

Research on the choice of cooperative industries for Jiangsu manufacturing industry to expand production capacity

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Abstract: International production capacity cooperation is an important measure proposed by the state to maintain medium and high-speed economic growth and move towards the middle and high-end level. It is also an important content to promote China's new round of high-level opening-up and enhance international competitive advantage. As a big province of manufacturing industry development, Jiangsu Province is of great significance to expand production capacity cooperation. This paper first summarizes the current situation of international capacity cooperation in manufacturing industry in Jiangsu Province, and then analyzes the importance of expanding international production capacity cooperation in Jiangsu Province from both theoretical and practical perspectives. Then, it calculates the top ten advantageous industries in Jiangsu Province through the calculation of location entropy, and calculates the absolute and relative advantages of industries by principal component factor analysis, and combines the results of the two kinds of analysis. Finally, the paper summarizes the industries that Jiangsu Province should expand the cooperation of production capacity. At the same time, it analyzes the potential of these industries and puts forward relevant suggestions.

1. Background and development significance

1.1 Background of international capacity cooperation

Under the background of the accelerated adjustment of global industrial structure and China's economic development entering the new normal, promoting international production capacity and equipment manufacturing cooperation is an important measure proposed by the state to maintain medium and high-speed economic growth and move towards the middle and high-end level, and it is also an important content to promote China's new round of high-level opening-up and enhance international competitive advantage. China launched one belt, one road initiative in the world in September 2013, aimed at restarting the development of the "Silk Road" economic belt and putting forward the new plan and plan for the "maritime Silk Road twenty-first Century". In May 2015, one belt, one road, was launched by the State Council to guide the international cooperation in production and equipment manufacturing. The direction of the international capacity cooperation was also pointed out. The establishment of financial institutions such as Asia Investment Bank brought great opportunities for the common prosperity of enterprises in the world. Since the 19th National Congress of the Communist Party of China, China has continued to adhere to the basic state policy of reform and opening up and to open the door to carry out construction. One belt, one road initiative was also developed by provinces, municipalities and governments at all levels, which are more specific and feasible policies and measures in combination with their actual conditions. One belt, one road and another is that the institutions and experts and scholars at all levels have also studied the problems related to China's international capacity cooperation and launched some pioneering work to promote the concrete implementation and landing of the "one belt and one road" regional industrial interconnection and interoperability strategy.

1.2 Current situation of international capacity cooperation of manufacturing industry in Jiangsu Province

Jiangsu Province is a big manufacturing province in China. Its manufacturing base is strong and

its total output value is relatively high. At present, Jiangsu Province is in the stage of rapid growth in terms of international production capacity cooperation. Some large enterprises, such as XCMG, Xinneng machinery, Baoli international and Taibo machinery, have built a number of machinery manufacturing bases in Brazil, Germany, Russia, Nigeria and other countries. Enterprises like Qishuyan Locomotive have also built locomotive manufacturing and maintenance bases in Kenya, Iran and other countries, and implemented three key projects. Changzhou, Suzhou, Taizhou, Nanjing and other cities also made efforts to promote Trina Solar, Atlas, Zhongsheng radio and television, sumeda and other enterprises to implement 13 key projects, and build a number of power stations in India, Thailand, Venezuela, South Africa, Pakistan and other countries. In terms of petrochemicals, Dongfang Hengxin, Nanhua construction and SINOCEM engineering have implemented six key projects and built a number of production bases in Pakistan, Malaysia, Sri Lanka, Saudi Arabia and other countries. In terms of light and textile, Jinsheng industry, Yulun textile and olint have implemented three key projects, and built a number of textile production bases in Uzbekistan, Vietnam, Ethiopia and other countries. Building materials enterprises have also built a number of textile production bases in Uzbekistan, Vietnam, Ethiopia and other countries.

