

Study on the Trade Relationship between Guangdong Province and RCEP Member Countries in Electrical and Mechanical Products

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Abstract. As the number one import and export product between Guangdong province and RCEP member countries, trade in electromechanical products plays an important role, and this paper focuses on the changes between bilateral trade in electromechanical products after the official implementation of the RECP agreement. Using data from the General Administration of Customs, Guangdong Provincial Statistical Yearbook, and UN Comtrade database, the trade status of electromechanical products between Guangdong Province and RCEP member countries from 2015-2022 is collated, and the trade structure between the two sides is analyzed exponentially. The results show that Guangdong Province's trade in electromechanical products with Japan, South Korea, Singapore and other developed economies has a weak and stable competitive relationship and strong trade complementarity, and there is a large trade potential; with the Philippines, Indonesia, Australia and New Zealand electromechanical products have a low level of competitiveness and complementarity. On the basis of this study, recommendations are made to further promote the trade of electromechanical products between Guangdong Province and RCEP countries to improve the quality and excellence.

Keywords: Guangdong Province, RCEP, Electromechanical Products (E&E Products), Trade Relations.

1 Introduction

Since the Regional Comprehensive Economic Partnership Agreement (RCEP) officially came into effect on 1 January 2022, RCEP has become an important booster for the stable growth of China's trade in goods in terms of volume. According to relevant data, China's total import and export volume with other members of RCEP reached 12.95 trillion yuan in 2022, up 7.5 per cent year-on-year, accounting for 30.8 per cent of China's total foreign trade. 2022 Guangdong province issued the "Guangdong Province Action Plan for the High-Quality Implementation of the Regional Comprehensive Economic Partnership Agreement (RCEP)" to comprehensively support economic and trade co-operation with the RCEP. 2023 Guangdong's exports to RCEP countries will be US\$189.376 billion, compared with US\$156.392 billion in 2021, a growth rate of 21.09 per cent. At the same time, E&E products are important trade products of RCEP member countries in Guangdong province, and their import and export account for a large proportion of the overall import and export share. Guangdong's exports of E&E products to RCEP member countries account for more than 60% of the total exports of RCEP member countries, and imports of E&E products to RCEP countries account for nearly 70% of the total

imports. However, the import and export of E&E products in the country, there are large differences between categories, this paper analyzes the trade relationship between Guangdong province and RCEP member countries E&E products from the perspective of trade dependence, competitiveness, complementarity, etc. ^[4]

2 Current Situation

In recent years, the scale of import and export of electromechanical products between Guangdong Province and RCEP member countries has been expanding, but the commodity structure and country structure differ greatly. Overall, bilateral trade cooperation in electromechanical products has become increasingly close, with more room for development.

The development of trade in E&E products between Guangdong province and RCEP member countries in 2015-2022 is steadily increasing, and the total trade in E&E products increased from US\$179.433 billion in 2015 to US\$230.457 billion in 2022, with an average annual growth rate of 3.6%. Guangdong province's trade in E&E products with RCEP member countries is dominated by imports, which increased from 98.018 billion US dollars in 2015 to 137.63 billion US dollars in 2021, with an average annual growth rate of 5.78%. Guangdong province's total import trade of E&E products to RCEP member countries increased from US\$81.415 billion in 2015 to US\$107.553 billion in 2022, with an average annual growth rate of 4%. During the period of 2015-2022, Guangdong province's trade in E&E products to RCEP member countries has always shown a deficit, and the magnitude of the deficit has been growing, with the bilateral E&E trade deficit rising from 2015's 16.602 billion USD in 2015 to 33.332 billion USD in 2021, a two-fold increase, but in 2022 and 2023, the deficit magnitude is significantly reduced to 15.35 billion USD and 2.549 billion USD respectively.

Table 1. Trade of electromechanical products between Guangdong Province and RCEP member countries from 2015 to 2022.

