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Department of Sociology, Economic
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38.04.01 Economics
International Economics and Business

GRADUATION THESIS

on

Cooperation between China and Russia in international logistics

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Institute of Economics and Administration
Department of Sociology, Economic Theory and International Processes
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ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Bian Na, group 24ЭЭВам1, full-time mode of study

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

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

2 The deadline for the Master's degree student to complete the graduation thesis is 15.06.2026.

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

4 The list of issues to be studied includes overview of international logistics, current situation and existing problems in Sino-Russian international logistics, suggestions and countermeasures for promoting the development of Sino-Russian international logistics.

5 The list of visuals contains tables and figures.

6 The date of setting the assignment is 8.10.2024.

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The assignment was accepted by Master's degree student _____ / Bian Na /
(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	1.09.2024 – 31.10.2024	
2	Framing the scientific concept of research	1.11.2024 – 18.12.2024	
3	Collection of scientific literature for the thesis	19.12.2024 – 15.01.2025	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2025 – 19.02.2025	
5	Framing of a detailed plan and layout of the research	20.02.2025 – 12.03.2025	
6	Studying new literature sources within the topic of the thesis	13.03.2025 – 26.03.2025	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2025 – 30.04.2025	
8	Preparing the first chapter of the thesis	1.05.2025 – 30.06.2025	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2025 – 22.10.2025	
10	Preparing the second chapter of the thesis	23.10.2025 – 24.12.2025	
11	Conducting analytical research within the third chapter of the thesis	25.12.2025 – 25.02.2026	
12	Preparing the third chapter of the thesis	26.02.2026 – 21.04.2026	
13	Preparing the introduction and conclusion	22.04.2026 – 12.05.2026	
14	Completing the graduation thesis	13.05.2026 – 27.05.2026	
15	Handing in the thesis for compliance control and antiplagiat	28.05.2026 – 11.06.2026	
16	Getting acquainted with the feedback and review	13.06.2026	
17	Presenting the written thesis	15.06.2026	

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Summary

The graduation thesis comprises 85 pages, 3 chapters, 15 figures, 8 tables, 74 sources. INTERNATIONAL LOGISTICS, TRANSPORT, LAWS AND REGULATIONS, INFORMATIZATION, PROFESSIONAL LOGISTICS PERSONNEL TRAINING SYSTEM, OCEAN FREIGHT, AIR FREIGHT

The research object of this paper is the international logistics system between China and Russia.

The goal of the research is in the context of the rapid growth of Sino-Russian trade and the increasing complexity of cross-border logistics demands, how to identify and systematically overcome the major constraints hindering the development of international logistics between China and Russia, and further construct a multi-dimensional optimization strategy framework to enhance the efficiency, intelligence level, sustainability, and resilience of bilateral logistics cooperation. The ultimate goal is to provide strategic references for government decision-makers, logistics enterprises, and educational institutions in both countries.

The methodological framework of the paper is formed by the complex of theoretical and practical methods such as multi-method approach is adopted. Comparative analysis is used to identify differences in logistics infrastructure and informatization levels between China and Russia. Case analysis is employed to illustrate specific problems and successful practices. Spatial analysis methods are applied to depict the distribution characteristics of commodity flows and major logistics nodes. A policy and regulatory analysis framework based on strategic management theory is constructed to evaluate the current state of bilateral logistics cooperation and to propose improvement strategies

The results of research include three-dimensional problem analysis framework of “infrastructure docking – informatization level – talent cultivation” has been constructed. Unlike previous studies that often focused on a single dimension (e.g., only infrastructure or only policy), this framework systematically integrates the relatively scattered restrictive factors in the existing literature on Sino-Russian logistics. It enables a comprehensive and in-depth diagnosis of the root causes of logistics inefficiencies, highlighting the interconnections between physical infrastructure, information systems, and human capital. This holistic perspective enhances the theoretical contribution of the paper and provides a more solid foundation for strategy formulation.

Novelty of this study is the paper proposes specific, actionable countermeasures for two of the most critical and persistent technical barriers: the railway gauge difference and the logistics informatization gap. For the gauge inconsistency, the paper suggests a phased approach combining short-term measures (upgrading transshipment facilities and optimizing processes at border crossings such as Manzhouli-Zabaikalsk) and long-term solutions (jointly studying gauge-changeable train technology and pilot projects on key routes). For the informatization gap, the paper proposes establishing unified data exchange standards (covering data formats, information content, and transmission protocols), promoting the application of big data, AI, IoT, and blockchain technologies, and building a unified Sino-Russian cross-border logistics information platform. These countermeasures have strong contemporary relevance, technical feasibility, and practical value, directly addressing the most urgent needs of logistics operators.

The theoretical relevance of the thesis is established by systematically analyzes the current situation, existing problems, and countermeasures for the development of Sino-Russian international logistics. By combining quantitative data (e.g., trade volumes, freight throughput, informatization indicators) and qualitative case studies (e.g., border port operations, logistics platform applications, talent training programs), it explores the development opportunities and potential risks in bilateral logistics cooperation, and proposes targeted, feasible, and forward-looking countermeasures and suggestions

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Introduction

With the deepening of economic globalization and the continuous advancement of the Belt and Road Initiative, international logistics has evolved from a mere support function to a strategic link in promoting bilateral trade, regional economic integration, and supply chain resilience. As two major neighboring countries with highly complementary economic structures, China and Russia have witnessed rapid growth in bilateral trade over the past decade. According to the Ministry of Commerce of the People's Republic of China, the trade volume between China and Russia reached 190.27 billion US dollars in 2023, a year-on-year increase of 29.3%, achieving the strategic goal of 200 billion US dollars proposed by the heads of state of the two countries ahead of schedule. In 2025, the bilateral trade volume is estimated to exceed 250 billion US dollars, driven by strong demand for energy products, mechanical and electrical goods, agricultural products, and cross-border e-commerce. As major neighboring economies with highly complementary industrial structures, China and Russia have witnessed increasingly close trade and logistics cooperation under the framework of economic globalization and the Belt and Road Initiative. The continuous improvement of bilateral economic and trade relations has further consolidated the foundation for cross-border logistics development.

On this basis, the rapid growth of bilateral trade volume has put forward higher requirements for the efficiency, connectivity and intelligence level of the international logistics system. However, problems such as infrastructure incompatibility, digital gaps and talent shortages have become prominent constraints, which provides a realistic background and research motivation for this study.

However, behind this remarkable growth lies a series of persistent and increasingly prominent challenges in the field of international logistics. Issues such as inconsistent technical standards (e.g., the 1,435 mm standard gauge in China versus the 1,520 mm broad gauge in Russia), insufficient capacity at key border ports, outdated and scattered warehousing facilities, a significant gap in logistics informatization levels, and a shortage of professionals with cross-cultural and technical expertise have become major bottlenecks constraining the efficiency, cost-effectiveness, and reliability of cross-border logistics

between the two countries. These problems not only increase transportation time and costs but also limit the ability of enterprises to respond flexibly to market fluctuations and policy changes. Therefore, systematically analyzing the current situation and existing problems of Sino-Russian international logistics, and proposing targeted and feasible optimization strategies, is of great theoretical and practical significance for promoting the high-quality development of bilateral trade and deepening regional economic integration.

The research object of this paper is the international logistics system between China and Russia. The core research subject of this paper is: in the context of the rapid growth of Sino-Russian trade and the increasing complexity of cross-border logistics demands, how to identify and systematically overcome the major constraints hindering the development of international logistics between China and Russia, and further construct a multi-dimensional optimization strategy framework to enhance the efficiency, intelligence level, sustainability, and resilience of bilateral logistics cooperation.

The ultimate goal is to provide strategic references for government decision-makers, logistics enterprises, and educational institutions in both countries.

The main research tasks of this paper are divided into four sequential stages:

1 Data collection and preprocessing. Through multiple channels, including official statistical yearbooks (e.g., China Customs statistics, Russian Federal Customs Service data), academic literature, industry reports (e.g., from the China Federation of Logistics and Purchasing, Russian Logistics Association), and enterprise case studies, relevant data on Sino-Russian trade volume, logistics infrastructure, informatization level, policy regulations, and talent development are collected. The original data are screened, cleaned, and verified for accuracy and completeness. Content with low relevance to the research topic, such as unrelated trade routes or outdated policy measures, is deleted. Special attention is paid to the comparability of Chinese and Russian data sources, and where discrepancies exist (e.g., railway freight volume figures), both sides' data are presented and explained.

2 Selection and design of research methods. A multi-method approach is adopted. Comparative analysis is used to identify differences in logistics infrastructure (e.g., railway gauge, port capacity, warehousing standards) and informatization levels (e.g., coverage of

TMS/WMS, electronic waybill usage) between China and Russia. Case analysis is employed to illustrate specific problems and successful practices (e.g., the Manzhouli-Zabaikalsk border crossing, the application of G7 Network in China). Spatial analysis methods are applied to depict the distribution characteristics of commodity flows and major logistics nodes (e.g., border ports, coastal ports, inland hub cities). A policy and regulatory analysis framework based on strategic management theory is constructed to evaluate the current state of bilateral logistics cooperation and to propose improvement strategies.

3 Explanation and demonstration of research findings. Based on the results of the previous stages, the internal logic of the identified problems and the feasibility of the proposed countermeasures are explained and demonstrated. This includes analyzing the causal relationships between technical standard differences and logistics inefficiencies, between information gaps and supply chain visibility, and between talent shortages and service quality. The applicable conditions of different strategies in different logistics scenarios (e.g., border ports vs. inland areas, railway vs. road transportation, bulk commodities vs. high-value goods) are clarified, and potential implementation challenges and risk factors are discussed.

4 Summary of implications and formulation of strategic recommendations. The implications of Sino-Russian international logistics development for regional economic integration, supply chain resilience, the Belt and Road Initiative, and the broader China-Russia comprehensive strategic partnership of coordination are summarized. Systematic strategic recommendations are formulated for government decision-makers (e.g., policy coordination, investment in infrastructure, regulatory harmonization), logistics enterprises (e.g., technology adoption, cross-border cooperation, talent development), and educational institutions (e.g., curriculum design, industry-education integration, international exchange programs). The paper concludes with an outlook on future research directions, such as the application of blockchain technology in cross-border logistics and the impact of carbon neutrality goals on green logistics cooperation.

The main innovations of this paper are reflected in three aspects. Firstly, a three-dimensional problem analysis framework of “infrastructure docking – informatization level – talent cultivation” has been constructed. Unlike previous studies that often focused on a

single dimension (e.g., only infrastructure or only policy), this framework systematically integrates the relatively scattered restrictive factors in the existing literature on Sino-Russian logistics. It enables a comprehensive and in-depth diagnosis of the root causes of logistics inefficiencies, highlighting the interconnections between physical infrastructure, information systems, and human capital. This holistic perspective enhances the theoretical contribution of the paper and provides a more solid foundation for strategy formulation.

Secondly, the paper proposes specific, actionable countermeasures for two of the most critical and persistent technical barriers: the railway gauge difference and the logistics informatization gap. For the gauge inconsistency, the paper suggests a phased approach combining short-term measures (upgrading transshipment facilities and optimizing processes at border crossings such as Manzhouli-Zabaikalsk) and long-term solutions (jointly studying gauge-changeable train technology and pilot projects on key routes). For the informatization gap, the paper proposes establishing unified data exchange standards (covering data formats, information content, and transmission protocols), promoting the application of big data, AI, IoT, and blockchain technologies, and building a unified Sino-Russian cross-border logistics information platform. These countermeasures have strong contemporary relevance, technical feasibility, and practical value, directly addressing the most urgent needs of logistics operators.

Thirdly, the paper introduces “cross-cultural talent training” and “industry-education integration” as independent strategic modules. While many studies on international logistics emphasize infrastructure and technology, this paper recognizes that professional talent is the fundamental driver of sustainable development. It proposes a comprehensive talent cultivation system that includes: strengthening Russian and Chinese language teaching and cross-cultural communication training; establishing mechanisms for mutual recognition of academic qualifications and credits between Chinese and Russian universities; promoting exchange programs for teachers and students; building cross-border logistics internship and practice bases; establishing a Sino-Russian logistics vocational training center; and creating a mutually recognized vocational qualification certification system. This emphasis on talent development transcends the traditional research focus on hardware and software, providing

a new perspective for the long-term, high-quality development of Sino-Russian international logistics.

In recent years, as carbon emission regulations become increasingly stringent and environmental awareness rises globally, the logistics industry is also undergoing a green transformation. However, this paper acknowledges that the current challenges in Sino-Russian international logistics are more fundamental. There are significant differences between the two countries in railway gauges, vehicle technical standards, customs clearance procedures, warehousing operation standards, and data exchange protocols. These differences greatly increase logistics time and costs, reduce supply chain visibility, and create barriers for small and medium-sized enterprises. Moreover, the lack of a unified logistics information sharing platform and the low level of application of new technologies such as big data and artificial intelligence restrict the intelligent development of logistics. In addition, the shortage of logistics professionals who possess both professional knowledge and cross-cultural communication skills (especially Russian-Chinese bilingual proficiency) has become a critical bottleneck. How to balance rapid trade growth with logistics capacity building, and achieve the simultaneous advancement of infrastructure connectivity, information sharing, policy coordination, and talent cultivation, has become a major issue currently faced by the development of Sino-Russian international logistics.

This thesis systematically analyzes the current situation, existing problems, and countermeasures for the development of Sino-Russian international logistics. By combining quantitative data (e.g., trade volumes, freight throughput, informatization indicators) and qualitative case studies (e.g., border port operations, logistics platform applications, talent training programs), it explores the development opportunities and potential risks in bilateral logistics cooperation, and proposes targeted, feasible, and forward-looking countermeasures and suggestions. The aim is to provide theoretical references and practical guidance for optimizing the logistics policy environment, promoting the connectivity of logistics infrastructure, enhancing the level of information sharing, and cultivating professional logistics talents, thereby facilitating the high-quality, efficient, and sustainable development of Sino-Russian international logistics under the new pattern of bilateral economic and trade cooperation and the Belt and Road Initiative.

Chapter 1 Overview of international logistics

1.1 The concept and characteristics of international logistics

International logistics represents a highly intricate and multifaceted process that necessitates meticulous planning, efficient implementation, and stringent control over the seamless flow and secure storage of goods, services, and the associated information that traverses international borders. This comprehensive process encompasses a wide array of activities, commencing with the procurement of raw materials and components in one country, followed by their transportation, storage, and distribution, and ultimately culminating in the final delivery of finished products to consumers in another nation.

A diverse and interconnected network of stakeholders is deeply embedded within this complex web of international logistics. These stakeholders include manufacturers who are responsible for producing the goods, suppliers who provide the necessary inputs and materials, freight forwarders who skillfully coordinate the movement of cargo across borders, carriers who undertake the physical transportation of goods, customs authorities that meticulously oversee border-crossing regulations and ensure compliance, and end-users who are the ultimate recipients of the products.

To clearly demonstrate the constituent dimensions of the international logistics system, its core structure is presented in figure 1.

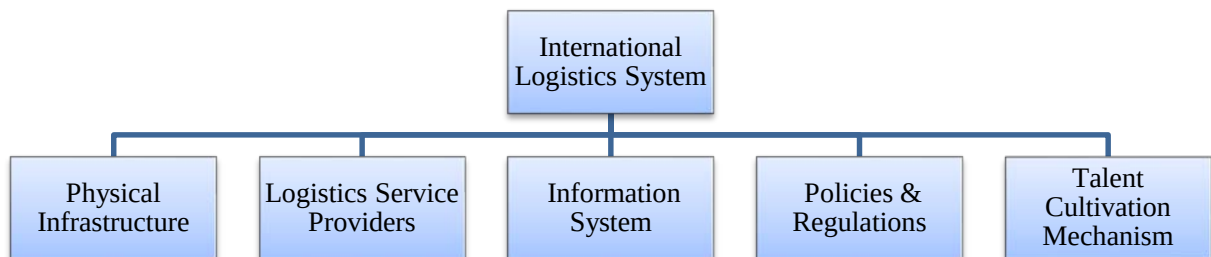


Figure 1 – Core composition of international logistics system [2]

This hierarchical diagram shows five interrelated core modules of the international logistics system, namely physical infrastructure, logistics service providers, information systems, policies and regulations, and talent cultivation mechanism.

At its core, international logistics serves as a vital bridge that spans the geographical, economic, and regulatory divides that exist between different countries. Its primary objective is to guarantee the smooth and uninterrupted movement of goods, thereby facilitating international trade and economic growth. To achieve this, it integrates various essential functions, such as transportation, warehousing, packaging, material handling, and information management.

For instance, consider the scenario where a Chinese electronics manufacturer exports smartphones to Russia. The international logistics journey for these smartphones commences right at the factory floor. Here, the products are meticulously packaged using high-quality materials and advanced techniques to withstand the rigors of long-distance transportation, including potential impacts, vibrations, and environmental factors. Subsequently, they are transported via land, sea, or air to Russian ports or border checkpoints, depending on factors such as cost, time sensitivity, and the nature of the goods.

Throughout this entire journey, logistics providers play a pivotal role. They are tasked with devising the most cost-effective and timely transportation routes, taking into account factors such as distance, traffic conditions, and the availability of transportation modes. They must also navigate the often-complex customs clearance procedures, which involve preparing and submitting a wide range of documents, paying duties and taxes, and complying with various regulations and requirements. Moreover, they are responsible for ensuring the safety and intactness of the goods throughout the entire supply chain, implementing measures such as proper handling, storage, and security.

The concept of international logistics has undergone a profound transformation over time. In the nascent stages of international trade, logistics was primarily concerned with the physical movement of goods from one place to another, with a focus on basic transportation and storage functions. However, with the advent of economic globalization, the ever-increasing complexity of supply chains, and the rapid advancements in information

technology, international logistics has broadened its scope to encompass more strategic and value-added functions [27].

In the contemporary era, international logistics not only places a strong emphasis on the efficiency of goods transportation but also prioritizes supply chain optimization, risk management, and the enhancement of customer service. It has evolved into a holistic approach that goes beyond mere physical movement of goods, aiming to create a seamless and efficient global supply chain ecosystem. This involves the integration of various technologies, such as real-time tracking systems, data analytics, and automation, to improve visibility, control, and decision-making throughout the supply chain. It also entails collaboration and partnership among different stakeholders, including suppliers, manufacturers, logistics service providers, and customers, to achieve common goals and create value for all parties involved.

International logistics possesses a series of distinct and complex characteristics that are intricately intertwined, collectively shaping its unique operational environment. These characteristics require logistics enterprises to possess a high degree of professionalism, flexibility, and adaptability to cope with the complex and ever-changing global market environment [24].

One of the most prominent features of international logistics is its global coverage. It operates across different countries and regions, each with its own unique economic, political, cultural, and legal landscapes. For example, taking the transportation of goods from China to Russia as an illustration, logistics operators not only need to be well-acquainted with and comply with China's export regulations, which may include requirements related to product standards, labeling, and documentation, but also strictly adhere to Russia's import requirements, which may involve customs duties, import quotas, and product certifications.

At the same time, they must take into account the differences in transportation infrastructure, such as the variance in railway gauge between China and Russia, which may require the use of specialized equipment or transshipment facilities. These factors necessitate that international logistics providers possess a global perspective and the ability

to adapt to diverse environments, including different business practices, communication styles, and time zones.

