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

GRADUATION THESIS

on

Competitiveness and complementarity of Sino-Russian trade

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

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ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Sun Xin, group 23ЭЭБам1, full-time mode of study

1 The topic of the graduation thesis: "Competitiveness and complementarity of Sino-Russian trade"

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

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

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 history of Sino-Russian trade, China and Russia complementary trade analysis, Sino-Russian trade competition analysis, problems in Sino-Russian commodity trade structure, Sino-Russian trade complementary potential.

5 The list of visuals contains tables and figures.

6 The date of setting the assignment is 7.09.2023.

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(signature) (full name)

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

Schedule for completing the graduation thesis

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

Academic adviser _____ / Vlazneva S. A. /
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The assignment was accepted by Master's degree student _____ / Sun Xin /
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Summary

The graduation thesis comprises 63 pages, 3 chapters, 8 figures, 10 tables, 60 sources.

RUSSIA, CHINA, TRADE COOPERATION, EXPORT, IMPORT, TRADE STRUCTURE, COMPETITIVENESS, COMPLEMENTARITY

The object of this research is international bilateral economic relations. The subject of this thesis is current state, problems and prospects of China and Russia trade relation.

This master thesis aims to analyze the current situation of Sino-Russian trade structure by the sorting out relevant data, provide suggestions for the overall development of Sino-Russian trade.

The methodological framework of the paper is formed by system approach, analysis and synthesis, statistical and comparative methods. To display identified economic dependencies graphical method was applied.

The results of research include: history of Sino-Russian trade was studied, China and Russia complementary trade analysis was conducted, Sino-Russian trade competition analysis was conducted, problems in Sino-Russian commodity trade structure were identified, Sino-Russian trade complementary potential was determined.

The novelty of work is trends, prospects for the development of trade cooperation of the countries and suggestions on optimization of trade structure are revealed.

The theoretical and practical significance of the research is that the conclusions made in the thesis form the basis for further research of the trade cooperation of the countries. The results of the research can be used in the teaching of educational disciplines «World Economy», «International Economic Relations», «International Trade».

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Introduction

China and Russia are both major powers in the world today and the two largest economies in transition. China and Russia are friendly neighbors. As a big neighbor, the economic and trade cooperation between the two sides not only has obvious geographical advantages, but also is highly complementary. China and Russia have a long history of economic and trade exchanges. With the gradual recovery of the Russian economy and the continuous strengthening of the economic strength of China and Russia, the level of cooperation between the two sides has continuously improved, the areas of cooperation have gradually expanded, the results of cooperation have become increasingly rich, and the economic and trade cooperation between the two countries has been continuously strengthened. China-Russia economic and trade cooperation faces new situations, new opportunities and new challenges.

As adjacent major global economies, China-Russia trade relations have undergone unique developmental trajectories and structural changes amid shifts in the international landscape and bilateral strategic adjustments. Since the establishment of diplomatic relations in 1992, Sino-Russian trade has evolved from fluctuations following the collapse of the Soviet Union, to energy-driven growth in the 2000s, and now to deep integration in the 2020s amid geopolitical realignments and globalization restructuring. It has remained a significant chapter in the global economic landscape. In 2024, bilateral trade reached 244.8 billion dollars, with China remaining Russia's largest trading partner for 15 consecutive years. However, challenges such as slowing growth (just 1.9 %), high energy dependency (73 % of Russia's exports to China), and logistical-financial bottlenecks have become increasingly prominent, requiring in-depth analysis of underlying contradictions and exploration of upgrading pathways from both theoretical and practical perspectives.

The complementarity of China-Russia trade is rooted in the economic structural differences between the two countries: as a resource-exporting economy, Russia dominates bilateral trade with energy and mineral exports, while China, as a global manufacturing hub, relies on mechanical, electrical, and light industrial products for exports. This resources-for-manufacturing model, while ensuring supply chain stability, also brings

structural risks – fluctuations in international energy prices directly impact trade volumes (e.g., the 2024 decline in Brent crude prices reduced Russia's crude oil export value to China by 15 billion dollars), while China's low-to-mid-end manufactured exports face an added value bottleneck (e.g., smartphone prices are 22 % lower than the global average). Additionally, under Western sanctions, Russia's supply chain de-westernization has accelerated, but institutional barriers such as certification hurdles, digital service taxes, and low cross-border logistics efficiency (e.g., the Siberian Railway's freight speed of only 30 km/h) further constrain trade potential.

The object of this research is international bilateral economic relations. The subject of this thesis is current state, problems and prospects of China and Russia trade relation.

This master thesis aims to analyze the current situation of Sino-Russian trade structure by the sorting out relevant data, provide suggestions for the overall development of Sino-Russian trade. In order to achieve this goal we need to complete the following tasks:

- to overview Sino-Russian trade development;
- to analyze the trade structure between China and Russia;
- to study the problems existing in the trade structure between China and Russia;
- to overview Sino-Russian trade complementary potential.

The novelty of work is trends, prospects for the development of trade cooperation of the countries and suggestions on optimization of trade structure are revealed.

The theoretical and practical significance of the research is that the conclusions made in the thesis form the basis for further research of the trade cooperation of the countries. The results of the research can be used in the teaching of educational disciplines «World Economy», «International Economic Relations», «International Trade».

The master thesis structure is determined by the purpose and tasks decided in the work. It includes introduction, three main parts, conclusion and references.

The study employs empirical analysis, and case studies, with data covering the UN Comtrade database (1992–2024), official statistics from China and Russia (Customs Administration, Federal State Statistics Service), and industry reports (China Association of Automobile Manufacturers, China Household Electrical Appliances Association).

The deep integration of China-Russia trade is both a historical choice and an inevitability in globalization restructuring. Against the backdrop of accelerating changes in the global economic landscape, translating complementary advantages into sustainable growth momentum concerns not only the development of the two nations but also provides a new paradigm for South-South cooperation. Through a combination of historical depth and practical analysis, this paper aims to provide theoretical support and practical references for the high-quality development of bilateral trade.

Chapter 1 China-Russia trade development process and problems analysis

1.1 History of Sino-Russian trade

Sino-Russian relations have a long history, and the development of the two countries has been deepening in the past 70 years. In 2020, Sino-Russian trade will further increase, and China will occupy a core position among Russian trading partners [30, p. 11].

Sino-Russian trade can be traced back to the Soviet period. This paper selects the development course of Sino-Russian trade and analyzes the competitiveness and complementarity of Sino-Russian trade structure. Sino-Russian bilateral trade has certain characteristics in different stages, especially after China and Russia joined the WTO, the degree of openness has been further improved, and the scale of Sino-Russian trade has shown new characteristics. By summarizing the current situation of Sino-Russian economic and trade development, this paper mainly studies the structural characteristics and causes of import and export trade between China and Russia.

The data in this section comes from China Customs and Russian Customs. Through the analysis of the development process of Sino-Russian bilateral trade from 1992 to 2008, the reasons for the development of Sino-Russian bilateral trade are summarized [39, p. 3].

Stages of tortuous development of Sino-Russian bilateral trade (1992–2000).

During this period, the development of Sino-Russian bilateral trade was wave-like, and the growth rate of trade volume fluctuated greatly. The most important feature of Sino-Russian commodity structure during this period was China to Russia.

Exports are mainly labor-intensive products, while Russian exports to China are mainly primary raw materials, and the exports of both sides are single and stable. Sino-Russian trade order has been improved through running-in adjustment, and complementary factors have played a positive role in promoting the sustained development of bilateral trade to a certain level. A complete economic and legal foundation and foreign economic system are the prerequisites for the development of commodity trade between the two countries. In 1992, the Russian Federation and China signed the Sino-Russian Intergovernmental Agreement on Economic and Trade Relations

and the Agreement on Encouraging and Protecting Investment, which laid a good foundation for the development of bilateral trade between China and Russia. The Chinese and Russian governments attach great importance to bilateral economic and trade cooperation. Thanks to the joint efforts of both sides, after the disintegration of the Soviet Union, China and Russia formed a multi-channel and extensive cooperation model with the participation of the state, local governments and enterprises. In 1992, the bilateral trade volume between China and Russia reached US 5.86 billion dollars, and Russia became the sixth largest trading partner after China, next only to China, Hongkong, Japan, the United States, Taiwan Province and Germany.

At the national level in 1993, the bilateral trade volume between China and Russia reached US 7.67 billion dollars, making China Russia's second largest trading partner. After the disintegration of the Soviet Union, according to the international situation and the economic and trade conditions of the two countries, China and Russia constantly adjusted their trade policies and decentralized their foreign trade power, which broke the monopoly mode of government foreign trade under the highly planned economic system of China and the Soviet Union and gradually formed border trade and direct trade between enterprises, which played a very important role in the growth of Sino-Russian trade from 1992 to 1994. After China declared Heihe, Suifenhe, Manzhouli and Hunchun as ports for opening to the outside world, the region and Russia launched extensive cooperation in commodity trade, joint ventures, labor export, tourism, land leasing and other fields, and signed thousands of orders. The rapid development of local and border trade between China and Russia has changed the double-standard trade pattern dominated by trade between countries. The main reason for the rapid development of Sino-Russian economic and trade relations in this period lies in the adjustment of Sino-Russian economic and trade strategy. After the cold war, Russia adjusted its foreign trade strategy in an all-round way, focused on developing economic and trade relations with its neighbors, and put forward the concept of China-Russia constructive partnership, which sent a friendly signal to the development of Sino-Russian economic and trade relations. At the same time, the achievements of China's reform and opening up have initially appeared, and the market economic system has gradually taken shape [1, p. 9].

With the further development, the economic and legal systems closely related to it have been continuously improved, laying a solid foundation for Sino-Russian trade cooperation. However, since 1994, Sino-Russian trade has fallen sharply. Compared with 1993, the growth rate of bilateral trade between China and Russia dropped to -34 %, and the total trade volume dropped from 7.67 billion dollars in 1993 to 5.08 billion dollars in 1994. The scale of Sino-Russian trade has shrunk dramatically, which is not only a structural decline of a single commodity or a single trade situation, but a general decline of all traded commodities and all forms of trade. However, the decline of bilateral trade during this period was not due to political factors, but mainly due to the important turning point in the economic development of China and Russia. To sum up, there are several reasons for the decline in trade: First, the domestic economic situation in Russia has undergone major changes. From 1993 to 1994, Russia faced a serious economic crisis, and its GDP fell sharply due to the high inflation rate. Russia implements export quota and license system for main raw materials, petroleum, nonferrous metals and other resource commodities, which increases the non-tariff cost of Sino-Russian trade. Secondly, Russia attaches great importance to the oil and gas trade with western countries, especially with the Nordic countries, which makes the import sources of Russian light industrial products diversified, the complementarity of Sino-Russian trade further weakened, and the dominant position of Russian goods in the Russian consumer goods market no longer exists; Third, the visa-free system in Russia was also suspended in 1994, which greatly restricted the business exchanges between the two countries and indirectly hindered the development of Sino-Russian trade. Fourthly, China's domestic economic policy has changed since 1994. In order to prevent the economy from overheating, the China government has adopted a fiscal austerity policy and reduced the scale of infrastructure construction. Therefore, the demand for light metals and raw materials has further declined, which has affected Russian raw materials and machinery and equipment exported to China. Fifth, during this period, Sino-Russian trade was highly complementary, but the risk tolerance of a single trade structure was low. The establishment of the Russian Federation has not changed the distorted economic structure of the Soviet Union. Russia's main export products are still resource products. During this

period, the average proportion of export commodities is over 75 %, and imports are mainly concentrated in food and daily necessities, accounting for an average of 50 %. China's imports from Russia are mainly steel, mineral metals and raw materials. The average proportion is over 80 %, followed by animal and vegetable oils and fats, with an average proportion of over 11 %. During this period, the complementarity of Sino-Russian trade structure inevitably led to the problem of vulnerability. Once the basic economic conditions and foreign trade laws and regulations of the two countries change, it will bring great instability to Sino-Russian trade. In 1996, bilateral trade between China and Russia resumed, and the trade volume rose to 6.84 billion US dollars, with an average growth rate of 25.3 %. From 1997 to 2000, Sino-Russian trade generally showed a downward trend, which was mainly caused by unfavorable factors such as the single and limited trade structure between China and Russia, the lack of motivation in the initial trade level and changes in bilateral policies (table 1.1 and figure 1.1).

Table 1.1 – Statistics of changes in Sino-Russian trade volume from 1991 to 1999 (unit: billion US dollars) [8]

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total trade	39.0	58.6	76.8	50.8	54.6	68.5	61.2	54.8	57.2
Increase, %	-11	50.1	31.06	-33.85	7.48	25.46	-10.66	-10.46	4.38

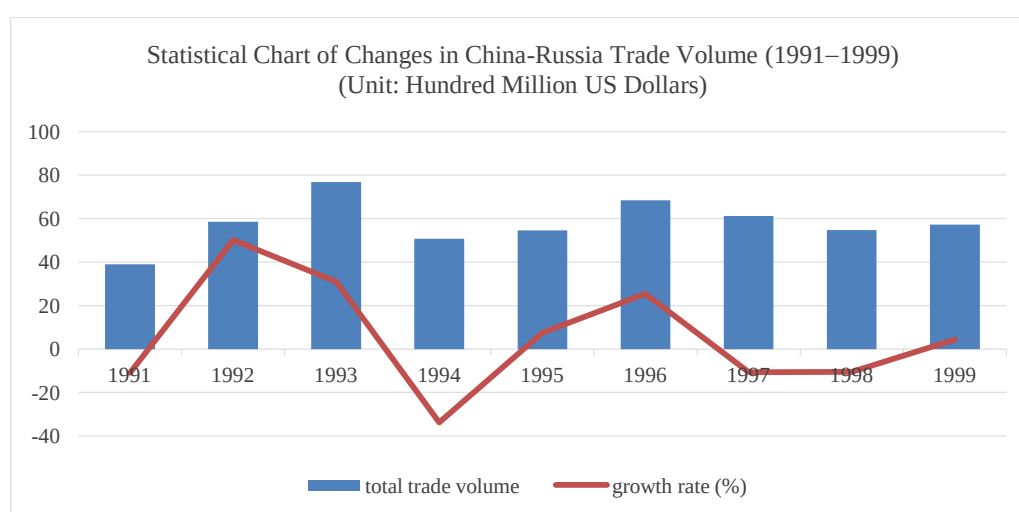


Figure 1.1 – Statistical chart of Sino-Russian trade volume from 1991 to 1999 (unit: billion US dollars) [8]

This situation changed after Putin came to power in 1999. Previously, Sino-Russian strategic partnership was more reflected in the political, military and diplomatic levels, and Putin emphasized that Sino-Russian economic and trade cooperation should become an indispensable part of Sino-Russian strategic coordination. Therefore, Sino-Russian bilateral trade has entered a new stage.

