

# *Research on the Development of Textile Industry in Shandong Province Based on Input-Output Model*

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**Abstract:** Based on the latest input-output table of Shandong Province in 2017, the quantitative research analysis of industrial association was conducted on the total output, direct and complete consumption coefficients, industrial ripple effects, cross-correlation analysis and industrial types of the textile industry in Shandong Province using the input-output analysis method, and the research results show that the focus should be on the three industries of chemical products, agriculture, forestry, animal husbandry and fishery products and textile, clothing, footwear, leather and down and their products. At the same time, the development of textile industry can promote and pull the development of these three industries, so as to promote the development of the overall economy of Shandong Province.

## 1. Introduction

Using the input-output analysis table of Shandong Province in 2017<sup>[1]</sup>, this paper examines and analyzes the correlation between the textile industry sector in Shandong Province and other industry sectors within the province. Firstly, two indicators, direct consumption coefficient and complete consumption coefficient, were used to measure the industrial correlation of textile industry in Shandong Province, and it was found that agriculture, wholesale and retail, textile, clothing, shoes, hats, leather and down and their products in Shandong Province have a greater impact on textiles, and the development of textile industry has a greater promotion effect on the development of the above industries. Secondly, the ripple effect of textile industry is measured by induction coefficient and influence coefficient, and it is found that textile industry is subject to higher degree of demand induction and production demand ripple. Finally, the two indicators of intermediate input rate and intermediate demand rate are then used to measure the industry type analysis of textiles, and it is concluded that the textile industry belongs to type II intermediate product type industry sector. According to the above input-output analysis of textile industry in Shandong Province, in order to provide more reference for the adjustment and optimization and upgrading of textile industry structure in Shandong Province.

## 2. Shandong Province textile industry input and output table

In this paper, the input-output flow of textile industry in Shandong Province in 2017 has been compiled, as shown in Table 1.

Table 1: Input-output flow of textile industry in Shandong Province, 2017 (RMB million).

Various industrial sectors	Textile output	Textile input	Various industrial sectors	Textile input	Textile output
Agriculture, forestry and fishery products and services	363	9170296	Other manufacturing products and scrap waste	57356	66111
Oil and gas extraction products	72	72090	Production and supply of electricity and heat	271	614318
Metal ore mining products	3299	0	Gas production and supply	16	0
Food and Tobacco	252634	98422	Architecture	1788	8449
Textiles	5737313 3	5737313 3	Wholesale and retail	13118	1460557
Textile, clothing, shoes, hats, leather, down and other products	1807575 9	9466243	Transportation, storage and postal	22247	584366

Due to layout issues, the table only shows data for some industries

## 3. Shandong Province Textile Industry Association with other industries

### 3.1 Direct consumption factor

The direct consumption coefficient refers to the direct consumption of the products of each sector in the production process of a unit product in a certain sector. The direct consumption coefficient of textile industry in Shandong Province, as shown in Table 2.

Table 2: Direct consumption coefficient of textile industry in Shandong Province, 2017.

Industry	Direct consumption factor	Ranking
Textiles	0.598427	1
Textile, clothing, shoes, hats, leather, down and other products	0.098737	2
Agriculture, forestry and fishery products and services	0.095650	3
Chemical products	0.046308	4
Wholesale and retail	0.015234	5
Finance	0.006828	6
Production and supply of electricity and heat	0.006408	7
Transportation, storage and postal	0.006095	8
Leasing and Business Services	0.004309	9
General Purpose Equipment	0.003023	10

The direct consumption coefficient higher than 0.01 belongs to the sectors with greater

consumption. As can be seen from Table 2, Shandong Province, the textile industry consumes a larger sector of five, the largest consumption of textile, clothing, footwear, hats, leather and down and their products. It is worth noting that these five sectors are involved in the first, second and third industries. It shows that the textile industry in Shandong Province and the first, second and third industry economic and technical links are close<sup>[2]</sup>.

