

# An Index Analysis of the International Competitiveness of China's Textile Industry

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## Abstract

The textile industry is a traditional advantageous industry in China, and with the progress and development of science and technology, the textile industry is getting much more attention than before. However, textile exports have been hit by the changing political situation in today's world, the increasing complexity of the world economy, coupled with the impact of the epidemic. This paper collects relevant data and literature on China's textile export trade in recent years to comprehensively analyze the problems in China's textile products, by using market-possessing rate (MPR), trade competitive index (TC), and revealed comparative advantage index (RCA). The paper then discusses the strategies and ways to enhance the international competitiveness of China's textile industry as well as the sustainable development of textile exports.

## Keywords

China, Textile Industry, International Competitiveness, Market-Possessing Rate, Trade Competitive Index, Revealed Comparative Advantage Index

## 1. Introduction

Today China has become the world's largest producer and exporter of textiles. The textile industry not only makes a significant contribution to the gross domestic product, but also creates many employment opportunities. However, the development of the textile industry is not optimistic. The growth of China's textile trade has slowed down, requiring it to face the pressure from policies and markets, such as industrial upgrading in the east, improved environmental requirements, and labor shortage and rising land costs. At the same time, the epidemic has also brought a certain impact on China's import and export trade. In response to the epidemic, all the countries have increased the control of import and export trade.

Therefore, to improve the international competitiveness of China's textile products, the transformation and upgrading of the textile industry has been an imminent and realistic need.

Lan Zhan extracted 16 indicators from industrial market performance, enterprise competitiveness, industrial inputs and other aspects of factor analysis, finding that R&D effective utilization rate, enterprise overall scale and enterprise operating costs contribute well to the competitiveness of the textile industry (Zhan, 2006). The improvement of the overall competitiveness of the textile industry mainly stems from the comparative advantage generated by resource endowment and the policy effect after China's accession to the WTO (Cheng, 2008). Measures should be taken so that the intra-industry trade based on the differentials in products and economies of scale will become the main force to drive the competitiveness.

Based on the export data of textile products from 57 countries to China along the "Belt and Road" route in 2014, the advancement of the country's international logistics performance leads to a significant rise in China's textile product exports (Wang & Yang, 2017). Regression models among technical trade barriers and different types of textile products show that the impact of technical trade barriers on clothing is stronger than that on textile raw materials, fabrics textiles, and other products (Qian, 2017). Factors such as the difference in per capita GDP, trade surplus, and market size affect the intra-industry trade of textiles between China and India, and the greater the difference in per capita GDP, the higher the intra-industry trade between the two countries (Tan et al., 2018).

Since the outbreak stage of the COVID pandemic, some countries represented by the United States have set up an increasing number of restrictive requirements and a variety of trade barriers on the export of China's products. To shape competitive advantages, China's textile enterprises themselves should seize the chance to carry out the innovation of green manufacturing and to advance their own textile technology level (Gu, 2020). Regarding the relationship between the textile industry and the green economy, two other important findings should be noted: In progress of establishing the green economy, the textile industry has a huge potential for energy saving. In 2025, it is estimated to save 16.16 - 27.53 million tons of standard coal equivalent, and the carbon dioxide emission reduction will reach 32.63 - 55.6 million tons (Lin et al., 2018). Rapid population and economic growth will lead to a sharp increase in textile production and consumption. Due to the varying levels of management, the China's textile industry needs to transform and upgrade its fossil-fuel based production processes with the goal of reducing emissions (Lin & Bai, 2020).

Unlike the above literature, this paper provides an in-depth analysis of all aspects of China's textile exports through the collection of UN Comtrade data and the use of classical trade competitiveness indicators.

## 2. The Exports of China's Textile Industry

### 2.1. The Product Structure of China's Textile Exports

Textiles are an important necessity in the daily life. Broadly speaking, textile

products include 1) textiles: all kinds of textile raw materials, medical textiles and non-woven fabrics and other textile products, and 2) clothing and apparel. In the past five years, stimulated by masks and other anti-epidemic materials, textile exports have risen markedly, becoming the major category in the goods of trade. Their cumulative trade surplus amounts to 272.58 billion U.S. dollars, accounting for 51% of the country's total surplus. Meanwhile, the product structure of China's textile exports has also changed. Textiles experienced a rapid rise in the proportion, reaching 52.3%, for the first time more than clothing and apparel (47.7%). See **Table 1**. Judging from the current international environment, China's export market for textile products still has a lot of space for development.

