Research on the Characteristics of Industrial Agglomeration in Manufacturing and Producer Services

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Abstract. The spatial agglomeration of industries not only promotes the development of the economy, but also accelerates the innovation of the industry. It is of great significance for rationalizing the economic layout, optimizing resource allocation, establishing a spatial innovation system, and forming regional competitive advantages. At present, China's manufacturing and productive service industries are showing different industries and regional agglomeration trends, the manufacturing industry agglomeration is more obvious, the agglomeration of producer services has the characteristics of non-equilibrium and urbanization agglomeration economic, gradually move towards collaborative gathering.

Theoretical Interpretation of Industrial Agglomeration

Industrial agglomeration is the concentration of industries in the same geographic space, the process of continuous collection of industrial elements in the spatial range, and a form of industrial organization.

Relevant Research at Home and Abroad

Research Status Abroad. In the 1920s, Weber A. Weber and A. Marshall began to pay attention to the problem of industrial agglomeration, which opened up a new research field, namely, space economics. In the 1930s, Hoover (1937) divided industrial agglomeration into a single industrial agglomeration and urbanization agglomeration. Technological progress, the increased mobility of labor and entrepreneurial talent led to a gradual decrease in regional specialization, and the expansion of urban The development of diversity has increased the degree of urbanization. In the 1970s and 1980s, the characteristics of the agglomeration economy became more and more obvious. “New Geographical Economics” represented by Krugram (1991, 1995) has made great contributions, and is considered to be the economic theory following the industrial organization theory, the new economic trade theory and the new growth theory.

In empirical terms, foreign researchers mostly use the developed countries such as the United States and the United Kingdom as their research objects. Amiti (2007) proposed that the factors that affect the localization of industries include traditional trade factors, new trade factors, and economic geographic factors, and that the market scale effect of the new trade theory and the market correlation of the new economic geography can promote the geographical concentration of industries. Haaland, Kind & Knarvik et al. (2012) believed that the localization of industrial demand representing market scale effect is economic the most important determinant of geography.

Research state in China. The domestic related research began in the 1990s, starting with the spatial agglomeration of the manufacturing industry. Some scholars have studied the spatial externalities of heterogeneous associations, especially producer services and manufacturing, from the perspective of market function (Yin Guangwei, Li Ji, 2010; Chen Jianjun, Yuan Kai, 2013) and the perspective of industry association (Chen Jianjun et al., 2016). Industry's collaborative
agglomeration, an empirical analysis of its collaborative agglomeration degree (Jiang Manqi, Xi Qiangmin, 2014). Some scholars (Su danni et al., 2018) believe that the industrial agglomeration with high technological content and high added value of our products has not yet reached the optimal level. Due to the huge regional economic differences, there is considerable room for adjustment in the industrial layout. At the provincial level, the spatial agglomeration of the manufacturing industry is characterized by a higher degree of agglomeration of capital and technology-intensive industries and a lower degree of agglomeration of resource-based industries (Luo Yinchen, Gu Renxu, 2014). The influencing factors for industrial agglomeration are mostly summarized as resource factors, transaction costs, external environment, industrial policies, etc. (Wu Qiaoyikang, Feng Xiao, 2020). Some studies have focused on the effects and impact of industrial agglomeration (Chen Changshi et al., 2019; Shen Qianling, 2018), and believe that industrial agglomeration contributes to high-quality economic development (Huang Qinghua, 2020).

**Realistic Evolution of Industrial Agglomeration**

The spatial agglomeration of industries not only promotes economic development, but also accelerates industrial innovation. As early as in the 1970s, Italy became noticeable due to the rapid development of its northern copper industry cluster and its international competitiveness. After the 1980s, with the deepening of economic globalization and the further development of innovative industries, the concentration of the Silicon Valley electronics industry in the United States once again made people shine. In the 2014 Global Financial Center Index (GFCI) ranking report, Singapore was the fourth largest international financial center. At the same time, Hong Kong has become one of the most important shipping and service centers in Asia.

