Article

Influencing Factors of Textile Export from Yangtze River Delta to Member States of Regional Comprehensive Economic Partnership

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Abstract: Based on the panel data of textile exports from the Yangtze River Delta region to the countries of Regional Comprehensive Economic Partnership (RCEP) member countries from 2013 to 2022, multiple factors were determined affecting textile exports. According to the extended trade Gravity Model, textile exports from the Yangtze River Delta region increased rapidly from 2013 to 2022, and the volume continued to expand. ASEAN countries, Japan, and South Korea were important trade partners. The gross domectic product, population size, dependence on trade, free trade agreements, and other indicators of the importing countries were found to be important in textile exports. The textiles produced in the Yangtze River Delta region have been exported to countries with a large economic scale, high demand from a large population, and a high degree of market opening. The competitiveness of textiles in the Yangtze River Delta region in the global market is increasing with great potential.

Keywords: Member States of RCEP, Yangtze River Delta Region, Textile, Trade Gravity Model

1. Introduction

Recently, economic globalization has been negatively impacted by significant changes in the global market and the WTO negotiations that block global free trade. Due to the intensification of the Russian-Ukrainian conflict has exacerbated geopolitical risks and its spillover effects on energy and food supply, the world has entered into a complex and turbulent period. The Regional Comprehensive Economic Partnership (RCEP) was proposed by the ASEAN countries to promote the development and prosperity of the regional economy through the construction of regional economic integration. RCEP is an economic cooperation agreement with far-reaching impacts. RCEP was formally agreed in 2020, marking an important step in regional economic integration, which embodies the sincerity and determination of the RCEP member states and shows that the regional economic integration process is critical. It also demonstrates the importance and necessity of regional economic integration.

Since June 2, 2023, the agreement has entered into force in the Philippines for China, Japan, South Korea, Australia, New Zealand, and the 10 ASEAN countries. The move aims to realize the world's largest free trade agreement (FTA), which is an important milestone in regional cooperation in East Asia and a new and convenient channel for economic and trade relations between China and the member countries. RCEP is expected to bring unprecedented development opportunities, and at the same time, become a strong driving force for world economic growth, injecting new vitality into the global economy.

As an important traditional industry supporting China's economic development and a key industry for safeguarding people's livelihood, the textile industry has always played a pivotal role in the trade of China. China and the member states of RCEP come to have a solid economic and trade cooperation, especially in the textile trade for which the two parties have long maintained stable exchanges. ASEAN and Japan occupy an important position in China's textile exports while Europe and the United States are China's third and fourth-largest export markets for textiles. This close trade relationship reflects the complementary nature of the two economies and the sustainable development of China's textile industry. South Korea and Australia lead the world's textile and apparel consumer market also being important destinations for China's textile export.

The Yangtze River Delta region is an important area of China's development and is a cradle of China's modern textile industry. The region is taking a leading position in industrial exports and technological innovation and plays a vital role in promoting the development of China's textile industry. In 2022, China's textile exports reached USD 315.784 billion, and the Yangtze River Delta region's textile exports accounted for 46% of China's total exports, which shows the importance of textile exports from the region in China's exports. Under RCEP, a new environment for trade, new opportunities, and challenges emerge in the textile industry of the region.

RCEP strengthens China's economic and trade cooperation with neighboring countries, promotes sustainable development and transformation, and upgrades China's textile industry. It also promotes China's textile exports in the Yangtze River Delta region. Given the current situation of textile exports to RCEP member states from the Yangtze River Delta region, this study aims to explore the barriers faced by textile exports. Through qualitative and quantitative studies, the influencing factors on textile exports from the Yangtze River Delta Region were determined, and their degrees of influence were estimated. The Gravity Model was employed for this study, and the results provide the basic understanding and strategy to promote China's textile exports through continuous global cooperation with neighboring countries. The results of this study also offer a reference to make countermeasures in multiple dimensions to support and guide the sustainable and healthy development of the textile industry in China.

2. Literature Review

RCEP is the world's largest FTA covering the largest population, economy, and volume of trade. The agreement was initiated by the ten ASEAN countries at the 19th ASEAN Summit in 2011 based on five free trade agreements (the five "10+1"), including ASEAN-China, ASEAN-Japan, ASEAN-Korea, ASEAN-Australia-New Zealand, and ASEAN-India (Wen, 2019) to build a large-scale free trade area covering major economies in the Asia-Pacific. Under the leadership of ASEAN, RCEP conforms to the trend of the times of economic globalization and regional economic integration to build a free trade area with great development potential. RCEP also promotes the market opening of member states and the organizational model of regional economic integration to solve the problems of overlapping and fragmentation of the Asia-Pacific FTA, which impacts regional economic integration in East Asia.