**Table 1.** Breakdown of China's textile and apparel exports in 2017 - 2020 (100 million USD).

	Textile export volume	Clothing and apparel export volume
2017	1157.00	1588.10
2018	1190.98	1576.33
2019	1272.50	1534.50
2020	1541.31	1415.01

## 2.2. Export Distribution of Domestic Regions

According to the export value of textile products from China's major provinces and cities in 2021, Zhejiang, Jiangsu, Shandong, Guangdong and Fujian are the top five. The export growth rates of their textile products and apparel are higher than the national average, while Guangdong Province shows a negative growth trend. In 2021, the above provinces exported textile and apparel of 82.16 billion U.S. dollars, respectively, US\$ 51.73 billion, US\$ 45.78 billion, US\$ 31.86 billion and US\$ 27.69 billion, representing year-on-year growth of 15.5%, 11.3%, -6.8%, 20.5% and 29.0%. In 2021, textile and apparel exports from western China showed a high rate of development, while the core provinces in the east had a more pronounced pulling effect on the economy. During the year, the western region's exports of textile and apparel totaled US\$ 18.26 billion, an increase of 28.4% over the same period of the previous year, and its share in the country's textile and apparel exports was 5.8%. Exports from the eastern region totaled US\$ 270.45 billion, an increase of 8.5%, and accounted for 85.7% of the country's textile and apparel exports. Exports from the central region were worth US\$ 22.68 billion, a decrease of 3.0%. And exports from the three northeastern provinces amounted to US\$ 4.40 billion, an increase of 1.6%.

## 2.3. Export Distribution of Foreign Regions

The United States, ASEAN, the European Union, and Japan are the largest markets for China's textile and apparel exports. China exported 172.49 billion U.S. dollars of textiles and apparel to these four traditional markets, accounting for

55% of the total global textiles and apparel exports, of which the U.S. is the largest export market for textiles, with annual textile exports to the U.S. totaling US\$ 56.35 billion. In recent years, the economic and trade relations between China and the United States are constantly changing, and the game of great powers is becoming more intense. At present, the U.S. imposed import tariffs on certain products from China and unilaterally restricted Xinjiang cotton and its products into the global supply chain through relevant laws. China's exports to the U.S. have taken a hit, but remain competitive internationally.

In 2021, our textile and apparel exports to ASEAN countries grew significantly. China's textile and apparel exports to the 10 ASEAN member countries reached US\$ 491.2 billion, a year-on-year increase of 24.9%. The increase in exports to Malaysia, Indonesia, Cambodia and Thailand was particularly sizable, up 60.4%, 54.2%, 40.8% and 35.5% separately from the same period of the previous year.

In addition, due to Britain's exit from the European Union, the EU has been the third largest export market for China's textile products export trade after ASEAN. In 2021, China's total textile and apparel exports to the 27 member states of the EU amounted to US\$ 46.99 billion, a decrease of 11.1% from the same period of the previous year, of which China's total apparel exports to the EU increased by 21.3%, as shown in **Table 2**.

**Table 2.** China's textile and apparel exports to selected countries/regions, 2021.

	World	U.S.	ASEAN	E.U.	Japan	Korea	U.K.
Total Exports of Textile and Apparel from China (100 million USD)	3155.0	563.5	491.2	469.9	200.3	100.7	89.7
Year-on-Year Growth of Exports (%)	8.4	4.0	24.9	-11.1	-7.2	10.5	-28.9
Exports of Textile from China (\$100 m)	1452.2	167.8	354.3	146.3	53.7	33	22.7
YoY Growth of Textile Exports (%)	-5.6	-33.2	24.1	-44.1	-31.1	-8.3	-59.3
Exports of Apparel from China (\$100 m)	1702.8	395.6	136.9	323.6	146.6	67.7	67
YoY Growth of Apparel Exports (%)	24.0	36.3	27.3	21.3	6.3	22.8	-4.9

### 3. Measurement of China's Textile Market Structure

This section analyzes the structure of China's textile export market by applying the export market concentration index, the export diversity index, and the export uniformity index.