However, the production capacity cooperation of Jiangsu Province is still in the initial stage for Jiangsu Province's export trade. There are some advantageous industries that have not completely "gone out" and there are serious overcapacity problems. What industries in Jiangsu Province should go global still need further research.

In 2018, Jiangsu's foreign investment increased from US \$10.3 billion in 2015 to US \$16 billion, with an average annual growth of 15%. The provincial system and mechanism for promoting international production capacity cooperation were further improved, various supporting policies were implemented and effective, and the service guarantee ability was comprehensively improved. Efforts should be made to realize the transformation of foreign investment from scale expansion to efficiency improvement, the transformation of foreign contracted projects from traditional construction mode to overall solutions, and the transformation of foreign trade and economic cooperation from "large scale input and large output" to "excellent import and export". The economic and social benefits of international production capacity cooperation have been further improved, and the promotion role of the province's economic development and industrial transformation and upgrading has been significantly enhanced.

1.3 The significance of Jiangsu Province's manufacturing industry to expand international production capacity cooperation

After May 25, 2015, one belt, one road, was put forward by the State Council in May 25, 2015. The government of Jiangsu issued the Jiangsu provincial action plan to promote international capacity and equipment manufacturing cooperation. The government began to promote the development of the international production and equipment manufacturing cooperation projects in the province and the overseas base, relying on the development of the "one belt and one road" and the development of the Yangtze River economic belt. To promote the "going out" of Jiangsu's equipment, technology, brands, standards and services.

Jiangsu is a big manufacturing province, but also a small province of resources and energy, with narrow environmental capacity. Industrial development has long relied on the mode of "both ends of raw materials and main markets" for a long time. With the continuous changes of economic structure at home and abroad, the market competition is becoming more intense, and the development of traditional industries is facing severe challenges. The extensive development path based on high energy consumption, high material consumption and low price competition is difficult to continue. At the same time, Jiangsu has overcapacity in traditional manufacturing industries such as steel, cement, flat glass, shipbuilding, and other emerging industries such as photovoltaic and wind power equipment. Of course, these excess capacity is not backward capacity, but surplus capacity in advantageous industries, which can fully meet the needs of some developing countries to undertake industrial transfer. Therefore, it is an important breakthrough to promote Jiangsu's economic transformation and development, optimize and upgrade industrial structure,

dissolve surplus production capacity, and encourage enterprises to expand international production capacity cooperation. Through investment and cooperation with neighboring countries and emerging market countries, the advantageous industries in the province can transfer their production capacity by means of foreign trade, foreign investment and construction of overseas production bases. On the one hand, it can expand the international trade share of the related production links in the industry, and promote the development and extension of the industrial value chain of the advantageous industries in the province; on the other hand, it can also alleviate the increasingly tense capital in Jiangsu Province. Source pressure makes land and talents invest in industries with more value and potential, which helps to realize the transformation and upgrading of industrial structure.

2. Overview of related theories

2.1 Industrial transfer theory

International industrial transfer refers to the industrial transfer across different countries or regions. Generally, according to the principle of regional comparative advantage, part of the production, sales and even R & D links of an enterprise are transferred to another country or region by means of transnational investment or national trade, so as to realize the spatial transfer of industries, so as to promote a certain industry to give full play to its advantages, Extend the life of industry and promote economic development. The main representative model is the marginal industry transfer theory of Kojima. The theory of marginal industrial expansion was first put forward in the theory of foreign direct investment published by Japanese economist Kojima in 1977. He believes that a country's choice of foreign direct investment and other fields should be carried out one by one from the marginal industries that have been or will be in a comparative disadvantage, so as to give full play to the potential comparative advantages of the home country and extend the vitality of an industry, so as to bring about a win-win situation in industrial cooperation and trade between the two sides.

2.2 Product competitiveness theory

Industrial international competitiveness, in essence, is a comparative concept, which refers to the competitiveness of a certain industry in a country or region compared with other countries in terms of production efficiency, market share and profitability. The theory of industrial competitiveness was first proposed by Professor Michael Porter of Harvard Business School.