Rapid development of bilateral trade between China and Russia (2000–2012).

After President Putin took office, Russia's economy gradually recovered from the turmoil in the 1990s, especially the rising prices in the international energy market provided strong support for Russian energy exports and laid the foundation for the prosperity of Sino-Russian trade. At the same time, energy cooperation between China and Russia is also constantly strengthening. As a major energy power, Russian energy exports to China have become an important force to promote the growth of bilateral trade. On the political level, Putin regards strengthening the strategic partnership with China as the focus of his foreign policy, promoting the economic and trade ties between China and Russia, and continuously deepening the cooperation between the two countries in various fields. From 2000 to 2008, the trade volume between China and Russia increased by 40 %, 33 %, 11.8 %, 32.1 %, 34.7 %, 37.1 %, 14.7 %, 44.3 % and 18 % respectively. In 2007, the trade volume between China and Russia reached US 48.17 billion dollars, the highest point since 1992 [36, p. 100] (figure 1.2). In addition, the trade structure between China and Russia has also been optimized, from low value-added labor-intensive goods to capital or technology-intensive goods, which reflects the improvement of the quality of trade cooperation. The promotion of mutual investment, especially the cooperation in large-scale energy and infrastructure projects, has laid a solid foundation for the economic development of the two countries. These factors have jointly promoted the rapid growth of Sino-Russian trade from fluctuation. From 1992 to 2012, it reflected the complexity and dynamics of trade cooperation between the two countries and laid a solid foundation for the future development of Sino-Russian trade [49, p. 13].

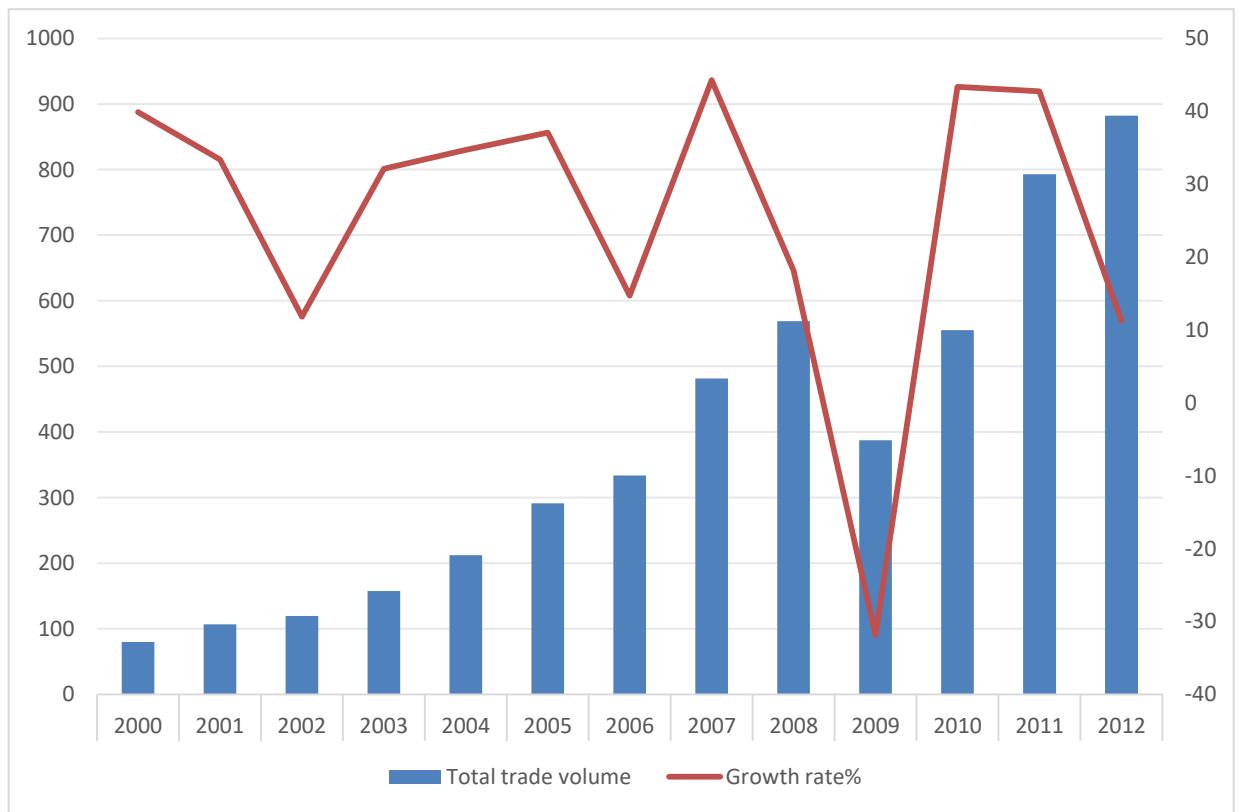


Figure 1.2 – Changes in China-Russia trade volume from 2000 to 2012 (unit: billion US dollars) [7]

Although China's exports to Russia are mainly mechanical and electrical products, light industrial products and electronic information products. In 2005, crude oil and refined oil products, steel, logs, pulp, ore and other products accounted for about 70 % of China's total imports from Russia, while oil exports still accounted for 50 % of the total growth of bilateral trade. The reasons for the rapid development of Sino-Russian trade during this period are as follows.

The Treaty of Good-Neighborliness, Friendship and Cooperation in 2001 established a long-term cooperation framework and eliminated institutional obstacles. The two countries have established a regular meeting mechanism between prime ministers to promote pragmatic cooperation in the fields of energy, science and technology and investment. For example, in 2004, China and Russia signed the Supplementary Agreement on the Eastern Section of the Sino-Russian Border, which completely solved the border dispute and created a stable environment for border trade. In addition, in 2004, Russia put forward the strategy of turning eastward, which formed a strategic connection with China's

Belt and Road Initiative and injected new impetus into bilateral trade [3, p. 18]. The trade in Xinjiang, Inner Mongolia and other border areas accounts for about 20 %, which promotes local economic development. Take Heilongjiang Province as an example. In 2002, the border trade with Russia reached US 2.33 billion dollars, accounting for 73.5 % of the total border trade between China and Russia. In 2007, it soared to US 10.73 billion dollars, a year-on-year increase of 60.4 %. Border ports such as Manzhouli and Suifenhe allow border residents to import 8,000 yuan of goods duty-free every day through the model of mutual trade zone (such as Hunchun mutual trade zone), which promotes the active non-governmental trade. From 2000 to 2007, the border trade volume between China and Russia increased from 2.2 billion to 10.7 billion dollars, which became an important support for bilateral trade.

After China joined the WTO in 2001, the tariff level dropped from 15.3 % to 9.8 %, and the market opened up, attracting Russian resource products to import. At the same time, the upgrading of China's manufacturing industry promoted the export of mechanical and electrical products. In 2005, the proportion of mechanical and electrical products exported to Russia reached 38.1 %, up 12 percentage points from 2000. From 2000 to 2008, Russia's GDP grew at an average annual rate of 7 %, and the rise in energy prices (crude oil price rose from 15.9 US dollars/barrel in 1999 to 64.28 US dollars/barrel in 2007) led to an increase in fiscal revenue and a significant increase in import capacity. In 2007, Russia's GDP reached 1.3 trillion US dollars, an increase of 94 % compared with 2000, which provided a material basis for Sino-Russian trade [32, p. 99].

The economic integration in the Asia-Pacific region is accelerating, and the geographical advantages of China and Russia are prominent. Relying on ports in trans-siberian railway and the Far East, the two countries have established a cross-border logistics network. For example, in 2006, the Sino-Russian crude oil pipeline (China branch of the East Siberia-Pacific pipeline) started construction and was put into operation in 2011, with an annual oil transportation capacity of 15 million tons, which became a landmark project of energy cooperation. In addition, regional cooperation mechanisms such as APEC promote trade facilitation. During the APEC Summit in Shanghai in 2001, China and Russia signed the Memorandum of Understanding on Regional Economic

Cooperation, which deepened cooperation in the fields of electronics and energy [17, p. 10].

In 2008, the global financial crisis led to a short-term decline in Sino-Russian trade volume, and in 2009, the trade volume fell to 38.7 billion US dollars, down 31.8 % year-on-year. China's exports to Russia were hit hard, and the export of mechanical and electrical products dropped by 25 %, mainly due to the shrinking Russian consumer market and the devaluation of the ruble. However, the two sides quickly took countermeasures: China expanded its credit support to Russia and provided Russia with a loan of 25 billion dollars in 2009 for energy cooperation; Russia reduces tariffs (the overall tariff is reduced from 10 % to 7.8 %) to simplify the customs clearance process; Russian enterprises increased their exports to China's agricultural products, automobiles and other fields. In 2010, the export of agricultural products increased by 30 % year-on-year, and the market share of Chery and Geely in Russia exceeded 5 %. In 2009, China and Russia signed the Memorandum of Understanding on Cooperation in the Oil Field to promote upstream exploration and development cooperation; China's direct investment in Russia increased from 725 million in 2008 to 1.548 billion dollars in 2010, focusing on energy, minerals and other fields.

In 2010, the trade volume between China and Russia recovered to US 50 billion dollars, up 43.3 % year-on-year, showing the resilience of bilateral trade. The development of this stage laid a solid foundation for the follow-up comprehensive strategic cooperation between China and Russia, and also accumulated experience for dealing with a more complicated international environment. 2000–2012 is a crucial period for the transformation of Sino-Russian trade from scale expansion to structural optimization. Political mutual trust, border trade, improvement of economic fundamentals and globalization dividends jointly promote the rapid growth of trade, while the impact of the financial crisis has tested the policy coordination ability of both sides [35, p. 12]. The experience of this period shows that Sino-Russian trade not only has the natural advantages of complementary resources, but also has the institutional resilience to deal with external risks, which provides important support for the upgrading of bilateral economic and trade cooperation in the new era [2, p. 5].

1.2 Sino-Russian trade development status quo

1 Sino-Russian bilateral trade.

Since the beginning of the 21st century, with the deepening and development of Sino-Russian strategic partnership, bilateral economic and trade trade has developed rapidly, and economic and trade cooperation has become the core content of Sino-Russian strategic coordination partnership [48, p. 78]. On August 23, 2012, after nearly 20 years of negotiations and struggles, Russia was finally approved to become a member of the World Trade Organization (WTO) [47, p. 157].

According to the relevant agreements reached between Russia and the WTO, Russia will gradually lower the trade threshold and further improve the level of trade facilitation after its accession to the WTO, which provides good conditions and opportunities for the development of Sino-Russian economic and trade relations, especially for the export products of Russian enterprises [6, p. 27]. Since 2016, the bilateral trade volume has increased slightly to US 66.1 billion dollars in 2016, a year-on-year increase of 2.2 %. Sino-Russian trade began to recover. In 2017 and 2018, the bilateral trade volume between China and Russia reached US 84 billion dollars and US 108.28 billion dollars, with growth rates of 20.8 % and 27.1 % respectively, maintaining rapid growth for two consecutive years, breaking through the US 100 billion dollars mark for the first time.

In 2013, the Belt and Road Initiative was linked with Russia's strategy of turning eastward to promote the upgrading of trade structure and the expansion of cooperation areas. In 2024, the bilateral trade volume reached US 244.8 billion dollars, up by 7.5 % year-on-year, and China remained the largest trading partner of Russia for 15 consecutive years [24, p. 38].

Smartphones, home appliances and new energy vehicles (such as low-temperature battery models resistant to -40°C) account for 60.3 % of exports to Russia, and Huawei and Xiaomi have a market share of over 80 % in Russia. In 2024, the export volume of automobiles reached 1.09 million. Haval ranked second in Russian passenger car sales with 12 % market share, and Zeekr became the top seller of electric vehicles with 43 % market share, driving the Russian electric vehicle market to grow by 26.4 % year-on-year.

In 2024, the cross-border e-commerce trade volume with Russia increased by 30.9 % year-on-year, and the border cities such as Hunchun reached the whole territory of Russia in 72 hours through the multimodal transport of road+railway+sea. AliExpress has established five smart warehouses in Moscow and Yekaterinburg, and 90% of the orders have reached 48 hours; JD.COM and Russia Post jointly developed the China-Russia Special Line, which increased the time limit for customs clearance by 40 %. The number of sellers in China on platforms such as Ozon has increased 30 times in three years, and Russia has become the fourth largest export market for cross-border e-commerce in China. Digital economy and artificial intelligence cooperation were included in the agenda of the meeting between the Chinese and Russian prime ministers, and the draft DEPA (Digital Economy Partnership Agreement) entered the consultations. China and Russia jointly develop a cross-border e-commerce data platform, integrate functions such as commodity display, logistics tracking, payment and settlement, support multilingual interface and electronic contract signing, and achieve accurate matching between supply and demand.

