International Journal of Scientific Engineering and Science
Volume 7, Issue 1, pp. 53-56, 2023. ISSN (Online): 2456-7361

# The Impact of High-Tech Industrial Agglomeration on Economic Development

Yang Jialiang
Jiangsu University, Jingjiang College, Zhenjiang, China

***Abstract*—** *China's economy has shifted from high-speed growth to high-speed development, and is in the crisis of changing development mode to improve the driving force of economic environment change to drive growth. As an important area of China's economic development, the source of economic development and the gathering place of emerging industries, the Pearl River Delta has important reference value for the development of other urban agglomerations. Therefore, based on the Pearl River Delta, the added value of high-tech manufacturing industry in the Pearl River Delta will increase from 461.289 billion yuan in 2013 to 99086 billion yuan in 2020, 2.1 times that of 2013. Based on the analysis of high-tech industry, business focus and relevant theories of economic growth, this paper analyzes the impact of high-tech focus on the mode of economic growth. Second, based on the local economic development in the Pearl River Delta, select the economic distance matrix, and according to the empirical analysis results, establish a field-specific measurement model for the visualization analysis of high-tech industrial agglomeration to guide material agglomeration. In order to better understand the characteristics of high-tech industries in the Pearl River Delta urban agglomeration and the impact mechanism of economic development, and make policy recommendations for urban economic development. Finally, according to the current high-tech industry agglomeration in the Pearl River Delta, the paper puts forward suggestions from four aspects: promoting the development of industrial agglomeration, strengthening the division and cooperation of high-tech industries, implementing the differentiated and orderly talent attraction policy, and guiding the rational flow of government funds, and provides a perfect match for the overflow results of high-tech business integration.*

***Keywords*—** *High technology; Industrial agglomeration; economic development spatial spillover.*

## I. INTRODUCTION

The 14th Five Year Plan period is a particularly important stage for China to transform into an innovative country. In the economic environment where the international economic situation is complex and the COVID-19 has not yet ended, the importance of innovation on a country's development path is self-evident. At the initial stage of reform and opening up, China's modernization and urbanization construction mainly rely on the advantages of labor, which means that the development of the real economy largely depends on the impact of the problem. High-power industry, high investment and high pollution provide the impetus for the rapid development of the economy, but it has brought a series of follow-up problems such as environmental pollution. As the economy develops to a new stage, the factor cost continues to rise, The shortage of resources has also gradually emerged. In order to face various complex challenges at home and abroad, ensure the quality and efficiency of economic development, and successfully complete economic transformation, we must rely on the power of innovation. Academic circles have different opinions on the factors that affect innovation. Economists have found that industrial agglomeration can bring economies of scale and technology spillovers. The geographical agglomeration of enterprises is conducive to the agglomeration of labor. The gathering of labor talents accelerates the speed of knowledge diffusion. New ideas, new knowledge and new technology flow from places with high potential energy to places with low potential energy. The convenience of various information and facilities in the agglomeration area greatly facilitates the development of enterprises, At the same time, the information flow of enterprises in the cluster area is sufficient to reduce the transaction costs of enterprises, which reduces the production costs of enterprises and is conducive to the formation of economies of scale.

## II. RESEARCH STATUS AT HOME AND ABROAD

Most foreign scholars analyze the causes of industrial agglomeration from the perspective of industrial correlation, but should pay attention to the geographical proximity of industries. E. Bhaskaran (2012) used the SWOT method to analyze the phenomenon of auto parts industrial agglomeration in Chennai, and found that industrial agglomeration not only improves the technological production efficiency of the agglomeration community, but also has important significance for the improvement of the technological production efficiency of the entire auto parts industry. Junichi Nishimura (2011) used the data of 229 small enterprises in Japan to discuss the impact of industrial cluster policy on the efficiency of enterprise research and development, and believed that the establishment of a broad cooperation network outside the cluster is of great significance for the improvement of enterprise research and development efficiency. Jomphong Mongkhonvanit (2014) took the automobile industry in Thailand as the research object, studied the industrial agglomeration phenomenon of this industry, and found that the dynamic cooperation between academic institutions and the government and industry can effectively promote the growth of regional economy. Shouhua Wei (2015) discussed the path from economies of scale to industrial clusters in the Yangtze River Delta, and the impact of industrial clusters on economic efficiency in the process of transformation. The factors affecting industrial structure were studied through multiple regression models, and the results were more scientific and rigorous.

