be a rapid logistics decision-making system. Logistics information system can provide timely and accurate data, and use scientific and systematic analysis methods to enable managers to choose some executable programs [2]. In this way, the decision-making of logistics enterprises will become faster, more accurate and more scientific.

3.3 Suggestions for strengthening China-Russia logistics cooperation

The China-Russia international cooperation projects, such as the China-Mongolia-Russia Economic Corridor, have had a profound positive impact on logistics development. One of the most significant impacts is the improvement of transportation infrastructure. New railway lines have been constructed or upgraded, for example, the construction of new sections of the Chinese Eastern Railway has enhanced freight capacity between China and Russia [30]. This not only allows more goods to be transported but also reduces transit times. Additionally, the development of new border crossings has improved cross-border operational efficiency, as shown in figure 18. These crossings are equipped with modern customs inspection, cargo handling, and transportation transfer facilities, featuring dedicated areas for bulk cargo, general cargo, and perishable goods, ensuring smooth and efficient cargo processing. These cooperation projects have also promoted the integration of logistics services [53].

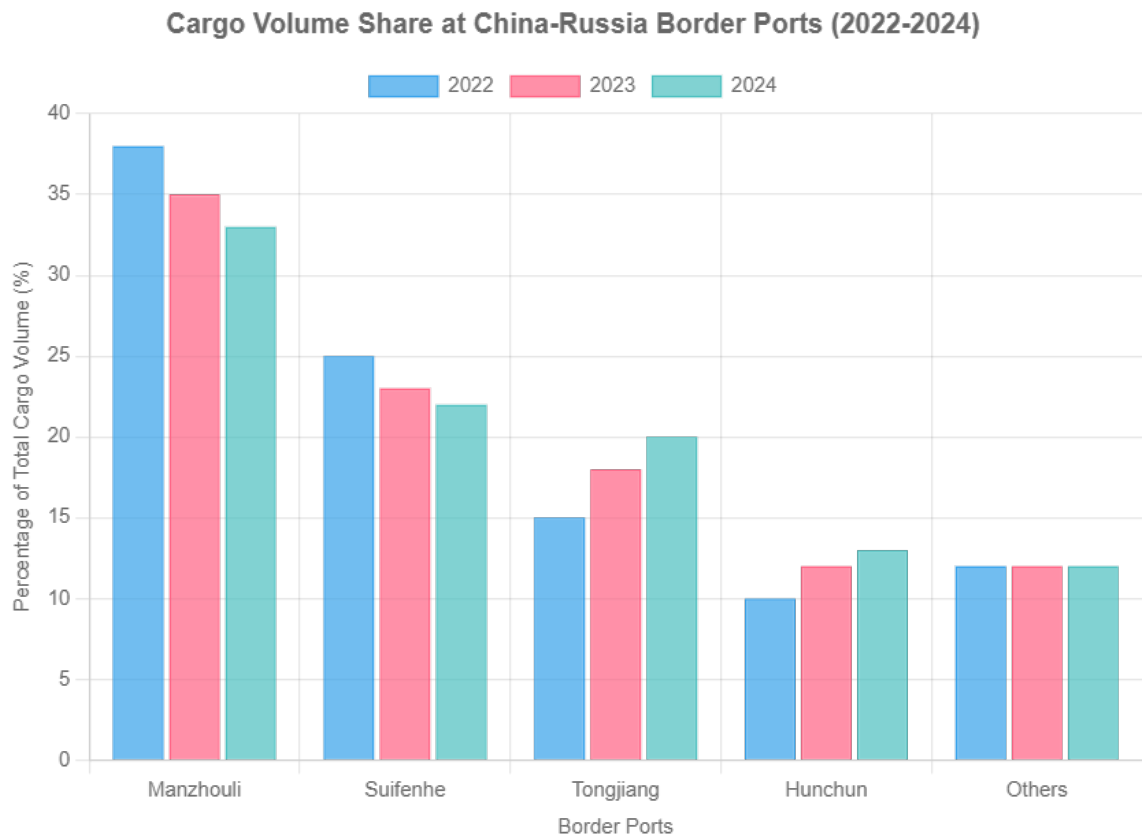


Figure 18 – Bar chart of freight volume ratio and change of major border ports between China and Russia [43]

Today, Chinese and Russian logistics companies tend to collaborate through joint ventures or strategic partnerships. This integration enables the sharing of resources, expertise, and technology. For instance, Chinese logistics companies with advanced warehouse management systems can partner with Russian enterprises that understand local markets and distribution networks to provide more comprehensive logistics services to customers engaged in China-Russian trade, including door-to-door delivery, inventory management, and value-added services such as product customization and packaging [31].