High complexity is another significant characteristic of international logistics. This complexity arises from the involvement of multiple parties, the coexistence of various transportation modes, and the interplay of different regulatory systems. International freight shipments require a large number of documents, such as bills of lading, customs declarations, and certificates of origin. Each document has specific requirements and must be accurately completed to ensure smooth customs clearance. For instance, a single error or omission in a customs declaration can lead to delays, fines, or even the seizure of goods. Additionally, coordinating different transportation modes, such as combining sea freight with inland trucking or rail transport, further adds to the complexity. This requires careful planning and coordination to ensure that the goods are transferred smoothly between different modes of transportation, that the necessary documentation is in order, and that the delivery times are met. For instance, in a typical China-Russia international logistics operation, goods may first be transported by truck from a Chinese factory to a seaport, then shipped by container vessel to a Russian port, and finally transported by rail to an inland destination in Russia. This multimodal transportation, along with the involvement of multiple parties, various transportation modes, and different regulatory systems, makes international logistics highly complex and challenging to manage.

International logistics is also characterized by long-distance and time-consuming transportation. Due to the involvement of long-distance transport, international logistics often requires a significant amount of time. For example, a sea freight shipment of goods from Shanghai, China, to St. Petersburg, Russia, may take several weeks, depending on factors such as the route, weather conditions, and port congestion. This extended transit time has implications for inventory management, cash flow, and customer satisfaction. Logistics companies need to carefully plan and manage transit times to meet customer delivery requirements. They may adopt techniques such as just-in-time (JIT) inventory management in combination with reliable transportation schedules to reduce inventory holding costs while ensuring timely delivery. JIT inventory management involves receiving goods only when they are needed for production or sale, thereby minimizing the amount of inventory

held in stock. However, this requires a high level of coordination and reliability in the transportation process to avoid stockouts or delays.

High risk is another characteristic of international logistics. These risks encompass political risks, economic risks, natural disasters, and transportation-related risks. Political instability in a country may lead to sudden changes in trade policies, customs regulations, or even border closures. For example, shifts in international relations between China and Russia could potentially impact the flow of goods, such as the imposition of trade sanctions or the tightening of customs controls. Economic fluctuations, such as currency devaluations or inflation, can also affect logistics costs and profitability. For instance, a significant devaluation of the Russian ruble against the Chinese yuan could increase the cost of importing goods from China for Russian buyers, leading to a decrease in demand or a need to renegotiate prices.

Natural disasters like typhoons, earthquakes, and floods can disrupt transportation routes and damage goods. For example, a severe typhoon in the South China Sea could delay or divert sea freight shipments, causing disruptions in the supply chain. Moreover, risks such as theft, damage during handling, and cargo loss are also common in international logistics. These risks can result in financial losses for the parties involved and may require insurance coverage to mitigate.

Regulatory diversity is yet another feature of international logistics. Each country has its own set of laws, regulations, and policies regarding international trade and logistics. These regulations cover multiple areas, including customs duties, import and export restrictions, product standards, and environmental protection requirements. For instance, Russia has specific regulations on the labeling and packaging of imported goods, as well as restrictions on certain types of products, such as agricultural products or hazardous materials. International logistics operators must stay updated on these regulatory changes to avoid costly delays, fines, or even the rejection of shipments. This requires continuous monitoring of regulatory developments, maintaining good relationships with customs authorities, and ensuring that all necessary documentation and certifications are in order.

1.2 The architecture of international logistics system

The physical infrastructure of the international logistics system serves as the cornerstone for the seamless flow of goods across borders. It encompasses transportation facilities, warehousing facilities, and logistics nodes, all of which work in harmony to ensure efficient logistics operations.

Transportation stands as the linchpin of international logistics, with various modes available, each offering distinct advantages and limitations [44]:

1 Sea transport: the backbone of global trade. Sea transport reigns supreme as the most widely utilized mode for international trade, thanks to its colossal carrying capacity and relatively low cost. Container ships, the workhorses of sea freight, can transport vast quantities of goods in standardized containers, enabling efficient loading, unloading, and intermodal transportation. In the context of China-Russia trade, sea routes connect Chinese coastal ports such as Shanghai, Qingdao, and Dalian with Russian ports such as Vladivostok, Nakhodka, and St. Petersburg, facilitating the movement of a wide array of commodities, including raw materials, manufactured goods, and consumer products. However, sea transport's relatively sluggish pace makes it unsuitable for time-sensitive products, such as perishable goods or high-tech electronics. It is also subject to factors such as weather conditions, port congestion, and piracy risks, which can cause delays and disruptions.

2 Air transport: the speed demon for high-value goods. Air transport offers unparalleled speed, making it the go-to choice for time-sensitive goods like electronics, perishable items, and high-value products. Chinese and Russian airlines operate a plethora of international flights, enabling the rapid transit of goods between the two nations. Air cargo services provide fast and reliable delivery, often within a few days or even hours, depending on the destination. However, air transport comes at a premium price and has limited cargo capacity compared to sea transport [44]. It is also more sensitive to factors such as flight delays, security restrictions, and fuel price fluctuations, which can affect costs and availability.

3 Land transport: bridging neighboring countries. Land transport, comprising road and rail, plays a pivotal role in international logistics [66], particularly for neighboring

countries like China and Russia. Rail transport is particularly well-suited for large-volume, long-distance shipments. The China-Russia railway network, which includes the Trans-Siberian Railway and the Chinese Railway Express, facilitates the direct transportation of goods between major cities in both countries, such as Beijing, Moscow, and Harbin. Rail transport offers advantages such as cost-effectiveness, reliability, and environmental friendliness compared to air transport. Road transport, on the other hand, offers flexibility and door-to-door service, making it ideal for short-distance and small-volume shipments. It allows for direct delivery to customers' premises, reducing the need for additional handling and storage. However, land transport is also subject to factors such as road conditions, traffic congestion, and border crossing procedures, which can cause delays and increase costs.

In view of the dominant position of different transportation modes in Sino-Russian trade, the proportion of various modes in 2025 is shown in figure 2.

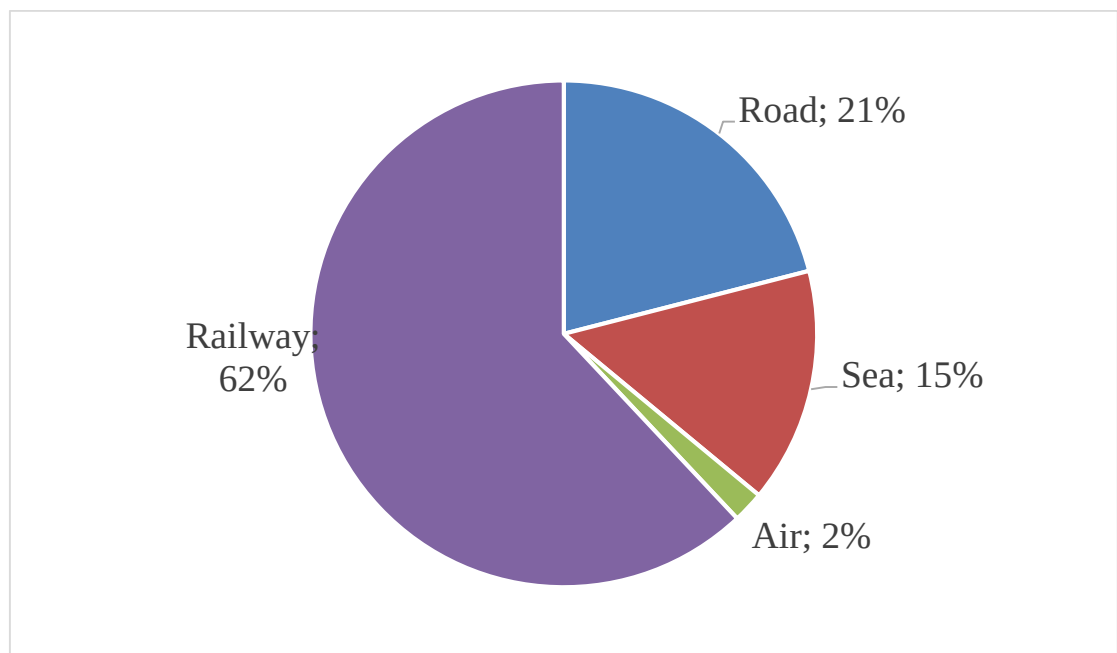


Figure 2 – Proportion of transport modes in China-Russia trade (2025) [18; 61]

The pie chart shows that railway transport accounts for 62%, road transport 21%, sea transport 15%, and air transport 2%, indicating that railway is the main force of Sino-Russian cross-border logistics.

Warehousing facilities are indispensable for storing goods at various stages of the international logistics process. These facilities include ports, free trade zones, distribution

centers, and bonded warehouses. In the China-Russia international logistics landscape, bonded warehouses near border areas serve as temporary storage hubs, allowing for flexible customs clearance and inventory management. They enable companies to store goods without paying customs duties and taxes until the goods are actually imported into the country, providing cash flow benefits and reducing the risk of inventory obsolescence. Distribution centers in major cities in both countries streamline the sorting, packaging, and distribution of goods to their final destinations. They act as central hubs for consolidating and deconsolidating shipments, optimizing transportation routes, and improving delivery times.

Logistics nodes, such as ports, airports, and border crossings, are the critical points in the international logistics system. Ports act as major hubs for sea-land transportation transfer, where goods are loaded and unloaded from ships and transferred to other modes of transportation, such as trains or trucks. They are equipped with advanced infrastructure and facilities, including cranes, warehouses, and customs inspection areas, to handle large volumes of cargo efficiently. Airports serve as the epicenters of air cargo operations, with dedicated cargo terminals, runways, and handling equipment to facilitate the rapid movement of goods. Border crossings are vital for land-based international logistics, where customs clearance and border inspections take place. They are often equipped with customs offices, inspection booths, and weighing scales to ensure compliance with regulations and prevent the illegal movement of goods. For instance, the Manzhouli-Zabaikalsk border crossing is a major logistics node for China-Russia land trade, handling a substantial volume of goods transported by rail. It serves as a gateway for trade between Northeast China and the Russian Far East, facilitating the exchange of goods such as timber, minerals, and consumer products.

Logistics service providers are the driving forces behind the movement of goods within the international logistics system. They offer a range of services that facilitate the efficient and cost-effective transportation of goods [22]:

1 Freight forwarders: the intermediaries coordinating logistics. Freight forwarders act as intermediaries between shippers and carriers, handling a multitude of tasks. These include booking transportation space, arranging customs clearance, preparing shipping documents,

and providing freight insurance. In the China-Russia international logistics arena, freight forwarders with in-depth knowledge of the regulations and logistics networks of both countries can assist shippers in optimizing their logistics operations and reducing costs [66]. They can leverage their relationships with carriers, customs authorities, and other service providers to secure the best rates, routes, and services for their clients. They can also provide value-added services such as cargo consolidation, warehousing, and distribution, enabling shippers to focus on their core business activities.

2 Carriers: the actual transporters of goods. Carriers are the entities responsible for the physical movement of goods from the point of origin to the destination. They include shipping lines, airlines, trucking companies, and railway operators. For example, Russian Railways and Chinese shipping companies play crucial roles in transporting goods between the two countries, ensuring the reliable and timely delivery of commodities. Shipping lines operate container ships and other vessels on regular routes, providing scheduled services for the transportation of goods by sea. Airlines operate cargo flights, offering fast and efficient air transport services. Trucking companies provide door-to-door delivery services for land transportation, using a fleet of trucks and drivers to transport goods over short and medium distances. Railway operators operate trains on railway networks, providing a cost-effective and environmentally friendly mode of transportation for large-volume shipments.

Warehousing and distribution companies manage warehousing facilities and are responsible for the storage, handling, and distribution of goods. They ensure that goods are stored safely and can be efficiently retrieved and delivered to customers, thereby enhancing the overall efficiency of the logistics system. They use advanced technologies such as warehouse management systems (WMS), automated storage and retrieval systems (AS/RS), and radio frequency identification (RFID) to optimize warehouse operations, improve inventory accuracy, and reduce handling costs. They also offer value-added services such as order fulfillment, packaging, and labeling, enabling customers to receive their goods in a ready-to-use condition.

The information system serves as the nerve center of the international logistics system, enabling real-time monitoring, coordination, and decision-making. It leverages advanced technologies to streamline logistics processes and improve overall efficiency:

1 Electronic data interchange (EDI): streamlining information exchange. EDI allows different parties in the logistics process, such as shippers, carriers, and customs authorities, to exchange information electronically in a standardized format. This speeds up the processing of documents, reduces errors, and enhances the overall efficiency of the logistics system [22]. For example, in China-Russia trade, EDI can be used to transmit customs declaration information between Chinese exporters and Russian customs authorities, facilitating a smoother customs clearance process. It eliminates the need for paper-based documents, reduces manual data entry, and enables faster communication and approval of customs declarations.

2 Global positioning system (GPS) and tracking technologies: ensuring real-time visibility. GPS and other tracking technologies enable real-time monitoring of the location and status of goods during transportation. Shippers and customers can track the movement of their shipments, enhancing transparency and improving customer service. In China-Russia international logistics, GPS-enabled trucks and ships can be tracked throughout their journey, providing accurate information on delivery times and enabling proactive management of potential delays. For example, if a truck is delayed due to traffic congestion or adverse weather conditions, the logistics provider can inform the customer in advance and take appropriate measures to minimize the impact on the delivery schedule.

3 Supply chain management (SCM) software: optimizing the entire logistics process. SCM software helps in optimizing the entire logistics process, from procurement to delivery. It integrates information from different sources [38], such as suppliers, manufacturers, and distributors, to improve inventory management, reduce costs, and enhance overall supply chain performance. By providing a holistic view of the supply chain, SCM software enables logistics managers to make informed decisions and respond quickly to changing market conditions. For example, it can help in forecasting demand, optimizing production schedules, and managing inventory levels to avoid stockouts or overstocking. It can also facilitate collaboration and communication among different stakeholders in the supply chain, improving coordination and efficiency.

1.3 Improving the policies and regulations for bilateral logistics cooperation

Currently, China and Russia have established a series of policies and regulations to support bilateral logistics cooperation. However, there are still some areas that require improvement.

Both China and Russia have made efforts to some extent to simplify customs procedures [28]. For instance, measures have been implemented to expedite customs clearance for certain types of goods, such as perishable goods or high-tech products. However, discrepancies still exist in customs inspection standards, tariff classification, and valuation methods. These differences can lead to delays and increased costs in cross-border logistics [6]. For example, there may be variations in the interpretation of product categories for tariff purposes between the customs authorities of the two countries, which can trigger disputes during the customs clearance process. In some cases, goods may be classified under different tariff codes, resulting in different duty rates being applied. This can lead to additional costs for the importer and may require time-consuming negotiations or appeals to resolve the issue.

Both nations have introduced trade facilitation policies, such as promoting the use of electronic documents and establishing “green channels” for specific goods. However, the implementation of these policies lacks full coordination. In some instances, the lack of harmonization in trade facilitation measures between China and Russia can still impede the smooth flow of goods. For example, while China may have implemented electronic customs declaration systems, Russia may still require paper-based documents for certain types of transactions, leading to additional administrative burdens and delays.

There are differences in transportation regulations, including vehicle standards, driver qualifications, and road-use fees. For land transportation between China and Russia, these disparities pose challenges for logistics operators [8]. For example, discrepancies in truck weight and size limits can affect the selection of transportation equipment and the efficiency of cross-border road transport. If a truck that is compliant with Chinese regulations exceeds the weight or size limits in Russia, it may be required to unload some of its cargo or pay additional fees, leading to increased costs and delays. The policy differences and

cooperation status described above are directly reflected in key quantitative indicators of bilateral logistics cooperation [24]. To more clearly present the current scale and structure of China-Russia logistics cooperation, the main indicators for 2025 are summarized in table 1.

Table 1 – Key indicators of China-Russia logistics cooperation (2025) [17; 46]

Indicator	Value	Source/Note
China-Russia Railway Freight Volume	About 200 million tons (Chinese data) / 186 million tons (Russian data)	Growing at 6.3% year-on-year
China-Russia Road Freight Volume	>6 million tons	Year-on-year growth of 46%
Russia's Share of China's Exports	~45% of Russia's imports	Russia accounts for approximately 45% of imports from China
Russia's Share of China's Imports	~27% of Russia's exports	China is Russia's largest trading partner

As shown in table 1, the China-Russia railway freight volume has approached 200 million tons and is growing rapidly, while road freight volume increased by 46% year-on-year, indicating strong demand for land transport. Meanwhile, Russia accounts for approximately 45% of China's exports, and China is Russia's largest trading partner, highlighting the importance of logistics cooperation for bilateral trade. However, the rapid growth in freight volume also places higher demands on the existing logistics system.

Improving the policies and regulations for bilateral logistics cooperation is of great significance for promoting the development of China-Russia international logistics.

Harmonized and streamlined policies and regulations can significantly reduce the time and cost of cross-border logistics. For example, if China and Russia can unify customs inspection procedures and reduce the number of required documents, the customs clearance time can be shortened, enabling goods to reach the market faster. This not only enhances the competitiveness of enterprises but also fosters the growth of bilateral trade. Faster customs clearance means that goods can be delivered to customers more quickly, reducing inventory holding costs and improving customer satisfaction. It also allows enterprises to respond more quickly to market demands and take advantage of business opportunities [8].

A more efficient logistics system, supported by improved policies and regulations, can strengthen economic cooperation between China and Russia. It can facilitate the expansion of trade volume, the development of cross-border investment, and the integration of supply chains. For instance, better-coordinated transportation regulations can encourage more Chinese and Russian enterprises to engage in joint logistics projects, further deepening economic ties. This can lead to the creation of new business opportunities, the transfer of technology and expertise, and the development of regional value chains.

Consistent and clear policies and regulations can help reduce uncertainties and risks in international logistics. By clarifying the rights and obligations of different parties and standardizing the operational process, the likelihood of disputes and losses can be minimized. For example, unified product safety and quality regulations can prevent disputes over product compliance during cross-border trade [22]. If both countries have the same standards and requirements for product safety and quality, it becomes easier for enterprises to ensure that their products meet the necessary criteria, reducing the risk of product recalls or legal disputes.

To improve the policies and regulations for bilateral logistics cooperation, the following strategies can be adopted:

China and Russia should strengthen communication and coordination at the government level to harmonize relevant policies and regulations. This can include establishing regular policy-making dialogue mechanisms and jointly formulating standards and regulations in key areas such as customs, transportation, and trade facilitation. For example, they can work together to develop a unified customs tariff classification system for commonly traded goods, eliminating discrepancies in tariff interpretation and reducing the risk of disputes. They can also coordinate their transportation regulations to ensure compatibility and facilitate the smooth movement of goods across borders.

Leveraging information technology to digitalize policy implementation can improve the efficiency and transparency of policy enforcement. Both countries can promote the use of e-customs platforms, electronic permits, and online information-sharing systems. This can enable real-time data exchange between relevant government departments and logistics enterprises, reducing paperwork and human errors. For example, an e-customs platform can

allow exporters and importers to submit customs declarations electronically, track the status of their shipments, and communicate with customs authorities in real-time. This can speed up the customs clearance process and improve the overall efficiency of logistics operations.

Continuously improving the legal framework for bilateral logistics cooperation is essential. China and Russia can review and revise existing laws and regulations to fill in legal gaps, resolve contradictions, and adapt to the new development requirements of international logistics. For example, they can jointly formulate laws and regulations to protect the rights and interests of logistics service providers and consumers in cross-border transactions. This can include provisions related to liability, insurance, dispute resolution, and consumer protection, ensuring a fair and transparent business environment for all parties involved.