On the basis of foreign research, many domestic scholars have also made a lot of research, Chen Qiangyuan and Liang Qi

(2014) believed that industrial agglomeration is an inevitable part of economic development, and the characteristics of industrial agglomeration will change with different stages of economic development. The government should do a good job in the whole process of development, ensure that enterprise integration and economic growth promote each other, and maximize profits. Zhang Tinghai (2014) found that the formation of enterprises is related to urbanization. With the advancement of urbanization, rural factors have been transformed into non-agricultural factors, and industrial clusters have also been formed. Ren Taizeng (2015) found that enterprises in industrial agglomeration adapt to the external environment in the process of industrial agglomeration. Yan Han and Ge Wei (2017) believed that industrial integration refers to the process that the same industry is highly concentrated in a specific geographical area, and the industrial sectors of the industry are constantly converging at the job level. From a national perspective, this generally means that similar businesses are concentrated in one region.

Domestic scientists have studied the impact of density in China on the basis of foreign research. Zhang Fan (2016) studied the impact of the downturn in China's financial industry from 2001 to 2013, and found that the impact of financial business pressure on economically developed regions is more obvious, while low-income regions are weaker, but may gradually emerge. Wu Songfei and Fan Jinhua (2017) studied the impact of financial industry concentration on regional economic growth in Anhui Province from 1998 to 2015, and found that financial industry concentration has a positive impact on economic growth.

Liao Qiang (2019) studied the impact of China's online business focus space. During the research period from 2006 to 2016, the local econometric model found that the spatial dependence and heterogeneity of the provincial industrial lines were obvious, and the industrial center was the common "center edge" of the spatial structure. Liang Qi and Wang Ke (2019) selected the data of 1999, 2005 and 2009, and studied the effect of sintering effect and selection on industrial production efficiency using Epanechnikov kernel density estimation method. Among them, the agglomeration of high-tech industries is more important than that of traditional industries.

The research on high-tech agglomeration industry is relatively rich, mainly focusing on the scale and impact, pattern evolution and effect of high-tech agglomeration industry. Jiang Yao and Gao Changchun (2017) divided the five industries in the Yangtze River Delta into high-tech industries. They found that high level of human capital, high level of openness and enterprise production scale will have a positive impact on the agglomeration of high-tech industries. Qiu Shilei, Wang Zilong and others (2018) explored the impact of integrating innovation space into high-tech industries. Using the land scale model, we find that the innovation potential of high-end enterprises in our province has the effect of expanding space and the result of space integration, and this effect is obvious. Li Hongjin and Zeng Minjie (2019) studied the effects of the continuous development space of small enterprises in Guangdong Province from 2011 to 2015, and found that the development of small enterprises had faults, good liquidity and remarkable business integration results. Sponge results. Chen Kang and Zhan Xiaolei Xiaolei (2019) studied the impact of high-tech industrial agglomeration on its broader performance, and applied local entropy to measure the degree of industrial integration.

## III. VARIABLE SELECTION AND DATA SOURCE

### *3.1 Measurement method of high-tech industry agglomeration level*

According to the development data of high-tech industries obtained in this document, among many indicators to measure the degree of industrial agglomeration, the location entropy index and the spatial Gini coefficient are the best. The spatial Gini coefficient is mainly used to compare industries in different regions. The distribution balance does not really reflect the integration of industries. The spatial entropy index overcomes the defect of spatial Gini coefficient and ignores the scale factor of area. This measures the degree of agglomeration of high-tech industries from multiple geographical angles, and reflects the overall agglomeration characteristics of the world industrial space. Therefore, based on the data availability and research needs of this paper, the site entropy index is selected as the research and analysis method to measure the degree of high-tech industry integration in the Pearl River Delta.

### *3.2 Variable selection*

(1) Specific changes (Y). The real per capita GDP really reflects the level of economic growth of a country or region.
(2) Descriptive change (LQ). The main feature of this page is the list of top enterprises in the Pearl River Delta region.
(3) Manage changes. In addition to the key descriptive changes, there are also some factors affecting economic growth that need to be included in the equation system, such as regulatory changes.

TABLE 1. Descriptive statistical results of variables

| Variable | Average value | Standard deviation | Minimum value | Maximum |
|---|---|---|---|---|
| Real GDP per capita (Y) | 10.946 | 0.488 | 9.521 | 11.816 |
| Agglomeration level (LQ) | 1.161 | 1.332 | 0.144 | 5.349 |
| Labor input (L) | 5.786 | 0.644 | 4.551 | 6.849 |
| Fixed asset investment (K) | 0.377 | 0.141 | 0.165 | 0.710 |
| Technical innovation (R&D) | 0.019 | 0.024 | 0.001 | 0.248 |
| Economic openness (OPE) | 1.189 | 0.799 | 0.169 | 3.471 |
| Financial development level (F) | 2.631 | 0.889 | 1.446 | 5.226 |
| Government intervention (GOV) | 0.103 | 0.033 | 0.055 | 0.210 |
| Infrastructure construction level (T) | 2.239 | 0.871 | 0.266 | 3.561 |

### *3.3 Data source and processing*

The research object is 9 cities in the Pearl River Delta region. Considering the availability and comparability of data,

the time window of data is set as 2006-2017. The total trade volume of import and export commodities is converted from US dollars into RMB, and measured according to the average exchange rate of RMB published in the Yearbook of China's Trade and Foreign Economic Statistics. The natural logarithms of the data of the real GDP per capita (Y), labor input (L) and infrastructure construction level (T) are smoothed. The descriptive statistics of each variable are shown in Table 1. The standard deviation of each variable is small, and the dispersion of sample data is low.