Crude oil, natural gas and coal account for 73 % of China's exports. In 2024, the import of crude oil was 108 million tons (accounting for 19.6 % of China's imports), and the gas transmission capacity of natural gas pipelines was 31 billion cubic meters. The China-China East Line natural gas pipeline runs through the whole line, and the annual gas transmission capacity has increased to 38 billion cubic meters. The Arctic LNG-3 project adopts the full value chain cooperation mode, and Russian enterprises participate in polar drilling rig manufacturing, module construction and logistics transportation, breaking the traditional energy trade mode. The export of soybeans, beef and seafood to China increased by over 20 % annually, and the trade volume of agricultural products reached 50 billion yuan in 2024, making Russia the third largest source of agricultural products imports in China. Among them, wheat exports were 275,000 tons, surpassing the United States for the first time; The export proportion of rapeseed oil, barley, sunflower oil and other categories increased significantly, with 255 Sino-Russian agricultural cooperation projects with an investment exceeding 11 billion US dollars. The Sino-Russian joint venture polyethylene production base was put into production, and the added value of wood deep processing project was increased by 20 % by introducing environmental

protection technology, such as replacing traditional fuel with biomass energy and reducing carbon emissions by 30 %.

In June 2022, BRICS leaders reached important consensus on the Framework for BRICS Digital Economy Partnership, providing a mechanism guarantee for cooperation in the digital economy [27, p. 6]. In 2023, the Development Plan for the Key Directions of Sino-Russian Economic Cooperation before 2030 defined energy, science and technology and agriculture as the core areas [29, p. 29]. In 2024, the Joint Statement on Commemorating the 75th Anniversary of the Establishment of Diplomatic Relations promoted the cooperation of the whole industrial chain, covering more than 20 agreements including biosafety, digital economy and aerospace. For example, the two sides deepened the compatibility between Beidou and GLONASS system, and jointly launched the Astor Friendship microsatellite, carrying the test load developed by Chinese and Russian universities. Suifenhe and Manzhouli ports started the pilot of electronic waybill. With the help of the Northeast-Far East special policy, an agricultural machinery factory in Harbin reduced the tariff by 65 %, shortened the customs clearance time from 7 days to 24 hours, and the export volume to Russia soared by 400 % in 2024. The China-Kyrgyzstan-Urumqi Railway started construction in April 2024, and it is estimated that the freight time between Europe and Asia will be shortened by 30 % after it is opened to traffic in 2028. The digital RMB-digital ruble direct exchange channel reduces the cross-border payment time to one hour, reduces the handling fee by 70 %, and accounts for over 95 % of local currency settlement in 2024. Heihe and Suifenhe pilot projects for the immediate settlement of digital RMB, and the capital turnover efficiency increased by 40 %. Heilongjiang Pilot Free Trade Zone launched 195 innovative cases, and the cross-border e-commerce trade volume in Hunchun exceeded 6.65 billion yuan, a year-on-year increase of 30.9 %. Through the green channel policy, the B2C package inspection rate of cross-border e-commerce has dropped from 30 % to 10 %, and the cost of single-ticket customs clearance has dropped from 80 yuan to 50 yuan.

2 Sino-Russian trade product structure.

From 2011 to 2024, the structure of China's imports from Russia was still dominated by energy and resource-based products, but it showed the characteristics of diversification

of energy categories and the growth of resources deep-processed products. According to the data of the General Administration of Customs of China, Russian exports to China in 2024 were 129.32 billion US dollars, including.

Energy products accounted for 73 %, and crude oil, natural gas and coal accounted for more than 70 %. Crude oil imports increased from 25.32 million tons in 2011 to 108 million tons in 2024, accounting for 19.6 % of China's total crude oil imports. In 2024, crude oil imports amounted to 444.1 billion yuan, accounting for nearly 50 % of the total exports to China. The East China-Russia crude oil pipeline runs stably. After the start of the Arctic LNG-3 project, the export of liquefied natural gas (LNG) to China reached 8.6 million tons, about 14 billion cubic meters. The gas transmission through the East China-China pipeline will increase from 5.9 billion cubic meters in 2019 to 31 billion cubic meters in 2024, accounting for 40 % of total natural gas imports, and will further increase to 38 billion cubic meters in 2025. From 2018 to 2024, the export of soybeans, beef and seafood to China grew at an average annual rate of over 20 %. In 2024, the trade volume of agricultural products reached 50 billion yuan, and Russia became the third largest source of agricultural products imports in China. Among them, wheat exports were 275,000 tons, surpassing the United States for the first time; Soybean imports reached 9.3 million tons, an increase of 38.8 % compared with 2023, and Russia became the second largest source of soybean imports in China.

The Sino-Russian joint venture polyethylene production base was put into production, and Tongjiang railway port imported deep-processed products such as polyethylene plastic particles in January 2024, indicating that the deep-processing capacity of Russian resources has improved. Cross-border wood processing projects in Heihe Free Trade Zone have increased the added value of wood deep processing by 20 % by introducing environmental protection technologies, such as replacing traditional fuels with biomass energy and reducing carbon emissions by 30 %.

From 2011 to 2024, China's exports to Russia increased from US 38.94 billion dollars to US 115.49 billion dollars, with mechanical and electrical products and high-tech products becoming the core of growth, especially cross-border e-commerce and new energy vehicles: the proportion of mechanical and electrical equipment and transportation

equipment in the total exports to Russia rose from 38.1 % in 2011 to 60.3 % in 2024. Smartphones, home appliances and new energy vehicles (such as low-temperature battery models resistant to -40°C) dominate the market. Huawei and Xiaomi have a market share of over 80 % in Russian smart phones, Haval ranked second in Russian passenger car sales with a market share of 12 %, and Zeekr became the top seller of electric vehicles with a share of 43 %, driving the Russian electric vehicle market to grow by 26.4 % year-on-year. In 2023, the export volume of automobiles reached US 11.655 billion dollars, and in 2024, the export volume reached 1.09 million, making it the single product with the highest export value to Russia. The cross-border e-commerce trade volume with Russia increased by 30.9 % in 2024, and the border cities such as Hunchun reached the whole territory of Russia in 72 hours through the multimodal transport of road+railway+sea. The number of sellers of AliExpress, Ozon and other platforms in China has increased by 30 times in three years, and Russia has become the fourth largest export market for cross-border e-commerce in China. The digital RMB-digital ruble direct exchange channel shortens the cross-border payment time to one hour, and reduces the handling fee by 70 %. In 2024, the local currency settlement accounted for over 95 %, of which RMB accounted for more than 60 %. China and Russia jointly develop a cross-border e-commerce data platform, integrate functions such as commodity display, logistics tracking, payment and settlement, support multilingual interface and electronic contract signing, and achieve accurate matching between supply and demand.

In June 2022, BRICS leaders reached important consensus on the Framework for BRICS Digital Economy Partnership, providing a mechanism guarantee for cooperation in the digital economy. In 2023, the Development Plan for the Key Directions of Sino-Russian Economic Cooperation before 2030 defined energy, science and technology and agriculture as the core areas. In 2024, the Joint Statement on Commemorating the 75th Anniversary of the Establishment of Diplomatic Relations promoted the cooperation of the whole industrial chain, covering more than 20 agreements such as biosafety and digital economy.

Trade facilitation measures: the pilot project of electronic waybill at Suifenhe Port reduced the declaration time from 3 minutes to 1.5 minutes, and improved the

comprehensive customs clearance efficiency by 100 %. The China-Kyrgyzstan-Urumqi Railway started construction in April 2024, and it is estimated that the freight time between Europe and Asia will be shortened by 30 % after it is opened to traffic in 2028.

30 % of Russian banks were excluded from the SWIFT system due to sanctions imposed by the United States and Europe, but both sides responded to risks through local currency settlement (accounting for over 95 %) and blockchain financial platform [45, p. 23]. Russia has increased the import of alternative technologies from China, such as medical equipment and industrial parts. Russian enterprises reduce costs through localized production (for example, Geely and Chery set up factories in China). In 2024, China's direct investment in increased by 18 % year-on-year, focusing on energy, minerals and high-tech fields.

Green transformation and cooperation in emerging fields.

Xudabao nuclear power plant and Arctic LNG-3 project landed, and the cooperation of hydrogen energy industry chain started. Sino-Russian joint research and development of non-platinum catalyst hydrogen energy battery, using 2–4 nm porous material carrier, reducing costs and improving efficiency.

China and Russia jointly launched the Astor Friendship microsatellite, carrying the experimental load developed by universities; Ozon set up a logistics center in China, and the number of sellers in China increased by 30 times in three years. Through the AI document review system, the EAC certification status was automatically recognized to avoid compliance risks.

Through the analysis of Sino-Russian trade structure, it is found that the main categories of Sino-Russian bilateral trade goods are inconsistent and have strong trade complementarity. From 2011 to 2024, the trade structure between China and China was characterized by energy dominance, technological breakthrough and green transformation's exports to Russia were upgraded from labor-intensive to technology-intensive, and Russia's exports to China were expanded from rough processing of resources to deep processing of resources+agricultural products. Despite structural dependence and logistics bottlenecks, through policy coordination, technological innovation and regional cooperation, the two sides are gradually building a multi-polar and

sustainable trade pattern. In the future, with the opening of the China-Kyrgyzstan-Uzbekistan railway, the development of the Arctic waterway and the popularization of digital RMB settlement, Sino-Russian trade is expected to exceed 300 billion US dollars in 2025 and become a model of global South-South cooperation.

3 The status of Sino-Russian trade in international trade.

In 2024, the trade volume between China and Russia reached US 244.8 billion dollars, up 1.9 % year-on-year, accounting for 0.74 % of the total global trade in goods (US 33 trillion dollars). Although this ratio is lower than that of China and the United States (2.08 %) and Central Europe (2.38 %), the growth rate is remarkable-the trade volume has doubled in the past five years, and the compound growth rate from 2020 to 2024 is 17.8 %, far exceeding the global average. If re-export trade is included, the actual proportion may be close to 1 %. Russia is China's fifth largest trading partner (the top four are ASEAN, the European Union, the United States and South Korea). In 2024, its exports to China accounted for 33.8 % of its total exports, and its imports accounted for 28.7 %. Energy imports (crude oil and natural gas) guarantee 19.6 % of China's crude oil demand and 40 % of pipeline natural gas supply, which is the core source of energy security. China has been the largest trading partner of Russia for 15 consecutive years, accounting for 33.8 % of its total foreign trade, far exceeding India's second largest partner (8.8 %). Exports to China support 30 % of Russia's fiscal revenue, and imports of mechanical and electrical products fill 40 % of its manufacturing equipment gap.

Sino-Russian trade has been upgraded from the traditional mode of resources for technology to a new partnership of strategic synergy and innovation drive, which plays a triple role as an energy stabilizer, a technology substitute and a rule test field in global trade. Despite structural dependence and geopolitical risks, its growth resilience (doubled in the last five years), policy coordination (95 % in local currency) and regional influence (33.8 % in Russian foreign trade) make it the key fulcrum of a multipolar world. With the opening of the China-Kyrgyzstan-Uzbekistan railway, the development of the Arctic waterway and the popularization of digital RMB, Sino-Russian trade is expected to exceed 300 billion US dollars in 2025, providing a new paradigm of non-Westernization for global trade governance.

1.3 Analysis of the problems in Sino-Russian trade

1 The growth of trade scale does not match the global status, and the growth rate faces structural bottlenecks.

In 2024, the trade volume between China and Russia reached US 244.8 billion dollars, up only 1.9 % year-on-year, which was significantly lower than the high growth rates in 2021 (35.9 %) and 2022 (26.3 %). This slowdown is not only affected by the fluctuation of international oil price (Brent crude oil price dropped from 123/barrel in 2022 to 85/barrel in 2024), but also reflects the diminishing marginal effect of energy-dependent growth model. In 2024, the growth rate of China's exports to Russia (4.1 %) was lower than that of India (12.7 %) and Turkey (9.3 %), and its market share was squeezed. The trade volume between China and Russia accounted for 2.4 % of total foreign trade (in 2024), which was higher than that in 2019 (1.7 %), but still far lower than that in China, the United States (6.7 %) and Central Europe (7.7 %). As China's fifth largest trading partner, Russia's market size is only 1/5 of that of ASEAN and 1/3 of that of EU, reflecting that the bilateral trade potential has not been fully released. In 2024, China's direct investment in Russia was about US 3.2 billion dollars (up 18 % year-on-year), but it was mainly concentrated in the fields of energy and minerals (accounting for 65 %), while Russia's investment in China was only US 120 million dollars, less than 4 % of China's investment in Russia. The investment cooperation between the two sides in the fields of high technology and agricultural deep processing is still in its infancy. In 2024, Sino-Russian joint R&D projects only accounted for 3.8 % of China's international cooperation projects (figure 1.3).

2 The trade structure is deeply dependent on energy and low-end manufacturing, and its ability to resist risks is insufficient.

Vulnerability of energy unipolar dominance

Energy is the main commodity imported by China from Russia, including oil, natural gas and coal [28, p. 8]. Energy products accounted for 73 % of Russia's exports to China (in 2024), of which the total exports of crude oil, natural gas and coal exceeded 92 billion dollars.