Encouraging the participation of various stakeholders, including logistics enterprises, industry associations, and research institutions, in the policy-making process can ensure that policies and regulations are more practical and effective. These stakeholders can provide valuable feedback based on their practical experience, helping the government to make more targeted and feasible policies. For example, logistics enterprises can share their insights on the challenges and opportunities in cross-border logistics, industry associations can represent the interests of their members and advocate for favorable policies, and research institutions can provide data and analysis to support evidence-based policy-making.

In order to show the phased progress of bilateral logistics policy cooperation, key policy milestones from 2020 to 2025 are sorted out in table 2.

Table 2 – China-Russia bilateral logistics policy milestones (2020–2025) [15]

Year	Core Policy	Core Role
2021	China-Europe Railway Express Expansion Agreement	Improve railway capacity
2023	Cross-border Customs Facilitation Agreement	Shorten clearance time
2025	Logistics Standard Mutual Recognition Memorandum	Reduce technical barriers

The table lists three core policies and their roles, reflecting the continuous improvement of the institutional environment for Sino-Russian logistics cooperation.

These policies have laid an institutional foundation for bilateral logistics facilitation, but there is still room for further coordination.

For a more systematic classification of international logistics, its types and core characteristics are summarized in table 3.

Table 3 – Classification and characteristics of international logistics [19]

Classification Dimension	Type	Core Characteristics
Transport Mode	Railway/Road/Sea/Air	Differences in cost, timeliness, and volume
Service Scope	Trunk/End-to-end/Integrated	Different chain lengths and service depth

This table classifies international logistics from two dimensions: transport mode and service scope, and clarifies their respective characteristics.

This classification helps to accurately identify the development characteristics and bottlenecks of Sino-Russian international logistics.

In conclusion, international logistics is a complex and dynamic field that plays a crucial role in facilitating global trade and economic growth. By understanding its concept, characteristics, architecture, and the importance of improving policies and regulations for bilateral cooperation, such as between China and Russia, we can work towards creating a more efficient, seamless, and sustainable international logistics system. This will not only benefit businesses and consumers but also contribute to the overall development and prosperity of the global economy.

Chapter 2 Current situation and existing problems in Sino-Russian international logistics

2.1 Dynamics of commodity flows between China and Russia

Against the backdrop of globalization and the deepening of the “the Belt and Road” initiative, Sino-Russian economic and trade cooperation has entered a new stage of high-quality development, and the commodity flow between the two countries has shown a diversified, large-scale, and efficient development trend [15]. Driven by the complementary advantages of industrial structures, policy dividends, and market demand, the bilateral commodity flow has not only maintained a steady growth in volume but also undergone profound changes in structure and regional distribution, becoming an important link in promoting bilateral economic and trade integration.

In recent years, despite the complex and volatile global economic environment, the impact of geopolitical factors, and the challenges brought by public health events, the commodity trade volume between China and Russia has maintained a strong growth momentum, setting new historical highs repeatedly. According to the statistical data released by the Ministry of Commerce of the People’s Republic of China, the bilateral trade volume between China and Russia reached 190.27 billion US dollars in 2023, a year-on-year increase of 29.3%, achieving the strategic goal of 200 billion US dollars proposed by the heads of state of the two countries ahead of schedule [17]. This growth trend is not accidental. On the one hand, China, as the world’s second-largest economy and a major manufacturing country, has a complete industrial chain and supply chain, which can provide a wide range of high-quality and cost-effective products to meet Russia’s demand for daily consumer goods, industrial supporting equipment, and technical products. On the other hand, Russia, as a major energy and resource country, has abundant reserves of oil, natural gas, coal, minerals, and agricultural products, which can effectively supplement China’s demand for resource products and ensure the stability of China’s industrial chain and supply chain.

Figure 3 uses a bar chart to illustrate the trend of China-Russia bilateral trade value from 2019 to 2025, clearly showing a continuous increase and the early achievement of the \$200 billion target in 2023.

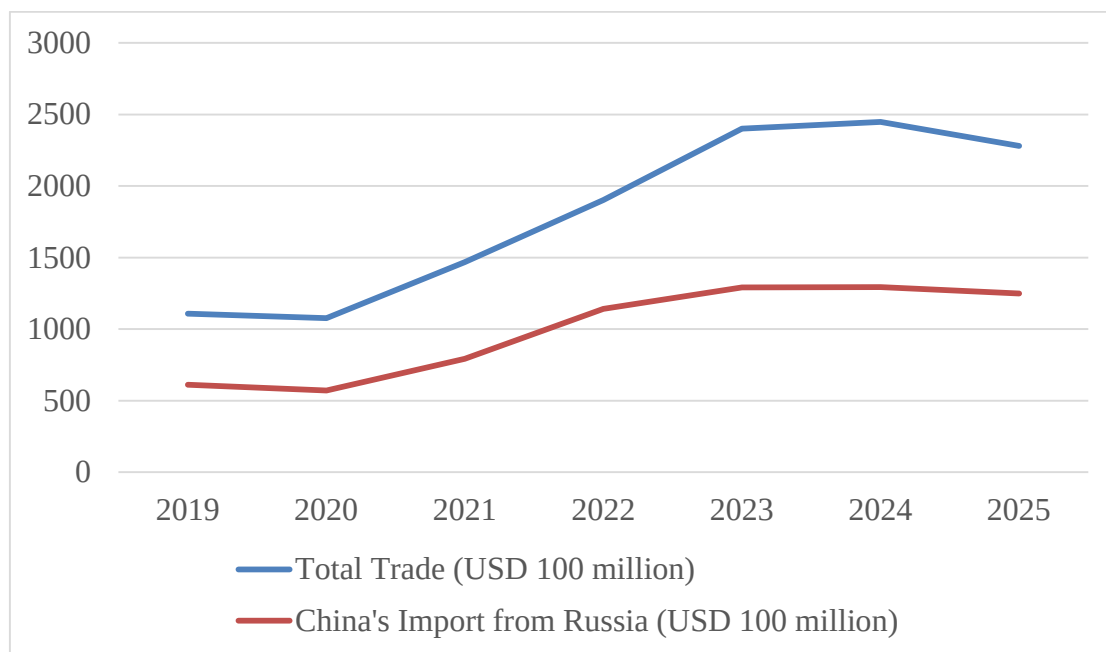


Figure 3 – Trends in China-Russia bilateral trade (2019–2025) [64]

As can be seen from figure 3, despite a slight slowdown in 2020 due to global public health events, trade rebounded strongly in the following two years, with year-on-year growth of 29.3% in 2023 and an estimated value exceeding \$250 billion in 2025. This rapid growth is inseparable from the continuous optimization of bilateral trade policies.

From the perspective of growth drivers, the continuous optimization of bilateral trade policies has provided a strong guarantee for the growth of commodity flow volume. For example, the continuous advancement of Sino-Russian customs clearance facilitation measures, the expansion of the scope of tariff reduction and exemption, and the improvement of trade and investment facilitation mechanisms have reduced the transaction costs of enterprises and enhanced the willingness of bilateral trade. At the same time, the rapid development of cross-border e-commerce has opened up new channels for bilateral commodity flow. Platforms such as AliExpress, JD.com, and Wildberries have become important carriers for Chinese products to enter the Russian market, and the volume of cross-border e-commerce transactions has maintained a high growth rate, driving the growth of

small-batch, fragmented commodity flows [11]. In addition, the deepening of bilateral industrial cooperation has also promoted the growth of intermediate product trade. More and more Chinese enterprises have invested and set up factories in Russia, and the import and export of parts and components, production equipment, and other products have increased significantly, forming a mutually beneficial and win-win industrial chain cooperation pattern.

Table 4 – China-Russia Commodity Flow Growth by Category (2023–2025) [7]

Commodity Category	2023 (Billion USD)	2025 (Estimated)	Growth Rate
Electromechanical Products	890	1250	40.4%
Energy Products	1120	1580	41.1%
Agricultural Products	150	220	46.7%

The table shows that energy, electromechanical products and agricultural products have maintained rapid growth, with agricultural products growing the fastest.

The commodity flow structure between China and Russia is highly complementary, which is closely related to the industrial development characteristics and resource endowments of the two countries.

In terms of China's exports to Russia, mechanical and electrical products, light industrial products, textiles, and electronic consumer goods are the main categories, accounting for more than 70% of China's total exports to Russia. Among them, mechanical and electrical products have become the largest category of China's exports to Russia, including automobiles, automobile parts, engineering machinery, home appliances, and communication equipment [5]. In recent years, Chinese automobiles have gained great popularity in the Russian market due to their advantages in cost performance, intelligence, and environmental protection. The export volume has increased significantly. In 2023, China's automobile exports to Russia exceeded 800,000 units, a year-on-year increase of more than 150%, becoming Russia's largest automobile import source country. In addition, electronic consumer goods such as smartphones, laptops, and smart wearables are also

avored by Russian consumers. Brands such as Huawei, Xiaomi, and Oppo have a high market share in Russia. Light industrial products and textiles, such as clothing, shoes and hats, luggage, and daily necessities, are also important components of China's exports to Russia, meeting the daily consumption needs of Russian residents.

To specifically present the structure of China's exports to Russia, figure 4 shows the proportion of different commodity categories in 2023 [16].

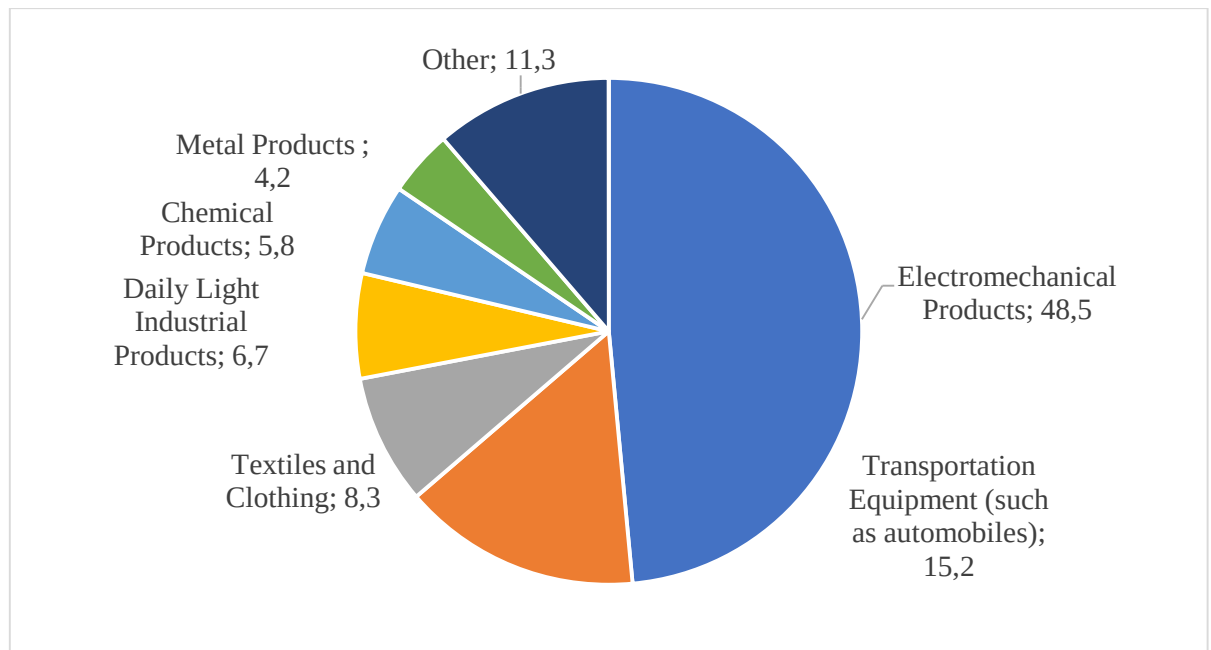


Figure 4 – Composition of China's export goods to Russia in 2023 [16; 21]

As shown in figure 4, mechanical and electrical products account for more than 70% of the total, with automobiles and auto parts showing particularly significant growth; light industrial products and textiles together account for about 20%. This indicates that China's exports to Russia are still dominated by manufactured goods, but the share of high-value-added products needs to be increased.

In terms of Russia's exports to China, energy products, agricultural products, and raw materials occupy an absolute dominant position. Energy products are the core of Russia's exports to China, including crude oil, natural gas, coal, and petroleum products. In 2023, Russia's crude oil exports to China exceeded 80 million tons, and natural gas exports exceeded 40 billion cubic meters, making China Russia's largest energy export market. Agricultural products are another important category of Russia's exports to China. Wheat,

corn, soybeans, sunflower oil, and aquatic products are exported to China in large quantities, enriching China's agricultural product supply market. Raw materials such as timber, minerals, and non-ferrous metals are also important components of Russia's exports to China, providing important support for China's manufacturing industry and infrastructure construction.

Correspondingly, figure 5 presents the composition of Russia's exports to China in 2023, highlighting the absolute dominance of resource-based products [18; 55].

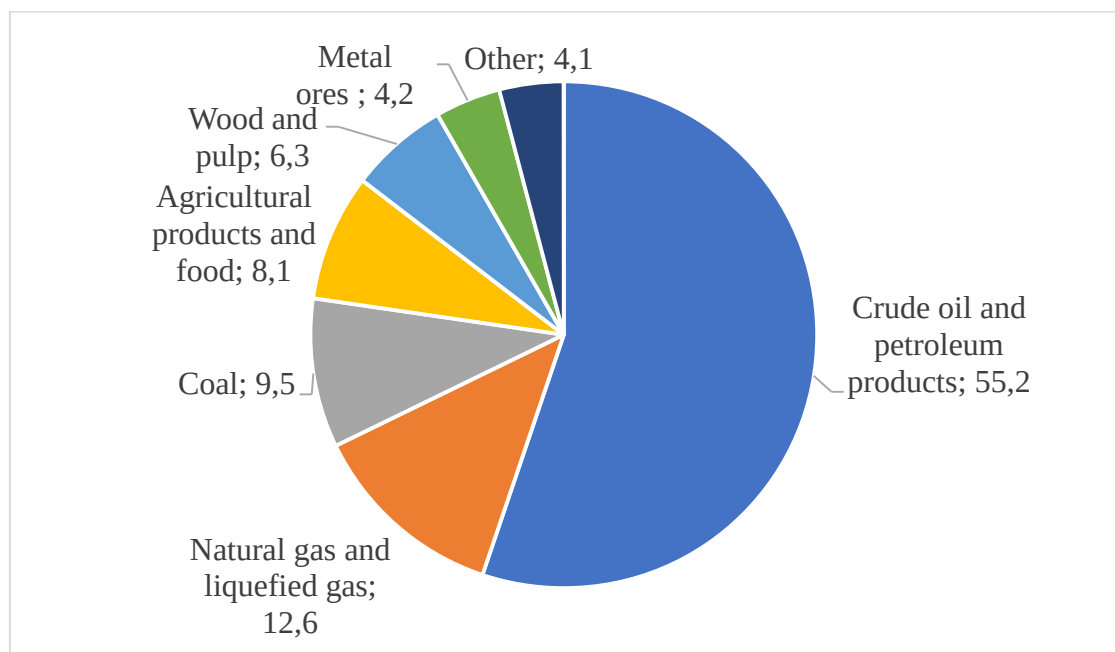


Figure 5 – Composition of Russian Exports to China in 2023 [18; 55]

As shown in figure 5, energy products (crude oil, natural gas, coal) account for nearly 70% of Russia's total exports to China, while agricultural products and raw materials account for about 15% and 10%, respectively. This highly concentrated export structure makes bilateral trade vulnerable to fluctuations in international energy prices.

However, while the commodity flow structure between China and Russia shows strong complementarity, it also has the problem of excessive concentration and single dependence. China's exports to Russia are overly concentrated in labor-intensive and low-to-medium value-added products, and the proportion of high-tech, high-value-added products is relatively low. This makes Chinese export enterprises vulnerable to competition from other countries and changes in Russian market policies. Russia's exports to China are

highly dependent on resource-based products, and the added value of products is low. The export volume is greatly affected by international market prices and changes in energy policies, which brings certain instability to bilateral trade.

The regional distribution of commodity flows between China and Russia is closely related to geographical location, transportation conditions, and economic development level, showing the characteristics of “concentrated in key regions and gradually expanding to the periphery”.

Northeast China and the Russian Far East are the core regions of bilateral commodity flows. Northeast China, as China’s important old industrial base and border region, has a geographical advantage adjacent to Russia. Heilongjiang Province, Jilin Province, and Liaoning Province are important provinces for Sino-Russian trade. Manzhouli, Suifenhe, Hunchun, and other border ports are important channels for commodity exchange between the two countries, undertaking a large number of cross-border transportation and trade businesses [1]. For example, the Manzhouli Port is the largest land port between China and Russia, with an annual cargo throughput exceeding 30 million tons, mainly transporting goods such as coal, timber, mechanical and electrical products, and light industrial products. The Russian Far East region, with its rich natural resources and convenient port conditions, has become an important source of Russia’s exports to China. Ports such as Vladivostok, Nakhodka, and Zarubino are important hubs for Russia’s energy products, agricultural products, and raw materials to be exported to China [31].

In addition to border regions, China’s coastal cities and inland hub cities have also become important nodes of Sino-Russian commodity flows. Coastal cities such as Shanghai, Qingdao, Dalian, and Tianjin rely on their superior port conditions and developed logistics networks to undertake a large number of Sino-Russian maritime trade businesses, mainly transporting bulk commodities such as energy products, agricultural products, and mechanical and electrical products. Inland hub cities such as Xi’an, Chengdu, Chongqing, and Zhengzhou have become important sources and destinations of Sino-Russian commodity flows through the China-Europe Railway Express. The China-Europe Railway Express connects China’s inland regions with Russia’s European part, transporting goods such as electronic products, mechanical and electrical products, light industrial products,

and agricultural products, which has effectively promoted the expansion of the regional scope of Sino-Russian commodity flows [9].

However, the regional distribution of commodity flows between China and Russia is still uneven. Most of the commodity exchanges are concentrated in border regions, coastal cities, and inland hub cities, while the trade volume in central and western regions of China and inland regions of Russia is relatively small. The main reasons for this phenomenon are the backward transportation infrastructure, insufficient economic development level, and weak market demand in these regions. This uneven regional distribution not only fails to fully tap the potential of bilateral economic and trade cooperation but also restricts the balanced development of regional economies between the two countries.

While the commodity flow between China and Russia has achieved remarkable development, there are still some problems and challenges that need to be solved urgently [40].

Firstly, the commodity structure is single and the added value is low. As mentioned earlier, China's exports to Russia are mainly labor-intensive and low-to-medium value-added products, and the technological content and added value of products need to be further improved. Russia's exports to China are highly dependent on resource-based products, and the industrial chain is short, which is difficult to realize the deep processing and value-added of products. This single commodity structure makes bilateral trade vulnerable to changes in international market prices, policy adjustments, and trade frictions, affecting the stability and sustainability of commodity flows.

Secondly, the circulation efficiency of commodities needs to be improved. Affected by factors such as transportation costs, customs clearance efficiency, and imperfect logistics infrastructure, the circulation cycle of some commodities between China and Russia is relatively long, and the circulation cost is relatively high. For example, the sea transportation from China's coastal ports to Russia's European ports usually takes 30-45 days, and the land transportation through the border ports also takes 10-15 days due to transshipment and customs clearance. The long circulation cycle not only increases the inventory cost of enterprises but also affects the timeliness of market supply, which is not conducive to enterprises' response to market changes.