#### 3.1. Herfindahl-Hirschman Index (HHI)

Export market concentration index, namely Herfindahl-Hirschman index (HHI),

refers to the degree to which a country or a region's exports are concentrated in a certain country or region. China's HHI index for textile commodities can be expressed by the sum of the squares of the individual export market shares:

$$\text{HHI} = \sum_{i=1}^n \frac{X_i}{X} = \sum_{i=1}^n (S_i)^2$$

where  $X$  represents the total export amount of textile commodities,  $X_i$  denotes the export amount of textile commodities to market  $i$ , and  $S_i$  is the export share. If the HHI index becomes smaller, indicating that the proportion of the textile commodities in these countries and markets is on a downward trend, and the structure of the export market gradually ameliorates.

### 3.2. Export Diversity Index (*D* Index)

Diversity index is used to measure the spatial pattern and complexity of a landscape in landscape ecology. The index can also be utilized to analyze the changes in the export market share of textile commodities. The formula is:

$$D = -\sum_{i=1}^n P_i \log_2 P_i$$

$P_i$  refers to the share of  $i$  exporting country or region in the total textile export market and  $n$  indicates the number of export markets. When there is only 1 national or regional market for textile commodities,  $D$  is 0, meaning that the export situation has deteriorated to the extreme. When the export market increases or the market share of each exporting country or region tends to average,  $D$  will increase. If  $D$  becomes larger, the market structure of textile exports tends to be improved.

### 3.3. Export Uniformity Index (*E* Index)

The index measures the uniformity or evenness of the market distribution and is calculated by:

$$E = D/D_{\max}$$

$E$  ranges from 0 to 1. The more  $E$  approaches 0, the larger the differences in exporting destinations and in market shares of textile products, and the distribution of export markets is not balanced. On the contrary, when  $E$  tends to 1, the gap between each export market share is narrowing and the structure of export markets is gradually balanced and optimized.

In **Table 3**, HHI shows a zigzagging and slow rising trend. During these 7 years, the export market of textile commodities is more concentrated in the countries or markets with an already large share of exports. Thus, the market structure is slightly deteriorating.  $D$  index shows a steady upward trend, indicating that the gap between the main export markets shrinks and the share gradually converges to an average. In the period of 2017 to 2020,  $E$  index also presents climbing steps year by year, equalizing export shares among various markets.

**Table 3.** China's structure indices of textile export markets during 2015 - 2021.

Year	HHI Index	D Index	E Index
2015	0.1425	0.4006	0.0299
2016	0.1384	0.3948	0.0296
2017	0.1377	0.3939	0.0294
2018	0.1440	0.4026	0.0298
2019	0.1531	0.4145	0.0306
2020	0.2200	0.4805	0.0345
2021	0.1688	0.4333	0.0313

## 4. Analysis of the International Competitiveness of China's Textiles

### 4.1. Comparison of Export Volume

As can be seen from **Table 4**, the export volume of China's textiles is much larger than that of other countries. In 2015, China's total export volume was 108.934 billion U.S. dollars, while the average export volume of the other five countries was only 13.458 billion dollars. By 2020, China's exports have totaled a whopping \$154.091 billion, while the average of the other five countries is \$12.375 billion. The other five countries together are not up to China. This demonstrates that the overall level of China's textile industry is at the forefront of the world.