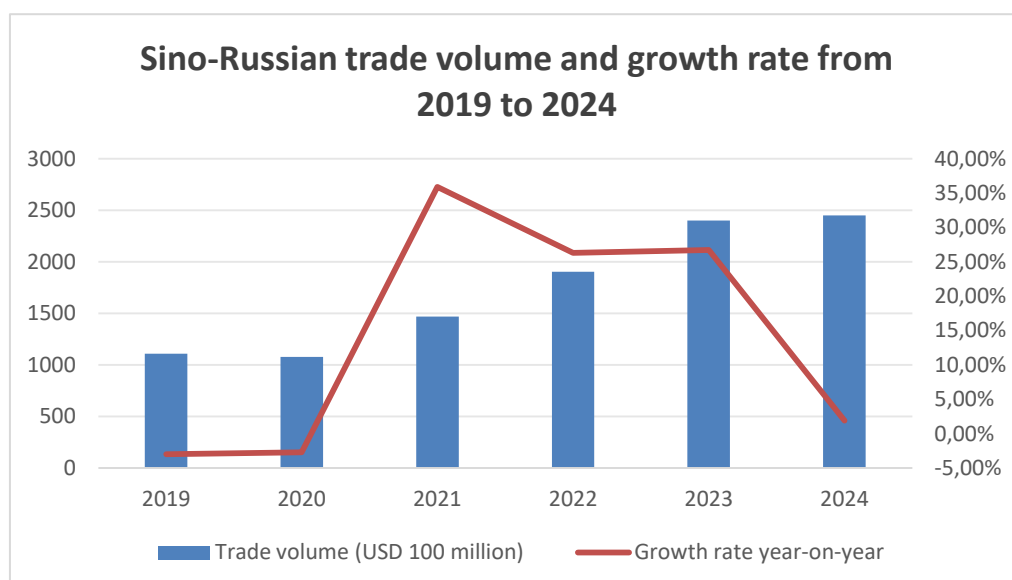


Figure 1.3 – Trade volume and growth rate between China and Russia from 2019 to 2024 [42]

From the specific composition, crude oil accounts for 50 % (444 billion yuan), natural gas accounts for 8 % (92.8 billion yuan) and coal accounts for 7 % (77.8 billion yuan), which together account for 65 % of Russia's total exports to China. This energy dependence makes the trade volume vulnerable to international price fluctuations: every 10 % fluctuation of international energy prices will directly affect the trade volume between China and Russia by about 20 billion US dollars. For example, in 2024, the price of Brent crude oil dropped from 123/barrel in 2022 to 85/barrel, and the export of crude oil alone decreased by about 15 billion dollars (figure 1.4).

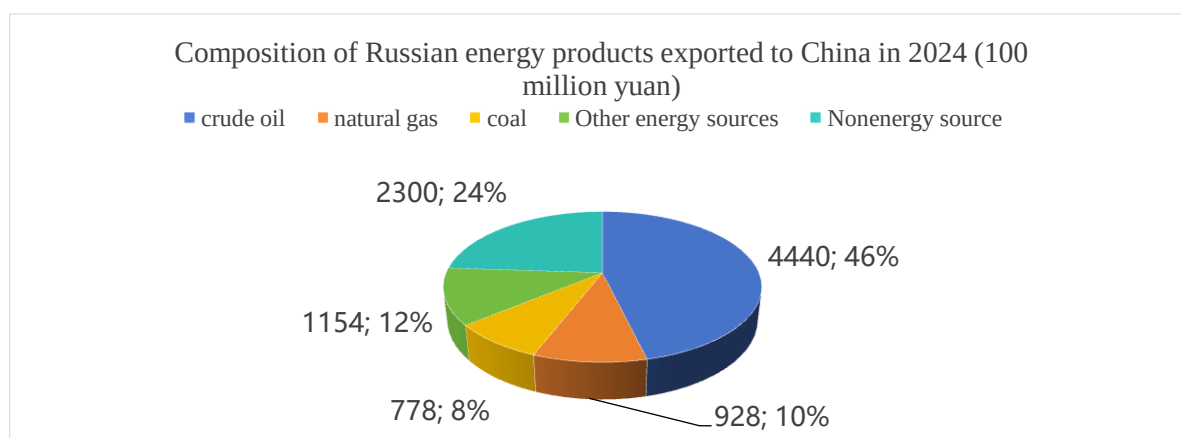


Figure 1.4 – Composition of Russian energy exports to China in 2024 [15]

The EU carbon tariff (CBAM) further aggravates the risk [18, p. 92]. Although CBAM is mainly aimed at steel, aluminum and other industries at present, in response to the sanctions, Russia has imposed a 15–25 % carbon border adjustment tax on steel and fertilizer exported from the European Union since April 2025, resulting in an increase of about 5 % in Russian export costs and indirectly pushing up the import costs of downstream industries such as steel and aluminum products in China. For example, in 2024, the cost of Russian steel exports to China increased by about 320 million US dollars due to carbon tariffs, and the profit margin of China's automobile and construction industries decreased by 1.2 percentage points.

The hidden trouble of China's export increase in quantity and decrease in quality.

China's exports of mechanical and electrical products to Russia accounted for 60.3 % (in 2024), but the structural problems were prominent: low-end products such as smart phones (with an average price of 180 dollars) and household appliances (with an average price of 120 dollars) dominated, while high-tech products such as high-end chips and industrial robots only accounted for 12 %. For example, in 2024, China exported about 50 million mobile phones to Russia, but the average price was 22 % lower than the global market, and it lacked core technologies such as 5G chips. At the same time, Russian imports of high-tech products (such as semiconductor equipment) from China only account for 4.2 % of its similar imports, which is far lower than that from South Korea (38 %) and Japan (27 %) (figure 1.5).

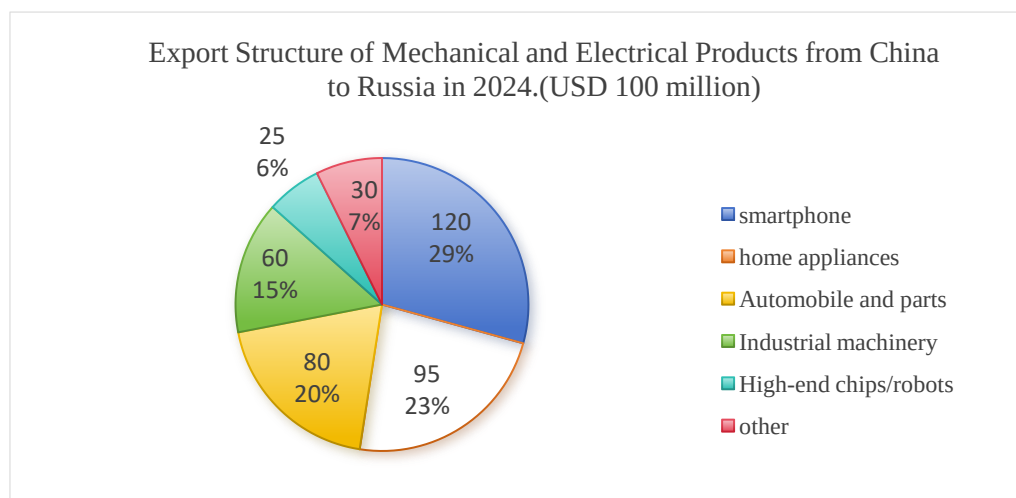


Figure 1.5 – Structure of China's electromechanical exports to Russia in 2024 [20]

Although China's automobile exports are outstanding (1.09 million vehicles were exported to Russia in 2024, valued at 110 billion yuan), its core components still depend on imports. For example, 92 % of China cars in the Russian market use Korean gearboxes and Japanese engines, and the matching rate of local supply chains is less than 15 %.

Structural gap between agricultural products and deep-processed products.

From 2015 to 2024, three categories of primary products – vegetable oils (rapeseed oil, sunflower oil), fish, and grains (barley, wheat) – consistently accounted for over 70 % of Russia's agricultural exports to China. For example, vegetable oil imports reached 2.58 billion dollars in 2023, comprising 29.3 % of total agricultural imports from Russia, while rapeseed oil and barley together accounted for 23 % in 2024 [21, p. 3].

In 2024, Russia's meat exports to China totaled only 560 million dollars, with 80 % being primary processed products like frozen chicken breasts, with 40 % lower added value than similar EU products. This structure remains largely unchanged from 2015, indicating minimal improvement in deep-processing over a decade. Although total export value increased by 105 % from 3.411 billion in 2015 to approximately 7 billion in 2024, the growth in primary product exports was driven primarily by price increases rather than technological upgrades. For instance, vegetable oil imports surged by 99.5 % year-on-year in 2023, but processing remained concentrated at the primary stage (e.g., pressing).

Deep-processed products are limited to a few categories such as chocolate and candies. In 2024, chocolate exports reached 150 million, accounting for 12.5 % of deep-processed product exports, while categories like milk powder and prepared meals remain in their infancy. For example, China imported only 70 million dollars worth of dairy products from Russia in 2023, less than 1 % of total agricultural imports [43, p. 115]. Although chocolate exports grew 20-fold from 7 million dollars in 2015 to 150 million in 2024, they still represent just 2.1 % of total agricultural exports.

Russian agricultural processing enterprises generally lack cold-chain logistics and food research and development capabilities, as shown in table 1.2. For example, frozen chicken breasts exported to China in 2024 were only minimally processed (e.g., cutting and packaging), while similar EU products are pre-seasoned and ready-to-cook, commanding a 40 % higher unit price. Russian deep-processed food products have weak

brand influence in China, with consumers preferring European, American, or domestic brands. In 2024, Russian products accounted for only 3.2 % of China’s chocolate import market, far below Belgium (28 %) and Switzerland (22 %).

Table 1.2 – Core data of Russian agricultural exports to China from 2015 to 2024 [16]

Year	Total export	Proportion of primary products	Proportion of deep processing products	Main export categories and proportion	Deep processing represents the category and scale
2015	34.11	89 %	11 %	fish (45 %), oilseeds (22 %), grain (15 %)	chocolate (0.07 billions of dollars)
2016	38.42	88 %	12 %	fish (42 %), plant oil (18 %), oilseeds (17 %)	chocolate (0.12 billions of dollars)
2017	40.08	87 %	13 %	fish (39 %), plant oil (21 %), oilseeds (16 %)	chocolate (0.18 billions of dollars)
2018	51.46	86 %	14 %	plant oil (25 %), fish (32 %), oilseeds (18 %)	chocolate (0.25 billions of dollars)
2019	54.11	85 %	15 %	plant oil (28 %), fish (29 %), oilseeds (17 %)	chocolate (0.32 billions of dollars)
2020	54.75	84 %	16 %	plant oil (31 %), fish (27 %), oilseeds (19 %)	chocolate (0.41 billions of dollars)
2021	68.3	85 %	15 %	plant oil (33 %), fish (25 %), grain (18 %)	chocolate (0.65 billions of dollars)
2022	88	85 %	15 %	plant oil (35 %), fish (23 %), grain (20 %)	chocolate (0.89 billions of dollars)
2023	76	85 %	15 %	plant oil (34 %), fish (22%), grain (21 %)	chocolate (1.2 billions of dollars)
2024	70	85 %	15 %	colleseed oil (13 %), barley (10 %), sunflower seed oil (8 %)	chocolate (1.5billions of dollars)

Russia’s agriculture is dominated by crop farming and fisheries, with crop farming accounting for 68 % of agricultural output value in 2023, while food processing represents only 18 %. This industrial structure has led to a heavy reliance on raw material exports [10, p. 23]. From 2015 to 2024, annual investment growth in Russia’s food processing industry averaged just 3.2 %, far below that of crop farming (8.5 %). For example, Russia’s vegetable oil refining capacity accounted for only 5 % of the global total in 2023, with 80 % of equipment dependent on imports. China has strict import standards for deep-processed foods, requiring Russian enterprises to obtain certifications such as HACCP and ISO to enter mainstream markets. In 2024, for instance, only three Russian pork

enterprises obtained Chinese market access qualifications.

3 Lack of strategic alignment and rule coordination, and prominent institutional obstacles.

The deep integration of the Eurasian Economic Union (EAEU) and the Belt and Road Initiative (BRI) is a significant challenge. The EAEU, promoted by Russia, focuses on aligning with EU standards, such as adopting the EU's CE certification system. In contrast, China's BRI emphasizes infrastructure connectivity and market expansion in developing countries, leading to differences in goals between the two sides in Central Asian projects [44, p. 72]. For example, the China-led Central Asia-Uzbekistan-Uzbekistan railway and the Russia-promoted North-South Corridor railway have been in competition for routes. It was only in 2024 that both sides reached an agreement to integrate the routes, three years behind the original plan.

Double threshold of trade rules and certification system.

Russia's GOST-R certification process, which can take 6 to 8 months, differs from the internationally recognized ISO standards, increasing certification costs for Chinese automotive and home appliance companies by 20 % to 30 %. In 2024, China's truck exports to Russia fell by 19 % year-on-year, with some companies facing inventory overstock of more than 100,000 vehicles due to delays in obtaining timely certification [26, p. 21]. Additionally, Russia's Digital Service Tax (DSA) imposes an additional 3 % tax on Chinese e-commerce platforms, higher than the 1.5 % rate for local businesses. In 2024, truck exports declined by 19 %, with about 30 % of orders canceled due to certification delays exceeding 6 months. For example, a Shaanxi Auto model had to modify its exhaust system due to differences between Russian standards (such as GOST 52922-2008) and ISO standards, causing a 4-month delay in certification and the loss of over 20,000 orders. Similarly, a Haier refrigerator model faced a 7-month certification period due to differences in the GOST-R energy efficiency testing method compared to IEC standards, missing the Black Friday sales season and losing approximately 50 million dollars in sales (table 1.3).

Table 1.3 – China's exports of trucks, automobiles and home appliances to Russia [12]

Year	Truck exports (unit: 10,000 units)	Year-on- year growth, %	Automobile exports (unit: 10,000 units)	Year-on- year growth, %	Home appliance exports (unit: billion US dollars)	Year-on- year growth, %
2014	1.2	-	3.5	-	12.5	-
2015	1.5	+25 %	4.2	+20 %	14.8	+18.4 %
2016	1.8	+20 %	5.1	+21.4 %	20.1	+16.2 %
2017	2.1	+16.7 %	6.3	+23.5 %	23.5	+16.9 %
2018	2.3	+9.5 %	7.8	+23.8 %	27.2	+15.7 %
2019	2.5	+8.7 %	9.5	+21.8 %	31.8	+16.9 %
2020	2.8	+12 %	11.2	+17.9 %	38.5	+21.1 %
2021	3.2	+14.3 %	15.6	+39.3 %	38.5	+21.1 %
2022	5.8	+81.2 %	90.9	+482.7 %	47.2	+22.6 %
2023	14.34	+147.2 %	115.8	+27.4 %	56.8	+20.3 %
2024	11.53	-19 %	115.8	-	62.3	+9.7 %

Competition in the third-party market has intensified.