	Japan		Korea		Australia		New Zealand		AEASN	
	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export
2015	266.26	184.34	336.75	119.6	0.75	51.08	0.32	6.19	376.1	368.01
2016	268	177.83	337.43	171.46	1.65	47.03	0.28	6.35	389.77	360.78
2017	270.3	184.24	355.06	183.99	1.4	53.09	0.27	6.21	448.12	388.85
2018	299.57	192.98	438.96	169.36	1.43	55.98	0.43	7.07	579.43	414.44
2019	299.26	174.34	363.33	127.68	1.22	56.66	0.63	7.26	546.21	452.28
2020	284.14	169.34	330.99	97.04	1.00	63.53	0.61	7.40	560.69	510.27
2021	299.61	203.20	426.02	132.19	1.21	76.67	0.60	10.13	648.85	620.79
2022	273.83	216.24	355.71	119.6	0.83	92.8	0.68	10.94	597.98	635.96

Source: General Customs Administration

From the country distribution point of view, as shown in Table 1, Guangdong Province, the main import and export market of E&E products are ASEAN countries, South Korea and Japan. 2022, Guangdong and ASEAN countries total imports of 59.798 billion U.S. dollars, total exports of 63.596 billion U.S. dollars, ASEAN countries are the first largest trading country of Guangdong E&E products, and the last eight years of the bilateral trade volume growth rate is very fast, the average annual growth rate of 10.4%. 10.4%. Japan is the first destination market for Guangdong's exports of E&E products to RCEP countries, and South Korea is the first source country for Guangdong's imports of electromechanical products from RCEP countries. On the other hand, the trade volume of E&E products between Guangdong province and New Zealand, Australia, Laos and Brunei are very small.

According to the "Workbook on Import and Export Statistics of Electromechanical Products" (2013 edition), E&E products are classified into: metal products, machinery and equipment, electrical and electronic products, transport vehicles, transport, instruments and meters, and other E&E products. Since the General Administration of Customs and UN Comtrade database can only provide HS six-digit codes at most, based on the availability of data, six-digit codes will be taken for electromechanical products with more than six-digit codes, and the classification of E&E products and HS codes are shown in Table 2.

Table 2. Classification and HS coding of electromechanical products.

Classification	HS Code
Electrical and electronic products	85
Machinery and equipment	84
Metal products	82, 83, 7307-7326, 7412-7419, 75072, 7508, 7609-7616, 780600, 7907, 800700, 810199, 810299, 810390, 810490, 81059, 810600, 81079, 810890, 81099, 81109, 811100, 811219, 811229, 811259, 811299
Instrument and meters	90
Transport vehicles	86-89
Other electromechanical products	680421, 680422, 6805, 7011, 91, 9207, 93031-93033, 9304, 93052, 93059, 93062-93063, 94011-94013, 9402, 94031, 94032, 9405, 9406, 950300, 95043, 95045, 950490, 95069, 9508, 9613

Source: Workbook on Import and Export Statistics of Electromechanical Products (2013 edition)

In terms of commodity structure, as shown in Figure 1, in 2022, the E&E product with the highest share of import and export trade between Guangdong and RCEP member countries is electrical and electronic products, accounting for more than 50 per cent. Japan, Vietnam and South Korea rank in the top three of Guangdong's exports of electrical and electronic products, while South Korea, Malaysia and Japan rank in the top three of Guangdong's imports of electrical and electronic products. Instruments and instruments and means of transport accounted for the smallest share of exports but grew significantly. In 2023, Guangdong's exports of means of transport to RCEP member countries amounted to US\$5.998 billion, compared with

US\$2.272 billion in 2016, an increase of nearly two times.^[2] Overall, in 2022, Guangdong Province shows a deficit in trade of electromechanical products to RCEP member countries and a slight deficit to ASEAN (deficit of US\$8.144 billion), which is a reduction from the trade deficit of US\$11.682 billion of E&E products from Guangdong Province to Japan in 2021.

