Research on Undertaking Industrial Transfer from Eastern Region in Shaanxi Province

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Abstract

To undertake industrial transfer from the developed region is an important way to accelerate economic development for less-developed region. This article analyzes industries that have transfer trend in eastern five provinces and one municipality in China by calculating regional industry agglomeration indexes. The paper also analyzes competitive industries by calculating LQ in Shaanxi Province, and it identifies the industries which can be undertaken from the eastern region in Shaanxi Province.

Keywords: Industrial transfer, industrial undertaking, regional industry agglomeration indexes, industry choice, Shaanxi Province

1. Introduction

With the changing domestic and international economic situation, the Chinese eastern coastal region are encountering the crisis that the price of manufacturing factor rises, so that the business cost and resource constraints have become increasingly prominent in the area ,the eastern region have accelerated the pace that transfer industry to western region to realize industrial upgrading in recent years. To western region in China, it is an effective way to realize industrial upgrading and regional economic development by undertaking industrial transfer of the eastern coastal areas .As the important province in western region, it has the important theoretical and the practical significance to study on undertaking eastern industrial transfer for Shaanxi province.

Akamatsu Kaname (1962) analyzed industrial transfer from the perspective of industry development and put forward "wild-geese-flying pattern". Raymond Vernon (1966)analyzed industrial transfer from the perspective of product development and put forward " product life cycle theory". Kiyoshi Kojima(1978) put forward "the marginal industrial transfer theory", and thought that Japanese should transfer the marginal industry. Lewis,W.A(1978)analyzed the causes of industry transfer from the perspective of labor cost, and put forward "the theory of labor intensive industry transfer". Gereffi, G (1999) used a global commodity chains perspective to analyze the social and organizational dimensions of international trade networks, and found typical trajectories from assembly to OEM and OBM export roles. Teng Tangwei, Hu senlin(2016) analyzed the industrial transfer of two provinces and one city in the lower Yangtze and the undertaking industrial transfer of seven provinces and one city in the middle and upper reaches of Yangtze River Economic Belt, and found that most industries in Shanghai, Jiangsu, Zhejiang lack the competitiveness, and the trend of industrial transfer has become inevitable .

This paper analyzes industries that have transfer trend in eastern five provinces and one municipality in China by calculating regional industry agglomeration indexes, and analyzes competitive industries by calculating LQ in Shaanxi Province in China, and it identifies the industries which can be undertaken from the eastern region in Shaanxi Province.

2. The current situation of industrial transfer in eastern region in China

2.1Measurement of industrial transfer

Two index has been used in this paper, namely static industry agglomeration index and dynamic agglomeration index, which can be used to study the eastern industrial transfer status and help Shaanxi province select industries to undertake.

Static industry agglomeration index can be used to measure regional advantageous industries; Dynamic industry agglomeration index reflects the direction and speed of industrial transfer. Comprehensive study of static and dynamic industry agglomeration index, we can analyze industrial transfer and agglomeration trend within the country .Specific as follows:

1) Static industry agglomeration index(or named LQ)

The measure of regional static agglomeration is Hoover coefficient of localization(1936). It is based on the location quotient with respect to output, which is defined as:

$$LQ_{ij} = \frac{Output_{ij} / Output_j}{Output_i / Output}$$

Where $Output_{ij}$ is output of industry i in region j, $Output_j$ is total output in region j, $Output_i$ is total output of industry i, and $Output$ is total industrial output of China. Consider the regional difference in price levels, we use employment data instead of output data to calculate agglomeration index, which is defined as:

$$LQ_{ij} = \frac{E_{ij} / E_j}{E_i / E}$$

If LQ_{ij} is larger than one, then region j has a higher percentage of industry i than of total industrial employment. Given the location quotients of industry i for region j, we can measure the degree of regional specialization, and it can be used to reflect the structure of regional advantageous industries.