Porter thinks that the traditional comparative advantage theory and the scale economy theory have not been able to clarify the reasons for the advantages. Therefore, he put forward Porter's "Five Forces Model" and "diamond" model successively in the 1980s. The five forces model focuses on the competitiveness of existing competitors, the ability of potential competitors to enter, the ability of substitutes, and the suppliers' competitiveness Bargaining power and buyer's bargaining power explain the competitiveness of enterprises. The diamond model is put forward by Porter through the in-depth study on the competitiveness of many industries in many countries. He thinks that the competitiveness of an industry in a country is composed of four factors: production factors, domestic market demand, related or supporting industries, enterprise strategy, structure and horizontal competition, and two auxiliary factors, namely government behavior and opportunity. This has played a good theoretical guidance role for a country to participate in the international division of labor, transfer industry or undertake industrial transfer.

3. An empirical analysis of Jiangsu's advantageous industries

3.1 Location entropy

Location quotient, also known as specialization rate, refers to the ratio between the proportion of the output value of a specific sector in the total industrial output value of a region and the proportion of the output value of that sector in the total industrial output value of the whole country.

By calculating the location quotient of a specific industry in a certain region, we can find out the industries which have a certain dominant position in the whole country.

Location entropy LQI is used to measure the relative concentration of manufacturing industry I in Jiangsu Province. When $LQI > 1$, it shows that I industry is higher than the average level of Jiangsu Province and belongs to the advantage industry of Jiangsu Province. Q_i is the output value of I industry in Jiangsu Province, and Q is the total industrial output value of Jiangsu Province. Q_j is the output value of J industry in China, and Q is the total output value of national industry.

$$LQ_i = \frac{q_i/q}{Q_j/Q}$$

According to the formula, the table is as follows:

Table 1 location entropy of 30 industries in Jiangsu Province

Industry	Location entropy
Instrument manufacturing industry	2.84
Chemical fiber manufacturing	2.51
Electrical machinery and equipment manufacturing industry	1.64
Computer, communication and other electronic equipment manufacturing industry	1.44
Manufacturing of railway, ship, aerospace and other transportation equipment	1.41
Chemical raw materials and chemical products manufacturing industry	1.38
Textile and garment industry	1.37
textile industry	1.26
General equipment manufacturing industry	1.23
Metal products industry	1.13
Special equipment manufacturing industry	1.11
Wood processing and wood, bamboo, rattan, palm, grass products industry	1.10
Ferrous metal smelting and calendering industry	1.01
Pharmaceutical manufacturing industry	0.93
Culture and education, arts and crafts, sports and entertainment products manufacturing industry	0.84
Other manufacturing industries	0.80
Printing and recording media reproduction	0.75
Paper and paper products industry	0.75
Automobile manufacturing industry	0.68
Rubber and plastic products industry	0.63
Nonferrous metal smelting and calendering industry	0.57
Non metallic mineral products industry	0.56
Comprehensive utilization of waste resources	0.48
Agricultural and sideline food processing industry	0.47
Leather, fur, feather and its products and footwear industry	0.46
Wine, beverage and refined tea manufacturing	0.43
Petroleum processing, coking and nuclear fuel processing industries	0.40
Food manufacturing	0.30
Furniture manufacturing	0.29
Metal products, machinery and equipment repair industry	0.26

From the calculation results, the location quotient of 30 manufacturing industries in Jiangsu Province is more than 1, and the location quotient of industrial sales output value and employees are greater than 1 in 12 industries. There are five "significant advantage industries" with location quotient value greater than 1.4, including chemical fiber manufacturing industry, railway, shipbuilding, aerospace and other transportation equipment manufacturing industry, electrical

machinery and equipment manufacturing industry, computer, communication and other electronic equipment manufacturing industry, instrument and meter manufacturing industry, etc. as Jiangsu's significant advantage industries, they have high professional level, industrial chain and phase The supporting facilities are relatively complete. There are 7 "potential advantageous industries" with location quotient value between 1 and 1.4. These industries have a certain level of specialization, but their advantages are not very prominent.