Since the 1980s and 1990s, first of all, processing and manufacturing industries have been concentrated in the eastern coastal areas, represented by textile and apparel, electronic information, petrochemicals, steel and other industries. The industrial added value of the eastern region has maintained rapid growth. Since then, some manufacturing clusters have formed in the eastern coastal area, mainly including the three core economic zones of the Yangtze River Delta, the Pearl River Delta, and the Bohai Rim Economic Zone, which has concentrated 70% of the country's manufacturing capacity. Secondly, a number of distinctive industrial clusters have been formed nationwide, mainly in the traditional manufacturing industries of small commodities such as electronics, leather goods, furniture, clothing, toys, etc. in Jiangsu and Zhejiang, and a number of industrial clusters and creative industrial parks have emerged. The output value created by this part of the industry accounts for more than half of the total output value of Jiangsu and Zhejiang industries. At present, there are nearly 100 professional towns with a certain scale in the traditional industry in Guangdong Province. Suzhou's electronic information industry and Jinjiang shoe industry are all developing towards clustering, which is already influential throughout the country. At present, China's industry has mainly formed agglomeration scale in the eastern coastal areas, and the agglomeration degree and level in the central and western regions are relatively low.

The initial driving force for industrial agglomeration is regional comparative advantage, and the government plays an important role in promoting the formation of regional comparative advantage. The government can gradually accumulate external economic advantages by formulating fiscal and taxation policies that encourage innovation and preferential policies to attract agglomeration of production factors. Industrial clusters continue to grow in the process of integrating into the industrial value chain system, beyond regional boundaries, and actively expand outward, exchange information and resources, and achieve leapfrog development.

**Manufacturing Agglomeration Characteristics**

Industrial concentration is an inevitable result of industrialization. Especially for the competitive manufacturing industry, most of them have inherent requirements for pursuing economies of scale, and their agglomeration characteristics are more prominent than for the service industry.
Regional Agglomeration Feature

From the perspective of new economic geography, in order to save transportation costs, companies will tend to be located in areas with large market demand, and upstream and downstream companies will also follow up, and under the cumulative cycle of increasing returns to scale, agglomerated enterprises will become more. With more and more coming, the scale of agglomeration is getting bigger and bigger, so the place has gradually become a gathering center with obvious advantages. Factors leading to the agglomeration of manufacturing industry in the geographical space are: trade and foreign direct investment, distance to international markets, labor migration and flow, or other regional characteristics and industrial characteristics.

China's industrial development started late, but in recent years the pattern of manufacturing agglomeration has gradually formed. The economic agglomeration in the Pearl River Delta and the Yangtze River Delta and the agglomeration of innovative industries in Zhongguancun are typical examples. The textile industry in Jiangsu and Zhejiang, the electronics industry in Guangdong, and the tobacco manufacturing cluster in Yunnan each have their own characteristics. Industrial clustering has brought agglomeration economies and economies of scale to the local economic development, thereby promoting the development of the local economy.

From a national perspective, there are industrial differences and provincial differences in China's manufacturing agglomeration. In the western inland regions, manufacturing is mainly concentrated in provincial capital cities and a few central cities. According to the proportion of manufacturing employment, 32.6% of manufacturing employment in Gansu is concentrated in the provincial capital Lanzhou, and 53.7% in Qinghai manufacturing employment is concentrated in Xining. The concentration of provincial capital in the central region is slightly lower than that in the west, and the concentration of manufacturing in the eastern coastal areas has further decreased, and the distribution of manufacturing in the province is more scattered. However, in the Yangtze River Delta and Pearl River Delta regions, the manufacturing industry has shown a high degree of agglomeration.

In short, the eastern coastal provinces and regions have developed economies, diversified industries, and sound internal urban systems, so the distribution of manufacturing is relatively scattered; the economic development of the central and western regions is relatively backward, and employment opportunities are concentrated in a few cities, and the level of manufacturing agglomeration is relatively high.

Industry Agglomeration Characteristics

The spatial agglomeration of China's manufacturing industry also shows the characteristics of industry agglomeration. According to the national economic industry classification standard (GB/T4754-2011), the whole manufacturing industry is divided into one category and then gradually subdivides it into large, medium and small industries. In the category, there are 30 large categories, 169 medium categories and 482 small categories of industries.
Table 1. Industry concentration classification ranking.