The establishment of the RCEP Free Trade Area is an important milestone in regional economic integration in East Asia. It aims to improve the business environment in the region and significantly reduce the institutional costs of enterprises, thus further increasing the trade innovation potential and the integration of the industrial, supply, and value chains in the region. In its framework, China has constructed a new open economy system to form a new development pattern in which the domestic macroeconomic cycle and the international economic cycles promote each other (Wang, 2021). The new system has laid a solid foundation for the establishment of the market of RCEP. With the gradual formation of the market, a broader market space can be accessible, promoting intra-regional trade and investment exchanges, realizing a more comprehensive, in-depth, and diversified opening up, and supporting the virtuous cycle of the national economy. RCEP has had a positive impact on the development of the textile trade. This agreement offers the important bases of global textile production in China, ASEAN, Japan, and South Korea which are key textile consumer markets. RCEP provides an important opportunity for China to participate in regional industrial cooperation and build a complete industrial chain. By strengthening cooperation with RCEP member states, the production cost can be decreased, and the scope of regional trade is widened, thus promoting the competitiveness of China's textile industry in the global market.

In this study, textiles were classified into 11 categories according to the classification of the General Administration of Customs of China (HS50 to HS63), which cover a wide range of raw materials and yarns to fabrics, garments, and other textile products. Ding (2023) and Zhou (2023) used this classification to define textile and apparel and empirical analysis. "Textile" is defined as the HS code of the eleventh class of all commodities in chapters 50−63 of the classification of textile goods, and the corresponding analysis, which provides a clear and systematic framework for in-depth study of the textile trade. This provides a clear and systematic framework for the in-depth study of the textile trade.

Geographical distance, economic volume, demographic variables, trade agreements, and competitive advantage indices have been studied for their impacts on the development of export trade. Findlay et al. (2014) used the gravity formula and found an inverse relationship between geographic distance and trade volume between trading countries. Lau (2009) used the Gravity Model to explore the trade elasticity of Chinese textiles in the US market between 1989 and 2009. He found a unique and long-lasting equilibrium in the relationship between the demand for Chinese textile imports in terms of quantities, import prices, and USA per capita gross domestic product (GDP). Ullah and Mahmood (2019) found that the GDP of Pakistan and the South Asian Association for Regional Cooperation (SAARC) partner countries affected bilateral trade in the trade Gravity Model. Common language has a positive but small effect on bilateral trade and the market size, and distance while the exchange rate negatively influences trade. Wang and Xu (2023) used a stochastic frontier Gravity Model to explore China's export trade of textiles to RCEP member states. The bilateral trade and economic scale, the total population size of the importing countries, and the existence of a common language were found to have a significant promotion effect on China's textile exports. However, the demographic differences between the countries as well as the geographical distance between the two countries showed a dampening effect on exports. In addition, differences in government effectiveness indices and the level of polity negatively impacted export efficiency.

Ma and Zhao (2019) used the trade Gravity Model to explore the factors affecting the bilateral agricultural trade between China and Pakistan. The total economic size, market price level, free trade zone membership, population, and arable showed a significant positive correlation and were negatively affected by geographical distance and exchange rate fluctuations. Therefore, China needs to grasp the major strategic opportunities such as "Belt and Road", "China-Pakistan Economic Corridor" and "China-Pakistan Free

Trade Area Agreement" to construct China-Pakistan Economic and Trade Corridor, strengthen cross-border economic and trade exchanges, and utilize the potential of agricultural education and agricultural technology to promote the sustained and steady increase in bilateral trade.

It is necessary to promote the sustained and steady development of bilateral agricultural trade. Wei (2024) concluded that import tariff concessions on Japan under the RCEP framework had increased China's export volume of textile and apparel products in all 14 categories. Zhao (2022) empirically analyzed the trade potential of China's textile exports to RCEP countries using the extended Gravity Model and showed that the increase in per capita GDP between China and the importing countries of RCEP, as well as the widening of the per capita income gap between China and the target countries of trade positively affected China's textile exports. Meanwhile, the signing of free trade agreements has also significantly boosted China's textile exports. However, the widening of institutional distance might harm China's textile exports, but the significance of geographic distance and exchange rates was not significant.

Wang (2012) constructed a Gravity Model of textile trade based on the data between China and 20 major trading partners between 1995 and 2004. China's textile products had a larger trade volume in countries with large economies, larger market demand, and higher market openness. This demonstrates the competitiveness of China's textiles in maintaining market share, which has been strengthened. However, factors such as trade protection measures, regional trade organizations, and trade distance did not significantly impact China's textile and clothing exports. Using the Global Trade Analysis Project (GTAP) Model, Zhao (2016) simulated the potential impact on China's textile trade after the implementation of RCEP and quantitatively assessed the economic effect on China's textile trade with zero tariffs on textiles of RCEP member states. The result showed that the textile industry of South Korea, Japan, and Vietnam has developed more rapidly than China, and its international competitiveness is relatively strong.