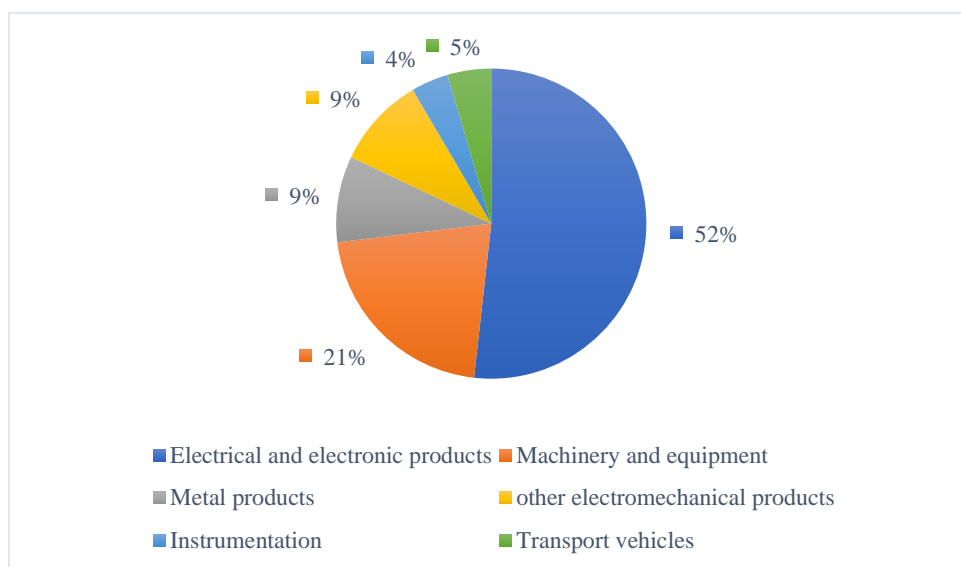


Figure 1. The proportion of Guangdong province's exports of major electromechanical products to RCEP member countries in 2022.

3 Competitiveness Analysis

3.1 Analysis of Trade Indicative Indices

The index of demonstrated comparative advantage is the ratio of a country's or region's share of exports of a particular commodity in the value of its total exports to the share of exports of that commodity in total world exports, expressed by formula (1):

$$RCA_k = \frac{X_{ik}/X_i}{X_k/X} \quad (1)$$

X_{ik} denotes the total amount of category k products exported by Guangdong province to RCEP member country i (total amount of category j products exported by RCEP member countries to Guangdong Province), and X_i denotes the total export value of Guangdong province to RCEP countries (total export value of RCEP member countries to Guangdong Province), and X_k denotes the total amount of export of product k from Guangdong province to the world (the total amount of export of product k from RCEP member countries to the world). X indicates the total amount of all products exported from Guangdong province to the world (the total amount of all products exported from RCEP member countries to the world).^[1]

Table 3. Regional RCA Index of Guangdong Province's Export of Mechanical and Electrical Products to RCEP Member States from 2015 to 2022.

	Japan	Korea	ASEAN	Australia	New Zealand
2015	1.09	1.24	0.77	1.09	0.80
2016	1.08	1.20	0.89	1.08	0.80
2017	1.07	1.19	0.88	1.07	0.77
2018	1.05	1.14	0.90	1.05	0.78
2019	1.01	1.08	0.90	1.01	0.78
2020	1.00	0.96	0.92	1.00	0.75
2021	1.01	1.00	0.91	1.01	0.77
2022	1.03	0.96	0.84	1.03	0.78

Source: General Customs Administration

The Index of Displayed Comparative Advantage (RCA) can reflect the competitive position of a country's (region's) products in world trade. If $RCA > 2.5$, it indicates that the export products of the region are extremely competitive, if $1.25 \cong RCA \cong 2.5$, it indicates that the export products of the region have strong international competitiveness, if $0.8 \cong RCA \cong 1.25$, it indicates that the export of the products of the region have medium international competitiveness, and if $RCA < 0.8$, it indicates that the export competitiveness of the products of the region is weak. ^[1] Table 3 lists the RCA index of E&E products between Guangdong province and RCEP member countries during the period of 2015-2022. As can be seen from the table, the RCA index between Guangdong and South Korea, Japan, Australia and ASEAN are greater than 0.8, indicating that Guangdong province's E&E products have higher competitiveness in the markets of the above countries; among them, the competitiveness in the South Korean market is the highest but in recent years it has been showing a The RCA index of Guangdong's products to New Zealand is greater than 0.8. The RCA index between Guangdong and New Zealand is less than 0.8, indicating that Guangdong's mechanical and electrical products are less competitive in the New Zealand market.

