REVIEW ARTICLE

THE COMPETITIVENESS EVALUATION OF THE TEXTILE INDUSTRY IN CHINA

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ABSTRACT

Based on the selection of 29 typical provinces, autonomous regions and municipalities in China, the paper constructs the competitiveness evaluation index system of textile industry, using the method of the principal component analysis (pca). The results show that there are obvious regional differences between the 29 typical provinces, autonomous regions and municipalities in China for the textile industry's competitiveness. Furthermore, the overall competitiveness of the textile industry in China shows that the competitiveness of east China is stronger, while the competitiveness of west China is weaker.

KEYWORDS

textile industry; principal component analysis; competitiveness analysis

1. INTRODUCTION

Textile industry has been the pillar industry of China's national economic development over the years. The competitiveness of a region's textile industry is closely related to the regional government policies, government investment, resources and other factors. On the premise of output-oriented, most textile enterprises ignore issues such as environmental pollution, resource utilization efficiency, and technological innovation.

At present, domestic and foreign scholars mainly focus on environmental competitiveness and technological progress in the textile industry from the angle of research. The methods used mainly include fuzzy comprehensive evaluation, analytic hierarchy process, entropy method, etc. There are relatively few research results abroad. A previous study was trying to take pollution index as input index into the traditional DEA model to calculate the industrial environmental efficiency (Reinhard et al., 2000). On the basis of previous studies, substituted the transformation of environmental pollution variables into DEA model with the help of nonlinear transformation function, expecting to be able to calculate the textile industry development efficiency taking environmental factors into account (Hailu et al., 2001). In China, some research used the method of empirical analysis to analyze the productivity and added value of the textile industry in the world, and concluded that the international competitiveness of China's textile industry is weak (Xu, 2002). Others study constructed the evaluation index system of sustainable development factors, and analyzed the competitiveness and efficiency of the textile industry in 17 provinces by using DEA method (Liu, 2015). By analyzing the driving force and development trend of China's textile industry, there has pointed out that there were some problems in the development of China's textile industry, such as low level of enterprise management informatization, backward technology and equipment, lack of brand management concepts (Chen, 2016). In the previous study, inspected the current situation of China's textile industry product development, found that there are many problems in the development mode of China's textile products (Liu, 2017).

With the development of China's own characteristics, there are not only

differences in competitiveness among different provinces in China's textile industry, but also differences in the current situation of resource utilization efficiency in China's textile industry. On this basis, principal component analysis is used to evaluate and analyze the textile industry competitiveness of 29 provinces in China, in order to provide reference for the sustainable development of China's textile industry.

2. INDEX SELECTION AND DATA SELECTION

2.1 Index selection

The evaluation index system of textile industry competitiveness should consider the comprehensiveness of the index, with the emphasis on the selection of the index related to environment and resources. Based on sample data availability and the textile industry's own development situation, this paper selects the following 14 indexes, total assets, finished products, industry, enterprise quantity, output per capita GDP, advocate business wu income and export delivery value, market share and profit, cost, profit margin, current assets turnover, assets and liabilities ratio, product sales, carbon emissions.

2.2 Data selection

Due to the lack of data in Sichuan and Tibet, this article only conducts a comparative study on the competitiveness of the textile industry in 29 other provinces and cities in China. According to the indicators selected in the above-mentioned establishment of the textile industry competitiveness evaluation index system, the China Industry Statistical Yearbook, China Textile Industry Development Report and the provincial statistical yearbooks are collected and organized as indicators, and the original data is used for research.

3. ANALYSIS OF THE EMPIRICAL RESULTS

3.1 KMO test and Bartlett test

SPSS 23.0 software is utilized to conduct KMO test and Bartlett test on the data to determine whether it is suitable for principal component analysis.

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After calculation, the KMO value is 0.778, close to 1 through the test results of KMO and Bartlett, indicating that the correlation between the selected data is relatively strong; at the same time, the P value in Bartlett sphericity test is 0.00, less than the significance level of 0.05, indicating that it is not a unit matrix. Therefore, this group of data has passed the validity test and is suitable for principal component and factor analysis.

3.2 Determining the number of principal components

This paper selects the principal components whose eigenvalue is greater than 1 and the cumulative variance contribution rate reaches 85%, and ignores other principal components. After calculation and analysis, there are three main components that meet our requirements. The calculation results are shown in Table 1 below.