Most research on the influencing factors of China's exports has been conducted from the perspective of the trade between countries and trade in specific products. Although the textile industry takes an important position in China's exports, and the Yangtze River Delta region is the main production base of textiles, the research on factors affecting the region's textile export is insufficient. With the implementation of RCEP, the world's largest FTA has emerged, and textiles, as a key trade product, attract extensive attention from the academic society. Although scholars have studied China's textile exports recently, research on a specific production area is also lacking. Therefore, it is demanded to study the current situation of the textile trade between the Yangtze River Delta region and the member states of RCEP and the trade relationship between the two parties to understand the relationship between countries in trade. A Gravity Model was constructed to quantitatively analyze the textile export volume in dimensions, such as total economic volume, population, geographic distance, foreign trade dependence, and competitiveness of the textile industry. How to cooperate with RCEP member states and develop the textile industry structure to a higher level in textile export was suggested for effective economic integration and enhancement of the regional economic development.

This article is organized as follows. The second section presents the result of a literature review. The third section describes the current situation of textile trade between the Yangtze River Delta region and RCEP member states. The fourth section shows the analysis of factors affecting the textile trade of the Yangtze River Delta region with RCEP member states. The fifth section presents the analysis result of the factors influencing the textile products between the Yangtze River Delta region and RCEP member states. The sixth section concludes this study and suggests recommendations.

3. Methodology

Data related to the current situation of textile trade between the Yangtze River Delta region and the RCEP member states were obtained from China's General Administration of Customs and the World Bank's WDI database. The data contained scales, product structures, and market distributions. Based on the panel data of textile exports between 2013 and 2022, the trade Gravity Model was constructed. Then, factors affecting the textile exports from the Yangtze River Delta to RCEP member states were determined to understand the evolution and development of the textile trade between the two parties. Then, the countermeasure suggestions were made about how to construct the RCEP FTA and enhance the export capacity and international competitiveness of textiles in the Yangtze River Delta region. The current situation of the textile trade was analyzed to reveal the level and characteristics of the textile trade in the Yangtze River Delta region, too. The factors affecting the textile trade between the Yangtze River Delta region and the RCEP member states were determined from various perspectives, such as the level of economic development, supply and demand, trade costs, regional economic integration, and so on. Through the qualitative analysis, the influence mechanism and degree of each factor on textile trade were assessed. To accurately quantify the impact of each factor on the textile trade between the Yangtze River Delta region and the RCEP member states, an empirical analysis was carried out using a trade Gravity Model to investigate the degree and direction of the influence of each factor on textile trade. Based on the results, recommendations were suggested to construct the RCEP FTA, expand the scale of textile exports in the Yangtze River Delta region, and implement appropriate policies for the sustainable development of textile trade between the two parties, mutual benefits, and win-win situation.

4. Textile Export from Yangtze River Delta Region to RCEP Member States

The textile industry is traditional in the Yangtze River Delta with a large potential for development in the global market due to its unique location conditions and a long history of textile culture. This section provides an overview of the development of textile trade in the Yangtze River Delta, and the current status of trade between the Yangtze River Delta and the RCEP member states in terms of export, product structure, and country structure.

4.1. Scale of Textile Exports

From 2013 to 2022, exports to each RCEP member country from the Yangtze River Delta Region increased with a fluctuation. the region's export value of textiles to the RCEP member states was USD 40.577 billion, increased from USD 34.941 billion in 2013 by 19.81%. However, in 2015, the growth rate slowed. The demand in the global market has rebounded since then, but the share of China in the market has decreased with a harsh market environment. China's textile industry experiences multiple barriers in the global market in terms of foreign safety, environmental protection, and tariffs (Li, 2019), which increases costs and pressure on China's export trade. From 2017 to 2022, with the "Belt and Road" construction, the economic and trade cooperation between the Yangtze River Delta region and RCEP member states strengthened, and the export value of textile products increased (Figure 1). The textile exports from the region to RCEP member states accounted for nearly half of the total national textile exports to RCEP member states, which highlighted the importance of the region's textile exports At the same time, RCEP member states have become key partners in China's textile export trade. Therefore, an in-depth study of the textile export from the region to RCEP member states and its development is of great significance in promoting the continuous improvement and development of China's textile sector.
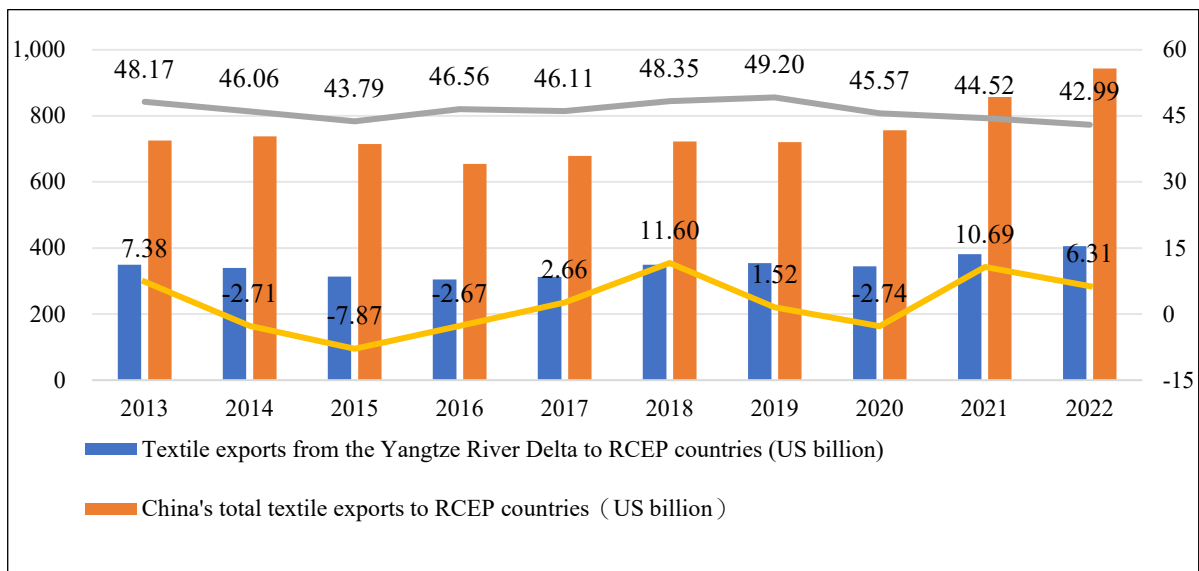
Sources: General Administration of Customs of China