## IV. EXPLORATORY SPATIAL DATA ANALYSIS

In the spatial regression analysis, how to express the geographic spatial interaction in the model, transform the spatial interaction into a real data structure, and define the mutual adjacency of spatial objects. At the same time, considering the differences between the economic distance matrix and economic development, there is a strong correlation between urban strata. The time attribute of the economic distance weighting matrix can better reflect the mechanism of economic growth and reflect the overall distribution of economic growth. Elastic space. Therefore, this paper selects the economic distance spatial weighting matrix determined by the actual gdp between regions to test the spatial correlation.

Using STATA15 software, the Moran economic growth rate index of 9 cities in the Pearl River Delta from 2008 to 2019 was calculated by selecting the economic distance of the matrix. See Table 2 for calculation results.

TABLE 2. Global spatial autocorrelation index of economic growth in the Pearl River Delta region from 2008 to 2019

| Year | Moran's I | Z | P |
|---|---|---|---|
| 2008 | -0.120 | -1.972 | 0.047 |
| 2009 | -0.126 | -1.965 | 0.048 |
| 2010 | -0.115 | -1.978 | 0.045 |
| 2011 | -0.115 | -1.977 | 0.045 |
| 2012 | -0.139 | -1.983 | 0.043 |
| 2013 | -0.174 | -2.185 | 0.037 |
| 2014 | -0.179 | -2.190 | 0.036 |
| 2015 | -0.189 | -2.214 | 0.032 |
| 2016 | -0.205 | -2.326 | 0.028 |
| 2017 | -0.202 | -2.301 | 0.029 |
| 2018 | -0.211 | -2.430 | 0.027 |
| 2019 | -0.250 | -2.589 | 0.018 |

There is no discrimination and isolation in the spatial distribution of the economic development level of the nine cities in the Pearl River Delta. The urban diversity, spatial "siphon effect" and "club" phenomenon are obvious in the development process. From the perspective of evolution, the economic growth of the Pearl River Delta region from 2008 to 2019 showed an improvement in spatial distribution.

The direct effect, indirect effect and total effect of workers' contribution to economic growth are all negative, and all have passed the 1% statistical test. The results show that the contribution of labor force not only has a negative impact on urban economic growth, but also has an impact on the economic growth of surrounding cities. This is not in line with expectations. It may be due to the industrialization and improvement of the Pearl River Delta region required by industrial transformation in recent years, the high density of capital and technology, and the excessive contribution of low productivity - labor quality, but it has played a role in preventing and suppressing the outside world to a certain extent, and hindered the economic development of surrounding cities.

TABLE 3. Spatial effect decomposition results of SDM model under double fixed effects

| Variable | Direct effect | Indirect effect | Total effect |
|---|---|---|---|
| LQ | 0.0004 | 0.0318* | 0.0322* |
| | (0.0081) | (0.0166) | (0.0163) |
| LL | -0.2908*** | -0.5656*** | -0.8564** |
| | (0.0526) | (0.1081) | (0.1183) |
| K | 0.1836** | 0.6344** | 0.8170*** |
| | (0.0771) | (0.1501) | (0.1606) |
| RD | 0.1564* | 0.2019 | 03583**. |
| | (0.0818) | (0.1745) | (0.1536) |
| OPE | 0.0527* | 0.0916* | 0.1832** |
| | (0.0273) | (0.0471) | (0.0745) |
| F | 0.1339*** | 0.1562** | 0.2901*** |
| | (0.0245) | (0.0614) | (0.0694) |
| GOV | -0.0894 | -1.2567 | -1.3461 |
| | (0.3991) | (1.0423) | (0.9988) |
| LT | 0.0269* | 0.3704** | 03973*** |
| | (0.0139) | (0.1215) | (0.1108) |

The direct and indirect effects of technology introduction on economic growth are both positive and negative statistical tests, and the indirect effects are positive but not significant. This shows that increasing R&D expenditure may stimulate urban economic growth and also have a positive impact on surrounding cities, but not necessarily. R&D costs have a significant impact on regional scientific and technological potential and technological innovation, and are the key to improving regional scientific and technological entrepreneurship. Only by continuously improving the ability of scientific and technological innovation can enterprises gain competitive advantages in market competition and promote sustainable economic development.