**Table 4.** World and national textile exports in 2015 - 2021 (100 million USD).

	Overall	China	India	U.S.	Germany	Italy	Turkey	Others
2015	2885.31	1089.34	172.36	139.35	132.55	117.46	111.20	1123.05
2016	2811.95	1046.05	161.21	131.94	134.30	116.94	111.55	1109.96
2017	2953.32	1095.95	170.87	136.23	142.19	120.82	116.48	1170.78
2018	3123.31	1185.30	181.15	138.22	119.49	128.02	118.81	1252.32
2019	3056.38	1195.75	171.89	133.59	138.65	117.98	117.77	1180.75
2020	3285.49	1540.91	150.42	113.77	139.78	97.83	116.97	1125.81
2021	3542.69	1455.69	222.33	131.22	150.36	119.1	151.65	1312.34

### 4.2. International Market-Possessing Rate

The international market-possessing rate, MPR, is the share of a country's total exports to total world exports. It reflects changes in the international competitiveness of a country's particular industry or product. The larger the proportion, the more competitive an industry or product of a country is in the export market.

$$MPR_{ij} = X_{ij} / X_{wj}$$

in which  $MPR_{ij}$  is the market share of the  $j$ th commodity in country  $i$ ,  $X_{ij}$  is the export value of the  $j$ th commodity in country  $i$ , and  $X_{wj}$  is the export value

of the  $j$ th commodity in the world.

**Table 5.** Comparison of MPR of textiles in selected countries during the period from 2015 to 2021.

	China	India	U.S.	Germany	Italy	Turkey
2015	37.75%	5.97%	4.83%	4.59%	4.07%	3.85%
2016	37.20%	5.73%	4.69%	4.78%	4.16%	3.97%
2017	37.11%	5.79%	4.61%	4.81%	4.09%	3.94%
2018	37.95%	5.80%	4.43%	3.83%	4.10%	3.80%
2019	39.12%	5.62%	4.37%	4.54%	3.86%	3.85%
2020	46.90%	4.58%	3.46%	4.25%	2.98%	3.56%
2021	41.09%	6.28%	3.70%	4.24%	3.36%	4.28%

By comparing various values in **Table 5**, we can see that China's textile export value has a high international market share, far exceeding that of other large textile exporting countries in the world. Apart from the 0.55% decline in China's export share during 2015-2016, the international market share of China's textile export value showed a steady increase during 2017-2020, reaching a new peak in 2020. This is because of a constant demand for Chinese medical textiles in the COVID pandemic episode. In 2021, with the gradual recovery worldwide, China's exports showed a slight decline, but still accounted for 41.09% of world textile exports.

China, India, the United States, Germany, Italy, Turkey are often ranked top countries in terms of the textile export value. In 2020, China's textile exports amounted to 154.091 billion U.S. dollars, accounting for 46.9%, ranking first in the world. The share rose by 7.78% to the previous year. India's textile exports amounted to 15.042 billion dollars, 4.58% of total global textile exports, 1.4% reduction compared with last year, ranking second in the world. Germany's textile exports were US\$ 13.978 billion, 4.25% of total exports, compared with last year a fall of 0.29%, ranking third in the world. The U.S. ranked fourth and Italy ranked sixth in the world.

### 4.3. Trade Competitiveness Index (TC)

The trade competitiveness index (TC) is an effective tool for analyzing the international competitiveness of an industrial structure, reflecting whether and to what extent similar products produced in the country have a competitive advantage over those offered by other countries in the world market. It takes values in the range between  $(-1, 1)$ . If the value of TC exceeds 0, it means that the product is very competitive internationally, and the closer its value is to 1, the more competitive the product is internationally; if the value of TC is below 0, it means that the product is not competitive internationally; when the indicator is 0, it means that this kind of goods is intra-industry trade, and the competitiveness is comparable to the international level. The formula for calculating the TC index is:

$$TC_{ij} = (X_{ij} - Y_{ij}) / (X_{ij} + Y_{ij})$$

where  $X_{ij}$  denotes the export value of certain product  $i$  of country or region  $j$  and  $Y_{ij}$  denotes the import value of certain product  $i$  of country or region  $j$ . By measuring the competitiveness index of China's textile trade in 2015-2021, summarized in **Table 6**, it can be found that the TC values in 2015-2021 are all above 0, which means that China's textile trade has a certain competitive ability in the global context. The TC value of China's textile trade shows a slow decline during 2019-2021, but still maintains a high level above 0.8, implying a high potential for export competitiveness. Indeed, as an export-oriented industry, the export volume of China's textile industry are much larger than the imports.