Fig. 1. Trade scale of textile exports from the Yangtze River Delta Region to RCEP member states from 2013 to 2022.

4.2. Product Structure of Textile Exports

In the textile exports of the region to RCEP member states from 2013 to 2022, the top five major products belonged to categories 61, 62, 54, 60, and 63. Categories 61 and 62 accounted for more than 35% in the past ten years. However, the export value and the proportion of the products in the two categories have decreased with the export of category 61 decreasing by 20.35% from USD 9.640 billion in 2013 to USD 7.678 billion in 2022. The exports of category 62 decreased by 25.65% from USD 8.831 billion to USD 6.565 billion. While the export volume and proportion in the export of categories 54, 60, and 63 increased. In 2020, due to the impact of the epidemic, the export of epidemic-prevention materials such as masks and protective clothing increased significantly (Shi, 2022), but the trade value of category 63 fluctuated. In addition to the five categories of products, the proportion of other categories of textiles did not change significantly. The main textile products exported from the region to RCEP member states included chemical fibers, semi-products, manufactured products, and several other categories of products. The structure of textile exports in the past ten years did not change much as products of categories 61, 62, and 54 were major products to the RCEP member states (Table 1). Chinese textile exporters need to understand the changes in market demand to accurately capture the future

demand and to flexibly adjust the supply according to the changes. Through such strategic adjustments, enterprises can maintain competitiveness in fierce competition to secure their market position.

Table 1. Product structure of the top five categories of textile exports from the Yangtze River Delta Region to RCEP member states from 2013 to 2022. (in USD billion)

Year / Category		61	62	54	60	63
2013	Export amount	96.40	88.31	29.42	24.89	26.30
	Proportion（%）	27.59	25.27	8.42	7.12	7.53
2014	Export amount	86.95	81.96	33.43	29.50	26.59
	Proportion（%）	25.58	24.11	9.83	8.55	7.82
2015	Export amount	77.28	71.57	33.16	34.66	26.22
	Proportion（%）	24.68	22.85	10.59	9.42	8.37
2016	Export amount	71.75	66.14	34.94	44.34	26.39
	Proportion（%）	23.54	21.70	11.46	10.35	8.66
2017	Export amount	69.41	67.56	38.14	57.13	27.25
	Proportion（%）	22.18	21.59	12.19	11.08	8.71
2018	Export amount	74.27	71.75	46.27	40.34	29.52
	Proportion（%）	21.27	20.55	13.25	11.55	8.45
2019	Export amount	72.08	69.42	49.78	44.34	29.77
	Proportion（%）	20.33	19.58	14.04	12.51	8.40
2020	Export amount	63.74	60.95	40.31	40.04	60.60
	Proportion（%）	18.48	17.67	11.69	11.61	17.57
2021	Export amount	72.97	59.97	53.27	57.13	45.77
	Proportion（%）	19.12	15.71	13.96	14.97	11.99
2022	Export amount	76.78	65.65	61.69	56.49	42.04
	Proportion（%）	18.92	16.18	15.20	13.92	10.36

Sources: General Administration of Customs of China

4.3. Textile Export Structure

In the RCEP region, the textile export from the Yangtze River Delta region to each member state varies considerably. In 2022, ASEAN, Japan, Australia, and South Korea had higher proportions, accounting for 14.05, 6.26, 2.42, and 1.80% of the total textile exports from the region, whereas Brunei, Laos, Singapore, and New Zealand imported textiles less from the region. The major importing countries in ASEAN from the region in 2022 included Vietnam, Indonesia, Cambodia, Thailand, Myanmar, and Malaysia, which accounted for 92.53% of the total exports to ASEAN. Vietnam imported USD 8.243 billion of textiles from the region, accounting for 5.05% of the total exports to RCEP member states from the region. This result for Vietnam was higher than that of Australia, making Vietnam another important export country after Japan. Over the past decade, Vietnam's economy has grwon at a high rate, and the textile industry chain has developed rapidly, which in turn has boosted the demand for textiles. As a result, the exports from the region to Vietnam increased from USD 5.190 billion in 2013 to USD 8.243 billion in 2022, showing great growth potential. In contrast, the total exports of the Philippines, Singapore, Brunei, and Laos accounted for 1.20% of the total textile exports from the region, suggesting a polarization in the ASEAN market. As the third largest market, Australia's imports increased from USD 2.908 billion in 2013 to USD 3.944 billion in 2022. In contrast, the New Zealand market accounted for 0.33% in 2022 with a slight increase, albeit with relatively a small smooth fluctuation (Table 2). The result suggests that it is mandatory to explore the trade potential of each RCEP member state, strengthen the cooperation with the countries, and improve the competitiveness of textile products for further increase in exports.