## REFERENCES

[1] Weiliang Chen, Xinjian Huang, Yanhong Liu, Xin Luan, Yan Song. The Impact ofHigh-Tech Industry Agglomeration on Green Economy Efficiency—Evidence from theYangtze River Economic Belt[J]. Sustainability, 2019, 11(19).

[2] DeSilva, D. G. , McComb, R. P. Geographic Concentration and High Tech FirmSurvival[J]. Regional Science and Urban Economics, 2012, 42(4) : 691-701.

[3] Drncker, J. , Feser, E. Regional Industrial Structure and Agglomeration Economies:An Analysis of Productivity in Three Manufacturing Industries[J] . RegionalScience and Urban Economics, 2015, 42(1) : 1-14.

[4] Takahashi, T. Agglomeration in a City with Choosy Consumers under ImperfectInformation[J] . Journal of Urban Economics, 2013, 76(1) : 28-42.

[5] Xie Huiqiang, Feng Haiyan, Ma Yu Research on the impact of high-tech industrial agglomeration and technological innovation on high-quality economic development from the perspective of spatial effect [J] Exploration of Economic Issues, 2021 (04): 123-132

[6] Yao Yuxi Research on the impact of high-tech industrial agglomeration on regional total factor productivity [J] Technology and Management, 2021,23 (03): 34-40

[7] Wu Jianjun, Gao Yanfei Research on the impact of airport economy on high-tech industrial agglomeration -- an empirical analysis based on China's provincial panel data [J] Journal of Central South Forestry University (Social Science Edition), 2021,15 (04): 25-33

[8] Huang Baofeng, Wu Hantao, Cao Zengdong, Mao Ting The nonlinear effect of high-tech industrial agglomeration on economic growth: empirical study based on threshold regression [J] Management modernization, 2019, 39 (03): 30-34
[9] Wu Mengzhu, Wang Jiawen Research on the impact mechanism of high-tech industrial agglomeration on regional income gap in China [J] Journal of Wuhan University of Technology (Social Science Edition), 2019, 32 (04): 106-114
[10] Shi Xiaoli, Li Yanting Research on the impact of high-tech industrial agglomeration on regional technological innovation capacity -- based on the investigation of the Yangtze River Economic Belt [J] Journal of Chongqing University of Technology (Social Sciences), 2019, 33 (07): 46-54
[11] Wu Zongjie, Liu Shuai, Dong Huizhong, Liu Mingrui The spatial spillover effect of high-tech industrial agglomeration on the quality of regional economic growth [J] Statistics and Decision, 2019, 35 (21): 126-130
[12] Wang Zilong, Tan Qingmei, Xu Xiaodi Measurement method and empirical study of high-tech industry agglomeration level [J] Scientific Research, 2006 (05): 706-714
[13] You Ruiling Research trends of high-tech industrial agglomeration [J] Technical Economy and Management Research, 2018 (01): 107-112
[14] Ma Yu, Qiu Wanhua, Wang Xinyu Research on the effect of high-tech industrial agglomeration and technological innovation on high-quality economic development -- based on panel smooth transformation regression model [J] Industrial Technology and Economy, 2020,39 (02): 13-20
[15] Feng Weiyi, Yang Shuo Measurement and comparative study of high-tech industry agglomeration degree -- empirical analysis based on China's data from 2007 to 2017 [J] Industrial Technology and Economy, 2020,39 (06): 154-160
[16] Hu Yiting, Gao Yaqi The impact of high-tech industrial agglomeration on regional technology absorption -- from the perspective of human capital and institutional environment [J] Industrial Technology and Economy, 2020,39 (09): 153-160
[17] Jing Xiangyuan, Tan Qingmei The endogenous power of high-tech industry "agglomeration" -- take Jiangsu as an example [J] Science and Technology and Economy, 2011, 24 (04): 28-32
[18] Fu Yunpeng, Gao Jian Research on the impact of high-tech industrial agglomeration on regional economic development [J] City, 2021 (12): 57-69
[19] Zhao Yulin, Wei Fang Research on China's high-tech industry agglomeration based on entropy index and industry concentration [J] Science of Science and Management of Science and Technology, 2008 (11): 122-126+180
[20] Qin Qin Analysis of regional agglomeration effect of high-tech industries [J] Journal of Hubei Radio and Television University, 2004 (05): 94-96

*About the author: *Yang Jialiang (1994 -), male, master's degree, main research interests are energy economy and industrial policy.*