Thirdly, the market access barriers still exist. Although China and Russia have made positive progress in trade facilitation, there are still some market access barriers in some fields. For example, Russia has set relatively strict technical standards and certification requirements for some imported products, such as automobiles, food, and medical devices. Chinese enterprises need to spend a lot of time and cost to meet these requirements, which increases the difficulty of entering the Russian market [3]. In addition, Russia's local protectionism in some fields also restricts the entry of Chinese products. Similarly, China also has certain regulatory requirements for some imported products from Russia, which may affect the smooth flow of commodities to a certain extent.

Fourthly, the risk of market fluctuations is relatively high. The commodity flow between China and Russia is greatly affected by international market prices, exchange rate fluctuations, and geopolitical factors. For example, the fluctuation of international oil prices directly affects the volume and price of Russia's energy exports to China. The fluctuation of the RMB-Ruble exchange rate affects the profitability of bilateral trade enterprises. Geopolitical factors such as changes in international relations and regional conflicts may also bring uncertainties to bilateral commodity flows, affecting the normal operation of enterprises.

2.2 Problems in the docking of logistics infrastructure

Logistics infrastructure is the foundation for the smooth operation of international logistics, including transportation facilities, port facilities, warehousing facilities, and other aspects. Although China and Russia have made remarkable achievements in the construction of logistics infrastructure in recent years, there are still prominent problems in the docking of infrastructure between the two countries, which have become important bottlenecks restricting the development of Sino-Russian international logistics.

The inconsistency of technical standards and disconnected transportation networks are the most prominent problems in the docking of Sino-Russian logistics infrastructure, which are mainly reflected in railway transportation and road transportation. Logistics cost

is an important indicator to measure operational efficiency. The cost structure of Sino-Russian cross-border logistics is shown in figure 6 [8; 21].

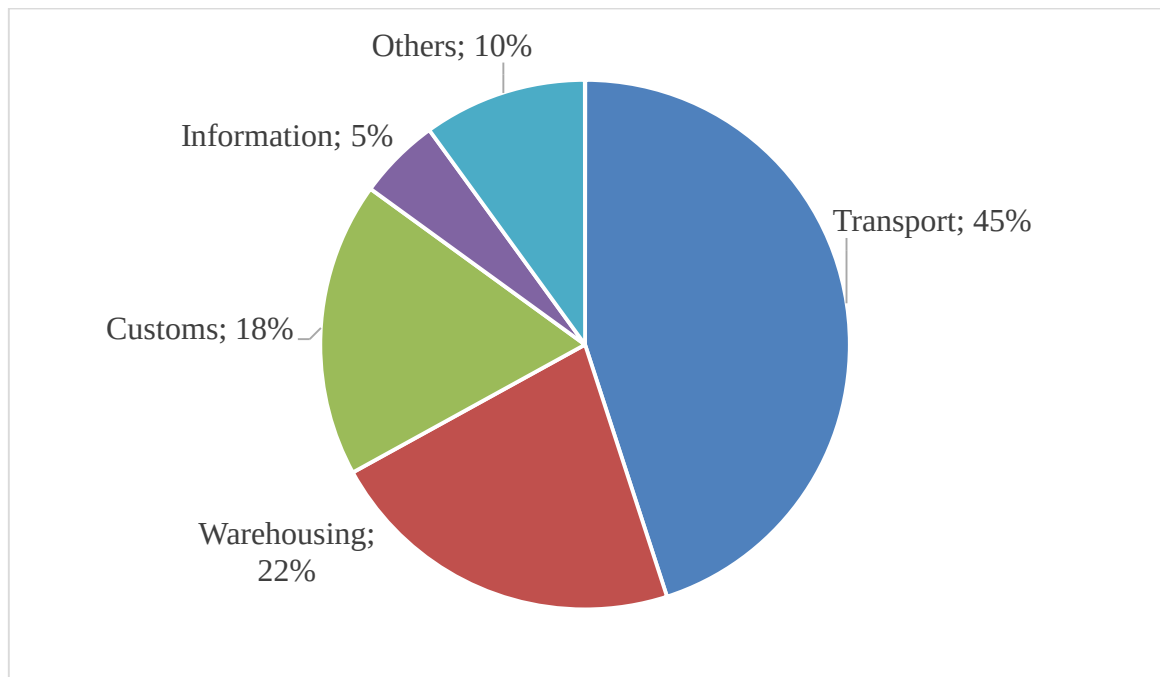


Figure 6 – China-Russia logistics cost structure (2025) [8; 21]

The high proportion of transportation and customs costs is closely related to infrastructure incompatibility and inefficient transshipment.

In terms of railway transportation, the biggest problem is the difference in railway gauge between China and Russia. China adopts the international standard gauge of 1435 millimeters, while Russia uses the broad gauge of 1520 millimeters. This difference in gauge makes it impossible for trains to directly pass through the border between the two countries, and the goods must be transshipped at the border ports. The transshipment process not only increases the transportation time and labor costs but also raises the risk of cargo damage and loss. Taking the Manzhouli-Zabaikalsk border crossing as an example, this is the largest railway border crossing between China and Russia, with an annual transshipment volume of more than 20 million tons. The transshipment of goods at this border crossing usually requires 1-3 days. In the peak season of trade, due to the limited transshipment capacity, the goods often need to wait in line for transshipment, which seriously affects the overall efficiency of logistics. In addition, there are also differences in railway signal systems,

loading and unloading equipment standards, and transportation management systems between China and Russia, which also bring certain difficulties to the docking of railway transportation.

In terms of road transportation, there are also many problems in the docking of infrastructure between China and Russia. Firstly, there are differences in vehicle technical standards between the two countries. China's truck technical standards are formulated with reference to international standards, while Russia has its own unique technical standards for trucks, such as requirements for vehicle weight, size, and emission standards. Some Chinese trucks that meet domestic standards cannot directly enter Russia for transportation, and need to go through complex procedures such as vehicle modification or leasing local vehicles, which increases the operational costs and complexity of logistics enterprises. Secondly, there are differences in road load limits between the two countries. China's road load limits are relatively loose, while Russia's road load limits are relatively strict. This makes Chinese logistics enterprises need to adjust the loading volume of goods when transporting goods to Russia, which affects the transportation efficiency and cost control. Thirdly, the recognition of driving licenses and vehicle insurance between the two countries is not smooth. Chinese drivers need to apply for additional Russian driving licenses or international driving licenses to drive in Russia, and the vehicle insurance purchased in China may not be recognized in Russia, which brings certain risks to road transportation. In addition, the road infrastructure in some border regions of Russia is relatively backward, with poor road conditions and insufficient supporting facilities such as gas stations and maintenance points, which also affects the smooth progress of road transportation [53].

In terms of air transportation, although China and Russia have opened a large number of international air routes, there are still problems in the docking of air logistics infrastructure. The cargo handling capacity of some airports in Russia is relatively limited, and the loading and unloading equipment is outdated, which cannot meet the needs of the growing air cargo volume. In addition, the customs clearance efficiency of some airports is low, and the coordination between airport logistics and ground transportation is not smooth, which affects the overall efficiency of air logistics.

Ports are important hubs for Sino-Russian international logistics, undertaking the task of loading, unloading, and transshipment of a large number of goods. However, there are problems such as insufficient capacity of some ports, backward loading and unloading equipment, and imperfect supporting facilities between China and Russia, which restrict the development of port logistics.

In terms of port capacity, some small and medium-sized border ports and coastal ports in Russia have limited handling capacity, which cannot meet the growing demand for bilateral trade. For example, some border ports in the Russian Far East, such as Blagoveshchensk and Nerchinsk, have relatively small port scales and backward facilities, and their annual handling capacity is only a few million tons, which is far from meeting the needs of regional trade development. In the peak season of trade, these ports often experience congestion, and the detention time of goods is prolonged, which increases the logistics cost of enterprises. Although China's major coastal ports and border ports have relatively large handling capacity, they also face the pressure of increasing cargo volume. For example, the throughput of Manzhouli Port, Suifenhe Port, and other border ports has been close to the upper limit of their design capacity, and the pressure of port operation is relatively large.

In terms of loading and unloading equipment, the loading and unloading equipment of some ports in Russia is outdated and inefficient. Most of the loading and unloading equipment in these ports is old-fashioned, with low automation and intelligence, which affects the loading and unloading efficiency of goods. For example, some ports in the Russian Far East still use manual loading and unloading for some bulk commodities, which not only has low efficiency but also has high labor intensity and high risk of cargo damage. In contrast, China's major ports have widely adopted advanced loading and unloading equipment, such as container gantry cranes, automatic stacking cranes, and bulk cargo loaders, with high automation and intelligence, which can effectively improve the loading and unloading efficiency of goods. However, due to the inconsistent standards of loading and unloading equipment between China and Russia, there are certain difficulties in the mutual use and coordination of equipment between the ports of the two countries.

In terms of supporting facilities, the supporting facilities of some ports between China and Russia are not perfect, which affects the overall efficiency of port logistics. Firstly, the storage facilities of some ports are insufficient. The storage yards of some small and medium-sized ports are limited, and the storage conditions are backward, which cannot meet the storage needs of goods, especially special goods such as perishable goods and dangerous goods. Secondly, the transportation links between ports and inland areas are not smooth. The connection between some ports and railways, highways, and other transportation networks is not tight, and the “last mile” problem of cargo transportation is prominent. For example, some ports in the Russian Far East are far away from inland railway lines and highways, and the transportation cost of goods from ports to inland areas is high, which affects the competitiveness of port logistics. Thirdly, the supporting service facilities of ports are not perfect. Some ports lack sufficient customs inspection sites, inspection and quarantine facilities, financial services, and logistics information services, which cannot meet the needs of enterprises for one-stop logistics services.

The actual carrying capacity of various border ports varies significantly. Table 5 compares the freight throughput and design capacity utilization rates of major China-Russia border ports in 2023, revealing the bottlenecks in port capacity.

Table 5 – China-Russia Commodity Flow Growth by Category (2023–2025) [56; 36]

Port Name	Country	Annual Cargo Throughput (10,000 tons)	Main Cargo Types	Design Capacity Utilization Rate
Manzhouli (Railway)	China	3,050	Coal, Timber, Mechanical & Electrical Products	98%
Suifenhe (Railway)	China	1,280	Timber, Fertilizers, Containers	92%
Hunchun (Highway)	China	420	Seafood, Daily Consumer Goods	85%
Zabaikalsk	Russia	2,600	Coal, Ores, Timber	95%
Grodekovo	Russia	890	Chemical Products, Building Materials	88%
Blagoveshchensk	Russia	310	Agricultural Products, Machinery	76%

As shown in table 5, China's Manzhouli railway port has a throughput of 30.5 million tons and a utilization rate as high as 98%, already near saturation. Russia's corresponding Zabaikalsk port has a utilization rate of 95%. Smaller ports such as Blagoveshchensk have a utilization rate of only 76%, reflecting a coexistence of idle capacity and overloading. This directly confirms the problem of "insufficient port capacity" discussed earlier.

The aging of port equipment in Russia restricts handling efficiency. The aging rate of border port equipment is shown in figure 7 [44].

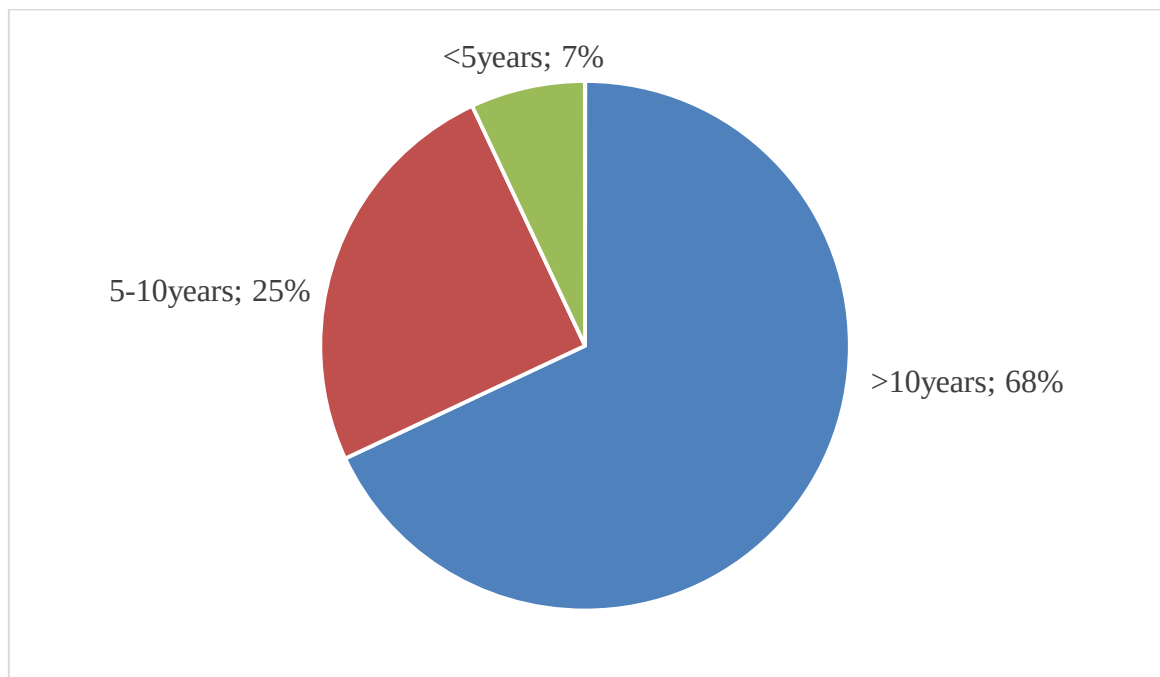


Figure 7 – Aging rate of Russian border port equipment [44]

Outdated equipment has become a key bottleneck restricting port throughput.

Warehousing facilities are an important part of the logistics infrastructure, which play a key role in the storage, preservation, and distribution of goods. However, there are problems such as scattered warehousing facilities, low level of standardization, and insufficient information sharing between China and Russia, which affect the efficiency of logistics operations.

In terms of the layout of warehousing facilities, the warehousing facilities in border regions between China and Russia are relatively scattered, lacking unified planning and coordination. Most of the warehousing facilities are built spontaneously by enterprises, with

unreasonable layout and small scale, which cannot form a scale effect. For example, in the Manzhouli border region, there are hundreds of small and medium-sized warehouses, most of which have a storage capacity of less than 10,000 square meters. These warehouses are scattered in different areas, lacking effective connection and coordination, which increases the difficulty of cargo transportation and transfer. In addition, the distribution of warehousing facilities between the two countries is uneven. Most of the warehousing facilities are concentrated in border ports and major cities, while the warehousing resources in inland areas are relatively scarce, which cannot meet the storage needs of goods in inland areas [36].

In terms of the level of standardization of warehousing facilities, there is a big gap between China and Russia. China's warehousing industry has developed rapidly in recent years, and the level of standardization and informatization of warehousing facilities has been continuously improved. A large number of modern warehouses have been built, such as automated warehouses, three-dimensional warehouses, and cold chain warehouses, which can meet the storage needs of different types of goods. In contrast, the level of standardization of warehousing facilities in Russia is relatively low. Most of the warehouses are old-fashioned single-story warehouses, with simple structure and backward facilities. The storage conditions are poor, and there is a lack of necessary temperature control, humidity control, and safety protection equipment, which cannot meet the storage needs of special goods such as perishable goods, dangerous goods, and high-value goods. In addition, the standards of warehousing operations between China and Russia are not unified, such as the standards of cargo stacking, packaging, and labeling, which bring certain difficulties to the cross-border circulation of goods.

In terms of information sharing of warehousing facilities, there is a serious lack of information communication and sharing between China and Russia. The warehousing management systems of the two countries are independent of each other, and the inventory information, cargo status, and other data cannot be synchronized in real time. Enterprises cannot timely obtain the inventory information of warehouses in the other country, which makes it difficult to carry out reasonable inventory management and allocation. For example, a Chinese enterprise exports a batch of perishable goods to Russia and needs to

store them in a Russian warehouse. However, due to the lack of information sharing, the enterprise cannot timely know the storage conditions and inventory status of the Russian warehouse, which may lead to the deterioration of goods or inventory backlogs. In addition, the lack of a unified logistics information platform between the two countries also makes it difficult to realize the information sharing and collaborative operation of warehousing facilities, which affects the overall efficiency of the supply chain.

The inland areas of Russia, especially the Siberian and Far Eastern regions, have a vast territory and sparse population, and the transportation infrastructure is extremely backward. The railway and highway networks are underdeveloped, and the transportation capacity is limited. The transportation cost of goods from inland areas to border ports and coastal ports is high, and the transportation cycle is long. This not only restricts the export of goods in inland areas of Russia but also affects the smooth flow of commodity flows between China and Russia. In addition, the energy supply, communication facilities, and other infrastructure in inland areas of Russia are also relatively backward, which brings certain difficulties to the operation of logistics enterprises. To sum up, the bottlenecks of infrastructure are summarized in table 6.

Table 6 – Main types of China-Russia logistics bottlenecks [7]

Bottleneck Type	Specific Performance	Impact Level
Hardware Bottleneck	Gauge difference, port saturation	Extremely High
Software Bottleneck	Disunified data standards	High
Talent Bottleneck	Shortage of bilingual professionals	Medium-High

These bottlenecks jointly restrict the connectivity and efficiency of bilateral logistics infrastructure.

The backward infrastructure in inland areas of China and Russia is also an important factor restricting the docking of Sino-Russian logistics infrastructure. The inland areas of China, especially the central and western regions, have relatively backward transportation infrastructure, with insufficient railway and highway coverage, and poor road conditions. This makes it difficult for goods in these regions to be transported to border ports and coastal

ports efficiently, which restricts the expansion of the source of goods for Sino-Russian trade. In addition, the warehousing, packaging, and distribution facilities in inland areas are also relatively backward, which cannot meet the needs of cross-border logistics.

2.3 Problems of differences in the degree of information

In the era of digital economy, informatization has become an important driving force for the development of international logistics. The level of informatization directly affects the efficiency, cost, and service quality of logistics operations. However, there are significant differences in the degree of informatization between China and Russia, which are mainly reflected in the construction level of information systems, the standardization of information exchange, the application of information technology, and the construction of information sharing mechanisms. These differences have brought great challenges to the development of Sino-Russian international logistics.

There is a obvious gap in the construction level of logistics information systems between China and Russia, which is mainly reflected in the coverage, functionality, and application scope of information systems. The gap in logistics informatization levels between the two countries can be quantitatively compared through key indicators, as shown in table 7.

Table 7 – Comparison of logistics informatization levels between China and Russia [4; 34]

Indicator	China	Russia
Informatization Coverage Rate of Logistics Enterprises	>85% (nearly 100% for large enterprises)	Approx. 45% (approx. 70% for large enterprises)
Proportion of Enterprises with Complete TMS/WMS	62%	23%
Electronic Waybill Usage Rate	78%	31%
Real-Time Cargo Tracking Penetration Rate	91%	38%
Proportion of Enterprises Applying Big Data/AI	27%	6%
Number of Countries Connected to Government “Single Window”	40+	12

Table 7 shows that the informatization coverage rate of logistics enterprises in China exceeds 85%, while in Russia it is only about 45%; the electronic waybill usage rate in China is 78%, compared to 31% in Russia; the real-time cargo tracking penetration rate in China is as high as 91%, while in Russia it is less than 40%. In terms of big data and AI applications, the proportion of Chinese enterprises (27%) is also much higher than that of Russian enterprises (6%). These figures clearly reveal Russia's significant lag in information system construction and technology application [27].