Table 2. Export value and share of textile products from the yangtze river delta region to rcep member states in 2022.

Country	Textile exports from the Yangtze River Delta Regions (US billion)	Percentage of textile products from the Yangtze River Delta Region to RCEP member states (%)
ASEAN-10	229.36	14.05%

Country	Textile exports from the Yangtze River Delta Regions (US billion)	Percentage of textile products from the Yangtze River Delta Region to RCEP member states (%)
Vietnam	82.43	5.05%
Indonesia	39.44	2.42%
Cambodia	27.96	1.71%
Thailand	21.62	1.32%
Myanmar	20.72	1.27%
Malaysia	17.57	1.08%
Philippines	14.27	0.87%
Singapore	4.79	0.29%
Laos	0.47	0.03%
Brunei	0.11	0.01%
Japan	102.16	6.26%
Australia	39.44	2.42%
South Korea	29.36	1.80%
New Zealand	5.44	0.33%

Sources: General Administration of Customs of China

5. Analysis of the Factors Influencing Textile Export

Based on the above analysis of the current situation, factors affecting the textile export trade of the Yangtze River Delta region to the RCEP member states were determined from various perspectives, such as the level of economic development, trade costs, and regional economic integration.

5.1. Level of Economic Development and Supply and Demand

The regional economy and the level of economic development of the importing countries were major factors with significant constraints and driving effects on exports. They shaped the competitiveness of textile products in the global market. In the global economy, trade relations are closely linked. The development of the regional economy is closely related to technology. Over the past few decades, the regional economy and export trade technology have changed greatly. Developed regions have a higher level of economic development with enterprises that have more capital and technology, which makes it easier for them to carry out innovative activities, heighten their technology levels, and continuously improve the industrial chain. This enhances the competitiveness of enterprises in the export. The higher the level of regional economic development, the more advantageous the commodity exports. The textile industry in the Yangtze River Delta Region, as a traditionally advantageous industry, is unique with a significant cluster effect, which has a strong momentum of development and vigorously promotes the growth of China's textile exports. As the economies of importing countries continue to prosper, their national income levels have steadily risen, which in turn increases their purchasing power. In the process, consumer demand is growing and increasingly diversified. If domestic supply is insufficient to meet these newly layered consumer demands, the country's reliance on imported products increases accordingly. Therefore, the GDP level of the importing country is an important indicator to estimate the demand for imported products, and the improvement of the economic level of the RCEP member states stimulates demands for textile consumption and increases imports.

5.2. Trade Costs

Textile export is affected by the geographical distance between the exporting and importing countries, which is important in the analysis. The increase in geographic distance undoubtedly raises transportation costs, which in turn dampens textile exports. That is, the increase in distance increases the logistics costs and reduces the efficiency of trade. In addition, geographical distance is impacted by cultural differences. Geographically close countries tend to show cultural similarity, while distant countries have greater cultural differences. Such cultural differences impact textile exports. For example, in RCEP, China, Japan, and South Korea have higher cultural similarities due to their geographical proximity. On the contrary, there are cultural differences between China and New Zealand, which may make textile exports more difficult. Communication between geographically close countries is frequent, which to a certain extent facilitates trade activities. The main destinations of its textile exports to RCEP member states from the regions are concentrated in closer countries such as Vietnam, Japan, and South Korea, which verifies the importance of geographic distance to textile exports. When formulating textile export policies and strategies, geographical distance must be considered to optimize the allocation of resources and enhance the scale and competitiveness of textile products.

5.3. Regional Economic Integration

Regional economic integration significantly impacts textile exports. Through the construction and promotion of regional economic integration, a unified market can be established to eliminate tariff barriers. The integration can remove the division and specialize production with a concentration of capital. The geographical distribution pattern of trade can be reshaped, too. Although trade between member states and non-member states has declined, the position and influence of regional economic integration have not weakened. On the contrary, by strengthening trade, the status and competitiveness can be enhanced, and trade among member states can be accelerated, which increases overall trade. Regional economic integration is accompanied by externalities. Economic integration in the regional economy improves the vitality of member states and accelerates their development, also increasing external demand and contributing to the growth of global trade (Bin *et al*., 2022). However, at the same time, due to the strategy of "free trade internally and trade protection externally", the expansion of intra-regional trade requires the expense of the trade volume with countries outside the region. This phenomenon may impact the balanced development of global trade and the openness of markets. RCEP has impacted the textile export of the region. With regional economic integration, further expansion and enhancement of textile trade in the region are expected. Opportunities and challenges of regional economic integration must be considered to formulate appropriate strategies by using the advantages and potential effects of regional economic integration.