2) Dynamic industry agglomeration index

This article draws lessons from Zhang Chunfa (2006) in the measurement of industrial transfer index, which is defined as:

$$D_{ij(0-t)} = b_{ij(0-t)} \Big/ \sum_{j=1}^{n} b_{ij(0-t)}$$

$D_{ij(0-t)}$ is dynamic agglomeration index of industry i in region j in the period of time (0-t), which reflects industrial agglomeration rate in a certain period and a certain area, as well as industrial regional transferring direction and speed. $b_{ij(0-t)}$ reflects growth speed of production of industry i in region j in the period of time (0-t), $\sum_{j=1}^{n} b_{ij(0-t)}$ reflects the national average growth rate of industry i in the period of time (0-t).

When $\sum_{j=1}^{n} b_{ij(0-t)}$ >0, if $D_{ij(0-t)}$ >1, it shows that industry i rapidly agglomerates to region j in the period of time (0-t); If $D_{ij(0-t)}$ <0, it shows that industry i transfer to external region from region j in the period of time (0-t);If 0 < $D_{ij(0-t)}$ <1 ,it shows that while longitudinal production of industry i in region j has increased , but the growth rate is less than the national average growth rate in the period of time (0-t), the industry is also relatively transfer.

When $\sum_{j=1}^{n} b_{ij(0-t)}$ <0, if $D_{ij(0-t)}$ >0, $b_{ij(0-t)}$ <0, it shows that industry i transfer to external region from region j in the period of time (0-t); If $D_{ij(0-t)}$ <0, $b_{ij(0-t)}$ >0,it shows that industry i rapidly agglomerate to region j in the period of time (0-t).

2.2 Data sources

This paper uses data of eastern five provinces and one municipalities, which is Zhejiang, Fujian, Guangdong, Jiangsu, Shandong and Shanghai, we use data from China Statistical Yearbook and China Statistical Yearbook on Industrial Economy for 2015 to measure static industry agglomeration index, and uses data from China Statistical Yearbook and China Statistical Yearbook on Industrial Economy for 2010-2015 to measure dynamic industry agglomeration index.

We use the average growth rate of employment of five provinces and one city over the period of 2009--2014 to measure $b_{ij(0-t)}$, then use the national average growth rate of employment over the period of 2009–2014 to measure $\sum_{j=1}^{n} b_{ij(0-t)}$ .We use data of 28 manufacturing industries ,as shows below table for details.

2.3The result of calculation and data analysis

The result is shown in Table 1, we use selection criteria to reflect whether the eastern five provinces and one city have industrial transferring trend, which are as follows:(1) static industry agglomeration index is larger than 1, and dynamic industry agglomeration index is less than 1. This suggests that some industries have a large share and increase in the region, but the industrial growth rate is less than the national average speed, so the industry has shown the trend of transferring; (2) static industry agglomeration index is less than 1, and dynamic industry agglomeration index is less than 0.8. This suggests that the industry has not formed large-scale development, and the growth rate of industry is lower than national average growth rate, and hasn't formed industry agglomeration, so the industry still presents the trend of transferring.

Table 1: Industry agglomeration index of eastern five provinces and one municipality

Industry	Zhejiang		Fujian		Guangdong		Jiangsu		Shandong		Shanghai	
	static	dynamic	static	dynamic	static	dynamic	static	dynamic	static	dynamic	static	dynamic
Processing of food from agricultural	0.35	0.30	0.85	1.12	0.31	0.72	0.61	0.93	2.15	0.95	0.41	1.12
Manufacture of foods	0.43	0.63	1.47	1.85	0.72	1.42	0.37	0.76	1.65	1.28	1.17	0.50
Beverages manufacturing	0.43	1.21	1.12	2.36	0.68	1.75	0.49	0.06	0.94	0.19	0.35	-0.13
Tobacco industry	0.47	0.6	0.62	12.81	0.14	5.61	0.31	-2.51	0.44	-6.06	0.61	-6.74
Textile industry	3.33	2.82	0.72	4.43	0.57	5.62	1.65	1.66	1.67	2.05	0.56	-7.88
Textile clothing, shoes and hats manufacturing	1.92	0.57	3.14	1.73	1.82	1.05	1.42	1.32	0.84	0.86	1.51	-0.07
Leather, fur, feather (down) and its products	2.62	-0.54	0.85	3.42	2.19	1.47	0.47	1.07	0.6	-0.22	0.57	-1.45
Timber processing, bamboo cane, palm fiber and straw products	0.59	0.05	1.81	1.65	0.75	0.74	1.16	1.47	1.36	1.46	0.48	-0.01
Furniture manufacturing	1.73	1.42	1.78	0.82	2.43	0.86	0.43	0.8	0.89	1.55	1.55	0.37
Paper &Paper products	1.16	0.78	1.51	3.45	1.52	1.55	0.67	1.61	1.56	0.39	0.77	1.17
Printing and record medium reproduction	0.95	1.31	0.79	1.11	1.87	1.84	0.67	1.45	0.68	1.70	1.83	0.60
Cultural educational and sports goods	0.88.	0.63	1.23	2.30	3.24	1.35	1.04	1.30	0.74	0.36	1.31	-2.22
Petroleum processing, coking and nuclear fuel processing	0.78	-1.17	0.15	6.34	0.23	0.53	0.32	0.79	1.09	1.46	0.84	-0.71
Chemical materials and	0.63	0.83	0.45	1.83	0.54	1.59	1.10	1.29	1.48	1.53	0.84	0.37

