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The Potential of Mutual Trade Between China and Russia in the Field of High-Tech Manufacturing Products

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ABSTRACT

The article investigated the dynamics of mutual trade between China and Russia in the field of high-tech products. Analyzed the scale, structure and trends of mutual trade on high-tech products between China and Russia. Determined the main groups of goods in the field of high-tech products. Calculated and assessed the possibilities of cooperation between China and Russia in this area, using the Trade Complementarity Index. It is shown that China and Russia are ideal partners in the field of trade in high-tech products. The main problems of trade development in this area are revealed: from the point of view of Russia, it has a low level of diversification of methods for obtaining transitional technologies, and for China — a weakness in independent development of new technology.

Keywords: high-tech products; mutual trade; China; Russia; Trade Complementarity Index; export potential; technologies; innovations; research and development (R&D)

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INTRODUCTION

The level of development of high-tech industries is the main indicator of the efficiency of innovative economic activity and international competitiveness around the world. As a significant stimulus to international trade, high-technology manufactures have the following characteristics:

- high technology intensity;
- high value added;
- low power consumption;
- low emission of hazardous waste.

The term "high technology" originated in the United States. In the book "Technologies and International Trade", published by the US Academy of Sciences in 1971, it was stated that high technologies are developed and used to gain a competitive advantage and gain in the economy [1]. In the opinion of T.V. Konochkina, "high-tech products — it is a product manufactured by enterprises in knowledge-intensive industries, produced using the newest techniques and technologies, with the participation of highly qualified, specially trained personnel, embodying modern scientific achievements, best practices and high socio-economic performance" [2].

APPROACHES TO THE CLASSIFICATION OF HIGH-TECH PRODUCTS

Three approaches to classifying high-tech products are mainly used in world practice: patent, industry and product.

In order to harmonize international patents, within the framework of the tripartite agreement among the EU, the USA and Japan, their patent offices have been invited to group patents into different categories, among which the high-tech group. Many correlation tables had to be developed to implement this approach.

As for the industry approach, the ISIC (International Standard Industrial Classification of All Economic Activities), classifier is based on the ratio of research and development (R&D) to value added and output.

OECD has divided all industries into four categories: high-tech, medium-tech and high-level, medium-tech and low-level and low-tech.[1] Based on this approach, within the Standard International Trade Classification (SITC) OECD has developed a list of high-tech products ranked by research and development (R&D) expenditure per unit of sales.[2]

Taking into account the classification of high-tech products according to the EU standard on the basis of NACE Rev.2[3] in Russia at the national level, a list has been created, approved by the Ministry of Industry and Trade, in which the codification Russian Classification of Economic Activities (OKVED 2) are included: production of pharmaceutical substances (21.1), production of computers, electronic and optical products (26), production of computers and peripheral equipment (26.2), production of office equipment (except computers and peripheral equipment) (28.23), production of other finished products (32), production of aircraft, including space, and related equipment (30.3) [3]. Most of the points are in line with the OECD classification, except for the group 32, which is not part of the final list of high-tech products in Russian and Chinese trade.

The Chinese high-tech industry classification standard is based on the international classification of economic activities (ISIC Rev.3) which are based on the National Standard Industrial Classification of All Economic Activities (GB/T4754–2017). List of high-tech products of manufacturing industry was built and released by the National Bureau of Statistics of China in December 2017

[1] OECD (2011) ISIC rev. 3. Technology intensity definition. Classification of manufacturing industries into categories based on R&D intensities. Paris: OECD. URL: http://www.oecd.org/sti/ind/48350231.pdf.

[2] Standard International Trade Classification. Official UN website. URL: https://unstats.un.org/unsd/publication/SeriesM/SeriesM_34rev4r.pdf

[3] URL: https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

and divided into six subsectors[4]: production of pharmaceutical substances; aviation products, including aircraft and related equipment; production of electronics and communication equipment; production of computers and office equipment; production of measuring and medical equipment; information chemical elements. With the exception of the latter, the rest of the classification is largely consistent with that of OECD [4].