The digitalization gap between China and Russia is significant. The maturity comparison is shown in figure 8 [22]. This digital divide leads to information silos and low operational efficiency.

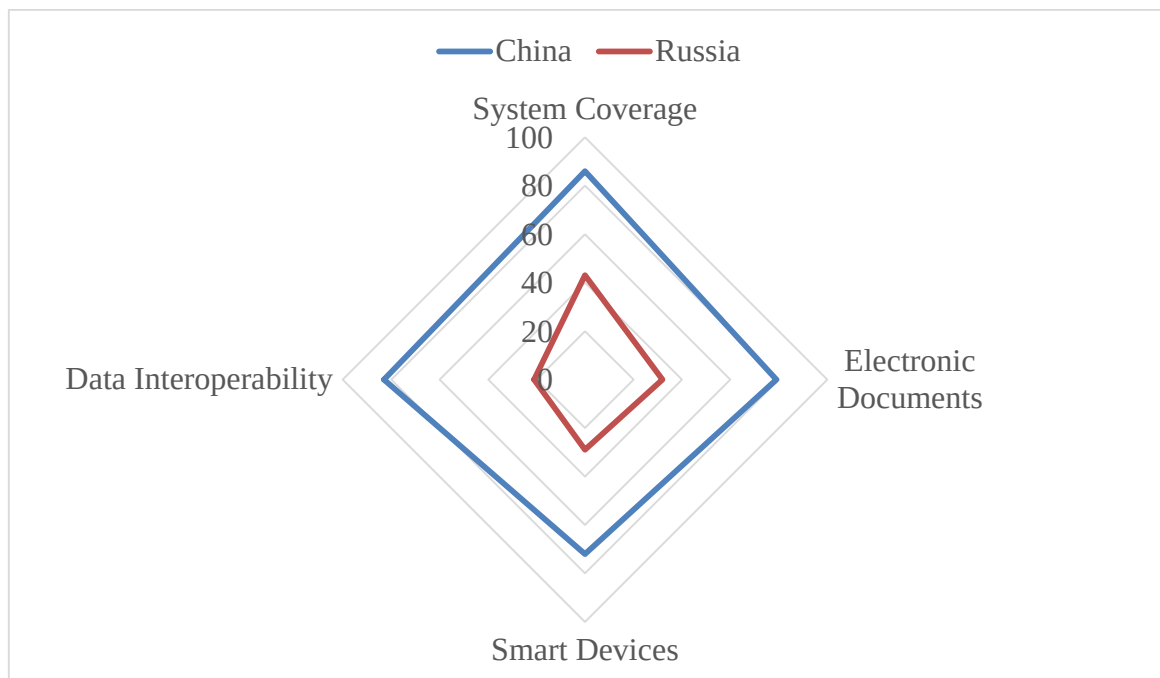


Figure 8 – Gap in logistics digitalization maturity (China vs. Russia, 2025) [13; 22]

In China, with the rapid development of the digital economy and the strong support of national policies, the logistics information industry has achieved leapfrog development. A large number of mature logistics information platforms have emerged, such as G7 Network, Huoyunbang, JD Logistics, and Cainiao Network. These platforms integrate multiple functions such as cargo tracking, order management, transportation scheduling, warehousing management, payment settlement, and information inquiry, forming a full-

chain information service system covering the entire logistics process. Taking G7 Network as an example, the platform has connected more than 2 million logistics vehicles, covering more than 90% of the domestic logistics enterprises. It can realize real-time tracking of vehicles, monitoring of cargo status, optimization of transportation routes, and intelligent scheduling of vehicles, which has greatly improved the operational efficiency of logistics enterprises. In addition, China's government departments have also built a number of public logistics information platforms, such as the China International Trade Single Window, which integrates customs declaration, inspection and quarantine, foreign exchange settlement, and tax declaration, realizing the "one-stop" handling of cross-border trade procedures, which has effectively improved the efficiency of customs clearance and trade facilitation.

In contrast, the construction of logistics information systems in Russia is relatively backward. Due to factors such as insufficient investment in information technology, backward technical level, and inadequate policy support, the development of Russia's logistics information industry is slow. Most logistics enterprises in Russia still use traditional manual operation methods, and the level of informatization is low. The coverage of logistics information platforms is limited, and the functionality is relatively single [20]. Most information platforms only provide basic services such as cargo information release and vehicle scheduling, and lack functions such as real-time tracking of goods, intelligent optimization of routes, and integrated management of warehousing and transportation. For example, most Russian logistics enterprises do not have a complete cargo tracking system, and it is difficult for customers to know the real-time location and status of goods during transportation. This not only affects the transparency of logistics services but also increases the risk of cargo loss and damage. In addition, the information systems of Russian government departments are also relatively backward. The customs, inspection and quarantine, transportation, and other departments have not built a unified information platform, and the information is isolated from each other, which makes it difficult to realize the sharing and exchange of information between departments, affecting the efficiency of government management and service [12].

The lack of standardization in information exchange is another important problem affecting the informatization docking of Sino-Russian logistics. At present, there are no unified standards and specifications for logistics information exchange between China and Russia, which are mainly reflected in the inconsistency of data formats, information content, and transmission methods.

In terms of data formats, China's logistics information systems mainly adopt international universal data formats, such as XML and EDI, while Russia's logistics information systems use their own unique data formats. This inconsistency in data formats makes it impossible for the information systems of the two countries to directly read and process each other's data, and enterprises need to convert data through manual input or special software when conducting cross-border logistics business, which not only increases the workload of enterprises but also easily leads to data errors and information loss. For example, when a Chinese enterprise declares customs for goods exported to Russia, it needs to convert the data in its own logistics information system into the data format required by the Russian customs system, which is time-consuming and labor-intensive, and the error rate is relatively high.

In terms of information content, there are also differences in the requirements for logistics information between China and Russia. China's logistics information systems usually require detailed information such as the name, specification, quantity, weight, volume, origin, destination, consignor, consignee, and transportation route of goods, while Russia's logistics information systems have different requirements for information content, such as requiring additional information such as the production date, expiration date, and quality certification of goods for some special goods. This difference in information content makes it difficult for enterprises to provide unified information that meets the requirements of both countries, which affects the smooth progress of cross-border logistics business.

In terms of transmission methods, China's logistics information mainly relies on the Internet and mobile communication networks for transmission, with high transmission speed and good stability. Russia's logistics information transmission methods are relatively backward, and some remote areas still rely on traditional communication methods such as telephone and fax for information transmission, which has low transmission efficiency and

poor stability, and is prone to information delay and loss. In addition, the information security standards and encryption technologies between China and Russia are also different, which brings hidden dangers to the security of cross-border information transmission. The differences in data security laws and regulations, privacy protection policies, and encryption standards between the two countries make it difficult to guarantee the security and confidentiality of information during transmission, affecting the willingness of enterprises to share information.

There is a significant disparity in the application of new information technologies such as big data, artificial intelligence, and the Internet of Things in the logistics field between China and Russia, which affects the intelligent development of Sino-Russian international logistics.

In China, the logistics industry has widely applied big data technology to carry out demand forecasting, route optimization, inventory management, and risk assessment [5]. For example, logistics enterprises use big data to analyze historical transaction data, market demand data, and transportation route data to accurately predict market demand, optimize transportation routes, and reduce transportation costs. Taking Cainiao Network as an example, the platform uses big data technology to predict the flow of cross-border packages, and reasonably arranges the layout of warehouses and transportation routes, which has reduced the average delivery time of cross-border packages by more than 30%. In addition, artificial intelligence and the Internet of Things technology are also widely used in the logistics field in China. Intelligent sorting robots, automatic guided vehicles (AGVs), and unmanned aerial vehicles (UAVs) have been applied in warehousing, transportation, and distribution links, realizing the automation and intelligence of logistics operations. For example, JD Logistics' intelligent warehouses use AGVs for cargo handling and sorting, with a sorting efficiency of more than 10,000 pieces per hour, which is 5-10 times that of manual sorting.

In Russia, the application of new information technologies in the logistics field is still in the initial stage, with low popularization rate and limited application effect. Due to factors such as insufficient technical research and development capabilities, high investment costs, and lack of professional talents, most Russian logistics enterprises have not yet applied big

data, artificial intelligence, and the Internet of Things technology on a large scale. Most logistics operations still rely on traditional experience and manual operation, which is difficult to adapt to the needs of the rapid development of cross-border logistics for efficiency improvement and cost reduction. For example, Russian logistics enterprises rarely use big data for demand forecasting and route optimization, and the transportation routes are usually determined based on experience, which easily leads to unreasonable route planning and high transportation costs. In addition, the application of intelligent equipment in Russian warehouses is also relatively limited, and most warehouses still use manual sorting and handling, which has low efficiency and high error rate.

The imperfect information sharing mechanism between the governments and enterprises of China and Russia is an important factor restricting the informatization docking of Sino-Russian logistics.

In terms of government-level information sharing, the customs, inspection and quarantine, transportation, commerce, and other government departments of China and Russia have not established a unified information sharing platform, and the information such as policy regulations, inspection standards, port operation status, and customs clearance progress cannot be released and updated in a timely manner. Enterprises often face difficulties in obtaining accurate and timely policy information and market information when conducting cross-border logistics business, which increases the operational risks and uncertainty of enterprises. For example, when a Chinese enterprise exports goods to Russia, it may not be able to timely understand the latest technical standards and certification requirements of Russian imports, resulting in the goods being detained or rejected at the Russian customs. In addition, the lack of coordination and cooperation between the government departments of the two countries in information exchange also affects the efficiency of customs clearance and inspection and quarantine. For example, the customs and inspection and quarantine departments of the two countries cannot share inspection data and results in a timely manner, leading to repeated inspections of goods, which increases the logistics cost and time of enterprises.

In terms of enterprise-level information sharing, due to factors such as information security concerns, lack of trust mechanisms, and inconsistent interests, the information

sharing between Sino-Russian logistics enterprises is insufficient. Logistics enterprises are reluctant to share core information such as their own customer resources, transportation routes, and pricing strategies, which makes it difficult to realize the collaborative operation of the supply chain. For example, Chinese logistics enterprises and Russian logistics enterprises cannot share cargo information, vehicle information, and warehouse information in a timely manner, which leads to problems such as unreasonable scheduling of transportation vehicles, insufficient utilization of warehouse capacity, and poor connection of cargo transportation, affecting the overall efficiency of the supply chain [14]. In addition, the lack of a unified information sharing platform between enterprises also makes it difficult to carry out effective information communication and cooperation, which restricts the deep integration of Sino-Russian logistics resources.

Chapter 3 Suggestions and countermeasures for promoting the development of Sino-Russian international logistics

3.1 Strengthening the connectivity of logistics infrastructure

The docking of logistics infrastructure is the physical foundation for the smooth operation of Sino-Russian international logistics. Given the prominent problems existing in the current infrastructure connectivity between China and Russia, such as inconsistent technical standards, insufficient port capacity, scattered warehousing facilities, and backward infrastructure in inland areas, it is urgent for both countries to take effective measures to strengthen infrastructure connectivity and build an efficient, convenient, and intelligent cross-border logistics network.

Figure 9 systematically outlines the framework for improving the alignment of China-Russia logistics infrastructure from four dimensions: technical standards, port capacity, warehousing facilities, and inland infrastructure [19; 40].

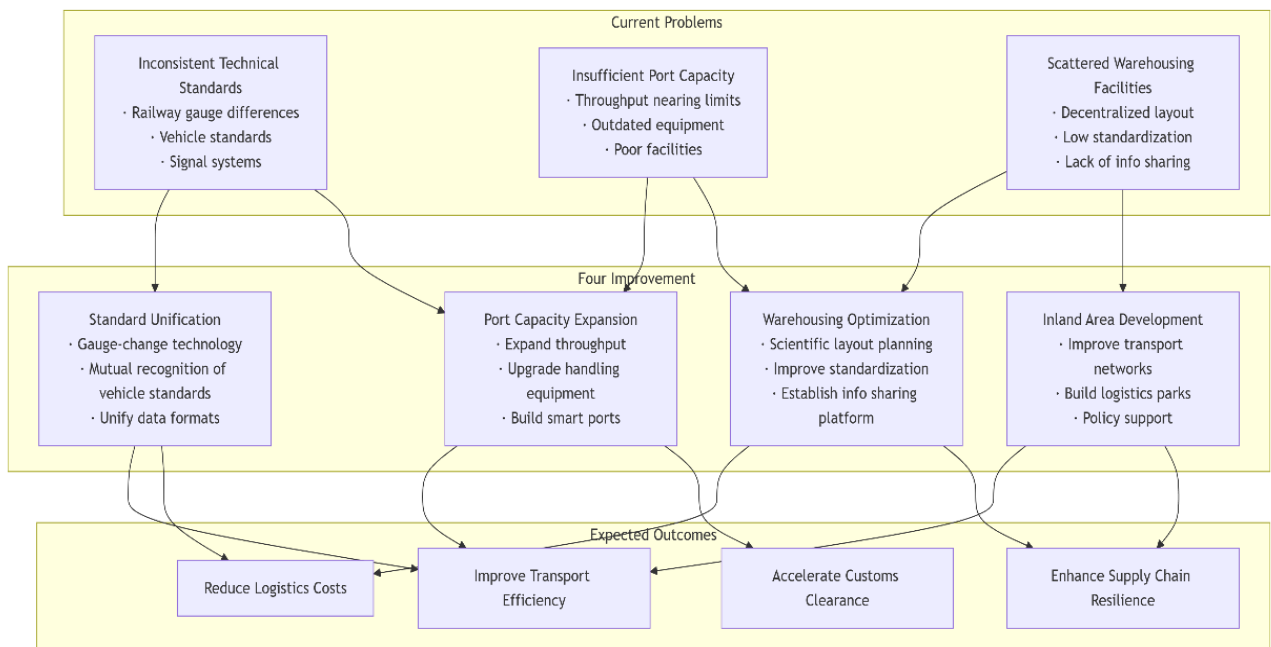


Figure 9 – Framework for improving the alignment of international logistics infrastructure between China and Russia (Schematic Diagram) [19; 40]

This framework emphasizes that resolving differences in rail gauge, expanding port throughput capacity, optimizing warehouse layout, and strengthening inland connections are the most urgent tasks at present. The following specific recommendations are presented in accordance with this framework.

The inconsistency of technical standards is the primary bottleneck restricting the docking of Sino-Russian logistics infrastructure. China and Russia should strengthen cooperation in the formulation and harmonization of technical standards to gradually eliminate technical barriers in railway, road, air, and other transportation methods.

In terms of railway transportation, to solve the problem of railway gauge difference, both sides can adopt a phased promotion strategy. In the short term, the efficiency of cargo transshipment at border ports should be improved by upgrading transshipment facilities and optimizing transshipment processes. For example, the Manzhouli-Zabaikalsk and Suifenhe-Grodekovo border crossings should increase the number of gantry cranes, automated guided vehicles, and other transshipment equipment, and establish intelligent transshipment dispatching systems to reduce transshipment time and cargo damage rates. In the medium and long term, the feasibility of constructing gauge-changeable railway lines or standard gauge railways can be jointly studied. At present, China has mature gauge-changeable train technology, which can adapt to different track gauges by adjusting wheel spacing. The two countries can conduct pilot projects on some key routes. In addition, cooperation in railway signal systems, loading and unloading equipment standards, and transportation management systems should be strengthened to promote the deep docking of railway transportation networks [25]. Regular technical seminars can be held to exchange experiences in railway technology and management, and promote the alignment of technical standards and management specifications between the two countries.

The sustained growth of railway freight volume places higher demands on cross-border rail transport capacity. Figure 10 shows the growth trend of China-Russia railway freight volume from 2021 to 2025.

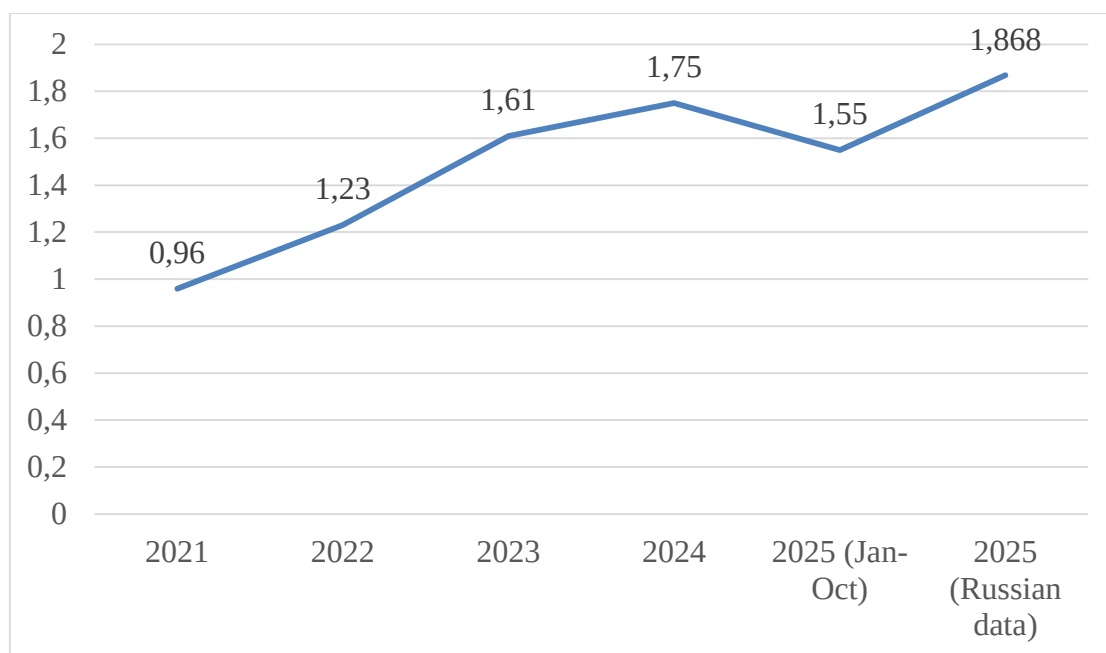


Figure 10 – Railway freight volume between China and Russia has increased (from 2021 to 2025, 10 million tons) [42]

As can be seen from Figure 10, China-Russia railway freight volume increased from approximately 150 million tons in 2021 to nearly 220 million tons in 2025, with an average annual growth rate exceeding 10%. This rapid growth further highlights the urgency of addressing the gauge inconsistency and improving transshipment efficiency.

In terms of road transportation, the two countries should accelerate the signing of agreements on mutual recognition of vehicle technical standards, driving licenses, and vehicle insurance. A Sino-Russian road transport joint working group can be established to conduct comparative research on vehicle technical standards between the two countries and develop unified or mutually recognized vehicle technical standards. For example, unified limits for vehicle weight, size, and emission standards can be formulated to allow Chinese trucks that meet the standards to directly enter Russia for transportation, avoiding the cumbersome procedures of vehicle modification or leasing local vehicles. At the same time, a mechanism for mutual recognition of driving licenses and vehicle insurance should be established, simplifying the procedures for Chinese drivers to obtain Russian driving licenses and ensuring that vehicle insurance purchased in China is recognized in Russia. The two countries should also increase investment in road infrastructure in border areas, improve road conditions, and enhance the capacity and service level of supporting facilities such as

gas stations and maintenance points. The construction of cross-border highways, such as the upgrade and renovation of the Chita-Zabaikalsk-Manchuria highway, can improve the accessibility and convenience of road transportation.