India used the Russian-Indian trade settlement mechanism (settled in rupees-roubles) to significantly reduce tariffs. In 2024, the export growth rate to Russia reached 12.7 %, mainly seizing China's share in the fields of mechanical parts (up to 18 %) and medicines (up to 22 %). Turkey's tariff on ceramic tiles and textiles exported to Russia was reduced to zero through FTA, and its market share reached 7.5 % in 2024, surpassing China's (6.8 %).

4 Shortcomings in the logistics and financial system restrict the improvement of efficiency.

80 % of China-Russia land freight depends on trans-siberian railway, and the speed of the Mongolian section is only 30 kilometers per hour. In 2024, 300,000 tons of electronic products were stranded at Suifenhe Port due to lack of transportation capacity, and the average detention time was extended from 2 days to 7 days, and the additional cost increased by 10–15 %. The annual navigation period of the Arctic waterway is less than six months. In 2024, the freight volume passing through the waterway only accounted for 4.2 % of the Sino-Russian shipping volume, far below the expected 15 %.

The challenge of increasing quantity and decreasing profit in local currency settlement.

Although local currency settlement accounts for 95 % (in 2024), RMB accounts for

only 17 % of Russia's foreign exchange reserves and is mainly used for energy trade settlement. Small and medium-sized enterprises still rely on third-party transit (such as Hong Kong banks) for cross-border payment, and the handling fee is as high as 1.2–1.5 %, which is 2–3 times that of US dollar settlement. Although the digital RMB-digital ruble direct exchange channel has been opened, it only covers 20 % of the border trade scenes, and the penetration rate is insufficient.

The EU's New Battery Law (implemented in 2024) requires carbon tariffs on imported batteries, and China's new energy vehicle batteries exported to Russia face additional costs (about 500 US dollars/vehicle) [40, p. 155]. After the revision of Russia's Environmental Code, the formaldehyde emission standard for wood processing projects was raised to 0.05 ppm (the original standard was 0.1 ppm), which led to a 30 % increase in the upgrading cost of China's wood enterprises in Russia.

Chapter 2 Sino-Russian trade competitiveness and complementarity analysis

2.1 China and Russia complementary trade analysis

This chapter analyzes the competitiveness and complementarity of Sino-Russian trade. Among them, Sino-Russian trade is complementary to some extent. In foreign trade, according to the theory of comparative advantage, China and Russia should give full play to their respective comparative advantages in order to maximize the interests of both sides. Therefore, in order to understand the competitiveness and complementarity of Sino-Russian trade, this paper introduces several measurement indicators and provides countermeasures to optimize the trade structure between the two countries.

Sino-Russian trade is obviously complementary, and the two countries show their respective comparative advantages in different fields. China is competitive in labor-intensive products and machinery and equipment, while Russia is good at resource-based products. Although there is competition in some industries such as hardware, plastics and jewelry, on the whole, the complementarity of trade between the two countries is greater than competitiveness. Empirical research shows that the trade structure between China and Russia is characterized by strong complementarity and weak competitiveness. Under the Belt and Road strategy, there is great potential for trade cooperation between the two countries, especially in labor-intensive manufactured goods and primary products. By optimizing the trade structure and improving the quality of trade products, Sino-Russian trade is expected to diversify, further tap the potential of bilateral trade and promote the common economic development of the two countries [51, p. 16].

The present situation of Sino-Russian trade shows the characteristics of rapid growth and high complementarity. Russia has become China's sixth largest trading partner. This increase is largely attributed to the fact that Russia faced western sanctions and shifted its trade focus to the east, especially China, in order to reduce the impact of sanctions on its economy. In terms of trade structure, Sino-Russian trade is highly complementary. China imported a lot of energy resources from Russia, such as oil and natural gas. At the same time, Russia also imported a large number of manufactured goods

and consumer goods from China. In 2023, Russia surpassed Saudi Arabia and became the largest crude oil importer in China.

From 2007 to 2023, the total trade volume between China and Russia continued to grow, reaching the peak of nearly 10 years in 2023, indicating that Sino-Russian trade is still growing [19, p. 77]. As can be seen from figure 2.1, the total trade volume between China and Russia in 2009, 2015 and 2016 decreased significantly compared with the previous year. This is due to the impact of the international financial environment and crisis and some local factors. In addition, the drop in international oil prices in 2015 had a great impact on Russia, the main oil importer of China, which led to a significant reduction in the total trade volume between China and Russia. After entering the 21st century, with the international strategy of Belt and Road put forward by China and further promoted, the total trade volume between China and Russia has further increased. With the further establishment of friendly relations between the two countries, trade barriers between the two countries have been reduced, and trade has become more convenient and accelerated. In 2018, the total trade volume between China and Russia exceeded the 100 billion dollars mark. Subsequently, from 2019 to 2023, the total trade volume between China and Russia remained above 100 billion US dollars for five consecutive years, and even exceeded 200 billion US dollars in 2023. China's share in Russia's foreign trade continues to rise, consolidating its position as Russia's largest trading partner. This series of changes reflects the deepening of Sino-Russian trade cooperation and the adaptability and development potential of the two countries in the face of global economic challenges.

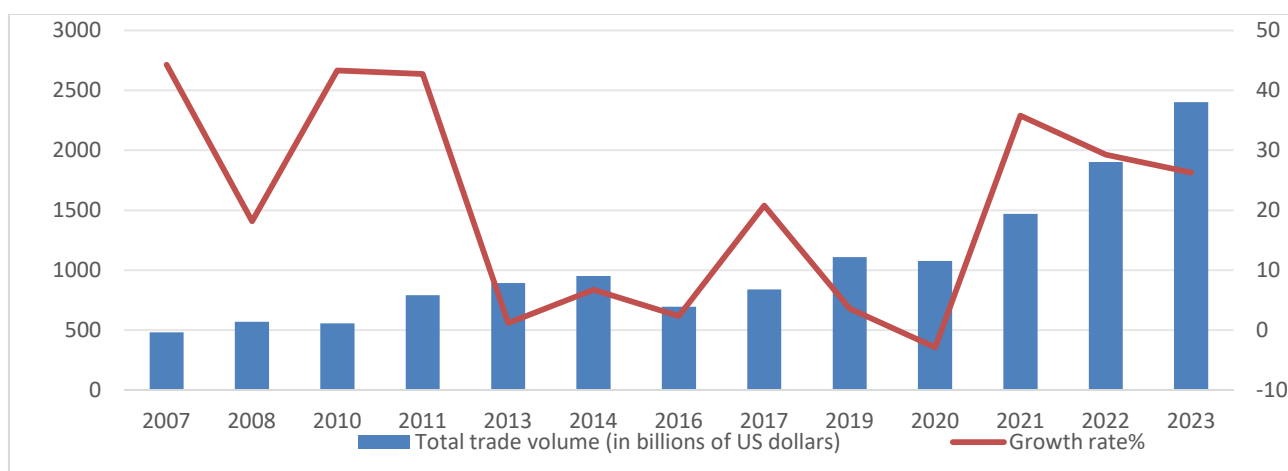


Figure 2.1 – Total trade volume between China and Russia from 2007 to 2023 (in billions of dollars) [41]

The trade volume between China and Russia grew from 89.2 billion dollars in 2013 to 244.8 billion in 2024, a 174 % increase. In 2022, the growth rate surged to 29.3 % due to the Russia-Ukraine conflict. The deficit widened to 38.03 billion in 2022 but gradually narrowed [31, p. 85]. From 2014 to 2016, the trade volume declined due to falling energy prices. After 2017, it began to recover and grow again. In 2022, Western sanctions accelerated the shift in trade, making China a core partner in Russia's supply chain [22, p. 81] as shown in figure 2.2 and table 2.1 below.

Table 2.1 – Import and export of bilateral trade between China and Russia from 2013 to 2024 [5]

Year	Total trade (billion US dollars)	year- on-year growth	China's exports (billion US dollars)	China's imports (billion US dollars)	Trade balance (China deficit +)
2013	892	-	496.8	395.2	-101.6
2014	953	6.80 %	536.8	416.2	-120.6
2015	680.6	-28.60 %	349.5	331.1	-18.4
2016	695.6	2.20 %	372.9	322.7	-50.2
2017	840.7	20.80 %	428.8	411.9	-16.9
2018	1070.6	27.10 %	507.9	562.7	54.8
2019	1107.5	3.40 %	523.5	584	60.5
2020	1076.5	-2.80%	492.6	583.9	91.3
2021	1468.7	36.40 %	675.6	793.1	117.5
2022	1902.7	29.30 %	761.2	1141.5	380.3
2023	2401.1	26.20 %	1109.7	1291.4	181.7
2024	2448.2	1.90 %	1155	1293.2	138.2



Figure 2.2 – Import and export of bilateral trade between China and Russia from 2013 to 2024 [5]

China-Russia cooperation has achieved a series of achievements in trade, investment, energy and other fields [53, p. 37]. In terms of Sino-Russian energy cooperation, China has always been Russia's largest oil and energy trading country. At the same time, Russian natural gas and coal energy products are also very abundant in China. In 2023, Russia provided China with 22.7 billion cubic meters of natural gas, 700 million cubic meters higher than the export volume stipulated in the contract and 1.5 times the supply in 2022. From the perspective of trade growth potential, it is expected that Sino-Russian trade will continue to advance in adversity. The increasing pressure on traditional energy and related industries highlights the opportunities for cooperation between green energy and technological innovation. By 2024, the growth potential of Sino-Russian trade is expected to reach about 15 %, but it also faces the risk of western sanctions and energy import restrictions. The proportion of local currency settlement in Sino-Russian trade has increased year by year, which has brought certain benefits to the economic development of the two countries.

When analyzing the competitiveness and complementarity of Sino-Russian trade, we can quantify this relationship from the perspective of global industrial chain. According to the research of Institute of World Economics and Politics of Chinese Academy of Social Sciences, the roles of China and Russia in the global industrial chain have undergone significant changes. The competitiveness and complementarity of Sino-

Russian trade are interdependent, and complementarity promotes competitiveness. There is no fixed complementarity, and there is no fixed competitiveness. By further strengthening Sino-Russian cooperation, the two countries can continue to develop complementarity, strengthen trade ties, realize mutually beneficial trade, and promote the sustainable development of high technology through competition. Generally speaking, China and Russia face both competition and complementary advantages in the field of trade. By deepening cooperation, the two sides can achieve a win-win situation in highly complementary fields, while promoting industrial transformation and technological innovation through mutual cooperation in the field of competition.

First, regarding China's position in Russia's foreign trade, as shown in table 2.2, the total Sino-Russian trade volume has been growing in recent decades, and the status of the two countries in each other's trade has gradually improved. Russia's dependency on Chinese trade has continuously increased, as reflected by the sustained rise in the proportion of Sino-Russian trade in Russia's total foreign trade [9, p. 95]. The leap in Sino-Russian trade dependency has gone through three stages: Foundation Period (2008–2013): The proportion stabilized at 7–10 %. China mainly exported mechanical and electrical products and imported energy, with trade significantly influenced by fluctuations in international oil prices. Acceleration Period (2014–2020): Western sanctions and the Belt and Road Initiative (BRI) promoted the de-westernization of Sino-Russian trade. The proportion increased from 11 % to 19 %, and China firmly established itself as Russia's largest trading partner [4, p. 1]. Explosive Growth Period (2021–2024): Geopolitical conflicts prompted a full-scale shift of Russia's supply chains toward China. The proportion exceeded 30 % in 2022 and reached 35 % in 2023, meaning nearly one out of every three U.S. dollars in Russia's foreign trade was related to China.

Structural driving factors include in 2023, China's imports of crude oil, natural gas, and coal from Russia accounted for 68 % of Russia's exports to China and 45 % of Russia's total energy exports, serving as the core pillar of trade dependency. After Western automakers withdrew in 2022, the market share of Chinese automobiles in Russia surged from 19 % to 51 % in 2023, while the proportion of mechanical and electrical products in China's exports to Russia rose from 45 % to 58 %. The proportion of local currency

settlement between China and Russia increased from 15 % in 2018 to 92 % in 2023, eliminating exchange rate risks and boosting trade scale [46, p. 90]. Russia's import dependency on Chinese mechanical and electrical products rose from 38 % in 2013 to 72 % in 2023, with critical components (such as automotive chips and machine tools) highly reliant on China, reflecting supply chain security. In 2023, local currency settlement covered 95 % of energy trade, weakening the U.S. dollar's pricing power and promoting the diversification of the international monetary system. The Sino-Russian trade network has extended to Central Asia and the Middle East. In 2023, transit trade through Kazakhstan increased by 140 %, forming a de-westernized supply chain corridor and achieving geo-economic restructuring (table 2.2, figure 2.3).