Despite the many positive impacts of cooperative projects, significant challenges arise from policy and regulatory differences between China and Russia in areas such as customs clearance, taxation, and transport safety standards, as shown in figure 19.

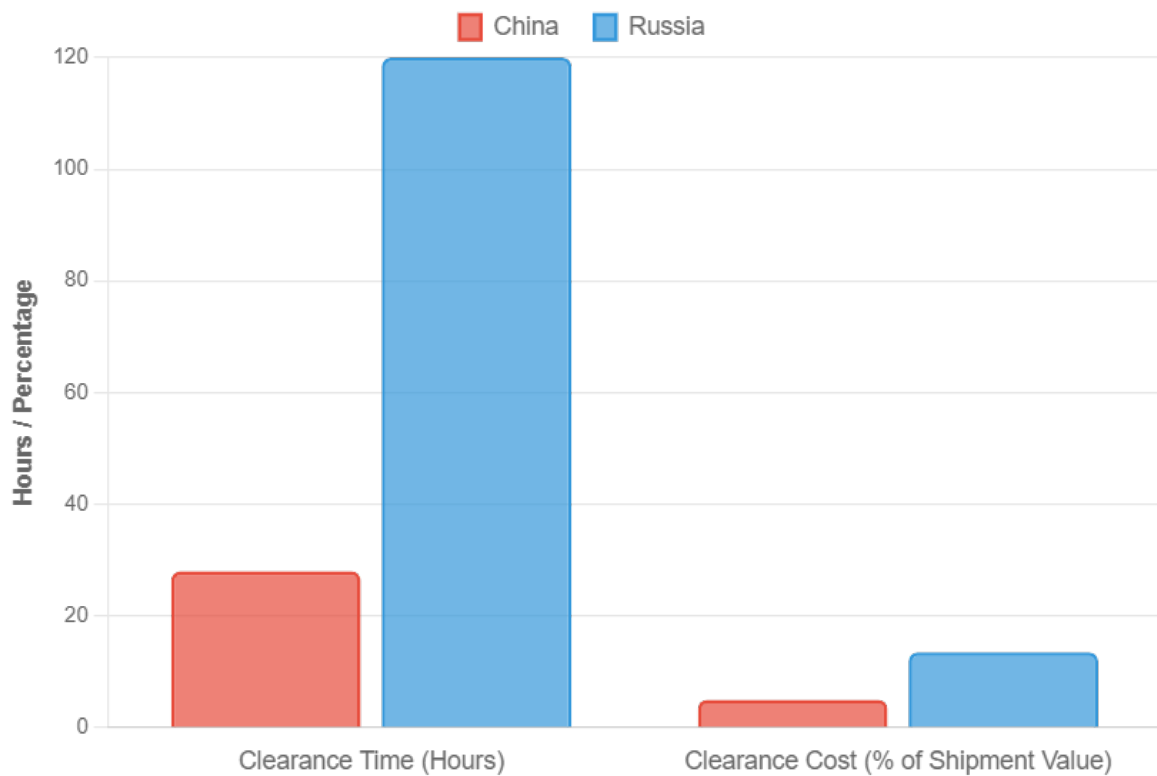


Figure 19 – Comparison of customs clearance time and cost between China and Russia [42]

In terms of customs clearance, there are substantial discrepancies in document requirements between the two countries. Chinese exporters must provide a set of documents when clearing through Chinese borders, but they face different requirements upon arrival at the Russian border. For example, Chinese certificates of origin have specific formats, while Russia may require different formats or additional information, which can cause confusion for logistics operators and lead to delays. Moreover, inspection times at customs in both countries can vary. In some cases, due to plant quarantine issues, Russian customs might conduct more thorough inspections on specific types of goods like agricultural products, leading to longer border waiting times and increased overall transportation time and costs for logistics operations. Tax policies also pose challenges. The tax rates on imported and exported goods may differ between the two countries, and the methods of tax calculation can vary. For instance, Russia's value-added tax (VAT) system for imported goods may differ from that in China.