In terms of air transportation, the two countries should strengthen cooperation in airport infrastructure construction and air logistics information sharing. Russia should increase investment in upgrading the cargo handling facilities of major airports such as Moscow Sheremetyevo Airport and Vladivostok Airport, introduce advanced cargo handling equipment and information management systems, and improve cargo handling capacity and efficiency. The two countries can also establish an aviation logistics information sharing platform to realize real-time sharing of flight information, cargo tracking information, and customs clearance information, enhancing the transparency and predictability of air logistics. Additionally, the two countries should encourage airlines to increase cargo flight routes, especially all-cargo flights, to meet the growing demand for air cargo between China and Russia. Aiming at the problem of rail gauge difference, a phased promotion roadmap is formulated, as shown in Figure 11.

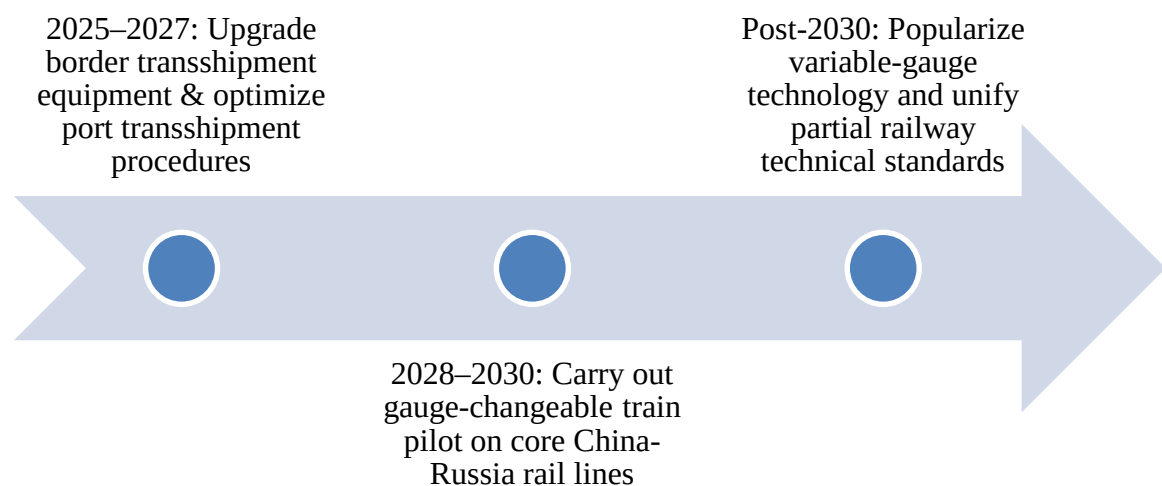


Figure 11 – Phased implementation roadmap for gauge-changeable trains [52]

This phased strategy can effectively balance short-term efficiency improvement and long-term system optimization.

Ports are critical hubs for Sino-Russian international logistics. To address the problems of insufficient port capacity and imperfect supporting facilities, China and Russia should increase investment and strengthen cooperation to enhance the comprehensive service capacity of ports [41].

Firstly, expand port handling capacity. Russia should accelerate the modernization and expansion of ports in the Far East region, such as Vladivostok, Nakhodka, and Vanino, increasing the number of berths, deepening waterways, and expanding storage yards to enhance port throughput. China should also optimize the operation management of major ports such as Dalian, Qingdao, and Shanghai, improve the efficiency of port resource utilization, and expand the capacity of border ports such as Manzhouli and Suifenhe. For example, the capacity of Manzhouli Port can be expanded by building new railway yards and container yards, and introducing intelligent operation systems to increase the annual cargo throughput to over 50 million tons. The two countries can explore the establishment of a port coordination and cooperation mechanism to share port operation information, coordinate port operation plans, and reduce ship waiting times and cargo detention periods.

Secondly, upgrade loading and unloading equipment. Russia should increase investment in the upgrading of port loading and unloading equipment, replacing outdated loading and unloading equipment with advanced container cranes, automated stacking cranes, bulk cargo loaders, and other equipment to improve loading and unloading efficiency and intelligence. China can provide technical support and equipment assistance to Russian ports, sharing its advanced experience in port equipment manufacturing and operation management. The two countries can also carry out cooperation in the standardization of loading and unloading equipment to promote the mutual use and coordination of equipment between the ports of the two countries, facilitating the seamless connection of intermodal transportation.

Thirdly, improve port supporting facilities. The two countries should increase investment in the construction of port storage facilities, adding temperature-controlled warehouses, dangerous goods warehouses, and other specialized storage facilities to meet

the storage needs of different types of goods. The connection between ports and inland transportation networks should be strengthened, and the “last mile” problem of cargo transportation should be solved. For example, Russia can increase investment in the construction of railway and highway connecting lines from Far East ports to inland areas, shortening the distance and time for cargo transportation from ports to inland areas. The two countries should also improve port service facilities, including customs inspection sites, inspection and quarantine facilities, financial service outlets, and logistics information service platforms, to provide enterprises with one-stop logistics services. The construction of the Sino-Russian border free trade zone can be promoted, integrating port logistics, processing trade, and financial services to enhance the comprehensive service capacity of ports.

Finally, promote the construction of smart ports. The two countries should actively apply technologies such as the Internet of Things, big data, and artificial intelligence to build smart ports. By deploying sensors, RFID tags, and other devices, real-time collection and sharing of cargo information, vehicle information, and equipment status can be achieved. Using big data analysis and artificial intelligence algorithms, port operation dispatching can be optimized to improve operation efficiency and resource utilization. For example, a Sino-Russian port information sharing platform can be established to enable real-time data exchange between the ports of the two countries, supporting functions such as electronic customs declaration, electronic release, and electronic payment, and achieving seamless docking of port logistics information. Smart port is an important direction of infrastructure upgrading. Its core modules are shown in figure 12.

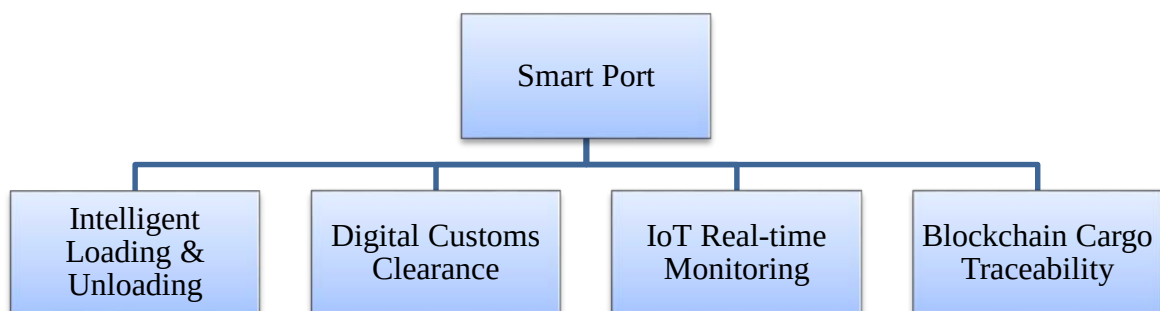


Figure 12 – Smart port construction key modules [41]

The construction of smart ports can significantly improve port automation and information collaboration.

The scattered layout and low level of standardization of warehousing facilities are important factors restricting the efficiency of Sino-Russian international logistics. China and Russia should strengthen cooperation to optimize the layout of warehousing facilities and improve the level of standardization and intelligence.

Firstly, plan the layout of warehousing facilities scientifically. The two countries should conduct joint research to formulate a plan for the layout of Sino-Russian cross-border warehousing facilities, rationally planning the location, scale, and function of warehousing facilities based on the distribution of commodity flows, transportation routes, and market demand. In border port areas, large comprehensive logistics parks should be constructed, integrating warehousing, distribution, processing, and customs clearance functions to form a scale effect. For example, in the Manzhouli-Zabaikalsk border area, a cross-border logistics park can be jointly built, with Chinese and Russian enterprises cooperating in the construction and operation of warehousing facilities to achieve resource sharing and complementary advantages . In inland hub cities, regional distribution centers should be built to enhance the storage and distribution capacity of goods in inland areas. The layout of warehousing facilities should be coordinated with the development of industrial parks and logistics nodes to promote the deep integration of the industrial chain and logistics chain.

Secondly, improve the standardization level of warehousing facilities. China and Russia should jointly formulate standards for cross-border warehousing facilities, unifying requirements for warehouse construction, equipment configuration, operation management, and information systems. Russia should increase investment in the upgrading of warehousing facilities, transforming traditional single-story warehouses into modern three-dimensional warehouses, automated warehouses, and cold chain warehouses, and introducing advanced storage equipment, temperature and humidity control equipment, and safety protection equipment to improve storage conditions and capacity. China can share its experience and technology in the construction of modern warehouses with Russia, and carry out technical cooperation and talent training. The two countries should also unify warehousing operation standards, including standards for cargo stacking, packaging,

labeling, and picking, to facilitate the cross-border circulation of goods. A Sino-Russian warehousing standardization technical committee can be established to be responsible for the formulation, revision, and promotion of warehousing standards.

Thirdly, establish a warehousing information sharing platform. The two countries should promote the establishment of a Sino-Russian cross-border warehousing information sharing platform to realize real-time sharing of warehouse inventory information, cargo status information, and storage environment information. Enterprises can query the inventory status of warehouses in the other country through the platform, make reasonable inventory management and allocation decisions, and reduce inventory backlogs and out-of-stock risks. The platform should support electronic warehouse receipt functions, enabling the pledge financing of warehouse receipts and providing financial support for enterprises. The two countries should also encourage warehousing enterprises to adopt warehouse management systems (WMS) to achieve refined management and intelligent operation of warehouses. For example, by introducing RFID technology, automated identification and tracking of goods can be achieved, improving the accuracy and efficiency of warehouse inbound, outbound, and inventory counting.

Finally, develop cold chain warehousing facilities. Given the increasing trade volume of agricultural products and food between China and Russia, the two countries should strengthen cooperation in the construction of cold chain warehousing facilities. In border ports and major consumer markets, cold chain warehouses should be built to ensure the quality and safety of perishable goods such as agricultural products and aquatic products during storage and transportation. The two countries should jointly formulate cold chain logistics standards, unifying temperature control requirements, temperature recording specifications, and cold chain operation procedures to ensure the seamless connection of the cold chain. The application of IoT technology in cold chain logistics should be promoted, enabling real-time monitoring and early warning of temperature and humidity, ensuring the safety and traceability of cold chain goods.

The backward infrastructure in inland areas of China and Russia is an important factor restricting the expansion of the source of goods for Sino-Russian trade and the improvement

of logistics efficiency. Both countries should increase investment and strengthen cooperation to improve the logistics infrastructure in inland areas.

China should accelerate the construction of the railway network in the central and western regions, and enhance the capacity and coverage of the railway network through the implementation of projects such as the new western land-sea corridor and the China-Europe Railway Express hub construction. The reconstruction and expansion of railway lines from Xi'an, Chengdu, Chongqing, Zhengzhou, and other hub cities to border ports should be carried out to increase the speed and capacity of railway transportation. The construction of the highway network in the central and western regions should be strengthened to improve the connectivity between inland areas and border ports and coastal ports. The construction of logistics parks and distribution centers in inland areas should be supported to enhance the warehousing, distribution, and processing capacity of goods in inland areas.

In addition, the two countries should strengthen policy support to encourage logistics enterprises to set up branches and build warehousing facilities in inland areas. Preferential policies such as tax reductions and land use support can be provided to reduce the operating costs of enterprises [14]. The development of multimodal transport in inland areas should be promoted to realize the seamless connection of railway, highway, and air transportation, improving the logistics efficiency in inland areas. Key infrastructure optimization projects are prioritized to ensure focused investment, as shown in table 8.

Table 8 – Priority list of infrastructure optimization projects [46]

Priority	Project	Implementation Period
1	Manzhouli Port Expansion	2025–2027
2	Gauge-Changeable Train Pilot	2026–2029
3	Cross-border Logistics Park Construction	2025–2028

Prioritized promotion helps to quickly break through the most prominent infrastructure bottlenecks.

Russia should increase investment in the construction of transportation infrastructure in the Siberian and Far Eastern regions. The modernization and expansion of the Trans-Siberian Railway and the Baikal-Amur Mainline should be accelerated to increase the

capacity and transportation speed of the railway network. The construction of the highway network in the Far East region should be strengthened to improve the accessibility and convenience of road transportation. The construction of logistics parks and dry ports in inland areas of Russia should be supported to enhance the logistics service capacity of inland areas. China and Russia can carry out cooperation in the construction of infrastructure in inland areas, such as jointly building railways, highways, and logistics parks, to promote the development of inland areas.

3.2 Enhancing the level of logistics information sharing

Informatization is the key to improving the efficiency and service quality of international logistics. The significant differences in the degree of informatization between China and Russia, including the gap in information system construction, the lack of standardization in information exchange, the disparity in information technology application, and the imperfect information sharing mechanism, seriously restrict the development of Sino-Russian international logistics. Therefore, both countries should strengthen cooperation to enhance the level of logistics information sharing and build an intelligent, efficient, and transparent cross-border logistics information system.

The gap in the construction level of logistics information systems between China and Russia is the primary obstacle to information sharing. Russia should increase investment in the construction of logistics information systems, learning from China's successful experience to accelerate the development of the logistics information industry [24].

Firstly, increase investment in logistics information technology. The Russian government should increase financial investment in the field of logistics information, setting up special funds to support logistics enterprises in the research and development and application of information technology. A favorable tax policy for logistics information enterprises can be introduced, reducing the tax burden on enterprises and encouraging them to increase investment in information technology. Financial institutions should be guided to increase credit support for logistics information projects to solve the problem of insufficient funds for enterprises. At the same time, social capital should be encouraged to participate in

the construction of logistics information platforms, forming a diversified investment mechanism.

Secondly, promote the construction of public logistics information platforms. The Russian government should learn from China's experience in building platforms such as the China International Trade Single Window and accelerate the construction of a unified public logistics information platform integrating customs, inspection and quarantine, transportation, commerce, and other departments. The platform should provide one-stop services such as customs declaration, inspection and quarantine application, transportation booking, and cargo tracking, simplifying the procedures for cross-border logistics and improving the efficiency of government services. The government should also encourage the construction of third-party logistics information platforms, supporting logistics enterprises, freight forwarders, and carriers to settle on the platforms, enriching platform functions and enhancing service levels.

Thirdly, improve the coverage of logistics information systems. Russian logistics enterprises should accelerate the popularization and application of logistics information systems, establishing complete logistics information systems covering cargo tracking, order management, transportation scheduling, and warehousing management. Large logistics enterprises should be encouraged to develop independently or introduce mature logistics information systems to achieve full-process information management. Small and medium-sized logistics enterprises can reduce the cost of information technology application by using software-as-a-service (SaaS) models. China can provide technical support and experience sharing to Russian logistics enterprises, helping them improve the level of information technology application. For example, Chinese logistics information platform enterprises can provide technical support and operational guidance to Russian partners to promote the localization and application of logistics information systems in Russia.

Finally, strengthen cooperation in logistics information technology. The two countries should establish a Sino-Russian logistics information technology cooperation mechanism, regularly holding exchange meetings on logistics information technology to share the latest achievements and application experiences in logistics information technology. Cooperation between enterprises in the two countries in the research and development and application of

logistics information technology should be encouraged, jointly developing logistics information systems suitable for cross-border logistics. The two countries can carry out joint research projects on the application of new technologies such as blockchain and the Internet of Things in the logistics field, promoting technological innovation and achievement transformation in the logistics information industry [61].

The lack of standardization in information exchange is an important factor restricting the information docking of Sino-Russian logistics. China and Russia should strengthen cooperation to establish unified standards and specifications for logistics information exchange.

Firstly, unify data formats. The two countries should establish a Sino-Russian logistics information standardization working group to jointly develop unified or mutually recognized logistics information data format standards. Based on internationally universal data formats such as XML and EDI, considering the actual conditions of both countries, a Sino-Russian cross-border logistics information data exchange standard should be formulated, specifying the structure, field definition, and coding rules of data. The two countries should promote the adoption of unified data format standards in their respective logistics information systems to ensure the smooth exchange and processing of information between the systems of the two countries. For data formats that are already in use but do not meet the unified standards, a transition plan should be developed, and enterprises should be guided to gradually upgrade and transform their systems.

Secondly, harmonize information content requirements. The two countries should jointly formulate a basic catalog of logistics information for cross-border logistics, specifying the basic information content that must be provided, such as the name, specification, quantity, weight, volume, origin, destination, consignor, and consignee of goods. For special goods, additional information requirements should be unified, such as the production date, expiration date, quality certification, and hazardous characteristics of goods. By harmonizing information content requirements, the information needs of both countries can be met, avoiding the trouble of repeatedly providing information. The two countries should also establish an information mapping and conversion mechanism to

automatically convert information that is required differently by the two countries, reducing the burden on enterprises.

Thirdly, unify transmission methods and protocols. The two countries should jointly formulate standards for logistics information transmission methods and protocols, specifying network transmission protocols, data encryption standards, and interface specifications. A dedicated Sino-Russian logistics information transmission network should be established to ensure the security, stability, and real-time performance of information transmission. The two countries should strengthen cooperation in information security, jointly formulating information security management standards and emergency response plans for security incidents to ensure the security and confidentiality of information during transmission. The application of blockchain technology in logistics information exchange should be promoted to improve the trustworthiness and traceability of information.

Finally, establish an information exchange testing and certification mechanism. The two countries should establish a Sino-Russian logistics information exchange testing and certification center, responsible for testing and certifying the information exchange capabilities of logistics information systems in both countries. Enterprises that pass the certification can enjoy convenient information exchange services. The two countries should also establish an information exchange dispute resolution mechanism to promptly address issues such as information inconsistency, data loss, and security incidents that occur during information exchange, ensuring the smooth progress of information exchange. To realize information interconnection, a unified logistics information platform framework is constructed, as shown in figure 13 [14; 26].

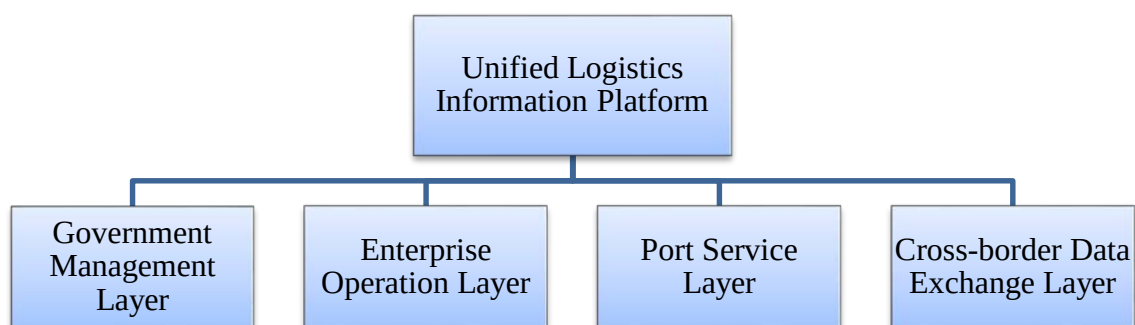


Figure 13 – Framework of Sino-Russian unified logistics information platform [14; 26]

China has a clear advantage in the application of new information technologies such as big data, artificial intelligence, and the Internet of Things in the logistics field. Russia should increase the application of these technologies in the logistics field, learning from China's successful experience to enhance the level of intelligence in Sino-Russian international logistics.