Table 1: Variance contribution rate									
Composition	Initial eigenvalue			Extract the sum of squares of loads			Sum of squares of rotating loads		
	A total of	Percentage of variance	Cumulative %	A total of	Percentage of variance	Cumulative %	A total of	Percentage of variance	Cumulative %
1	8.274	59.097	59.097	8.274	59.097	59.097	8.192	58.516	58.516
2	2.060	14.714	73.811	2.060	14.714	73.811	2.057	14.691	73.207
3	1.600	11.425	85.237	1.600	11.425	85.237	1.684	12.030	85.237

3.3 Naming principal components

After observing the initial factor loading matrix and the rotating factor

loading matrix after factor rotation in the following table, and name the principal component factors.

Table 2: Rotation factor load matrix			
	composition		
	1	2	3
The total assets of	987.	010.	- 003.
Finished goods	950.	002.	- 101.
Gross industrial output value	970.	035.	116.
The number	938.	062.	- 081.
Per capita GDP	031.	- 835.	- 050.
Main business income	966.	079.	119.
Export delivery value	920.	023.	- 164.
Market share	966.	079.	119.
Profit total	971.	062.	152.
Cost rate of return	027.	- 595.	612.
Current asset turnover	199.	309.	619.
Asset-liability ratio	091.	083.	- 889.
Product sales rate	177.	932.	041.
Carbon emissions	871.	111.	153.

The rotating factor loading matrix shows that the first principal component has a large load of 9 indicators, which are total assets, finished products, gross industrial production value, number of enterprises, main business income, export delivery value, and market share, Total profit and carbon emissions, which shows that the nine indicators have a strong correlation. Since these nine indicators reflect the scale of the industry from different angles, the first principal component is called the industry scale factor. The principal component can explain 58.516% of the variance, indicating that the principal component is the most important factor affecting the competitiveness of the textile industry.

The second principal component has a greater load on the per capita output value and product sales rate, which reflects the profit level of the industry. Therefore, the second principal component is called the industrial benefit factor.

The third principal component has a large load on the asset liability ratio, cost utilization rate and current asset turnover rate. In a comprehensive view, these three indicators reflect the operational status of the industry and show the survival pressure faced by enterprises. Therefore, the third principal component is called the survival pressure factor.

3.4 Calculating factor scores

For convenience, these 14 indicators are coded as X1-X14 from total assets to product sales rate in the above table. Then, according to the score function of the three principal components of the factor score coefficient matrix, the calculation formula is as follows:

$$F_1 = 0.124X_1 + 0.123X_2 + 0.118X_3 + 0.119X_4 + 0.039X_5 + 0.115X_6 + 0.120X_7 + 0.115X_8 + 0.116X_9 + 0.009X_{10} - 0.006X_{11} + 0.035X_{12} - 0.016X_{13} + 0.101X_{14}$$

(Formula 1)

$$F_2 = -0.035X_1 - 0.042X_2 - 0.016X_3 - 0.011X_4 - 0.422X_5 + 0.006X_6 - 0.033X_7 + 0.006X_8 - 0.001X_9 - 0.271X_{10} + 0.176X_{11} - 0.003X_{12} + 0.462X_{13} + 0.028X_{14}$$

(Formula 2)

$$F_3 = -0.031X_1 - 0.090X_2 + 0.042X_3 - 0.075X_4 - 0.070X_5 + 0.047X_6 - 0.126X_7 + 0.047X_8 + 0.065X_9 + 0.341X_{10} + 0.382X_{11} - 0.535X_{12} + 0.063X_{13} + 0.071X_{14}$$

(Formula 3)

According to formula 1, 2 and 3, the scores and ranking of textile industry in 29 provinces, autonomous regions and municipalities directly under the central government in these three principal components are calculated. According to the proportion of variance contribution rate of the three principal components of the total variance contribution rate as the weight, the calculation formula of comprehensive score of textile industry competitiveness is obtained:

$$F = (0.58516F_1 + 0.14691F_2 + 0.1203F_3)/0.85237$$

(Formula 4)

3.5 Analysis of competitiveness results

According to the formulas 1 to 4, we can calculate the scores of textile industry in 29 provinces in three principal components and comprehensive factors. And then obtain the ranking of these provinces.