Additionally, special tax incentives or exemptions available in one country may not apply in another. This makes it difficult for logistics companies and traders to accurately calculate the total cost of goods and develop pricing strategies [47]. There are also differences in transport safety standards. In road transport, vehicle safety requirements differ between China and Russia. Russian trucks must meet specific safety regulations concerning vehicle condition, use of safety equipment, and driver training. Both Russian trucks operating in China and Chinese trucks operating in Russia need to comply with these standards, which may require additional investment in vehicle upgrades and driver training. Similarly, in rail transport, the safety standards for track maintenance, train operation, and cargo loading vary between countries. This presents challenges for cross-border rail freight, as logistics providers need to ensure compliance with both national standards [32].

The China-Russia Joint Logistics Information Platform is expected to revolutionize the logistics industry. This platform will serve as a centralized hub for all logistics-related information, integrating data from various sources such as transportation companies, warehouses, customs, and freight forwarders. For example, transportation companies can update real-time location and status information of vehicles or vessels on the platform, warehouses can provide detailed information on inventory levels, available storage space, and cargo processing times, and customs can share information on clearance procedures, inspection requirements, and clearance status. The platform is open to all parties involved in Sino-Russian logistics, which will facilitate better coordination and communication. Chinese exporters can use the platform to track the entire process of goods from production to delivery to Russian customers, and receive alerts for any potential delays or issues, such as clearance problems or transportation disruptions. Logistics companies can leverage the platform to optimize operations, such as identifying underutilized transport capacity, planning routes more intelligently, and allocating resources more effectively. The joint platform can also support the development of new logistics services, for instance, companies can develop innovative solutions based on platform data, such as predictive maintenance of transport vehicles, or provide just-in-time inventory management for businesses engaged in Sino-Russian trade.

The construction of smart logistics parks in China and Russia is another viable cooperation project. These parks will be equipped with the latest logistics technology and facilities. In storage areas, automated storage and retrieval systems will be used, where overhead stacker cranes can efficiently store and retrieve goods, maximizing the vertical space of the warehouse. The parks will also feature advanced sorting and packaging facilities, such as the automatic sorting system mentioned earlier, which can be integrated into the overall operations of the park. For transportation, the design of the parks will facilitate seamless connections between different modes of transport, for example, dedicated zones for rail-to-road or sea-to-road transfers, along with efficient loading and unloading equipment [54].

Smart logistics parks will also incorporate intelligent energy management and environmental protection technologies. Solar panels can be installed on the roofs of warehouses and other buildings within the park to generate renewable energy; energy-saving lighting systems and climate control measures will be adopted to reduce energy consumption; additionally, waste management systems will be established to recycle and properly dispose of packaging materials and other waste generated during logistics operations. These parks will not only serve as centers for logistics activities but will also become platforms for knowledge sharing and innovation. Chinese and Russian logistics companies, technology suppliers, and researchers can collaborate within the parks to develop new logistics solutions and improve existing processes.

The cooperation between China and Russia in the cultivation of logistics professionals is crucial for the long-term development of the logistics industry in both countries. Both sides can share educational resources, with Chinese universities and vocational training institutions that have a professional edge in logistics education collaborating with their Russian counterparts to jointly develop logistics courses tailored to the specific needs of Sino-Russian trade. For example, these courses could include modules on cross-border logistics operations, interpretation of policies and regulations from both countries, and the application of advanced logistics technologies in Sino-Russian trade.

Additionally, student and faculty exchange programs can be established. Russian students can study at top logistics schools in China, gaining exposure to advanced logistics

practices and technologies; similarly, Chinese students can visit Russia to understand local market dynamics and logistics challenges under Russian conditions. Beyond academic exchanges, on-the-job training programs can also be developed, where Sino-Russian logistics companies can provide internship or training opportunities for students and young professionals from each country, allowing them to gain practical experience in actual logistics operations, such as working in warehouse management, transportation management, and customs clearance [33].

By cultivating a workforce with greater skills and knowledge, the logistics industry in both China and Russia will be better equipped to handle the growing volume of trade and increasingly complex logistics operations.

Conclusion

The trade relations between China and Russia are multifaceted and carry profound significance. Economically, they act as a powerful driver for the growth of both nations, leveraging their complementary economic strengths. Politically, these relations reinforce mutual trust and stability, while regionally, they fuel cooperation and serve as a crucial part of the Belt and Road construction. Globally, they contribute to peace, security, and the advancement of international cooperation.

Logistics, an indispensable part of this relationship, is the key to unlocking the full potential of bilateral trade. It ensures seamless trade operations, boosts trade efficiency, broadens the scope of trade, and strengthens regional connectivity. In recent years, the China-Russia trade landscape has been evolving dynamically. The trade volume has been on an upward trend, and the trade structure is undergoing a transformation, with an increasing share of high-tech and value-added products. Cross-border e-commerce has emerged as a vibrant sector, but it grapples with various issues such as customs clearance bottlenecks, inefficient logistics distribution, payment security concerns, and insufficient consumer rights protection mechanisms.