Table 2.2 – Trade dependence between China and Russia from 2008 to 2024 (unit: billion US dollars, %) [11]

Year	Total trade between China and Russia	Total foreign trade of Russia	proportion	China's ranking among Russia's trading partners
2008	568.3	7342.38	7.74 %	3
2009	387.9	5437.92	7.13 %	3
2010	596.47	6724.59	8.87 %	3
2011	836.13	8682.59	9.63 %	2
2012	881.6	8501.3	10.37 %	2
2013	889.24	8442.13	10.53 %	2
2014	885.24	7829.11	11.31 %	1
2015	680.6	4932.3	13.80 %	1
2016	695.95	4712.05	14.77 %	1
2017	840.71	5840.32	14.39 %	1
2018	1070.6	6807.4	15.73 %	1
2019	1109.4	6728.34	16.49 %	1
2020	1077.7	5719	18.84 %	1
2021	1468.7	6584.3	22.31 %	1
2022	1902.7	6178.5	30.80 %	1
2023	2401.1	6845.2	35.08 %	1
2024	2448.2	7000	35.00 %	1

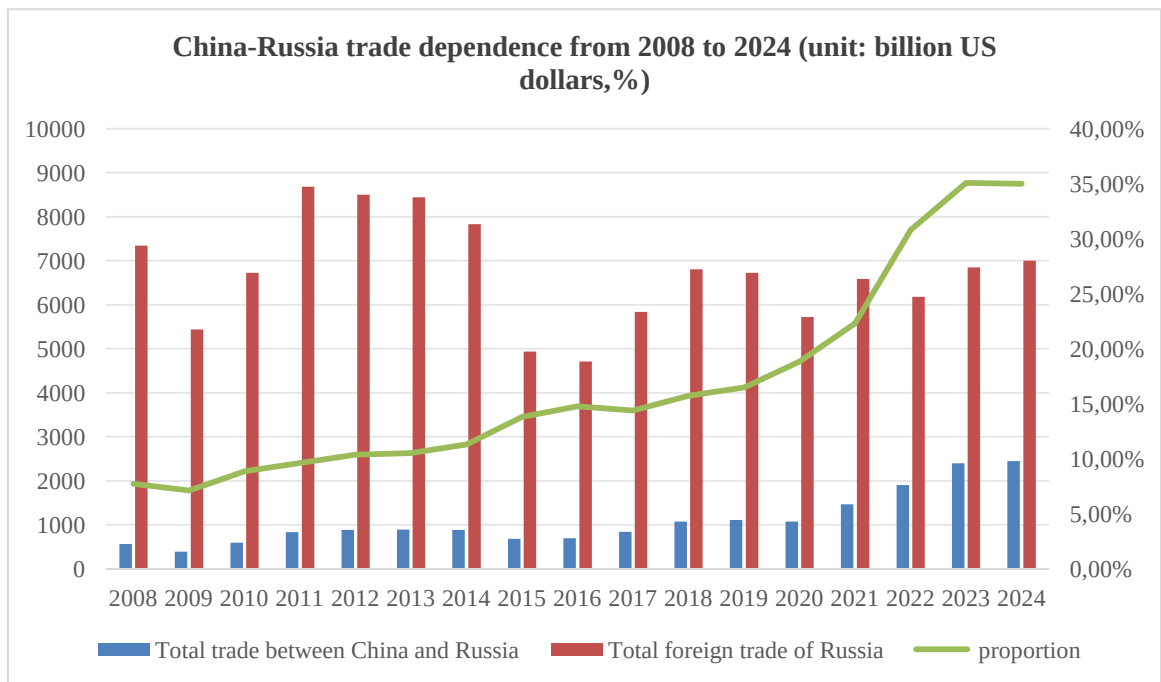


Figure 2.3 – Trade dependence between China and Russia from 2008 to 2024 (unit: billion US dollars, %) [11]

The complementarity of bilateral trade between China and Russia stems from the differences in economic structure, resource endowment and industrial division of labor between the two countries, which is embodied in three dimensions: industrial structure, production factors and product structure, and is deepening under the promotion of policies. The following analysis is based on the latest data and cases.

1 Complementarity of industrial structure: the natural match between manufacturing and resource-based economy.

China: a global manufacturing hub, with obvious advantages in light industry and electromechanical industry.

The manufacturing scale is leading the world.

In 2023, the added value of China's manufacturing industry reached 33 trillion yuan (about 4.6 trillion US dollars), accounting for 30 % of the global added value of manufacturing industry, 18.3 times that of Russia (the added value of Russian manufacturing industry was 251.577 billion US dollars). This gap is reflected in the coverage of the whole industrial chain: China has 41 industrial categories, 207 middle categories and 666 sub-categories, while Russian manufacturing industries are

concentrated in the fields of energy equipment and military industry, and the supporting rate of civil industries is less than 40 % (table 2.3).

Table 2.3 – Comparison of added value of Chinese and Russian manufacturing industry in 2023 [13]

Country	Added value of manufacturing industry (USD 100 million)	Global proportion
China	46,000	30 %
Russia	2,515.77	1.6 %

The export of mechanical and electrical products leads the trade with Russia.

In 2024, China's exports of mechanical and electrical products to Russia accounted for 60.3 %, amounting to about 70 billion US dollars, of which automobiles and parts, smart phones and home appliances constitute three core categories. Automobiles and spare parts the export value of automobiles with cylinder capacity of 1,500–3,000 ml is 8.56 billion US dollars, accounting for 14.99 % of China's TOP100 products exported to Russia. The market share of krypton brand new energy vehicles reached 43 %, and in 2024, it exported 1.09 million vehicles to Russia. Smartphones Together, Huawei and Xiaomi occupy 80 % of the Russian market. In 2024, the export value was US 2.67 billion dollars, accounting for 4.67 % of China's exports to Russia. Household appliances Haier, Hisense and other brands have a market share of over 35 % in Russia. In 2024, their exports reached 9.5 billion US dollars, up 12 % year-on-year.

Light industry fills the structural gap in Russia.

The output value of Russian light industry accounts for only 5 % of GDP, while China's textiles, furniture and daily necessities account for 45 % of Russian import market. In 2024, the cross-border e-commerce trade volume with Russia increased by 30.9 % year-on-year. AliExpress, Ozon and other platforms became the main channels, of which clothing products accounted for 62 %, and the average price was 30 % lower than that of local brands.

Russia: a powerful country in energy and heavy industry, with light industry

dependent on imports.

Energy exports dominate the global market

In 2024, Russia's energy exports to China reached 92 billion dollars, accounting for 73 % of its total exports to China. The specific composition is as follows: crude oil exports amounted to 108 million tons (19.6 % of China's imports), valued at 61.66 billion, which represents 49.22 % of Russia's TOP100 export products to China. Natural gas pipeline exports amounted to 31 billion cubic meters (40 % of China's imports), valued at 8.04 billion; liquefied natural gas (LNG) exports were 8.6 million tons, valued at 5.6 billion. Coal exports totaled 95.22 million tons, valued at 7.78 billion, representing 12 % of China's coal imports.

Military industry and high-end equipment technology export.

China and Russia have close cooperation in the fields of nuclear power, aerospace and Arctic energy development. The installed capacity of Unit 1 of Xudabao Nuclear Power Station is 1,291 MW, and it is expected to be put into operation in 2028 independent third-generation nuclear power technology Hualong No.1 is adopted, and the localization rate is over 85 %. The Spectrum -RG astronomical satellite jointly developed has been launched, and the Sino-Russian lunar research station project has entered the preliminary design stage. The Arctic LNG-3 project is planned to start in 2025, with an estimated annual output of 19.8 million tons of LNG. China enterprises will participate in modular construction, and the localization rate of equipment will reach 50 %.

Export growth of high-tech products.

Russia's export of high-tech products to China increased from 2.1 % in 2018 to 4.2 % in 2024, mainly in the fields of nuclear energy equipment and aerospace components. For example, in 2024, the amount of nuclear reactor components exported by Russia to China reached 320 million US dollars, increase of 27 % [52, p. 1].

Complementarity performance: deep synergy from trade to industry.

Trade structure is highly matched.

60.3 % of China's exports to Russia are mechanical and electrical products, and 73 % of Russia's exports to China are energy, forming a classic complementary model of China manufacturing + Russian resources. In 2024, the trade deficit between China and

China was US 12.75 billion, mainly due to energy imports, while achieved trade balance through the export of mechanical and electrical products (table 2.4).

Table 2.4 – Comparison of trade structure between China and Russia in 2024 [14]

Commodity classification	Proportion of China's exports to Russia	The proportion of China's imports from Russia
mechanical and electrical products	60.3 %	3.1 %
Energy and minerals	5.2 %	73.0 %
agricultural product	8.5 %	5.4 %
textile	12.1 %	1.2 %
other	13.9 %	17.3 %

Policies to strengthen industrial synergy

In 2023, the Development Plan of Key Directions of Sino-Russian Economic Cooperation before 2030 defined the path of energy for technology: Russia will exchange oil and gas resources for China's electric vehicle production line, and in 2024, China will build three complete vehicle production lines in Russia, with an annual production capacity of 200,000 vehicles, which will drive the matching rate of local supply chains to 25 %. China's exports of photovoltaic modules to Russia increased from 120 million in 2020 to 970 million in 2024, accounting for 38 % of the Russian market share, replacing the original share of European and American enterprises.

2 Complementary endowment of production factors: cross-regional allocation of labor, energy and technology [34, p. 40].

The labor shortage in Russia's Far East exceeds 5 million, and the population in 2024 is only 6.3 million, with a population density of less than 1 person per square kilometer, and the young population continues to flow out. In order to relieve the pressure, the Russian government relaxed the work visa restrictions for Russian laborers and allowed 1 million Russian laborers to be employed in the fields of construction and agriculture. There are more than 200 labor cooperation enterprises in Heilongjiang, Jilin and other places. In 2024, the number of foreign laborers increased by 15 % year-on-year, mainly engaged in agricultural planting (accounting for 42 %) and infrastructure construction (38 %). The per capita monthly income reached 12,000 yuan, which was

30 % higher than the same position in China (table 2.5).

Table 2.5 – Structure of Chinese labor export to Russia in 2024 [38]

Industry field	Number of expatriates (ten thousand)	Proportion
Agricultural planting	12.6	42 %
Capital construction	11.4	38 %
manufacturing industry	4.5	15 %
other	1.5	5 %

China's labor export has filled the manpower gap in the fields of agriculture and infrastructure in the Russian Far East. For example, Heilongjiang Dongjin Group leased 1.8 million mu of land in Russia, and returned 12,500 tons of soybeans in 2024 through the whole industrial chain model of planting-processing-transportation, driving the local agricultural output value to increase by 8 %. At the same time, the monthly income of laborers in China is 30 % higher than that in China, and the annual repatriation of domestic capital exceeds 20 billion yuan, which promotes the economic development of northern provinces.

In 2024, China's external dependence on crude oil is 73 %, and natural gas is 45 %. Russia will become the largest source of crude oil imports in China (accounting for 19.6 %) and the largest source of pipeline natural gas (accounting for 40 %). The East China-Russia crude oil pipeline will transport 30 million tons of oil annually, and the natural gas pipeline will transport 38 billion cubic meters of gas annually (the target in 2025). The Arctic LNG-3 project will adopt the mode of China module construction + Russian resource development to reduce the transportation cost by 20 % (table 2.6).

Table 2.6 – Source structure of China's energy imports in 2024 [37]

Energy category	Total import volume	Russian proportion
crude oil	5.53 million tons	19.6 %
natural gas	1.32 million tons (LNG)	40 %
coal	5.43 million tons	12 %

The natural gas pipeline on the eastern route between China and China will cover

the three northeastern provinces of, the Bohai Sea and the Yangtze River Delta, with an annual gas transmission capacity of 38 billion cubic meters, accounting for 12 % of China's total natural gas consumption. The Arctic LNG-3 project is planned to start in 2025, with an estimated annual output of 19.8 million tons of LNG. China enterprises will participate in the modular construction, and the localization rate of equipment will reach 50 %, and the transportation cost will be reduced by 20 % compared with the traditional mode.

Russia has more than 120,000 patents in aero-engines, quantum computing, polar exploration and other fields. In 2024, Sino-Russian joint research and development projects increased by 25 % year-on-year, focusing on hydrogen energy batteries, industrial Internet of Things and other fields. For example, the hydrogen energy battery project jointly developed by China and Russia uses non-platinum catalyst technology, which reduces the cost by 40 % compared with traditional batteries. It is expected to achieve mass production in 2026 (table 2.7).

Table 2.7 – Distribution of China-Russia Joint R&D Projects in 2024 [23]

Field	Number of projects	Proportion
Hydrogen energy battery	12	28 %
Industrial internet of things	10	23 %
Polar exploration	8	19 %
astronautical technology	6	14 %
other	5	16 %

The export of labor services from China eased the manpower bottleneck of Russian Far East development, and at the same time increased the income of residents in northern provinces of China. Russian energy supply ensures China's energy security, while China's technical support reduces Russian development costs. Russian basic scientific research is combined with China's industrialization ability to promote technological breakthroughs in hydrogen energy, 5G and other fields.

Through the cross-regional allocation of the above elements, China and Russia are upgrading from resources for products to technology for markets, but it is necessary to

further optimize policy coordination and deepen technical cooperation to release greater potential.

3 Complementary product structure.

The product structure of Sino-Russian bilateral trade is significantly complementary, which is embodied in the direct exchange of energy and manufacturing, the dislocation supplement of light industry and resource-based economy, and the gradual deepening of technical cooperation [33, p. 33]. This complementarity not only stems from the natural differences in industrial structure between the two countries, but also is influenced by policy orientation and global industrial chain division, but also faces challenges such as structural solidification and low level of technical cooperation.

Russian energy exports dominate the supply to China. In 2024, Russian energy exports to China reached 92 billion US dollars, accounting for 73 % of its total exports to China, of which crude oil, natural gas and coal were the three pillars: crude oil exports were 108 million tons (accounting for 19.6 % of China's crude oil imports), amounting to 61.66 billion US dollars, accounting for 49.2 % of Russian exports to China; The gas transmission capacity of natural gas pipeline is 31 billion cubic meters (accounting for 40 % of China's pipeline natural gas imports), amounting to 8.04 billion US dollars; Coal exports reached 95.22 million tons (accounting for 12 % of China's coal imports), amounting to US 7.78 billion.

Russia is the largest source of crude oil imports and pipeline natural gas in China, and energy cooperation directly supports China's energy security (in 2024, China's foreign dependence on crude oil is 73 % and natural gas is 45 %).

China's mechanical and electrical products dominate exports to Russia. In 2024, China's exports of mechanical and electrical products to Russia reached 70 billion US dollars, accounting for 60.3 % of the total exports to Russia, forming three main forces of smart phones+home appliances+cars: Huawei and Xiaomi together accounted for more than 80 % of the Russian market, with an export value of 12 billion US dollars, and the average price was 22 % lower than the global market; Haier and Hisense account for 35 % of the Russian market, with an export value of 9.5 billion US dollars, mainly low-end refrigerators and washing machines; Brands such as Krypton and Chery account for 43 %

of Russia's new energy market. In 2024, they exported 1.09 million vehicles worth 110 billion yuan, but core components (such as gearboxes and batteries) depend on imports. Russia's energy export income provides market support for China's mechanical and electrical products, while China's manufacturing industry fills the gap in Russian civil industry, forming a classic model of resources for products.