In order to analyze the mutual trade between Russia and China in the field of high-tech products, it is need to develop a narrow list of high-tech products. Taking into account the Russian and Chinese classification standards for the high-tech industry are based as well as on the international standard, the author determined to turn to the OECD standard for the classification of high-tech products. It has an advantage over other standards, firstly, because of the product approach, which takes better account of specific high-tech products that are used in mutual trade between countries. Secondly, it includes the "adapter" HS 2007-SITC Rev. 4., which would lead to harmonized the commodity description and coding system. The harmonized commodity description and coding system is a unified international product classification. Its application allows the collection of reliable and accurate statistics on all world trade that are consistent and understandable to all countries. Using HS 2007-SITC Rev. 4, a list of high-tech products in the trade between China and Russia was compiled[5] (see *Table*).

The *Table* shows that high-tech products are in groups 28, 29, 30, 32, 38, 39, 84, 85, 87,88, 90 and 93 and include chemical products, machine and mechanical devices, electrical equipment, record and sound-reproducing equipment, television equipment, vehicles, aircraft, optical, photographic, cinematic, measuring instruments, control, precision, medical and surgical instruments and equipment, watches and other clocks, weapons and ammunition.

DYNAMICS AND CHARACTERISTICS OF DEVELOPMENT OF MUTUAL TRADE IN HIGH-TECH PRODUCTS BETWEEN RUSSIA AND CHINA

China cooperates with Russia in many fields. Particular attention is given to one of the most important field, namely — high-tech products of manufacturing industry.

Analysis of development of bilateral trade of Russia and China in this field was carried out on the basis statistics of United Nations Conference on Trade and Development (UNCTAD), according to which in the period 2016–2020 trade turnover increased steadily (except 2020, due to the pandemic). It peaked at around 170 bln USD in 2019. It accounts for 15.23% of all bilateral trade of Russia and China (*Fig. 1*).

According to UNCTAD data for the period 2016–2020 (*Fig. 2*) the trade structure of China and Russia in high-tech products shows some stability: 4/5 of its total volume relates to the aerospace industry, production of computer and office equipment, and also — electronics and telecommunications.

As shown in *Fig. 2*, Russia's position in the non-electronic equipment and armament fields is generally stable during the analysis period, while in the aerospace industry it is leading, having a growing trade surplus in this group. The main products exported by Russia to China — are fuel elements, unirradiated (8 401.30); детали ядерных реакторов (8401.40); turbojet engines (8411.12); aircraft and others, mechanical (except helicopters), weight (unloaded) more than 15 thous kg (8804.40).

As for the rest, China maintains undeniable surpluses, especially in electronics and telecommunications, as well

[4] URL: http://www.stats.gov.cn/tjsj/tjbz/201310/P020131021347576415205.pdf

[5] Correspondence Tables. Untrade Statistics. Official UN website. URL: https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp

Table

List of high-tech products

Industry product groups (68)	SITC Rev.4	HS-2007
Aerospace industry	(714–714.89–714.99) + 792.1+ 792.2+792.3+792.4+ 792.5+ 792.91+ 792.93+ 874.11	8411(11,12),841210,841121,841122,8411(81,91),8802(11,12),8802(20,30),880240
Computers and office equipment	751.94+ 751.95+ 752+ 759.97	8843(31,32),8471(30,40,50),8741(60,70,80,90),847330
Electronics and telecommunications	763.31+ 763.8+ (764–764.93–764.99) + 772.2+ 772.61+ 773.18+ 776.25+ 776.27+ 776.3+ 776.4+ 776.8+ 898.44+ 898.46	851920,8521(10,90),8517,8504,844470,8540(81,91),8541, 8542,8523(51,80)
Pharmaceutics	541.3+ 541.5+ 541.6+ 542.1+ 542.2	2941,2937,2938, 3003,3004
Scientific instruments	774+ 871+ 872.11+ (874–874.11–874.2) + 881.11+ 881.21+ 884.11+884.19+ (899.6–899.65–899.69)	9018,9005,901841,901490,9015(10,90),900610,900711,9001(10,20,30,90),9021(10,40,50)
Electronic equipment	778.6–778.61–778.66–778.69) +778.7+778.84	8532(21,24,29,30),8543(10.20.90), 8531(10,80)
Chemical industry	522.22+522.23+522.29+522.69+525+531+574.33+591	280300,2804(61,69),2805(12,30),2825(20,90),2844(10,20,30,40,50),2845(10,90),3204(11,19),390760,3808(91,99)
Nonelectronic equipment	714.89+714.99+718.7+728.47+731.1+731.31+731.35+731.42+731.44+731.51+731.53+731.61+731.63+731.65+733.12+733.14+733.16+735.9+737.33+737.35	8411(21,22),84199,8401,840120,8456,845811,845891,8459(21,31,51,61),8460(11,12,31),8462(21,31,41),8466(93,94),8515(21,31)
Weapon	891	871000,93(0111,0200,0700,0621,0629,0630,0639,0310,0390,0400,0510,0521,0529,0591)