chemical products industry												
Pharmaceutical manufacturing	0.81	0.87	0.33	0.52	0.31	1.19	0.76	1.60	1.06	1.20	1.04	0.27
Chemical fiber industry	4.11	-6.34	1.08	-16.2	0.37	-7.47	2.55	-9.67	0.54	20.66	0.41	16.4
Rubber products industry	1.76	0.47	1.70	1.61	0.94	1.03	1.05	2.06	1.82	1.27	1.31	-0.68
Plastic products industry	1.42	0.66	1.53	1.00	2.62	1.40	0.89	0.96	0.62	0.88	1.55	0.59
Nonmetal mineral products	0.42	0.22	1.50	3.15	0.54	1.20	0.62	1.45	1.31	1.01	0.49	-0.21
Ferrous metal smelting and rolling processing industry	0.35	2.82	0.40	5.23	0.25	2.96	0.78	2.35	0.71	1.85	0.38	-2.17
Nonferrous metal smelting and rolling processing industry	0.55	0.8	0.11	2.26	0.53	1.41	0.67	1.92	0.79	0.90	0.54	0.48
Metal products industry	1.08	0.58	0.61	1.56	1.72	1.20	1.29	1.30	0.72	0.56	1.81	0.55
General equipment manufacturing industry	1.36	0.68	0.46	2.50	0.45	1.36	1.42	1.12	1.41	1.44	1.85	0.67
Special equipment manufacturing industry	0.56	0.80	0.44	1.31	0.71	1.40	1.21	1.55	1.15	0.7	1.51	0.97
Transportation equipment manufacturing industry	2.44	7.66	0.10	-1.18	0.63	1.68	1.01	1.76	0.77	8.59	1.63	7.49
Manufacture of electrical machinery and equipment	1.28	1.09	0.71	0.66	2.12	0.88	1.22	1.56	0.66	0.79	1.46	0.61
Communications equipment, computers and other electronic equipment manufacturing	0.54	0.64	0.77	0.7	2.74	0.87	2.03	1.62	0.45	1.05	1.70	0.75
Instrumentation and culture, office machinery manufacturing	1.61	0.82	1.22	1.06	1.62	0.71	1.37	3.01	0.43	0.65	1.49	0.50

Source: According to China Statistical Yearbook and China Statistical Yearbook on Industrial Economy for 2010 -2015

Take Zhejiang Province as an example, static industry agglomeration index of Textile Clothing, Shoes and Hats Manufacturing is 1.92 in 2014,which shows Textile Clothing, Shoes and Hats Manufacturing has advantage in Zhejiang Province, but dynamic industry agglomeration index is 0.57 during the period of 2009-2014.