The output value of Russian light industry accounts for only 5 % of GDP, while China's textiles, furniture and daily necessities account for 45 % of Russia's import market. In 2024, the cross-border e-commerce trade volume with Russia increased by 30.9 % year-on-year, and the clothing products of AliExpress platform accounted for 62 %, and the average price was 30 % lower than that of local brands. Among the textiles exported by China to Russia, basic garments (average price < 25 USD/piece) account for 80 %, and high value-added functional fabrics (such as cold-resistant outdoor fabrics) only account for 20 %, reflecting the characteristics of increasing quantity but decreasing quality.

In 2024, Russian agricultural exports to China were 7.2 billion US dollars (about 50 billion yuan), but the proportion of primary products was over 85 %: soybeans and rapeseed exported a total of 3.2 billion US dollars, accounting for 44 % of agricultural exports, mainly used for feed processing in China. Milk powder and prepared vegetables only account for 12 %, and the export value is 890 million US dollars, which is 40 % lower than the added value of similar products in the EU. China's demand for Russian agricultural products focuses on raw materials, while Russia imports less deep-processed food from China (accounting for only 5 % in 2024), and the lack of two-way deep-processing capacity restricts trade upgrading.

Russia has more than 120,000 patents in aero-engines, nuclear energy, polar exploration and other fields. In 2024, the proportion of high-tech products exported to China increased to 4.2 %, mainly including nuclear reactor components (export value of 320 million US dollars) and aerospace components. Huawei in China cooperated with Moscow State University to develop 5G base station chips, which increased the computing power by 2.5 times; CRRC introduced Russian high-speed rail bearing technology and made it domestically, which reduced the cost by 40 % and broke the foreign monopoly. In 2024, Sino-Russian joint R&D projects increased by 25 % year-on-year, focusing on

hydrogen batteries and industrial Internet of Things. However, the total amount of projects only accounts for 3.8 % of China's international cooperation projects, which is not deep enough.

The product structure complementarity between China and Russia takes energy-manufacturing as the core, light industry-agricultural products as the supplement, and high-tech cooperation as the potential growth point, which not only reflects the natural adaptability of the two economies, but also exposes the problems of structural solidification and low level of technical cooperation. In the future, it is necessary to promote the transformation of trade from scale expansion to quality upgrading through policy guidance (such as local currency settlement, joint R&D fund), deep cultivation of industrial chain (such as building home appliance industrial park in Russia) and coordination of technical standards (such as docking of 5G and hydrogen energy standards), and release the synergistic effect of manufacturing power+resource power.

2.2 Sino-Russian trade competition analysis

Sino-Russian trade is dominated by complementarity, but there is still some competition in certain fields, mainly reflected in the export structure of the international market, the market layout of third countries and some industrial fields. The following analysis is carried out from three dimensions: product competition, market competition and industrial competition, and supported by data.

1 Competitive areas of export product structure.

Russian is a major exporter of crude oil and natural gas in the world (crude oil exports accounted for 12 % of the world in 2024), while China is a coal exporter (15 % of the world). Although China imports a large amount of Russian energy, Russian natural gas and China coal may form an indirect substitute in Europe, Southeast Asia and other markets (for example, the demand for natural gas and coal is changing in Europe's energy transformation). China occupies a leading position in the world in the export of new energy equipment such as photovoltaic modules and lithium batteries (the export of photovoltaic modules accounts for 80 % of the world in 2024), while Russia expands the

export of liquefied natural gas through the Arctic LNG project. There is potential competition between them in the low-carbon energy international market, such as the technical route selection (renewable energy vs natural gas) in the energy transformation of Southeast Asian countries.

Russia is the world's largest wheat exporter (accounting for 18 % of the world in 2024), and the three northeastern provinces of China are important producing areas of corn and soybeans (corn exports account for 10 % of the Asian market). There is competition between the two countries in Africa, the Middle East and other food import markets. For example, Egypt imports Russian wheat and China corn at the same time. Russian sunflower oil exports account for 60 % of the world's total, and China's palm oil processed products exports account for 25 % of the Southeast Asian market. There is an alternative relationship between them in the field of food processing raw materials.

China's exports of mechanical and electrical products are mainly consumer electronics and general machinery (accounting for 16 % of global mechanical and electrical exports in 2024), while Russia is good at military equipment and heavy machinery (such as mining equipment). However, in Central Asia, Latin America and other markets's mid-range construction machinery (such as excavators) has price competition with similar Russian products (the price of American products is 10–15 % lower). China's exports of textiles, household appliances and other daily necessities account for more than 30 % of the world's total, and Russia's local light industry is weak, so there is little competition in bilateral trade. However, in third-country markets (such as Central and Eastern Europe), China's goods may squeeze the market share of Russian local light industrial products.

2 Competition layout in the third country market.

In 2024, Russian natural gas exports to Europe accounted for 45 % of its total, and China exported liquefied natural gas to Europe through LNG ships (accounting for 8 % of European imports), which formed competition in the European energy diversification strategy. China's electric vehicles (such as BYD) have a market share of 12 % in Europe in 2024. Russian Volga tried to return to Europe through technical upgrading, but the market share was less than 1 %. The competition was mainly reflected in cost performance and

brand recognition.

China has built railway and power station projects in Central Asia through the Belt and Road Initiative (such as the China-Kyrgyzstan-Uzbekistan Railway), while Russia has promoted infrastructure projects in Central Asia through the Eurasian Economic Union (such as the renovation of the refinery in Kazakhstan). There is competition between them in project financing and technical standards (China emphasizes cost performance, while Russia emphasizes geopolitical influence). China invests in copper mines and lithium mines in Central Asia, while Russia dominates oil and gas cooperation. There is subtle competition between the two sides for the dominance of resource development in Central Asian countries [25, p. 9].

China exports mechanical and electrical equipment and electronic components to Southeast Asia (accounting for 35 % of ASEAN's imports), while Russia tries to cut in through technical cooperation (such as joint production of automobiles with Vietnam), but the scale is small. China and Southeast Asian countries jointly build photovoltaic power plants, while Russia promotes LNG long-term cooperative contracts to compete for clean energy cooperation projects under the goal of carbon neutrality.

Sino-Russian trade competition is characterized by limited fields, controllable intensity and cooperative hedging: the main competition points are concentrated in energy (traditional and new energy), agricultural products and some third-country infrastructure markets, but the scale is much smaller than complementary trade; The essence of competition is a natural reflection of the different positioning of the two countries in the global value chain (Russian resource-based economy vs China manufacturing economy); By deepening the integration of bilateral industrial chains (such as the export of equipment driven by the Siberian Power 2 pipeline) and the coordination of third-party markets, competition is expected to be further transformed into differentiated cooperation.

Generally speaking, complementarity is still the core feature of Sino-Russian trade, and competition is more reflected in the structural interaction in the global economic structure than in the zero-sum game.

Although the scale of Sino-Russian trade continues to expand, its position in global trade is still not high. As neighboring countries, China and Russia have complementary

advantages in geography, especially in energy import and export structure and economic and trade cooperation. Since the early 1990s, the economic and trade volume between the two countries has grown rapidly, but in 2012, it still did not exceed 90 billion US dollars, which was only one fifth of the trade volume between China and the United States, indicating that the relative position of Sino-Russian trade in global trade is not high. In horizontal comparison, the trade volume between China and Russia is much lower than that between China, the United States and Japan. In 2012, the trade volume between China and the United States was US 484.68 billion, 5.5 times that of China and Russia, accounting for 12.5 % of China's total foreign trade. The trade volume between China and Japan was US 329.45 billion, accounting for 8.5 % of the total. From the vertical comparison, the absolute scale of Sino-Russian trade increased by more than 14 times from 1992 to 2012, but its proportion in China's total foreign trade remained at around 2.5 %, while in 2012 it was only 2.23 %. Sino-Russian economic and trade cooperation has long been dominated by trade, with insufficient cooperation in production and investment. China's total investment in Russia is only about US 4 billion, far below the goal set by the leaders of the two countries in 2004, that is, the cumulative investment in Russia will reach US 12 billion by 2020. Russia's investment in China is relatively small, indicating that the current investment scale is far from the potential of both sides. In new fields such as finance, energy, agriculture, infrastructure and regional cooperation, there are subjective or objective obstacles to bilateral cooperation. For example, Russia hopes that China will expand its energy investment in Russia, but it cannot provide China with corresponding preferential policies, and there are similar problems in regional cooperation. The prospect of Sino-Russian trade is developing in a positive direction, and the degree of trade integration and complementarity between the two countries is also promoting the progress of bilateral trade. However, due to various factors, Sino-Russian trade cooperation has always been characterized by small scale, low level and low level, and the trade scale is still unsatisfactory. In recent years, the scale of Sino-Russian trade has increased significantly. In 2023, the bilateral trade volume of goods between China and Russia will exceed 240 billion US dollars, and the logistics demand behind it will also increase significantly. However, the economic sanctions imposed by Europe and the

United States on Russia have prompted an urgent change in Russia's export market and import channels, which has become the biggest driving force for the rapid development of Sino-Russian trade.

Chapter 3 Sino-Russian trade problems and future development countermeasures and suggestions

3.1 Problems in Sino-Russian commodity trade structure

This chapter deeply analyzes the problems existing in Sino-Russian trade, and puts forward the countermeasures and suggestions for the future development of the two countries. Sino-Russian trade relations have a long history, and trade development is a complex project, which cannot be achieved overnight. In 2015, the Belt and Road Initiative has been fully implemented, but the in-depth trade cooperation between China and Russia is still in its infancy. Due to the advantages of geographical location and political relations, as well as the background of the conflict between Russia and Ukraine, Russia is facing comprehensive western sanctions, and China and Russia have great potential in trade development. After the Belt and Road Initiative was put forward, Sino-Russian trade has undergone significant changes. The two countries should seize the opportunity of the Belt and Road Initiative, strengthen economic and trade cooperation, adjust the trade structure, make rational use of comparative advantages, speed up the establishment of the free trade zone, adjust the adjustment of the free trade zone and adjust the economic structure, and finally achieve a win-win situation.

1 Basic situation of Russian-Chinese trade structure.

China and Russia have different development paths and significant differences in economic structure. These differences provide great potential for complementary trade between the two countries. For example, Russia has advantages in energy and mineral resources, while China has strong competitiveness in manufacturing and high-tech industries. At the same time, the competitiveness of the two countries in global market export and bilateral import and export trade is weak, which lays the foundation for the stable development of trade between China and Russia.

2 Excessive dependence on a single commodity in the trade structure.

A notable feature of Sino-Russian trade structure is over-reliance on certain commodities as the main export products. This dependence is particularly evident in

Russian exports to China.

In Russian exports to China, crude oil and mineral products account for the main proportion, averaging over 50 %, and even reaching over 70 % in some years. This heavy dependence on a single commodity makes the trade between Russia and China vulnerable to international price fluctuations. For example, although the international oil price has rebounded since 2017, the medium-and long-term forecasts of the World Bank and OPEC show that the oil price will not exceed 80 dollars per barrel between 2020 and 2025. This means that the total foreign trade between Russia and China will be significantly affected by oil price fluctuations.

This excessive dependence on a single commodity makes Sino-Russian bilateral trade vulnerable to adverse international factors. Any adverse change in the price of major export commodities, such as oil, will directly affect Sino-Russian trade and bring great uncertainty. For example, fluctuations in the international energy market, changes in the global economic situation and geopolitical factors may have a major impact on oil prices, thus affecting the scale and balance of Sino-Russian trade.

3 Challenges of Russia's economic restructuring.

Although Russia has been emphasizing economic restructuring since 2014, on the whole, the measures taken by the Russian government have limited short-term effects on changing Russia's foreign trade export structure.

Russia's demand for diversified economic development still faces strong structural constraints. Although Russia has made some progress in some fields (such as high technology and agriculture), the export scale of these fields is relatively small, and it is impossible to significantly change the export structure dominated by energy and minerals in the short term. For example, although Russia's agricultural sector has great export potential, its proportion in foreign trade is still low, which cannot have a substantial impact on the overall trade structure.

Russia's foreign trade sustainable development model is facing challenges. Excessive dependence on energy and mineral exports makes the Russian economy vulnerable to international price fluctuations, making it difficult to achieve stable and sustainable development. For example, the long-term downturn in the international energy

market may lead to problems in Russia's economy, thus affecting the stability and sustainability of its foreign trade.

4 Suggestions on optimizing Sino-Russian trade structure.

China and Russia should further strengthen cooperation in high-tech, agriculture, manufacturing and other non-energy fields. For example, China can increase its investment in Russian agriculture to help Russia improve agricultural production efficiency and increase agricultural products exports.

At the same time, the two sides can cooperate in the high-tech field, jointly develop and popularize new technologies, and improve their competitiveness in the global market.

Russia should further promote economic restructuring and reduce its dependence on energy and mineral exports, such as encouraging enterprises to develop diversified economies and increasing the proportion of non-energy exports through policy guidance and financial support.

China can further optimize its export structure to Russia, increase the proportion of high value-added products and enhance the competitiveness of China products in the Russian market.

Both sides should strengthen logistics and infrastructure construction to improve trade efficiency. For example, further improve the customs facilities at Sino-Russian border ports, enhance logistics and transportation capacity, and reduce trade costs.

At the same time, the two sides can explore new modes of logistics cooperation, such as jointly developing northern sea route and other maritime transport channels to expand trade space.

China and Russia should strengthen cooperation in the international economic field and jointly cope with international risks, such as establishing bilateral or multilateral economic cooperation mechanisms to jointly cope with fluctuations in the international energy market and changes in the global economic situation.