Source: compiled by the author URL: https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf; https://unstats.un.org/unsd/publication/Series1M/SeriesM_34rev4r.pdf

as computers and office equipment, the share of which in the total turnover of high-tech manufacturing products in the period 2016–2020 was about 70%.

Russian imports of computers and office equipment from China in 2016 amounted to 2 863 mln USD, and in 2020–4 998 mln USD. In these five years, China's imports in this sector have almost doubled. For this reason, Russia's trade balance was negative, and the situation only got worse: –2 835 mln USD in 2016 and already –4 932 mln USD in 2020. Mostly imported from China are portable machines for automatic data processing not exceeding 10 kg, consisting of at least one central computing unit, keyboard and display (8 471.30).

Imports from China in electronics and communications accounted for almost 50% of the total turnover of high-tech products during the period under review. In four years, its scale increased from 5 363 to 8 071 mln USD. Negative balance of trade balance in this sector rose from –5 314 mln USD in 2016 to –7 711 mln USD in 2020. China supplies Russia with telephones, headphones and microphone/loudspeaker (8 518.31), base stations for receiving and transmitting voice,

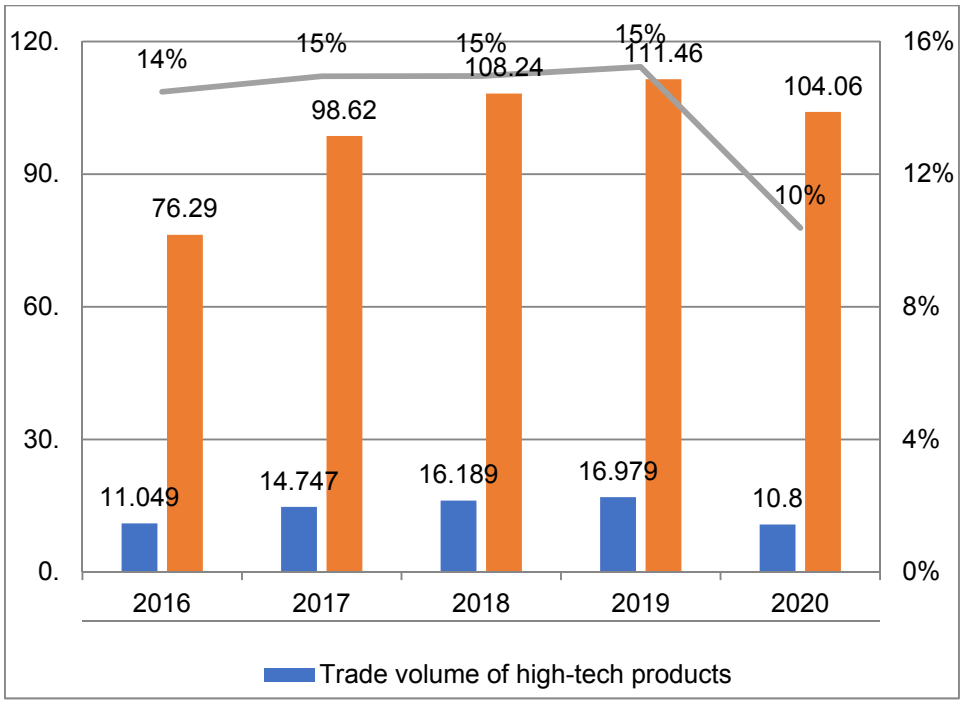
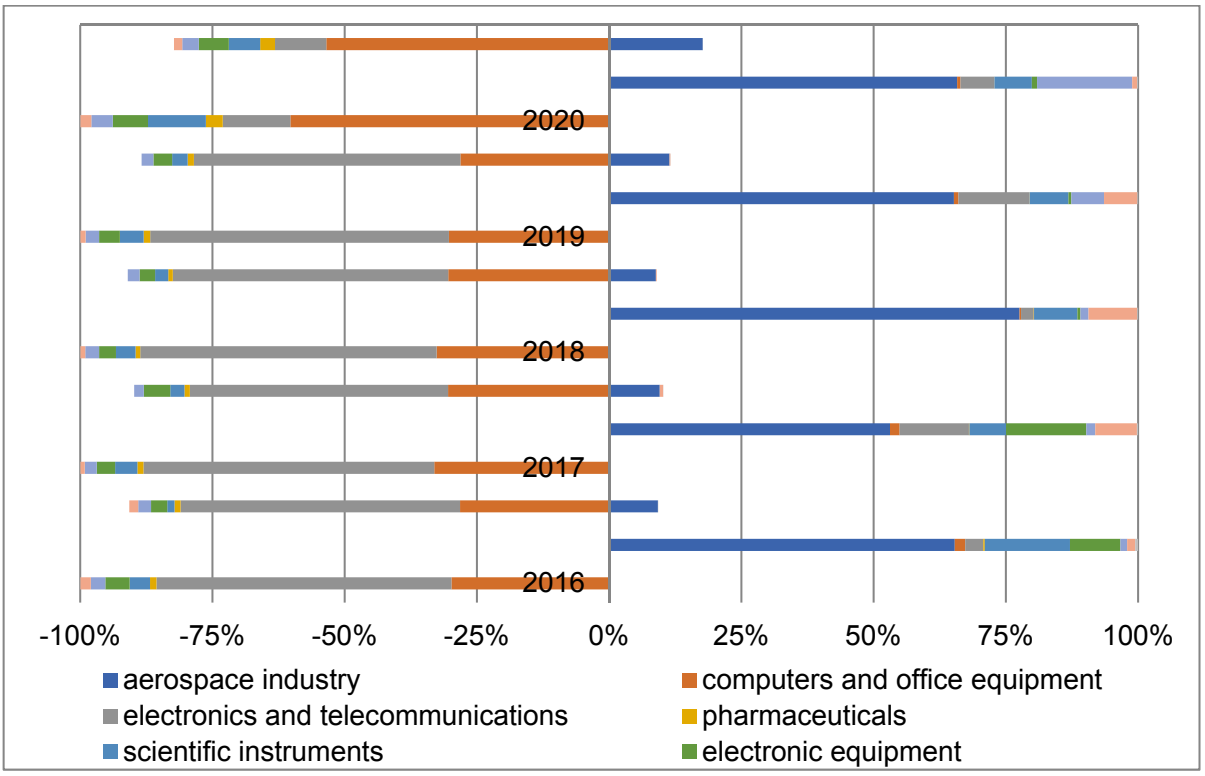


Fig. 1. **Dynamics of the development of trade on high-tech goods between Russia and China in 2016–2020 (billion US)**

Source: compiled by the author based on UNCTAD.



Puc. 2. **Dynamics of the structure of mutual trade between Russia and China by commodity groups of high-tech products in 2016–2020 (million US dollars)**

Source: compiled by the author based on UNCTAD.