3.2 Export Similarity Analysis

The export similarity index is used to measure the structural characteristics of the economy or commodity competition between regions, and its value ranges from 0 to 1. The formula (2) is as follows.

$$ESI(ij, w) = \left\{ \sum_k \frac{\frac{x_{iw}^k}{x_{iw} + x_{jw}^k}}{2} * \left(1 - \frac{\frac{x_{iw}^k}{x_{iw}} \frac{x_{jw}^k}{x_{jw}}}{\frac{x_{iw}^k}{x_{iw} + x_{jw}^k}} \right) \right\} * 100 \quad (2)$$

X_{iw}^k and X_{jw}^k denote the total amount of category k products (E&E products in Chapters 84-91 in this paper) exported to the w market by Guangdong province and RCEP member countries, respectively; X_{iw} and X_{jw} denote the total amount of all products exported by Guangdong province and RCEP member countries to the w market of the third country, respectively.

Generally speaking, the ESI index lies between 0 and 100, and the larger the value, the more specialized Guangdong province and RCEP member countries are in the third-party w-market, and the more moderate the competition is; on the contrary, it indicates that the commodity structure of Guangdong province and RCEP member countries in the w-market is the more similar, and the more intense the bilateral competition.

Table 4. ESJ Index of Guangdong Province and RCEP member countries exporting mechanical and electrical products to the United States from 2015 to 2022.

	Japan	Korea	Australia	New Zealand	Singapore	Thailand	Philippine	Malaysia	Vietnam
2015	48.58	48.04	30.80	15.81	74.10	55.59	60.83	45.19	16.87
2016	50.10	49.81	33.68	16.57	74.95	54.85	64.45	47.48	27.27
2017	51.05	51.13	34.72	16.98	77.79	54.50	64.60	48.83	27.17
2018	52.29	52.06	32.61	17.37	59.04	52.65	73.10	50.19	27.68
2019	51.73	51.18	32.29	18.41	71.62	46.60	70.90	49.92	35.81
2020	51.36	51.19	21.88	24.02	61.93	55.56	71.88	49.90	43.91
2021	49.44	49.57	28.63	21.40	67.41	54.50	67.60	49.06	45.23
2022	48.09	47.74	29.11	17.97	68.63	58.78	69.66	46.93	47.12

Source: General Customs Administration

In this paper, the U.S. market is selected as the reference object, and it can be seen from Table 4 and 5 that the ESJ indexes of Singapore, the Philippines, Thailand, Japan, South Korea, and Malaysia are higher, most of which are more than 50, which indicates that China competes more fiercely with these countries in the U.S. market; whereas the ESJ indexes of Australia, New Zealand, Indonesia, Laos, Cambodia, Brunei, and Myanmar are lower. Among them, in 2022, for example, Indonesia's ESJ index is 16.53, and the four ASEAN countries (Laos, Cambodia, Brunei, and Myanmar) 14.44, suggesting that Guangdong Province is hardly competitive with these countries in exports of E&E products. It is worth noting that the ESJ index for Vietnam's exports of E&E products to the United States has increased rapidly in recent years, suggesting an upward trend in its competitiveness with Guangdong province in E&E products.

Table 5. ESJ Index of Guangdong Province and ASEAN member countries exporting mechanical and electrical products to the United States from 2015 to 2022.