6. Analysis of Factors

6.1. Model Selection

In research on global trade, the Gravity Model is widely used to analyze it. Tinbergen (1963) and Poyhonen (1963) used the Gravity Model to study bilateral trade and concluded that economic integration increases trade between two countries. The larger the economic aggregation, the larger the bilateral trade. Distance decreases trade volume, i.e. the farther the distance, the smaller the trade volume. This is an important theoretical basis for subsequent research on global trade. The trade Gravity Model indicates that bilateral trade between two countries is related to the total economic volume of the two countries and is affected by various variables. The introduction and modification of these variables make the trade Gravity Model logical and accurate. The variables are used to quantify the trade relationship between countries. The basic model of traditional trade Gravity Model derived from the Newtonian Model is

$$IMP_{ij} = \frac{GDP_i GDP_j}{DIS_{ij}} \tag{1}$$

where IMP_{ij} represents the trade volume of country i to country j, which reflects the scale of economic exchanges between the two countries. GDP_i and GDP_j represent the gross domestic product of country i and country j, respectively, which reflect the country's economic strength and potential demand for trade. DIS_{ij} stands for the straight-line distance between the two countries, and this variable captures the impact of geographic distance on trade activities. DIS_{ij} represents the straight-line distance between the two countries, a variable that reflects the impact of geographical distance on trade activities. In order to simplify the calculation process and show the relationship between the variables more intuitively, the linear formula is used in logarithm with α_0, α_1, and α_2 as constants.

$$\ln(IMP_{ij}) = \alpha_0 \ln(GDP_i) + \alpha_1 \ln(GDP_j) - \alpha_2 \ln(DIS_{ij}) \tag{2}$$

6.2. Selection of Influencing Factors

To define the influencing factors of the textile export of the Yangtze River Delta Region to RCEP member states, the methodology of Wang (2012) was employed. In the method, the level of economic development, transaction costs, foreign trade dependence of trading partners, textile competition index, and the level of regional integration were considered. To explore the role of influencing factors, the trade Gravity Model was constructed by selecting indicators and utilizing panel data from 2013 to 2022. The textile export value of the region to RCEP member states was used as the explanatory variable. The model was defined as

$$\ln(EX_{ijt}) = \alpha_0 + \alpha_1 \ln(GDP_{jt}) + \alpha_2 \ln(POP_{jt}) + \alpha_3 \ln(DIS_{ij}) + \alpha_4 \ln(TCI_t) + \alpha_5 \ln(DFT_{jt}) + \alpha_6 FTA_{jt} + \varepsilon_{it} \tag{3}$$

where the explanatory variables are EX_{ijt}, in this paper, i represents the Yangtze River Delta region, j represents the RCEP member states, and t represents the year, which is a random error term. The explanation of each variable is shown in Table 3.

Table 3. Description and analysis of explanatory variables.

Variable name	Expected Symbol	Theoretical note	Data sources
EX_{ijt}		Denotes the value of textile exports from the Yangtze River Delta region to each RCEP member country.	General Administration of Customs of China
GDP_{jt}	+	Denotes the gross domestic product, or GDP_{jt}, of RCEP member country j in period t, the size of which directly reflects the country's economic level. When the value of GDP_{jt} is higher, it indicates that the overall economic strength of the RCEP member states is stronger, which in turn means that the size of their demand is larger.	World Bank database
POP_{jt}	+	Denotes the total population of RCEP member country j in period t. POP_{jt} is an important indicator of the size of the country's market demand. larger values of POP_{jt} indicate a larger population base, which in turn implies a stronger demand for various products in the country.	World Bank database
$DIS_{jt} \times Oil_t$	-	Denotes the product of the geographic distance between RCEP member country j and the Yangtze River Delta region and the international price of crude oil, the larger the value, the greater the trade communication, the greater the cost of transportation.	www.distancefromto.net/ U.S. Energy Administration website
TCI_t	+	Denotes the Textile Competitiveness Index (TCI) of the Yangtze River Delta (YRD) region in period t. It refers to the ratio of the difference between the import and export of textiles to the total amount of import and export, and the larger the TCI is, the larger the export of textiles from the YRD region is.	General Administration of Customs of China
DFT_{jt}	+	Indicates the foreign trade dependence of RCEP member country j in period t, which can be assessed quantitatively through the ratio of the country's total exports and imports of all commodities to its GNP. This indicator deeply reflects the degree of dependence of the country's economy on the global market and its level of openness. Higher values of DFT_{jt} imply that the country's import and export interactions with the global market are more frequent, and therefore its import and export capacity is correspondingly stronger.	World Bank database
FTA_{jt}	+	Dummy variable, taking 1 when country j signs a free trade agreement with China in year t, and 0 otherwise, both importers and exporters have joined the World Trade Organization, and the trade terms will have a certain positive impact on the behavior of both international transactions.	China Free Trade Zone Service Network

6.3. Descriptive Statistics and Multicollinearity Test

Six indicators in 14 countries over 10 years were determined from the data and information collected. Before conducting regression analysis on the panel data, descriptive statistics were obtained for each variable as shown in Table 4 to understand the characteristics and distribution of the data.