Firstly, promote the application of big data technology. The two countries should encourage logistics enterprises to use big data technology for demand forecasting, route optimization, inventory management, and risk assessment. By collecting and analyzing historical transaction data, market demand data, transportation route data, and weather data, accurate prediction of market demand can be achieved, enabling reasonable arrangement of transportation capacity and inventory, reducing transportation costs and inventory costs. A Sino-Russian cross-border logistics big data center can be established to integrate logistics data from both countries, providing data support and decision-making references for government departments and enterprises. Using big data analysis, the correlation between logistics efficiency and economic development can be studied, providing a basis for formulating logistics development strategies. Big data technology can also be used for risk warning and management, such as assessing the impact of political risks, exchange rate fluctuations, and natural disasters on logistics, helping enterprises develop response measures in advance.

Secondly, promote the application of artificial intelligence technology. The two countries should encourage logistics enterprises to use artificial intelligence technology for intelligent scheduling, intelligent sorting, and intelligent customer service. By applying artificial intelligence algorithms, transportation vehicle scheduling and route planning can be optimized, improving transportation efficiency and reducing energy consumption. Intelligent sorting robots and automated guided vehicles should be widely used in warehousing and distribution links to improve sorting and handling efficiency. Intelligent customer service systems can provide 24-hour online consultation and support, improving customer satisfaction. The two countries can carry out joint research and application of artificial intelligence technology in the logistics field, sharing research results and application experiences. For example, a Sino-Russian artificial intelligence logistics

laboratory can be established to conduct research on key technologies such as intelligent dispatching and autonomous driving, promoting the deep application of artificial intelligence in the logistics field.

Thirdly, promote the application of Internet of Things technology. The two countries should encourage logistics enterprises to use Internet of Things technology for cargo tracking, environmental monitoring, and equipment management. By deploying sensors, RFID tags, and GPS devices on goods, vehicles, and warehouses, real-time collection and sharing of cargo location, status, and environmental parameters can be achieved, improving the visibility and controllability of the logistics process. IoT technology should be applied in cold chain logistics to monitor temperature and humidity in real-time, ensuring the quality and safety of cold chain goods [18]. IoT technology should also be applied in warehouse management to achieve automated identification and tracking of goods, improving the accuracy and efficiency of inbound, outbound, and inventory counting. The two countries should jointly formulate IoT application standards for cross-border logistics to ensure the interoperability and compatibility of IoT devices and systems between the two countries.

Finally, explore the application of blockchain technology. The two countries should actively explore the application of blockchain technology in cross-border logistics information sharing, customs clearance, and supply chain finance. Using the decentralized, tamper-proof, and traceable characteristics of blockchain, a trusted cross-border logistics information sharing platform can be established to solve the problems of information asymmetry and lack of trust. Blockchain technology can be applied to customs clearance processes, enabling the sharing and mutual recognition of customs declaration data, inspection data, and certificate data, improving the efficiency and transparency of customs clearance. Blockchain technology can also be applied to supply chain finance, enabling pledge financing of warehouse receipts and factoring of accounts receivable, providing convenient and secure financial services for enterprises. The two countries can carry out pilot projects of blockchain technology application in the logistics field, accumulating experience and promoting the widespread application of blockchain technology in Sino-Russian international logistics [42].

The imperfect information sharing mechanism between the governments and enterprises of China and Russia is an important factor restricting the informatization docking of Sino-Russian logistics. Both countries should strengthen cooperation to improve the information sharing mechanism and build a transparent, efficient, and orderly information sharing environment.

Firstly, establish a government-level information sharing platform. The Chinese and Russian governments should accelerate the establishment of a unified information sharing platform between relevant departments such as customs, inspection and quarantine, transportation, and commerce. The platform should achieve real-time sharing of policy regulations, technical standards, inspection and quarantine requirements, port operation status, customs clearance progress, and other information, providing accurate and timely policy information and market information for enterprises. The two countries should establish a regular information exchange mechanism, holding regular meetings on customs, inspection and quarantine, and transportation cooperation to exchange the latest policy trends and technical standards, coordinate solutions to problems encountered in the cooperation process. Government departments of the two countries should strengthen coordination in information exchange to avoid duplication of inspections and inconsistent standards, improving the efficiency of customs clearance and inspection and quarantine.

Secondly, establish an enterprise-level information sharing mechanism. The two countries should encourage and guide Sino-Russian logistics enterprises to establish information sharing mechanisms to realize the sharing of cargo information, vehicle information, warehouse information, and customer information. A trust mechanism can be established through contract agreements, membership systems, etc., to regulate the information sharing behavior of enterprises and protect the information security and commercial secrets of enterprises [26]. An information sharing incentive mechanism can be established to reward enterprises that actively share information, enhancing the willingness of enterprises to share information. An industry association can be established for Sino-Russian logistics enterprises to serve as a bridge for enterprise information exchange and cooperation, organizing exchange activities and training courses to enhance the information sharing awareness and capabilities of enterprises.

Thirdly, establish a unified logistics information platform. The two countries should promote the establishment of a unified Sino-Russian cross-border logistics information platform to integrate government information resources and enterprise information resources, providing comprehensive, timely, and accurate logistics information services. The platform should have functions such as cargo tracking, order query, transportation scheduling, warehousing management, payment settlement, and credit evaluation, supporting the entire chain of cross-border logistics operations. The platform should adopt unified data standards and interface specifications to ensure seamless connection with the information systems of various enterprises and government departments. The platform should also have an intelligent decision support function, using big data analysis and artificial intelligence algorithms to provide enterprises with services such as route optimization suggestions and risk warning.

Finally, strengthen the construction of laws, regulations, and credit systems. The two countries should strengthen cooperation in the field of logistics information sharing laws and regulations, jointly formulating laws and regulations for cross-border logistics information sharing to clarify the rights, obligations, and responsibilities of information sharing. A cross-border logistics credit system should be established to record the credit status of enterprises in information sharing, and enterprises with good credit can enjoy more convenient information sharing services. Punishment mechanisms should be established for information leaks, data tampering, and other behaviors to ensure the security and reliability of information sharing. The two countries should strengthen the protection of personal privacy and commercial secrets in information sharing to prevent the abuse and leakage of information.

3.3 Cultivating professional Sino-Russian logistics talents

Professional talent is the fundamental guarantee for the development of international logistics. The development of Sino-Russian international logistics requires a large number of professionals with cross-cultural communication skills, professional logistics knowledge, and information technology application capabilities. However, the current shortage of

professional talents in Sino-Russian international logistics and the unreasonable talent structure have become important factors restricting the development of the industry. Therefore, both countries should strengthen cooperation to cultivate professional Sino-Russian logistics talents and provide talent support for the sustainable development of Sino-Russian international logistics.

Sino-Russian international logistics involves different language, cultural, and legal environments, requiring logistics professionals to have cross-cultural communication skills and international vision. China and Russia should strengthen cooperation in education and training to build a cross-cultural talent training system.

Firstly, strengthen language teaching and cross-cultural communication training. Chinese universities and vocational colleges should strengthen Russian language teaching, offering Russian courses in logistics management, international trade, and other related majors to improve students' Russian application skills. Russian educational institutions should also strengthen Chinese language teaching to cultivate Russian students' Chinese communication skills. The two countries should encourage educational institutions to offer cross-cultural communication courses to help students understand the history, culture, business practices, and legal systems of the other country, enhancing their cross-cultural communication skills and adaptability. The two countries can also carry out language exchange programs, organizing students to study in the other country for short-term language training and cultural exchange activities to improve their language skills and cultural understanding.

Secondly, establish a mechanism for mutual recognition of academic qualifications and credits. The two countries should accelerate the signing of an agreement on mutual recognition of academic qualifications and credits to facilitate the exchange and cooperation of students between the two countries. Chinese and Russian universities can carry out joint training programs, adopting models such as "2+2" or "3+1" to allow students to study in both countries and obtain academic qualifications recognized by both countries [37]. The two countries should encourage educational institutions to develop joint courses and teaching materials, integrating logistics knowledge and practical cases from both countries to cultivate logistics talents with international vision and professional competence. A Sino-

Russian university alliance can be established to promote exchanges and cooperation in teaching, scientific research, and talent cultivation between universities of the two countries.

Thirdly, strengthen exchange and cooperation among teachers. The two countries should encourage exchange visits and further study for logistics teachers. Chinese logistics teachers can be sent to Russian universities for short-term visits and academic exchanges to learn about Russia's logistics education concepts and teaching methods. Russian logistics teachers can also be invited to teach and give lectures at Chinese universities. The two countries can jointly organize logistics teacher training courses to improve the teaching level and professional competence of teachers. Joint research projects can be carried out to promote the development of logistics disciplines. The two countries should also encourage the compilation and introduction of logistics teaching materials. China can introduce Russia's excellent logistics teaching materials and cases, and Russia can also learn from China's logistics education experience.

Finally, cultivate international logistics talents with comprehensive qualities. The two countries should encourage the cultivation of compound logistics talents, requiring not only professional logistics knowledge but also basic knowledge and skills in international trade, finance, law, information technology, and other related fields. The two countries can establish interdisciplinary logistics management majors to offer courses in international trade practices, international settlement, international commercial law, logistics information systems, etc., to cultivate compound logistics talents with a broad knowledge base and strong comprehensive application skills. The two countries should also cultivate logistics talents with innovation ability and entrepreneurial spirit, encouraging students to participate in logistics innovation and entrepreneurship competitions, and providing support for innovation and entrepreneurship.

Industry-education integration and school-enterprise cooperation are important ways to cultivate applied logistics talents. China and Russia should strengthen cooperation between educational institutions and logistics enterprises to promote the deep integration of industry, education, and research, cultivating logistics talents that meet the needs of industrial development.

The scale and direction of talent demand are closely related to the actual indicators of logistics cooperation. Figure 14 summarizes key quantitative data on China-Russia logistics cooperation in 2025, providing a reference for talent cultivation.

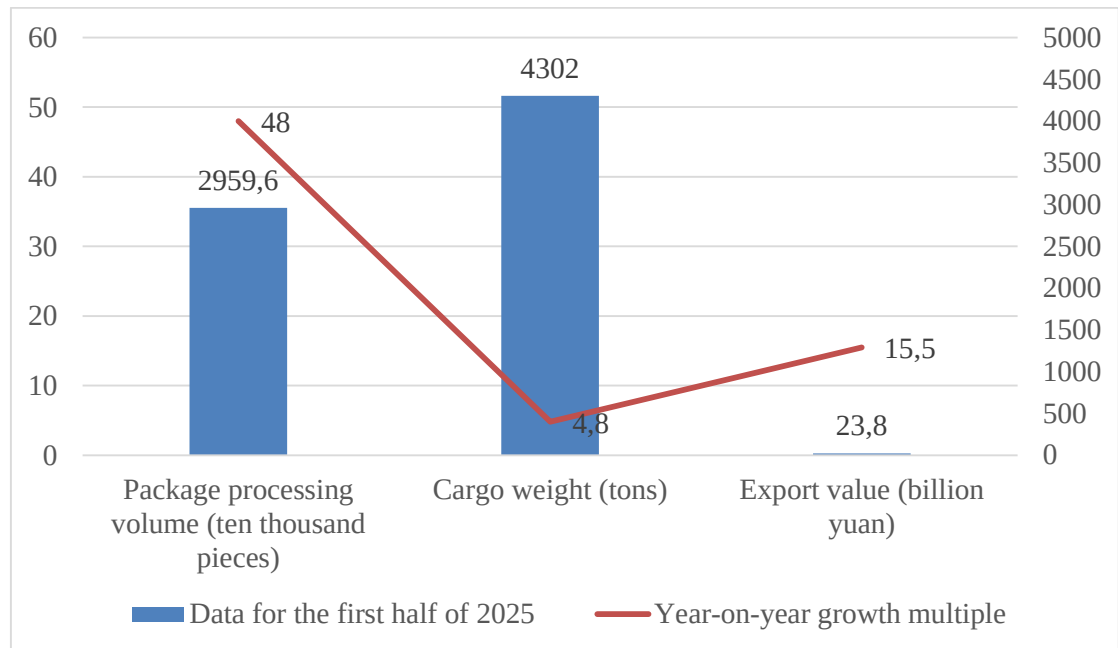


Figure 14 – Key indicators of China-Russia logistics cooperation (2025) [47]

Figure 14 shows that the China-Russia railway freight volume, road freight volume, and Russia's share of China's exports and imports are all maintaining high growth, which means the logistics industry needs a large number of professionals who are familiar with bilateral operations, master information technology, and possess cross-cultural communication skills. The following sections will elaborate on specific measures such as industry-education integration and order-based training.

Firstly, establish a school-enterprise cooperation mechanism. The two countries should encourage logistics enterprises to establish industry-education integration bases in universities and vocational colleges, and jointly develop talent training programs, curriculum systems, and teaching content with schools. Logistics enterprises can send senior management and technical experts to serve as guest professors or practical instructors in schools to participate in teaching activities. Schools can send teachers to logistics enterprises for temporary training to understand the latest developments and talent needs of the industry, improving the pertinence and practicality of teaching. The two countries can establish a

Sino-Russian logistics school-enterprise cooperation alliance to organize exchange activities, project cooperation, and information sharing, promoting the deep integration of industry, education, and research.

Secondly, carry out order-based talent training. Logistics enterprises can sign order-based training agreements with schools to jointly cultivate logistics talents that meet the specific needs of enterprises based on the talent needs of the enterprises [7]. The curriculum and teaching content can be customized according to the requirements of enterprises, and enterprises can participate in the entire process of student selection, teaching, practice, and assessment. Students who complete the training can directly enter the cooperative enterprises for employment, achieving seamless connection between talent cultivation and enterprise needs. The two countries should encourage cross-border order-based training, where Chinese logistics enterprises can sign agreements with Russian educational institutions to cultivate Russian logistics talents, and Russian logistics enterprises can also sign agreements with Chinese educational institutions to cultivate Chinese logistics talents.

Thirdly, strengthen the construction of internship and practice bases. The two countries should encourage logistics enterprises to open internship positions to schools, providing students with internship and practice opportunities. Schools should establish long-term and stable internship and practice relationships with enterprises, regularly organizing students to participate in internships and practical activities to improve their practical operation skills and problem-solving abilities. The two countries can jointly build cross-border logistics internship and practice bases, organizing students to conduct internships and practical training in logistics enterprises and ports of the other country to understand the logistics operation processes and management models of the other country, enhancing their cross-border logistics practical capabilities. For example, Chinese students can intern at Russian Far East ports to learn about the operation processes and management methods of Russian ports; Russian students can intern at Chinese logistics enterprises to learn about China's advanced logistics information technology and management experience.

Finally, promote cooperation between industry associations and educational institutions. The two countries' logistics industry associations should strengthen cooperation with educational institutions, jointly organizing logistics skills competitions, vocational

skills certification, and other activities to enhance students' vocational skills and competitiveness. Industry associations can release talent demand forecasts and industry development reports to provide a basis for schools to develop talent training plans. Industry associations can also organize logistics experts to participate in the development of school teaching plans and curriculum standards to ensure that the content of talent training meets the needs of industry development. The two countries can establish a Sino-Russian logistics talent training steering committee to guide and coordinate the work of logistics talent cultivation [72].

For logistics practitioners already working, vocational training and on-the-job education are important ways to improve their professional competence and adaptability. China and Russia should strengthen cooperation to provide rich vocational training and on-the-job education opportunities for Sino-Russian logistics practitioners.

Firstly, establish a Sino-Russian logistics vocational training center. The two countries can jointly establish a Sino-Russian logistics vocational training center in border areas such as Manzhouli and Vladivostok, providing vocational training services for logistics practitioners from both countries. The training center can offer courses such as logistics management, customs clearance practices, international trade practices, Russian, and Chinese, to improve the professional competence and language communication skills of practitioners. The training center can also customize training courses according to the needs of enterprises, providing targeted training services for enterprises. The two countries should encourage professional training institutions to carry out cooperation and jointly develop training courses and teaching materials to improve the quality and level of training.

Secondly, carry out online training and distance education. The two countries should make full use of information technology to develop online training platforms and distance education courses, providing convenient and flexible learning opportunities for logistics practitioners. Online training platforms can offer a wealth of course resources, including video lectures, case studies, simulation exercises, etc., allowing practitioners to learn anytime and anywhere according to their own schedules and needs. The two countries can jointly develop online training courses for Sino-Russian logistics, covering logistics management, customs clearance procedures, laws and regulations, and other content of both

countries, helping practitioners understand the logistics environment and requirements of the other country. Online learning communities and discussion forums can be established to facilitate communication and experience sharing among practitioners from the two countries.

Thirdly, encourage enterprises to carry out on-the-job training. Logistics enterprises should increase investment in employee training, establishing sound on-the-job training systems. Enterprises can invite industry experts and scholars to give lectures and provide training, organizing employees to participate in various vocational skills competitions and exchange activities to improve their professional competence and teamwork spirit. Enterprises can also establish mentoring systems, pairing experienced veteran employees with new employees to help them adapt to work requirements and improve their job skills. The two countries should encourage cross-border on-the-job training, where Chinese logistics enterprises can send employees to Russian logistics enterprises for temporary training to learn about Russia's logistics operation models and management experience. Russian logistics enterprises can also send employees to Chinese logistics enterprises for temporary training to learn about China's advanced logistics technology and management concepts.

Finally, establish a vocational qualification certification system. The two countries should strengthen cooperation to establish a mutually recognized Sino-Russian logistics vocational qualification certification system. Based on the vocational qualification standards of both countries, a unified or mutually recognized vocational qualification certification standard can be developed to provide a basis for the career development of Sino-Russian logistics practitioners. Practitioners who pass the certification can obtain vocational qualification certificates recognized by both countries, which is conducive to their employment and career development in the other country. The two countries should encourage logistics enterprises to recognize vocational qualification certificates, linking the vocational qualification of employees with their compensation and promotion to enhance the enthusiasm of practitioners for learning and self-improvement [43].

Sino-Russian international logistics is a field full of opportunities and challenges, requiring logistics professionals to have international vision and innovation ability. China

and Russia should strengthen cooperation to provide rich international exchange and innovation practice opportunities for logistics professionals.

Firstly, carry out international exchange and visit programs. The two countries should encourage logistics professionals to participate in international exchange and visit programs to learn about the latest developments and advanced experiences of international logistics. Governments at all levels and industry associations can organize logistics professionals to visit and study in countries with advanced logistics development, such as conducting research and training in Germany, the Netherlands, Singapore, and other countries to learn about their advanced concepts and technologies in logistics management, information technology application, green logistics, etc. The two countries can also hold international logistics forums, seminars, and other exchange activities, inviting well-known experts, scholars, and entrepreneurs from around the world to share the latest research achievements and practical experiences, providing an international exchange platform for logistics professionals.

Secondly, encourage participation in international logistics projects. The two countries should encourage logistics enterprises and professionals to participate in international logistics projects to enhance their international cooperation and innovation capabilities in practice. For example, participating in the implementation of China-Europe Railway Express, the new western land-sea corridor, and other major international logistics channel projects, as well as cross-border e-commerce logistics projects, allows professionals to exercise and improve their capabilities in practice. The two countries can also establish a Sino-Russian logistics innovation and entrepreneurship fund to support logistics professionals in carrying out innovation and entrepreneurship activities, encouraging them to explore new logistics business models, technologies, and services.