Which shows longitudinal production of the industry has increased, but the growth rate is less than the national average growth rate, the industry also relatively transfers. According to the above-mentioned standard and the data of table 1, the industries which have transfer trend in eastern five provinces and one city are shown in table 2. As a typical manufacturing industry base , the eastern region are suffering from increasing cost of production and facing with the industrial upgrading pressure, so enterprises must transfer labor-intensive industry in order to open up new markets and obtain favorable resources. Transferring trend of the labor -intensive industry in Shanghai and Zhejiang is obvious, especially Shanghai, dynamic industry agglomeration index of most industries is negative, because Shanghai developed the service industry greatly in recent years, manufacturing industry has shown significant declining trend; Not only labor-intensive industry have certain transfer trend, but also some communications equipment and other electronic equipment manufacturing industry have transfer trend in Fujian, Guangdong and Zhejiang. Transferring trend of the labor-intensive industry is also more obvious in Shandong. Transfer of the labor-intensive industry is influenced to a certain extent because of policy factors in Guangdong and Jiangsu, Guangdong carried out "double transfer policy" in 2008 to encourage the Pearl River Delta region to transfer industry inside Guangdong. Jiangsu Province has also taken similar measures, Jiangsu issued a special policy on building the North Jiangsu Development Zone with the power of both North and South of Jiangsu, encourage South of Jiangsu transfer its industry to North Jiangsu in 2006.

Table 2: Transferring industry in eastern five provinces and one municipality

Region	Transferring industry
Zhejiang	Food industry ; textile and clothing, shoes, hat manufacturing; agricultural and sideline products processing industry; tobacco products; leather, fur, feather (down) and its products; wood processing and wood, bamboo, cane, palm, grass products; paper and paper products industry; sporting goods manufacturing industry; petroleum processing, coking and nuclear fuel processing; rubber products; plastic products; non-metallic mineral products; metal products; equipment manufacturing industry; communications equipment, computer and other electronic equipment manufacturing industry; instrumentation and culture, office machinery manufacturing
Fujian	Pharmaceutical industry; furniture manufacturing ; manufacturing of transportation equipment; communications equipment, computer and other electronic equipment manufacturing industry; chemical fiber manufacturing; electrical machinery and equipment manufacturing industry
Guangdong	Communications equipment, Furniture manufacturing; computer and other electronic equipment manufacturing industry; instrumentation and culture, office machinery manufacturing; wood processing and wood, bamboo, cane, palm, grass products industry; petroleum processing, coking and nuclear fuel processing; chemical fiber manufacturing; electrical machinery and equipment manufacturing industry
Jiangsu	Chemical fiber manufacturing industry; agricultural and sideline products processing; food and beverage manufacturing industry; tobacco products; furniture manufacturing; petroleum processing, coking and nuclear fuel processing
Shandong	Agricultural and sideline products processing industry; beverage manufacturing; tobacco products; textile and clothing, shoes, hat manufacturing; leather, fur, feather (down) and its products; paper and paper products industry; sporting goods manufacturing; metal products; equipment manufacturing industry; manufacture of electrical machinery and equipment; instrumentation and culture, office machinery manufacturing

Shanghai	Food manufacturing; beverage manufacturing; tobacco products; textiles industry; textile and clothing, shoes, hat manufacturing; leather, fur, feather (down) and its products; wood processing and wood, bamboo, cane, palm, grass products; furniture manufacturing; printing and record medium reproduction; culture and education sporting goods manufacturing industry; petroleum processing, coking and nuclear fuel processing; chemical raw material and chemical products manufacturing industry; pharmaceutical industry; rubber products; plastic products; non-metallic mineral products; ferrous metal smelting and rolling processing; non-ferrous metal smelting and rolling processing; metal products; equipment manufacturing industry; special equipment manufacturing industry; manufacture of electrical machinery and equipment; communications equipment, computer and other electronic equipment manufacturing industry; instrumentation and culture, office machinery manufacturing

3. Advantageous industries in Shaanxi province

Shaanxi province plays an important role in western China. According to the characteristics of its industry, Shaanxi Province should seize the opportunity of the eastern industrial transfer and promote economic development rapidly. In order to analyze the current situation of industrial development in Shaanxi Province, this paper uses static industry agglomeration index (or named LQ) to measure advantageous industry of Shaanxi Province in 2014 , as shown in Table 3.