3.2 Principal component factor analysis

Principal component analysis is a practical multivariate statistical analysis method, which can be used to. This section uses this method to evaluate the comprehensive competitiveness of 30 industries in Jiangsu Province. In Jiangsu Statistical Yearbook (2016), 11 basic evaluation indexes of total industrial output value, total current assets, total fixed assets, total assets, total liabilities, main business income, total profit, enterprise loss, asset liability ratio, cost profit rate, labor productivity of 30 industries are selected and expressed as $x_1, X_2 \dots X_{11}$. Among them, 8 indexes, such as total industrial output value, are positive indexes of benefit evaluation, while total liabilities, enterprise loss area and asset liability ratio are negative indexes of benefit evaluation. Negative indexes are transformed into positive indexes through mathematical treatment. Using SPSS calculation, the comprehensive score is as follows.

Table 2 comprehensive score of principal component method for 30 manufacturing industries in Jiangsu Province

Industry	Comprehensive score
Chemical raw materials and chemical products manufacturing industry	4.08
Computer, communication and other electronic equipment manufacturing industry	4.01
Electrical machinery and equipment manufacturing industry	3.99
General equipment manufacturing industry	1.87
Ferrous metal smelting and calendering industry	1.43
Automobile manufacturing industry	0.91
Special equipment manufacturing industry	0.66
textile industry	0.59
Metal products industry	0.45
Non metallic mineral products industry	0.11
Manufacturing of railway, ship, aerospace and other transportation equipment	-0.08
Pharmaceutical manufacturing industry	-0.1
Textile and garment industry	-0.12
Agricultural and sideline food processing industry	-0.21
Instrument manufacturing industry	-0.27
Nonferrous metal smelting and calendering industry	-0.49
Rubber and plastic products industry	-0.5
Chemical fiber manufacturing	-0.74
Wood processing and wood, bamboo, rattan, palm, grass products industry	-0.74
Petroleum processing, coking and nuclear fuel processing industries	-0.84
Wine, beverage and refined tea manufacturing	-0.87
Paper and paper products industry	-0.9
Culture and education, arts and crafts, sports and entertainment products manufacturing industry	-1.01
Food manufacturing	-1.24
Printing and recording media reproduction	-1.24
Leather, fur, feather and its products and footwear industry	-1.36
Furniture manufacturing	-1.58
Other manufacturing industries	-1.6

Comprehensive utilization of waste resources	-1.62
Metal products, machinery and equipment repair industry	-2.29

It can be seen from the calculation results in Table 2 that among the 30 manufacturing industries in Jiangsu Province, the scores of chemical raw materials and chemical products manufacturing industry, computer, communication and other electronic equipment manufacturing industry, and electrical machinery and equipment manufacturing industry are about 4, with significant advantages; General equipment manufacturing industry, ferrous metal smelting and calendaring industry have a score of more than 1, which has a comparative advantage; the negative number in the table indicates that the industry is below the average level of manufacturing industry in Jiangsu Province.

4. Suggestions on the development of advantageous industries

According to the analysis of the empirical results, the advantageous industries of Jiangsu Province are high-end equipment manufacturing industry, electrical machinery and equipment manufacturing industry, general equipment manufacturing industry, instrument manufacturing industry, railway, shipping, aerospace and other transportation equipment manufacturing industry.

4.1 High end equipment manufacturing industry

In 2015, the total output value of computer, communication and other electronic equipment manufacturing industry in Jiangsu Province reached 1839.031 billion yuan, accounting for about 20% of the national total. Among them, electronic devices, electronic components, microcomputers (including notebook computers), communication equipment and other fields accounted for a large share of the industry's sales output value. At present, the industry has the most potential for development. Excellent enterprises can be encouraged to expand international production capacity cooperation by means of merger and acquisition, investment and construction, and facility operation, establish R & D institutions overseas, build infrastructure such as operation information network and data center, and cooperate with communication and network manufacturing enterprises.