(1) First principal component analysis

Through calculation, we can find that Shandong, Jiangsu, and Zhejiang still have the highest ranking scores for the industry scale factor of the first main component, indicating that the region has a large industrial scale, complete industrial chain, and strong industrial strength. The central provinces are also very high, have a certain industrial base and related upstream and downstream industries, and have better development conditions. For Inner Mongolia, Yunnan, Guizhou and other places, the textile scale is relatively small. Currently, due to the lack of necessary financial support, it is difficult to form a competitive advantage.

(2) Second principal component analysis

By observing the score and ranking of the second principal component industrial benefit factor, we find that the central and northeast rank higher, which indicates that their textile industry has a high profit level

such as Shandong, Jiangsu, Zhejiang are not dominant. The reason may be that the cost of labor, raw materials and land in developed areas is relatively high and the competitive pressure is high. As a result, the profit margin is low. However, some developed regions such as Beijing and Tianjin have higher efficiency of textile industry. The added value of the industry is higher due to the driving and radiation effect of big brands, thus ensuring the benefit level.

(3) Third principal component analysis

According to the score ranking of the survival pressure factor of the third principal component industry, the scores of Jiangsu, Zhejiang and other 15 provinces and cities are lower than the national average level, which reflects that the survival pressure of the textile industry in these provinces is high, but the reasons are different. For example, Jiangsu and Zhejiang are due to the large scale of textile industry, mature market, and high competitive pressure, while Gansu and Qinghai are due to the disadvantages that the low level of local economic development, the lack of upstream and downstream related industries to drive the textile industry turnover is difficult; while Shanghai and Beijing are due to the regional development strategy positioning, not suitable for the development of human and land demand of manufacturing industry.

(4) Comprehensive factor analysis

In general, the comprehensive score of 10 provinces is positive, and the competitiveness level of textile industry in 19 provinces is lower than the national average level. Through the comprehensive factor score, it can be seen that there is a big gap in the competitiveness of the textile industry in 29 provinces of China. The top five provinces, in turn, Shandong, Jiangsu, Zhejiang, Henan, Guangdong, especially the three provinces are Shandong, Jiangsu, Zhejiang Henan and Guangzhou. Though Shandong, Jiangsu, Zhejiang and other coastal areas still have highest scores, we can see that the central region, represented by Henan Province, is also developing rapidly and has a good development prospect. In contrast, Inner Mongolia, Yunnan, Guizhou and other places in the last few places are relatively backward in economic development. However, the performance of coastal cities is not good, which shows that although China's textile industry is still strong in the east and weak in the west, and the coastal industry is better than the mainland.

4. SUGGESTIONS

4.1 Accelerating the construction of environmental system

In recent years, China has issued a series of policies and standards, such as "green supply chain management guidelines for green manufacturing enterprises", "notice on developing green manufacturing system construction", "Green Manufacturing Engineering Implementation Guide (2016-2020)" and "industrial green development plan (2016-2020)". The establishment of these systems has played a good guide to the green development of textile industry. Therefore, the government should encourage and adhere to the relevant departments to continue to strengthen the mechanism and system construction, improve the clean

production system of the textile industry, improve the relevant standards, strengthen the management system of energy conservation emission reduction, strengthen the clean audit and performance evaluation and develop green textile products.

4.2 Innovating management methods

In order to accelerate the green development of the textile industry, the government needs to update the management model of the textile industry in a timely manner, strengthen the use of social and market means, form a collaborative management mechanism driven by the market, government supervision, and public participation, promote the green transformation and development of the textile industry, and attach importance to reducing the textile industry's backwardness Production capacity, and ban pollution emission companies with poor economic efficiency.

4.3 Choosing the suitable growth mode of industrial chain

At present, there is a serious homogenization trend in the textile industry. If all the textile enterprises in provinces pursue this kind of large and complete product types and organize production, their competitiveness will be weakened. Therefore, on the basis of static comparative advantage and regional production factor endowment structure, it is necessary to appropriately extend the textile industry chain, give pay to the leading role of leading enterprises and the social effect of brand. The pattern of "point to line, line to surface" has been formed.

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