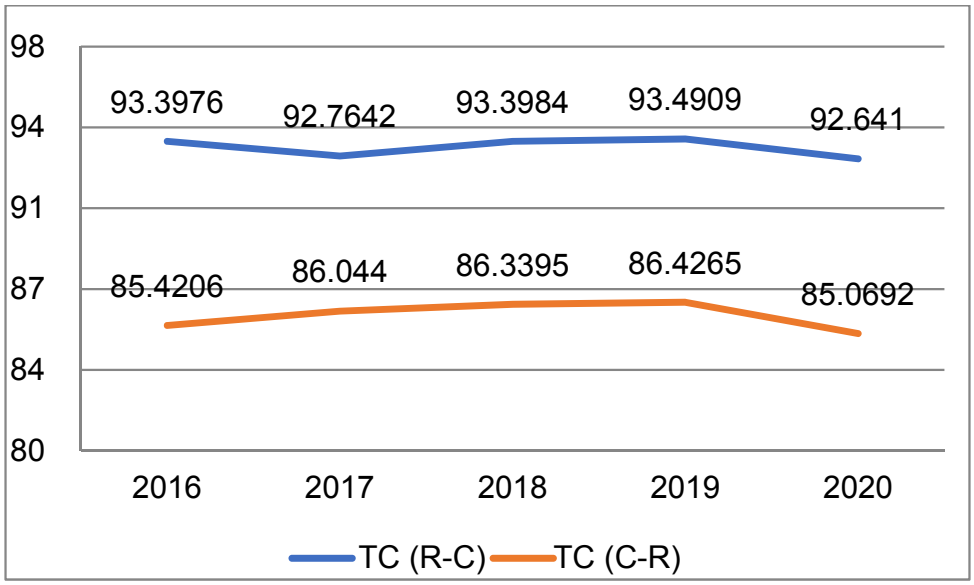


Fig. 3. **The assessment of Sino-Russian trade potential on High-Tech products with ITC index**

Note: TC(R-C) — Index of trade complementarity of Russia with China; TC(C-R) — Index of trade complementarity of China with Russia.

Source: compiled by the author based on the ITC Trade Map database at UNCTAD.

images and other data, as well as wireless communication devices.

Thus, in mutual trade with China, Russia remains mainly a net importer of high-tech products of manufacturing industry.

The complementarity index (Trade Complementary Index) should be used to analyze the degree of conformity of the trade structure and the possibilities for further trade cooperation between China and Russia in the field of high-tech products.[6]

TCI is calculated as follows:

$$c^{ij} = 100\left[1 - \sum_{k=1}^{m} |m_k^i - x_k^j| / 2\right], (0 \le c^{ij} \le 100),$$

where m_k^i — share of production k in total imports of country i;

x_k^j — share of production k in total exports of country j.

If the supply of country j s absolutely in line with the demand of country i, then $TCI^{ij} = 100$, i.e. country j is the ideal trading partner for country i. If TCI reached to zero, countries j and i — are ideal competitors.

According to the authors' calculation based on UNCTAD data (*Fig. 3*), the complementarity index for five years in China's trade with Russia in high-tech products averaged 85.6%. Russia's trade with China was more intensive, with an average of 93.2%. Analysis confirms that China and Russia have become ideal partners in this sphere.

PROBLEMS ARISING IN THE MUTUAL TRADE OF HIGH-TECH PRODUCTS BETWEEN CHINA AND RUSSIA

Products imported to China from Russia are mainly in the aerospace industry which depends on purchases of high-tech parts and components from western countries [5]. Russia receives mainly products related to the production of computers and office equipment, electronics and telecommunications from China, which is also largely dependent on imported key technologies from western countries [6]. After the imposition of Western sanctions, the two countries will have to find new ways to promote high-tech production and trade.

[6] A practical guide to trade policy analysis. WTO. URL: https://www.wto.org/english/res_e/publications_e/practical_guide12_e.htm

In general, there are three main ways to get new technologies: develop innovations internally, adopt and imitate foreign technologies and utilize foreign direct investment. Typically, different countries use combinations of these methods, but mostly someone.

The USA and the UK are the first models based on strong basic research and huge costs of technological innovation to promote exports of high-tech products.

Japan and South Korea are implementing the second model, focusing on product improvement and supporting high-tech export growth through secondary innovation.

China adopts the third model, attracting large-scale foreign direct investment oriented towards high-tech exports. It produces some high-tech products that do not possess the originality of basic technologies, so it is easily influenced by technological barriers from developed countries [7].

Russia is forced to conduct research and development on its own due to sanctions imposed by countries supplying high-tech products. Almost half of Russian companies in the field of high-tech products have chosen this model, innovative solutions range from 10 to 42%. In the high-tech production environment, as in other fields, R&D-oriented cooperation with foreign partners is not sufficiently developed, Russian import dependence in high-tech products is high enough [8].

In order to solve these problems, as part of the government import substitution plan, China and Russia should develop their own production in those industries, they are highly dependent on countries that have applied sanctions through measures such as increased spending on research work, provision of tax incentives, etc. However, both countries should strengthen cooperation between their scientific and research organizations and high-technology enterprises. In addition, China and Russia may find new partners instead of those who imposed sanctions [9, 10].

CONCLUSION

Trade potential of China and Russia in high-tech products is high enough. In recent years, however, trade sanctions have made it more problematic. Both countries will have to find new partners and strengthen cooperation in innovation and production.

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