### 3.2 Complete consumption factor

Complete consumption refers to the complete consumption generated by one sector to another sector by producing one unit of final product. The complete consumption coefficient of textile industry in Shandong Province in 2017 is shown in Table 3.

The value of the complete consumption coefficient of the textile industry indicates the degree of its dependence and pull on other industries. According to Table 3, it can be seen that the complete consumption coefficient of textile industry on chemical products, agriculture, forestry, animal husbandry and fishery products and services, textile, clothing, shoes, hats, leather, down and their products, wholesale and retail is relatively large, indicating that the textile industry is more dependent on the above four industries, while the development of this industry can drive the development of the above four industries<sup>[3]</sup>.

Table 3: Coefficient of complete consumption of textile industry in Shandong Province, 2017.

Industry	Complete consumption factor	Ranking
Textiles	1.840306	1
Chemical products	0.568443	2
Agriculture, forestry and fishery products and services	0.356022	4
Textile, clothing, shoes, hats, leather, down and other products	0.318018	5
Wholesale and retail	0.161173	6
Petroleum, coking products and processed nuclear fuel products	0.112242	7
Food and Tobacco	0.097691	8
Transportation, storage and postal	0.095822	9
Paper printing and stationery and sporting goods	0.064521	10

## 4. Shandong Province textile industry wave and effect analysis

In this paper, we use the coefficient of influence and the coefficient of induction to quantitatively analyze that the textile industry in Shandong Province is influenced by other industries to a higher extent and its changes have a greater impact on other industries in the province.

### 4.1 Inductance coefficient analysis

The inductivity coefficient indicates the degree of demand induction that the sector receives when each of the other industries adds one unit of final product. Table 4 shows the inductance coefficients for each industry. If Inductive stress factor more than 1, it means that for every unit of output increase in the national economic system, the degree of demand of the industry is higher than the social average. As can be seen from Table 4, the inductivity coefficient of textile industry is 1.79, ranking 5th in the province, which is higher than the social average inductivity degree,

indicating that the textile industry has a strong driving role in the development of the national economy of Shandong Province, but when there is rapid economic growth, various industrial sectors will also continue to grow and develop, and the demand pressure of the textile industry will increase in order to meet the needs of society. Therefore it also tends to become an important sector that restricts the development of the national economy.

Table 4: Induction coefficients of industries in Shandong Province, 2017.

Industry	Inductive stress factor	Ranking
Chemical products	4.607300	1
Metal Smelting and Rolling Products	2.411437	2
Wholesale and retail	2.064692	3
Petroleum, coking products and processed nuclear fuel products	1.999811	4
Textiles	1.797751	5
Transportation equipment	1.687339	6
Transportation, storage and postal	1.669511	7

## 4.2 Impact factor analysis

The impact coefficient indicates the degree of impact on the output of other industries when a sector increases the production of a unit of final product. The impact coefficient of the textile industry in 2017 is shown in Table 5.

Table 5: Descending order of influence coefficients in Shandong Province, 2017.

Industry	Impact factor	Ranking
Textiles	1.461158	1
Textile, clothing, shoes, hats, leather, down and other products	1.414094	2
Instrumentation	1.403002	3
Communication equipment, computers and other electronic equipment	1.397312	4
Specialized equipment	1.361561	5

If Impact factor more than 1, indicates that the growth of output of an industry has a higher degree of ripple effect on other sectors than the social average. From Table 3, we know that the influence coefficient of textile industry in Shandong province is 1.46, ranking the 1st among all industrial sectors in the province, indicating that textile industry is the pillar industry in Shandong province, and the development of this industrial sector will have a great radiating effect, which will not only promote the development of the whole Shandong economy, but also play an important role in the optimization and upgrading of industrial structure in Shandong province. In addition, the growth of output of textile industry has a higher pulling effect on other industries in Shandong Province than the social average, which has a strong driving effect on the national economy.