	Indonesia	Malaysia	Myanmar	Cambodia	Laos	Brunei
2015	12.74	45.19	1.25	45.19	59.66	79.47
2016	12.95	47.48	5.53	47.48	62.97	45.63
2017	10.96	48.83	6.85	48.83	61.70	30.70
2018	9.11	50.19	18.89	50.19	/	17.30
2019	11.15	49.92	15.41	49.92	63.38	24.15
2020	15.39	49.90	7.20	49.90	63.49	0.79
2021	13.14	49.06	7.92	49.06	64.96	16.58
2022	16.53	46.93	9.36	46.93	/	14.44

Source: General Customs Administration and UNCTAD database

3.3 Trade Complementarity Analysis

The Trade Complementarity Index (TCI) measures the complementarity of a product between two countries, formula (3)(4)(5) is as follows.

$$C_k = RCA_{xik} * RCA_{mjk} \quad (3)$$

$$RCA_{xik} = \frac{X_{ik}/X_i}{W_{xk}/W_X} \quad (4)$$

$$RCA_{mjk} = \frac{M_{jk}/M_j}{W_{mk}/W_m} \quad (5)$$

RCA_{xik} denotes the demonstrated comparative advantage of exports of product category k (E&E products) in country i, and RCA_{mjk} denotes the demonstrated comparative disadvantage of country j's imports of product category k (E&E products); X_{ik} and X_i denote the total amount of China's (RCEP member countries) exports of all products in category k, China's (RCEP member countries) exports of all products, respectively; W_{xk} and W_X denote the total amount of world exports of all products in category k, and the total amount of world exports of all products, respectively; M_{jk} and M_j denote, respectively, the total amount of China's (RCEP member countries) imports of all products in category k, and the total amount of China's (RCEP member countries) imports of all products; W_{mk} and W_m denote the total of world imports of product group k and the total of world imports of all products, respectively. The trade complementarity index is greater than 1, i.e. $RCA_{xik} * RCA_{mjk}$ value is greater than 1, then China has a comparative advantage over RCEP member countries in E&E products, indicating that China and RCEP member countries have stronger trade complementarity in E&E products; if $RCA_{xik} * RCA_{mjk}$ value is between 0 and 1, it indicates that the trade of E&E products between China and RCEP member countries is not complementary.^[3] As can be seen from Table 6 and 7, China's trade in E&E products is most complementary to that of Japan, the Republic of Korea and Singapore. $RCA_{xik} * RCA_{mjk}$ values are all greater than 1; with Australia, New Zealand, Indonesia and the four ASEAN countries (Laos, Cambodia, Brunei and Myanmar) $RCA_{xik} * RCA_{mjk}$ value is less than 0.1, the table name of the two sides of the E&E products do not have complementarity; and with Thailand, the Philippines, Malaysia's trade complementarity is stronger, the $RCA_{xik} * RCA_{mjk}$ value is close to 1, of which the trade in E&E products with Vietnam will have a TCI value greater than 1 in 2020-2021, indicating that the trade in E&E products between the two countries is becoming more and more complementary.

Table 6. Trade complementarity between China and some RCEP member countries from 2015 to 2022.

	Japan	Korea	Australia	New Zealand	ASEAN
2015	1.18	1.56	1.18	0.04	0.80
2016	1.16	1.45	1.16	0.04	0.89
2017	1.13	1.42	1.13	0.03	0.91
2018	1.09	1.34	1.09	0.03	0.95
2019	1.08	1.26	1.08	0.04	0.94
2020	1.05	1.10	1.05	0.05	0.95