| Industry                                                                 | CR₄  | Top4 provinces in industry concentration |
|--------------------------------------------------------------------------|------|------------------------------------------|
|                                                                          |      | 1                                           | 2                 | 3                  | 4               |
| Chemical Fiber Manufacturing                                             | 78.2 | Zhejiang 37.2                              | Jiangsu 31.4      | Fujian 5.5          | Guangdong 4.1   |
| Communication equipment, computer and other electronic equipment manufacturing | 74.5 | Guangdong 34.1                             | Jiangsu 20.9      | Shanghai 12.7       | Beijing 6.8    |
| Textile industry                                                         | 73.0 | Jiangsu 23.0                               | Zhejiang 22.4     | Shandong 19.7       | Guangdong 7.9   |
| Textile and apparel footwear manufacturing                               | 69.4 | Jiangsu 22.5                               | Guangdong 18.3    | Zhejiang 17.3       | Shandong 1.3    |
| Instrumentation and culture, office supplies machinery manufacturing     | 68.8 | Guangdong 31.0                             | Jiangsu 19.0      | Zhejiang 11.6       | Shanghai 7.3    |
| Electrical machinery and equipment manufacturing                         | 66.3 | Guangdong 26.0                             | Jiangsu 16.8      | Zhejiang 12.8       | Shandong 0.8    |
| Metal products industry                                                  | 63.7 | Guangdong 22.9                             | Jiangsu 17.5      | Zhejiang 12.7       | Shandong 0.6    |
| Paper and paper products industry                                        | 60.4 | Shandong 21.3                              | Guangdong 15.8    | Jiangsu 12.0        | Zhejiang 1.4    |
| General equipment manufacturing                                          | 58.2 | Jiangsu 18.0                               | Shandong 16.0     | Zhejiang 14.0       | Shanghai 0.3    |
| Chemical raw materials and chemical products manufacturing               | 53.6 | Jiangsu 19.3                               | Shandong 16.7     | Guangdong 9.6       | Zhejiang 8.0    |
| Non-metal products industry                                              | 49.6 | Shandong 18.0                              | Henan 11.7        | Guangdong 11.5      | Jiangsu 8.5    |
| Agricultural and sideline food processing industry                       | 48.9 | Shandong 22.6                              | Henan 9.2         | Jiangsu 6.6         | Guangdong 6.4   |
| Special equipment manufacturing                                          | 46.8 | Shandong 16.4                              | Jiangsu 13.5      | Guangdong 8.7       | Zhejiang 8.3    |
| Ferrous metal smelting and rolling processing industry                   | 46.3 | Hebei 15.6                                 | Jiangsu 15.3      | Shandong 8.4        | Liaoning 7.1    |
| Food processing industry                                                 | 45.5 | Shandong 19.4                              | Henan 10.0        | Guangdong 9.8       | Inner Mongolia 6.3 |
| Tobacco manufacturing                                                    | 43.2 | Yunnan 19.9                                | Hunan 9.4         | Shanghai 7.5        | Jiangsu 6.4    |
| Petroleum processing, coking and nuclear fuel Processing Industry        | 40.3 | Shandong 13.0                              | Liaoning 12.7     | Guangdong 9.1       | Shanxi 5.6     |
| Beverage manufacturing                                                   | 40.0 | Sichuan 12.3                               | Shandong 11.9     | Guangdong 8.5       | Henan 7.4      |
| Pharmaceutical manufacturing                                             | 39.7 | Shandong 13.7                              | Jiangsu 10.1      | Zhejiang 9.1        | Guangdong 6.8   |
| Non-ferrous metal smelting and rolling processing industry               | 37.6 | Jiangsu 10.6                               | Henan 9.6         | Shandong 8.9        | Guangdong 8.4   |
| Transportation Equipment Manufacturing                                   | 37.4 | Guangdong 10.8                             | Jiangsu 9.0       | Shandong 8.8        | Shanghai 8.7   |

Data Source: Calculation of “China Industrial Statistical Yearbook”

In terms of industries, the food processing industry, non-metallic products industry, beverage manufacturing industry, transportation equipment manufacturing industry, etc. are relatively scattered in various provinces; the pharmaceutical manufacturing industry is a key development industry in each province, and it is also an industry that is protected by the local government. Manufacturing relies more on raw materials with local characteristics, so it is scattered in various
provinces. Capital and technology-intensive industries, such as electronics and communications equipment manufacturing, electrical machinery manufacturing, and transportation equipment manufacturing, have significant clustering characteristics in inland provinces and regions, while they are more dispersed in eastern coastal provinces. This is because capital and technology-intensive industries generally have higher requirements for labor quality, as well as industrial supporting conditions and greater market demand. In the central and western regions, only large capital cities generally have such development conditions. In addition, the capital and resource-intensive industries such as tobacco products industry, petroleum processing and coking industry are heavily influenced by government policies, and local governments will protect them. The agglomeration level is low within the province, but within the province the level of agglomeration is high. The reason is that these industries have high requirements for economies of scale, so they tend to be distributed in areas with resources or location advantages.