<div align="center">**Table 4.** Descriptive statistis of variables.</div>

Variant	Sample size	Average value	Standard deviation	Min	Max
$lnEX$	140	20.597	2.011	15.388	23.480
$lnGDP_{jt}$	140	26.254	1.734	23.157	29.282
$lnPOP_{jt}$	140	7.866	1.644	3.718	10.224
$lnDIS$	140	12.283	0.760	10.506	14.022
$lnTCI_t$	140	0.579	0.007	0.569	0.590
$lnDFT_{jt}$	140	0.576	0.282	0.223	1.431
FTA	140	0.843	0.365	0	1

In empirical analysis, it is crucial to test multicollinearity. Multicollinearity is caused by an extraordinarily high correlation between explanatory variables, which distorts model estimation. To eliminate this problem, the variance inflation factor (VIF) was used in the covariance test. A VIF higher than 10 was considered a critical value for determining multicollinearity. Table 5 shows that the VIF value of each explanatory variable selected was lower than 10, indicating there was no significant multicollinearity problem, ensuring the accuracy and reliability of the model estimation.

<div align="center">**Table 5.** Results of the VIF test between variables.</div>

Variant	VIF	1/VIF
$lnPOP_{jt}$	2.13	0.469
$lnGDP_{jt}$	2.00	0.501
FTA	1.28	0.782
$lnDIS$	1.26	0.792
$lnDFT_{jt}$	1.15	0.867
$lnTCI_t$	1.04	0.965
trend	1.18	0.848
Mean VIF	1.43	

6.4. Model Setting Tests

For the estimation of panel data, the mixed regression model, random effects model, and fixed effects model were used. The following tests were conducted to evaluate the three models and ensure the scientific rationality of the models. Firstly, the Ordinary Least Square (OLS) model and the fixed effect model were constructed and their applicability was compared with the result of F-tests. When the p-value is 0, the original hypothesis is rejected, *i.e.*, the fixed effect model is selected. A random effects model was used in the Lagrange Multiplier (LM) test is applied to compare the random effects model with the mixed effects model. When a p-value of 0, the original hypothesis is rejected, indicating that the random effects model is appropriate. Finally, the Hausman test was used to compare the random effect model with the fixed effect model. The p-value of the Hausman test was 0.77, supporting the original hypothesis at a significance level of 1%, therefore, the random effect model was chosen in this study.

<div align="center">**Table 6.** Model setting test results.</div>

	OLS	Fixed effects model	Random effects model
$lnGDP_{jt}$	0.482***	0.209	0.359**
	(0.066)	(0.214)	(0.158)
$lnPOP_{jt}$	0.712***	3.205**	0.847***
	(0.072)	(1.234)	(0.215)
$lnDIS$	0.214*	0.268***	0.215***
	(0.119)	(0.083)	(0.079)
$lnDFT_{jt}$	1.309***	0.371	0.571*
	(0.307)	(0.323)	(0.302)
$lnTCI_t$	2.624	1.125	1.029
	(11.560)	(2.899)	(2.886)
FTA	-0.491*	0.263***	0.234**
	(0.249)	(0.097)	(0.096)
trend	0.038	0.004	0.019**

	(0.030)	(0.014)	(0.009)
_cons	-2.358	-14.507	0.634
	(7.055)	(10.660)	(4.097)
N	140.000	140.000	140.000
R²	0.788	0.447	
Adj-R²	0.777	0.354	
F-test		Prob > F = 0.0000	
LM test		Prob > chibar2 = 0.0000	
Hausmann test		Prob > chi2 = 0.7773	

Note: Standard errors in parentheses $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

According to Table 6, the gravity equation of textile export in the Yangtze River Delta region was derived as follows.

$$\ln(EX_{ijt}) = 0.634 + 0.359\ln(GDP_{jt}) + 0.847\ln(POP_{jt}) + 0.215\ln(DIS_{ij}) + 1.029\ln(TCI_t) + 0.571\ln(DFT_{jt}) + 0.234FTA_{jt} \tag{4}$$