2021	1.05	1.23	1.05	0.04	0.92
2022	1.11	1.22	1.11	0.05	0.83

Source: General Customs Administration and UNCTAD database

4 Conclusions and Recommendations

4.1 Conclusions

In general, E&E products accounts for a large part of the total trade volume between Guangdong province and RCEP member countries. Guangdong's exports of E&E products to RCEP member countries are mainly electrical machinery and equipment, railway transport equipment, aircraft and their parts, etc. while imports of E&E products from RCEP member countries are mainly computers and their parts, automobile parts and accessories, and digital cameras. Among them, the scale of trade between China and Japan, South Korea is large, while the scale of trade with ASEAN countries is also growing year by year. Both China and RCEP have strong comparative advantages in E&E products, but there is still a big gap between the international competitiveness of Guangdong's E&E products and that of some developed countries, such as Japan, South Korea and Singapore. At the same time, Guangdong's trade in E&E products with these countries is also complementary, there is a greater trade potential. The implementation of the RCEP will have a far-reaching impact on the trade of E&E products in Guangdong Province. Firstly, reduction of tariff barriers among member countries, making it easier for E&E products from Guangdong Province to enter the markets of other member countries, thus increasing the export value of Guangdong's E&E products. Secondly, it will also promote the integration of the industrial chain within the region, which is conducive to the Guangdong Province mechanical and electrical enterprises to find partners in the region, and further optimize the supply chain structure. However, the implementation of RCEP may also bring some challenges, such as the need to adapt to the product standards and technical regulations of different countries, which may increase the production and export costs of Guangdong's mechanical and electrical products.

4.2 Recommendations

Facing the opportunities and challenges brought by the implementation of RCEP, Guangdong Province can take countermeasures in the following aspects:

1. Full utilization of tariff preferences. The implementation of RCEP has reduced tariffs among member countries, and electromechanical enterprises in Guangdong Province can make full use of this policy to find new export markets and improve the international competitiveness of their products. Enterprises are encouraged to actively utilize the RCEP tariff preference policy to reduce costs and increase revenue.
2. Promote industry chain integration. Guangdong Province can take advantage of the implementation of RCEP to promote the integration of the electromechanical industry chain, optimize the supply chain structure, reduce production costs, and improve product quality and added value. R&D investment in semiconductor equipment and integrated circuit-related industries should be increased to promote the technological upgrading of the E&E industry, improve the domestic supply capacity of upstream E&E raw materials, and improve the

integration of the upstream and downstream industrial chain of electromechanical products, which will be conducive to the reduction of imports of raw materials for E&E products in Guangdong province, and improve the international competitiveness of its E&E products. ^[5]

3. Strengthen independent innovations. The import and export products are mainly electronic components, and the processing of finished products is not very profitable. Therefore, the relevant electromechanical enterprises should improve their independent innovation ability, create national electromechanical product brands, increase the research and development of technology and patents, and move closer to the two ends of the "smile curve". At the same time, enterprises should seize the policy dividend of industrial transformation in Guangdong Province and the opportunity of RCEP rules to improve their core competitiveness, and promote the international competitiveness of E&E products to improve rapidly. ^[6]

In short, RCEP market occupies a pivotal position in Guangdong's foreign trade. As a major manufacturing province, Guangdong should seize the opportunity of RCEP to extend the international industrial chain and supply chain. Guangdong should also cope with the challenge of industrial transfer brought by RCEP, enhance the dominance of the industrial chain and strengthen the international competitive advantage.

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References

- [1] Shi Hongyuan. Study on the Competitiveness and Complementarity of Sino-Japanese Trade in Electromechanical Products[J]. Economic Forum. 2019.12:80-88.
- [2] Meng Xia Huang Chen Liu. Zhang Xiao. The impact of RCEP on China's exports of electromechanical products[J]. Asia-Pacific Economic Research.2018.4: 26-35.
- [3] ZeXu Li, Ki-Moon Han, Hyun-Woo Cho. The Impact of RCEP on ASEAN Trade: Focusing on Korea's Response Strategies. Korea International Trade Research Institute. 2023.12: 19(6):145-160.
- [4] Luo Lin. Study on Guangdong's Export Competitiveness of Electromechanical Products to RCEP Countries[J]. China Business Journal.2023.14:073-076.
- [5] He Yuqi. Study on the Export Structure, Problems and Countermeasures of Electromechanical Products in Guangdong Province[J]. Market Weekly.2022.13:94- 97.
- [6] Deborah Elms. Using RCEP: products for Asia. Asian Trade Centre.2019.12.