4.2 Electrical machinery and equipment manufacturing industry

Electrical machinery and equipment manufacturing industry. This industry is one of the pillar industries of Jiangsu's equipment manufacturing industry, and its total output value ranks the third in all industries of Jiangsu manufacturing industry, accounting for the proportion of the whole country. It can encourage powerful enterprises to "go out" as high as 23.1%. Jiangsu has advantages in light rods, optical fibers, optical cables, special optical cables, optical devices and voltage complete sets, which can solve the contradiction of long-term shortage of raw materials. The research and development and production of enclosed bus, DC switchgear, bridge bus, switch cabinet, transformer and other fields have certain advantages. For developing countries in the early stage of power construction, Jiangsu's products are very attractive. We can encourage advantageous enterprises to participate in major power project cooperation in various ways, expand the export scale of thermal power and hydropower equipment in Jiangsu, and actively carry out investment, construction and operation of overseas power grid projects.

4.3 General equipment manufacturing industry

At present, the general equipment manufacturing industry in Western Europe, the United States, Japan and other countries is relatively developed. The concentration of this industry in China is not high, and more than 90% of them are small and medium-sized enterprises. Compared with the developed countries such as Western Europe, the United States and Japan, there is still a certain gap in technical level. Jiangsu has certain advantages in the fields of refrigeration compressor, boiler and auxiliary equipment manufacturing, bearing, gear, transmission and driving parts, internal combustion engine and accessories manufacturing, crane and other material handling equipment manufacturing. On the one hand, qualified enterprises in Jiangsu can increase market development and expand exports in combination with the implementation of major overseas construction projects.

On the other hand, Jiangsu's equipment production capacity can be combined with the advanced technology of developed countries to meet the market demand of other developing countries with more cost-effective equipment and industrial production lines.

4.4 Instrument manufacturing industry

Instrument manufacturing industry. This industry is a modern high-tech industry, and the developed countries in the world regard the instrument as the priority industry. In recent years, Jiangsu has developed rapidly in the fields of environmental monitoring special instruments and meters manufacturing, electronic measuring instruments manufacturing, transportation equipment and production counting instruments manufacturing. However, in general, there are many small and medium-sized enterprises in the industry, and the concentration is not high. Compared with developed countries, there is a certain gap in technological level, precision and technical reliability. Jiangsu enterprises can cooperate with Germany, the United States and other enterprises with brand, technology and market advantages. By introducing excellent technologies, digesting and absorbing them, Jiangsu enterprises can promote the technological content of products and jointly develop the third-party market.

4.5 Manufacturing of railway, ship, aerospace and other transportation equipment

Railway, shipping, aerospace and other transportation equipment manufacturing industry. This industry is a basic manufacturing industry related to the national economy and people's livelihood, and the output value of Jiangsu's industry accounts for 20% of the country's total. Jiangsu's railway transportation and rail transit equipment industry has developed rapidly, making breakthroughs in several key technical fields such as vehicle and signal, reaching the level of fully independent production; Jiangsu's shipbuilding and offshore engineering equipment manufacturing is in the lead in China, with the current production capacity accounting for 1 / 10 of the world's and 1 / 3 of the country's, which has become an important advantageous industry in Jiangsu Province. Jiangsu should actively develop and implement overseas urban rail transit projects, accelerate the integration of rail transit equipment enterprises, so as to enhance the transnational operation ability and international competitiveness of leading enterprises. At the same time, we will cooperate with developed countries, vigorously explore the market of high-end ships and offshore engineering equipment, and improve the R & D and manufacturing capacity of high-end ship products.

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