6.5. Analysis of Results

GDP_{jt} was a significant factor at a significance level of the 5% test being positive, indicating that the increase in the level of economic development of the trading partner positively impacted the export of textiles from the Yangtze River Delta Region, and the pulling effect on the export of textiles was relatively weak. POP_{jt} was a significant factor at a significance level of the 1% test being positive, indicating that the increase in the population size of RCEP member states significantly affected the exports from the region. The larger the population of the importing country, the larger the market demand. At the same time, when the division of the labor market in the country was imperfect, the external consumption capacity increased, which promoted the exports of the region. Changes in the population size of the importing country affected textile exports from the region. The coefficients of the DIS were positive, implying that geographic distance positively affected exports, which was contrary to the hypothesis. However, this result coincided with that of Huang and Li (2022) and Luo *et al*. (2023). Transportation between the region and the RCEP member states is convenient, and at the same time, the hindering effect of geographic distance on trade is significantly weakened with the continuous improvement of transportation. As a result, exports from the region were not significantly decreased despite the increase in distance. TCI_t presents the global division of labor in the industry and a country's position in the global textile industry. It was positive, meaning that the textile exports from the region had a promotional effect, but not significant. With the access of RCEP member states to the TPP, textile enterprises invested and built factories, which led to the rapid development of their textile industry and strong competitiveness. DFT_{jt} showed a coefficient of 0.571 at a significance level of 5%. As the trade dependence of a country increases, the country's dependence on or openness to the global market also increases. The country's ability to import and export to the global market has also increased. Therefore, trade dependence has a significant effect on textile exports in the region. The coefficient of the dummy variable FTA was positive, which is in line with the hypothesis at a significance level of 10%. This indicated that FTA had a significant positive effect on textile exports from the region. The implementation of FTA significantly reduced the transaction costs of the participating countries. As China's free trade zone is in development, a free trade strategy with multiple parties and bilateral trade relationships significantly enhances the level of textile exports.

7. Conclusions and Recommendations

RCEP is the world's largest FTA. This promotes global economic and trade cooperation and highlights multilateralism and free trade. In the Yangtze River Delta Region, the implementation of RCEP has increased its textile trade. Based on the "trade scale - product structure - market structure", the current situation of the textile export from the region to RCEP member states was analyzed in this study. By applying the trade Gravity Model, the key factors affecting textile exports of the region were determined. The region has established close cooperation with RCEP member states, which is indispensable and important in the textile trade. Between 2013 and 2022, the total textile exports of the region to RCEP member states increased with an average rate of 2.417%, and it accounted for a significant proportion of China's total textile exports. As the proportion of exports to developing countries such as Laos and Myanmar increased, that to developed countries such as Japan decreased. The region has increased its exports to other member states in the ASEAN region than developed countries. The textile exports between the Yangtze River Delta region and RCEP member states were influenced by multiple factors. The economic scale and population size of member states and their free trade agreements were important factors affecting the textile exports of the region, which significantly contributed to the growth of textile exports from the region to the RCEP member states. This revealed that textile products from the Yangtze River Delta Region are exported to countries with a prosperous economy, a large population base, and a high degree of market openness. These

factors influence the multi-dimensional trade mechanism and affect textile exports to RCEP member states. Trade agreements play a significant role in the textile exports of the region. RCEP member states form an important textile production base and are important textile consumer markets. This situation makes China deepen regional cooperation and build efficient and synergistic textile and apparel industry chains for mutual benefit. FTAs become a new engine for the growth of China's global trade. This influences the Yangtze River Delta Region in the textile industry and provides opportunities to integrate the region's high-quality resources and establish a cooperation system for more production capacity.

China is leading the global economic and trade exchanges and cooperation and is building a sound and efficient communication platform to promote trade among RCEP member states. It is necessary to promote the China-Japan-South Korea Free Trade Agreement (FTA) and strengthen the "10+1" cooperation framework to build a stable regional economic cooperation system. It is demanded to promote trade cooperation in an open, inclusive, and pragmatic manner, implement trade preference clauses as soon as possible, ensure the effective implementation of RCEP, and promote regional economic integration. At the same time, existing free trade agreements including those between China-Cambodia and China-Australia must be upgraded for more openness and broader cooperation. In promoting regional economic cooperation, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is necessary to expand the free trade network and increase economic and trade exchanges for the economic vitality of the Asia-Pacific region and the prosperity of the global economy. By strengthening regional economic cooperation, a stable and reliable development environment for all countries can be secured to promote the prosperity and development of the global economy. Through RCEP, China is negotiating with member states to simplify the import and export regulations, reduce the threshold of access to currency and financial markets, and reduce the interference of political factors. This enhances the level of trade liberalization. In this process, China needs to encourage domestic textile enterprises to go global and make use of the advantages of RCEP. At the same time, the opportunity to promote regional economic integration must be seized by learning from Japan, South Korea, and other textile powerhouses with advanced technology. The collaboration and complementation in the textile industry chain must be advanced, and the division of labor and the cooperation process need to be refined. It is essential to increase the competitiveness of the textile industry such as chemical fibers, semi-products, and finished products, and enhance competitiveness in the global market to improve the quality of textile production and export efficiency.

China must be aware of the different positions of RCEP member states in the labor system to strengthen trade with member states with strong demand and pay attention to those with lower demand for increasing exports. Japan and South Korea have strong ties with China in the textile trade, and the potential is still huge. Given that the construction of the China-Japan-South Korea Free Trade Area is still in the advancement stage, the degree of trade needs to be enhanced to construct the Free Trade Area. At the same time, cooperation with Laos, Brunei, Singapore, and other member states also must be strengthened for the expansion of the market. Such activities will promote the textile exports of the Yangtze River Delta Region.

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