## 5. Shandong Province textile industry type analysis

According to the intermediate demand rate and intermediate input rate of the industry, the industry can be divided into four types, which are intermediate product-based industrial sector, intermediate product-based industrial sector, final demand-based basic industrial sector and final demand-based industrial sector<sup>[4]</sup>.

## 5.1 Intermediate demand rate analysis

The intermediate demand rate is the ratio of intermediate demand in each industrial sector to the final demand in that industry, and Table 6 shows the intermediate demand rate for the textile industry. As shown in Table 6, the intermediate demand rate of some industries in Shandong province is greater than 1. The reason is that the demand for these industries can only be met through imports and inflows from outside the province. Among them, the intermediate demand rate of textile industry is 0.89, excluding several industries with intermediate demand rate greater than 1, ranking 11 among all sectors, indicating that the products obtained from textile industry are more often used in the production of other industries, and the textile industry has the nature of raw material industry.

Table 6: Decreasing order of intermediate demand rate by sector in Shandong Province, 2017.

Industry	Intermediate demand rate	Ranking
Oil and gas extraction products	3.094762	1
Other manufacturing products and scrap waste	1.843178	2
Metal ore mining products	1.646925	3
Non-metallic and other ore mining products	1.037314	4
Metal Smelting and Rolling Products	1.026705	5
Metal products, machinery and equipment repair services	0.943365	6
Leasing and Business Services	0.926310	7
Petroleum, coking products and processed nuclear fuel products	0.914062	8
Gas production and supply	0.902783	9
Non-metallic mineral products	0.897418	10
Textiles	0.891067	11
Communication equipment, computers and other electronic equipment	0.887332	12

## 5.2 Intermediate input rate analysis

The intermediate input rate is the ratio of intermediate inputs to total inputs in the production of an industrial sector in one year, and Table 7 shows the intermediate input rate of the textile industry. From Table 7, we can see that the intermediate input rate of textile industry reaches 0.89, which ranks 1st among all sectors, indicating that textile industry in Shandong province is an industry with high intermediate input rate and low value added.

Table 7: Descending order of intermediate input rates by industry in Shandong Province, 2017.

Industry	Intermediate input rate	Ranking
Textiles	0.896215	1
Instrumentation	0.891891	2
Woodworking products and furniture	0.881611	3
Textile, clothing, shoes, hats, leather, down and other products	0.871444	4
Communication equipment, computers and other electronic equipment	0.869525	5

### 5.3 Determination of industrial structure

Based on the above calculation of the intermediate input rate and intermediate demand rate coefficients for the textile industry, it can be concluded that the textile industry is an industry with high input rate and high demand rate. According to the three-dimensional structure division of the industry (see Table 8), it can be seen that the textile industry is a type II intermediate product-based industrial sector with a strong drive to the upstream industry and a strong dependence on the downstream enterprises.

Table 8: Industry three-dimensional structure division.

Projects	Small intermediate demand rate	Large intermediate demand rate
Large intermediate input rate	Type III Final Demand Industry Sector	Type II intermediate product type industrial sector
Small intermediate input rate	Type IV Final Demand Basic Industry Sector	Type I intermediate product-based basic industry sector

### 6. Conclusion and Policy Recommendations

From the correlation analysis, we can find that we should focus on the development of chemical products, agriculture, forestry, animal husbandry and fishery products and textile, clothing, shoes, hats, leather and down products, while the development of textile industry can promote and pull the development of these three industries; from the industrial ripple effect analysis, we can conclude that the textile industry in Shandong Province has become an important industry that restricts the economic development. It should fully ensure the supply of upstream industries of textile industry to meet the development of textile industry; in addition, textile industry has a great radiation effect on other industries in Shandong province, it should increase the government support and give priority to the development of textile industry to stimulate the growth of total social demand, so as to drive the rapid development of other industries; in addition, textile industry in Shandong province belongs to type II intermediate product type industrial sector, which has a strong drive on The upstream industry is relatively strong, while the downstream industry is also more dependent on it. From the perspective of industry management, the technological investment in the textile industry should be strengthened so as to improve the added value of the textile industry.

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