Thirdly, strengthen the cultivation of innovation ability. The two countries' educational institutions and enterprises should pay attention to the cultivation of innovation ability, encouraging students and employees to have the courage to innovate and try [53]. Innovation and entrepreneurship courses can be offered, and innovation and entrepreneurship competitions can be organized to stimulate the innovation awareness and potential of students and employees. Enterprises should establish incentive mechanisms for

innovation, rewarding employees who put forward innovative suggestions and achieve innovative results, creating a corporate culture that encourages innovation and tolerates failure. The two countries can jointly organize Sino-Russian logistics innovation competitions, selecting and promoting excellent innovation projects, providing an innovation practice platform for logistics professionals.

After implementing the above optimization strategies, the improvement of core logistics indicators is expected, as shown in figure 15 [35].

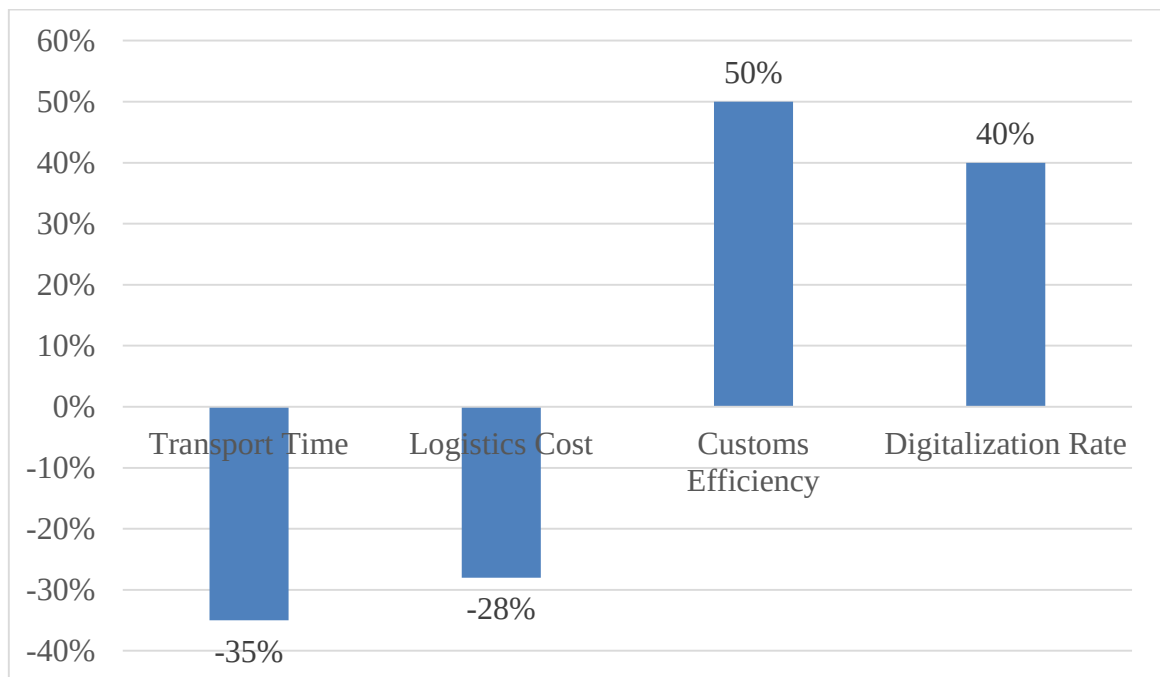


Figure 15 – Expected efficiency improvement after optimization (2030) [35]

The above results prove that the proposed strategies have significant effects on improving the efficiency and quality of Sino-Russian international logistics.

Finally, cultivate the concept of green logistics and sustainable development. With the increasing global attention to environmental protection and sustainable development, green logistics has become an important direction for the development of international logistics. The two countries should strengthen the cultivation of green logistics concepts among logistics professionals, incorporating green logistics knowledge into talent training programs and vocational training courses. Professionals should understand the concepts and methods of green logistics, such as optimizing transportation routes to reduce energy

consumption, using environmentally friendly packaging materials, and promoting new energy vehicles. The two countries should encourage logistics enterprises to adopt green logistics practices, such as using electric trucks for urban distribution and installing solar panels in warehouses, and establish a green logistics evaluation system to promote the green transformation of the logistics industry.

In conclusion, the development of Sino-Russian international logistics faces both broad prospects and severe challenges. By strengthening the connectivity of logistics infrastructure, enhancing the level of logistics information sharing, and cultivating professional Sino-Russian logistics talents, the existing problems can be effectively solved, promoting the efficient, convenient, and intelligent development of Sino-Russian international logistics, and providing strong support for the further expansion and deepening of Sino-Russian economic and trade cooperation.

Conclusion

This thesis has systematically examined the development of international logistics between China and Russia, with a particular focus on the current situation, existing problems, and practical countermeasures for enhancing bilateral logistics cooperation. As two major neighboring countries with highly complementary economic structures – China being the world’s second-largest economy and a manufacturing powerhouse, and Russia being a leading energy and resource supplier – the bilateral trade volume has grown rapidly over the past decade. According to official statistics, trade between the two countries reached 190.27 billion US dollars in 2023, a year-on-year increase of 29.3%, achieving the strategic goal of 200 billion US dollars ahead of schedule, with an estimated value exceeding 250 billion US dollars in 2025. However, the rapid expansion of trade has placed unprecedented pressure on the logistics system that underpins this economic relationship. Through a comprehensive analysis of commodity flows, infrastructure connectivity, informatization levels, and talent development – covering three core chapters and multiple sub-sections – this study has identified several critical bottlenecks and proposed a multi-dimensional optimization framework to address them.

The first major finding of this research is that while the commodity flow between China and Russia has become increasingly diversified and large-scale, it remains characterized by structural imbalances and excessive concentration. China’s exports to Russia are dominated by mechanical and electrical products (over 70% of total exports), including automobiles, auto parts, engineering machinery, and electronic consumer goods. Although Chinese automobiles have gained significant popularity in the Russian market – with exports exceeding 800,000 units in 2023, a year-on-year increase of over 150% – the share of high-value-added products remains relatively low. Conversely, Russia’s exports to China are heavily dependent on energy products (nearly 70% of total exports), including crude oil (over 80 million tons in 2023), natural gas (over 40 billion cubic meters), coal, and petroleum products. Agricultural products and raw materials account for approximately 15% and 10% respectively. This asymmetric structure makes bilateral trade highly vulnerable to

fluctuations in international energy prices, exchange rate volatility, and geopolitical tensions. Furthermore, the regional distribution of commodity flows is highly uneven: the majority of trade is concentrated in border regions (such as Manzhouli, Suifenhe, and Hunchun) and coastal cities (such as Shanghai, Qingdao, and Dalian), while inland areas of both countries – including China’s central and western regions and Russia’s Siberian and Far Eastern territories – remain underdeveloped in terms of logistics infrastructure and trade volume. This uneven distribution not only fails to fully tap the potential of bilateral economic cooperation but also exacerbates regional economic disparities. Therefore, future efforts should focus not only on expanding trade volume but also on diversifying export structures, promoting high-value-added products, and developing inland logistics networks to achieve more balanced regional development.

The second major finding is that the docking of logistics infrastructure between China and Russia faces profound challenges that severely constrain cross-border logistics efficiency. The most prominent issue is the difference in railway gauge – 1,435 mm in China versus 1,520 mm in Russia – which necessitates costly and time-consuming transshipment at border crossings. Taking the Manzhouli-Zabaikalsk border crossing as an example, this is the largest railway border crossing between the two countries, with an annual transshipment volume exceeding 20 million tons. However, transshipment typically requires 1–3 days, and during peak seasons, goods often face additional waiting times due to limited transshipment capacity, leading to increased transportation costs and risks of cargo damage. In addition, port capacity at many border crossings is nearing saturation: Manzhouli railway port has a throughput of 30.5 million tons and a utilization rate of 98%, while Russia’s corresponding Zabaikalsk port has a utilization rate of 95%. In contrast, smaller ports such as Blagoveshchensk have a utilization rate of only 76%, reflecting a coexistence of idle capacity and overloading. Warehousing facilities are scattered, poorly standardized, and lack modern technologies such as automated storage and retrieval systems (AS/RS) and cold chain capabilities. In China, modern three-dimensional warehouses and automated warehouses have become common, while in Russia, most warehouses remain old-fashioned single-story structures with poor temperature and humidity control. Furthermore, inland

areas of both countries suffer from backward transportation infrastructure – China’s central and western regions have insufficient railway and highway coverage, while Russia’s Siberian and Far Eastern regions have underdeveloped railway networks and limited road connectivity – further exacerbating logistics costs and transit times. To overcome these barriers, Chapter 3 proposed a phased approach: in the short term, upgrading transshipment facilities (e.g., increasing the number of gantry cranes and automated guided vehicles) and optimizing processes at existing border crossings; in the medium and long term, jointly exploring gauge-changeable train technology (which China has already developed maturely) and pilot projects on key routes, as well as expanding port capacity through modernization, constructing smart ports using IoT and big data, and establishing cross-border logistics parks that integrate warehousing, distribution, processing, and customs clearance. Moreover, harmonizing technical standards for vehicles (e.g., weight, size, and emission limits), establishing mutual recognition mechanisms for driving licenses and vehicle insurance, and improving road and railway networks in inland areas are essential steps toward seamless connectivity.

The third major finding is that the significant gap in logistics informatization between China and Russia represents another major obstacle to efficient cross-border logistics. Through a comparative analysis of key indicators, this study found that China has achieved a logistics enterprise informatization coverage rate of over 85% (nearly 100% for large enterprises), with widespread adoption of electronic waybills (78%), real-time cargo tracking (91%), and advanced technologies such as big data, AI, and IoT (27% of enterprises). In contrast, Russia’s coverage rate is only about 45% (approximately 70% for large enterprises), electronic waybill usage stands at 31%, real-time tracking penetration is below 40%, and only 6% of enterprises apply big data or AI. Moreover, the number of countries connected to government “Single Window” systems is over 40 for China, compared to only 12 for Russia. The lack of unified standards for data formats (e.g., China uses XML and EDI while Russia uses proprietary formats), information content (e.g., Russia requires additional information such as production date and quality certification for special goods), and transmission protocols (e.g., Russia still relies on telephone and fax in remote

areas) further impedes information exchange between the two countries. Consequently, this thesis recommends establishing a bilateral logistics information standardization working group to develop unified data exchange standards covering data formats, information content, and transmission protocols; building a public logistics information platform that integrates customs, transportation, trade facilitation, and port operations; and promoting the application of emerging technologies such as blockchain for secure and transparent information sharing, big data for demand forecasting and risk assessment, AI for intelligent scheduling and customer service, and IoT for real-time cargo tracking and cold chain monitoring. A dedicated Sino-Russian cross-border logistics information platform would enable real-time cargo tracking, electronic customs clearance, automated data exchange, and intelligent decision support, significantly reducing delays, lowering costs, and improving supply chain visibility and resilience.

The fourth major finding is that the shortage of professional logistics talents with cross-cultural communication skills and technical expertise has emerged as a critical bottleneck. The development of Sino-Russian international logistics requires professionals who are proficient in both Chinese and Russian, understand the legal and business environments of both countries, possess modern logistics management knowledge (e.g., supply chain optimization, warehousing management, multimodal transport coordination), and are skilled in information technology applications (e.g., TMS, WMS, big data analytics). However, existing educational and training systems in both countries have not adequately addressed this demand. Language barriers remain significant: Chinese logistics students rarely study Russian, and Russian students rarely study Chinese. Cross-cultural communication training is largely absent from standard curricula. Moreover, there is no mutual recognition mechanism for academic qualifications and credits between Chinese and Russian universities in the field of logistics. Industry-education integration is weak, with limited internship opportunities for students in cross-border logistics enterprises. This thesis therefore proposes a comprehensive talent cultivation framework that includes: strengthening Russian and Chinese language teaching and cross-cultural communication training in universities and vocational colleges; establishing mutual recognition mechanisms

for academic qualifications and credits between Chinese and Russian institutions; promoting exchange programs for teachers and students (e.g., sending Chinese logistics teachers to Russian universities for short-term visits and inviting Russian teachers to lecture in China); building cross-border logistics internship and practice bases (e.g., Chinese students interning at Russian Far East ports and Russian students interning at Chinese logistics enterprises); creating a Sino-Russian logistics vocational training center in border areas such as Manzhouli or Vladivostok; developing online training platforms and distance education courses for practitioners; and establishing a mutually recognized vocational qualification certification system for logistics professionals. These measures will help build a sustainable pipeline of skilled logistics professionals capable of supporting the long-term development of bilateral logistics cooperation.

In addition to the empirical findings, this thesis has made several theoretical contributions to the literature on international logistics and Sino-Russian trade. Firstly, a three-dimensional problem analysis framework of “infrastructure docking – informatization level – talent cultivation” has been constructed. Unlike many existing studies that focus on a single aspect (e.g., only infrastructure or only policy), this framework systematically integrates the relatively scattered restrictive factors identified in previous research, enabling a more comprehensive diagnosis of root causes and facilitating the formulation of coordinated, multi-pronged strategies. Secondly, the thesis proposes specific, actionable countermeasures for two of the most persistent technical barriers: the railway gauge difference and the logistics informatization gap. For gauge inconsistency, a phased approach combining short-term measures (upgrading transshipment facilities and optimizing processes at border crossings) and long-term solutions (jointly studying gauge-changeable train technology and pilot projects on key routes) is suggested. For the informatization gap, the thesis proposes establishing unified data exchange standards (covering data formats, information content, and transmission protocols), promoting the application of big data, AI, IoT, and blockchain technologies, and building a unified Sino-Russian cross-border logistics information platform. These countermeasures are grounded in technical feasibility and practical relevance, directly addressing the most urgent needs of logistics operators. Third,

the thesis introduces “cross-cultural talent training” and “industry-education integration” as independent strategic modules, recognizing that human capital is as important as physical infrastructure and information technology for sustainable development. This perspective transcends the traditional focus on hardware and software, providing a new lens for understanding and addressing the long-term challenges of international logistics cooperation.

From a practical perspective, the findings and recommendations of this thesis have significant implications for policymakers, logistics enterprises, and educational institutions in both China and Russia. For government decision-makers, the thesis highlights the need for policy coordination and harmonization in areas such as customs procedures, transportation regulations, and technical standards. Specific actions include: establishing regular policy-making dialogue mechanisms; jointly formulating unified customs tariff classification systems for commonly traded goods; harmonizing vehicle weight, size, and emission standards; and accelerating the signing of agreements on mutual recognition of driving licenses and vehicle insurance. For logistics enterprises, the thesis provides guidance on technology adoption (e.g., implementing TMS/WMS, adopting IoT sensors for cargo tracking), cross-border cooperation (e.g., participating in joint logistics park projects, sharing warehousing resources), and talent development (e.g., sending employees to cross-border training programs, establishing mentoring systems). For educational institutions, the thesis recommends curriculum design enhancements (e.g., offering Russian/Chinese language courses, cross-cultural communication modules, and logistics information technology courses), industry-education integration (e.g., establishing school-enterprise cooperation alliances, creating internship bases), and international exchange programs (e.g., student exchange, teacher training, joint research projects).

Despite the comprehensive analysis presented in this thesis, several limitations should be acknowledged. First, the data used in this study are primarily derived from secondary sources, including official statistical yearbooks (e.g., China Customs statistics, Russian Federal Customs Service data), academic literature, industry reports (e.g., from the China Federation of Logistics and Purchasing and the Russian Logistics Association), and

enterprise case studies. While efforts have been made to ensure accuracy and comparability, discrepancies between Chinese and Russian data sources (e.g., railway freight volume figures: approximately 200 million tons according to Chinese data versus 186 million tons according to Russian data) cannot be fully eliminated. Future research could benefit from primary data collection through surveys, interviews, or on-site observations with logistics enterprises operating on both sides of the border. Second, the thesis focuses on identifying existing problems and proposing countermeasures, but does not quantitatively evaluate the potential impact of these countermeasures on logistics efficiency, cost reduction, or carbon emissions. Future studies could employ simulation models (e.g., discrete event simulation, agent-based modeling) or econometric methods (e.g., difference-in-differences, stochastic frontier analysis) to assess the effectiveness of specific policies and investments. Third, the geopolitical and economic environment is subject to rapid change, particularly in light of international sanctions, energy market volatility, and shifting trade policies. The strategies proposed in this thesis should be periodically reviewed and adapted to evolving circumstances. Fourth, the green logistics dimension, while briefly mentioned in the talent cultivation section, has not been fully integrated into the core analysis. As both China and Russia pursue carbon neutrality goals (China aims for carbon peak by 2030 and carbon neutrality by 2060; Russia has committed to reducing greenhouse gas emissions), future research should explore how green logistics practices, such as low-carbon transportation modes (e.g., electrification of road freight, optimization of rail transport to reduce energy consumption), energy-efficient warehousing (e.g., solar panel installation, LED lighting, smart energy management systems), circular supply chains (e.g., reusable packaging, waste reduction), and carbon footprint tracking, can be incorporated into Sino-Russian logistics cooperation. Fifth, the role of emerging technologies such as blockchain, digital twins, and autonomous vehicles in cross-border logistics deserves further investigation. While this thesis has touched upon blockchain for information sharing, a more in-depth analysis of implementation challenges, cost-benefit trade-offs, and regulatory barriers would be valuable.

Looking ahead, the development of Sino-Russian international logistics holds immense potential but also faces considerable challenges. The continued expansion of the Belt and Road Initiative, the modernization of the Trans-Siberian Railway, the growing demand for cross-border e-commerce (with platforms such as AliExpress, JD.com, and Wildberries playing increasingly important roles), and the deepening of bilateral industrial cooperation (with more Chinese enterprises investing and setting up factories in Russia) all present opportunities for deepening logistics cooperation. At the same time, the need for digital transformation, the pressure of carbon reduction targets, the complexities of geopolitical risk management, and the ongoing impacts of international sanctions will require sustained commitment and coordinated action from both governments, enterprises, and educational institutions. By strengthening infrastructure connectivity (e.g., resolving the gauge difference, expanding port capacity, optimizing warehousing layouts), enhancing information sharing (e.g., building unified data exchange standards, promoting advanced technologies, improving information sharing mechanisms), and cultivating professional talents (e.g., cross-cultural training, industry-education integration, vocational training), China and Russia can build a more efficient, intelligent, resilient, and sustainable international logistics system. Such a system will not only support the continued growth of bilateral trade – potentially reaching 300 billion US dollars by 2030 – but also serve as a model for regional economic integration under the Belt and Road framework, demonstrating how neighboring countries with different economic systems and technical standards can overcome barriers through cooperation and innovation.

In conclusion, this thesis has provided a systematic diagnosis of the current state and existing problems of Sino-Russian international logistics, drawing on a wealth of empirical data, comparative analysis, and case studies. It has proposed a multi-dimensional optimization strategy encompassing infrastructure, informatization, talent development, and policy coordination. The findings underscore that addressing the railway gauge difference, closing the informatization gap, and building a cross-cultural talent pool are urgent priorities that require immediate attention and sustained investment. While significant progress has been made in bilateral trade, with both countries demonstrating strong political will and

economic complementarity, the logistics system must evolve in tandem to sustain and enhance this momentum. It is hoped that the theoretical contributions and practical recommendations offered in this thesis will serve as a valuable reference for policymakers, logistics practitioners, researchers, and educators seeking to promote the high-quality, efficient, and sustainable development of Sino-Russian international logistics in the years to come. Future research should continue to monitor the implementation of these strategies, evaluate their effectiveness, and adapt them to the ever-changing global economic and geopolitical landscape.

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