**Table 6.** China's textile trade competitiveness index in 2015-2021.

2015	2016	2017	2018	2019	2020	2021
0.862	0.891	0.898	0.895	0.891	0.836	0.805

#### 4.4. Revealed Comparative Advantage Index (RCA)

RCA is the most persuasive indicator displaying the competitiveness of a country or region's products or industries in the international market. It aims to quantitatively describe the relative export status of each industry (product group) within a country:

$$RCA_{ij} = (X_{ij} \div X_{ii}) / (X_{iw} \div X_{iw})$$

$X_{ij}$  is the trade value of product  $i$  exported by country (region)  $j$ , and  $X_{ii}$  is the total export trade value of country (region)  $j$ .  $X_{iw}$  is the world's export trade value of product  $i$ , and  $X_{iw}$  is the world's global export trade. Normally, when RCA is greater than 2.5, it indicates that the product has a strong comparative advantage in the international market. If RCA lies within 1.25 and 2.5, the product has a strong comparative advantage. If RCA is between 0.8 and 1.25, it has a medium comparative advantage. Finally, when RCA is less than 0.8, the product is considered uncompetitive.

In recent years, India's textile export volume is second only to China. We calculate RCA of China and of India respectively, presented in **Table 7**, and we can see that RCAs of both countries in textile trade during 2015-2021 show very strong comparative advantages in general. China's advantage grows slowly in 2015-2020, while India's advantage slows down. Affected by the epidemic, year 2020 was an important turning point for China's textile exports with respect to India, as many orders from India flowed to China, and thus China's comparativeness reached its new peak in 2020. However, as the spread of the epidemic is controlled by stages, India's exports recover in 2021, and India's RCA is back above 3. China's textile trade exports are much larger than India's, but the comparative advantage is not as strong as India's. The average value of China's RCA over the seven-year period is 2.91 and 3.41 for India. Although China's textiles have a great deal of



comparative advantage in the international arena, there is still much room to develop when compared to India.

**Table 7.** RCA of Textiles between China and India in 2015-2016.

Year	2015	2016	2017	2018	2019	2020	2021
RCA of China	2.75	2.84	2.91	2.98	2.98	3.20	2.73
RCA of India	3.69	3.48	3.43	3.49	3.30	2.92	3.55

#### 4.5. Conclusions by Comparison

Through the comparison of the above indicators, all countries have certain advantages in the textile production industry, even in the face of such a sudden event as the epidemic. However, China's textile industry has an absolute advantage in overall competitiveness. China still occupies a dominant position in textile and clothing exports and has a great potential to level up its competitiveness in textile trade.

#### 5. Suggestions on the Development of China's Textile Exports

##### 1) Improve the scientific research capacity

The center of the development of China's textile industry should be shifted from "quantity-based" to "quality-based", from "labor-intensive" to "knowledge-intensive" and "capital-intensive". Encourage and support enterprises to make investment in their R&D and continue to introduce and employ advanced technology and equipment from home and abroad. This will strengthen the industry competitiveness in the global market.

##### 2) Facilitate the enterprise scale development

China's textile enterprises are numerous and small in scale, with a low degree of industry concentration and a poor ability to avoid risks. The industry should be built as soon as possible several diversified large-scale multinational groups with competitiveness worldwide. Other small textile firms should take the developing road of "precision, professionalism and specialization", and actively build close collaboration with large enterprises to benefit their production.

##### 3) Implement the brand strategy

The formation of textile brands is not only the advantage of technology and market, but also the long-term accumulation of culture, fashion trends, consumption patterns and many other factors. The higher the brand reputation of enterprises, the higher the added value of their products, the more acceptable to foreign customers, the more can occupy a larger market. Therefore, China can strengthen the brand publicity of textile products and create Chinese textile brands with high quality and high technology.

##### 4) Cultivate talents and professionals

China's textile industry should increase the introduction and training of talents and professionals. Excellent engineers and designers can form a design team that

leads the trend of times. Talents and professionals in the company's business management, marketing, and other aspects can boost the operational level of enterprises through various ways. Finally, all staff should fully understand the WTO rules and foreign anti-dumping and special protection measures to reduce trade disputes.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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