Table 3: Static industry agglomeration index of Shaanxi Province in 2014(LQ>1)

Industry	LQ
Petroleum processing, coking and nuclear fuel	3.9
Non-ferrous metal smelting and rolling processing industry	2.16
Tobacco industry	1.82
Beverage manufacturing	1.82
Processing of food from agricultural	1.81
Food manufacturing	1.80
Pharmaceutical manufacturing	1.28
Nonmetal mineral products	1.27
Transportation equipment manufacturing	1.05
Plastic products industry	1.04

Source: According to China National Statistical Yearbook for 2015, Statistical Yearbook of Shaanxi Province for 2015

According to the data from Table 3, in the 28 manufacturing industries, there are 10 industries that their LQ is larger than 1 in Shaanxi Province in 2014, they are Petroleum processing, coking and nuclear fuel, Non-ferrous metal smelting and rolling processing industry, Tobacco industry, Beverage manufacturing, Processing of food from agricultural, Food manufacturing, Pharmaceutical manufacturing, Nonmetal mineral Products, Transportation equipment manufacturing, Plastic products industry.

It shows that these industries have the advantage of scale economy in Shaanxi Province.It shows that the advantageous industry are mainly resource-based industry in Shaanxi, and these industries have made great

contribution to local economic development. According to the data from Shaanxi Provincial Bureau of Statistics in 2014, the share of output of Coal mining and washing industry was 11.6%, the share of output of Oil and gas exploration was 9.7%,the share of output of Petroleum processing, coking and nuclear fuel was 9.5%,the share of output of Non-ferrous metal smelting and rolling processing industry was 7%, Shaanxi's industrial structure is mainly concentrated in raw materials mining and primary processing which is in the upstream section of the industrial chain .

4. Industry choice of undertaking industrial transfer from the eastern region in Shaanxi Province

4.1 Principle of undertaking industrial transfer

Shaanxi Province not only cannot simply copy the industry of eastern region, but also cannot be generosity on undertaking industrial transfer from the eastern region. It is necessary to choose industries which fit local resource endowment and comparative advantage, make use of "endogenous development" model in order to drive the interactive relationship between industrial undertaking and industrial upgrading, focus on enhancing autogenous ability of economic development. It is important to accomplish the "Three combinations", which means industrial undertaking should combine with the development of industrial clusters, industrial undertaking should combine with industrial upgrading and industry undertaking should combine with sustainable development.

4.2 Important industries of undertaking in Shaanxi Province

Shaanxi Province should consider with its foundation and advantages of industry to choose the right industry to undertake. Making use of its advantage of abundant human resources and the low cost of business, Shaanxi can undertake labor-intensive projects to promote employment rate. Making use of resource advantage, Shaanxi should develop downstream products and improve utilization of resources into value-added products, so that Shaanxi can change their resource advantage into industrial advantage. Shaanxi can undertake high-technology industry actively relying on the advantage of science and education.

Shaanxi should pay more attention to the industries which have large scale of investment and high technology content to undertake. Specially, Shaanxi should make the manufacturing sectors with high level of technology, value-added content and R&D institutions transfer to the industrial base .Meanwhile, Shaanxi should develop industrial clusters on the cultivation of well-known brands and leading enterprises. Shaanxi should be focus on undertaking high-technology, equipment manufacturing, energy & chemical industry, modern services, deeply processing of special resources. To nurture and develop industrial clusters which are aircraft, automotive, power transmission, engineering machinery, machine tools, energy, chemical industry, a new generation of mobile communications, integrated circuits, software, pharmaceuticals and other industrial clusters.

5. Conclusion

Through calculating of static industry agglomeration index and dynamic aggregation index, this paper sums up the industries which has transferring trend in eastern five provinces and one municipality in China, the result shows transferring trend of the labor intensive industrial in these area is obvious, as well as it analyzes competitive industries in Shaanxi Province, which are mainly heavy resource-based industries. Shaanxi should make use of their own industrial foundation and comparative advantage to seek accurate industry to undertake .The whole process of service mechanism should be established for the industrial undertaking and the development of industrial clusters.

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