Green logistics is becoming an inevitable trend in China-Russia trade. With growing global concerns about the environment, both countries are taking steps to reduce the carbon footprint of their logistics operations. The adoption of electric vehicles in transportation, although still in the initial stages, shows great potential for reducing emissions. Energy-efficient railway locomotives are being introduced to reduce diesel consumption, and sustainable packaging materials, such as biodegradable polymers and recycled paper pulp, are being explored to minimize waste. These efforts not only contribute to environmental protection but also meet the growing demand from consumers and businesses for sustainable development. Innovations in logistics technology and practices are injecting new vitality into the industry. Automated sorting systems can handle large volumes of goods quickly and accurately, reducing labor costs and human errors. Blockchain applications enhance the security and transparency of logistics information, making it easier to track the origin, movement, and condition of goods. Multimodal transportation, which combines different

modes such as railway, road, and maritime, provides more efficient and cost - effective logistics solutions.

Cross-border e-commerce logistics centers are being established to streamline the logistics process for online retailers, improving the efficiency of customs clearance and delivery. Against this backdrop, this paper aims to comprehensively analyze the development of China-Russia international logistics. By exploring its current situation, prospects, and challenges in detail, it hopes to propose feasible strategies and measures to promote the further development of China-Russia international logistics. These strategies may include strengthening infrastructure construction, improving policy coordination, promoting technological innovation, and enhancing talent training. By addressing these aspects, it is expected that the China-Russia international logistics industry can better serve the bilateral trade, contributing to regional economic integration and global trade connectivity.

Concurrently, the logistics demands between the two countries are escalating due to the expanding trade scale, especially in the context of booming cross-border e-commerce. Although the two sides have made headway in logistics cooperation, border trade logistics still suffers from infrastructure deficiencies and weak third - party logistics capabilities [34]. The logistics routes and hubs between China and Russia form a comprehensive and efficient network. The Siberian Land Bridge, China-Europe Railway Express, China-Russia Highway Transportation Special Lines, Sea-Land Combined Transportation, and air transportation each have unique advantages, catering to different types of goods and trade needs.

The key logistics hubs, both in China and Russia, are strategically located and equipped with advanced facilities, facilitating the smooth flow of goods and playing a vital role in the trade and logistics ecosystem. Looking towards the future, technological innovation and green logistics are set to redefine the China-Russian international logistics sector. The integration of IoT, big data analytics, and artificial intelligence is revolutionizing logistics operations, enhancing efficiency, and improving service quality. Meanwhile, the pursuit of green logistics, through the adoption of electric vehicles, energy-efficient railway

locomotives, and sustainable packaging materials, is not only an environmental imperative but also a step towards long - term sustainable development.

Innovations in logistics technology and practices, such as automated sorting systems, blockchain applications, multimodal transportation, and cross - border e-commerce logistics centers, are injecting new vitality into the industry. However, the development of China-Russian logistics is not without challenges.[60]International cooperation projects, despite their positive contributions to infrastructure improvement and service integration, are hampered by differences in policies and regulations between the two countries. Discrepancies in customs clearance procedures, tax policies, and transportation safety standards create obstacles in logistics operations, leading to inefficiencies and increased costs. To overcome these challenges and propel the development of China - Russia logistics, a series of collaborative initiatives are essential.

Establishing a joint logistics information platform can break down information silos, enabling real - time information sharing and more efficient coordination among all stakeholders. The construction of intelligent logistics parks, equipped with state - of - the - art technologies and sustainable features, can serve as innovation hubs and enhance the overall competitiveness of the logistics industry. Cooperation in training logistics professionals is also crucial. By sharing educational resources, conducting student and faculty exchanges, and providing on - the - job training opportunities, the two countries can nurture a skilled workforce capable of meeting the evolving demands of the logistics industry.

In conclusion, the future of China - Russia international logistics is promising. With the two countries' shared commitment to cooperation and innovation, continuous efforts to optimize logistics systems, strengthen infrastructure, upgrade service levels, and embrace technological advancements, the China-Russian logistics industry is well - positioned to reach new heights. This will not only underpin the further deepening of bilateral trade but also contribute to the economic development, regional integration, and global trade connectivity of both countries.

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