At the same time, the two sides can strengthen financial cooperation and explore innovative methods, such as using local currency to settle accounts, so as to reduce the risk of external sanctions and ensure the stable trade.

The fragility of Sino-Russian commodity trade structure mainly stems from the

excessive dependence of trade structure on a single commodity, which makes bilateral trade extremely vulnerable to international price fluctuations and external risks. Although Russia has taken some measures in economic restructuring, it is difficult to change the export structure mainly based on energy and minerals in the short term. In order to reduce the fragility of the trade structure, the two sides should strengthen cooperation in non-energy fields, optimize the trade structure, strengthen logistics and infrastructure construction, and jointly cope with international risks. Through these measures, Sino-Russian bilateral trade is expected to achieve more stable and sustainable development.

Although China has always ranked high among Russian trading partners, it is undeniable that Europe and the United States, which are very attractive to the Russian market, are equally attractive. Due to geographical proximity and historical tradition, Europe has always been the preferred direction of Russian economic cooperation. Before the Crimean incident in 2014, Russia was a member of the Group of Seven (G7), which included the United States, Britain, Germany, France, Japan, Italy and Canada. In addition, due to historical ties, Russia has always been regarded as a European country. Most of its population and its political and economic center are concentrated in the western region, where it has close political and economic ties with Europe. Russia has always regarded the EU as an important economic and trade partner. All these factors will have a certain influence on Russia's choice of foreign trade cooperation.

Especially by strengthening BRICS cooperation, Russia is trying to find a balance of strategic partnership between China and the EU to meet the actual needs of its economic recovery and return to the status of a big country. This undoubtedly increases the competitive pressure that China faces in the Russian market. For example, in 2024, although the market share of China brand in Russia increased significantly, the traditional industrial powers in Europe, such as German and Polish, formed strong competition for Russian goods in the fields of machinery and transportation. The long-term existence and deep roots of these countries in the Russian market have led to fierce competition for China goods.

Take machinery and transport goods as an example. These goods account for more than 30 % of China's exports to Russia. Although the trade between Russia and China is

highly complementary in this kind of goods, it does not affect the trade complementarity between Russia and other similar industrial powers. Therefore, the competition faced by China in the Russian market will exert certain pressure on the bilateral trade between China and Russia. In addition, with the rapid development of the global economy, the pattern of international trade is also changing quietly. As an important form of trade, e-commerce is gradually becoming an important bridge for commodity exchange among countries. China's goods account for nearly half of the Russian online trading market, covering many categories from electronic products to clothing and cosmetics. This phenomenon not only reflects China's strong competitiveness in the global market, but also shows the strong demand of Russian consumers for China products.

However, the competitive pressure faced by China's goods in the Russian market not only comes from the traditional industrial powers in Europe and the United States, but also comes from Russia's own policy adjustment and changes in market demand. For example, in March 2022, the Russian government promulgated an important bill to modify the provisions on patent compensation. The bill allows unauthorized use of patents from unfriendly countries and regions without paying compensation. This policy provides new opportunities for China's goods to enter the Russian market, but it may also trigger a competitive rebound of other international brands.

To sum up, China's commodities are facing fierce competition in the Russian market, not only from traditional industrial powers, but also influenced by Russia's own policy adjustment and changes in market demand. Although China brand's market share in Russia has increased, it still needs to innovate and enhance its competitiveness to maintain and expand its market share.

3.2 Sino-Russian trade complementary potential

Although Sino-Russian bilateral trade is highly complementary, the actual trade volume and growth rate show that the full potential of this complementarity has not been fully exerted. Compared with the trade volume and growth rate between China and the United States and between China and South Korea in the same period, Sino-Russian trade

still has great development potential.

The low degree of economic integration between China and Russia is one of the main reasons for the current trade situation. Although the two countries signed the Sino-Russian Intergovernmental Oil Cooperation Agreement in 2009, taking energy cooperation as an opportunity to strengthen the stability of economic and trade cooperation, this measure has limited impact on the economic integration of the two countries. China attaches importance to economic and trade cooperation with countries in the Asia-Pacific region, while Russia tends to cooperate with European countries. This strategic tendency leads to the insufficient integration of economic cooperation between the two countries and limits the release of trade potential.

The mutual investment between China and Russia is relatively small. By the end of 2020, China's non-financial direct investment in Russia has only reached US 14 billion, far below the scale of bilateral investment between China and the United States and European investment in Russia. This shows that there is still huge room for Sino-Russian economic and trade cooperation. In addition, the tension between Russia and the West and macroeconomic risks (especially the instability of the ruble value) increase the risk of China's investment in Russia, which further affects the expansion of investment scale.

The development of China, Russia and cross-border electronic commerce is relatively backward. Since the rapid development of e-commerce industry in China in 2010, the cooperation between China and neighboring cross-border electronic commerce has been deepening, providing a new way for the development of bilateral trade between China and South Korea, Japan and other countries. However, compared with these countries, Sino-Russian cross-border electronic commerce cooperation has developed slowly, and a professional cross-border electronic commerce platform has not been established specifically for the Russian market, which has hindered the exploration of the complementary trade potential between China and Russia to some extent.

The brand value and product competitiveness of China goods in Russian market need to be improved. On the one hand, when the Russian market opened in 1991, China's light industrial products once occupied the Russian consumer goods market. However, with the rapid development of Russian technology, mechanical products have gradually

become the main products exported by China to China. Nevertheless, light industrial products still account for a certain proportion, and these products are highly substitutable. Insufficient attention to the brand value of China products leads to low brand awareness and weakened competitiveness. On the other hand, during the difficult economic period in Russia, a large number of unqualified China products flooded into Russia, disrupting the normal trade order and seriously damaging the core competitiveness of China products.

Despite the above problems, there is great potential for complementary trade between China and Russia. By 2022, China has been Russia's largest trading partner for 13 consecutive years, and Russia has also successfully ranked among the top 10 major trading partners of China. Economic and trade cooperation between China and Russia has made steady progress [50, p. 88]. The two countries are highly complementary in the fields of energy, agriculture and industry, and the trade volume has continued to increase in recent years. In 2024, the bilateral trade volume between China and Russia reached US 244,819.5 billion, up 1.9 % year-on-year, and exceeded the US 240 billion mark for two consecutive years. In the future, the two sides should further strengthen policy coordination, optimize the trade structure, promote the cooperation between cross-border electronic commerce and the digital economy, enhance the brand value and competitiveness of Russian products, and realize the sustainable development of Sino-Russian trade.

Make full use of complementary advantages and optimize trade structure

Strengthen cooperation in the energy field: Russia has obvious advantages in the energy field. As major energy consumers, China and Russia should further deepen energy cooperation. In addition to traditional oil and natural gas, we can also expand cooperation in the field of new energy, such as green energy projects such as Arctic wind power and geothermal energy.

Promote the upgrading of manufacturing industry: China has strong competitiveness in manufacturing industry, while Russia has unique advantages in heavy industry and high technology. Both sides should strengthen cooperation in high-end manufacturing, aerospace, machinery manufacturing and other fields to increase the added value of products.

Expand agricultural cooperation: China can increase its investment in Russian

agriculture, build grain storage and deep processing facilities, and increase the added value of agricultural products. The combination of Russian rich land resources and China's advanced agricultural science and technology will bring mutual benefit and win-win results for both sides.

Open up trade potential and find new growth points.

Developing digital economy and cross-border electronic commerce: the scale of China-Russia cross-border electronic commerce has exceeded 20 billion US dollars. In the future, we should further strengthen cooperation in the fields of digital payment and live broadcast to promote the digital transformation of trade.

Increase the proportion of service trade: the two sides should strengthen cooperation in modern service industries such as finance, information and culture, and promote service trade as a new growth point.

Strengthening scientific and technological cooperation: Russia has a solid foundation in scientific research and development, and China has rich experience in scientific and technological application and industrialization. Both sides should strengthen cooperation in high-tech fields and jointly promote scientific and technological innovation.

Improve logistics and infrastructure, and improve trade efficiency.

Optimize the logistics network: China and Russia jointly held a container transportation conference to promote the Siberian railway capacity to increase by 20 % and reduce transportation costs by 15 %. In addition, the two sides should further improve border crossing facilities and improve customs clearance efficiency.

Expanding the Arctic waterway: China and Russia jointly opened the Northern Sea Route container route, and the freight volume in 2024 exceeded 1 million tons. The development of Arctic waterway will provide a new transportation channel for Sino-Russian trade and reduce transportation costs.

Strengthen policy coordination and cooperation to create a good trade environment.

Breaking trade barriers: The two sides should actively negotiate to break tariff and non-tariff barriers and promote trade liberalization.

Standardize trade order: China should strengthen legislation and supervision, properly solve the problem of grey customs clearance and create a standardized and

orderly trade environment for Russian enterprises.

Expanding direct investment: empirical research shows that the scale of direct investment has a positive effect on the growth of bilateral trade between China and Russia. Both sides should increase direct investment in infrastructure, energy, manufacturing and other fields to improve the quality and scale of trade.

Meeting challenges and improving trade competitiveness.

Dealing with the problem of single trade structure: reducing dependence on primary energy products and increasing the export proportion of high value-added products.

Enhance the brand value of China commodities: China enterprises should strengthen brand building and enhance the competitiveness of their products in the Russian market. At the same time, strengthen supervision over the quality of export products to prevent inferior products from entering the Russian market.

Strengthen scientific and technological innovation: China enterprises should intensify scientific and technological innovation, make use of Russian resource advantages to expand production capacity and enhance product competitiveness.

Deepen regional cooperation and expand cooperation space.

The Belt and Road Initiative is connected with the Eurasian Economic Union: under the framework of the Belt and Road Initiative and the Eurasian Economic Union, Sino-Russian cooperation will be closer, and the two sides should jointly meet the global economic challenges and create broader development prospects.

Strengthen cooperation in border areas: Sino-Russian border cities such as Hunchun and Suifenhe have become important trade hubs. Both sides should further strengthen economic cooperation in border areas and improve the level of trade facilitation.

Sino-Russian trade has strong complementarity and broad development prospects. The two sides should make full use of complementary advantages, optimize the trade structure, explore new growth points, improve logistics and infrastructure, strengthen policy coordination and cooperation, meet trade challenges and enhance trade competitiveness. Through these measures, Sino-Russian trade is expected to achieve sustainable development in adversity and provide strong support for the stable economic growth of the two countries.

Conclusion

This paper provides an in-depth analysis of the developmental trajectory, current status, challenges, competitiveness, and complementarity of Sino-Russian trade from 1992 to 2024, followed by targeted development strategies and recommendations.

Sino-Russian trade has evolved through three phases: tortuous development (1992–2000): Marked by fluctuating trade volumes amid post-Soviet economic instability, with China exporting labor-intensive goods and Russia primary resources. Rapid Growth (2000–2012): Driven by rising energy prices and policy support (e.g., the 2001 Treaty of Good-Neighborliness), trade volume surged, with energy cooperation as the cornerstone. Continuous Deepening (2012–present): Boosted by the Belt and Road Initiative and Russia's pivot to the East, bilateral trade reached 244.8 billion in 2024, with China remaining Russia's largest trading partner for 15 consecutive years. However, trade growth faced structural bottlenecks, with a mere 1.9 % increase in 2024.

In 2024, energy resources accounted for 73 % of China's imports from Russia, exposing trade to volatility in international energy prices (e.g., a 15 billion drop in Russian crude oil exports to China in 2024 due to falling Brent prices). China's exports, dominated by mechanical and electrical products (60.3 %), suffer from low added value – smartphone prices were 22 % below the global average, and high-tech exports (e.g., semiconductors) remained marginal. Russia's agricultural exports are overwhelmingly primary products (85 %), with deep-processed goods like chocolate accounting for only 15 %. China's imports of Russian deep-processed foods represent less than 1 % of its total agricultural imports. GOST-R certification delays (6–8 months) and inefficient logistics (Siberian Railway's 30 km/h freight speed) raise costs, while third-party market competition (e.g., India, Turkey) squeezes China's market share.

China's manufacturing (30 % of global manufacturing value added) complements Russia's energy exports (19.6 % of China's crude oil imports, 40 % of pipeline natural gas). China supplies labor for Russia's Far East development, while Russia ensures China's energy security. Joint R&D in hydrogen energy and polar exploration has increased by 25 % since 2024. Energy (73 % of Russia's exports) and mechanical goods

(60.3 % of China's exports) form a classic resources-for-manufacturing trade model. Competition exists in energy (e.g., LNG vs. renewables) and third-party markets (Central Asia, Europe), but complementarity remains the dominant trend.

Expand cooperation in high-tech, agriculture, and manufacturing to reduce single-commodity dependence. Russia should accelerate economic restructuring to diversify beyond energy exports, while China enhances export value added. Chinese goods need innovation and brand building to address fierce competition in the Russian market. Strengthen Sino-Russian scientific and technological cooperation to drive industrial upgrading. Deepen economic integration through expanded mutual investment (particularly in high-tech and agricultural deep processing) and accelerate cross-border e-commerce development with specialized platforms to enhance trade facilitation. Upgrade logistics networks, enhance border port facilities and customs clearance efficiency, develop the Arctic shipping route, and reduce transportation costs. Strengthen policy alignment to break trade barriers, standardize trade order, and expand direct investment. Align the Belt and Road Initiative with the Eurasian Economic Union, strengthen border economic cooperation, and enhance trade facilitation (e.g., electronic waybill pilots at Suifenhe Port).

Sino-Russian trade occupies a pivotal position in the global economic landscape. Despite challenges, its strong complementarity and untapped potential offer significant growth opportunities. By implementing strategies to optimize trade structure, enhance competitiveness, unleash complementary advantages, improve infrastructure, and deepen regional cooperation, Sino-Russian trade can achieve sustainable development, providing robust support for the economic growth of both nations. This partnership also sets a new paradigm for global trade governance, demonstrating the potential of non-Westernized cooperation models in the multipolar world economy.

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