**Agglomeration Characteristics of Producer Services**

The development of the service industry is one of the important signs of the degree of economic development, and is the inevitable result of the improvement of production technology and the evolution of the industrial structure. It is generally believed that the producer service industry is an industrial sector separated from the manufacturing industry and serving the manufacturing industry, mainly including logistics, finance and insurance, information services, scientific research and technology development, business services and other industries.

**Trends and Characteristics of Agglomeration of Producer Services**

The agglomeration and development of the productive service industry has benefited from the rapid development of the information technology represented by the Internet, and the great improvement in traffic conditions.

Compared with the manufacturing industry, the producer service industry has the characteristics of simultaneity of production and consumption, the intangibility of service products, and a high dependence on knowledge and information. Its industrial agglomeration presents different rules from the manufacturing industry. With the deepening of the division of labor, in order to reduce operating costs, enterprises outsource some of the non-productive service links to professional enterprises. These enterprises are more efficient, and these services require specialized knowledge, so the production service industry has become knowledge-intensive. Features of high degree. The concentration of productive service industries in a region can share innovations and obtain the required talents. Therefore, in order to reduce the cost of innovation and human capital investment, producer service companies are more willing to be located in regions with strong technological innovation capabilities and high education levels. On the other hand, the service objects of the producer service industry are mostly manufacturing, and the proximity of the service object layout can reduce transportation costs and make it easier to obtain demand information. Therefore, the producer service industry has the characteristics of synergy with the manufacturing industry. At the same time, some producer services such as finance and consulting at the high end of the value chain are capital and information-intensive industries with high added value of services. The service targets of these industries may be scattered throughout the country or even the world. The development of Internet technology has shortened the space-time distance, Also promoted the agglomeration of producer services.

Another major feature of the productive service industry is the bias towards urbanization. The tendency of productive service industries to gather in large urban areas, especially in central urban areas, is very obvious, forming distinctive city business cards and labels. Shanghai and Beijing have become national financial service centers, and coastal cities such as Dalian, Tianjin and Ningbo have developed into national modern logistics centers. Hangzhou has become a veritable ecommerce capital.
From the perspective of regional economic scope, industrial agglomeration is reflected in the difference between cities and rural areas, large cities and small cities, and their efficiency differences. Urban economics is the theoretical basis for the agglomeration of producer services, and the resulting spatial externalities are technical externalities.

**Agglomeration of Producer Services**

1. Modern logistics park. Logistics companies gather to provide services to customers in a certain geographical location. The scope of services includes not only traditional transportation and warehousing services, but also some modern logistics services such as information services and pledges. Transportation infrastructure and logistics information platforms are developed as logistics agglomeration areas.

2. Science and Technology Pioneer Park. The development of technological entrepreneurship clusters is conducive to enhancing technological innovation capabilities and providing technical support for the adjustment of the manufacturing structure.

3. Business service area. Mainly wholesale and retail enterprises, engaged in product distribution services, mainly located in areas with large population flow and convenient transportation areas, the ability to absorb employment is very strong.

4. Commercial circulation area. Rely on financial, securities, insurance and other productive services to provide convenient services for enterprises in the park.

Most of the agglomeration areas in China are government-led. This model is conducive to giving play to the coordination role of the government, increasing the investment in the agglomeration areas, and building a group of strong productive service industry agglomeration areas, thereby driving the service industry.

**Synergy of Industry**

At present, the manufacturing and production services industry is increasingly showing the trend of industrial integration and coordinated development. The upgrading of the manufacturing industry structure and the expansion of the value chain are inseparable from the effective support of the producer service industry. There is a strong synergy between the development of the producer service industry and the agglomeration of the manufacturing industry and the formation of the industrial cluster. Compared with developed countries, China's manufacturing industry is facing inadequate innovation and low added value. The main reason is the lack of innovation in the development of modern producer services. To give full play to the role of producer services in the construction of industrial clusters and the expansion of value chains is the due meaning of China's manufacturing industry in the future.

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